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Power Focus 6000 (3.4)

Introduction

In this section, you can find the basic information about the product and also the formatting conventions used in the topics.

General Description

The Power Focus 6000 from Atlas Copco takes productivity, ergonomics, quality and connectivity to entirely new levels. And all this while minimizing environmental impact. The Power Focus 6000 connects a wide range of Atlas Copco assembly tools, giving you a single assembly platform in your station. With Virtual Stations each tool gets its own virtual controller that is easily addressed from overlying systems. The perfect option for your smart connected assembly operation.

Features

- Connects a wide range of tool types
- Virtual Stations – connect up to 6 tools to one controller
- Web HMI – easy remote connection
- Results, process information and programming on 7” touch screen
- Dedicated factory network port, fieldbus slot, DIO and Open Protocol
- IAM module that carries all controller software
- On demand functionality via the Functionality Management System
- Connectors protected behind lockable front door

Benefits

- Increased flexibility in rebalancing assembly lines including integration of new tools
- Streamlined communication to overlying interfaces
- Easy installation with fewer cables, hardware components and network drops
- State of the art connectivity through both WiFi and Bluetooth
- Reduced inventory costs

Conventions

To enhance user understanding, certain formatting conventions are used throughout this document. The formatting conventions used are listed below.

User Guide Conventions

Element	Notation	Description	Output

Element	Notation	Description	Output
General emphasis	In the **Program** workspace.	To make certain text elements stand out, or to highlight.	Text in **Bold**
Graphical User Interface (GUI) items	Select the **Function** button.	Any reference to items found on screen in the GUI (for example, command buttons, icon names and field names).	Text in **Bold**
Graphical User Interface (GUI) Path >	Generally, on the top of the GUI.	Navigation aid which keeps track of the location in the GUI.	For example: Controller > Program > Edit
User input	Enter a **Description** for the program.	Any text input by the user.	Text in **Bold**
File names	Enter a ***File Name*** for the export.	Files either exported from, or imported into the system.	Text in ***Bold Italic***
Variable and parameter names	Enter a *Name* for the export.	Variable and parameter names (not values).	Text in *Italic*
Variable and parameter values	Enter a **VALUE** for the export.	Variable and parameter values.	Text in **BOLD CAPS**
System output	**`Client.Domain.Models.ExportImportConfiguration`**	Any text output by the system.	Text in **`Monospace`**

Element	Notation	Description	Output
External links		Links to external sites that have information connected to the document or subject content. These could include: • Technical Product Data • Dimensional Drawings • Accessories • Product Specific Information	Selectable text to external sites
Internal documentation links		• **Relevant Information** - links to information which is directly related to the current topic and needs to be considered for certain configurations that are made. • **In this Section** - links to all the topics within the section, which can be useful when understanding a feature, or configuration. If available, these links will be presented below the text.	Selectable text to internal content

General Data Protection Regulation (GDPR)

This product offers the possibility to process personal identifiable information such as system user name, role and IP-address. The purpose of this processing capability could be to enhance quality control through traceability and proper access management.

If you decide to process personal data you need to be aware of and comply with relevant personal data protection rules, including, in the EU the GDPR as well as other applicable laws, directives and regulations. Atlas Copco can in no way be held liable for any use made by you of the product.

Liabilities and Warnings

Liability

Many events in the operating environment may affect the tightening process and shall require a validation of results. In compliance with applicable standards and/or regulations, we hereby require you to check the installed torque and rotational direction after any event that can influence the tightening result. Examples of such events include but are not limited to:

- initial installation of the tooling system
- change of part batch, bolt, screw batch, tool, software, configuration or environment
- change of air- or electrical connections
- change in line ergonomics, process, quality procedures or practices
- changing of operator
- any other change that influences the result of the tightening process

The check should:

- Ensure that the joint conditions have not changed due to events of influence.
- Be done after initial installation, maintenance or repair of the equipment.
- Occur at least once per shift or at another suitable frequency.

Warnings

NOTICE

Changing parameters may lead to a decrease in tool performance and may also slow down the production.

⚠ **WARNING**

Risk of Property Damage or Severe Injury

Ensure that you read, understand and follow all instructions before operating the tool. Failure to follow all the instructions may result in electric shock, fire, property damage and/or severe bodily injury.

- Read all Safety Information delivered together with the different parts of the system.

- Read all Product Instructions for installation, operation and maintenance of the different parts of the system.
- Read all locally legislated safety regulations regarding the system and parts thereof.
- Save all Safety Information and instructions for future reference.

About the User Guide

The User Guide describes how to set up and configure the POWER FOCUS 6000.

It is intended for anyone operating or servicing the POWER FOCUS 6000.

In the Search window on the top menu bar, search for **Product Essentials Tutorials** for checking the available video tutorials.

Each Product Essentials Tutorial will provide an overview of how to do a specific task with an Atlas Copco product. These tutorials are designed so that users can watch and follow along with their own equipment. The Product Essentials Tutorials are available online to ensure they are always available to users on-demand, and provide baseline knowledge needed to work with Atlas Copco products.

Revision History

Reference Minimum Software version	Description
3.4.1	Added or updated paragraphs: • Updated "Configuration > Working with Controller Tab > Software" paragraph • Updated "Working with Controller Tab > Export/Import" paragraph • Added "Configuration > Working with Controller Tab > Export/Import > Exporting "All Controller Information"" paragraph • Added "Configuration > Working with Controller Tab > Export/Import > Exporting "Settings and Configurations"" paragraph • Added "Configuration > Working with Controller Tab > Export/Import > Exporting "Logs from Connected Tools"" paragraph • Added "Configuration > Working with Controller Tab > Export/Import > Exporting "Results"" paragraph • Added "Configuration > Working with Controller Tab > Export/Import > Importing Controller Configurations and Settings" paragraph • Added "Configuration > Working with Controller Tab > Export/Import > Automated Backup" paragraph • Added "Introduction > Supported Tools" paragraph • Updated "Configuration > Working with Tightening Tab > Multistep Programs > Tightening Steps" paragraph • Updated "Configuration > Working with Tool Tab > Tool Motor Tuning" paragraph • Added "Configuration > Working with Tool Tab > Open End Tuning" paragraph • Updated "Configuration > Working with Tightening Tab > Multistep Programs > Settings for a Multistep Program" paragraph • Added "Configuration > Working with Tightening Tab > Multistep Programs > Tightening Steps > Trace Setting" paragraph • Added "Configuration > Working with Setting Tab > Configuration of the Network > Setting up the Firewall" paragraph • Updated "Configuration > Working with Configurations Tab > General Virtual Station" paragraph • Updated "Configuration > Working with Configurations Tab > Tool Configuration > Configuration of the Direction Switch" paragraph • Updated "Reports and Statistics > Working with the Reports Tab > Events > Event Codes" paragraph • Updated "Reports and Statistics > Working with the Reports Tab > Results > Stored Results" paragraph

Reference Minimum Software version	Description
3.3.X	Added or updated paragraphs: • Updated "TrueAngle Compensation" paragraph • Updated "STwrench" paragraph • Updated "Configuration of the PIN Settings" paragraph • Added "External Result > Running the External Result Tightening Strategy with a Tool Connected" paragraph • Added "External Result > Running the External Result Tightening Strategy without a Tool Connected" paragraph • Updated "Tool Configuration" paragraph • Updated "TAG Check" paragraph • Updated "TAG Selection" paragraph • Added "Input Signals" paragraph • Added "Output Signals" paragraph • Added "Input/Output Signals" paragraph • Updated "Multistep Program > Tightening Steps" paragraph • Updated "Multistep Program > Step Monitors" paragraph • Updated "Multistep Program >Step Restrictions" paragraph • Added "Result Reporters" paragraph • Updated "Settings for a Multistep Program" paragraph • Added "Result View - Result Reporter" paragraph • Updated "Emergency Stop" paragraph
3.1.X	Added or updated sections: • Updated Fieldbus Configuration settings • Updated General Virtual Station - Unlock tool on loosening • Updated Event Codes
3.1	Added or updated sections: • Updated license management • Copying pasting of tightening programs • Updated signal • Updated third party licenses
3.0	Added or updated sections: • License (FMS) chapter • StepSync chapter • Updated Multistep • Apply and Undo button for Tightening and Source Tightening

Reference Minimum Software version	Description
2.8	Added or updated sections: • Calibration using STa6000 or STpad • Configurable job counter • Decrement on OK • Scanner pass-through
2.7	Added or updated sections: • Updated multistep steps • Source Batch (barcode scanning) • Updated Event Codes for SRB and TBP tools
2.6	Added or updated sections • Multistep tightening strategy (Editor) • WLAN and Bluetooth for wireless tools
2.5	Added or updated sections: • Multistep tightening strategy • Selector confirm • Saved positions • General virtual station • Wifi socket selector • Multiple PINs • External OK • Service alarms for pulse tools • Manual mode virtual station

Reference Minimum Software version	Description
2.4	Added or updated sections: • Settings: License manager • Settings: PIN code • Settings: Configure start screen • Tightening: Disable tightening, Measure angle to, Trigger lost, Torque tuning factor • Tool health and battery check • Controller health and battery check • Pulse strategies • 3-step tightening • Device: Accessory bus • Device: Led ring • Device: EHMI • Device: Fieldbus diagnostics • Export/Import
2.3	Added or updated sections: • System settings: network configuration • System settings: preferences • System settings: protocol configuration • System settings: tightening • Tightening: Time monitoring and Torque tuning factor • ST Wrench • Sources • Accessory configuration: tool configuration, start condition, and socket selector configuration • System administration: Export/Import • Tool configuration; ST Wrench • Appendix A: Front connections
2.1	Added or updated sections: • Settings: Fieldbus • Controller menu - Tightening: Current monitoring and True angle compensation • Four step tightening • System administration: Exported csv file format • Virtual station: I/O diagnostics and Fieldbus • Appendix A: Emergency stop

Reference Minimum Software version	Description
2.0	Added or updated sections: • Settings: Tool alarms • Tool configuration: Tool connection, Tool maintenance, Internal Wlan for wireless tools • Tightening setup: Loosening step • Tightening results: Live results, Stored results, Status for NOK results • Virtual station • Event codes in Power Focus 6000
1.6	First official release of the configuration guide for Power Focus 6000.

Prerequisites

Anyone interested in learning more about POWER FOCUS 6000 can benefit from reading this User Guide.

For a complete understanding of the technical aspects described in the User Guide, we recommend the following:

- Knowledge about tightening techniques
- Experience of working with the previous versions of Power Focus

System Overview

Software Structure

Menu Overview

The controller has several menus available to configure tightening and hardware accessories, perform tool maintenance, administer software, and view reports.

Tightening Tab



The **Tightening** tab lists the Tightening programs stored on the controller that are available for an individual tightening.
Tightening configurations are described in the **Tightening** tab.

Batch Sequence Tab



The **Batch Sequence** tab lists the batch sequences stored in the controller.

A Batch Sequence is one or more repetitive tightening programs in various combinations. Batch sequences are created and configured in the **Batch sequence** tab.

Sources Tab



The **Sources** tab lists the available options for controlling the selection of a tightening program (for example, a tightening program or a batch sequence, via digital input from different hardware). Scanner configurations are done in the **Sources** tab.

Tool Tab



The **Tool** tab provides information about the tools connected to the controller.
This menu is also for wireless tools connected to the controller.
Tool reference product, and when the tool was serviced and calibrated are some of the data available in the **Tool** tab.

Virtual Station Tab



The **Virtual station** tab configures the Virtual Stations.

The Virtual Station is a software abstraction of a controller system.
In the **Virtual station** tab the different resources, accessories, tools and tasks are assigned to a Virtual Station.

Controller Tab



The **Controller** tab lists hardware and software components.

The software versions stored and used in the controller are listed and can be updated.
The license manager for additional features is handled. It is also possible to import or export settings to and from the controller.

Configurations Tab



A list of accessory configurations are given in the **Configurations** tab.

Accessories like tool accessories, I/O Expander, Internal I/O, Stacklight, Operator Panel, and Socket selectors can be configured.
Digital I/O signals are mapped to buttons, lamps, switches and connectors.

Reports Tab



In the **Reports** tab the tightening results and events are listed.

Settings Tab



The **Settings** tab is used to set up the controller specific settings such as language, pin code, wireless network, fieldbus.

License Assignment Tab



The **License Assignment** tab is used to assign licenses and license features to Virtual Stations.

Help Tab



The **Help** tab contains useful help sections about the controller.
It is possible to download PDF-files in several languages through a computer connected to the controller.

Quick Start Guide

To create a better overview of the system, this instruction lightly goes through the different steps required to get started using the system.

This section does not cover every feature of the system, but instead focuses on the most basic features.

1. Decide on what kind of tool to use. The kind of tool being used affect the availability of tightening strategies.
2. The main purpose of the tool is to perform a tightening. This is done by defining a **tightening program** which contains all relevant parameters of a tightening, for example target angle and target torque.

3. One or several tightening programs can be added to a **Batch Sequence** which works as a series of tightening programs. A batch sequence can for example be a certain number of tightenings with a tightening program, or a sequence of different tightening programs.

4. Create a **Virtual Station** and assign a tool to it. The virtual station acts as an interface between the controller and the tool, allowing for several tools to be connected to a single physical controller. A virtual station is required even if only one tool is connected to the controller.

5. Assign a task to the Virtual Station. The task can be either a tightening program, a batch sequence, or a specified digital input (from for example a barcode scanner). The tool assigned to the station will now be able to perform the task.

Hardware Structure

Operating and Handling

The POWER FOCUS 6000 is set up and configured by using the controller front panel. It is also possible to access the controller interface through a web GUI by browsing to the controller's IP address on a connected PC.

Front Panel

The front panel contains a touch-screen display and special buttons.



1	Display_A color display with touch screen showing configuration views and results.
2	Special buttons_Special function buttons

Front Panel Buttons

These buttons are available as clickable icons in the web GUI.

Button	Name	Description
	**Home**	Go to the Home screen.
	**Result**	Go to the live result view.

Touch Screen Buttons

Button	Name	Description
	**Add**	Adds an additional item.
	**Back**	Return to previous view.
 	**Scroll up / Scroll down**	Move in a list that is too long for the screen.
 	**Maximize / Minimize**	Maximize or minimize a section with parameters.
	**Back (in a list)**	Back (and forward) between pages of a list.
	**Close**	Tap to close the window.
	**Notice**	Sign showing that a parameter is configured wrong.
	**Home**	Go to the Home screen. Only available in the web GUI.
	**Go Result**	Go to the live results screen. Only available in the web GUI.

Navigation

- To navigate in the controller GUI either tap on a menu item or move a finger (drag) across the display to scroll through items.
- Options are selected by tapping the required option.
- To enter data into a text box, tap the text box and a keyboard appears on the display.



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Web GUI

The web GUI is very similar to the controller display. It enables configuration and programming of the controller through a web browser on a computer connected to the controller.

Users can program the controller from the controller and the web interface at the same time.

License Introduction

Licenses for controller features are managed through the Functionality Management System (FMS). This allows customers to tailor controller functions to their specific needs through a dynamic licensing scheme.

Licenses can be obtained for individual features or collections of features and can be deployed across multiple virtual stations. The licenses can be returned to the pool when they are no longer required. Licenses can be obtained through the Atlas Copco License Portal (ACLP). Licenses can be downloaded from the ACLP and managed/distributed through ToolsTalk, or can be stored on a FMS Portable (USB drive) to be inserted into the controller.

Note that the creation and management of a customer account in the ACLP is not covered in this documentation. Contact your local Atlas Copco representative for more information.

Licenses Overview

Configuration of features governed by licenses can be done even in the absence of an installed license. E.g. configuration of tightening programs and configuration of Multistep programs. Assigning these features to a tool or virtual station is also possible. Running the feature without a valid license, however, will require the installation of the appropriate license.

License enforcement is performed at two stages: assignment and runtime (trigger pressed). If a feature for which no license is installed is assigned to a Virtual Station, a red exclamation mark will appear at the Virtual Station View in ToolsTalk 2. The controller GUI will also show a warning triangle at the tool or task section (depending on what is missing). If a feature for which no license is installed is started (i.e. trigger pressed), an event will be presented to the user informing the user of which license is missing. It will not be possible to proceed without a correct license installed.

Running an unlicensed feature will, in most cases, result in a locked tool.

Many features and functions in the controller require a license in order to be assigned and used by a virtual station. There are three types of licenses:

Virtual Station Type

Fixed collection of features bundled together in a single package. The Virtual Station Type determines, among other things, what tools can be run, how many programs and sequences can be used, which tightening strategies are available, and the type of reporting that can be done. The features contained in each Virtual Station Type are features that often are used in conjunction with each other, or which have internal dependencies that require the presence of other features in the package. Virtual Station Types are assigned in their entirety to a virtual station. The virtual station can then make use of all features contained in the Virtual Station Type. **In order to be able to perform tightenings, a Virtual Station has to be assigned a Virtual Station Type** license. Depending on the license type, various tightening options will be enabled or blocked.

Virtual Station Feature

Individual features which can complement Virtual Station Types. A lot of features can be purchased as a single license.

Controller Feature

Features that are controller-wide. These are features such as Soft PLC and Step Sync, which are assigned to a controller and once assigned can be used by all virtual stations on that controller.

License Sources

Licenses used on a controller can be pulled from several different sources. The number of simultaneous sources is limited to 10 (either 10 FMS Portable sources, or one License Server (TT2) in addition to 9 FMS Portable sources). If you would like to add licenses from a source when the source limit (10) has been reached, all licenses from one source need to be removed from the controller to make room for licenses from the other source.

Source Overview

The Source Overview tab (**License assignment** > **Source Overview**) provides the user with an overview of the licenses installed on the controller, as well as where they were installed from. A maximum number of 10 different sources can be displayed here, and each will be designated with FMS P (for FMS Portable, or dongle), or License Server (TT2).

Clicking on any license source will present that source's detailed license source information. It lists the source name and type, as well as the number and type of licenses in each category (Virtual Station Type, Virtual Station Feature and Controller Feature).

Supported Tools

Tools supported by a Virtual Station may vary depending on the Virtual Station type on the controller.

Supported Tools	BatchControl	JointControl	StationControl	CriticalControl	ProcessControl
BCP / BCV	X	-	-	-	-
TensorSB	-	X	X	-	-
TensorSL	-	-	X	X	X
TBP	-	-	X	X	X
TensorST	-	-	X	X	X
TensorSTR	-	-	X	X	X
SRB	-	-	X	X	X
TensorSTB	-	-	X	X	X
STWrench	-	-	X	X	X
TensorES	-	X	X	-	-
TensorSR	-	-	X	X	X
QST (Fixtured spindle)	-	-	X	X	X
TBPS	-	X	X	-	-
MWR-S (Mechatronic Wrench Signal)	-	-	-	-	-
MWR-T (Mechatronic Wrench Torque)	X	X	X	X	-
MWR-TA (Mechatronic Wrench Torque Angle)	-	-	X	X	X
External tool	X	X	X	X	X

Installation and Upgrade

In this section, you can find information to help with the initial installation of the product, or upgrading from one version to another.

License Installation

Installing Licenses on the Controller

Note that licenses sources are limited to 1 License Server (TT2) and 9 FMS Portables (dongles) simultaneously. Licenses are installed either through the server (ToolsTalk 2) or FMS Portable. If the license source limit is reached, all licenses from one source need to be removed from the controller in order to add licenses from another source.

Before installing licenses through the server (ToolsTalk 2), make sure that the controller time is synced with the server time.

Installing from the Server

Distributing server-based licenses is done through ToolsTalk 2. Please refer to the ToolsTalk 2 User Guide for instructions on installing licenses.

In order to be able to install licenses using ToolsTalk 2, the correct license server needs to be configured:

1. Select the **Settings** menu, and select the **Server connections** tab.
2. In the **Atlas Copco License Manager** field, set the switch to **On**.
3. Insert the correct **Server host** IP address (usually the same as the IP address for ToolsTalk 2) and Server Port.
4. Select **Apply**.

Installing from FMS Portable (USB)

The Functionality Management System (FMS) uses a special FMS Portable device to transfer functionality to and from a controller. The USB flash drive contains both a general purpose memory area and a trusted storage area that is only accessible by the License manager in a controller. The purchased feature items are downloaded from Atlas Copco to the general purpose area. The first time the FMS Portable is inserted into a controller with a License manager, the file is detected and decoded and the feature items are transferred to the trusted storage area that is only accessible from a License manager.

If you have a USB drive with the licenses installed, perform the following steps to install them on the controller.

1. Insert the USB into the USB port in the controller

   The USB License Management window will pop up in the GUI. The **Pool** column will show the total license count on the controller from all sources. The **Available on FMS P** column shows the licenses available on this dongle, while the **From this FMS P** column shows the number of licenses that have been moved to this controller from this particular FMS P.

2. Select the left-pointing arrow next to license you want to install on the controller.

   The number in the **Available on FMS P** column will decrease by 1 and the number in the **From this FMS P** column will increase by 1.

The user will be presented with events on the controller for both license transfer start and end.

License sync

Existing licenses are checked against the license server every two hours. If no response from the license server is obtained within a 14 day period, the affected licenses will be revoked. The user will also be warned when licenses are about to expire. When a license is within 7 days of expiration, the user will be presented with a warning once every two hours. If licenses are not renewed, they will expire and the affected functions will no longer be available.

Removing Licenses from the Controller

One way of removing an FMS Portable-installed licenses are described, for instructions how to remove server-installed licenses, please refer to the ToolsTalk 2 User Guide.

Removing FMS Portable-Installed Licenses

1. Make sure the FMS Portable is inserted into the USB port in the controller.
2. [If the USB License Manager window is not visible] Select the **License Assignment** menu.
3. Select the USB icon in the top right of the window.

   The USB License Manager window pops up.
4. Select the right-pointing arrow next to the license you want to remove from the controller.

   Licenses that are assigned to virtual stations can be removed from the controller. However, the Virtual Station will become unusable as a result.

Configuration

In this section, you can find detailed information about how to create, modify, and verify product settings.

Working with the Tightening Tab

WARNING

Risk of injury

A change in the configuration of the tightening program may cause unexpected torque, rotational direction, or speed in the system(s) where the tightening program is currently in use. This could result in severe bodily injury and/or property damage.

- Check the tightening program configurations after adding a new program or after applying changes to an existing program.

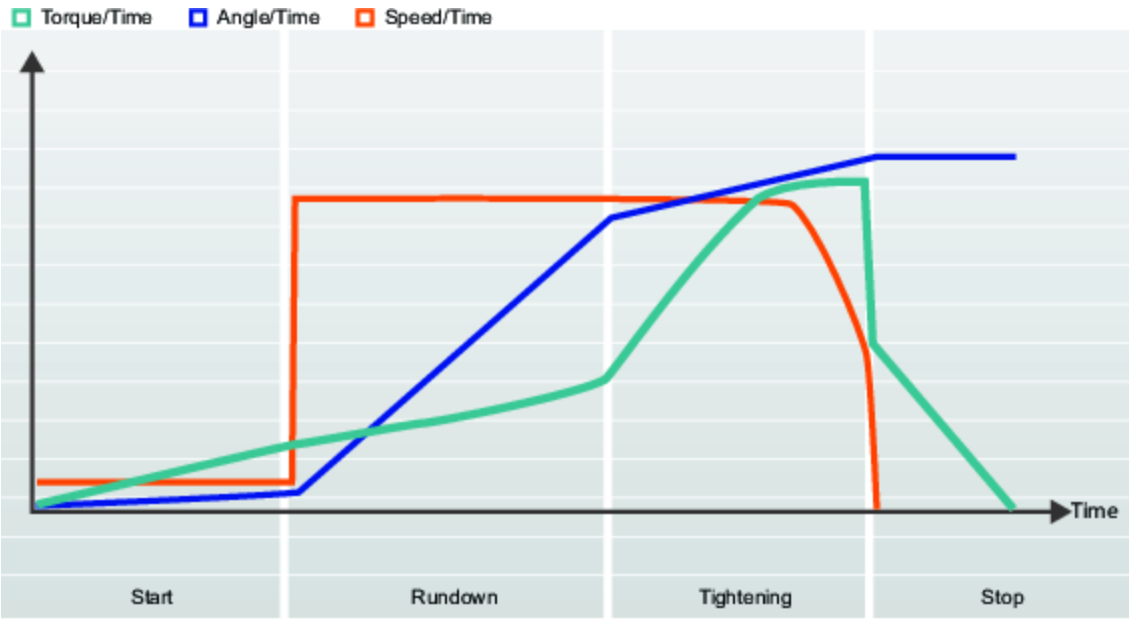
Changes made to tightening programs in any section need to be actively applied by clicking the Apply button in the bottom right corner of the GUI. Alternatively, changes can be undone by clicking the Undo button in the same location.

When navigating away from the section where changes have been made (by using the Back, Home or Result button), the user will be presented with a warning pop-up where the changes can also be applied or undone. The user cannot proceed without applying or undoing changes.

Controller features, such as the Low Reaction Tightening Strategies and controller-wide functions among others, require licenses distributed through the Functionality Management System (FMS). Whereas configuration of features is possible without specific licenses, the assignment and use of those features will require the correct license to be installed on the controller. Please refer to Licenses (FMS) for more detailed information on licenses.

The POWER FOCUS 6000 tightening programs need parameters to be set in order to perform tightening. Selecting a Strategy and either the **Target torque** or **Target angle** are mandatory. Other settings are optional, such as **Soft start**, **Selftap**, and **Torque compensation**. It is also possible to monitor the tightening as it progresses by adding limits within which the torque, or angle the nut turns, must remain.

The tightening procedure is divided into four steps: Start, Rundown, Tightening and Stop.



Tightening Programs

By selecting the tightening program it is possible to choose the method for applying clamping force (or pre-load) to the joint. Different joints require different strategies for how to apply the desired clamping force and to minimize unwanted in-service effects.

- The **TurboTight** strategy, enables the option to use Manual programming or Quick prog - for more information, see the paragraph TurboTight.
- The **Quick step**, **Two step** and **Three step** strategies enable the choice of tightening towards a Target torque or a Target angle value.

- The **Four step** strategy, is a configurable strategy where it is possible to choose to use all or just a few of the available steps - for more information, see the paragraph Four-step tightening strategy.
- The **External result** strategy, is used when OK tightenings are indicated by an external digital signal - for more information, see the paragraph External result.

All tightening programs require that you at least set the **Target torque** or **Target angle** value.

Parameter	Description	Default value
Strategy	Available tightening programs. **TurboTight**: No additional tightening behavior is used as default. Only target values are used. **Quick step**: Adds an initial tightening step to reduce pre-load scatter. **Two step**: Adds a pause between the first and final tightening step to further counteract short-term relaxation effects. **Three step**: Tightens to a defined First torque value, then loosens the screw and immediately retightens it to Target torque or Target angle. **Four step**: Tightening strategy divided into four separate steps. It is possible to switch off the steps separately. **Wrench - production**: Tightening strategy to use with an ST Wrench. **Wrench - quality**: Strategy used for quality test of tightenings with an ST Wrench. **Rotate**: Rotates the spindle a specified speed and angle. **External result**: presents a predetermined tightening result instead of measured torque/angle. **Multistep**: Tightening strategy consisting of multiple configurable steps, with restrictions and monitors.	TurboTight
Target type	Defines the type of the target value in the final step. **Target torque:** The tightening aims towards the specified target value when performing the final step. **Target angle:** The tightening aims towards the specified target value when performing the final step.	
Target torque	Defines the target torque of the tightening of the final step.	
Target angle	Defines the target angle of the tightening of the final step.	
Target speed	Activates setting the tool speed for the final step manually or using the default speed. **Auto:** Uses a value that is calculated based on the **Tool max speed**. **Manual:** Specify the tool speed manually.	Auto
<Manual>	Tool speed during tightening or during the final step.	

TurboTight

TurboTight is the default tightening strategy and it is designed to perform a very fast and ergonomic tightening based on the maximum speed of the tool (Tool max speed). This strategy has two options:

- **Quick prog**, that requires only the **Target torque** to be set to perform the tightening.
- **Manual**, that allows the user to configure several tightening parameters.

To minimize the risk of unexpected jerk at the end of the tightening when using the TurboTight tightening strategy, make sure to activate Time monitoring.

To minimize the risk of unexpected jerk at the end of the tightening when using the TurboTight tightening strategy, make sure to set the Time Max Limit.

Time Max Limit is enabled by default, but it is necessary to setup the related values. In the tightening stage, set **Angle Limit** to **From Rundown Complete**.
Set **Time Max** as low as possible, without stopping the normal tightening. In the rundown stage, set **Rundown Complete Torque** so that it is triggered when the torque start to increase.

Depending on the joint properties, for example if the joint is very stiff or very soft, a different tightening strategy than TurboTight might be needed.

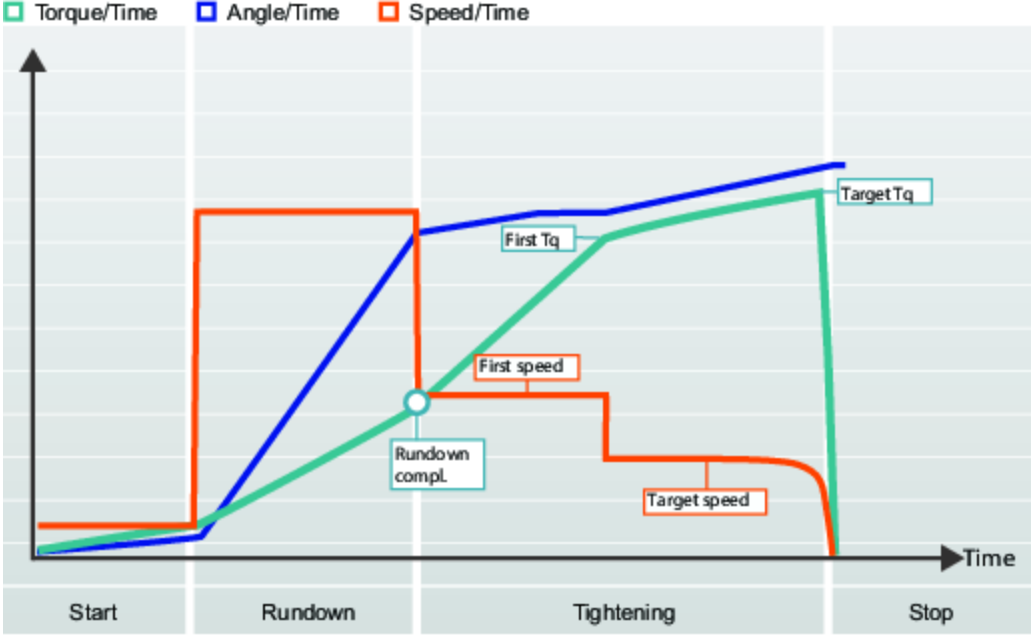
TurboTight is not available for Joint Control.

Fine-Tuning the TurboTight Strategy

TurboTight tightening strategy points to the target torque, and the result can be below or above the target. The most important parameter for TurboTight tightening strategy is the speed. It is possible to keep maximum speed for most tightenings, but if all/some of the tightenings overshoot, decrease the speed in small steps. **Rundown Complete Torque** is not used for controlling of the tightening; it is only used for calculating of limits and results.

Quick Step

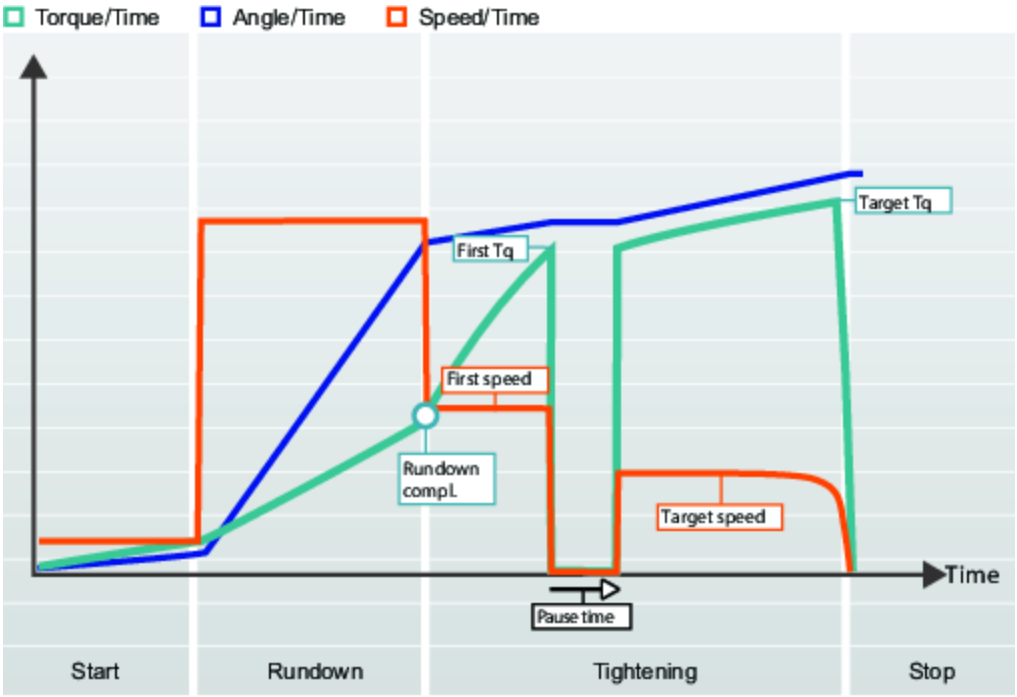
Quick step is a tightening strategy used to reduce the joint's preload scatter by adding an initial step with a given torque and speed, and then reducing the target speed in the final step.



Parameter	Description	Default value
First torque	Target torque for the first step.	
First torque	Torque during first step.	80% of Target Torque
First speed	Target speed for the first step.	
First speed	Tool speed during first step.	50% of Tool max speed

Two Step

The Two step strategy is very similar to the Quick step strategy except that it adds a small time delay between the first step and the final step, to further counteract short-term relaxation effects in the joint.



Parameter	Description	Default value
First torque	Torque during first step.	80% of Target Torque

Parameter	Description	Default value
First speed	Target speed for the first step.	
Pause time	Time between first and second step.	50 ms

Fine-Tuning the Two Step Strategy

When the First target is reached, the tool makes an immediate stop for a specified time before it continues with the final step. The First torque value and the Pause time should be chosen to improve ergonomics for hand-held tools.

Three Step

The Three step strategy adds a loosening step between the first step and the final step, to overcome short-term relaxation effects due to embedment, and reduce preload scatter. This is sometimes used to condition the joint. This can be useful in, for example, joints with many adjoining surfaces and will have a greater effect on new parts than on reused ones, due to the smoothing of surfaces, which reduces embedment.

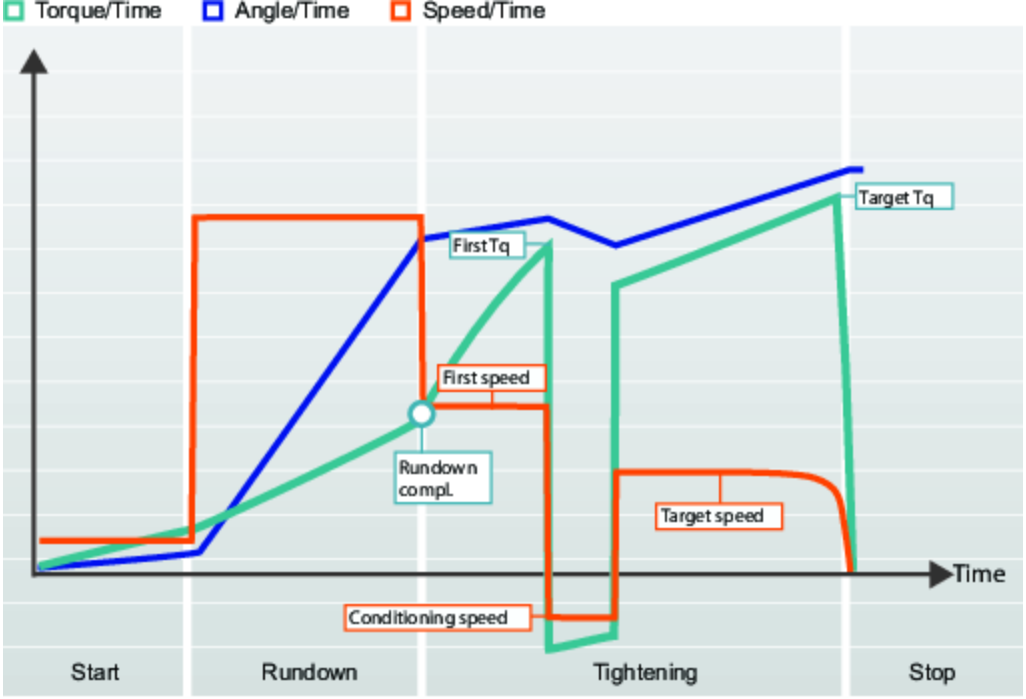
Conditioning the joint is done by tightening the first step to a given torque, **First torque**, and then releasing the load by turning the nut a specified **Conditioning angle** and then retightening the nut to its **Target torque** or **Target angle**.

The target torque can be lower than the torque reached during the first step after rundown. In order for the target torque to be lower than the first torque, set target torque (Tightening parameters > Tightening step > Final step > Target torque) to a value lower than First torque (Tightening parameters > Tightening step > First step > First torque).

If Angle is used as a target in the tightening program, the Target angle is measured from the position at the end of the loosening step (conditioning).

Behavior of Measure torque at, and Measure angle to

The **Max torque value** and **Value at peak torque** measured under Result evaluation for Measure torque at and Measure angle to, respectively, represent the highest values measured over the entire tightening. This means that if the Target torque is set lower than the First torque, the Result evaluation value will be higher than the end value. In order to view the tightening's final value, both Measure torque at, and Measure angle to should be set to Value at shutoff.



Parameter	Description	Default value
First torque	Torque during first step.	80% of Target Torque
First speed	Tool speed during first step.	50% of Tool max speed
Conditioning speed	Tool speed during the conditioning step.	50% of Tool max speed
Conditioning angle	Angle to turn the socket during the conditioning step.	180°

Fine-Tuning the Three Step Strategy

When the First target is reached and the conditioning step is entered, the tool makes an immediate stop and reverse before it continues with the final step. This conditioning step may need to be fine-tuned to improve ergonomics for hand-held tools.

Four Step

The four step tightening strategy is divided into separate steps, that can be switched **On** or **Off**, to customize the tightening task.

Each step has a target value and may monitor other values and is divided as follows:

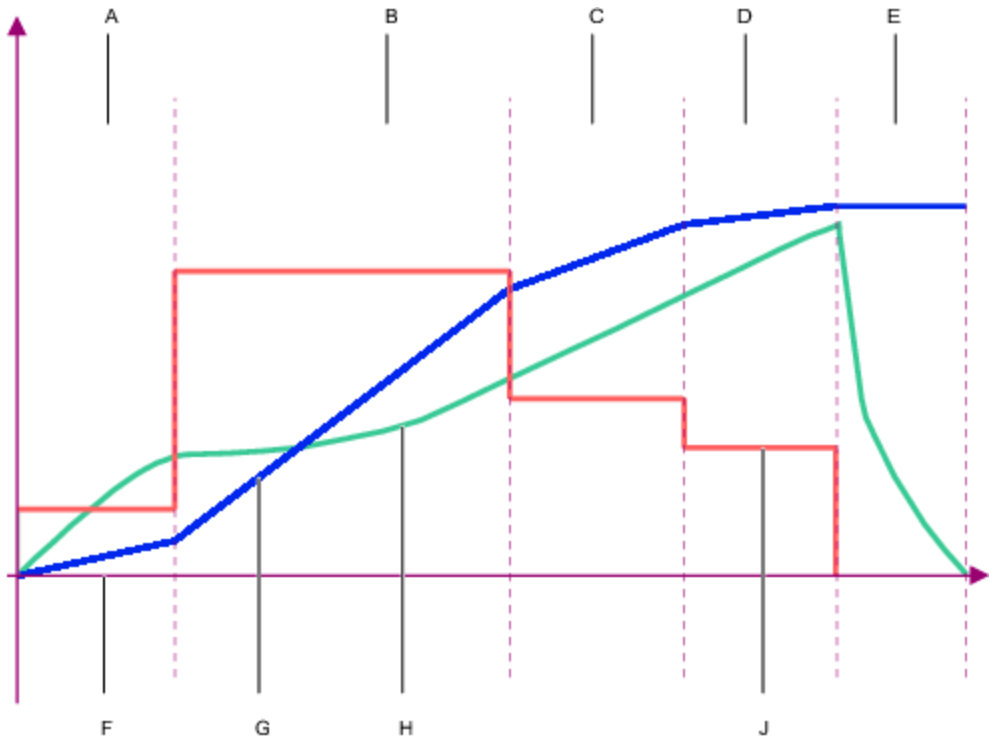
Step	Function
Start	The start step is used to engage the threads and to detect if a tightening has already occurred.
Rundown	The rundown step is used to run down a screw to the snug level.
Tightening	The tightening step is used to tightening the screw to a defined torque level, and may be divided into several steps. This final target value may be either a target torque or a target angle.
Stop	The stop step is to finalize the tightening in an ergonomic way.

- Example 1: If the start and rundown steps are used to tighten a screw to the snug level, a final tightening can be made in a later step.
- Example 2: If the tightening steps are used in a previous snug level tightening, a final assembly can be made to tighten the joint to the final target value.

Overview of the Four Step Strategy

A graphical representation of the different steps and curves for speed, torque and rotation angle seen over time.

The graphical representation is used in the documentation to describe the configuration setting and the meaning of the parameter values. The graphs are not used in any GUI.



The four step strategy

A	**Start** step
B	**Rundown** step
C	First step of the **Tightening** step
D	Final step of the **Tightening** step
E	**Stop** step
F	Speed over time curve
G	Torque over time curve
H	Angle over time curve
I	Time direction

Each step is configured with respect to torque, angle, time and tool speed. Each step has one target value which is either torque or angle, and monitors the other values.

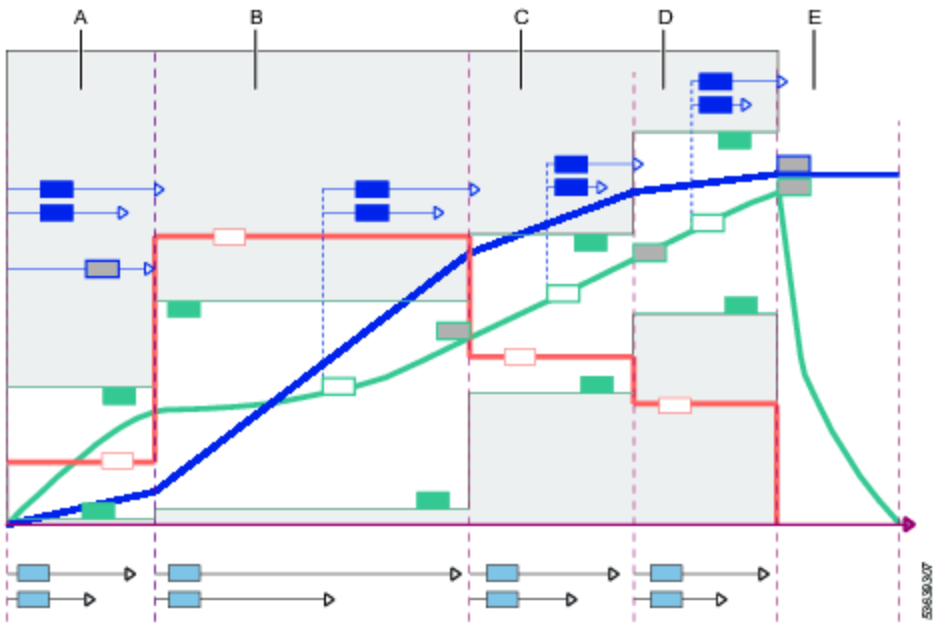
The different steps and their target values are:

Step	Function
Start	**Target = Angle** The step is used to engage the threads and to detect if a tightening has already occurred. Time, angle and torque limits can be monitored.
Rundown	**Target = Torque** The step is used to run down a screw or a nut to the snug level, with a defined torque value. Time, angle and torque limits can be monitored.
Tightening	The tightening step is divided into two steps: **first tightening** and **final tightening**. **First tightening target = Torque**. The step is used to tightening the screw or nut to a defined first target torque level. **Final tightening target = Angle or Torque.** The step is used to continue the tightening from the first tightening target to a final target angle or to a higher final target torque. Time, angle and torque limits can be monitored.
Stop	The Stop step terminates the tightening so that the socket can be released.

Parameter Definition

Different parameters control the four step strategy. To illustrate the parameters and their position they are shown in the combined speed-over- time curve, angle-over-time curve and torque-over-time curve.

The graphical representation is used in the documentation to describe the configuration setting and the meaning of the parameter values. The graphs are not used in any GUI.



Four step tightening strategy - all parameters

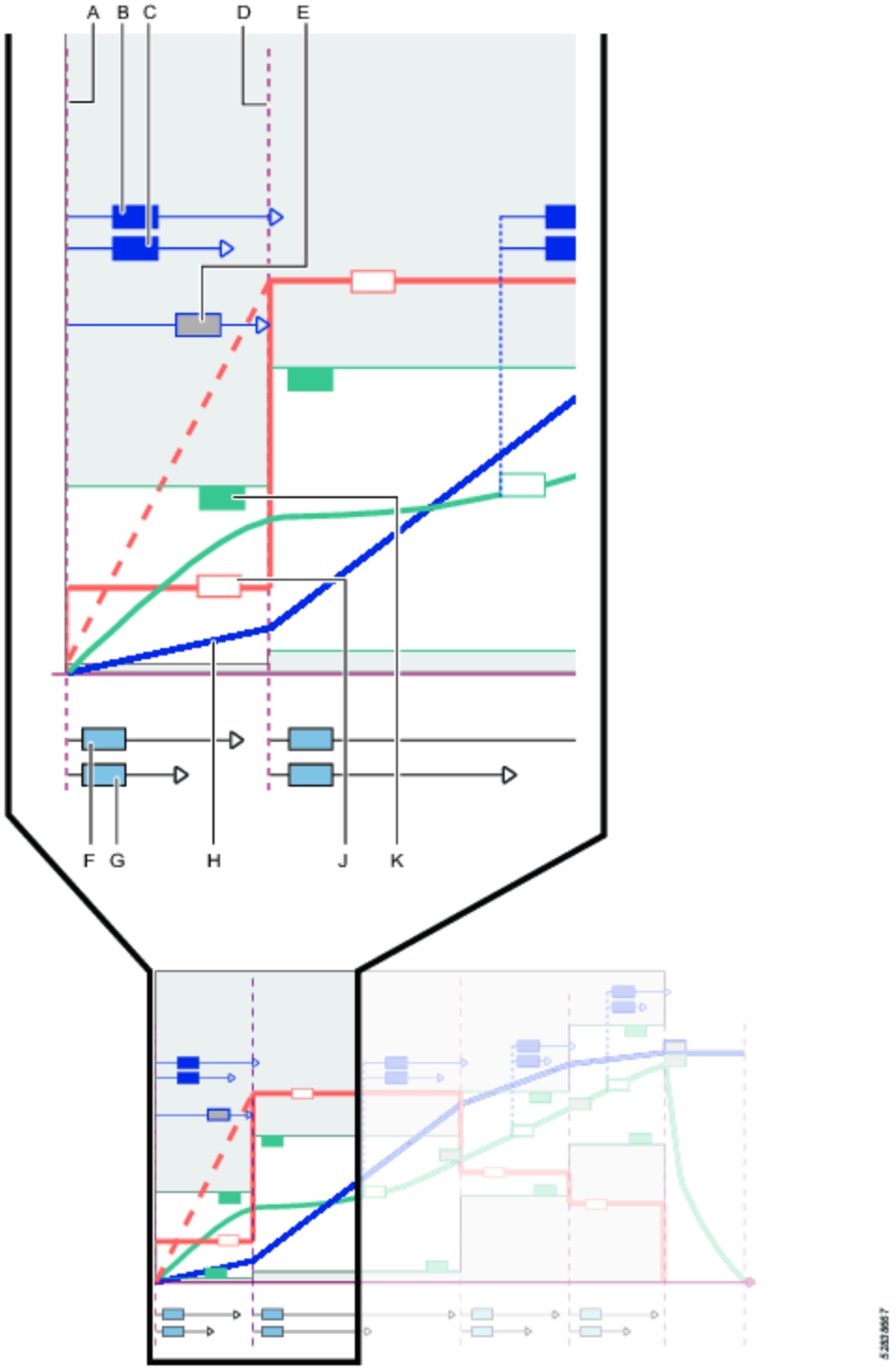
A	Start stage
B	Rundown stage
C	Tightening stage: First step
D	Tightening stage: Final step
E	Stop stage

Parameters for Four Step Tightening - Start Stage

The time, torque and angle are monitored during the start step. This step has an angle as target.

The graphical representation is used in the documentation to describe the configuration setting and the interpretation of the parameter values. The graphs are not used in any GUI.

The step is defined from trigger pressed until the specified target angle is reached.



A	Trigger pressed
B	Angle max (monitor)
C	Angle min (monitor)
D	End of start step
E	Target angle for start step
F	Time min (monitor)
G	Time max (monitor)
H	Angle curve
J	Speed curve

K	Torque max value (monitor)

The tables list all available parameters. Some parameters are only available and visible for certain functions.

Parameter	Description	Default value
Direction	Rotation direction for the tightening. CW: Clockwise CCW: Counter clockwise	CW
Current monitoring	**Off:** Current monitoring is disabled and the tool torque is measured by the torque sensor. **On:** the current is measured at final torque target and converted to a torque value. The calculated torque is compared to the measured torque. If the difference is within 10%, the tightening is considered OK	
True angle compensation	Switch with **On** or **Off** position.	Off
Negative	Only visible if **True angle compensation = On.** Defines the maximum negative rotation of the tool. If the value is exceeded the tightening is terminated and an error is reported. This is expressed in a numeric angle value.	30
Positive	Only visible if **True angle compensation = On.** Defines the maximum positive rotation of the tool. If the value is exceeded the tightening is terminated and an error is reported. This is expressed in a numeric angle value.	30
Attachment tuning enabled	**Yes** **No**	No

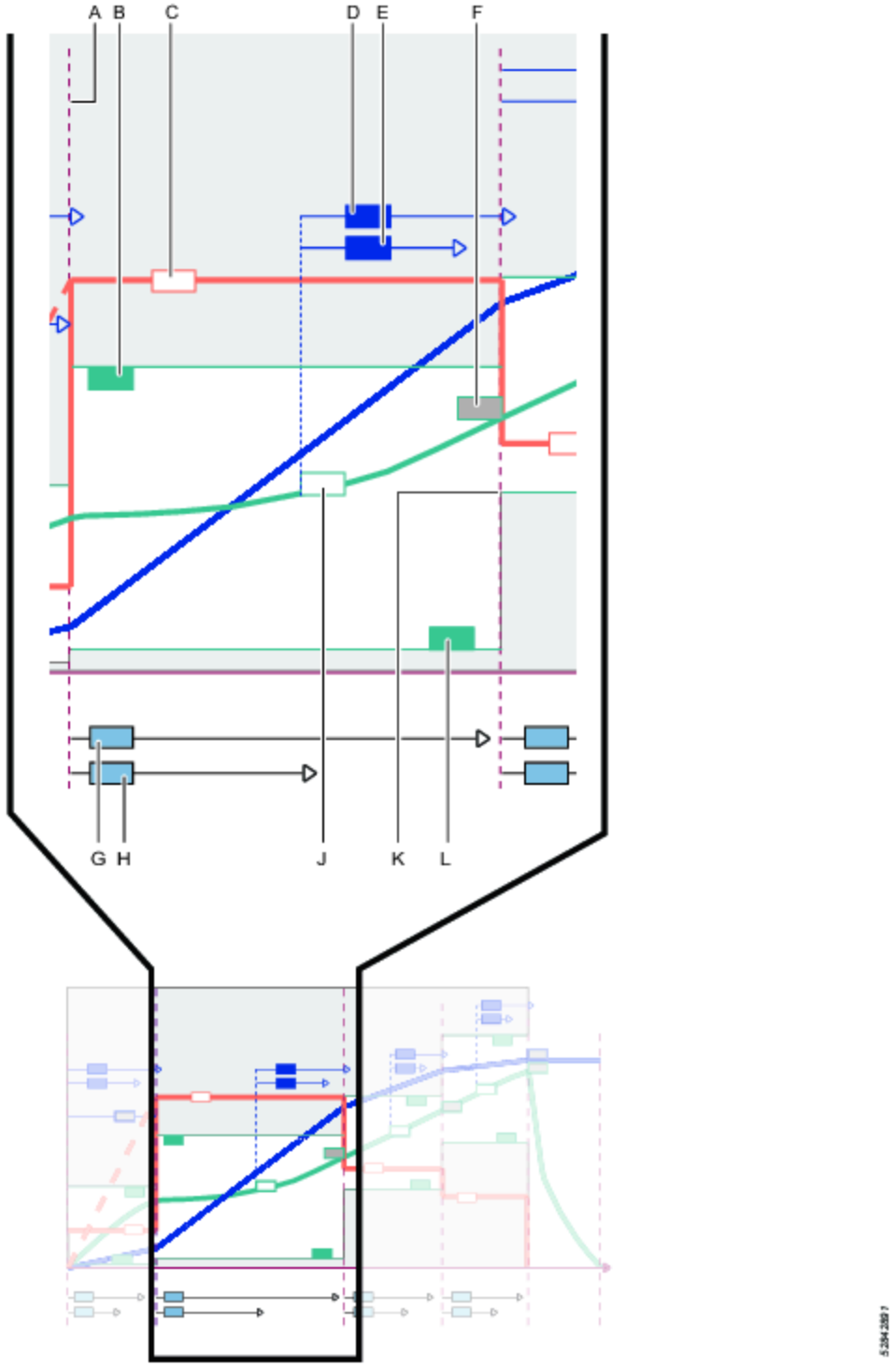
Parameter	Description	Default value
Soft start	**On:** The **soft start** allows a smooth start at slow speed. It is used to engage the thread. **Off:** The tool speed ramps up to the rundown speed as quickly as possible.	On
Speed	Defines the speed during Soft start.	34
Angle	Target angle for the step. End of step is defined at this point, when the target has been reached.	90
Angle min	Monitors the angle value and checks that the result is within the limit.	70
Angle max	Monitors the angle value and checks that the result is within the limit.	110

Parameter	Description	Default value
Torque min	Defines the lower torque limit during Soft start. If **Torque min** falls below the limit, the tightening is aborted and an error message is issued. The tightening will be considered NOK.	0.00
Torque max	Defines the upper torque limit during Soft start. If **Torque max** is exceeded, the tightening is aborted and an error message is issued. The tightening will be considered NOK.	1.25
Time min	Minimum time for the step. measured from trigger pressed. Expressed in a numeric millisecond value.	100.00
Time max	Maximum time for the step. measured from trigger pressed. Expressed in a numeric millisecond value.	500.00
Use attachment tuning	**Yes** **No**	No
Gear ratio	Only visible if **Use attachment tuning** is set to **Yes**. Min/Max values: 0.5/4.0 Gear ratio is needed to compensate the angle and torque. The Gear ratio will affect the max speed and max torque of the tool. When switching between the parameter **Use attachment tuning** Yes/No, the values of the Gear ratio are not reset to default values.	1.00
Efficiency tuning	Only visible if **Use attachment tuning** is set to **Yes**. Min/Max values: 0.5/1.0 Sets the efficiency loss for the attachment. Gear ratio combined with Efficiency tuning is needed to compensate the torque. When switching between the parameter **Use attachment tuning** Yes/No, the values of the Efficiency tuning are not reset to default values.	1.00

Parameters for Four Step Tightening - Rundown Stage

The **Rundown** step is from thread engagement until the screw head reaches the snug level. During rundown; time, torque and angle are monitored. The target value for the step is when the **Rundown complete torque** level is reached.

The graphical representation is used in the documentation to describe the configuration setting and the interpretation of the parameter values. The graphs are not used in any GUI.



Four step tightening - parameters in the rundown step

A	Start of **Rundown** step
B	Maximum torque level (monitor)
C	Speed curve
D	Minimum angle (monitor); Measured from **Rundown angle monitoring torque**
E	Maximum angle (monitor); Measured from **Rundown angle monitoring torque**
F	Rundown complete torque value
G	Time max (monitor)
H	Time min (monitor)

J	Torque curve and **Rundown angle monitoring torque** reference point
K	End of rundown step, when target value is reached
L	Minimum torque level (monitor)

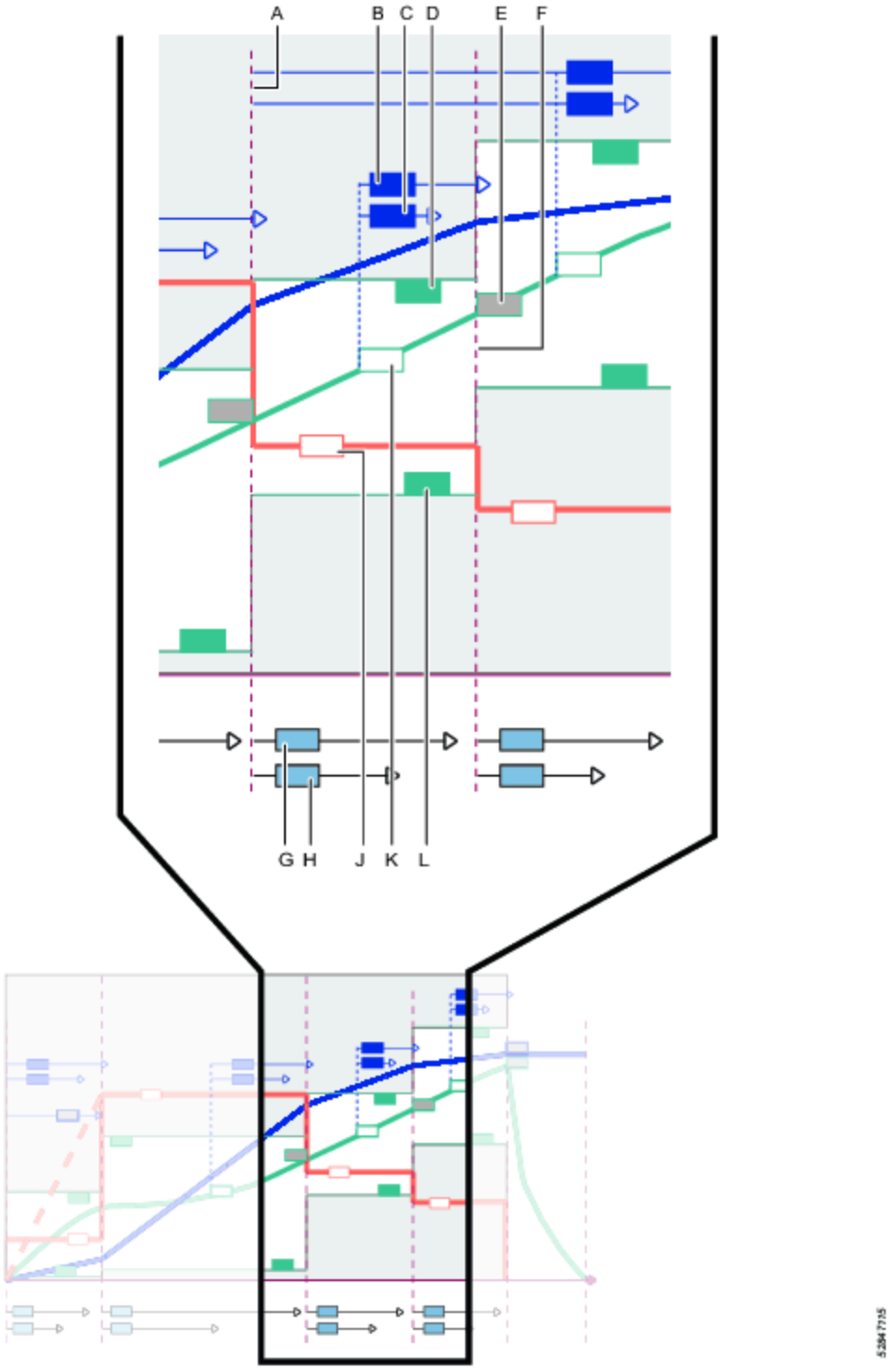
Parameter	Description	Default value
Rundown	Switch with **On** or **Off** position. If the switch is in the **Off** position, the step is not executed and all other parameters are invisible and are ignored. If both the start step and the rundown step are switched off, a final tightening can be performed as a separate task.	On

Parameter	Description	Default value
Rundown speed	If **Max** position, the speed is the set to full tool capability. If **Manual** position, the speed is set manually.	Max
Rundown speed (parameter entry box)	This parameter entry box is only visible when **Manual** speed setting is selected. The spindle rotation speed during the step.	690 rpm
Torque min (monitor)	Minimum torque value during the step.	0 Nm
Torque max (monitor)	Maximum torque value during the step.	6 Nm
Rundown angle monitoring torque	A specified torque value. From this point in time the angle monitoring starts.	0 Nm
Angle min (monitor)	Minimum spindle rotation for the step. Measured from **Rundown angle monitoring torque**.	100 degree
Angle max (monitor)	Maximum spindle rotation for the step. Measured from **Rundown angle monitoring torque**.	5000 degree
Time min (monitor)	Minimum time for the step. Measured from the start of the step.	10 ms
Time max (monitor)	Maximum time for the step. Measured from the start of the step.	5000 ms
Rundown complete torque	Defines the target torque for the rundown step. End of step is defined at this point, when the target value is reached.	5 Nm

Parameters for Four Step Tightening - Tightening Stage

The tightening step is divided into two steps, first step and final step. The **First tightening** step is from rundown complete until the **First torque** target level is reached. During the first tightening; time, torque and angle are monitored.

The graphical representation is used in the documentation to describe the configuration setting and the interpretation of the parameter values. The graphs are not used in any GUI.



Four step tightening - parameters in the first step of the tightening step

A	Start of the**First tightening** step in the tightening step
B	Min angle (monitor); Measured from **First angle monitoring torque**
C	Max angle (monitor); Measured from **First angle monitoring torque**
D	Maximum torque level (monitor)
E	First tightening torque value; Defines the target value and the end of the step

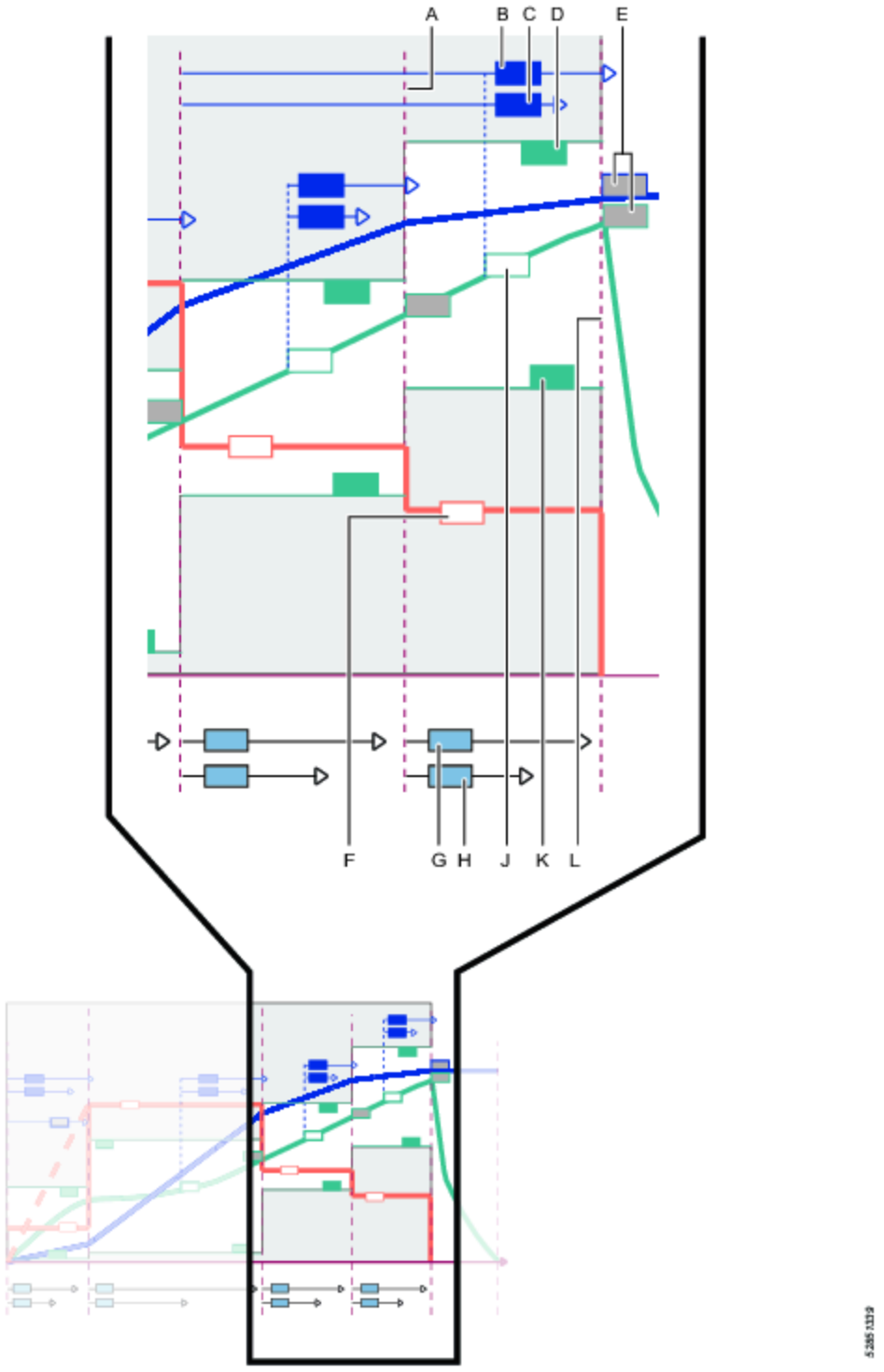
F	End of step
G	Time max (monitor)
H	Time min (monitor)
J	Speed curve
K	Torque curve and **First angle monitoring torque** reference point
L	Minimum torque (monitor)

Parameter	Description	Default value
First step	If the switch is in the **Off** position, the step is not executed and all other parameters are invisible and are ignored.	On
First torque	Defines the target torque for the step. End of step is defined at this point, when the target is reached.	20 Nm
First speed	If **Auto** position, the speed is set automatically. If **Manual** position, the speed is set manually.	Auto
First speed (parameter entry box)	This parameter entry box is only visible when **Manual** speed setting is selected. The spindle rotation speed during the step.	345 rpm
First torque min	Minimum torque value during the step.	19 Nm
First torque max	Maximum torque value during the step.	21 Nm
First angle monitoring torque	A specified torque value. From this point in time the angle monitoring starts.	5 Nm
First angle min	Minimum spindle rotation for the step. Measured from **First angle monitoring torque**.	0 degree
First angle max	Maximum spindle rotation for the step. Measured from **First angle monitoring torque**.	500 degree
Time min	Minimum time for the step. Measured from the start of the step.	10 ms
Time max	Maximum time for the step. Measured from the start of the step.	500 ms
Measure torque at	Max torque value Value at peak angle Value at shut off	

Parameters for Four Step Tightening - Final Tightening Stage

The tightening step is divided into two steps, first step and final step. The **First tightening** step is from rundown complete until the **First torque** target level is reached. During the first tightening; the time, torque and angle are monitored. The **Final tightening** step is from **First torque** until the final target level is reached. During the final tightening; the time, torque and angle are monitored. The target value for the step is either when the **Target torque** or the **Target angle** level is reached.

The graphical representation is used in the documentation to describe the configuration setting and the interpretation of the parameter values. The graphs are not used in any GUI.



Four step tightening - parameters in the final step of the tightening step

A	Start of **Final tightening** step

B	Minimum angle (monitor); Measured from a selectable reference point
C	Maximum angle (monitor); Measured from a selectable reference point
D	Maximum torque level (monitor)
E	Final target is either the **Target torque** or the **Target angle**; angle reference point is measured from a selectable reference point
F	Speed curve and speed value
G	Time maximum (monitor)
H	Time minimum (monitor)
J	Torque curve and **Final angle monitoring torque** reference point
K	Minimum torque (monitor)
L	End of step

The parameters differ between **Target torque** and the **Target angle** selection.

Parameters if Final target = torque

Parameter	Description	Default value
Target	Drop-down selection of final target. Torque: The final target in the tightening step is a torque value. Angle: The final target in the tightening step is an angle value.	
Target speed	Switch with **Manual** or **Auto** position. If the switch is in the **Auto** position, then the speed is set automatically by the tightening algorithm. If the switch is in the **Manual** position, then the speed is set manually.	Auto
Target speed (parameter)	This parameter is only visible when the**Manual** speed setting is selected. The spindle rotation speed during the step. This is expressed in a numeric value in rpm.	113
Target torque	Defines the target torque for the step. End of step is defined at this point, when the target has been reached.	
Torque limits	Switch with **Manual** or **Auto** position. The switch is only visible if the final target value is set to **Torque.** If the switch is in the **Auto** position, the torque limits are set automatically by the tightening algorithm. If the switch is in the **Manual** position, the maximum and minimum torque limits are set manually.	Auto

Parameter	Description	Default value
Torque min	The parameter is only visible if **Manual** torque limits have been selected. Minimum torque value during the step. This is expressed in a numeric torque value.	Final target torque - 5%
Torque max	The parameter is only visible if **Manual** torque limits have been selected. Maximum torque value during the step. This expressed in a numeric torque value.	Final target torque + 20%
Angle limits	Drop-down menu to select the reference point for angle limits. • **From torque**: Angle monitoring is measured from the **Final angle monitoring torque** point, which must be higher than the **First torque** value and lower then **Final target torque.**	
Final angle monitoring torque	A specified torque value. From this point the angle monitoring starts. The value must be higher than the **First torque** value and lower then **Final target torque.**	
Final angle min	Minimum spindle rotation for the step. Reference point for the measurement is selected from the drop-down menu **Angle limits**. This is expressed in a numeric degree value.	324 degrees
Final angle max	Maximum spindle rotation for the step. Reference point for the measurement is selected from the drop-down menu **Angle limits**. This is expressed in a numeric degree value.	396 degrees
Time min	Minimum time for the step. Measured from the start of the step. This is expressed in a numeric millisecond value.	10 ms
Time max	Maximum time for the step. Measured from the start of the step. This is expressed in a numeric millisecond value.	1000 ms
Measure torque at	Max torque value Value at peak angle Value at shutoff	Max torque value
Measure angle to	Value at peak torque Max angle value Value at shutoff	Max angle value

The values specified in the table below assumes that the first step of the tightening step is switched on.

Parameters if Final target = angle

Parameter	Description	Default value
Target	Torque: The final target in the tightening step is a torque value. Angle: The final target in the tightening step is an angle value.	

Parameter	Description	Default value
Target speed	If in **Auto** position, the speed is set automatically by the tightening algorithm. If in **Manual** position, the speed is set manually.	Auto
Target speed (parameter)	This parameter is only visible when the **Manual** speed setting is selected. The spindle rotation speed during the step.	113
Torque min	The parameter is only visible if **Manual** torque limits have been selected. Minimum torque value during the step. Must be above **First target torque**.	
Torque max	The parameter is only visible if **Manual** torque limits have been selected. Maximum torque value during the step.	
Min torque at final supervision	The value is used to monitor and to ensure that a minimum torque level is maintained during the entire final step. The level is normally set below the final torque minimum but higher than the rundown torque level. It can be used to verify that the screw is not broken during the tightening.	18 Nm
Target angle	Defines the target angle for the step. The reference point for the target angle is measured from the end of the previous activated step or step. End of step is defined at this point, when the target has been reached.	360 degrees
Angle limits	Drop-down menu to select the reference point for angle limits. • **Auto**. Sets a window of plus/minus 10% of the final target value. • **Manual**. Allows manual setting of maximum and minimum values. Sets a window of plus/minus 10% of the final target value as default value.	Manual
Final angle monitoring torque	A specified torque value. From this point the angle monitoring starts. The reference point depends on previous activated steps or steps.	
Angle min	Minimum spindle rotation for the step. Reference point for the measurement is selected from the drop-down menu **Angle limits**. This is expressed in a numeric degree value.	324 degrees
Angle max	Maximum spindle rotation for the step. Reference point for the measurement is selected from the drop-down menu **Angle limits**.	396 degrees
Time min	Minimum time for the step. Measured from the start of the step.	10 ms
Time max	Maximum time for the step. Measured from the start of the step.	1000 ms
Measure torque at	Max torque value Value at peak angle Value at shutoff	Max torque value

Parameter	Description	Default value
Measure angle to	Value at peak torque Max angle value Value at shutoff	Max angle value
NOK on trigger lost	**On** **Off**	On

Parameters for Four Step Tightening - Stop Stage

Soft-stop is used to finish the stop step in an ergonomic way.

Parameter	Description	Default value
Soft-stop	Drop-down menu with **On** or **Off** selection. If soft stop is set to **Off,** the tool will stop fast as possible after the final target has been reached. If the tools speed is reduced as fast as possible, it can cause a reaction force. A reaction force can corrupt an angle measurement, which in turn can be compensated with a True-angle compensation. If soft stop is set to **On**, the tool will finish the stop step in an ergonomic way.	Off

STwrench

The STwrench is connected to a controller using a wireless connection and is configured through the controller GUI or the web GUI.

The STwrench is configured under the tightening menu in the same way as the other tightening strategies.

The STwrench has a Rapid Backup Unit (RBU). The RBU defines the wrench function and stores the tightening programs. The controller supports currently only the RBU of the type **Production**.

The STwrench **End-fitting tool** (socket) contains a RFID TAG with a programmable number. This wrench uses this number to automatically recognize the tool and which program that can be used. The RFID TAG also stores the torque and angle correction coefficients.

The STwrench has several programs both for production tightening and for quality control.

The STwrench can only support tightening programs supported by the tool (*Wrench Production* and *Wrench Quality*).

For more information about the STwrench, see the STwrench User Guide (printed matter number 9836 4134 01).

STwrench Start Step Parameters

The parameters shown in the tables are available if one of the STwrench strategies are used. There are several combinations of strategies. Some of the parameters are only available for certain strategies and may not be visible in other strategies.

Parameter rules are automatically checked. If a violation occurs, the error indicator is displayed beside the incorrect parameters. Select the error indicator to display more information about the error.

Switching between strategies can result in the error indicator being shown. This indicates that the chosen combination is invalid, and needs to be corrected.

For more information about the STwrench, see the STwrench User Guide (printed matter number 9836 4134 01).

Parameters in the STwrench start step

Parameter name	Condition	Description	Default value
Tag number		**On**: after enabling TAG Check switch (*Configurations* > *Tool Configuration* > *TAG Check* > *On*), a correct TAG number is required to run the tightening program. **Off**: The TAG number is not checked.	Off
Required tag number	Tag number = On	The required TAG number for this tightening program.	1
Rehit detection		The parameter options are: **Complete** or **Off** .	Off
Torque correction coefficient		In certain cases extensions may be needed to fit the application. In this case the wrench measurement must be compensated to show a correct value. For more information about to calculate the correction coefficient, see the STwrench User Guide (printed matter number 9836 4134 01). The parameter is stored in the RFID TAG in the **End-fitting tool**.	1.0
Angle correction		In certain cases extensions may be needed to fit the application. In this case the wrench measurement must be compensated to show a correct value. To calculate the correction coefficient, please refer to the STwrench user guide. The parameter is stored in the RFID TAG in the **End-fitting tool**.	0°

NOTICE

The correction coefficients alter the STwrench measurement. It may cause an improper reading. Before making any corrections, refer to the latest version of the STwrench User Guide (printed matter number 9836 4134 01).

STwrench Rundown Step Parameters

The parameters shown in the tables are available if one of the STwrench strategies are used. There are several combinations of strategies. Some of the parameters are only available for certain strategies and may not be visible in other strategies.

Parameter rules are automatically checked. If a violation occurs, the error indicator is displayed beside the incorrect parameters. Select the error indicator to display more information about the error.

Switching between strategies can result in the error indicator being shown. This indicates that the chosen combination is invalid, and needs to be corrected.

For more information about the STwrench, see the STwrench User Guide (printed matter number 9836 4134 01).

Rundown complete is in the STwrench documentation defined as **Cycle start** , this is when the tightening step begins.

Parameters in the STwrench rundown step

Parameter name	Description	Default value
Rundown complete torque	Definition of the Rundown complete point	Depends on the smarthead minload (usually 5% of nominal torque) in Nm
Ratchet time		5000 ms

STwrench Tightening Step Parameters

The parameters shown in the tables are available if one of the STwrench strategies are used. There are several combinations of strategies. Some of the parameters are only available for certain strategies and may not be visible in other strategies.

Parameter rules are automatically checked. If a violation occurs, the error indicator is displayed beside the incorrect parameters. Select the error indicator to display more information about the error.

Switching between strategies can result in the error indicator being shown. This indicates that the chosen combination is invalid, and needs to be corrected.

For more information about the STwrench, see the STwrench User Guide (printed matter number 9836 4134 01).

Parameters in the STwrench tightening step

Parameter name	Condition	Description	Default value
Target		Select the target from the drop-down menu. The parameter options are: **Torque**, **Angle**, **Torque or Angle**.	Torque
Target Torque		Defines the target torque for tightening step.	0 Nm
Target Angle	Target = Angle	Defines the target angle for tightening step.	360°
Torque limits	Target = Torque	Selection made by a switch. **Auto** or **Manually** position.	
Torque min	Torque limits = Manual	Torque value for the lower limit	0 Nm
Torque max	Torque limits = Manual	Torque value for the upper limit	0 Nm
Angle limits	Target = Angle	Selected from a drop-down menu. The parameter options are: **Auto** or **Manually**. Angle values for max and min can be or selected	
Angle limits	Target = Torque	Selected from a drop-down menu. The parameter options are: **Off:** No angle limit monitoring. **From rundown complete:** The monitoring window is set from when the **Rundown complete torque** is reached. **From torque:** The monitoring window is set from when the specific torque value is reached.	
Final angle monitoring torque		Torque value from when the angle limits are monitored	18.75 Nm
Angle min	Angle limits = on or manually	Angle value lower limit	324°
Angle max	Angle limits = on or manually	Angle value upper limit	396°
Angle search limit	Angle limits = manually		
Measure torque at		Selected from a drop-down menu. The parameter options are: **Max torque value** **Value at peak angle**	
NOK on final less than target		Selection made by a switch. **On** or **Off** position.	Off

Parameter name	Condition	Description	Default value
Change bolt limit			50 Nm

Parameters in the STwrench tightening step if the strategy is Wrench - Production, and PVT compensate with snug

Parameter name	Condition	Description	Default value
Torque compensation point	Torque compensation = On		0°
PCT distance	Torque compensation = On		360°
PVT interval	Torque compensation = On		180°
Delay monitoring	Torque compensation = On		0°
Torque min	Torque compensation = On	Torque value for the lower limit	1 Nm
Torque max	Torque compensation = On	Torque value for the upper limit	20 Nm
Compensation value	Torque compensation = On	Selected from a drop-down menu. The parameter options are: **Average torque** **Peak torque**	

STwrench Loosening

The parameters shown in the tables are available if one of the STwrench strategies are used. There are several combinations of strategies. Some of the parameters are only available for certain strategies and may not be visible in other strategies.

Parameter rules are automatically checked. If a violation occurs, the error indicator is displayed beside the incorrect parameters. Select the error indicator to display more information about the error.

Switching between strategies can result in the error indicator being shown. This indicates that the chosen combination is invalid, and needs to be corrected.

For more information about the STwrench, see the STwrench User Guide (printed matter number 9836 4134 01).

Parameters in the STwrench loosening step

Parameter name	Condition	Description	Default value
Loosening limit		If this parameter is set to a value greater than 0, Power Focus checks if a negative torque exceeding this value is applied during the tightening. In that case, the overall status of the tightening is marked as Not OK. This function is started when the wrench reaches the Cycle Start (before starting the tightening, a loosening is allowed and does not produce results). This function is used to detect unwanted loosening at the end of a tightening (for instance, when the wrench is disengaged from the joint).	0 Nm

STwrench Stop Step Parameters

The parameters shown in the tables are available if one of the STwrench strategies are used. There are several combinations of strategies. Some of the parameters are only available for certain strategies and may not be visible in other strategies.

Parameter rules are automatically checked. If a violation occurs, the error indicator is displayed beside the incorrect parameters. Select the error indicator to display more information about the error.

Switching between strategies can result in the error indicator being shown. This indicates that the chosen combination is invalid, and needs to be corrected.

For more information about the STwrench, see the STwrench User Guide (printed matter number 9836 4134 01).

Parameters in the STwrench loosening step

Parameter name	Condition	Description	Default value
End cycle time		It is applied when torque goes below the cycle start and gets to the third percentage value set on the STwrench LEDs.	100 ms

Pulsing Tool Strategies

The strategy can be selected if the controller software version supports the tightening program. Pulsing tools can achieve a higher torque compared to normal rotating tools.

Pulse Tightening Program

Start

During the start step, the tool rotates in a speed mode without any pulsing.

Parameter name	Description
Soft start	Enables setting of the tool's speed, angle and maximum torque to facilitate the bolt entering the thread. Selected by radio buttons. **Off:** Soft start is turned off. **On:** Soft start is turned on.
Speed	Defines the speed during the soft start.
Time	Defines the *Soft start* duration.
Angle	Defines the target angle to turn the spindle for the bolt to enter the thread.
Torque max	Defines the upper torque limit during the soft start. If **Torque max** is exceeded, the tightening is considered NOK.
Rehit detection	**Early:** Terminates the tightening immediately when an already tightened screw/bolt is detected. The tightening will be considered as NOK. Requires that **Soft start** is activated. **Complete:** Even though an already tightened screw/bolt is detected, the tightening is not terminated until all tightening steps have been executed. The tightening will be considered as NOK. To make a rehit detection when **Soft start** is not activated, the **Rehit detection Complete** option must be selected. **Rehit detection Complete** will not terminate the tightening until all tightening steps have been executed. The tightening will be considered a rehit if the speed fails to reach half the rundown speed, a rehit error is then indicated. **Off:** No rehit detection will be performed. Combination Soft start = Off and Rehit = Early is not allowed.
Positive	The TrueAngle compensation can detect tool rotation and make angle compensations within the set limits.
Negative	The TrueAngle compensation can detect tool rotation and make angle compensations within the set limits.
Use attachment tuning	Attachment tuning is selected by radio buttons.
Gear ratio	Socket rotation speed = Tool speed / gear ratio.
Efficiency tuning	For example 0.9 means 10% efficiency loss.

Rundown

During rundown, the tool can use either speed mode, with a constant motor speed, or pulse mode. The selection is made depending on the encountered torque and the given torque limits within the configuration.

Parameter name	Description
High-speed rundown	The rundown step can be done in high-speed in order to minimize the time, without overshooting. This is achieved by letting the tool run at a higher speed for a specified angle length. When the angle has been reached, the speed will change to the lower speed specified in **Rundown speed** parameter. Only available for **SRB** tools. **Length:** Default 3600°, max 99999° **Speed:** *Tool max speed* must be higher than *Rundown speed* (rpm).
Rundown speed	Rundown speed can be set to either **Max** or **Manual**. If Rundown speed is set to **Manual**; enter the tool speed in rpm.
Rundown angle limits	**Off:** Rundown angle limits is turned off. **From Trigger:** Rundown angle limits is turned **On**. The system starts to monitor the tightening angle as soon as the tool trigger is pressed and reports if angle limits are violated. **From torque:** Rundown angle limits is turned **On**. The system starts to monitor the tightening angle from the specified torque value and reports if angle limits are violated.
Rundown angle monitoring torque	Torque value from where **Rundown angle limits** are set.
Angle min	Angle value for lower angle limit from starting point.
Angle max	Angle value for upper angle limit from starting point.
Time min	Minimum time for the step.
Time max	Maximum time for the step.
Rundown pulse limits	Selected from a shortcut menu: **Off:** Rundown pulse limits is turned off. **From Trigger:** Rundown pulse limits is turned **On**. The system starts to monitor the pulses as soon as the tool trigger is pressed and reports if the pulse limits are violated. **From torque:** Rundown pulse limits is turned **On**. The system starts to monitor the pulses from the specified torque value and reports if the pulse limits are violated.
Rundown pulse monitoring torque	Torque value from where the **Rundown pulse limits** monitor starts. The value must be set to a value greater than *Continuous max torque*.
Pulses min	Minimum number of pulses to reach the *Rundown complete torque* value.
Pulses max	Maximum number of pulses to reach the *Rundown complete torque* value.
Rundown complete torque	Defines the torque value for when snug is reached and the rundown is completed. The program proceeds with the tightening and starts with pulse mode, if not already done so during rundown.

Tightening

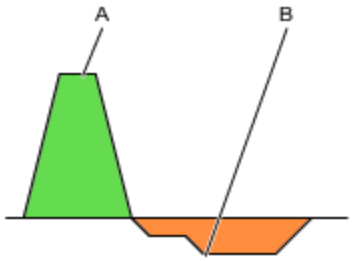
Parameter name	Description
Target torque	Final target torque for the tightening.
Pulse Energy	The *Pulse energy* delivered in the action pulse expressed in a percentage of the maximum energy that the tool can deliver in each pulse.
Reaction force tuning factor	The energy delivered by the tool expressed in a percentage value. The *reaction force tuning factor* is based on the action energy and results in a comfortable reaction.
Residual torque correlation factor	The term Residual torque correlation factor is similar to a calibration and adjusts between the dynamic torque, measured in the electrical tool, and the residual torque, measured by a control tool.
Torque limits	Limits can be **Automatically** or **Manually** selected.
Torque min	Minimum torque for the step.
Torque max	Maximum torque for the step.
Angle limits	**Off:Angle limits** is turned off. **From Rundown complete: Angle limits** is turned **On**. The system starts to monitor the tightening angle as soon as *Rundown complete* is reached and reports if angle limits are violated. **From torque: Rundown angle limits** is turned **On**. The system starts to monitor the tightening angle from the specified torque value and reports if angle limits are violated.
Rundown angle monitoring torque	Torque value from where **Rundown angle limits** monitoring starts.
Angle min	Angle value for lower angle limit from the starting point.
Angle max	Angle value for the upper angle limit from starting point.
Time min	Minimum time for the step.
Time max	Maximum time for the step.
Pulse limits	**Off:** No pulse limit monitoring. **From rundown complete:** The monitoring starts when the **Rundown complete torque** is reached. **From torque:** The monitoring starts when the specific torque value is reached.
Final pulse monitoring torque	Torque value from when the pulse limits are monitored.
Pulses min	Minimum number of pulses to reach the final target.
Pulses max	Maximum number of pulses to reach the final target.
Premature torque loss detection time	A constant increase in torque is assumed when moving from rundown to tightening. A socket slip off, or a broken screw head can cause the torque to decrease. This may be detected in a monitoring window.

Pulse Tightening with Direct Driven Electrical Tools

The principle below is applicable for direct driven electrical tools. It is applicable to the Atlas Copco SRB series of tools.

The pulse tightening uses a technique of pulsing the electrical current in the motor and has two distinct features:

- An action current that adds positive torque in the tightening direction.
- A reaction current that creates a comfort reaction by applying a reverse torque.



Pulse tightening principle

A	Action pulse to apply tightening force.
B	Reaction pulse for comfort

The figure shows the general principle of a current pulse tightening strategy. The detailed curve depends on the tool type and the tightening algorithm.

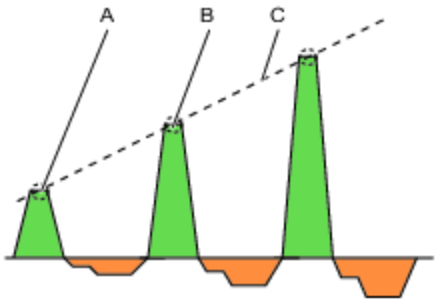
The pulse period consists of two phases as shown in the figure with an action current and a reaction current. Each action pulse adds torque to the tightening until the final target is reached. Each reaction pulse creates a counterforce that provides a comfortable reaction.

The energy level of the action phase and the reaction phase are configurable parameters. The combination of these two parameters creates an efficient tightening combined with operator comfort.

Tightening using the TensorPulse Program

The principle below is applicable for direct driven electrical tool. It is applicable to the Atlas Copco SRB series of tools.

After each pulse period the resulting torque in the screw is increased. After a series of pulses, the final torque target is reached.

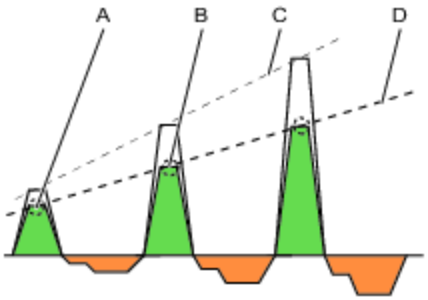


TensorPulse with maximum pulse energy

A	Maximum positive energy in pulse N
B	Maximum positive energy in pulse N+1
C	Increase in energy (torque)

The energy level in the action phase and reaction phase are user configurable parameters. The combination of these two parameters creates an efficient tightening combined with operator comfort. It is possible to set the amount of energy in the two phases as a percentage of the maximum energy that can be delivered in each period:

- *Pulse energy*; The amount of energy that is applied to each positive pulse as a percentage of the maximum energy that can be applied in the pulse period. The value is between 10-100%.
- *Reaction force retention factor*; The amount of energy that is applied to each reactive pulse as a percentage of the maximum energy that can be applied in the pulse period. The value is between 0-75%.



TensorPulse with reduced positive pulse energy

A	Reduced positive energy in pulse N
B	Reduced positive energy in pulse N+1
C	Resulting curve for torque build up using maximum pulse energy.
D	Resulting curve for torque build up using reduced pulse energy.

- A small **Pulse energy** (reduced energy) requires more pulses to reach the target torque as the torque is increased in smaller steps. Smaller steps provides better accuracy to terminate the tightening when the target is reached. Smaller pulses decrease tool movement and increases operator comfort.

- A correctly tuned *Reaction force retention factor* will create the desired operator comfort. If the factor is too high the operator feels a clockwise rotation of the tool. If the factor is too low, the operator feels a counter clockwise rotation of the tool.
- In an ideal configuration, the reaction energy does not create any loosening force. If the amount of pulses to reach the target value increases, the value is set too high and a small loosening occurs at each pulse.

The optimum values for the *Pulse energy* and the *Reaction force retention factor* need to be tuned for optimum performance of the tool and for best operator comfort.

Impulse Single Step Tightening Program

Rundown

Parameter name	Condition	Description	Default value
Rundown speed		Selected by radio buttons. Rundown speed can be selected between **Max** or **Manual**.	Max
Rundown speed	Rundown speed = manual	Specifies the tool speed during the rundown step.	
Rundown time limits		Selected from a shortcut menu: **Off:Rundown time limits** is turned off. **From Trigger: Rundown time limits** is turned **On**. The system starts to monitor the time as soon as the tool trigger is pressed and reports if the time limits are violated. **From torque: Rundown time limits** is turned **On**. The system starts to monitor the time from the specified torque value and reports if the time limits are violated.	Off
Rundown time monitoring torque	Rundown time limits = from torque	Torque value from where **Rundown time limits** monitor starts.	
Time min	Rundown time limits = On	Minimum allowed time for rundown.	10ms
Time max	Rundown time limits = On	Maximum allowed time for rundown.	5000ms

Parameter name	Condition	Description	Default value
Rundown pulse limits		Selected from a shortcut menu: **Off:Rundown pulse limits** is turned off. **From Trigger: Rundown pulse limits** is turned **On**. The system starts to monitor the pulses as soon as the tool trigger is pressed and reports if the pulse limits are violated. **From torque: Rundown pulse limits** is turned **On**. The system starts to monitor the pulses from the specified torque value and reports if the pulse limits are violated.	Off
Rundown pulse monitoring torque	Rundown pulse limits = from torque	Torque value from where the **Rundown pulse limits** monitor starts.	2.5Nm
Pulses min	Rundown pulse limits = On	Minimum number of pulses to reach the target.	2
Pulses max	Rundown pulse limits = On	Maximum number of pulses to reach the target.	50
Rundown complete torque		Defines the torque value for when snug is reached and rundown is completed.	5Nm

Tightening

Parameter name	Condition	Description	Default value
Target torque		Final target torque for the tightening.	
Pulse Energy		The *Pulse energy* delivered in the action pulse expressed in a percentage of the maximum energy the tool can deliver in each pulse.	
Residual torque correlation factor		The term Residual torque correlation factor is similar to a calibration and adjusts between the dynamic torque, measured in the electrical tool, and the residual torque, measured by a control tool.	100%
Torque limits		Selected by radio buttons. Limits can be **Automatically** or **Manually** selected	
Torque min	Torque limits = manual	Minimum torque for the step.	
Torque max	Torque limits = manual	Maximum torque for the step.	

Parameter name	Condition	Description	Default value
Time limits		Selected from a shortcut menu: **Off:Time limits** is turned off. **From rundown complete: Time limits** is turned **On**. The system starts to monitor the time as soon as *rundown complete* is reached and reports if the time limits are violated. **From torque: Time limits** is turned **On**. The system starts to monitor the time from the specified torque value and reports if the time limits are violated.	Off
Time monitoring torque	Time limits = from torque	Torque value from where the **Time limits** monitor starts.	
Time min	Time limits = On	Minimum allowed time for tightening.	10ms
Time max	Time limits = On	Maximum allowed time for tightening.	1000ms
Pulse limits		Selected from a shortcut menu: **Off:** No pulse limit monitoring. **From rundown complete:** The monitoring starts when the **Rundown complete torque** is reached and reports if the number of pulses is outside the limit. **From torque:** The monitoring starts when the specific torque value is reached and reports if the number of pulses is outside the limit.	Off
Final pulse monitoring torque	Pulse limits = from torque	Torque value from when the pulse limits are monitored.	
Pulses min	Pulse limits = on	Minimum number of pulses to reach the final target.	2
Pulses max	Pulse limits = on	Maximum number of pulses to reach the final target.	50
Premature torque loss detection time		A constant increase in torque is assumed when moving from rundown to tightening. A socket slip of, or a broken screw head can cause the torque decrease. This may be detected in a monitoring window.	200 ms

Rotate

The Rotate strategy is primarily a strategy for testing and demonstration purposes. When the tool is allowed to rotate freely, it turns the socket the specified angle using the lowest torque possible.

Parameter	Description	Default value
Target speed	Target speed for the Rotate strategy.	

Parameter	Description	Default value
<Target speed>	Manual tool speed during the Rotate strategy.	16.5% of Tool max speed
Target angle	Angle to turn the spindle.	360°

External Result

External result is a strategy used when an OK tightening is indicated by an external digital signal (and not by torque or angle values measured during tightening).

When the signal is sent, the Result view will show the value of the Target parameter provided in the tightening program (specified torque value, angle value, or text string). These (torque and angle) values do not represent actual measured values, but only inserted text.

Parameter	Description	Default value
Torque <Target torque>	Numerical value for desired displayed target torque value	0.00
Angle <Target angle>	Numerical value for desired displayed target angle value	360°
Text	Alphanumerical string for desired displayed text.	

Running the External Result Tightening Strategy with a Tool Connected

1. On the Home view, select the **Tightening** Tab. Then, create a tightening program with **External Result** strategy.
2. Return to the Home view and select the **Virtual Station** Tab.

   In the **Licenses** window, the **External Result Tightening Strategy with a Tool Connected** feature requires a license to be assigned and used by a virtual station.

3. In the **Tool** window, select the necessary tool. Then, select the tool configuration.
4. In the **Task** window, select the tightening program with an **External Result** strategy.
5. Send **EXTERNAL_OK** signal to the Virtual Station.
6. Select **Go Result** button to display the results.
   Results are sent from the Tool configuration for the tool connected to the Virtual Station.

Running the External Result Tightening Strategy without a Tool Connected

1. On the Home view, select the **Tightening** Tab. Then, create a tightening program with **External Result** strategy.
2. Return to the Home view and select the **Settings** Tab. Then, select **External Tool**.
3. Select the Plus icon at the upper-right corner of the GUI to create an external tool.

   It is possible to create up to 10 External Tools configurations.

4. In the **External Tool** window, enter the model, the serial number and the description of the external tool.

   Serial Number is a mandatory text box.
   The serial number can be used to provide an identifier for the necessary tool, for example the manufacturer serial number. The maximum number of characters for the Serial Number text box is 32.

   Once the switch at the upper-right corner of the **External Tool** window is set to **On**, return to the Home view and select the **Tool** Tab. The added external tool appears in the list of the available tools.

5. Return to the Home view and select the **Virtual Station** Tab.

   In the **Licenses** window, the **External Result Tightening Strategy without a Tool Connected** feature requires a license to be assigned and used by a virtual station.

6. In the **Tool** window, select the necessary external tool. Then, select the tool configuration.
7. In the **Task** window, select the tightening program with an **External Result** strategy.
8. Send **EXTERNAL_OK** signal to the Virtual Station.
9. Select **Go Result** button to display the results (serial numbers).
   Serial numbers are sent from the External Tool configuration for the tool connected to the Virtual Station.

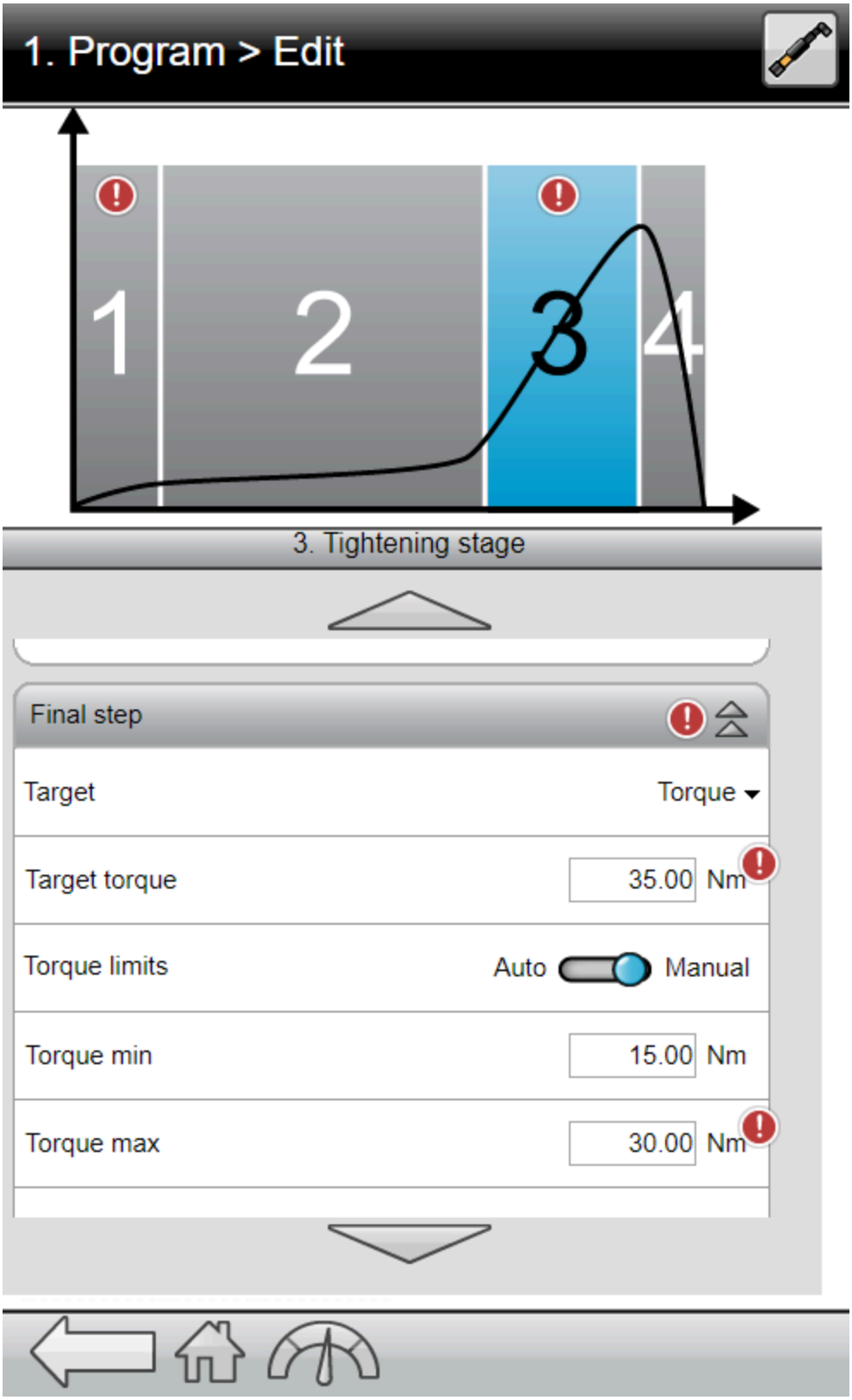
Tightening Program and Error Reporting Validation

The tightening program automatically validates with the parameter rules and tool properties as soon as new values are entered or changes are made. If the validation detects any errors they are reported with an error description.

Validation Error Reporting

If the validation gives an error, it is displayed with an icon next to the parameter or parameters causing the error. When you tap on the icon, a short description of the error is given.

Example (See image):



1. **Target torque** is set to 25 Nm with Final torque limits set to **Torque min** 23.75 Nm and **Torque max** 24.5 Nm (this value is hidden by the pop-up window in the image).
2. When you tap on the validation error icon next to the **Torque max** parameter, a short description of the error is given, saying that **Target torque** is greater than **Torque max** (Torque max <= Target torque).
3. To fix the error, adjust the **Torque max** value so that it is greater than **Target torque**, and the error icon will disappear.

Validate a Tool with a Tightening Program

1. In the Tightening menu, choose Tightening program library or Multistep program library. If required, select a specific program in the list. Note that validation can be performed both for the entire list of programs, or for individual programs.
2. Select the **tool icon**  in the upper right corner.
3. In the pop-up window, choose the tool to validate the tightening program against, and click **Validate**.

   If a tightening program is not compatible with the selected tool, it will be indicated by a red circle with an exclamation point.

Tightening Program Tool Compatibility Table

The availability of tightening strategies depends on the licenses installed on the controller.

Tightening Strategies	ES	ST	STR	SR	SB+	ETT	SL (low voltage)	QST	STB	SRB 2.0 ETP-SRB31-20	SRB 2.1 ETP-SRB31-25	SRB-HA	TBP / TBP-S	STW	External tool
Two step	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-
Quick step	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-
Three step	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-
Four step	X	X	X	X	-	X	X	X	-	-	-	-	-	-	-
Turbo Tight	X	-	X	X*	-	X	-	-	-	X	X	-	-	-	-
Rotate	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-
External Result	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X
Tensor Pulse	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-

Tightening Strategies	ES	ST	STR	SR	SB+	ETT	SL (low voltage)	QST	STB	SRB 2.0 ETP-SRB31-20	SRB 2.1 ETP-SRB31-25	SRB-HA	TBP / TBP-S	STW	External tool
Impulse - single step	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-
Wrench production	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
Wrench quality	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-

* Available only for SR31.

Tightening Features	ES	ST	STR	SR	SB+	ETT	SL (low voltage)	QST	STB	SRB 2.0 ETP-SRB31-20	SRB 2.1 ETP-SRB31-25	TBP / TBP-S	STW	External tool
True Angle	-	-	X	-	-	X	-	-	-	-	-	-	-	-

Multistep Programs

WARNING

Risk of injury

A change in the configuration of the tightening program may cause unexpected torque, rotational direction, or speed in the system(s) where the tightening program is currently in use. This could result in severe bodily injury and/or property damage.

- Check the tightening program configurations after adding a new program or after applying changes to an existing program.

Controller features, such as the Low Reaction Tightening Strategies and controller-wide functions among others, require licenses distributed through the Functionality Management System (FMS). Whereas configuration of features is possible without specific licenses, the assignment and use of those features will require the correct license to be installed on the controller. Please refer to Licenses (FMS) for more detailed information on licenses.

A multistep tightening is a tightening done in several steps. The number of steps and the type of steps vary depending on the tightening to be done. A multistep tightening program is highly configurable, including monitoring function and restrictions.

The multistep tightening strategy has not been implemented for STB tools.

Multistep GUI Interface

While multistep tightening programs can be selected from the controller screen, **editing** programs can only be done in the web GUI.

The interface for mutistep programs can be divided into three main areas.

On top there is a drop-down menu containing the Properties of the multistep tightening program. Here general properties such as program name, overal program monitor and validation can be filled out.

To the right there are three tabs containing the steps, monitors and restrictions that can be used to build the multistep program. To use any of the items, click on the appropriate tab, and drag the item in the list to the tightening area. Depending on its funtion, either drop the item between the beginning and the end of the program (for steps), or on top of a particular step (for monitors and restrictions).

The main area of the interface is made up of the **tightening area**. This is the area that includes all the steps in the tightening program.

At bottom left of the screen there are zoom buttons (+ and -), as well as a Delete button. Use the zoom buttons to zoom in and out on the tightening area.

Tightening Steps

This section lists the tightening steps that are valid for the Power Focus 6000 and Power Focus 6000 StepSync Controllers.

General Parameters

Name

It is possible to rename each step, if needed.

Rotational direction

Each of the tightening steps can run either **forward**, that is to make a tightening, or **reverse**, to loosen the screw slightly. The arrows indicate this direction. Many of the tightening steps have a direction hard-coded to forward, for example **Tighten to Angle**, or **Tighten to Torque**. Steps such as **Loosen to Angle** or **Loosen to Torque** have their direction automatically set to reverse.

The **reverse** setting is not allowed for tools configured with Gear Front Attachment (GFA) of type open end. The tightening direction of the tightening program must be the same as the tightening direction of the open end tool for a tightening to be allowed to be run. It is possible to assign a loosening program to a tightening program for an open end tool, but if the direction switch is set to run the loosening program, the tool will be locked.

Step category

For each step, there is an option to choose a **step category**. By selecting step category, the NOK tightenings will be listed in the event result view with related detailed status together with the corresponding multistep error information. If no selection is made, the detailed status will be set to "uncategorized multistep error". The related detailed status can be customized.

Angle window

A joint is considered **Hard** if the screw is tightened to its full torque and it rotates 30 degrees (or less) after it has been tightened to its snug point. A **Soft** joint rotates 720 degrees or more after it has been tightened to its snug point. The hardness parameter defines the **Angle Window** for the gradient calculation. The harder the joint - the smaller the angle window.

Speed Ramp / Acceleration (only available in ToolsTalk 2)

For most of the steps it is possible to specify how the acceleration to the target speed should be achieved. Three different settings are possible; Hard, Soft and Manual. The acceleration defined will be used whenever a step is started. Regardless whether the tool is already running with speed at the beginning of the step, the ramp will be used to accelerate to the target speed of the step. This will be the case even if the speed at the start of the step is higher, or lower than the target speed.

Speed ramp - Hard and **Soft** mode:

Acceleration	**Speed ramp used**
Hard	2000 rpm/s (Speed Ramp between 1000 and 10000 rpm/s is a Hard acceleration.)
Soft	500 rpm/s (Speed Ramp between 200 and 1000 rpm/s is a Soft acceleration.)

Speed ramp - Manual mode:

Parameter	**Default value**	**Minimum limit**	**Maximum limit**
Speed	60 rpm	Must be > 0	Must be <= Tool Max Speed
Acceleration	500 rpm/s	Must be > 0	Must be <= Tool Max Acceleration

Using speed shifts

You can define 1-5 angle triggers or torque triggers during a step, where the speed will shift.

The speed shifts can be added in the **Configuration** field.

Within one step, all the speed shift triggers are based on the same property (either torque or angle). They cannot be mixed within one step.

To add a speed shift:

1. In the dialog box of a step that can have speed shifts, select **Add speed shift**.
   Then, select an angle range or a torque range.
   The Speed Shift Angle/Torque fields open.

2. Add values according to the table below:

Parameter	Description
Angle/Torque trigger	Must be > 0
Speed	Must be >0
Speed ramp type	Hard or soft

The Torque triggers and Angle triggers must be less than the step target, depending on the type of the step and the trigger type.

The Torque trigger and Torque speed also validate against the Max torque and Max speed of the tool.
A warning or error indicator occurs whenever the Speed Shift settings exceed either the tool max values or step max values.

Controlling braking behavior (Ergo stop/Inertia)

The braking behavior of a Multistep tightening program can be controlled at two possible locations in the program: in a step preceding a reversal of direction of the tightening, and/or at the final step of the tightening program. At other locations in the Multistep program, the braking parameters will not be available in the step's general settings. Braking can be set to either **Ergo stop** or **Inertia**. **Inertia** will brake the tool completely, while **Ergo stop** will allow for a more ergonomic slowing down of the tightening.

To set the type of braking, go into the settings for the step, and set the *Brake configuration* dropdown to **Ergo stop** or **Inertia**. Inertia has no additional parameters.

Ergo stop parameters

Parameter	Description
Adaptive brake	Set the Adaptive Brake to On or Off
Ramp time	Only available when Adaptive Brake is set to Off. Insert time in ms.

List of individual steps

The following tightening steps are not supported for tools configured with Gear Front Attachment (GFA) of type open end:

- A - Loosen to Angle
- TrR - Loosen to Trigger Release
- T - Loosen to Torque
- E - Engage

- SR - Socket Release
- DT - Tighten to DynaTork

C - Clutch

This step will run the tool with the programmed Speed in forward direction until the Clutch has been released. When the tool has reported the release of the Clutch the step will finish with OK status.

A tightening program using the Clutch step cannot have any other step assigned.

This step is only valid for the Clutch tools BCV-RE and BCP-RE.

Parameter	Description
Speed Control	One Speed or Two Speed
Final Speed	Sets the final speed of the program [rpm]
Speed Ramp	Switch where speed ramp can be chosen [Hard, Soft]
Rehit	Rehit detection set to On or Off
Rehit angle	Sets the rehit angle [°]

CL - Clutch Loosening

This step will run the tool with the programmed speed in reverse direction until the tool trigger is released.

A loosening program using the Clutch step can't have any other step assigned.

This step is only valid for the Clutch tools BCV-RE and BCP-RE.

Parameter	Description
Final	Sets the speed of the program [rpm]

W – Wait

In this step the tool waits the specified amount of time. The tool does not rotate while waiting.

The tool waits the specified time. If the hold position is set to **On** the tool holds the position during the **Wait time**.

SR - Socket Release

This step runs the tool with speed n in the backward direction until the target angle is reached. The target angle is measured from the start of the step.

This step is only allowed to use as the last step in the tightening path of a multistep tightening program. However, it is possible to add a sync point after this step.

Parameter	Description
Target angle	The angle target. Default: 3° , must be > 0
Speed ramp type	Hard, soft, or manual. Default: Hard. If you select **Manual**, the Speed ramp field opens.
Speed ramp	If Speed ramp type is **Manual**, this field opens. Default: 500 rpm/s.
Speed	Default: 60 rpm.

DI – Run Until Digital Input

This steps runs the tool, in the direction defined by parameter *Direction*, until the input specified by *Digital Input* goes high or low depending on the value of *Stop Condition*.

This step is not available for STB tools.

Parameter	Description
Direction	Forward, or Backward
Digital Input	One of the following local digital inputs on the controller can be selected: • Local DI 1 • Local DI 2 • Local DI 3 • Local DI 4
Brake (Only valid for PF6 Flex and PF6 Stepsync controllers).	If **On** the tool will be stopped when the target is reached. If **Off** the program goes directly to the next step without stopping the tool.
Stop Condition	• **Falling edge**: The steps runs until a falling edge is detected after step start. • **Rising edge**: The steps runs until a rising edge is detected after step start. • **Any edge**: The step runs until a falling or a rising edge is detected after step start. • **Low**: The step runs until low value is detected. • **High**: The step runs until high value is detected.
Speed (rpm)	Default: 60 rpm.
Speed ramp type	Hard, soft, or manual. Default: Hard. If you select **Manual**, the Speed ramp field opens.
Speed ramp	Available if *Speed ramp type* is **Manual**. Default: 500 rpm/s.

A – Tighten to Angle / Loosen to Angle

A – Tighten to Angle

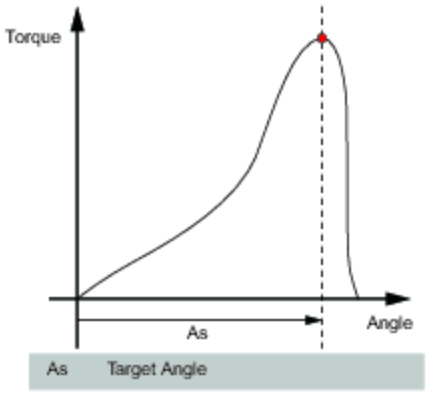
This step runs the tool until the target angle is reached. The target angle is measured from the start of the step.

A – Loosen to Angle

This step runs the tool with the speed n in the backward direction until the angle target is reached. The target angle is measured from the start of the step.

Parameters

Parameter	Description
Target angle	The angle target. Must be > 0.
Speed	Default: 60 rpm.
Speed ramp type	Hard, soft, or manual. Default: Hard. If you select **Manual**, the Speed ramp field opens.
Speed ramp	If Speed ramp type is **Manual**, this field opens. Default: 500 rpm/s.
Brake (Only valid for PF6 Flex and PF6 Stepsync controllers).	If **On** the tool will be stopped when the target is reached. If **Off** the program goes directly to the next step without stopping the tool.



TrR – Loosen to Trigger Release

This step is valid only for the PF6000 controller.

This step runs in the backward direction until the tool trigger is released (loosen). It can only be used as a last step in a program.

For STB tools, this step is only applicable for loosening programs.

Parameter	Description
Speed	Numerical value for rotation speed; in rpm.
Speed Ramp Type	List of options where speed ramp can be chosen [Hard, Soft, Manual]

TTTR – Tighten to Trigger Release

This step runs until the tool trigger is released (tighten). It can only be used as a last step in a tightening program.

Parameter	Description
Speed	Numerical value for rotation speed; in rpm.
Speed Ramp Type	List of options where speed ramp can be chosen [Hard, Soft, Manual]

Tighten to yield, method 2 (YM2)

This step is valid only for the PF6 Stepsync controller and not valid for PF6000 controller.

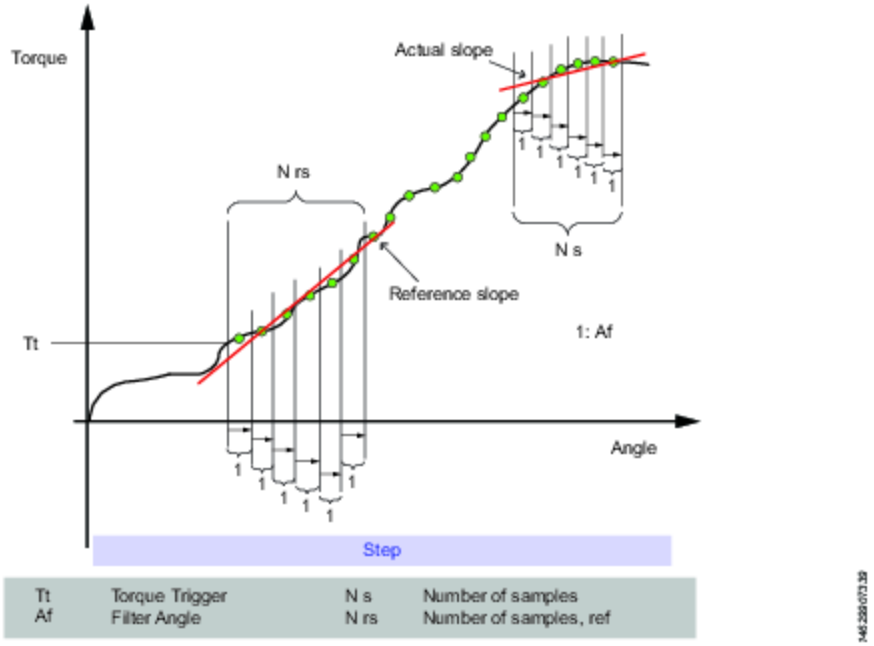
This step runs the tool with the specified speed in the forward direction until the yield point is detected.

Search for the yield point starts when the torque has reached **Tt**. The average of the torque over **Af** degrees is calculated. This procedure is repeated **N rs** times.

A reference slope is calculated with linear regression over the **N rs** points. After that, new average values are continuously calculated over **A f** degrees.

The actual slope is calculated with linear regression over the last **N s** average points. The yield point is reached when the slope is less than **Py %** of the reference slope.

Parameter	Description
Target torque	Must be > 0.
Filter angle	Default: 1. Must be > 0.
Number of samples	Default: 6. Must be >=4.
Number pf samples, reference	Default: 6. Must be >=4.
Yield point percentage	Default: 90%. Must be >20%.
Speed	Default: 60 rpm. Must be > 0.
Speed ramp type	Hard, soft, or manual. Default: Hard. If you select **Manual**, the Speed ramp field opens.
Speed ramp	If Speed ramp type is **Manual**, this field opens. Default: 500 rpm/s.
Brake (Only valid for PF6 Flex and PF6 Stepsync controllers).	If **On** the tool will be stopped when the target is reached. If **Off** the program goes directly to the next step without stopping the tool.



T - Tighten to Torque / Loosen to Torque

T – Tighten to Torque

This step runs the tool with the programmed speed in forward direction until the target torque is reached.

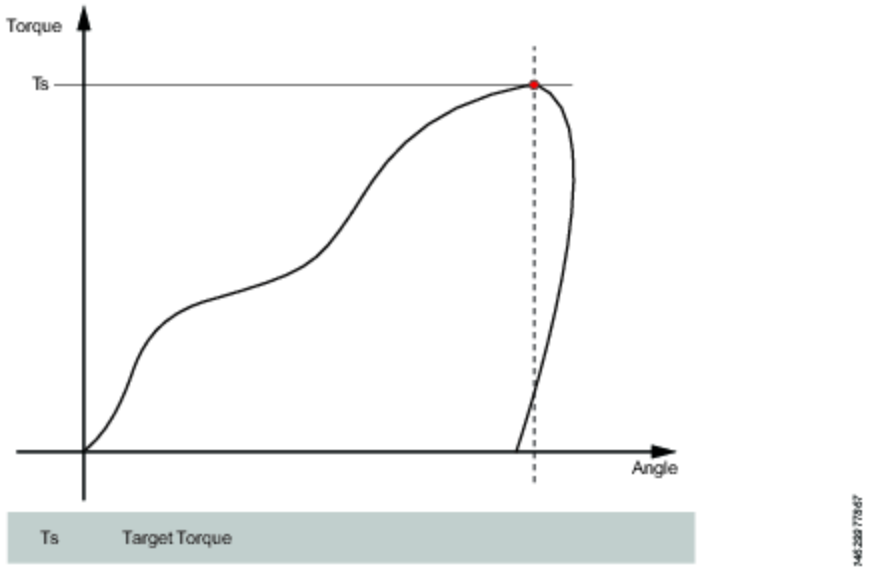
Parameter	Description
Target torque	The torque target. Must be > 0.
Speed ramp type	Hard, soft, or manual. Default: Hard. If you select **Manual**, the Speed ramp field opens.
Speed	Default: 60 rpm. Must be > 0.
Speed ramp	If Speed ramp type is **Manual**, this field opens. Default: 500 rpm/s.
Brake (Only valid for PF6 Flex and PF6 Stepsync controllers).	If **On** the tool will be stopped when the target is reached. If **Off** the program goes directly to the next step without stopping the tool.

T – Loosen to Torque

This step runs the tool with the speed in the backward direction. For the step to be active, the torque must first exceed 110 % of the Target torque. The Target torque should be set to a positive value. After reaching the target torque, the step runs until the torque drops below the target torque.

Parameter	Description
Target torque	The torque target. Must be > 0.
Speed ramp type	Hard, soft, or manual. Default: Hard. If you select **Manual**, the Speed ramp field opens.
Speed	Default: 60 rpm. Must be > 0.
Speed ramp	If Speed ramp type is **Manual**, this field opens. Default: 500 rpm/s.

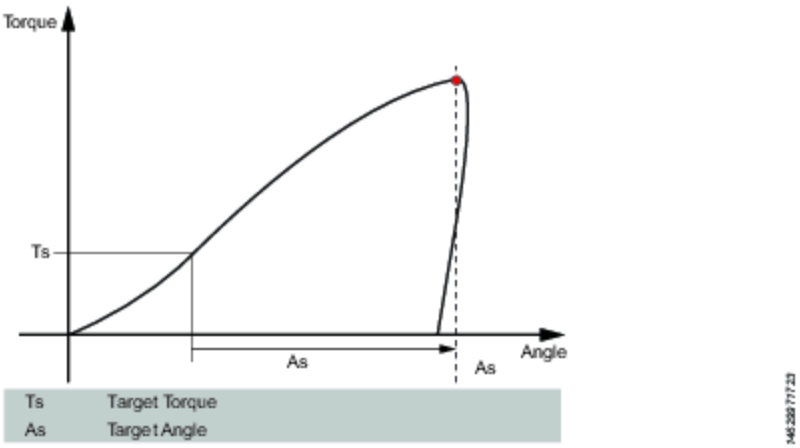
Parameter	Description
Brake (Only valid for PF6 Flex and PF6 Stepsync controllers).	If **On** the tool will be stopped when the target is reached. If **Off** the program goes directly to the next step without stopping the tool.



T+A – Tighten to Torque Plus Angle

This step runs the tool until the target torque is reached. From this point it continues to run an additional target angle.

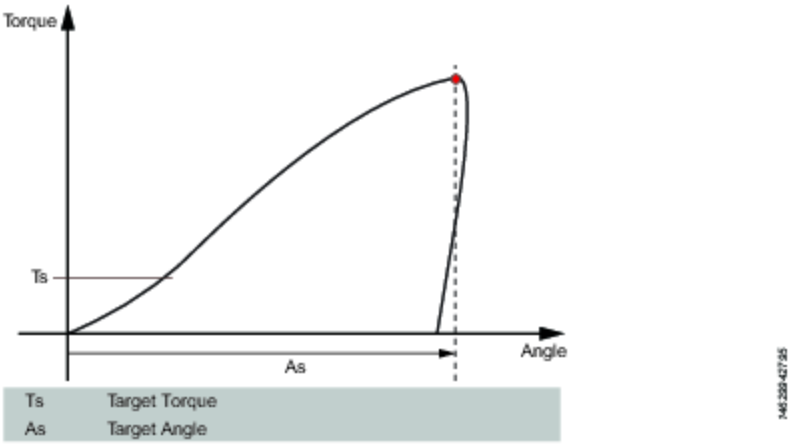
Parameter	Description
Target torque	The torque target. Must be > 0.
Target angle	The angle target. Must be > 0.
Speed ramp type	Hard, soft, or manual. Default: Hard. If you select **Manual**, the Speed ramp field opens.
Speed ramp	If Speed ramp type is **Manual**, this field opens. Default: 500 rpm/s.
Speed	Default: 60 rpm.
Brake (Only valid for PF6 Flex and PF6 Stepsync controllers).	If **On** the tool will be stopped when the target is reached. If **Off** the program goes directly to the next step without stopping the tool.



T|A – Tighten to Torque or Angle

This step runs the tool with the speed n in the forward direction until the first of either torque target or angle target is reached. The torque and angle measurements start at the beginning of the step.

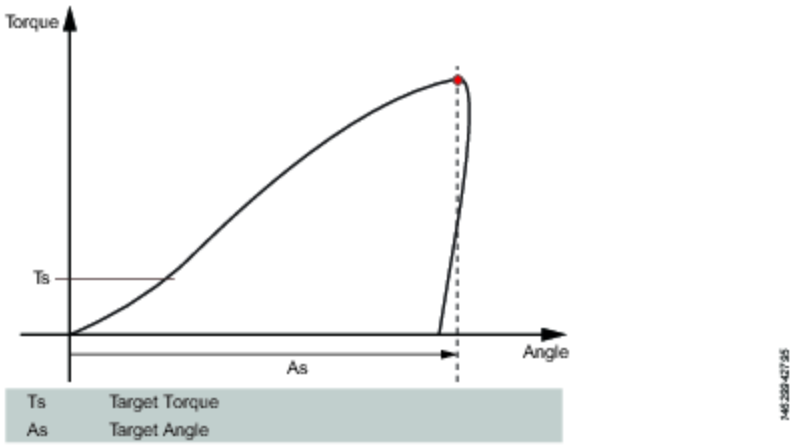
Parameter	Description
Target torque	Must be > 0.
Target angle	Must be > 0.
Speed	Default: 60 rpm. Must be > 0.
Speed ramp type	Hard, soft, or manual. Default: Hard. If you select **Manual**, the Speed ramp field opens.
Speed ramp	If Speed ramp type is **Manual**, this field opens. Default: 500 rpm/s.
Brake (Only valid for PF6 Flex and PF6 Stepsync controllers).	If **On** the tool will be stopped when the target is reached. If **Off** the program goes directly to the next step without stopping the tool.



T&A – Tighten to Torque and Angle

The tool runs until with the specified speed in the forward direction until both target torque and target angle are reached. The target torque and the target angle must be set to > 0.

Parameter	Description
Target torque	Must be > 0.
Target angle	Default: 0. Must be > 0.
Speed	Default: 60 rpm. Must be > 0.
Speed ramp type	Hard, soft, or manual. Default: Hard. If you select **Manual**, the Speed ramp field opens.
Brake (Only valid for PF6 Flex and PF6 Stepsync controllers).	If **On** the tool will be stopped when the target is reached. If **Off** the program goes directly to the next step without stopping the tool.



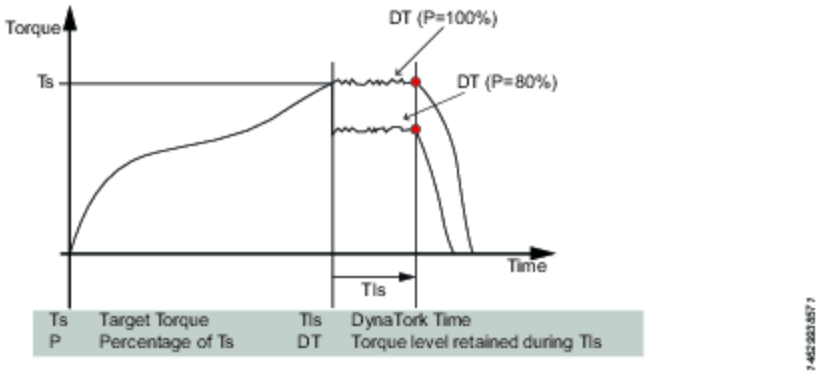
DT – Tighten to DynaTork

This step runs the tool with speed n in the forward direction until the **Target torque** is reached. The tool will then hold the current constant at the **DynaTork Percentage** of **Target torque** during the **DynaTork time**.

To avoid overheating of the tool, it is strongly recommended to never run DynaTork to more than 40% of the maximum torque of the tool.

Parameter	Description
Target torque	The torque target. Must be > 0.
DynaTork Time	The time DynaTork will be active.
DynaTork Percentage	The percentage of **Torque target**.
Speed ramp type	Hard, soft, or manual. Default: Hard. If you select **Manual**, the Speed ramp field opens.
Speed ramp	If Speed ramp type is **Manual**, this field opens. Default: 500 rpm/s.
Speed (rpm)	Default: 60 rpm.

Parameter	Description
Brake (Only valid for PF6 Flex and PF6 Stepsync controllers).	If **On** the tool will be stopped when the target is reached. If **Off** the program goes directly to the next step without stopping the tool.



Y – Tighten to Yield

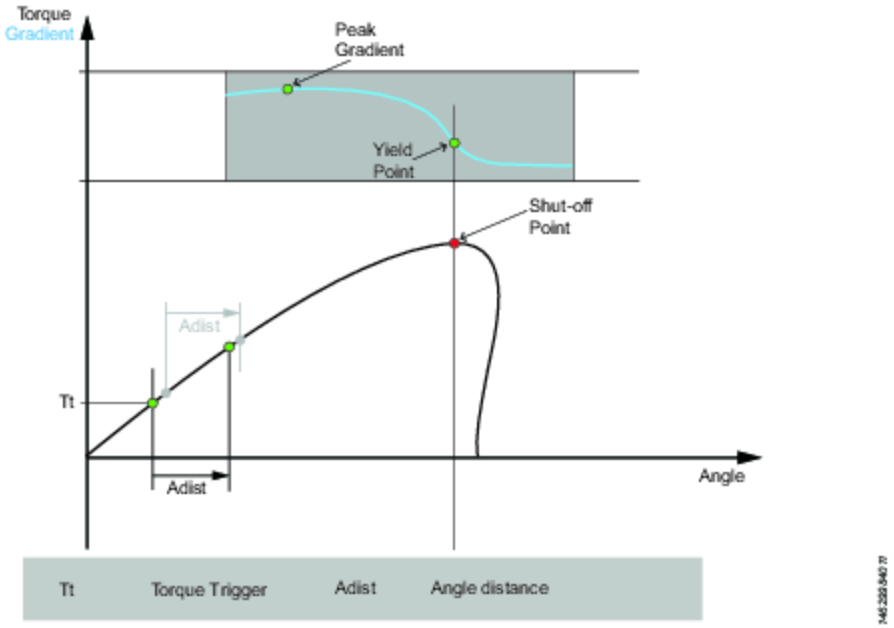
This step is not available for STB tools.

This strategy runs the tool with the speed in the forward direction until the yield point is detected. The yield point is found by monitoring the torque gradient from the point where the torque goes above the **Trigger Torque** level, calculated based on Torque and Angle distance measurements. The Angle distance parameter is set according to the specified hardness of the joint.

Set the **Gradient angle window** (for hard joint, for soft joint or for manually setting of the Angle window). If **Manual** is selected, the **Angle Window** must be set. A joint is considered **Hard** if the screw is tightened to its full torque and it rotates 30 degrees or less after it has been tightened to its snug point. A **Soft** joint rotates 720 degrees or more after it has been tightened to its snug point. The hardness parameter defines the Angle Window for the gradient calculation. The harder the joint - the smaller the angle window.

Parameter	Description
Gradient Angle Window	Specifies *Angle Window*: • For **Hard Joint**: *Angle Window* = **1 deg**. • For **Soft Joint**: *Angle Window* = **20 deg**. • **Manual**: Manually set *Angle Window*.
Angle Window	Available when *Gradient Angle Window* is set to **Manual**. Must be > 0 and <= 100.
Trigger Torque	The angle measurement starts at this trigger. Must be >= 0 and < Tool MaxTorque.
Damping	Frequency in which the gradient is being calculated. Must be > 0 and < 100 and < *Angle window*.
Yield Point Percentage	Must be >= 20 %
Speed	Default: 60 rpm. Must be > 0.

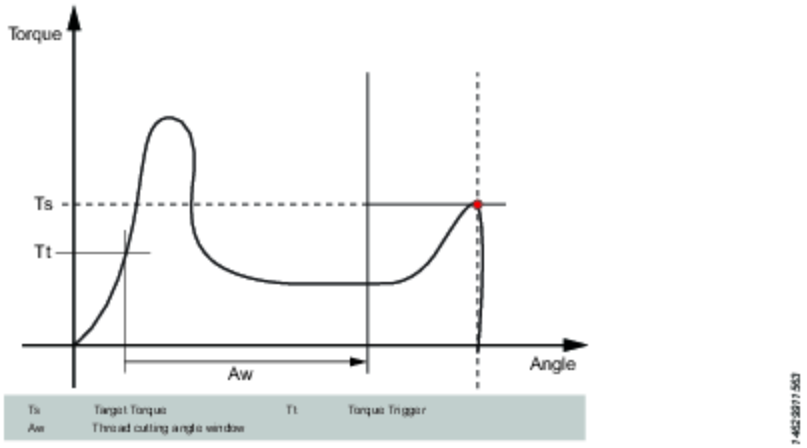
Parameter	Description
Speed ramp type	Hard, soft, or manual. Default: Hard. If you select **Manual**, the Speed ramp field opens.
Torque Filter Type	The type of the filter: • **None**: No filtering of the torque is used. The raw values are used as-is in the gradient calculation. • **Five-point**: The torque value used in the calculation are filtered using a sliding average filter over 5 torque samples. • **Low pass**: The torque values is filtered with a simple discrete Infinite Impulse Response filter. • **Sliding Average**: The torque values used in the calculation are filtered using a sliding average filter over a *Number of Samples* specified by the use.
Cut-off Frequency	Needs to be specified when *Torque Filter Type* is set to **Low pass**: • 20 Hz • 40 Hz • 90 Hz • 200 Hz • 600 Hz
Number of Samples	Needs to be specified when *Torque Filter Type* is set to **Sliding Average**: • 2 • 4 • 6 • 8 • 16 • 32
Brake (Only valid for PF6 Flex and PF6 Stepsync controllers).	If **On** the tool will be stopped when the target is reached. If **Off** the program goes directly to the next step without stopping the tool.



ThCT – Thread Cutting to Torque

The **Thread Cutting to Torque** function enables tightening where the Rundown torque required is greater than the **Rundown complete** torque, for example when tightening thin layers of metal using self-threading (or selftapping) screws. The tool runs in forward direction until the **Thread Cutting Angle** (Aw) is reached. The thread cutting angle window is measured from when the torque passes **Thread Cut Trigger Torque** (Ttc) for the first time. From the point where Thread cutting angle is reached, the step continues to run until the **Target Torque** (Tt) is reached.

Parameter	Description
Target torque	Must be > 0.
Thread Cutting Angle Window	Default: 0. Must be > 0.
Trigger Torque	The angle measurement starts at this trigger.
Speed	Default: 60 rpm. Must be > 0.
Speed ramp type	Hard, soft, or manual. Default: Hard. If you select **Manual**, the Speed ramp field opens.
Brake (Only valid for PF6 Flex and PF6 Stepsync controllers).	If **On** the tool will be stopped when the target is reached. If **Off** the program goes directly to the next step without stopping the tool.



RD – Rundown

This step is not available for STB tools.

Rundown step is the part of the tightening from when the screw enters the thread until just before the screw head touches the underlying surface and snug point is reached. The torque required during rundown does not contribute to any clamping force.

This step runs the tool with the speed in the forward direction, and depending on the **Rundown Type**, Torque or Snug the step behavior is as follows:

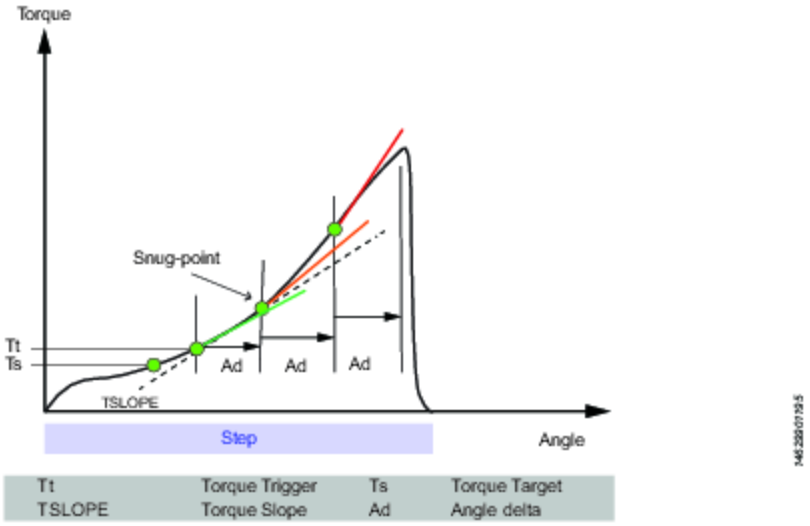
Rundown Type: To Torque: The step stops when the specified target torque is found.

Rundown Type: To Snug: The snug gradient calculation starts at the specified torque trigger level Tt. If no torque trigger is set the gradient calculation is started at the start of the step.

The slope calculation is made between two angle points $\mathbf{A_d}$ degrees apart and is calculated as: (Tn – Tn-1) / (An – An-1) and as soon as two slopes after each other are larger than **TSLOPE** the snug point is found.

Parameter	Description
Rundown type	**To Torque** or **To Snug**.
Target torque	Default: "not set". Must be > 0.
Speed	Default: 60 rpm. Must be > 0.
Speed ramp type	Hard, soft, or manual. Default: Hard. If you select **Manual**, the Speed ramp field opens.
Speed ramp	If Speed ramp type is **Manual**, this field opens. Default: 500 rpm/s.
Trigger Torque	If **Rundown type** is **To Snug**, the **Trigger torque** field is displayed. Default: "not set". Must be > 0.
Delta Angle	If **Rundown type** is **To Snug**, the **Delta angle** field is displayed. Default: "0". Must be > 0.
Torque Rate	If **Rundown type** is **To Snug**, the **Torque rate** field is displayed. Default: "0". Must be > 0.

Parameter	Description
Brake (Only valid for PF6 Flex and PF6 Stepsync controllers).	If **On** the tool will be stopped when the target is reached. If **Off** the program goes directly to the next step without stopping the tool.



E - Engage

This step is not available for STB tools.

This step runs the tool in both directions until the socket engages the screw. The step continues until **Target torque** or **Target angle** is reached, provided that **Continue if not Engaged** is set to **Yes**. If Target Angle is reached in any direction, the direction is reversed. Limit the search iterations by entering **Max Engage Attempts**. If Target Torque is reached in any direction the step will finish with **OK** status.

Ext - External Result

External result is a strategy used when an OK tightening is indicated by an external digital signal (and not by torque or angle values measured during tightening). This external signal can be provided through any means that can provide a digital signal into the Power Focus 6000 (e.g through the I/O bus).

When the signal is sent, the result view (logged data) will show the value of the Target parameter provided in the tightening program (specified torque value, angle value, or text string). These (torque and angle) values do not represent actual measured values, but only inserted text.

Parameter	Description
Torque <Target torque>	Numerical value for desired displayed target torque value. A signal could for example come from a Click Wrench and display <Target torque>.
Angle <Target angle>	Numerical value for desired displayed target angle value. A signal could for example come from a Click Wrench and display <Target angle>.
Text	Alphanumerical string for desired displayed text. For example: "Oil has been changed".

MWR - Mechatronic Wrench

Mechatronic Wrench is a specialized step that can be used only in conjunction with the Mechatronic Wrench (MWR).

This step cannot be used in combination with other steps. No restrictions can be used with this step. By default, the step has three monitors: Peak Torque, Angle, and Click.

Parameter	Description
Loosening limit	Numerical value for negative torque (i.e. torque in the loosening direction) at which point the tightening result is marked as NOK (False direction of tightening (loosen)); in Nm.
Tool Size	Numerical value for the specific length of the end fitting tool installed on the MWR-TA; in mm.
Tool Bend	Numerical value for the end fitting tool installed on the MWR-TA; in °/Nm.
Rehit Angle Window	Numerical value for the angle for determining if the screw was already tightened if the torque is reached; in °.
Max Angular Rate	Numerical value for the max rate at which the screw can be tightened; in °/s.

WP - Wrench Production

Strategy used for the quality test of the tightening performed with an STwrench.

Parameter	Description
Control Strategy	The **Wrench Production** step type can be configured with the following control strategies. • **Torque**: This strategy guides the operator is reaching the desired target torque. • **Angle**: This strategy guides the operator is reaching the desired target angle. • **Torque or Angle**: This strategy guides the operator is reaching the desired target angle or desired target torque. • **Torque and Angle**: This strategy guides the operator in tightening a bolt until both the target torque and angle have been reached. • **Yield Point**: With this strategy, the STWrench detects the yield point automatically. The torque limits specify the range in which the result is OK. Target angle specifies how far beyond the yield point the user may tighten. • **Loose**: This strategy is used to loosen a tightened screw. • **PVT compensate with snug**: This strategy guides the operator in reaching the desired target torque for joints with prevailing torque, when the prevailing torque level is higher than the final target.

Based on the control strategy selected, a combination of some of the parameters listed below will be displayed.

Parameters	Description
Target Torque	Defines the target torque for tightening step.

Parameters	Description
Measure torque at	Specifies where the torque will be measured. Choose between **Peak torque** or **Peak angle**. • **Peak torque**: The torque value will be set to the peak torque value. • **Peak Angle** : The torque value will be set to the torque measured at the peak angle.
Angle search limit	This is an offset that is used to the set the torque result value for a tightening. **Measure torque at** must be set to **Peak Angle** for this parameter to be available.
Ratchet time	Numerical value for ratchet time which is by default 5000 ms. This allows the operator to release the torque for a while and recharge during the tightening operation. If the **Ratchet time** is exceeded the result of the tightening is marked as NOK with the reason "Tightening timeout".
End cycle time	Numerical value in ms to indicate the end cycle time. Applied when torque goes below the rundown complete
Torque correction coefficient	The parameter is used to correct the torque reading when using an extension or torque multiplier on the wrench. Default value is 1.
Angle correction	The parameter is used to correct the angle reading when using an extension or torque multiplier on the wrench. Default value is 0.
Target Angle	Defines the target angle for tightening step.
Rehit detection	**On** or **Off**. Rehit detection can be used to determine when a tightening is a rehit based on the angle limit setting. **Angle limit for rehit** is enabled if **Rehit direction** is set to **On**.
Linear slope coefficient	Linear slope coefficient characterizes the joint stiffness in the linear part of the curve, as torque/angle slope in the Nm/Deg measurement unit.
Compensate value	Choose between **Average torque** and **Peak torque**. The Compensate value specifies how the PVT will be calculated. **Average torque** - The PVT will be based on an average calculated using the following: • Delay monitoring • PVT interval • PVT distance • Prevailing torque min • Prevailing torque max **Peak torque** - The PVT will be based on the peak value measured before snug was detected.
Delay monitoring	PVT calculation will not start before this window has been passed, starts at tightening start.
PVT interval	Sets how many degrees the PVT window shall be calculated for, start from the PVT distance point.
PVT distance	Sets how many degrees prior to snug the system shall start the PVT window.
Prevailing torque min	Prevailing torque minimum limit.

Parameters	Description
Prevailing torque max	Prevailing torque maximum limit

WQ - Wrench Quality

Strategy used for quality test of tightenings with an STwrench.

Parameter	Description
Control Strategy	The **Wrench Quality** strategy can be configured with the following control strategies. • **Residual Torque/Time**: This strategy analyzes the torque trace as a function of time. The operator shall execute this operation with a single, steady, movement. The wrench automatically recognizes the breakaway and residual point. • **Residual Torque/Angle**: This strategy evaluates the residual torque on a joint, looking for the residual point of the Torque/Angle trace. • **Residual Torque/Peak**: This strategy evaluates the residual torque on a joint as the peak torque necessary to rotate the bolt further. • **Loose and Retighten**: This strategy loosens a bolt and retightens it back to its original position • **Yield Point**: With this strategy the wrench detects the yield point automatically. Target Angle specifies how far beyond the yield point the user may tighten.

Based on the control strategy selected, a combination of some of the parameters listed below will be displayed.

Parameters	Description
Ratchet time	Numerical value for ratchet time which is by default 5000 ms. This allows the operator to release the torque for a while and recharge during the tightening operation. If the **Ratchet time** is exceeded the result of the tightening is marked as NOK with the reason "Tightening timeout".
Torque correction coefficient	The parameter is used to correct the torque reading when using an extension or torque multiplier on the wrench. Default value is 1.
Angle correction	The parameter is used to correct the angle reading when using an extension or torque multiplier on the wrench. Default value is 0.
Target Angle	Defines the target angle for tightening step.
Rehit detection	**On** or **Off**. Rehit detection can be used to determine when a tightening is a rehit based on the angle limit setting. **Angle limit for rehit** is enabled if **Rehit direction** is set to **On**.
Linear slope coefficient	Linear slope coefficient characterizes the joint stiffness in the linear part of the curve, as torque/angle slope in the Nm/Deg measurement unit.

Trace Setting

When the trace configuration is enabled on the program level, the trace resolution can be configured on step level. The setting for **Trace Setting** defines how the sampling should be done on each specific step.

With this trace recording the sample rates are not the same in all the steps, instead the sample rate depends on the configuration in each step. This means the trace is divided into one trace for each step.

Parameter	Description
Trace Setting	• **Program**: Use the settings as defined on program level. • **Manual**: The trace sample type from the program level will be used, that is, Time or Angle. Using a different sample rate will override the setting on the program level.
Sample Time	Choose the sample time from the drop-down list (0.25 - 1000 ms).
Sample Angle	Choose the sample angle from the drop-down list (0.25 - 20 degree).

The maximum number of samples in a trace is 4096. If a tightening produces more than 4096 samples a down-sampling process will take place. A down-sampling process is removing every second trace sample from the whole tightening and continuing recording with half the resolution. This process is repeated every time the 4096 sample limit is reached. Since the down-sampling process is done for all steps, the relation between the steps is the same.

Trace channel	Note
Torque	Available for all tools equipped with a torque transducer.
Angle	Available for all tools.
Speed	Available for all tools.
Torque Second	Only available for tools with two torque transducers.
Angle Second	Only available for tools with two angle transducers.
Current	Available for all tools.
Gradient	Available if some step/restriction/monitor produces the gradient values.

Step Monitors

The step monitors are used to verify that the tightening was achieved according to the specification, for example, angle limits or torque. Each step has mandatory step monitors and optional step monitors. The mandatory monitors are included when dragging a new step to the multistep program. The optional monitors are flexible and can be placed as needed in the multistep program. Every step can have up to eight monitors each.

The following monitors are automatically added to every step that is added to the multistep tightening program.

Default step monitors

Step Monitor	Applicable steps
Angle	All
Peak Torque	All

A – Angle

This step monitor measures the maximum angle reached during the monitor and checks that it is between **High limit** and **Low limit**. The angle measurement starts at the start of the monitor or, if specified, at the point where the torque passes **Trigger torque** for the first time during the monitor.

Parameter	Description
Type	Four angle types are available: Peak angle (default), Angle at peak torque, Shut off angle, and Angle at end.
Trigger torque	The angle measurement starts at this trigger.
Low Limit	Lowest acceptable angle.
High Limit	Highest acceptable angle.

YA – Angle from Yield

This monitor measures the peak angle reached from the yield point and checks that the peak angle is within the limit.

This step monitor is not available for the STB tools.

Parameter	Description
Gradient Angle Window	Specifies *Angle Window*: • For **Hard Joint**: *Angle Window* = **1 deg**. • For **Soft Joint**: *Angle Window* = **20 deg**. • **Manual**: Manually set *Angle Window*.
Angle Window	Available when *Gradient Angle Window* is set to **Manual**. Must be > 0 and <= 100.
Yield Point Percentage	Must be >= 20 %
Trigger Torque	The angle measurement starts at this trigger. Must be > 0 and < Tool MaxTorque.
Damping	Frequency in which the gradient is being calculated. Must be > 0 and < 100 and < *Angle window*.
Low Limit	Lowest acceptable angle. Must be >= 0
High Limit	Highest acceptable angle. Must be > 0

Parameter	Description
Torque Filter Type	The type of the filter: • **None**: No filtering of the torque is used. The raw values are used as-is in the gradient calculation. • **Five-point**: The torque value used in the calculation are filtered using a sliding average filter over 5 torque samples. • **Low pass**: The torque values is filtered with a simple discrete Infinite Impulse Response filter. • **Sliding Average**: The torque values used in the calculation are filtered using a sliding average filter over a *Number of Samples* specified by the use.
Cut-off Frequency	Needs to be specified when *Torque Filter Type* is set to **Low pass**: • 20 Hz • 40 Hz • 90 Hz • 200 Hz • 600 Hz
Number of Samples	Needs to be specified when *Torque Filter Type* is set to **Sliding Average**: • 2 • 4 • 6 • 8 • 16 • 32

MT – Mean Torque

This monitor measures the average torque during the monitor and checks the calculated value is within the limits.

This step monitor is not available for the STB tools.

Parameter	Description
Type	Specifies start condition: • **Step Start**: The measurement starts from step start and ends at the shut-off point. • **Torque Trigger**: The measurement starts at the point where the torque passes *Torque Trigger* for the first time. It ends at the shut-off point. • **Angle Trigger**: The measurement starts at the point where the angle is *Angle Trigger*, measured from the optional *Trigger Torque*, is reached. Without *Trigger Torque*, the *Angle Trigger* is measured from the start of the step. It ends at the shut-off point • **Angle Window**: Measures during an *Angle Window*. The window starts at the point where the torque passes *Trigger Torque* for the first time plus an angle offset, *Angle Trigger*. • **Time Interval**: Measures during the last *Time Interval* seconds of the tightening.

Parameter	Description
Torque Trigger	Available when *Type* is set to **Trigger Torque**, **Angle Trigger** or **Angle Window**. Must be >= 0 and < **Tool Max Torque**.
Angle Trigger	Available when *Type* is set to **Angle Trigger** or **Angle Window**. Must be > 0.
Angle Window	Available when *Type* is set to **Angle Window**. Must be > 0.
Time Interval	Available when *Type* is set to **Time Interval**. Must be > 0.
Low Limit	Lowest acceptable torque.
High Limit	Highest acceptable torque.

PT – Peak Torque

This step monitor measures the maximum torque reached during the monitor, including any over shoot, and checks that it is between **High limit** and **Low limit**.

Parameter	Description
Low Limit	Lowest acceptable torque.
High Limit	Highest acceptable torque.

PTCA – Post Thread Cut Angle

Measures the angle achieved during the monitoring and checks that it is between the specified angle limits. The **Trigger Torque** level is ignored until the end of the **Thread cut angle window** is reached. After that, the angle measuring starts as soon as the measured torque is above Trigger Torque. The parameter **Stop Condition** specifies where the angle measurement should end.

Parameter	Description
Trigger torque	Must be >= 0
Thread cutting angle window	Must be > 0
Angle measurement type	Peak angle Angle at peak torque Shut off angle Angle at end
Thread cut trigger torque	Must be >= 0
Low Limit	Must be >= 0

Parameter	Description
High Limit	Must be > 0 Must be > Low limit

PTCPT – Post Thread Cut Peak Torque

Measures the maximum torque achieved during the monitoring, including any over-shoot, and checks that it is between the Torque limits. All torque values are ignored until the end of the **Thread cut angle window** has been reached.

Parameter	Description
Thread cut trigger torque	Must be >= 0
Thread cutting angle window	Must be > 0
Low Limit	Must be >= 0
High Limit	Must be > 0 Must be > Low limit

PVTH – Post View Torque High

This monitor checks that all torque values in the **Angle Window Length** are below the **High limit**.

The Angle Window starts at the angle degrees set in **Start Angle** in reverse direction from the shut-off point. This then spans for the angle degrees set in Angle Window Length in reverse direction. If Start Angle is left blank, the Angle Window starts at the shut-off point. The torque values used in the monitor are based on the mean torque value, calculated over **Number of Samples**. If the total angle of the step is less than Start Angle plus Angle Window Length the monitor will report NOK.

Parameter	Description
Start Angle	Must be >= 0
Window length	Must be > 0
Number of samples	Minimum value =1 Maximum value = 80
High Limit	Highest acceptable torque.

PVTL – Post View Torque Low

Same as monitor **Post View Torque High**, but this monitor checks that all torque values in the **Angle Window Length** are above **Low Limit** instead.

Parameter	Description
Start Angle	Must be >= 0

Parameter	Description
Window length	Must be > 0
Number of samples	Minimum value =1 Maximum value = 80
Low Limit	Lowest acceptable torque.

PrT – Prevailing Torque

The monitor calculates the prevailing torque value in the **Window Length** and checks that it is between the Torque limits. The Angle Window starts at the angle degrees set in **Start Angle** in reverse direction from the shut-off point. This then spans for the angle degrees set in Angle Window Length in reverse direction. If **Start Angle** is left blank the angle window starts at the shut-off point. The calculated prevailing torque value is the mean or peak torque value (depending on the parameter set by the user) during the **Window Length**. The calculated value is saved as result data **Prevailing Torque Measured**. If **Torque compensation** is set to **On**, the Prevailing Torque Measured will be subtracted from all torque result values in consecutive steps. Any previously calculated prevailing torque compensation values will no longer be subtracted from torque result values. If **Torque compensation** is set to **No**, no subtraction will be made in consecutive steps.

If the total angle of the step is less than the **Start Angle** plus **Window Length**, then the monitor will report NOK.

Prevailing torque can be measured as an average of measured values, or at peak torque. To choose between these two modes, set the *Use Value* parameter to either **Mean torque** (for average values), or **Peak torque** (for peak value).

Parameter	Description
Torque Compensation	On or off.
Start Angle	Must be > 0
Window length	Must be >= 0
Low Limit	Must be > 0
High Limit	Must be >= 0
Use value	**Mean torque** (for average values), or **Peak torque** (for peak value).

SOT – Shut Off Torque

The shut off point is the point where the step reaches its target. The torque is measured at the shut off point and checked to be between **High limit** and **Low limit.**

Parameter	Description
Low Limit	Lowest acceptable torque.
High Limit	Highest acceptable torque.

SOC – Shut Off Current

The shut off point is the point where the step reaches its target. The current is measured at the shut off point and checked to be between **High limit** and **Low limit** .

Parameter	Description
Low Limit	Lowest acceptable current.
High Limit	Highest acceptable current.

SSD - Stick Slip Detection

This step monitor detects and reports stick slip effects during a step. The detection is done by counting the number of times the torque falls below the **Trigger Level**. If the number of times is larger than **Maximum Number of Oscillations** then the stick slip error is reported. The monitor operates in two different modes, **Dynamic** or **Fixed**. The difference between the modes is the way that the Trigger level is calculated.

Dynamic Torque: Trigger Level is dynamically calculated as **Peak Torque Percentage** of the current max torque, which has been achieved so far during the monitoring. The monitoring is started as soon as the torque passes the **Trigger Torque**.

Fixed Torque: Trigger Level is the fixed **Trigger Torque** specified by the user. In this mode the percentage is not needed.

If the torque never reaches the **Trigger Torque** then the monitoring is not started, this will result in status NOK.

Parameter	Description
Type	Specifies what type of Stick slip detection that will be done in the monitor Stick Slip detection. Default: Dynamic torque.
Peak Torque Percentage	Default: 80%, Must be >=10 and < 100.
Trigger Torque	Default: 5, Must be >= 0 and < Tool max torque.
Maximum Number of Oscillations	Default: 5, Must be >= 3 and <20.

Ti – Time

Measures the elapsed time during the monitor and checks that it is between the time limits. The time measurement starts at the start of the monitor and, if the Trigger Torque is specified, at the point where the torque passes Trigger Torque for the first time during the monitor.

Parameter	Description
Trigger Torque	Must be >= 0 and < Tool max torque.
Low Limit	Must be >= 0

Parameter	Description
High Limit	Must be > 0 Must be > Low limit

TG – Torque Gradient

This monitor checks the gradient is within the limit.

Parameter	Description
Gradient Angle Window	Specifies *Angle Window*: • For **Hard Joint**: *Angle Window* = **1 deg**. • For **Soft Joint**: *Angle Window* = **20 deg**. • **Manual**: Manually set *Angle Window*.
Angle Window	Available when *Gradient Angle Window* is set to **Manual**. Must be > 0 and <= 100.
End Point Check	If set to **Yes**, only the gradient measured at the shut off point of the step is checked to be within the limits.
Trigger Torque	The angle measurement starts at this trigger. Must be > 0 and < Tool MaxTorque.
Damping	Frequency in which the gradient is being calculated. Must be > 0 and < 100 and < *Angle window*.
Low Limit	Lowest acceptable torque gradient. Must be >= -100.
High Limit	Highest acceptable torque gradient. Must be > -100 and > Low limit.
Torque Filter Type	The type of the filter: • **None**: No filtering of the torque is used. The raw values are used as-is in the gradient calculation. • **Five-point**: The torque value used in the calculation are filtered using a sliding average filter over 5 torque samples. • **Low pass**: The torque values is filtered with a simple discrete Infinite Impulse Response filter. • **Sliding Average**: The torque values used in the calculation are filtered using a sliding average filter over a *Number of Samples* specified by the use.
Cut-off Frequency	Needs to be specified when *Torque Filter Type* is set to **Low pass**: • 20 Hz • 40 Hz • 90 Hz • 200 Hz • 600 Hz

Parameter	Description
Number of Samples	Needs to be specified when *Torque Filter Type* is set to **Sliding Average**: • 2 • 4 • 6 • 8 • 16 • 32
Angle Offset	Available when *End Point Check* is set to **No**. Specifies the degrees that the calculation of the gradient start after the trigger torque is passed for the first time.

TAW – Torque in Angle Window

This monitor checks that all torque values in the angle window are within the torque limits.

Parameter	Description
Trigger Torque	Must be >= 0
Start Angle	Must be > 0
Window Length	Must be <= 0
Low Limit	Must be >= 0
High Limit	Must be > 0 Must be > Low limit
NOK if window is passed	If set to **Yes**, status of this monitor is NOK if the end of angle window is not reached.

TRD – Torque Rate and Deviation

This step monitor measures and checks the torque rate, i.e. the ratio of torque vs. angle. The calculated torque rate is checked if it is within the torque rate limits defined by **High Limit** and **Low Limit**.

Parameter	Description
Trigger Torque	Torque of the angle start point.
Start Point Angle	When Start point angle has been measured from Trigger torque the measuring of the torque starts.
End Point Angle	Angle point where the measuring of the torque is stopped.
End Point Torque	Torque where the measuring of the torque is stopped.
Low Limit	Lowest acceptable torque.
High Limit	Highest acceptable torque.
Limit	Must be > 0

Cl – Click

Monitor to enable click torque and click angle results. This monitor has no settings, and can only be used in conjunction with the MWR step.

LD - Loosening Detection

This monitor can be used to check the torque and direction to see if a loosening is attempted when using the **Wrench Production** step strategy for an STWrench. If the applied torque is above the value set for **Loosening Limit** in the direction opposite to the configured thread direction of the program, the result shall be reported as NOK.

Step Restrictions

The following sections describe the step restrictions available for the PowerFocus 6000 Controller and the PowerFocus 6000 StepSync controller.

> In the The PowerFocus 6000 StepSync controller, it is possible to use syncronization points in the tightening program and when any condition that is set for a restriction is met, the tool will be stopped immediately and the program jumps to the next synchronization point (only valid for the Power Focus 6000 StepSync and PF6 Flex System controllers), or the end of the program. Whereas for a PowerFocus 6000 controller, the tool is stopped immediately and the program jumps to the end of the program.

To make sure the tightening stops if something unexpected happens, it is possible to add restrictions to the multistep tightening program. For each restriction, select **Repairable** = **Yes** to allow retry when tightening stops. For each of the steps in a multistep program it is possible to have up to four restrictions.

The following restrictions are automatically added to every step that is added to the multistep tightening program.

Default step restrictions

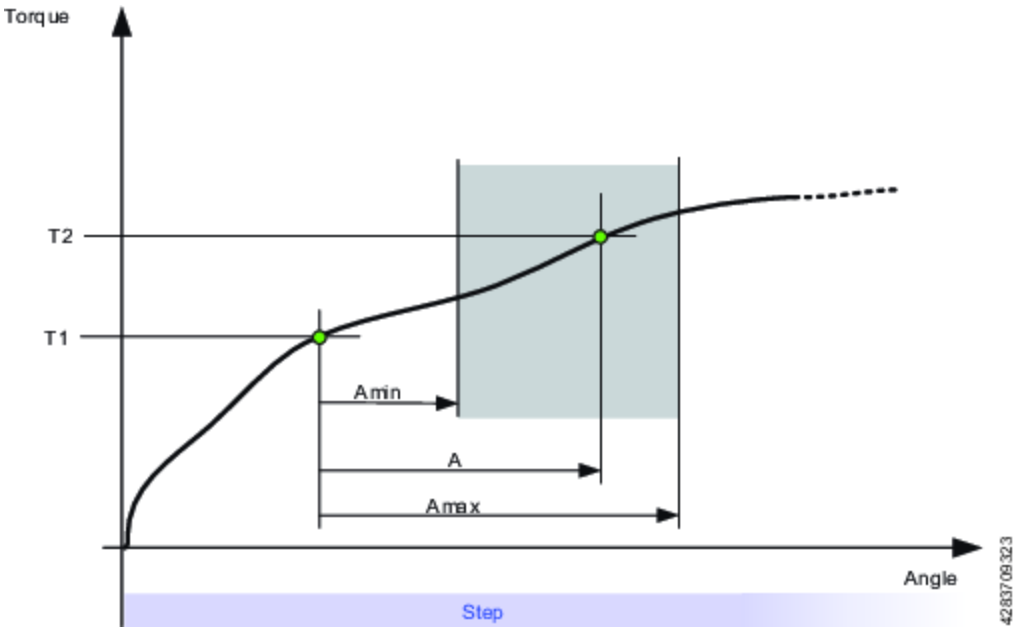
Step Restriction	Applicable steps
Step Restriction Maximum Time	All except External Result and MWR
Step Restriction Maximum Torque	• Tighten to Angle • Tighten to Torque+Angle • Turbo Loosening • Wait • Socket release • Run until Digital Input • Tighten to Trigger Release

Step Restriction	Applicable steps
Step Restriction Maximum Angle	• Tighten to Torque • TurboTight • Turbo Loosening • Tighten to DynaTork • Wait • Run until Digital Input • Loosen to Torque • Thread Cutting to Torque • Rundown • Tighten to Yield • Pulsing Rundown Snug • TensorPulse

CTh – Cross Thread

This restriction checks the angle from the point where torque passes **Start torque** (T1) to the point where the torque passes **End torque** (T2). If the angle measured from **Start torque** (T1) is higher than **Maximum limit** (Amax), the tool is stopped immediately.

When the torque passes **End torque** (T2), the measured angle is checked against the limit **Minimum limit** (Amin). If the angle is lower than this limit, the tool is stopped immediately.



Parameter	Description	In illustration
Start Torque	Must be <=0.	T1
End Torque	Must be <=0.	T2
Minimum Limit	The low angle limit.	Amin

Parameter	Description	In illustration
Maximum Limit	The high angle limit.	Amax

A – Maximum Angle

This restriction measures the angle. If the measured angle reaches the **Maximum Limit**, the tool is stopped immediately. The angle is measured from the start of the restriction or, if specified, from the point where the torque passes **Trigger Torque** for the first time during the restriction.

Parameter	Description
Trigger Torque	If specified, this is the torque from where the angle is measured.
Maximum Limit	If this limit is reached the tool is stopped immediately.

T – Maximum Torque

This restriction checks the torque. If the measured torque exceeds the **Maximum limit**, the tool is stopped immediately.

Parameter	Description
Maximum Limit	If the torque reaches this specified limit the tool is stopped immediately.

Ti – Maximum Time

This restriction checks the time. If **Maximum Limit** is reached, the tool is stopped immediately.

Parameter	Description
Maximum Limit	If this time is elapsed, the tool is stopped immediately.

RH – Rehit

This restriction checks the torque. If the measured torque exceeds the **Detection Torque**, the tool is stopped immediately and the program jumps to the end of the program. It is only possible to add step Rehit restriction to the first step of the multistep tightening program. Once the Rehit restriction has been added to the first step it shall not be possible to move the step to any other position within the tightening program. The Rehit restriction has to be deleted from the first step in order to move it to other position in the tightening program.

Parameter	Description
Detection Torque	If the measured torque exceeds the **Detection Torque**, the tool is stopped immediately and the program jumps to the end of the program. Must be greater than zero.

RT – Rescinding Torque

This restriction checks the torque and if the measured torque drops below the condition of the restriction the tool is stopped immediately and the program jumps to end of the program. There are two methods of Rescinding Torque Restrictions for Torque and Angle control processes

Parameter	Description
Type	**Torque control processes** or **Angle control processes**. **Torque control processes**: Torque control processes checks the torque. If the measured torque drops below the **Rescinding Torque Limit** the tool is stopped immediately and the program jumps to the end of the program. For the restriction to be active the torque must first exceed 110 % of the **Rescinding Torque Limit** **Angle control processes**: This restriction checks the maximum torque reached during the restriction. For the restriction to be active the torque must first exceed the **Trigger Torque**. If the measured torque drops below the maximum torque for longer time than **Rescinding Torque Time** the tool is stopped immediately and the program jumps to the end of the program. Cable tools have the option of choosing Rescinding Torque for Angle. This restriction is controlled by two parameters: **Peak Torque Percentage** and **Rescending Torque Time**. Percentage sets the downward deviation from the last peak torque, and **Rescending Torque Time** sets the duration (between 5 and 500 ms) of that deviation. Only when both conditions (equal to or lower than the indicated percentage for the set duration) are met, will the program be interrupted and jump to the end.
Rescinding Torque Limit	Default: 10 Nm. Must be > 0.

TG – Torque Gradient

This restriction checks the gradient and if it is outside the limits the tool is stopped immediately and the program jumps to the end of the program.

Parameter	Description
Gradient Angle Window	Specifies *Angle Window*: • For **Hard Joint**: *Angle Window* = **1 deg**. • For **Soft Joint**: *Angle Window* = **20 deg**. • **Manual**: Manually set *Angle Window*.
Angle Window	Available when *Gradient Angle Window* is set to **Manual**. Must be > 0 and <= 100.
Trigger Torque	Must be > 0 and < Tool MaxTorque.
Damping	Frequency in which the gradient is being calculated. Must be > 0 and < 100 and < *Angle window*.
Minimum Limit	Must be >= -100.
Maximum Limit	Must be > -100 and > Low limit.

Parameter	Description
Torque Filter Type	The type of the filter: • **None**: No filtering of the torque is used. The raw values are used as-is in the gradient calculation. • **Five-point**: The torque value used in the calculation are filtered using a sliding average filter over 5 torque samples. • **Low pass**: The torque values is filtered with a simple discrete Infinite Impulse Response filter. • **Sliding Average**: The torque values used in the calculation are filtered using a sliding average filter over a *Number of Samples* specified by the use.
Cut-off Frequency	Needs to be specified when *Torque Filter Type* is set to **Low pass**: • 20 Hz • 40 Hz • 90 Hz • 200 Hz • 600 Hz
Number of Samples	Needs to be specified when *Torque Filter Type* is set to **Sliding Average**: • 2 • 4 • 6 • 8 • 16 • 32

TAW – Torque in Angle Window

This restriction checks that the measured torque in the **Angle Window Length** is between the **Torque limits**. If the measured torque is outside the limits the tool is stopped immediately and the program jumps to the end. The Angle Window Length starts at the **Start Angle** from the point that the torque first passed the **Trigger Torque**. If Trigger Torque is not set, then the Start Angle begins at the start of the restriction.

If the end of the Angle Window Length is not reached, the status of the restriction is NOK.

Parameter	Description
Trigger Torque	Must be >= 0
Start Angle	Must be >= 0
Window Length	Must be >0
Minimum Limit	Must be >= 0
Maximum Limit	Must be <= Minimum limit

TCD - Torque vs Current Deviation

This restriction verifies that all current measurements converted to the corresponding torque are, at most, the **Maximum deviation** away from the actual torque measured with the torque transducer. The restriction starts when the torque reaches **Trigger Torque** for the first time during the step and is active until the step reaches its target.

If **Trigger Torque** is never reached, the monitor will report OK.

Parameter	Description
Trigger Torque	Must be >= 0
Maximum Deviation	Default: 1, Must be > 0

Result Reporters

The result reporters makes it possible to extract specific values of selected producer from the result. The result reporters belong to a step but has to be tied to the monitor/restriction from which they will read the values. Only monitors or restrictions located in the same step as the result reporter can be selected. A result reporter is added to a step using drag and drop (in the same way as monitors and restrictions). Each result reporter is responsible for reporting a specific result value, for example, Rundown Angle, Final Torque, Prevailing Torque.

It is possible to tie a result reporter to:

- program monitors
- step monitors
- step restrictions

Each result reporter defines a final value type:

- FA – Final Angle
- FC – Final Current
- FT – Final Torque
- PT – Prevailing Torque
- RA – Rundown Angle
- ST – Self-tap Torque

General Parameters

Parameter	Description
Producer	Specifies which monitor/restriction produces the value.
Value	Specifies which value to show from the selected producer.

Limitations:

- It is only possible to add a result reporter on a monitor/restriction belonging to a step in main path or a program monitor/program restriction.
- There may exist several reporters on a step if they are of different type.
- There may exist a result reporter of for example type final angle on every step and program monitor angle.
- For those monitor/restrictions that have more than one result value it is possible to add more than one result reporter if the result reporters are of different types.
- There may not exist several result reporters of the same type on a step or on a program monitor/restriction.
- There is only one result reported for each possible final value type.

Rules:

- The internal number of a result item has to be the same as for the corresponding result reporter.
- The internal number of a monitor/restriction result has to be the same as the internal number of the monitor/restriction in the configuration.
- The step results has to be ordered according to the order of execution. The first executed step has to be first.

Possible values reported by a result reporter if present in the monitor/restriction/step:

- The monitors/restrictions measured value (as float or integer)
- The monitors/restrictions high and low limits
- Status
- Torque trigger and angle trigger
- Angle target and torque target (read from the step)

Possible values for status:

- Low
- OK
- High
- Other
- NotSet

The target values do not belong to any step monitor so the target values are taken from the step that the monitor belongs to.

Adding a Multistep Program

1. In the **Tightening** menu, click on the **Multistep program library**.
2. Click on the **Plus** icon top right and choose the appropriate type of program in the pop-up window (Tightening or Loosening).

Deleting a Multistep Program

1. In the **Tightening** menu, click on the **Multistep program library**.
2. In the list, click on the multistep tightening program you want to delete.
3. In the program itself, at the bottom left, click on **Delete**.
4. Click **Yes** in the pop-up window to confirm your choice.

Settings for a Multistep Program

General Settings

Parameter	Description
Name	A user defined name for the multistep program.
Thread Direction	Direction of the threads, either clockwise (CW) or counter clockwise (CCW).
Loosening Program	Indicate if a loosening program is available. Choose from the list of available loosening programs in the controller.
Type	Type of program, either Tightening or Loosening.
Program Start	Gives the torque level for generating a result. If left blank, the result is generated every time the tool is started; otherwise result is only generated from the set torque level.
Program End Torque	Gives the torque value that stops a multistep tightening. The signal **168 - Program End** is true when, after a multistep tightening **Program End Torque** has reached, and **Program End Timeout** has elapsed. Default value for **Program End Torque** is Tool max torque * 0.03.
Program End Timeout	Gives the time value (in seconds) that stops a multistep tightening. The signal **168 - Program End** is true when, after a multistep tightening **Program End Torque** has reached, and **Program End Timeout** has elapsed. Default value for **Program End Timeout** is 0 seconds.
True Angle Compensation	Turns True Angle Compensation on or off (default is Off).

Attachment Tuning

Parameter	Description
Use attachment tuning	Select whether attachment tuning should be on or off.
Gear ratio	The gear ratio value can be between 0.5 and 4.0.
Efficiency tuning	The efficiency tuning value can be between 0.5 and 1.0.

Program Monitor

Parameter	Description
Angle	Turn angle monitoring **On** or **Off** for the entire program. If *Active in steps* and *Trigger Torque* are left blank, angle monitoring will start at program start.
Active in steps	Sets a range of steps the angle monitoring is valid for. If no end step is specified, angle monitoring will stop at the last step of the program that is not a *Socket Release step*.
Type	Type of angle monitoring. Choose between: • **Peak Angle**: the highest angle reached during the monitor • **Angle at Peak Torque**: the angle at the point where the highest torque was reached during the monitor (Not available for STB tools) • **Shut Off Angle**: the angle at the shut-off point of the step • **Angle at End**: the angle at the end of the monitor, including the brake, if active.
Trigger torque	Sets the value of the trigger torque for angle monitoring. For STB tools, Trigger Torque will only activate in the tightening direction when executing a tightening program; and only in the loosening direction when executing a loosening program.
Low limit	Sets angle monitoring (program) lower limit.
High limit	Sets angle monitoring (program) higher limit.
Torque	Turn Torque monitoring **On** or **Off** for the entire program. If *Active in steps* is left blank, torque monitoring will start at program start.
Active in steps	Sets a range of steps the torque monitoring is valid for. If no end step is specified, torque monitoring will stop at the last step of the program that is not a *Socket Release step*.
Type	Type of angle monitoring: • **Peak Torque**: the highest torque reached during the monitor. • **Shut Off Torque**: the torque at the shut-off point of the step.
Low limit	Sets torque monitoring (program) lower limit.
High limit	Sets torque monitoring (program) higher limit.

Program Restrictions

Parameter	Description
Maximum Time Limit	Set amount in seconds. This restriction checks the total time for the tightening and if it exceeds the **Time High** limit the tool is stopped immediately. The time is measured from the start of the program.
Maximum Torque Limit	This restriction checks the torque and if the measured torque exceeds the **Torque High** limit the tool is stopped immediately.

Reporters

This enables the user to choose which values (from monitors/restrictions) shall be shown as final values. Click **Add** to choose a result reporter to be tied to a program monitor/restriction value.

Parameter	Description
Reporter	Select a result reporter.
Producer	Select which monitor/restriction produces the value.
Value	Select which value to show from the selected producer.

Trace Configuration

The trace configuration can be done on program level or for each step. The default configuration is set on the program level and can be overridden in each step as needed.

Here, enabling this function allows the configuration to be done on program level.

Parameter	Description
Enabled	• **On**: Enables the trace resolution configuration on program level. • **Off**: The trace recording is done with the same resolution for the whole tightening. In this case, the trace points are evenly distributed in time over the whole tightening. For each time slot (0.25 ms) two values (the minimum and the maximum measured value) are displayed in the trace. The maximum number of samples in this format is 2000.
Sample Type	• **Sample Time**: specifies how often samples should be stored in the trace by specifying a sample time in ms. • **Sample Angle**: specifies how often samples should be stored in the trace by specifying a sample in deg.
Sample Time	Choose the sample time from the drop-down list (0.25 - 1000 ms)
Sample Angle	Choose the sample angle from the drop-down list (0.25 - 20 degree)

Validation

Parameter	Description
Validate against tool values	Use **On** if tool is known and set **Max Torque** and **Max Speed**. Use **Off** if tool is not known.
Tool	Drop-down for choosing the tool to validate against.
Max torque	Max torque of the tool to validate against.
Max speed	Max speed of the tool to validate against.

Creating a Multistep Program

To create a multistep program, drag and drop steps, monitors and restrictions in the tightening area.

Steps can only be placed between the start and end points of the program, whilst monitors and restrictions can only be placed on steps.

Function		Description
Start and end points		Start and end points of the multistep program. All steps must be placed between these two points.
Adding a step		Drag a step from the list and drop it in the desired position between the start and end points.
Moving a step		Click and hold a step and move it to the desired position
Showing step properties		Click on the step to reveal the properties
Closing step properties		Click anywhere in the tightening area to close the properties menu
Deleting a step		Open the step properties and click **Delete** at the bottom of the menu
Adding a restriction/monitor		Drag a restriction/monitor from the list and drop it on the appropriate step.
Moving a restriction/monitor		Click and hold the icon (checkmark for monitor, stop sign for restriction) and drag and drop it on the appropriate step
Showing restriction/monitor properties		Click on the restriction/monitor icon to reveal the properties menu
Closing restriction/monitor properties		Click anywhere in the tightening area to close the properties menu
Deleting a restriction/monitor		Open the restriction/monitor properties and click on **Delete** at the bottom of the menu
Step error		When a validation error occurs in a step, that step will be marked. Note that when the step properties are opened, the parameter causing the error will also be marked.
Monitor/Restriction error		When a validation error occurs in a monitor or restriction, that monitor or restriction will be marked. Note that when the monitor/restriction properties are opened, the parameter causing the error will also be marked.
Forbidden placement		When a particular placement (of a step, monitor or restriction) is not allowed, the placeholder icon will not be shown.

Multistep Program Tool Compatibility Table

The availability of steps, monitors and restrictions depends on the license installed on the controller.

The table below shows which steps, monitors and restrictions are available for the various tools.

Supported Tools	ES	ST	STR	IXB	SR	SL (Low Voltage)	BCV-RE/BCP-RE	MWR	STB	QST	STW	External Tool
PF6000-Handheld	X	X	X	-	X	X	X	X	X	X	X	X
PF6000-StepSync	-	X	X	-	X	X	-	-	-	X	-	-
PF6000-Fixtured	-	-	-	-	-	-	-	-	-	X	-	-

Step Type	ES	ST	STR	IXB	SR	SL (Low Voltage)	BCV-RE/BCP-RE	MWR	STB	QST	STW	External Tool
Tighten to Angle	X	X	X	X	X	X	-	-	X	X	-	-
Tighten to Torque	X	X	X	X	X	X	-	-	X	X	-	-
Tighten to Trigger Release	X	X	X	X	X	X	-	-	X*	-	-	-
Tighten to Torque + Angle	X	X	X	X	X	X	-	-	X	X	-	-
Tighten to Torque AND Angle	X	X	X	X	X	X	-	-	X	X	-	-
Tighten to DynaTork	X	X	X	X	X	X	-	-	X	X	-	-
Wait	X	X	X	X	X	X	-	-	X	X	-	-
Socket Release	X	X	X	X	X	X	-	-	X	X	-	-
Run until Digital Input	X	X	X	-	X	X	-	-	-	X	-	-
Tighten to Torque or Angle	X	X	X	X	X	X	-	-	X	X	-	-
Loosen to Angle	X	X	X	X	X	X	-	-	X	X	-	-
Loosen to Torque	X	X	X	X	X	X	-	-	X	X	-	-
Loosen to Trigger Release	X	X	X	X	X	X	-	-	X*	-	-	-
Thread Cutting to Torque	X	X	X	X	X	X	-	-	X	X	-	-
Synchronization Point	-	-	-	-	-	-	-	-	-	X##	-	-
Engage	X	X	X	X	X	X	-	-	-	X	-	-

Step Type	ES	ST	STR	IXB	SR	SL (Low Voltage)	BCV-RE/BCP-RE	MWR	STB	QST	STW	External Tool
Rundown	X	X	X	X	X	X	-	-	-	X	-	-
Tighten to Yield	X	X	X	X	X	X	-	-	-	X	-	-
Tighten to Yield M2	-	-	-	-	-	-	-	-	-	X	-	-
External Result	X	X	X	-	X	X	X	-	X	X**	-	X
Clutch	-	-	-	-	-	-	X	-	-	-	-	-
Clutch Loosen	-	-	-	-	-	-	X	-	-	-	-	-
Mechatronic Wrench (MWR)	-	-	-	-	-	-	-	X	-	-	-	-
Torque Calibration	-	-	-	-	-	-	-	-	-	X#	-	-
Wrench Production	-	-	-	-	-	-	-	-	-	-	X	-
Wrench Quality	-	-	-	-	-	-	-	-	-	-	X	-

Monitors (Evaluated at End of Step)	ES	ST	STR	IXB	SR	SL (Low voltage)	BCV-RE/BCP-RE	MWR	STB	QST	STW	External Tool
Time	X	X	X	X	X	X	-	-	X	X	-	-
Angle	X	X	X	X	X	X	-	X	X	X	X	-
Peak Torque	X	X	X	X	X	X	-	X	X	X	X	-
Shut Off Torque	X	X	X	X	X	X	-	-	X	X	-	-
Torque Rate Deviation	X	X	X	X	X	X	-	-	-	X	-	-
Post Thread Cut Angle	X	X	X	X	X	X	-	-	X	X	-	-
Post Thread Cut Peak Torque	X	X	X	X	X	X	-	-	X	X	-	-
Torque in Angle Window	X	X	X	X	X	X	-	-	X	X	-	-
Post View Torque High	X	X	X	X	X	X	-	-	X	X	-	-
Post View Torque Low	X	X	X	X	X	X	-	-	X	X	-	-
Angle from Yield	X	X	X	X	X	X	-	-	-	X	-	-
Stick-Slip detection	X	X	X	X	X	X	-	-	-	X	-	-
Prevailing Torque	X	X	X	X	X	X	-	-	X	X	-	-
Shut Off Current	X	X	X	X	X	X	-	-	X	X	-	-
Click	-	-	-	-	-	-	-	X	-	-	-	-

Monitors (Evaluated at End of Step)	ES	ST	STR	IXB	SR	SL (Low voltage)	BCV-RE/BCP-RE	MWR	STB	QST	STW	External Tool
Torque Calibration	-	-	-	-	-	-	-	-	-	X#	-	-
Loosening Detection	-	-	-	-	-	-	-	-	-	-	X	-

Restrictions (Immediate Stop)	ES	ST	STR	IXB	SR	SL (Low voltage)	BCV-RE/BCP-RE	MWR	STB	QST	STW	External Tool
Maximum Torque	X	X	X	X	X	X	-	-	X	X	-	-
Maximum Angle	X	X	X	X	X	X	-	-	X	X	-	-
Maximum Time	X	X	X	X	X	X	-	-	X	X	-	-
Cross Thread	X	X	X	X	X	X	-	-	X	X	-	-
Torque Gradient	X	X	X	X	X	X	-	-	-	X	-	-
Rescinding Torque - Torque control process	X	X	X	X	X	X	-	-	X	X	-	-
Rescinding Torque - Angle control process	X	X	X	X	X	X	-	-	-	X	-	-
Torque Vs Current Deviation	X	X	X	X	X	X	-	-	-	X	-	-
Torque in Angle Window	X	X	X	X	X	X	-	-	X	X	-	-
Rehit	X	X	X	X	X	X	-	-	X	X###	-	-

Program Monitor Type (Evaluate at end of program)	ES	ST	STR	IXB	SR	SL (Low voltage)	BCV-RE/BCP-RE	MWR	STB	QST	STW	External Tool
Program Monitor Angle	X	X	X	X	X	X	-	-	X	X***	-	-

Program Restriction Type (Immediate Stop)	ES	ST	STR	IXB	SR	SL (Low voltage)	BCX	MWR	STB	QST	STW	External Tool
Program Restriction Torque High	X	X	X	X	X	X	-	X	X	X	X	-
Program Restriction Time High	X	X	X	X	X	X	-	X	X	X	-	-

* The STB tool shall only allow loosen to trigger/tighten to trigger release step in a multistep loosening/tightening program.

** External result is not supported in a PF6000-Fixtured/StepSync system.

*** Program Monitor Angle is not supported in a PF6000-Fixtured/StepSync system.

Only supported by PF6000-Fixtured systems.

Only supported by PF6000-Fixtured and PF6000-StepSync systems.

Not supported by PF6000-Fixtured systems.

STB Tools and Multistep

Due to the wireless nature of STB tools, some multistep functions and behaviors may differ. Besides the general limitations listed here, descriptions of multistep functions will be additional information on STB tools where necessary.

Program Validation

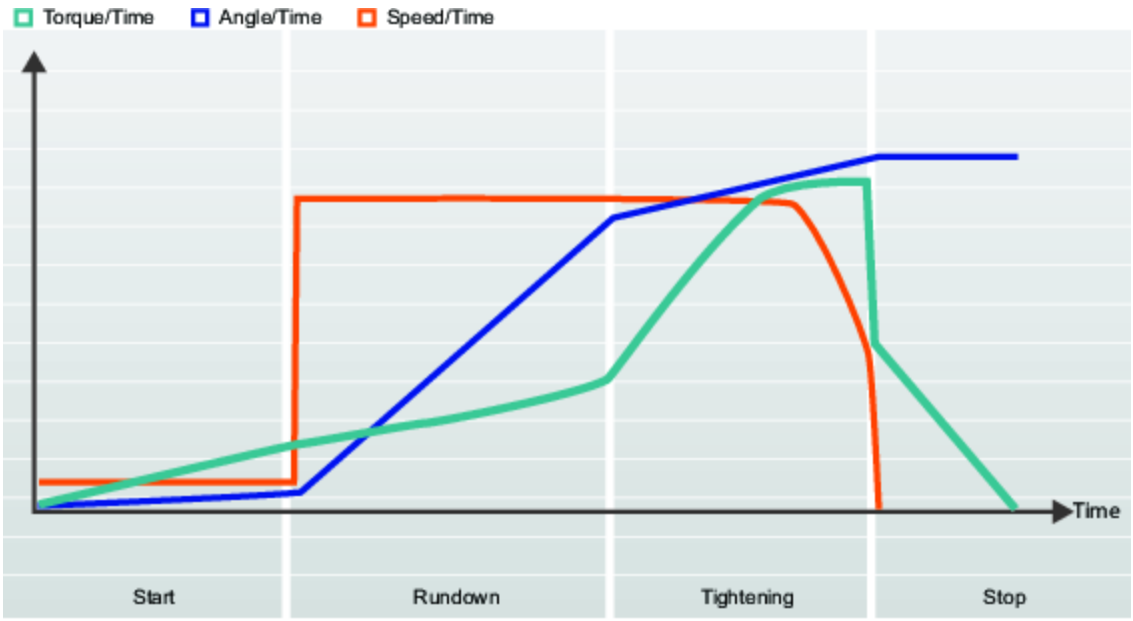
All tightening programs will be validated for compatibility with STB tools before the program is downloaded to the tool. If the chosen tightening program is not compatible with the tool, the tool will be locked. When this error occurs, it will trigger event 5030, "Configuration complexity exceeded".

To unlock the tool, reduce the complexity of the tightening program, or choose a different tightening program altogether.

Step Configuration Stages

The controller tightening programs need parameters to be set in order to execute the programs. Selecting a **Strategy** and either the **Target torque** or **Target angle** are mandatory. Other settings are optional. It is also possible to monitor the tightening as it progresses by adding limits within which the torque or angle rotation must remain.

The tightening procedure is divided into four stages: Start, Rundown, Tightening and Stop.



Typical tightening curve

The figure is typical of how tightenings are described. The curves represent how speed, torque and angle vary over time. All tightening strategies are represented in this way. Parameters, monitors and limits are also shown in detailed figures.

A task is defined from the time a trigger is pressed until the tightening target is reached, or an error occurs.

A combination of a tightening strategy together with specific parameter settings forms a **tightening program**.

The user can create many different **tightening programs**, and one of them is selected at runtime.

Start Stage

The optional Start step initiates the tightening, enables socket and thread finding, and the option to detect rehits.

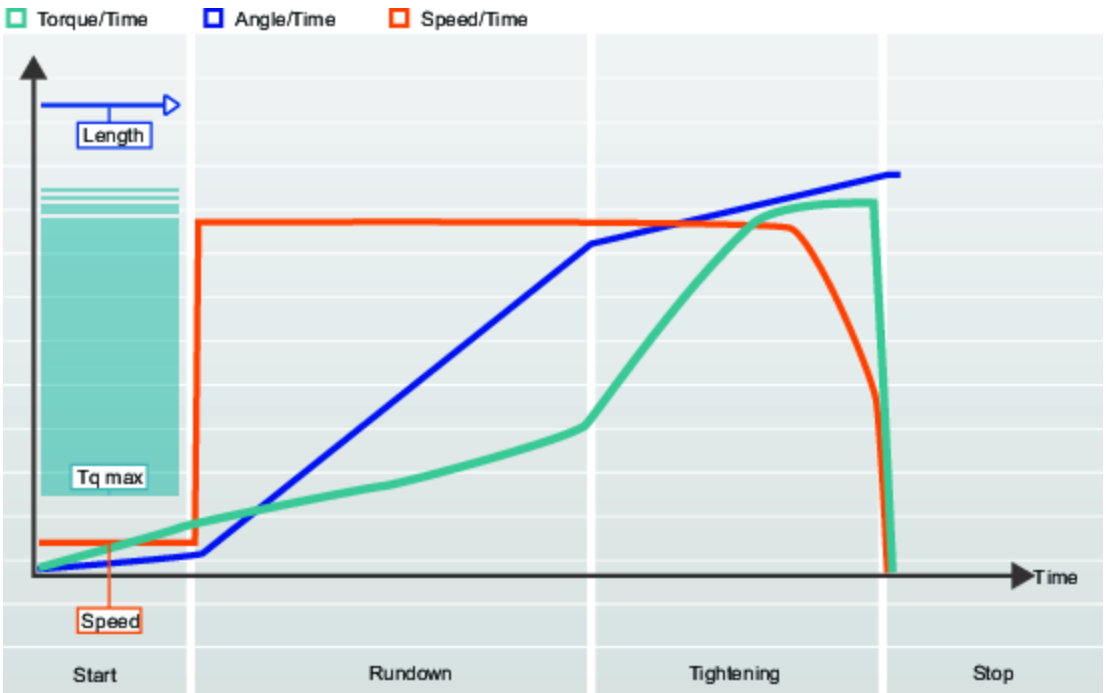
Direction

Direction defines the tightening direction of the spindle to clockwise (CW) or counterclockwise (CCW). The rotation of the spindle will always be in this direction, except when loosening and during the conditioning step used in the **Three step** strategy.

Parameter	Description	Default value
Thread direction	Defines the tightening direction of the spindle.	Clockwise

Soft Start

During **Soft start** it is possible to set the speed, the maximum torque and the the rotation angle to help the screw to enter the thread, and to prevent the tool being jerked out of position when the tool trigger is pressed.



Parameter name	Description	Default value
Soft start	Enables setting of the tool's speed, angle and maximum torque to facilitate the screw entering the thread. **Off:** Soft start is turned off. **On:** Soft start is turned on.	On
Speed	Defines the speed during Soft start.	35 rpm
Angle	Defines the angle to turn the spindle for the screw to enter the thread.	90°
Torque max	Defines the upper torque limit during Soft start. If **Torque max** is exceeded, the tightening is aborted and an error message is given. The tightening will be considered NOK.	1.25 Nm

Rehit Detection

When **Rehit detection** is activated, it is possible to detect a screw that has already been tightened.

Parameter	Description	Default value
Rehit detection	Detects attempts to tighten an already tightened screw. • **Early:** the **Rehit detection Early** option terminates the tightening immediately when a rehit is detected and ends the tightening in the most ergonomic possible way. To be able to use the Rehit detection Early option, Soft start must be set to On. This is because the **Soft start torque max** value is used as the torque limit beyond which the tightening is considered a rehit. The tightening is considered as NOK and a rehit error is indicated. • **Complete:** to make a rehit detection when Soft start is not used, the **Rehit detection Complete** option must be used. Rehit detection Complete does not terminate the tightening until all tightening steps have been executed and consequently takes longer. The tightening is considered a rehit if the speed never reaches half the rundown speed, and a rehit error is indicated. The tightening is considered as NOK. • **Off:** no rehit detection is performed.	Early

Current Monitoring

Current monitoring provides an extra security to monitor the tightening torque and is a complement to the torque sensor in the tool.

At final target torque, the rotor current is measured and converted to a torque value. If the calculated torque is within 10% of the measured torque, the tightening is considered to be **OK**.

Parameter	Description	Default
Current monitoring	Switch with On - Off position. • Off: Current monitoring is disabled and the tool torque is measured by the torque sensor. • On: the current is measured at final torque target and converted to a torque value. The calculated torque is compared to the measured torque. If the difference is within 10%, the tightening is considered OK.	Off

Current monitoring is not implemented for Turbo Tight, Rotate, Pulsing and STwrench strategies.

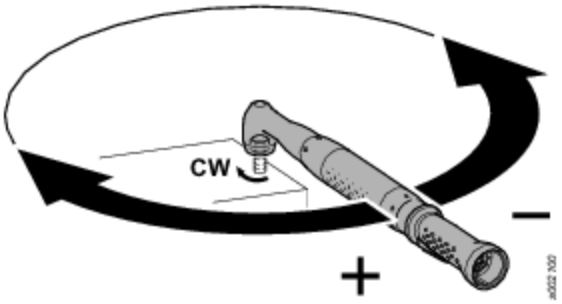
TrueAngle Compensation

Certain tools are equipped with a gyro and measure the tool rotation during tightening. If the tool is rotated during tightening, the angle measurement may be corrupted. This leads to faulty tightening if made to angle references. For variations within specified limits, the controller can compensate for these rotations and make a correct tightening.

If the tool rotation is outside specified limits, the tightening is aborted and the result status **NOK** is reported. Additional information reports **Tool movement exceeded**.

Parameter	Description	Default
TrueAngle compensation	Available for all tightening strategies except **Rotate**. Tools which have a crowfoot installed as an attachment do not support the parameter TrueAngle compensation.	On
Tool movement limits - Negative	Only visible if TrueAngle compensation is on. Defines the maximum negative rotation of the tool. If the value is exceeded the tightening is terminated and an error is reported. Expressed in a numeric angle value. • Min value: 1 • Max value: 180	30
Tool movement limits - Positive	Only visible if TrueAngle compensation is on. Defines the maximum positive rotation of the tool. If the value is exceeded the tightening is terminated and an error is reported. Expressed in a numeric angle value. • Min value: 1 • Max value: 180	30

Only tools with gyro have the capability to measure the tool movement.



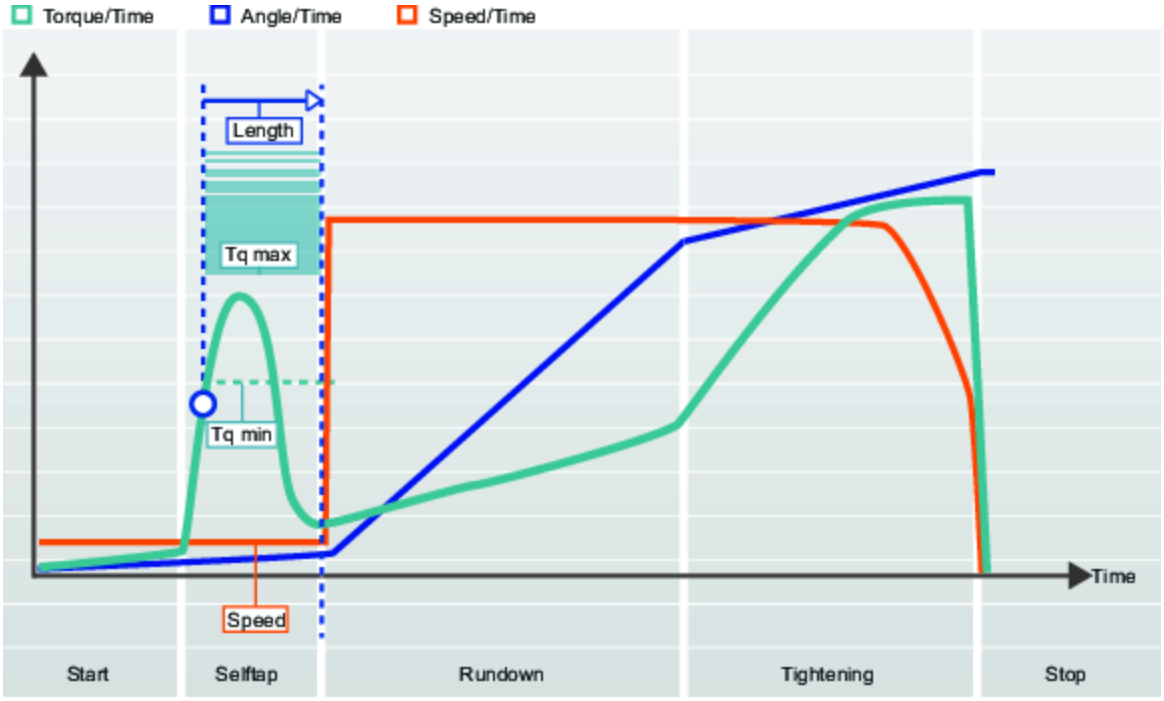
Rundown Stage

The part of the tightening from when the screw enters the thread until just before the screw head touches the underlying surface and snug is reached. The torque required during rundown does not contribute to any clamping force.

Parameter	Description	Default value
Rundown speed	Defines the speed during the Rundown step	Tool max speed

Selftap

The Selftap step enables tightening where the rundown torque required is greater than the **Rundown complete** torque, for example when tightening thin layers of metal using self-threading (or self-tapping) screws. The selftap window starts when the torque value reaches SelftapTorqueMin/2. The torque must reach over SelftapTorqueMin, but not pass SelftapTorqueMax, during the angle window.



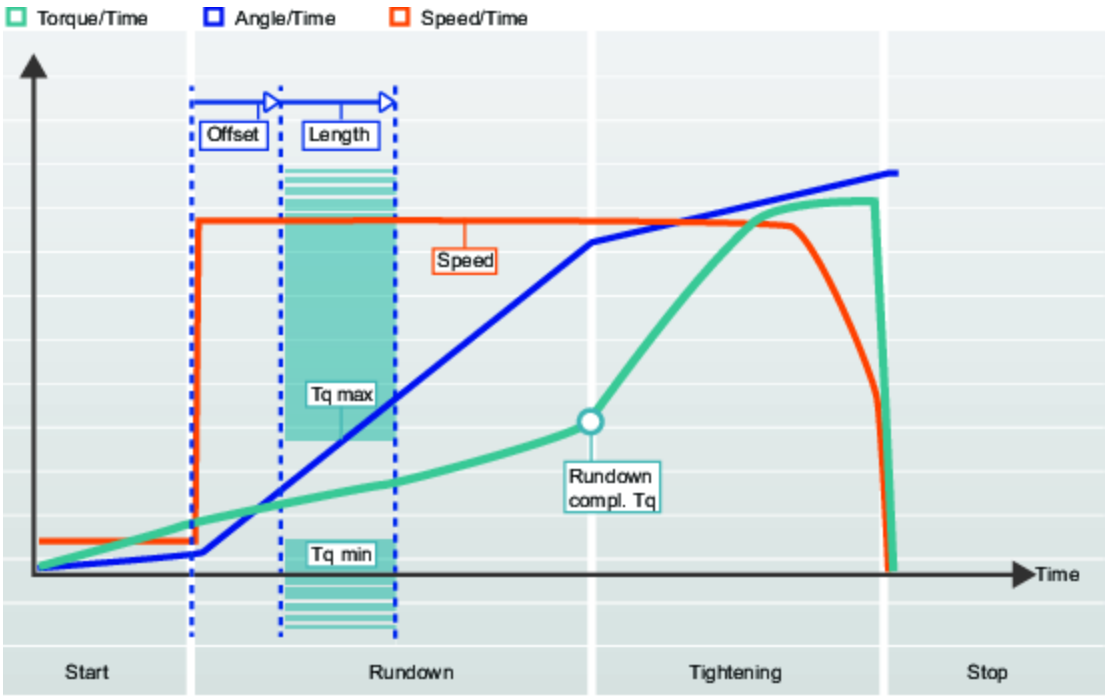
Parameter	Description	Default value
Selftap	Activates the Selftap step.	Off
Speed	Defines the speed during Selftap.	**Soft start speed** or 5% of **ToolMaxSpeed**

Parameter	Description	Default value
Length	Defines the angle to turn the socket during Selftap. Measured from the end of the Start step.	360°
Torque min	Torque value for lower Selftap limit.	0 Nm
Torque max	Torque value for upper Selftap limit.	Tool max torque

Rundown Torque Limits

The friction between the nut and joint can vary. This can cause the torque needed to run a nut down a thread, before engagement with the joint surface takes place, to vary as well. These effects could be, for example, hole interference, prevailing torque or varying lubrication.

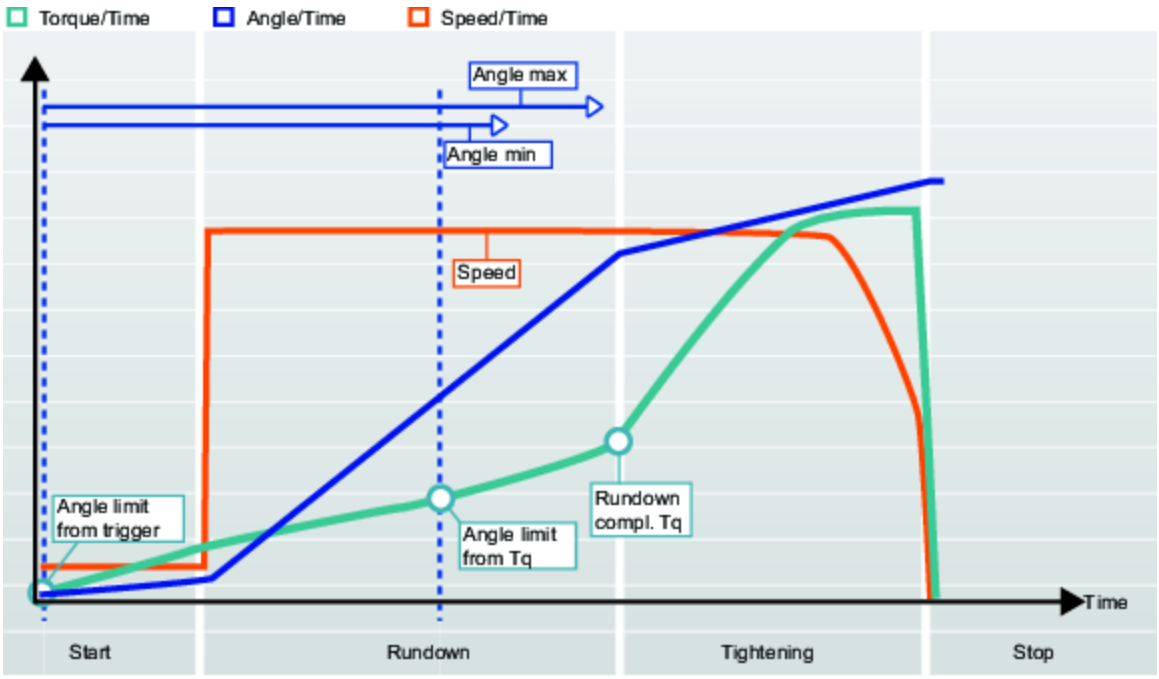
Monitoring the rundown torque can be useful when running down a lock nut which has a plastic insert in the threads to help the fastener resist vibration. This will require a higher torque, known as prevailing torque, to overcome the interference.



Parameter	Description	Default value
Rundown torque limits	Sets Rundown torque limits to On or Off. **Off:** No limits are set. **On:** Torque limits and angle interval are set.	Off
Offset	Angle offset before the Angle interval begins.	0°
Length	Angle defining the Rundown torque limit section.	360°
Torque min	Torque value for lower Rundown torque limit.	0 Nm
Torque max	Torque value for upper Rundown torque limit.	19% of Target torque

Rundown Angle Limits

By monitoring the angle of rotation during rundown, errors such as missing washers or screws with incorrect thread size or length can be detected. For example, threads that are too long would require a greater turning angle for the screw to reach snug.

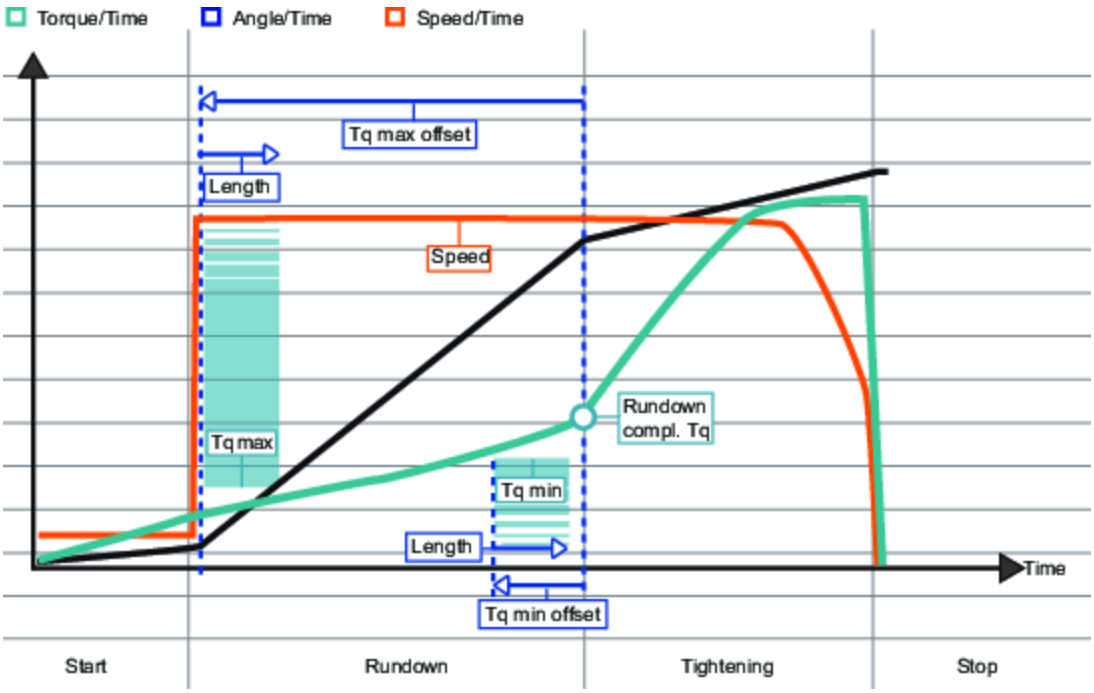


Parameter	Description	Default value
Rundown angle limits	Activates Rundown angle limits. The angle limits are set relative to when the tool trigger is pressed or when a specified torque value is reached. Angle limits will not be checked during Selftap if Selftap is activated. **Off:** No limits are set. **From trigger:**The system starts to monitor the tightening angle as soon as the tool trigger is pressed and reports if angle or time limits are violated. **From torque:** The system starts to monitor the tightening angle from the specified **<From torque>** value and reports if angle or time limits are violated.	Off
<From torque>	Torque value from where Rundown angle limits are set.	10% of Target Torque
Angle min	Angle value for lower angle limit from starting point.	100°
Angle max	Angle value for upper angle limit from starting point.	1000°
Time min	Minimum time (in milliseconds) for the step. Measured from the start of the step.	10 ms
Time max	Maximum time (in milliseconds) for the step. Measured from the start of the step.	5000 ms

Post View Torque

Some joints have a torque peak prior to Rundown complete. Post view torque makes it possible to monitor torque values during two specified angular intervals. The interval starts are defined as an angle prior to Rundown complete and torque is then monitored for a specified angular interval.

Post view torque is therefore similar to Rundown torque limits except that the maximum and minimum limits can be positioned independently of each other and can differ in length to better control the outcome of the rundown step.



Parameter	Description	Default value
Post view torque	Post view torque makes it possible to monitor torque values during two specified angular intervals.	Off
Torque min	Torque value for lower Post view torque limit.	
Torque min offset	Angle offset before the Post view torque min interval begins.	720°
Torque min length	Angle length defining the Post view torque min section.	90°
Torque max	Torque value for upper Post view torque limit.	
Torque max offset	Angle offset before the Post view torque max interval begins.	360°
Torque max length	Angle length defining the Post view torque max section.	90°

Rundown Complete

Rundown complete sets if the screw has reached snug. It ends the Rundown step so that the tightening step can be entered.

Parameter	Description	Default value
Rundown complete	Specifies how to control when snug is reached. **At torque:** Specifies the torque value for when the rundown step is completed.	At torque
<At torque>	Defines the torque value for when snug is reached and the rundown step is completed. Rundown complete must be smaller than **First torque** in multi-step strategies or **Target torque** in the TurboTight strategy.	

Stop Stage

The Stop stage terminates the tightening so that the socket can be released.

Soft Stop

Soft stop causes the tightening stop in a more ergonomic fashion.

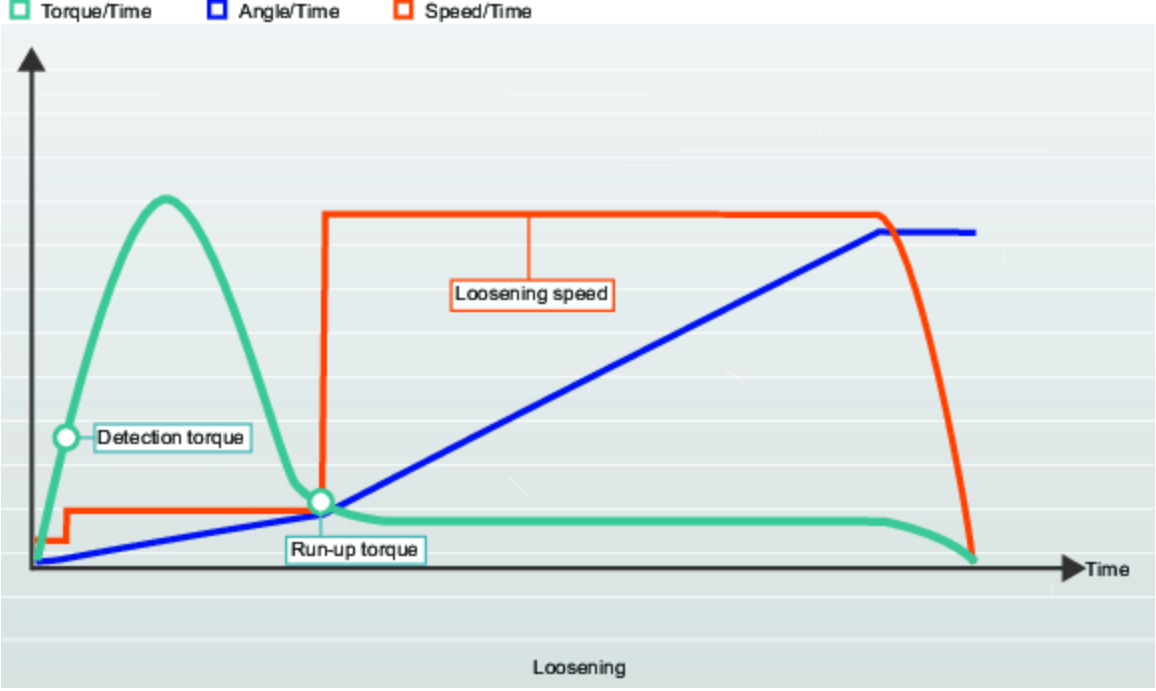
Do not stop tools within the time interval of 50-300 ms, as this is known to make it feel like an uncomfortable stop.

Parameter	Description	Default value
Soft stop	Turns the Soft stop on or off. • **Off:** No Soft stop is used. • **On:** Soft stop is activated. When target torque is reached, the tool speed is immediately decreased to 75%. Then the speed is decreased to zero in at most 40 ms.	Off

Loosening a Screw

By setting the loosening parameters, you can control the behavior of loosening for a specific tightening program. Specify the loosening speed and torque to ensure that the screw is unscrewed as desired, so that the screw thread does not break, regardless of what tool you use.

A loosening is considered OK when **Run-up torque** is reached. However, the screw will probably not have been fully run up by then. The screw should now be able to be turned using a low torque and the speed can be increased. The operator will need to proceed with the loosening until it is considered finished.

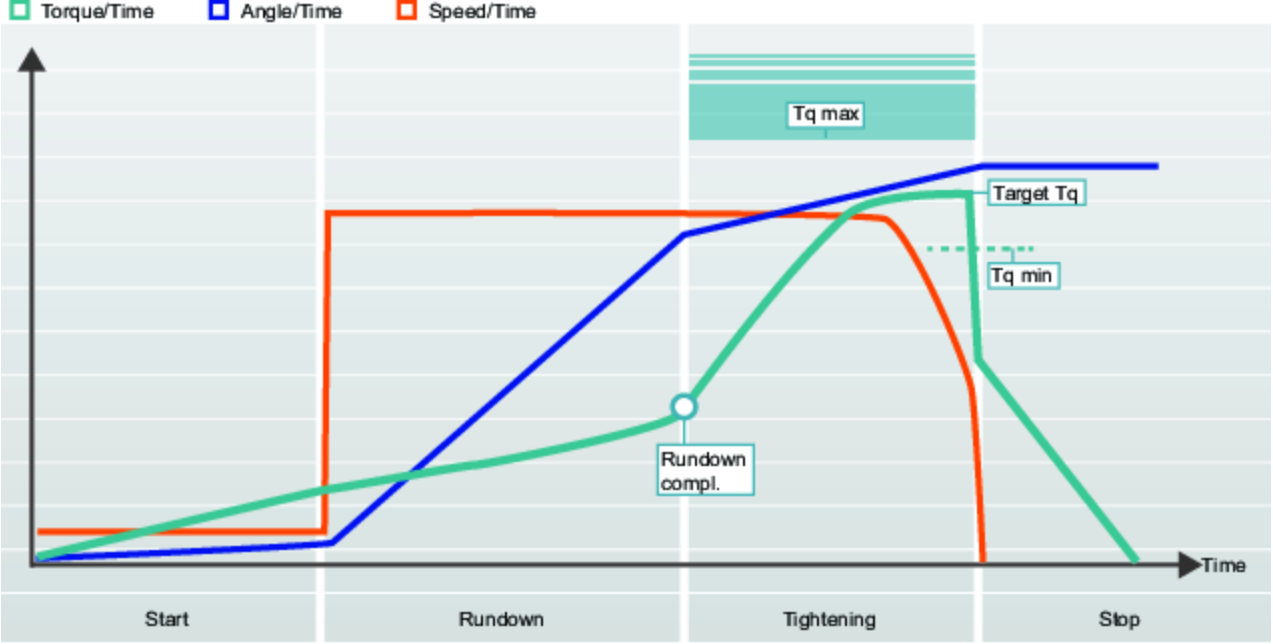


Parameter name	Description	Default value
Detection torque	The minimum torque required to begin performing a loosening operation and produce a loosening result.	7% ToolMaxTorque
Run-up torque	When the torque falls below **Run-up torque**, the loosening is considered to be OK. **Note!** Depending on variations in screw length, the system cannot determine when the screw has been run up completely. This is for the operator to decide.	3.5% ToolMaxTorque
Loosening speed	Loosening speed will be attained when **Run-up torque** is reached.	ToolMaxSpeed

Stage Parameter Descriptions

Target Torque Limits

By setting the **Target torque limits** , it is possible to discard a tightening should the torque result not fall within the specified torque limits. A too high torque can cause the screw to deform as a result of passing the yield point, and can even break, or can cause the stripping of threads. Not enough torque result in the clamping force not being enough to withstand the forces for which the joint is designed.



Parameter	Description	Default value
Torque limits	The tightening is considered as NOK if the torque result is outside the range defined by Torque min and Torque max. **Auto:** Torque limits are automatically set to the default values specified for Torque min and Torque max. **Manual:** Enables the Torque limit values to be set manually.	Auto
Torque min	Torque value for lower torque limit. Can be entered if **Manual** has been selected.	95% of Target torque
Torque max	Torque value for upper torque limit. Can be entered if **Manual** has been selected.	120% of Target torque

The parameter **Measure torque at** can have different values. By default the torque is measured at torque peak. The possible values of the parameter are listed in the table below.

Name	Description
Max torque value	Measures the highest torque value during the tightening.
Value at peak angle	Measures the torque value at the highest angle value.
Value at shutoff	Measures the last torque value before entering the break step.

Target Angle Limits

With Target angle limits set, it is possible to monitor whether the nut is turned the desired angle during the tightening.

Parameter	Description	Default value
Angle limits	Choose the section of the tightening, in degrees, in which to monitor the angle. 1. **Off:** No limits are checked. 2. **From Rundown complete:** The monitoring window is set from when the **Rundown complete torque** is reached. 3. **From torque:** The monitoring window is set from when the specified torque value is reached. Torque must be greater than Rundown complete torque. 4. **From First target:** The monitoring is set from when **First target** is reached. This option is not available if TurboTight is chosen. 5. **Auto:** The angle monitoring limits are automatically calculated by the controller 6. **Manual:** The angle monitoring limits are manually entered.	Off
<From torque>	Torque value from where angle limits are set.	
<From torque>	Torque value from where angle limits are set.	75% of Target Torque
Angle min	Angle value for lower angle limit	90°
Angle max	Angle value for upper angle limit	720°
Time min	Minimum time (in milliseconds) for the step. Measured from the start of the step.	10 ms For TurboTight: 0 ms
Time max	Maximum time (in milliseconds) for the step. Measured from the start of the step.	1000 ms For TurboTight: 40 ms

Position 1-4 are valid if the target is torque. Position 5-6 are valid if the target is angle.

The parameter **Measure angle at** can have different values. The parameter is only available when angle monitoring is turned on for the tightening program used. By default the angle is measured at Max angle value. The possible values of the parameter are listed in the table below.

Name	Description
Value at peak torque	Measures the angle at the highest torque value.
Max angle value	Measures the highest angle during tightening.
Value at shutoff	Measures the last angle value before entering the break step.

Torque Compensation

By using torque compensation, the actual clamping force applied to the joint can be better determined and the scatter in the applied clamping force can be reduced.

The torque compensation point is set by referring back to a specified angle from Rundown complete and calculating a value for the torque used during rundown. This is then compensated for when creating the preload in the screw by adding the torque value calculated in the torque compensation point to the Target torque.

Parameter	Description	Default value
Torque compensation	Enables adjustment if the Target torque for torque used in the rundown step. **Off:** No compensation is made. **On:** Manually sets the Torque compensation point.	Off

Residual Torque Correlation Factor

The term Residual torque correlation factor is similar to a calibration and adjusts between the dynamic torque, measured in the electrical tool, and the residual torque, measured by a control tool.

The *Residual torque correlation factor* is available for all tools running the TurboTight strategy and the TensoPulse tightening strategy. It is also available for the battery pulse tools that are supported by the controller.

When using a *Residual torque correlation factor* that differs from 100, the reported **Final torque** is no longer the dynamic torque measured by the tool transducer.

The dynamic torque measurement uses an internal torque transducer that constantly measures the torque. When the target torque is reached, the tool stops and the result is evaluated and reported. The measured final torque in the transducer is affected by the joint condition, the tool speed, gears and sockets.

The residual torque is measured after the tightening is completed. It is the torque needed to continue or restart the tightening to a higher level. The residual torque is determining the clamping force in the joint.

A dynamic torque measurement is highly repetitive but may differ between tool type and tool speed.	A handheld calibrated torque wrench provides high accuracy measuring the residual torque but has higher variations due to joint relaxation, torque decay, friction or operator technique.

The *Residual torque correlation factor* is a compensation between the dynamic torque and the residual torque. The factor should be determined by conducting tests. The selected tightening program is performed a few times and the dynamic torque is recorded. The tightenings are also manually measured to determine the residual torque.

$$\text{Residual torque correletation factor} = \frac{\text{Residual torque}}{\text{Dynamic torque}}$$

The *Residual torque correlation factor* can be calculated by dividing a residual torque by a dynamic torque. The*Residual torque correlation factor* is presented as percent and is by default 100%. This means the reported dynamic torque value has not been modified.

Parameters	Function
Target torque	The tool target torque set for the tightening using the TurboTight strategy.

Parameters	Function
Final dynamic torque	The final torque reported as the result of the performed tightening.
Dynamic torque	The dynamic torque measured by a reference transducer.
Residual torque	The desired residual torque that ensures the desired clamping force.
Residual torque correlation factor	The compensation factor between residual torque and dynamic torque

An example of how torque tuning can be used:

The TurboTight strategy is selected. The joint shall be tightened to 12 Nm to reach the desired clamping force. The following set up is made:

Example settings	Value	Function
Target torque	12 Nm	The programmed desired target torque in the controller
Residual torque correlation factor	100	The compensation factor between residual torque and dynamic torque

A number of tightenings are made. After each tightening the joint is checked with a calibrated torque wrench. The average is calculated and the following result has been found:

Initial parameters and results	Value	Function
Target torque	12 Nm	The programmed target torque in the controller.
Final torque	12 Nm	The final torque reported as the result of the performed tightening.
Dynamic torque	12 Nm	The uncompensated measured torque from the tool transducer.
Residual torque	10 Nm	The residual torque measured with a calibrated torque wrench or other test tool.
Residual torque correlation factor	100 %	The compensation factor between residual torque and dynamic torque

The testing shows that the residual torque is too low to produce the desired clamp force. The Residual torque correlation factor is calculated to 0.83, which is 83 %. An adjustment of the tuning factor is made and the following result is obtained.

Final parameters and results	Value	Function
Target torque	12 Nm	The programmed target torque in the controller.
Final torque	12 Nm	The final torque reported as the result of the performed tightening.
Dynamic torque	14.5 Nm	The uncompensated measured torque from the tool transducer.
Residual torque	12 Nm	The desired residual torque that ensures the desired clamping force.
Residual torque correlation factor	83 %	The compensation factor between residual torque and dynamic torque.

What this shows is that we need to tighten a bit more than the specified target, to compensate for differences and to reach the desired torque in the joint.

It is important that the correlation is made with the same tool type and parameter configuration that will be used in production.

Trigger Lost

NOK on trigger lost is a tightening program setting in the tightening stage of the program, which controls whether or not it is allowed to release the tool trigger before the target condition has been reached. The setting can be set to On or Off. Below is a description of the two states.

Switch setting	Description
On	Releasing the trigger before reaching the target condition will result in a NOK tightening.
Off	Releasing the trigger before reaching the target condition will result in an OK tightening as long as all other conditions have been met.

The default behavior is that premature trigger release shall not be allowed.

Availability

The NOK on trigger lost is available in the following tightening strategies: Rotate, Quick Step, Two Step, Three Step and Four Step. Note that the setting is only available when the Target of the program is set to Angle (not Torque).

Tightening Program Configuration - General Parameters

Changes made to tightening programs in any section need to be actively applied by clicking the Apply button in the bottom right corner of the GUI. Alternatively, changes can be undone by clicking the Undo button in the same location.

When navigating away from the section where changes have been made (by using the Back, Home or Result button), the user will be presented with a warning pop-up where the changes can also be applied or undone. The user cannot proceed without applying or undoing changes.

The general tightening program settings is used to set up and manage the tightening programs by naming tightening programs, to make general tightening settings such as selecting tightening strategy, Manual or Quick prog mode, and to set the **tightening program target value**.

For more information about tightening parameters, see Start Stage, Rundown Stage, Tightening Strategies, and Stop Stage.

For more information about Loosening parameters, see Loosening a screw.

Name

Use the **Name** field to give the tightening program a name. This name will be stored with the tightening results and sent to ToolsNet (if applicable). The name can be maximum of 32 characters long.

Strategy

Strategy sets the tightening strategy to be used with the tightening program.

For more information about the available strategies and the relevant parameters, see "Tightening Strategies".

Target

The Quick step, Two step, and Three step strategies enable the choice of tightening towards either a Target torque or a Target angle value. When TurboTight is activated, only the Target torque option is available.

Time Monitoring (elapsed time)

Time monitoring is available for all tightening strategies except Rotate. Time monitoring can be activated when angle limits are activated. Time monitoring is available for the rundown step and the final step of the tightening step.

To minimize the risk of unexpected jerk at the end of the tightening when using the TurboTight tightening strategy, make sure to activate Time monitoring.

Since handling the trace takes time, there is always a short difference between the Program elapsed time compared to Step elapsed time . This is especially noticeable in programs containing only one step.

When using an STB tool it is not possible to use time monitoring if all monitoring options are switched on.

Attachment Tuning

Attachment tuning gives the possibility to compensate for front attachments on the tool. The compensation can be made for each tightening program.

An operator can hot swap an attachment and then select a tightening program tuned for that specific attachment.

Attachment tuning is available for all conventional strategies except for the STwrench.

1. In **Tightening program settings**, set **Attachment tuning enabled** to **Yes**
2. Click on Tightening parameters > **Edit**
3. Click on the start step.
4. Under **Attachment tuning**, set **Use attachment tuning** to **Yes**

5. Set the necessary parameters for **Gear ratio** and **Efficiency tuning** (see table below).

Parameters for Attachment tuning

Attachment tuning	Description	Default
Attachment gear ratio	The *Attachment gear ratio* is needed to compensate the angle. Minimum: 0.5 Maximum: 3.6 Socket rotation speed = Tool speed / gear ratio	1.0
Efficiency tuning	Attachment gear ratio combined with the *Efficiency tuning* is needed to compensate the torque. Minimum: 0.5 Maximum: 1.0 For example 0.9 means 10% efficiency loss.	1.0

Working with the Batch Sequence Tab

Controller features, such as the Low Reaction Tightening Strategies and controller-wide functions among others, require licenses distributed through the Functionality Management System (FMS). Whereas configuration of features is possible without specific licenses, the assignment and use of those features will require the correct license to be installed on the controller. Please refer to Licenses (FMS) for more detailed information on licenses.

Batch sequences are used to perform a specified number of tightenings in a specific order. Each batch sequence is given a name.

Batch Sequence Settings

A batch sequence can consist of up to 99 batches, with a batch size of up to 99 tightenings. The batches in a batch sequence are carried out in the order listed, or by using a Socket selector to choose which batch to run.

Batch settings parameters

Parameter name	Description	Default value
Lock tool on Batch sequence compl.	A batch sequence is completed when the batch sequence counter is equal to the batch sequence size. **On:** The tool is locked and a tightening program or batch sequence must be selected to continue performing tightenings. **Off:** After completion, the batch sequence is ready to be repeated.	On

Parameter name	Description	Default value
Free order	**No:** The configured batches will be executed in the order listed, provided they have been configured to perform tightenings. If socket has been specified, the system will prompt for the socket when the batch is to be performed. **Yes:** The configured batches can be executed in any order. The operator must indicate to the system which batch is to be executed by using a Socket selector. A batch is regarded as complete when all joints have been completed.	No
Increment on NOK	Makes it possible to increment the batch counter value even though the tightening is reported as NOK. For Max consecutive NOK to work (the maximum number of times a single bolt can be tightenened), Increment on NOK must be set to **No**. Setting this parameter to Yes, will allow the sequence to move on to the next tightening.	No
Max consecutive NOK	Maximum consecutive not OK tightenings (NOK) are a defined maximum allowed number of NOK consecutive tightenings in a batch. If the **Max consecutive NOK** number is reached, the event **Too many NOK tightenings (4020)** is displayed.	0
Decrement on loosening	Decrements the counter within the currently active batch. Completed batched cannot be decremented. **Never:** The setting is off. Counter is not decremented when loosening is performed in the active batch. **Always:** decrements the counter in the active batch when loosening, if the last tightening was OK. **When last tightening was OK:** decrements the counter when performing a loosening in the active batch, regardless of the previous tightening result.	Never
Sequence abort timer	**On:** The selected batch sequence can be aborted within a specified time limit **Off:** The selected batch sequence cannot be aborted.	Off
Abort time (10-600)	The number of seconds during which the selected batch sequence can be aborted.	10

Batch Configuration

A batch is set up to perform a specified number of consecutive tightenings using the same tightening program. Batches must have tightening program and batch size specified in order to run.

Batch configuration parameters

Parameter	Description
Tightening program	The tightening program to use with the batch.
Batch size	Number of tightenings the batch will perform. Max. number of tightenings in one batch is 99. Batch size 0 will give the batch an infinite number of tightenings.

Parameter	Description
Identifier number	When using a Socket selector, this is the socket position used to activate the batch.

Working with the Sources Tab

External signals used as tasks for tightenings are configured in the **Sources** menu. Sources are accessories or similar connected to a virtual station. Two types of source tasks are available:

- Source **Tightening** task
- Source **Batch** task

Source Tightening is used to select a single tightening program.

Source Batch is used to select a batch sequence, a series of tightening programs.

For more information about selection of tasks, see Assigning a Task to a Virtual Station.

Source Tightening

The tightening menu shows a list of source tightening configurations. Separate lists can be linked to a Virtual Station by going to the Virtual Station in question, and choosing Task, Change task. There, a Source can be chosen as a task. Source tightenings link a specific tightening program to an identifier number. When the identifier number is sent to the controller (either by external digital signal, or, in cases where a socket selector is used, by lifting the corresponding socket in the selector) the linked program will run over and over until a different signal is sent (or socket is picked up). There is no batch counting.

Source Tightening lists can be set either in Control or Confirm mode.

When set to Control, an external source selects a tightening program by requesting an identifier number. In case of a socket selector, the identifier number is linked to a corresponding socket in the socket selector, and by lifting the socket the tightening program is selected.

In Confirm mode, the socket selector cannot be used as a controlling source. In this mode identifier numbers are linked to both a tightening program and a specific socket (indicated in an additional column in the list). When an identifier number is requested (by an external signal), the corresponding socket is prompted in the socket selector and the tightening program is activated when the operator lifts the socket (other sockets are disabled). If no socket is specified (that is, set to 0 in the Socket column), the tightening program is activated directly and the socket status is ignored.

Product Essentials Tutorials

 https://www.youtube.com/watch?v=XtgT4tDSDJc

Creating a Source Tightening

Changes made to tightening programs in any section need to be actively applied by clicking the Apply button in the bottom right corner of the GUI. Alternatively, changes can be undone by clicking the Undo button in the same location.

When navigating away from the section where changes have been made (by using the Back, Home or Result button), the user will be presented with a warning pop-up where the changes can also be applied or undone. The user cannot proceed without applying or undoing changes.

1. Go to the **Sources** menu, then select **Tightening** on the left navigation.
2. Click the **plus** icon in the top right of the workspace.
3. Give the Source Tightening a name and select the correct **Selector mode** (Control or Confirm, depending on what is required).
4. By default, only one editable Identifier number will be available when creating a new Source Tightening. At the bottom of the screen, click the **plus** icon to add more.
5. Give every item an identifier number

   If a socket selector is used, the identifier numbers will correspond to the positions in the socket selector, i.e. Identifier number 1 corresponds to socket number 1 in the socket selector.

6. Choose a tightening program to link to each identifier number by clicking on **Program** and choosing from the list of tightening programs.

Sources - max consecutive NOK

Max consecutive NOK can be set per Source Tightening or per individual program included in the Source Tightening.

Setting the max consecutive NOK per Source Tightening

1. Set *Max consecutive NOK per program* to **No**
2. Set the value in the *Max consecutive NOK* field.

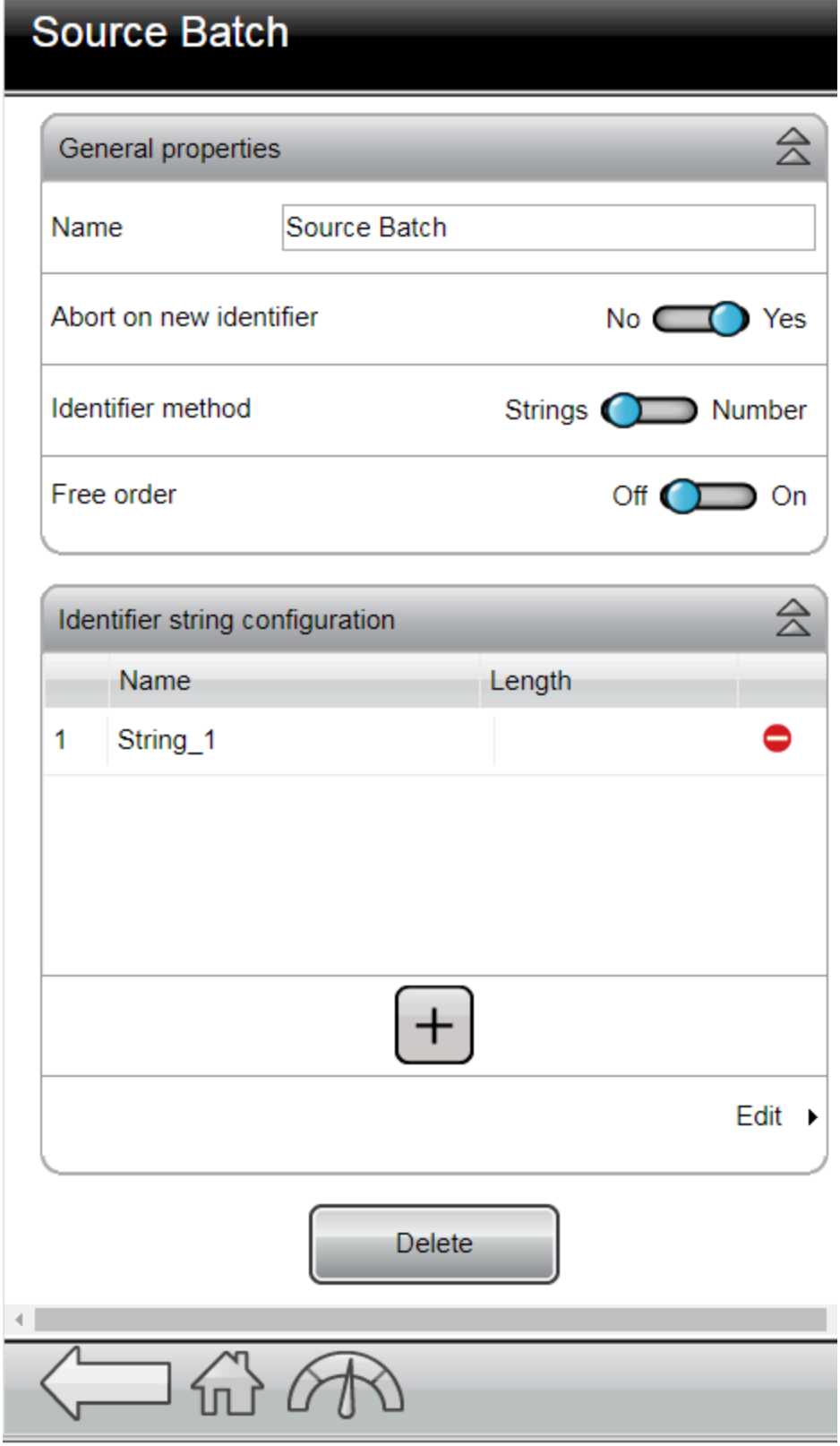
Setting the max consecutive NOK per program

1. Set *Max consecutive NOK per program* to **Yes**
2. For every program in the **Identifier selector configuration** section, set the value in the *Max NOK* column.

Source Batch Sequence

The Source Batch configuration is found under the **Batch** option in the Sources menu.

The controller can be configured to select a batch sequence based on either an identifier number or an identifier string.



Input	Description
Identifier number	The number must be a positive integer number that can originate from an accessory or from an external control entity.
Identifier string	The string must consist of ASCII characters and can originate from a scanner or from an external control entity.
Socket selector	The use of one or several socket selectors.

Product Essentials Tutorials

https://www.youtube.com/watch?v=-dTjDz6ravw

Creating a Source Batch

1. Go to the **Sources** menu, then select **Batch sequence** on the left navigation.
2. Click the **plus** icon in the top right of the workspace.
3. Give the Source Batch a name
4. Set the *Abort on new identifier* to **Yes** if scanning a new identifier string should abort the previous scan.
5. Select the **Identifier method** (String for text, or Number for numerical strings)
6. Set *Free order* to **On** if the strings should be able to be scanned in any order.

   Identifier strings can be made up of up to 4 different strings. When free order is set to No, the strings need to be scanned in a specific order for the system to recognize the string.

7. If required, add an identifier string by clicking on the **Plus** icon in the **Identifier string configuration** section.
8. Click on the **Name** label for the identifier string you want to change the properties of (pop-up window). The following properties can be indicated per string:
   - Name - the name of the string
   - Length - the length of the string. See Combining Identifier Strings for more information on concatenating strings.
   - Significant positions - used to specify which characters in the barcode string to read when putting together the string to match with your pre-defined string. The number of significant positions must match the number of characters in the pre-defined strings.
   - Saved positions - indicate which parts of each string used in the Source Batch is saved, and how they are represented in the log. In this field, indicate the positions in the string that need to be saved. Positions can constitute only parts of the entire string. If the field is left empty, the entire (concatenated) string will be saved. The table below shows some examples of saved position combinations.

     Saved position values are comma-separated (without spaces), and ranges are indicated using a hyphen.

Identifier string	Positions
String 1: 1234567	1-7
String 2: abcdef	8-13
String 3: GHIJKL	14-19
String 4: 890	20-22

Saved position examples

Saved positions	Saved results
(empty)	1234567abcdefGHIJKL890
1-3,9,11,15,20-22	123bdH890
8-12,1-7,19,20-21 will be changed automatically to: 1-12,19-21	1234567abcdeL89

The ID field in the string properties window cannot be altered, but can only be used to navigate between the different strings.

An error may occur when *Free order* is set to **On**, and the lengths of the different strings are duplicated. The scanned sequence will then not activate a tightening program. To remedy this error, set *Free order* to **Off**, or adjust the string lengths.

9. Click **Edit**.
10. In the **Edit** window, indicate which strings (in the **String contains** column) should be linked to which Batch sequence (in the **Activates** column). Click the **plus** icon at the bottom to add more strings.

    Wildcards can be used when typing the "string contains". The wildcard(s) can be used at any position in the string. No Batch sequence is activated in case of an ambiguous matching result.
    The wildcard is a . (period)

Configuring Significant Positions to Read in Barcode String

The positions in the barcode string are associated with a number between 1 and 1024. The first position of the string is 1 and the last is 1024.

The significant positions must be specified following the rules described in the table below. Barcode

strings:

Description	Significant positions	Valid configuration	Barcode string to match with pre-defined string
Significant positions in order	1,2,3,7,8	Ok	ABCGH
Significant positions in optional order	7,1,2,3,8	Ok	GABCH
Range of numbers	1–3,7-8	Ok	ABCGH

Combining Identifier Strings

The *identifier string* that is used for matching is a combination of up to four strings from a factory management system or up to four scanner inputs that need to be combined into one string.

The **Add** and **Delete** command buttons manage how many strings are combined. The following parameters are available:

Parameters for combining identifier strings

Parameter	Description
Check box	Select an entry if it is to be deleted.
Name	The string must be given a name.
Length	The length of the string must be known and must be entered. This is important to be able to combine the correct string identifier.
Significant positions	The comma-separated positions or ranges (separated by hyphen) in the combined string that are used for matching.
Saved positions	The comma-separated positions or ranges in the strings that will be saved in the result.

If more than one *identifier string* is to be used, perform the following steps:

1. Press the **Add** command button to create a new entry in the table.
2. Issue the string a name.
3. Enter the length of the string.
4. Repeat steps 1-3 for every string to be added. Up to four strings can be combined.

The Start-End parameters in each row define the individual string positions in the combined *string identifier* that is used in the next step of the matching process.

The first part in the task selection process using an *identifier string* as an input, is to define which positions in the string that are to be activated:

- Enter the significant positions, to define which positions in the *identifier string* will be used for matching. The positions must be either comma-separated, or by range.

Working with the Tool Tab

A tool must be connected to the controller for the **Tool** menu to show information.

Tool Information

The Tool information view contains information used for giving service personnel accurate information about the tool connected to the controller, so that they can give adequate help and support, or for operators to see what tool is connected to the controller.

Tool information

Information	Description
Model	Tool model denomination.
Max torque	The maximum torque the tool can use for a tightening.
Min speed	The minimum rotation speed of the tool.
Max speed	The maximum rotation speed of the tool.
Min final speed	The minimum final rotation speed of the tool (only for BCP/BCV-RE tools).
Max final speed	The maximum final rotation speed of the tool (only for BCP/BCV-RE tools).
Gear ratio	The ratio of the angular velocity of the input gear to the angular velocity of the output gear.
Serial number	The tool's serial number may be needed when the correct version of the Product instruction is required, in order to get the correct spare parts or service instructions.
Software version	Tool software version.
Product number	The tool's Product or Ordering number.

Tool TAG information

Tool TAG information is only available if the tool type is a STwrench.

STwrench tool information

Information	Description
TAG id	The programmable RFID TAG identification number that is programmed into the **End-fitting tool** (Socket).

Information	Description
Torque correction coefficient	In certain cases extensions may be needed to fit the application. In this case the wrench measurement must be compensated to show a correct value. To calculate the correction coefficient, refer to the latest version of the STwrench User Guide (printed matter number 9836 4134 01). The parameter is stored in the RFID TAG in the **End-fitting tool**.
Angle correction coefficient	In certain cases extensions may be needed to fit the application. In this case the wrench measurement must be compensated to show a correct value. To calculate the correction coefficient, refer to the latest version of the STwrench User Guide (printed matter number 9836 4134 01). The parameter is stored in the RFID TAG in the **End-fitting tool**.
Nominal torque	The smartHEAD of the STwrench contains the torque transducer and defines the wrench's nominal torque. For more information, refer to the latest version of the STwrench User Guide (printed matter number 9836 4134 01).

NOTICE

The correction coefficients alter the STwrench measurement. It may cause an improper reading. Before making any corrections, refer to the latest version of the STwrench User Guide (printed matter number 9836 4134 01).

Tool Connection

The tool connection area shows which virtual station the tool is connected to.

Tool Health

The Health view contains information about tool temperature.

Tool temperature

Tool temperatures (both for cabled and battery tools) are monitored continuously by the POWER FOCUS 6000. Supported temperature units are degrees Celsius (°C) and degrees Fahrenheit (°F), with Celsius being the default unit. It is possible to switch between the two units without requiring a controller restart. When the tool motor temperature or tool electronics temperature exceeds max temperature, the tool is locked and an alert (2014) is shown. The tool is once again unlocked when the tool temperature drops below the temperature limit.

Tool temperature is not available for the STwrench.

Monitoring Tool Temperature

From the display or through the web GUI, users can access the latest tool electronics and tool motor temperatures measured together with the timestamp when the measurement was taken.

1. On the Home view, tap on the Tool Tab.
2. Both tool electronics temperature and tool motor temperature are listed under Health.
   For pulse tools, the Tool pulse unit temperature is also listed.
3. Click on either entry to access a list of peak temperatures and their timestamps.

Tool Maintenance

The tool stores a service interval number and counts how many tightenings can be performed before a tool maintenance, or service is needed.

Setting the Maintenance Alarm

1. On the Home view, tap on the Settings Tab, then select Tool.
2. Set the **Service indicator alarm** to **On**.
3. Return to the Home view, tap on the Tool Tab, and then select the tool you wish to set the alarm for.
4. Enter a value in the Service interval box.

   Service intervals can only be set in multiples of 10 000. Any number other than multiples of 10 000 is rounded off to the nearest multiple of 10 000.

   When working with pulse tools, both service intervals for number of tightenings and number of pulses is set. Whichever interval is reached first will trigger the alarm.

Maintenance parameters

Field	Description
Last service	Date and time when last service was performed. The Last service date is set at the repair workshop. The **Last service date** is set to current date and time when the **Reset service count** button is pressed.
Total tightenings at service	Total number of tightenings performed by the tool since it was used for the first time. This value is made available at service, and will remain the same until next service.
Remaining tightenings	Total number of tightenings left until the service interval is reached.

Field	Description
Service interval	Number of tightenings to be performed between two service events. Can be set in multiples of 10 000.
Total pulses at service	[pulse tools only] Total number of pulses performed by the tool since it was used for the first time. This value is made available at service, and will remain the same until next service.
Remaining pulses	[pulse tools only] Total number of pulses left until the service interval is reached.
Service interval	[pulse tools only] Number of pulses to be performed between two service events. Can be set in multiples of 10 000.
Reset service counter	Reset of the **Remaining tightenings** counter and sets **Last service date** to current date.
Reset service data	[pulse tools only] Reset of the **Remaining tightenings** counter as well as oil status and sets **Last service date** to current date.

Tool Calibration

Tool calibration is used to control how well a tool corresponds to a reference transducer.

The calibration value stored in the tool memory is used to adjust the torque value given by the tool's torque transducer so that the correct torque value is displayed on the controller. The controller displays the date when the tool was last calibrated.

Calibration parameters

Field	Description
Last calibrated	Date and time when last calibration was performed.
Calibration value	Torque value to calibrate against.
Next calibration date	Date when the next calibration of this tool is needed.

Preparing the Calibration

1. Make sure the tool and controller are set up to perform tightening.
2. Set up the tool with a torque reference transducer (such as the STa6000, STpad or JSB Bench).

   Refer to the torque reference transducer User Guide for set-up instructions.

3. Select a Tightening program with a target torque corresponding to a tightening normally used with your tool.

   See Basic Tightening setup for a tutorial on setting up and activating a suitable tightening program.

Calibrating the Tool

The calibration value used for the tool is calculated from the torque readings read from the controller, and the torque reference transducer through the equation below:

New calibration value = Old calibration value × Mean (Reference values / Power Focus values)

1. On the Home view, tap on Tool Tab and select the tool to be calibrated. Then, go to **Calibration**.
2. Take note the old calibration value found in the **Calibration value** text box.
3. Make at least three tightenings and use the torque values read from the controller and the reference transducer (ACTA or similar) for calculating the mean torque values.
4. Calculate the new calibration value using the **New calibration value** equation.
5. Store the new calibration value in the tool memory by entering the calculated value in the **Calibration value** text box and tapping **Apply**.

After calibration is completed, perform a tightening to verify that the new values are correct.

Calibrating a Tool Through the STa6000 or STpad

Connecting the STa6000/STpad

The STa6000/STpad can be connected to the controller in two ways:

- **Connecting the STa6000**

Connection	Remarks
COM port	Connect the Atlas Copco USB to Serial adapter to the controller's USB port using the ACTA Serial cable. Connect the STa6000 to the Serial Adapter using a USB cable.
Ethernet port	Connect the ethernet cable between the STa6000 and the controller's Factory Ethernet port, or the factory network.

- **Connecting the STpad**

Connection	Remarks
COM port	Connect the STpad to the Controller's COM port using the ACTA Serial cable.
Ethernet port	Connect the ethernet cable between the STa6000 and the controller's Factory Ethernet port, or the factory network.

Performing the QA Calibration through the STa6000 or STpad

1. Make sure the tool is connected and assigned to a virtual station on the controller.

   Single tightening programs cannot be used for calibration purposes. Make sure a batch program is selected.

2. On the Home view, tap on Tool Tab. Then click on **QA Calibration**, and set the QA Calibration to **On**.

3. Select the virtual station the tool to be calibrated is connected to, and select the connection type to be used (TCP of COM port).

   Note that the default port for communication is 4561

4. Connect the STa6000/STpad to the controller, and select the correct virtual station.

5. Start the calibration from the STa6000/STpad.

   The STa6000/STpad requests controller information, including tool information and tightening program.

6. Execute the tightening. When the calibration device detects a tightening, it requests the tightening result from the controller.

7. Repeat the above step until all tightenings in the batch have been executed.

   Once completed, the STa6000/STpad creates a report, as well as calculate a new calibration value for the tool.

8. Select Store in the STa6000/STpad to send the new calibration value to the controller, which in turn writes it to the tool.

During calibration, if the tightening program is changed, or the sequence/batch is updated, the calibration is terminated.

There is no limit in the batch size used for calibration purposes. However, the STa6000 can only display two digits as batch size. Thus, the counter on the Sta6000 reads 00 for 100.

After calibration is completed, perform a tightening to verify that the new values are correct.

Tool Motor Tuning

A motor tuning adjusts the tool's motor control unit to optimize the performance and minimize loss.

For cable tools a motor tuning should be performed on each specific combination of controller and tool together. STB tools can be moved to another controller without the need to perform a new motor tuning.

Before performing the motor tuning, make sure the tool is connected to a virtual station and that the controller is set up to perform tightening.

The motor tuning takes approximately 1 minute to perform and rotates the spindle in both clockwise (CW) and counterclockwise (CCW) directions before it is finished.

For tools configured with open end Gear Front Attachment (GFA), remove the open end extension from the tool before performing the motor tuning.

Performing tool motor tuning

1. On the Home view, select the **Tool** Tab. Then, select the tool to be motor tuned and go to **Motor tuning**.
2. Select **Perform**, and then press the trigger on the tool.
3. Select **OK** to start the **Motor tuning**.

   Follow the instructions on the screen and keep pressing the tool trigger until the motor tuning is done.

   - If the motor tuning is successful, an OK event is displayed.
   - If the motor tuning is not successful, or the tool trigger was released before the motor tuning is done, an NOK event is displayed.

Open End Tuning

The open end tuning function is available for tools configured with open end Gear Front Attachment (GFA). The function calculates the true gear ratio of both the tool and the extension combined, and saves it to the tool.
The tuning takes approximately 2 minutes to perform.

When the open end tuning is completed, the tool must be calibrated with the open end extension attached.

Performing open end tuning

1. On the Home view, select the **Tool** Tab. Then, select the tool to be tuned and go to**Open End Tuning**.
2. Select **Perform**, and then press the trigger on the tool.
3. Follow the instructions on the screen and keep pressing the tool trigger until the open end tuning is done.

- If the open end tuning is successful, an OK event is displayed.
- If the open end tuning is not successful, or the tool trigger is released before the tuning is done, an NOK event is displayed.

WLAN and Bluetooth for Wireless Tools

The POWER FOCUS 6000 controller has built-in wireless LAN and Bluetooth radio modules that enable the connection of wireless tools to a controller using a pairing process. When the pairing is established, the tool will connect to the controller automatically as soon as the tool is in range of the controller. A tool paired with a controller is only able to connect to that specific controller even if another controller is set up to use the same radio channel.

The WLAN radio module in the controller can connect to three tools at a time, while the Bluetooth module allows for six simultaneous connections.

Pairing mode for STB tool and STwrench

Placing the STB Tool in Pairing Mode

1. Disconnect the (charged) battery from the tool.
2. Press the tool trigger while re-attaching the battery.
3. When the tool LEDs are off, release the tool trigger.
4. When the tool LEDs are on again, press the tool trigger.
5. When the tool LEDs are off again, release the tool trigger. Both LEDs start to flash (after approximately 10 seconds).
6. The tool is now in pairing mode. The LEDs keep flashing when the tool is in pairing mode.

Do not start the Power Focus pairing procedure before both LEDs on the tool are flashing. Initiate pairing within 30 seconds or the tool might time out.

When the tool is placed in pairing mode, tap the connection type to start the pairing process.

Placing the STwrench in pairing mode

1. Turn on the STwrench.
2. During the cell and gyroscope adjustment, press the UP, RIGHT and BARCODE buttons on the STwrench keyboard in that order.
3. At the end of the zero adjustment, the wrench is in pairing mode.

When the tool is placed in pairing mode, tap the connection type to start the pairing process.

Bluetooth Requirements

In order to use Bluetooth with the POWER FOCUS 6000, the following requirements need to be met:

- POWER FOCUS 6000 software 2.6 or higher
- A wireless tool equipped with a Bluetooth module
- Tool software boot version 9.1.6 or higher
- Tool software app version 3.6.1 or higher

Wireless Tools Restrictions

When all WLAN (3) or Bluetooth slots (6) are filled, additional wireless tools paired with the controller will replace existing paired tools. There are a few rules governing this replacement.

In the case of WLAN, one of the previously paired tools will be replaced at random.

In the case of Bluetooth, offline tools will be replaced first, followed by online tools. Tools linked to a Virtual Station will never be replaced. When pairing an additional Bluetooth-equipped tool to a controller that already has six wireless Bluetiooth tools linked to Virtual Stations, make sure to remove one of the paired tools from one of the Virtual Stations before pairing the additional tool. The tool disconnected from the Virtual Station will then be replaced by the new tool.

Pairing a Wireless Tool to a Controller

The pairing of a Mechatronic Wrench to a controller is done differently than other wireless tools, and requires an MWRKit to be connected to the controller. Please refer to the tool's Product Instructions for more detailed information.

Before you start the pairing process:

- Make sure WLAN or Bluetooth is enabled in the Controller (Depending on the wireless tool you want to pair)
- Make sure there are pairing slots available (3 for WLAN and 6 for Bluetooth)
- Check which radio channel to use
- Check how to put the tool into pairing mode. See the STB user guide (9836 3043 01) for instructions on how to do this, or follow the instructions below
- If possible, have a clear line of sight between tool and controller
- Make sure no other tools are being paired with the controller at the same time

1. Enable the internal WLAN by going to the **Settings** > **WLAN**. Drag the **Enabled** switch to **On**

If the WLAN Enabled switch is set to Off it is not possible to pair a tool to the controller. Tools already connected to the internal WLAN are disconnected when the Enabled switch is set to Off.

2. Set the radio channel to be used with the wireless tool. On the Home view, tap on Settings Tab, and click **WLAN**.
3. In the Radio channel area, tap the channel list and choose the appropriate channel.

   Changing the channel will permanently disconnect all wireless tools paired with the controller.

4. Return to the Home view, and tap on Tool Tab. Then, tap the pairing icon in the upper right corner.



5. Put the tool in pairing mode. See Putting the wireless tool into pairing mode.
6. In the **Pairing** dialog box, click **Perform** to start the pairing process.
7. The pairing process will end with one of the following results:
   - **Pairing successful** - The tool has been paired to the controller using the selected channel.
   - **Pairing unsuccessful** - This can be due to any of the following reasons:
     - No tool detected during the pairing process. Make sure the tool is in range and in pairing mode, and then click **Close** and try again.
     - More than one tool was found during the pairing process. Make sure no other tool is in pairing mode, and then click **Close** and try again.
     - Pairing already in progress. Make sure no one else is performing the pairing process on the controller, and then click **Close** and try again.
     - Pairing failed. Click **Close** and try again.

An IRC-W Infrastructure tool is a tool that is using the factory's wireless infrastructure to connect to the controller. The tool configurations, ADHOC or Infrastructure Mode, are set in ToolsTalk Service 2. A tool configured as an IRC-W Infrastructure tool can also connect as an ADHOC connected tool, using the controllers own built-in network. But when the tool restarts, it will revert to an IRC-W Infrastructure configured tool.

Connecting BCP/BCV-RE Tools

The process for connecting BCV and BCP tools to the controller is slightly different than for other types of tools.

1. On the Home view, tap on the Settings Tab. Then, select BCP/BCV-RE Connections.
2. Add a new BCP/BCV-RE Connection configuration by clicking on the **Plus (+)** icon top right.
3. Turn on the configuration and provide a name in the name field.
4. Fill in the Server port and the Server host of the tool you want to connect in the respective fields. You can find both of these in the tool's Loader Software.

The tool should now be connected to the controller. Assign it to a Virtual Station in order to use it with a tightening program.

Working with the Virtual Station Tab

Virtual stations are configured in the **Virtual Station** menu.

A virtual station is a software abstraction of a physical station and can be set up to use a specific tool and remotely execute different tasks using the tool.

In POWER FOCUS 6000, it is possible to set up a number of virtual stations per controller. Each virtual station can be connected to one tool and one or more accessories.

By using virtual stations, the operator can operate multiple tools and run different tasks using the same controller. It is possible to connect one cable tool and multiple STB tools simultaneously to the controller.

When configuring different tools, make sure the selected start signal in Start source matches the selected tool and that the selected task can be run on the specific tool.

Before any tightening can begin a task must be selected in the virtual stations menu. A task is of one of three types:

- Tightening program
- Batch sequence
- Sources

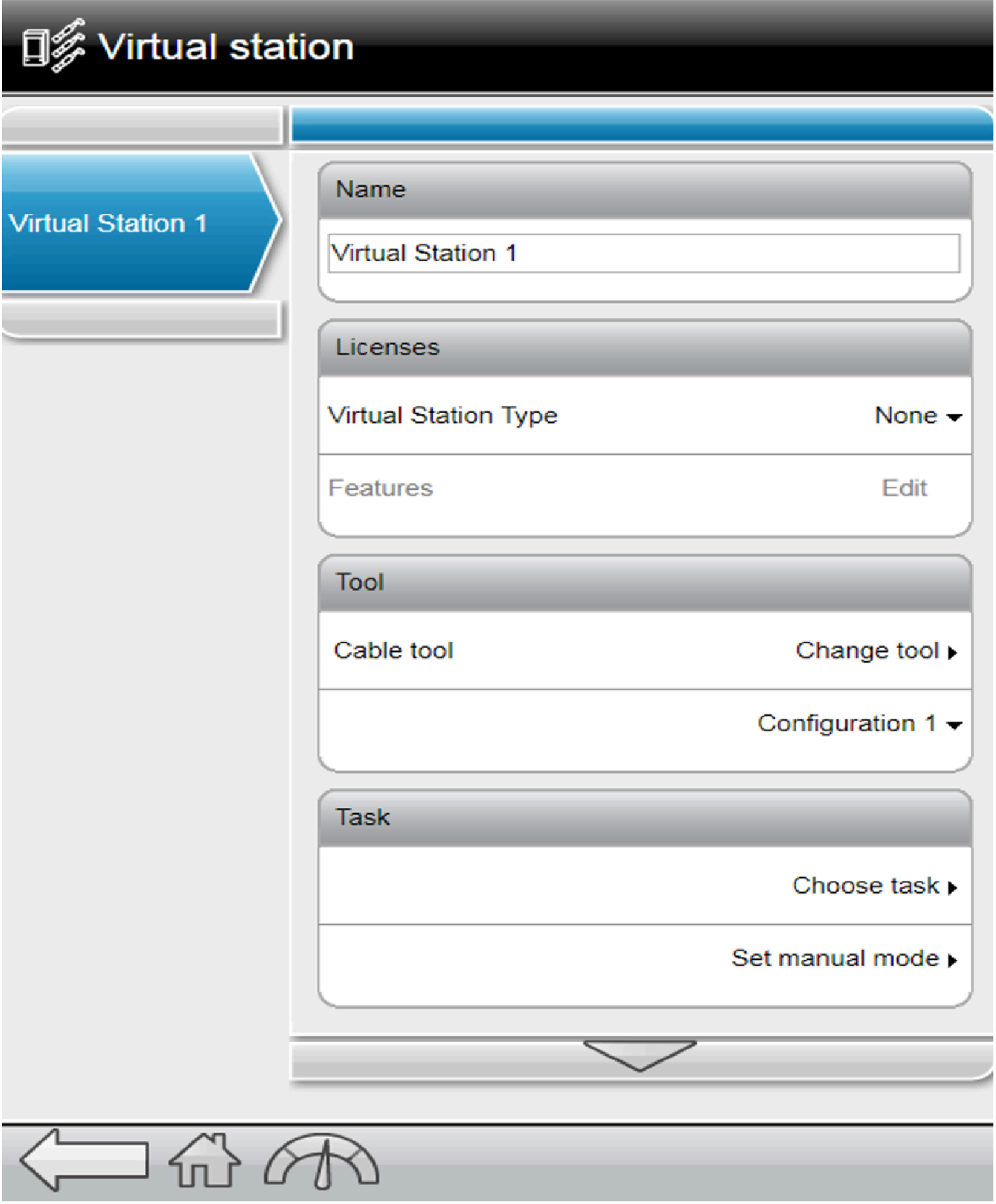
The selection can be made manually by the operator or by external signals.

Product Essentials Tutorials

 https://www.youtube.com/watch?v=Ay0zO5fGSD8

Creating a Virtual Station

Controller features, such as the Low Reaction Tightening Strategies and controller-wide functions among others, require licenses distributed through the Functionality Management System (FMS). Whereas configuration of features is possible without specific licenses, the assignment and use of those features will require the correct license to be installed on the controller. Please refer to Licenses (FMS) for more detailed information on licenses.



Create a virtual station

To create a new virtual station:

1. Tap on the plus sign.

2. Edit the name and other parameters.

To remove a virtual station: Tap on delete at the bottom of the list of parameters.

The list of virtual stations created is presented in the order of creation.

If no tool configuration is available when assigning a tool, a new tool configuration is automatically created and assigned to the virtual station.
This auto-created tools configuration will have Start source set to **Trigger only** and trace set to **Off.** For STB tools Start request will be set to **On.**

Assigning Licenses to a Virtual Station

To make virtual stations working, it is needed to assign them a Virtual Station Type license.

1. Select the **Virtual Station** menu and select the virtual station you want to assign licenses to.
2. In the Licenses section, select the arrow in the **Virtual station type** field

   The **Change License Type** window appears.
3. Select the Virtual Station Type you want to assign to the virtual station.
4. [If additional **Virtual Station Features** need to be assigned] Select **Edit** in the **Features** field.

   The **Select Features** window appears.
5. Check all features you want to assign to the virtual station, then select **OK**.

Unassigning licenses from a Virtual Station

1. Select the **Virtual Station** menu, then select the virtual station you want to unassign licenses from.
2. In the **Licenses** section, select the name of the license in the **Virtual Station Type** field.

   The **Change License Type** window appears.
3. Select the name of the assigned Virtual Station Type you want to unassign.

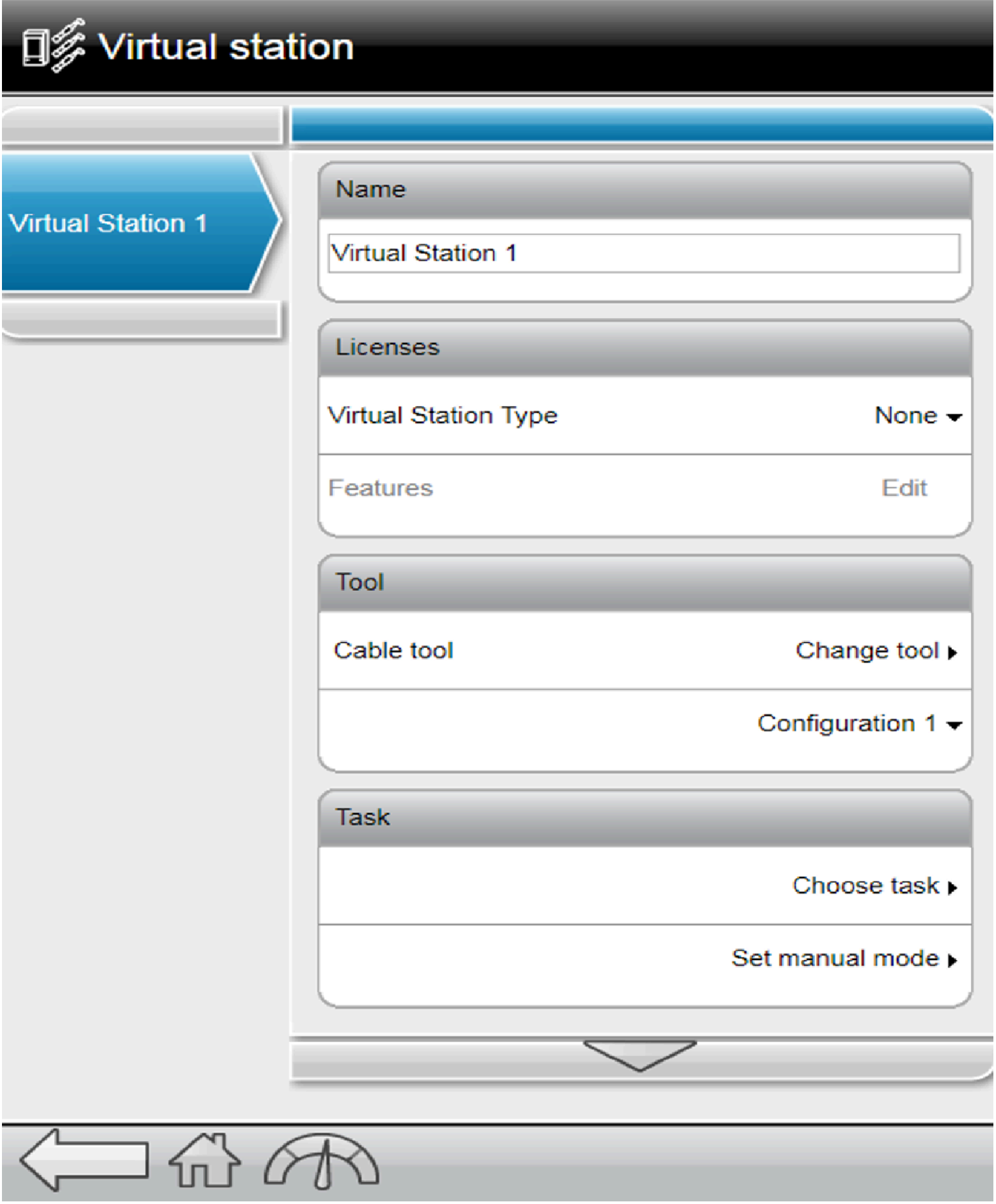
   The **Change License Type** closes and the **Virtual Station Type** field will say *None*. All features will be removed from the controller as well.

When a Virtual Station is deleted, the licenses associated with that Virtual Station will automatically be returned to the Pool.

Connecting a Tool to a Virtual Station

A virtual station can only have one tool connected. Just one of the tools connected to a controller can be a cable tool. Added virtual stations can connect wireless tools paired to the controller.

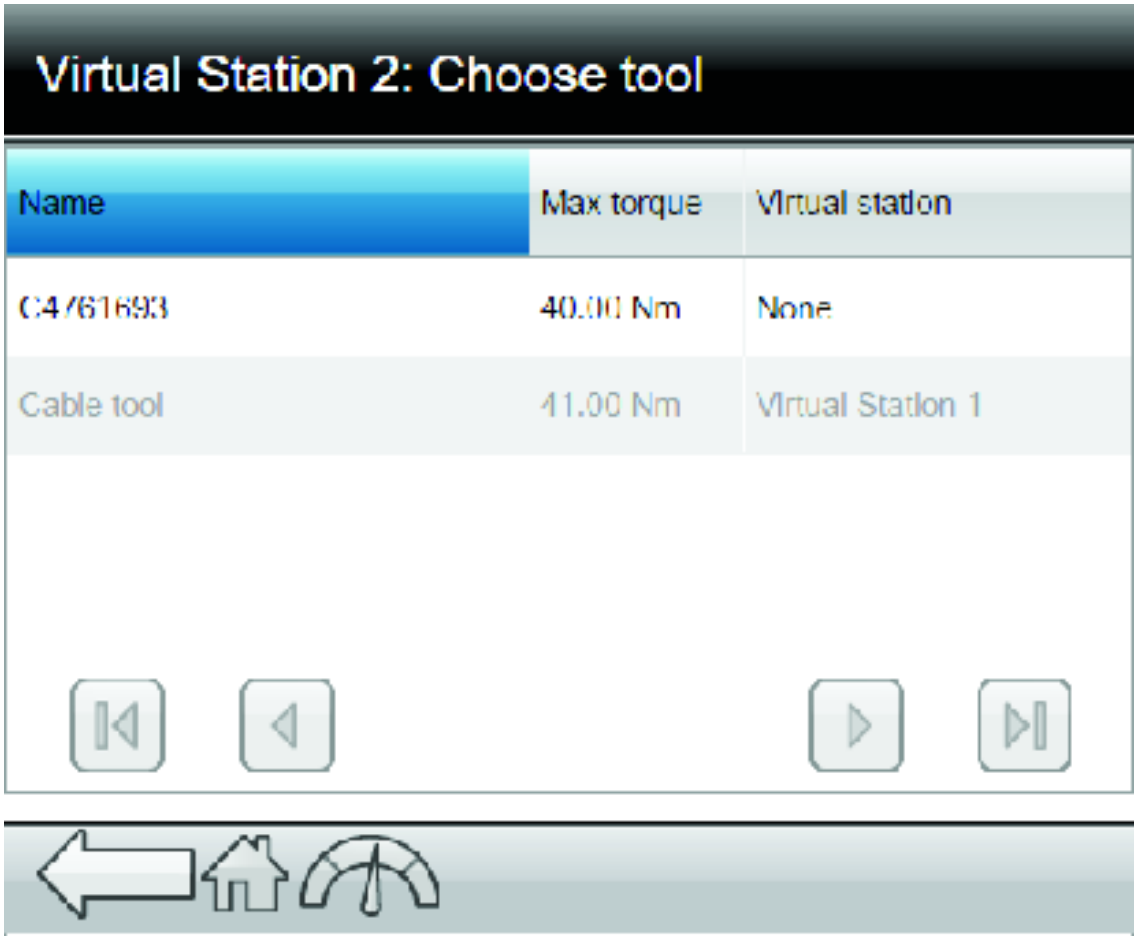
Each virtual station needs to have one tool configuration, in addition to the tool. The tool configurations are created in the **Configurations** menu.



1. Go to the **Virtual station** menu and tap the virtual station you want to connect the tool to.

2. In the Tool area, tap **Choose tool** to open the list of available tools.

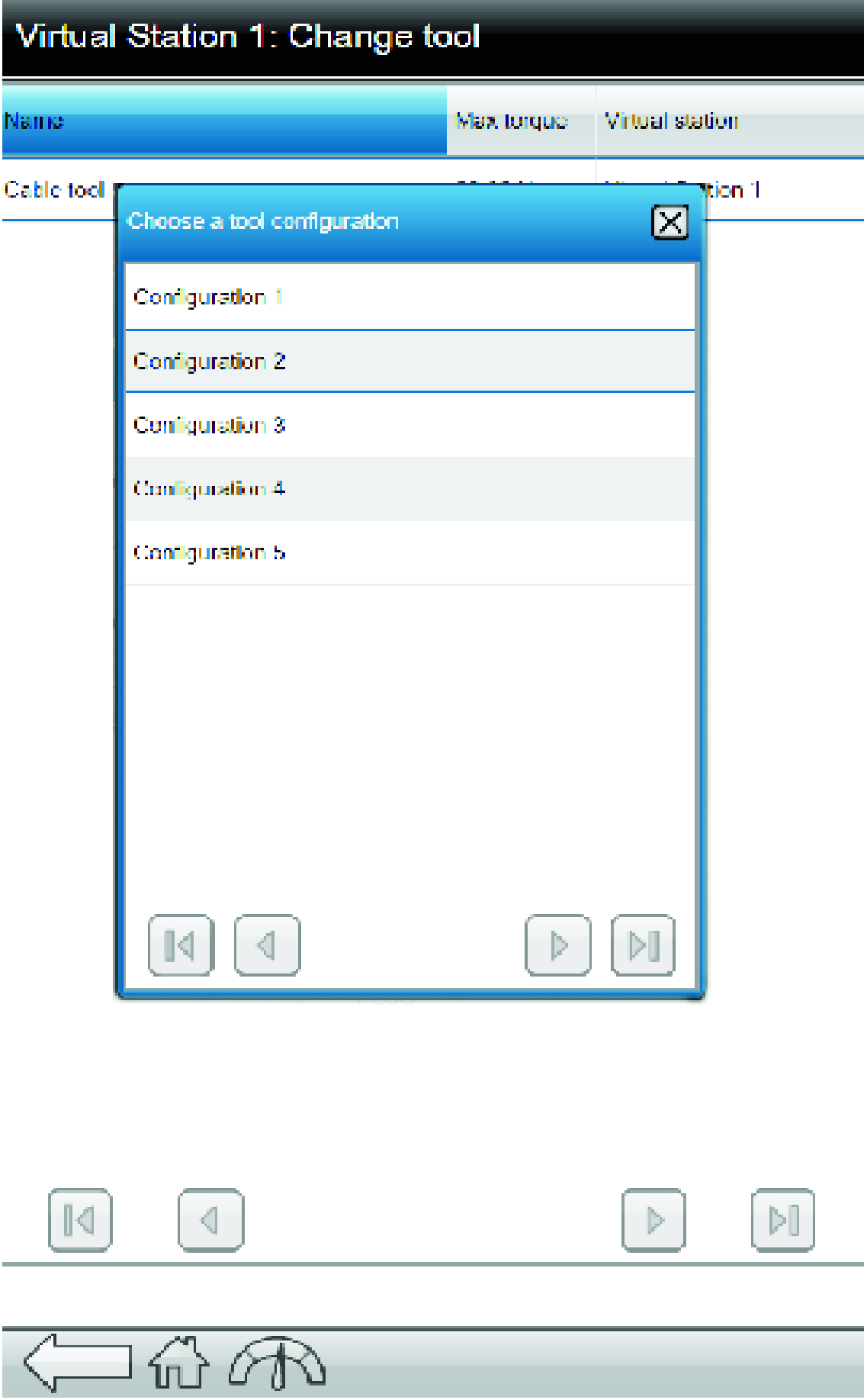
Or, if a tool is already chosen, tap **Change tool** to open the list of tools available to change to.



3. In the list of available tools, tap the desired tool to connect it to the virtual station.

   Tools not available will be greyed out. To connect such a tool, it must first be disconnected from its virtual station.

4. When connecting a new tool a tool configuration is attached. If there are more than one configuration available a list of tool configurations is shown.



5. To replace the tool configuration for the virtual station:
    - Click on the arrow beside the name of the current configuration.
    - Choose another of the configurations in the list.

It is not possible to deselect a configuration, only to select another available configuration.

Configuring Task Window in a Virtual Station

The selected task can either be running a tightening program, running a batch sequence or enabling the task using a source configured in the **Sources** menu.

The task can be monitored from the controller and the result of the task can be presented together with any events that may have occurred during the operation.

Configuring Manual Mode in a Virtual Station

Manual mode for Virtual stations is used for performing tasks while the tool is in locked mode. In cases where the tool is locked for a certain reason (e.g. because the tool is outside its TLS footprint) there still may be a need to perform certain tasks with the tool, such as performing emergency work. By configuring manual mode for the virtual station, users can determine what signals are sent when entering manual mode (Entering signals), what task can be performed while in manual mode (Secondary task), and what signals are sent when leaving manual mode (Leaving signals).

Since desired scenarios can vary between different users (i.e. which signals to send upon entry and exit and what task to perform), manual mode is fully configurable for each virtual station.

Configuration consists of three elements: entering signals, leaving signals and secondary task (note that by primary task is meant the (automatic) task that is assigned to the virtual station under *Task*).

1. Go to the **Virtual station** menu and click on the virtual station to configure, then under *Task*, click on **Set manual mode**

2. In the Manual mode configuration screen, set the secondary task. This determines which task shall be run when in manual mode.

   If no secondary task is set, the primary task will be used during manual mode.

   All task types (tightening, batch sequence, source) can be set for the secondary task as for the primary task.

3. Set the entering signals to be sent by clicking the **plus** icon at the bottom of the *Entering* section. See the parameters for entering signals below.

4. Set the leaving signals to be sent by clicking the **plus** icon at the bottom of the *Leaving* section. See the parameters for leaving signals below.

There is a limit of 99 signals that can be set for entering and leaving.

Entering and Leaving Signals

The parameters for entering and leaving signals are the same.

There are two types of signals: Boolean and integer/string type. For Boolean type signals, an on/off (true/false) switch is used. For integer/string type signals, a text field is used where the (I/O) signal or string can be indicated.

Signal	Type	Default value
Abort sequence	Boolean	Off
Acknowledge events	Boolean	Off
Activate tool scanner	Boolean	Off
Clear results	Boolean	Off
Disable Fieldbus	Boolean	Off
Disable Open Protocol Commands	Boolean	Off
Disable Tool scanner	Boolean	Off
Dynamic batch size	Integer	0
External identifier	Integer	0
External monitored [1-8]	Boolean	Off
Flash Tool Green Led (external protocol)	Boolean	Off
Generic IO [1-10]	Integer	0
Id for dynamic batch size	Integer	0
Reset batch	Boolean	Off
Reset batch sequence	Boolean	Off
Reset bistable relay	Boolean	Off
Reset Too Many NOK	Boolean	Off
Select input	Integer	0
Set bistable relay	Boolean	Off
Unlock tool on complete	Boolean	Off
Unlock tool on disable	Boolean	Off

Configuring Protocols Window in a Virtual Station

Under the tab **Protocols**, in the Virtual Station menu, you'll find a list of available communication protocols depending on the current license in use. The Open Protocol is available for all licenses.

To gain access to functionality through Open Protocol, a unique port for each Virtual Station needs to be defined.

1. Set the **Open Protocol** switch to **On**.

2. Enter the **Server port** number.
3. Enter the **PLC Index** value between 1 to 6.

   PLC Index is used to map where in the shared memory the Open Protocol commands are to be written. The default value is 1 but it is possible to enter values 1 to 6

4. Choose the action to be applied when the connection to the client is lost.

   The Disconnect setting controls the action applied when a connection error occurs:

   - **None** - The tightening program continues normally.
   - **Lock tool** - The tool is locked after finishing the current tightening normally.
   - **Unassign task** - The tightening is aborted after finishing the ongoing task. Except for plain tightening programs or Batch sequences where the task will be removed after finishing.
   - **Always lock tool** - The tool is locked after finishing the current tightening, regardless of result.

5. **Use legacy counter**

   The legacy counter setting counts all tightenings in a sequence and outputs that number to secondary systems. To enable this setting, set *Use legacy counter* to **Yes**.

6. **MID2500 loosening program**

   This setting allows for the selection of a MID2500 loosening program from the list.

7. Tap or select **Apply** when ready.

As the default value for **SoftPLC Index** is always 1 and no checks are made to see if it is in use, there is a possibility that you may have configured the system so that the same index is configured several times when adding Virtual stations. In this case, the Soft PLC will not be able to determine from which Virtual Station the incoming MID is originating from.

Configuring Accessories Window in a Virtual Station

For connecting and disconnecting QIF accessories to and from a virtual station, see Connecting QIF accessories to a virtual station and Connecting QIF accessories to a virtual station.

For troubleshooting with the help of I/O diagnostics of an accessory, see Digital Signal Diagnostics.

Digital Signal Diagnostics

During deployment and during troubleshooting of a controller, a diagnostic tool is very helpful. It is available for the analysis under the Info tag for a device configuration or a fieldbus mapping in the **Virtual station** menu.

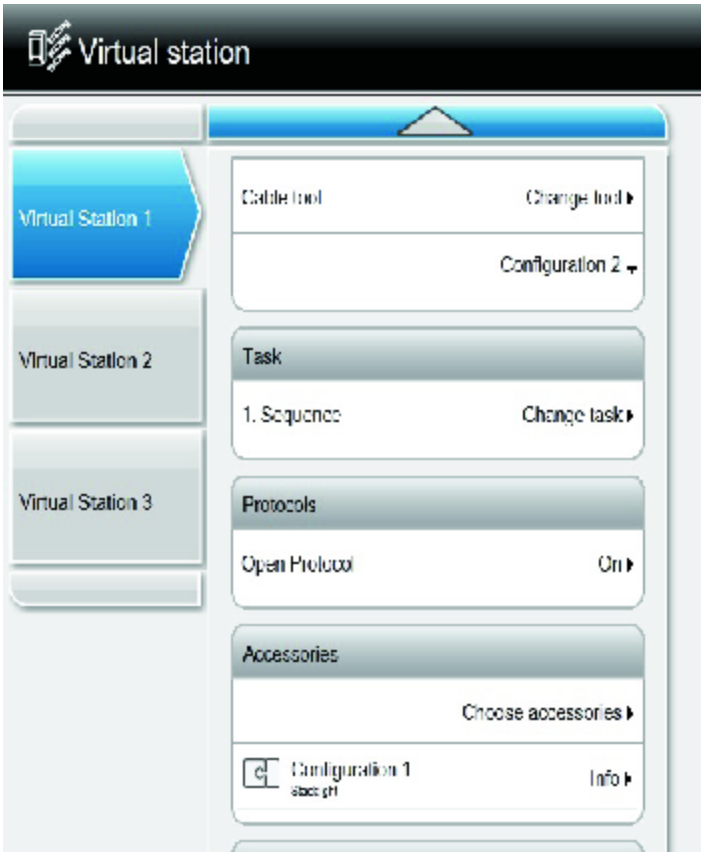
The controller can operate in normal mode or in diagnostics mode. In normal mode the digital input and output signals operate normally and are routed between the internal controller logic and to an external accessory or a connector.

The diagnostics mode is divided into monitor mode and forced mode. In the monitor mode signals operate normally, but provide live monitoring of the signal behavior. In forced mode the connection between the controller internal logic and the external accessory is opened and the input and output signals can be forced to a desired state.

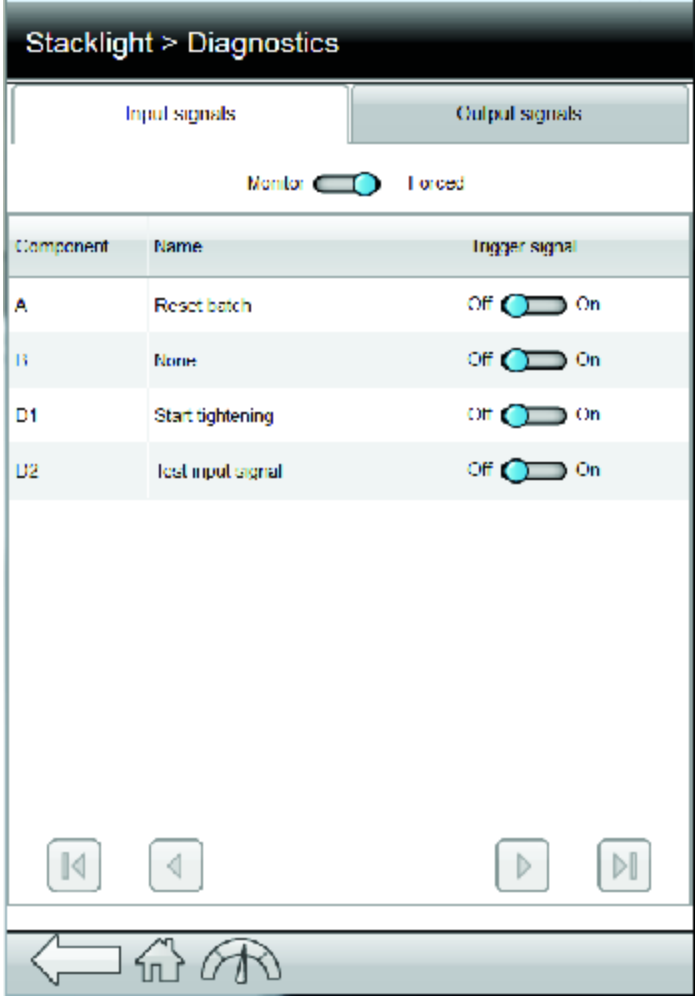
It is possible to diagnose digital signals for one device or one fieldbus at a time.

Diagnostics Configuration

Diagnostics for a specific accessory or fieldbus is accessible through the Info option in the Virtual Station view for the accessory or fieldbus.



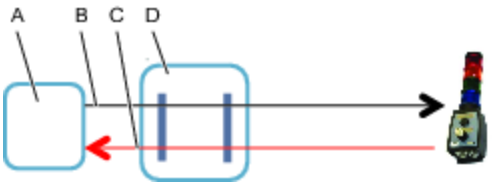
1. Tap **Info** and on the next screen tap **Diagnostics.**
2. Activate **Monitor mode** or **Forced mode** with the switch.
3. The statuses of input signals and output signals are available under the respective tabs.



It is only possible to access the diagnostics from one single user or function at a time. If the diagnostics is already in use an information message is shown on the screen.

Normal Operations

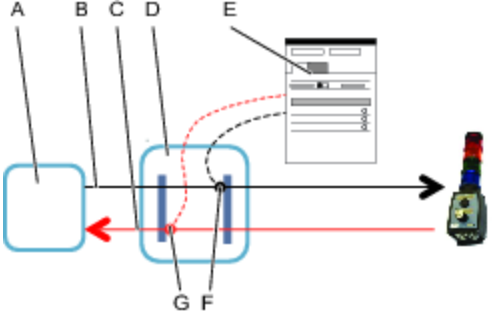
In normal operations mode external input signals are passed to the internal controller logic and controller output signals are passed to an external target, without any intervention from the diagnostics module.



A	Controller internal state machine and logic functions
B	Digital output signal path
C	Digital input signal path
D	Diagnostics module

Monitor Digital Signals

In the diagnostics mode all signals passed to and from the controller internal logic can be monitored. A signal tap is connected in the diagnostics module and the signal states are displayed on the web GUI or the controller GUI.

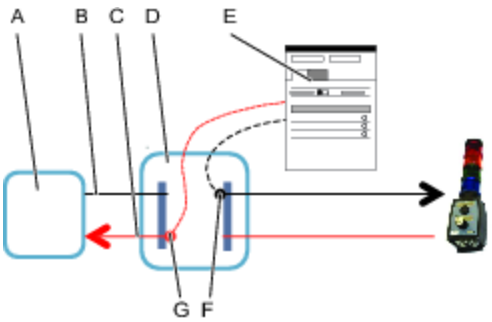


A	Controller internal state machine and logic functions
B	Digital output signal path
C	Digital input signal path
D	Diagnostics module
E	User interface
F	Output signal tap
G	Input signal tap

Force Digital Signals

In the diagnostics mode all signals passed to and from the controller internal logic can be forced to a desired state. The signal lines are opened in the diagnostics module. From the user interface both input and output signals can be forced to steady states. The user interface is either the web GUI or the controller GUI.

While signals are forced, the controller operates normally. When leaving the diagnostics mode and the forced mode all signals are set to the current operating state of the controller. This may lead to a change-of-state for digital outputs, which can create unwanted actions.



A	Controller internal state machine and logic functions
B	Digital output signal path
C	Digital input signal path
D	Diagnostics module
E	User interface
F	Forced output signal insertion point

G	Forced input signal insertion point

Configuring Fieldbus Window in a Virtual Station

The **Fieldbus** entry in the GUI shows the fieldbus mapping assigned to the controller.

To analyze the fieldbus configuration click on perform in the diagnostics field for the fieldbus mapping. Read more about the diagnostics tool in the Virtual station - Accessories section of this chapter.

To configure Fieldbus mappings, ToolsTalk 2 is required.



Virtual station - Fieldbus

Working with the Configurations Tab

Tool Configuration

In **Configurations >Tool configuration** menu it is possible to configure the available accessory functions on the tool.

Different functions are available depending on the tool type.

Configuring Accessory Functions on the Tool

1. Select **Filter by tool type**. Then, select the necessary tool.
2. Select **Edit** to configure the necessary functions.

A configuration assigned to a virtual station cannot be deleted.

3. If available, configure Tool LEDs, Function button, Buzzer and Direction switch by selecting the related box.
   Each box shows a number which corresponds to the number of the specific function (for example, 1 corresponds to Tool LEDs, 2 to Function button, 3 to Buzzer, and 4 to Direction switch).

4. If available, configure the General settings, Start condition, and Accessory bus according to the customer needs.

General settings

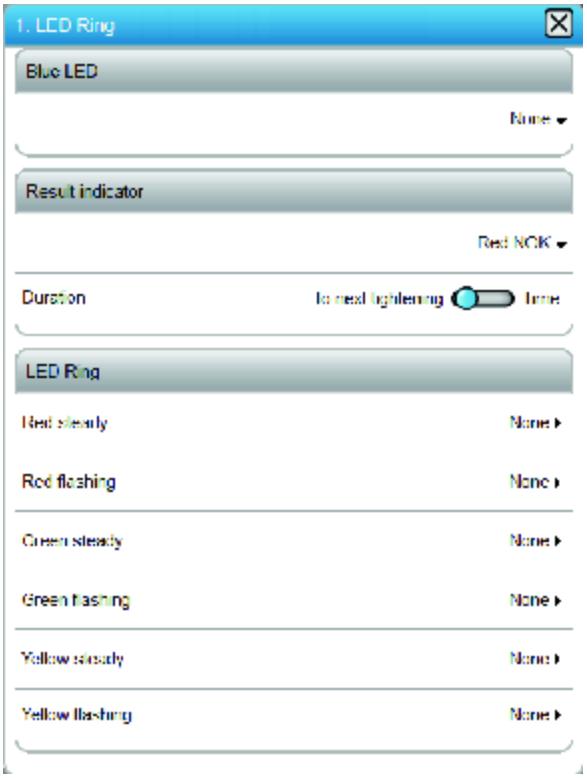
The general settings for the tool can be set in the General settings section.

Parameter	Description	Default value
Inactivity timeout	Determines if the tool turns the power off after a set period of inactivity, or not.	On
<Inactivity timeout>	If Inactivity timeout is set to On, it sets the number of minutes before the shutdown.	120 min
Front LED	Sets the behavior of the front LED (above tool trigger). Available only for wireless tools. When it is set to Off, the front LED does not lit when the trigger is pressed.	On
Duration after trigger released	Sets how long the front LED stays lit after the tool trigger is released (in seconds). For cable tools, the front LED stays lit for 10 seconds after the tools trigger is pressed.	0 sec
Trace	Enables the graphical representation of the tightening. For multistep programs, trace is always on from **Trigger pressed**. For wireless tools, select **Trigger pressed** or **Rundown complete** for making the trace.	Off
TAG check	Enables TAG checking on the tool. The tool locks if the TAG supplied with the program is not equal to the one inserted into the STwrench smartHEAD. TAG check is available only for STwrench or when no tool is selected when validating the tool configuration.	Off

Parameter	Description	Default value
TAG selection	It is used for selecting a Tightening Program/Batch or Batch Sequence by using Batch Sequence/Source Tightening/Source Batch. The Tightening Program/Batch or Batch Sequence has a TAG number configured that corresponds to the TAG number of the TAG inserted into the STwrench smartHEAD. On the STwrench display, the operator is informed about which Tightening Program/Batch or Batch Sequence is selected for the TAG inserted into the STwrench smartHEAD. TAG selection is available only for STwrench or when no tool is selected when validating the tool configuration.	Off

Configuration of the Tool LEDs

The different LED indicators on the tool are configured to be controlled by one of the available output signals.



Blue LED

The blue LED will be lit for a configurable duration of time, or configured to be lit until the following tightening. It is lit on the signal chosen by the configuration.

Result indicator

The result indicator decides how and for how long the LEDs are lit on tightening results. A pre-configured pattern is selected from a shortcut menu. This pattern can be a combination of tightening results.

Result indicator signals

Signal	Description
Off	No LEDs are activated after the tightening, regardless of the result
Green	If a result indicator is selected, a green light is the default signal if the tightening is terminated correctly (OK).
Red:high:yellow:low	If the tightening is terminated incorrectly (NOK); a red LED indicates that the final value is too high, or a yellow LED indicates that the value is too low. Red and yellow can be lit simultaneously (e.g. in case of too high torque, and too low angle).
Red:high(prio):yellow:low	If the tightening is terminated incorrectly (NOK); a red LED indicates that the final value is too high, or a yellow LED indicates that the value is too low. Red and yellow cannot be lit simultaneously. Only red is lit in case of simultaneous high and low values.
Red:NOK:yellow:low	A red LED indicates that the tightening is terminated incorrectly (NOK). An additional yellow LED can indicate if the value is too low.
Red:NOK	A red LED indicates that the tightening is terminated incorrectly (NOK). No additional LEDs are shown.

LED ring

The LED ring decides how the LEDs behave between the tightenings. The LED ring consists of three circles of LED lamps. One circle of red LEDs, one circle of yellow LEDs and one circle of green LEDs. Each circle can have a steady signal or a flashing signal. This provides a total of six different signals that can be connected to the LED ring.

- A LED is turned on only when no tightening is ongoing and when the controlling output signal is activated.
- A LED is turned off when the maximum time is exceeded. Only applicable if the signal type is an **Event**.
- A LED is turned off when the next tightening is started.
- A LED is turned off when the controlling output signal is deactivated. Only applicable if the signal type is an **State**.

Configuration of the Function Button

Use the function button on the tool to control up to six of the available input signals. The button's three possible condition states are combined with the two possible states of the direction switch.

Function button states	Direction switch states
Single push	CW
Single push	CCW
Double push	CW
Double push	CCW

Function button states	Direction switch states
Pressed	CW
Pressed	CCW

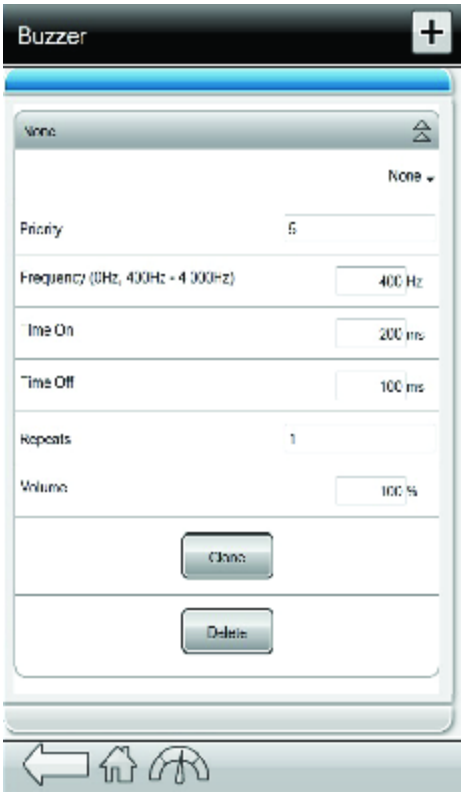
Two configurable parameters controls the push time.

Parameter	Description	Default value
Push detection interval	For single push: the maximum push time (in milliseconds) between the button being pressed and the button being released.	300 ms
Next push interval	For double push: the maximum time (in milliseconds) between the button being released after the first push, and the buttong being pressed again.	300 ms

Configuration of the Buzzer

The buzzer is configured by assigning a sound to a signal selected from a list of available signals.

The sound consists of a set of parameters described in the table. A signal with a sound can be prioritized between 1 and 10 where 1 is highest priority and 10 the lowest. By default a signal and sound has the priority 5. Up to 20 sounds can be assigned to signals.



Parameter	Description
Frequency	Exact frequency in Hz.
Time on	Time (in ms) that the buzzer makes a sound.
Time off	Time (in ms) that the buzzer is quiet.

Parameter	Description
Repetition	Number of times the buzzer repeats the on/off sequence.
Volume	The buzzer volume, in percentage of max volume.

Configuration of the Direction Switch

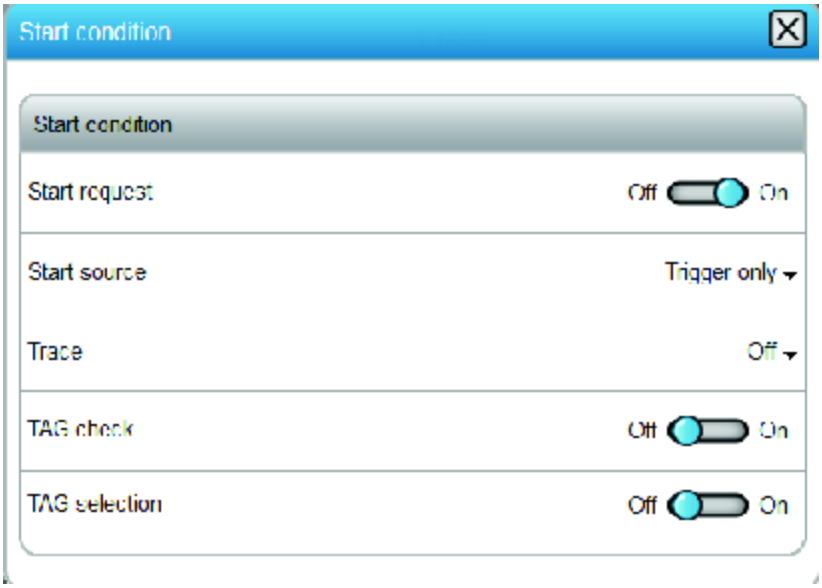
The direction switch on the tool can be configured to trigger certain input signals when switched quickly (with a duration of 500 ms) from clockwise (CW) to counter clockwise (CCW) and back, or vice versa.

Systems in Remote start

When the system uses remote start and the user wants to trigger a signal assigned to a direction switch in Tool configuration, one needs to assign the respective signal and use the signal 10029 - Select Loosening with a required duration of 500 ms to trigger it. For this to work, an extra configuration step in ToolsTalk is needed. Under **Hardware configuration** in ToolsTalk, a configuration must be set for the tool by clicking on the tool icon.

Configuration of the Start Condition

The start conditions for a tool, such as start request, start source, trace, and TAG conditions for STwrench are configured here. The functions are described in the respective sections.



Start Request

Start request enables the requirement of having a persistent connection between the tool and controller for an STB tool. This to make sure that the tool is always up to date with tightening program or batch settings, and with other settings on the controller, when performing tightening.

When Start request is set to On the tool gets locked if the tool loose connection with the controller. This means that if the tool loses connection in the middle of a tightening or a batch sequence, the tool will finish the ongoing tightening and then stop. The tool will be locked until it has reestablished the connection.

Parameters available for the start request

Parameter	Description	Default value
Start request	Lock the tool when the tool loose connection with the controller. **On**: The tool is locked from performing tightening if it loose connection with the controller.. **Off**: The tool can continue to perform tightening although it has lost connection with the controller.	On

Start Source

Use the tool start source to set how to start the tool. The default value is **Trigger only**.

Start Source is available only for certain tool types.

Options for start source

Start source	Description
Trigger only	Press the tool trigger to start the tightening.
Trigger OR Push	Press the tool trigger or push the tool against the joint to start the tightening.
Trigger AND Push	Press the tool trigger and push the tool against the joint to start the tightening.
Push only	Push the tool against the joint to start the tightening.
Digital input	Have a signal using digital input to trigger the start of the tightening.
Safety trigger	Two triggers (as with trigger and push) activated within 500 ms from each other to start the tightening.

Trace Configuration

Traces provide users with a graphical representation of the tightening. Traces can begin either from when the trigger is pressed or from after rundown complete.

Parameter	Description	Default value
Trace	Enables the result to be viewed in graphic form. **Off**: No trace is made. **Trigger pressed**: The trace is drawn from when the tool trigger is pressed. **Rundown complete**: The trace is drawn from when **Rundown complete** is reached.	Off

The maximum number of trace points is 2000 (200 for STB tools). If the maximum number of trace points is exceeded, every other result will be erased (effectively halving the sampling rate). Tracing will continue as long as the tightening is active, and every time the maximum number of trace points is reached, half of the trace points will be erased to allow the tracing to continue. Tracing will stop when the final stage of the tightening has finished.

TAG Check

TAG check feature enables TAG checking on the tool. When the TAG check is enabled both on the Power Focus 6000 and the STwrench, the tool locks if the TAG supplied with the program is not equal to the one inserted into the STwrench smartHEAD.

The TAG number is specified differently, depending on the work task.

In case of **Generic Tightening Strategies**, the TAG number is specified in the Tightening Program.

In case of **Multistep Tightening Strategy**, the TAG number depends on what has been selected in **Sources/Batch Sequence** menu.

- If running **Source Tightening** (*Sources* > *Tightening* > *Source Tightening* > *Selector mode - Confirm*), the TAG number is specified in the **Socket** box.
- If running **Batch Sequence** (*Batch sequence* > *Sequence library* > *Sequence* > *Batch configuration - Edit*), the TAG number is the Identifier Number.
- If running **Source Batch** (*Sources* > *Batch sequence* > *Source Batch*), the TAG number is specified in the **Batch Sequence** as per above section.

In case of **Batch Sequence** and **Source Batch**, set **Free order** - in the **Batch Sequence** - to **No**.

TAG check is available only for STwrench.

TAG check options	**Description**
Off	The tool does not lock, regardless of the inserted TAG.
On	The tool is locked as long as the TAG number is not equal to the TAG number specified in the tightening strategy configuration.

TAG Selection

TAG selection feature is used for selecting a Tightening Program/Batch or Batch Sequence that has a TAG number configured that corresponds to the TAG number of the TAG inserted into the STwrench smartHEAD.

TAG selection is available only for STwrench.

TAG selection options	Description
Off	The STwrench does not signal the controller to select Tightening Program/Batch or Batch Sequence.
On	Select the Tightening Program/Batch or Batch Sequence according to the TAG number configured in the Batch Sequence/Source Tightening/Source Batch.

Configuration of the Accessory Bus

Tool accessories are connected to the tool through the accessory bus. The tool accessories are configured separately for each tool configuration on the controller.

Accessory bus configurations

Type	Description
ST selector	A small display and buttons used to select tasks or programs according to the configuration.
TLS tag	Tool Location System tag used to provide output signaling to the operator.
EHMI	A small display and buttons used to select tasks or programs according to the configuration.

ST Selector

The **ST selector** is a tool accessory. It is installed on the tool and connected to the tool accessory bus. It has a small display, two input buttons and output LEDs.

Display

The display shows one information at a time and has four different pages that can be configured to display different preset items on every page.

Parameter	Description
Page 1	Select the mesage to be displayed from the list:. • Final torque • Final angle • Batch count • Remaining batch • Generic IO 1 • Generic IO 2 • Generic IO 3 • Generic IO 4 • Generic IO 5 • Generic IO 6 • Generic IO 7 • Generic IO 8 • Generic IO 9 • Generic IO 10 • Selected tightening program • Selected batch sequence id • Target torque • Target/Final torque
Page 2	
Page 3	
page 4	

Switch time

Parameter	Description
Switch time	Select the time to display one message before the next message is displayed.

Buttons

The two buttons can be configured to act upon the displayed information and used to step through listed items.

Parameter	Description
Left button	Select one action from the shortcut menu.
Right button	Select one action from the shortcut menu.

Status LEDs

The status LEDs can be activated or deactivated.

Parameter	Description
Enable result LEDs	Select the desired On or Off radio button.
Enable extra LEDs	Select the desired On or Off radio button.

The result LEDs are red, green and yellow, and show the same information as the main tool LEDs.

The two extra LEDs can show *Batch OK* and *Batch sequence OK*. Both these LEDs are turned off at the next tightening.

TLS Tag

The **Tool Location System (TLS)** tag, is a tool accessory. The TLS tag is installed on the tool and connected to the tool accessory bus. The TLS tag is part of the Ubisense positioning system and is handled independently from the controller. In addition to the positioning, the TLS tag can be used to provide information to the operator. Selected output signals can generate different LED light combinations.

Up to 10 different output signals can be mapped to a light priority.

TLS tag configuration parameters

Parameter	Description
Signal	Select a signal to trigger the LED light from a shortcut menu. For a signal of the type **Event**, select the duration of the signal.
Color	Select a color for the LED.
Priority	10 priority levels are available for the sounds where one (1) is the highest priority level. Default priority level is five (5).

For two simultaneous signals, the signal with the highest priority wins. When two signals with the same priority triggers the LED, the first arriving signal wins.

An output signal can be of type **Event** or of type **State**.
A state signal is active as long as the state is active.
An event signal is active during a configurable time.

EHMI

The **EHMI** is a tool accessory. It is installed on the tool and connected to the tool accessory bus. It has a graphical display, three function buttons, and optionally a scanner. The display is a subset of the controller GUI with the possibility to select tightening programs, batch sequences, and to view results from tightenings. The interaction with the controller is through function buttons.

In the EHMI configuration it is possible to decide if the function buttons are On or Off.

EHMI buttons

Parameter	Description
Enable function buttons	On = The buttons have full functionality to configure settings within the visible menus. Off = The function buttons can only be used to acknowledge a necessary dialog on the EHMI.

Digital Signals

Input Signals

Input signals are system commands that are carried out by using for example buttons or switches on an accessory, either a tool accessory or a QIF accessory, or by connecting the signal to an I/O input plug.

The input signal Lock tool must not be configured for more than one accessory for each virtual station.

Output Signals

Output signals are states or events of the system. They can be linked to either a tool accessory or a QIF accessory.

Triggering Manual Mode

Manual mode can be activated by a switch or an external system. For example (indicated below), a button on an operator panel can be configured to activate manual mode.

1. Go to the **Configurations** menu and choose **Operator panel** in the left navigation.
2. If no configuration for an operator panel exists, click the **plus** icon at the top right of the work space, otherwise continue to the next step.
3. In the configuration you want to alter, click **Edit**.
4. In the Operator panel configuration window, click on the position [A,B,C,D,E,F,G,I] to configure.
5. In the Position configuration window, click on the Component list. In the list, click **One way key switch**.
6. Click on the Turn signal list. In the list, choose Manual mode (use the arrow buttons to navigate within the list if necessary).
7. Close the Position configuration window.

If the user needs to be notified that Manual mode has been entered or left, then events 4070 and 4071 have to be configured, respectively.

Selector Configuration

Digital Input Information

Information about the connected digital inputs can be found by tapping **Tightening** and then **Digital inputs** on the **Sources** menu.

Socket Selector Configuration

Socket selector is a socket tray with LEDs that can be used to guide the user through, for example, a Batch sequence. When using more than one tightening program, it is convenient to use a selector. When a socket is lifted, the corresponding tightening program is selected. Several socket selectors can be connected to each virtual station.

Information about the connected socket selectors can be found by tapping **Tightening** and then **Socket selector** on the **Sources** menu.

Configuring the Socket Selector

1. Go to **Configurations**, then **Socket selector** and click on the plus at the top right to create a new configuration
2. Give the configuration a name
3. Click on **Edit**
4. Click **Add** or **Remove** for the correct number of socket slots, then select all the slots that need to be active (indicated in blue)

Connecting a Socket Selector to a Virtual Station

1. On the **Virtual station** menu, go to the virtual station to use and then go to Accessories and tap **Choose accessories**.
2. Under Accessories, click Choose accessories, then navigate to the Socket selector tab.
3. In the *Configuration* column (left), select a configuration you want to use with the socket selector (see Configuring the Socket Selector)
4. In the *Connected accessories* column (right), select the socket selector you want to use.

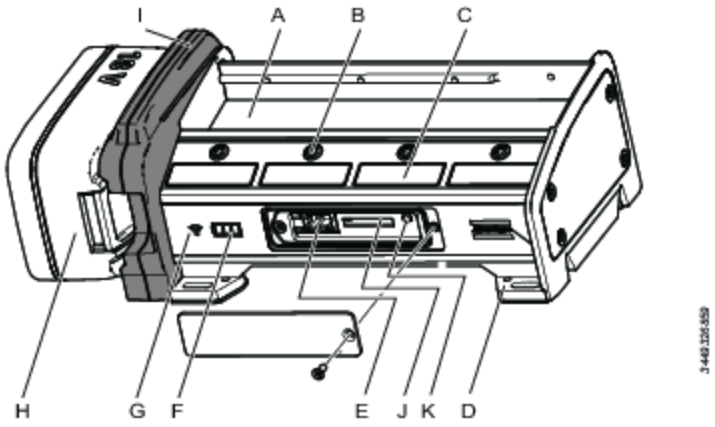
Setting up a Socket Selector via I/o Bus

1. Connect the socket selector to the controller's I/O bus.

2. Under **Virtual station > Accessories > Choose accessories > Socket selector**, check that the selector shows up in the *Connected accessories* column (right)

Setting up a Selector 6 via Ethernet Cable/Wireless

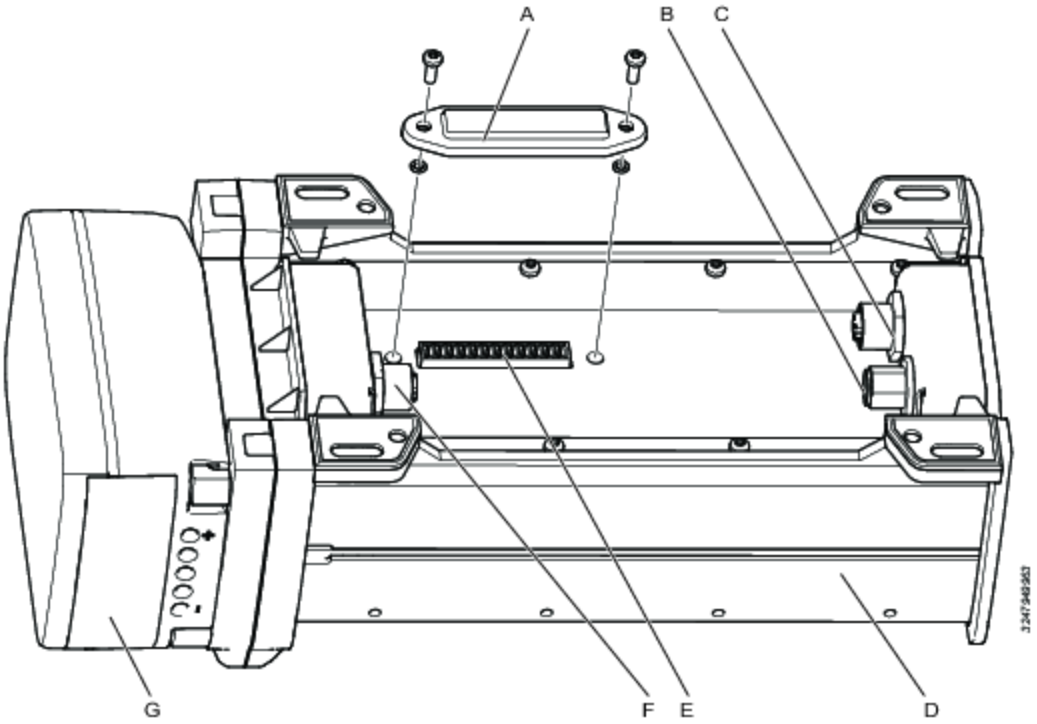
Selector 6 main overview



Selector front view

A	Holder for socket or bit
B	Indicator LEDs for the position
C	Sticker area
D	Mounting holes in each corner
E	Service port
F	Battery status LED (only available on wireless versions)
G	WLAN status LED (available on some selectors)
H	Battery (only available on wireless versions)
I	Mobility module (only available on wireless versions)

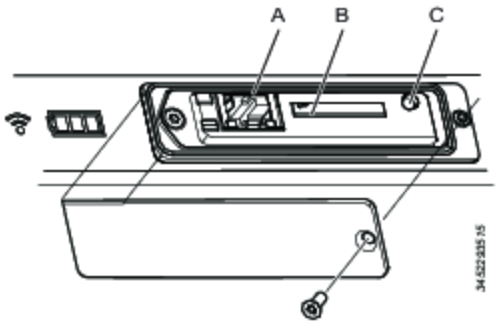
Selector 6 connection overview



Selector bottom view

A	Connector cover
B	External DC power in; Kycon (DC DIN) connector
C	Ethernet in, upstream connection; M12 D-coded female connector
D	Selector back side
E	Digital input and output connector
F	Ethernet out, downstream connection; M12 D-coded female connector
G	Battery

Selector 6 service port overview



Service interface

A	RJ45 Service port
B	RBU slot
C	Function button

General set-up

1. On the controller, go to **Settings > Network** and under *Factory Ethernet* port, check the IP address (only required when setting up via wireless connection).
2. Open the service port cover on the selector. The cover is secured by a 2 mm allen screw.
3. Connect an ethernet cable between a PC and the RJ-45 connector in the service interface.
4. Make sure the selector powered, either by PoE, by external power supply or by battery.
5. Open a web browser window in the PC.
6. Type the web address 169.251.1.1 and press the **Enter** key. The web server in the selector will respond and show the selector web interface.
7. Select **Settings** in the left navigation (this is selected by default). The **Settings** workspace shows the configuration menus and is divided into five different settings: Basic settings, Service port, Ethernet in, WLAN, and the POWER FOCUS 6000.
8. In the **Ethernet in** section, select **External mode** On or Off for the desired LED control source.
9. The next steps in the set-up depend on how the socket selector will be connected to the controller (Ethernet cable directly to the controller (default), Ethernet cable to factory network, or wireless to factory network). See the instructions below for your set-up.

Setting up socket selector - Ethernet wired to controller (default)

1. Ethernet ports (RJ45) for connecting devices and daisy-chaining controllers are only available in newer PF6 models. In order to connect Selector 6 via Ethernet cable to older controller models, an adapter cable should be used to connect the Ethernet cable to the controllers COM PORT.
2. In the **Ethernet In** section, select *PF6000* (default) in the Connected to drop-down.
3. Click the **Save** button in top right of the workspace.
4. Remove the ethernet cable from the service port.
5. Close the service port with the lid and secure it with the allen screw.

The socket selector shows up in the Connected accessories list (**Virtual station > Accessories > Choose accessories > Socket selector**)

Setting up Selector - wired to factory network

1. In the **Ethernet In** section, select *Factory net* from the Connected to drop-down
2. Select DHCP On or Off for dynamic or static IP address configuration. If a static IP address is required, in the IP address field, enter the IP address for the socket selector.
3. In the **PF6000** section, enter the controller IP address (see above) for the controller the selector will be connected to.
4. Click the **Save** button in top right of the workspace.
5. Remove the ethernet cable from the service port.
6. Close the service port with the lid and secure it with the allen screw.

   The socket selector shows up in the Connected accessories list (**Virtual station > Accessories > Choose accessories > Socket selector**)

Setting up socket selector - wireless to factory network

1. In the **Ethernet In** section, select *Factory net* from the Connected to drop-down
2. In the WLAN section, fill out the following parameters:
   - Enable: set radio button to YES
   - SSID: fill out the SSID name for the socket selector
   - Password: fill out the password for the wireless network to be connected to
   - Encryption type: choose the correct encryption type for the wireless network (WPA-PSK, or WPA2-PSK, EAP-TLS)
3. In the **PF6000** section, enter the controller IP address (see above) for the controller the selector will be connected to.
4. Click the **Save** button in top right of the workspace.
5. Remove the ethernet cable from the service port.
6. Close the service port with the lid and secure it with the allen screw.

   The socket selector shows up in the Connected accessories list (**Virtual station > Accessories > Choose accessories > Socket selector**)

General Virtual Station

In General Virtual Station, different specific result reporting and tightening settings can be saved. Different filters can be created, filtering out specific results. In the tightening settings, characteristics like the tool unlocking behavior can be set. These configurations can then be assigned to virtual stations.

Adding and editing a configuration

1. In the Configurations menu, click on the General Virtual Station tab, and click on the **plus sign** in the top right corner.
2. Give the new configuration a name and click on **Edit**.
3. In the Result filter for reporting window, set the switch to **On** for those parameters you want to include in the results. By default, all parameters are set to **On**.

   Turning on a result filter prevents the respective result from being sent, but the result is still shown on the controller.

   The following parameters can be set in the **Result filter for reporting** section:
   - Loosening
   - Batch increment
   - Batch decrement
   - Reset batch
   - Bypass Tightening Program
   - Abort sequence
   - Reset batch sequence
4. In the Tightening Settings window, set a value for any of the parameters listed. By default, all parameters are set to **Off**.

   The following parameters can be set in the **Tightening Settings** section:
   - Unlock tool on loosening - makes sure that the tool is locked after a NOK tightening.
   - Disable loosening - makes sure that an operator is not loosening a bolt that their processes do not allow to be loosened.
   - Disable tightening - makes sure that an operator is not tightening a bolt that their processes do not allow to be tightened.

Unlock tool on loosening options

Unlock tool on loosening	Description
Off	A disabled tool will remain disabled regardless of the loosening status.

Unlock tool on loosening	Description
On OK	A disabled tool will be unlocked after an OK loosening has been performed.
Always	A disabled tool will be unlocked as soon as a loosening has been performed, regardless of the loosening status.

Disable loosening options

Disable loosening	Description
Off	Disable loosening is Off. It is always possible to loosen a bolt.
On OK tightening	Disable loosening for an OK tightening. An operator cannot loosen a bolt that was terminated with tightening OK.
On NOK tightening	Disable loosening for an NOK tightening. An operator cannot loosen a bolt that was terminated with tightening NOK.
Always	Disable loosening is always ON. An operator can never loosen a bolt.

Disable tightening options

Disable tightening	Description
Off	Disable tightening is Off. An operator can always tighten a bolt.
On OK tightening	Disable tightening after an OK tightening, An operator cannot tighten another bolt if the current tightening was terminated with OK.
On NOK tightening	Disable tightening after a NOK tightening. An operator cannot tighten another bolt if the current tightening was terminated with NOK.
After every tightening	Disable tightening is activated after every tightening. An operator cannot tighten another bolt until the current tightening is terminated.

Allowing a disabled tool to unlock after loosening

- In the general virtual station configuration assigned to the virtual station to which the tool is connected, set the *Unlock tool on loosening* to **On OK** or **Always**.

In order to enable the setting above, the following conditions need to be met:

- The *Disable loosening* parameter cannot be set to **Off** or **Always**.
- The *Disable loosening* parameter cannot be set to the same value as the *Disable tightening*.
- The tightening program used must have loosening enabled.

When the tool is locked for either tightening or loosening due to a disable state, it can be unlocked by any of the following input signals:

- Master Unlock - 10005
- Unlock Tool on Disable - 10059

Unlocking a disabled tool through the input signals specified is not possible if *Lock tool on loosening* is set to **Always**.

Assigning a configuration to a virtual station

Each virtual station can have its own configuration associated with it, or multiple virtual stations can share the same configuration. For a configuration to come into effect it needs to be assigned to a virtual station.

1. Go to the Virtual Station menu and select the Virtual Station you want to assign the configuration to.
2. Under General, the first General Virtual Station configuration will be chosen by default. Click on the configuration name.
3. In the pop-up window, select the desired configuration from the list. The pop-up window will be closed upon selection.

Configuring QIF Accessories

A total of 15 QIF accessories can be connected to one controller. It is possible to add several scanners to each controller.

All QIF accessories connected to the controller can be connected to the same virtual station. One of each type of accessory and multiple socket selectors.

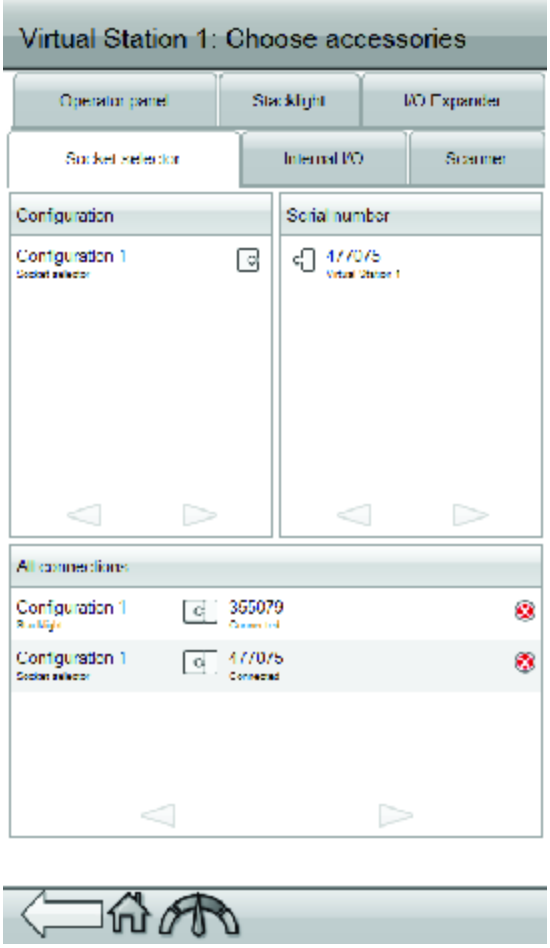
The functions of the QIF accessory can be connected to various input and output signals.

Connecting QIF Accessories to a Virtual Station

To connect a QIF accessory to a virtual station:

To connect a QIF accessory to a virtual station:

1. Configure the accessory in the **Configurations** menu.
2. Connect the accessory to the controller I/O bus.
3. In the **Virtual station** menu, choose the virtual station and then tap **Choose accessories** under **Accessories**.
4. On the appropriate accessory tab, tap both the accessory and the configuration to connect them.
    1. Connected accessories show up in **All connections**.



Disconnecting QIF Accessories From a Virtual Station

To disconnect a QIF accessory or a scanner from a virtual station:

1. On the **Virtual station** menu, choose the virtual station and then tap **Choose accessories** under **Accessories**.
2. Under **All connections**, tap the disconnect icon on the right to disconnect.

Configuration of the Scanner

In this menu, scanner configurations can be added. Scanners can be configured to either have scanned strings handled by the controller, or passed through to a an external system. When the scanned string is passed through, the controller does not select a task based on the string, but instead passes the string to an external device via an output signal.

Adding a scanner and enabling pass through

1. Go to **Configurations > Scanner**, and select the Plus sign at the top right.
2. Give the scanner configuration a name.
3. To enable pass through, select **Edit**, and set **Pass Through Mode** to **On**.

Scanner Configuration

A scanner is used to read a barcode string or a QR code containing information to choose the appropriate batch sequence.

The scanner is configured in the **Sources** tab.

The scanner reads the characters you specify and puts them together to form a string of text. This text string is matched to the pre-defined strings you have specified in the controller, and if they match, the batch sequence linked to your pre-defined string is selected.

Barcode strings of a length of up to 1024 characters can be read and they can contain characters in the positions 32-126 in the ASCII table. If the barcode contains a string longer than 1024 characters, the remaining part of the string, from position 1025 and forward, is discarded.

Configuring the Scanner

The scanner itself must be set up using a US keyboard, and the scanner will emit a carriage return character to terminate the barcode string.

Valid Scanners

For a list of scanners verified for use with the POWER FOCUS 6000 controller, contact your local Atlas Copco sales representative.

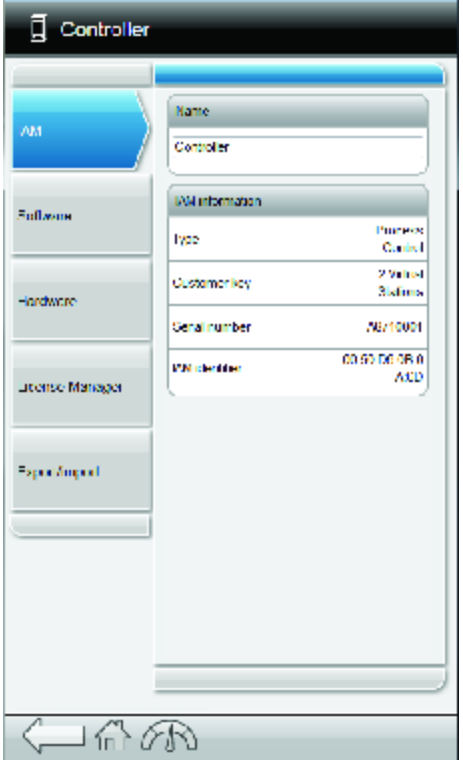
Working with the Controller Tab

The system administration tasks for the POWER FOCUS 6000 controller are handled in the **Controller** menu. The menu is accessed through the controller GUI, the web GUI, or the Tools Talk 2 GUI.

Intelligent Application Module

The **Intelligent Application module (IAM)** is a non volatile storage that is located in the controller. The storage module contains all the controller programs, configurations and results. Certain modules may also include additional loaded *feature items*.

For a complete list of available IAMs and their capabilities, please consult an Atlas Copco sales representative.



IAM information

Software

The version number of two versions of software available in the POWER FOCUS 6000 controller are under the Software tab.

Installing a second version of the controller software is useful when performing upgrades on multiple controllers. When production is ready for switching to the upgraded software, activation of the new software version is done locally on the controller GUI, from a remote computer with the web GUI, or with Tools Talk.

A new software distribution can be installed either by connecting a USB flash drive containing the software to the controller's USB port, or by using the web GUI.

The software update option is visible only when accessing the controller GUI from a PC. When a mass storage device with a valid software version is inserted in the USB port a prompt to update the software will appear.

The software update file must not be unzipped and must be stored in a folder named **PFImages** in the root directory on the USB flash drive.

An unexpected failure during software upgrade might lead to loss of data.
Before upgrading software versions, it is recommended to take a backup of the controller configuration by exporting "All controller information".

Updating Controller Software through USB

1. Connect the USB flash drive to the controller: the installation wizard starts automatically.

If several software versions are available on the USB flash drive, a list with the different software upgrade files is displayed.

2. Select the software upgrade file to install and follow the instructions to finish the installation.

The USB flash drive needs to have a partition available and be formatted to work for Linux. Possible formats are for example FAT or NTFS.

Manually restart all Sync Member controllers after upgrading to a new software version or downgrading from a new software version.

Updating Controller Software through Web GUI

1. On the **Controller** menu, go to **Software**, and select **Software update**. Then, click **Browse**.

2. Browse and choose the .zip file with the software and follow the instructions to complete the installation.

Manually restart all Sync Member controllers after upgrading to a new software version or downgrading from a new software version.

Activating the Software on the Controller

The controller can store two installed software versions. By using the Software activation, it is possible to choose which software version to use. Software activation can be performed either locally from the controller GUI or remotely from the web GUI.

The activation process requires a restart of the controller.

1. On the **Controller** menu, go to **Software**.

2. Swipe the **Software activation** switch to stored and follow the instructions.

Hardware

The Hardware tab contains Controller information, such as model designation and serial number, Health, Touch screen calibration, and information about the various electronics boards in the controller.

Health

The Health view contains information about battery status and controller temperature.

Battery status

Controller > Hardware > Health

The POWER FOCUS 6000 battery, located inside the controller's front panel serves as backup power for some system elements, such as the internal clock. The status of the battery is updated once a day, as well as at controller restart. When the battery is close to being completely depleted, a warning (3011) will be displayed. The battery shall be replaced as soon as possible when the warning pops up.

Controller temperature

Controller > Hardware > Health

Controller temperature is monitored continuously by the POWER FOCUS 6000. Supported temperature units are degrees Celsius (°C) and degrees Fahrenheit (°F), with Celsius being the default unit. It is possible to switch between the two units without requiring a restart of the controller. When the controller temperature exceeds max temperature, the drive stage is disabled and an alert (3010) is shown. The drive stage is once again enabled when the controller temperature drops below the temperature limit.

From the display or through the web GUI, users can access the latest controller temperature measured together with the timestamp when the measurement was taken.

Export/Import

The **Export/Import** Tab supports the user to make one of the following operations: Export, Import, and Automated backup.

The **Export** window supports the user to export controller configurations, settings, results, and events. In addition, it is possible to export tool logs, which can be shared with Atlas Copco Service personnel to troubleshoot problems with the tool(s).

The **Import** window supports the user to import controller configurations and settings.

> It is only possible to have one active Export or Import at the time. Any attempt to start a new Export/Import while there is an ongoing Export/Import is rejected.

The **Automated backup** window supports the user to generate automatically a backup file.

It is possible to export/import data through one of the following devices:

- USB flash drive (formatted and with a partition to work for Linux: possible formats are, for example, FAT or NTFS)
- Web GUI
- ToolsTalk 2

During the Export/Import process a progress bar informs the user that an export/import is ongoing. The time to perform an export/import is depending on the numbers of results, events, and log files.

Export/Import Between Controllers

Controllers may have different IAM types that could have different capabilities.
A controller can export all the configurations that are applicable for the current type of IAM module.

A controller cannot import a file exported from a different type of IAM module. This is applicable also when using ToolsTalk 2.

Exporting "All Controller Information"

It is possible to export controller configuration, settings, results, and events for further processing. Part of the export is done both from the cable tool, as well as connected wireless tools.

All data included in the export is stored in a file "PFExport_<IAM name>_<datetime (lowest value displayed for time is seconds)>.tar.gz", which includes the following files and directories:

- ***"PFExport_<datetime>_Results.csv"*** – All available results

  The results are exported in a CSV formatted text file. The latest performed result is the first in the CSV file.

  It is possible to export the following result information for tightenings and loosenings:

Result Information	**Power Focus 6000 - Tightening Programs**	**Power Focus 6000 - Multistep Programs**	**StepSync**
Identity number	-	-	X
Type of tightening	X	X	X
Virtual Station name	X	X	X
VIN (Identifier String)	X	X	X
Date and Time	X	X	X
Unique tool identifier	X	X	-
Batch Sequence Name	X	X	-
Batch Sequence Counter	X	X	-
Batch Count	X	X	-
Bolt name	-	-	X
Total status	-	-	X
Total status info	-	-	X
Status	X	X	X
Status info	X	X	X
Mode Name	-	-	X
Tightening program/Multistep Name	X	X	X
Stopping error	-	X	X
Errors	-	X	X
Failing Step	-	X	X

Result Information	Power Focus 6000 - Tightening Programs	Power Focus 6000 - Multistep Programs	StepSync
Channel	-	-	X
Target Torque (Nm)	X	X	-
Final Torque (Nm)	X	X	X
Target Angle (deg)	X	X	-
Start Final Angle (Nm)	X	X	X
Final Angle (deg)	X	X	X
Rundown Angle (deg)	X	-	-
Residual torque correlation factor	X	X	-
Elapsed time (s)	-	X	X
Angle low limit (deg)	X	X	X
Angle high limit (deg)	X	X	X
Torque low limit (Nm)	X	X	X
Torque high limit (Nm)	X	X	X
Number of pulses	X	-	-
Current at shutoff (A)	X	X	X
TrueAngle compensation (deg)	X	X	-
Time to rundown complete (ms)	X	-	-
Time to final torque (ms)	X	-	-
Target Text	X	X	-
Step Data	-	X	X
Selftap Torque	X	X	X
Prevailing Torque	X	X	X
Rundown Angle Trigger	X	X	X

The field delimiter and number format depends on the language settings:

Language	Date/time	Field delimiter	Number format
English (en_US)	MM/dd/yyyy hh:mm:ss	,	123.456
Czech (cs)	dd.MM.yyyy hh:mm:ss	;	123,456
German (de_DE)	dd.MM.yyyy hh:mm:ss	;	123,456
Spanish (es_ES)	dd/MM/yyyy hh:mm:ss	;	123,456

Language	Date/time	Field delimiter	Number format
French (fr_FR)	dd/MM/yyyy hh:mm:ss	;	123,456
Korean (ko_KR)	yyyy-MM-dd hh:mm:ss	,	123.456
Italian (it_IT)	dd/MM/yyyy hh:mm:ss	;	123,456
Japanese (ja_JP)	yyyy/MM/dd hh:mm:ss	,	123.456
Portugese (pt_BR)	Dd/MM/yyyy hh:mm:ss	;	123,456
Russian (ru_RU)	dd.MM.yyyy hh:mm:ss	;	123,456
Swedish (sv_SE)	yyyy-MM-dd hh:mm:ss	;	123,456
Chinese (zh_CN)	yyyy/MM/dd hh:mm:ss	,	123.456

For PF6000-StepSync, all available results are in the file named "PFExport_<datetime>_Results.csv.zip".

- ***"PFExport_<datetime>_Events.csv"*** - All available events

  The following event information are exported in a CSV formatted text file:

  - Severity
  - Date
  - Time
  - Code
  - Description
  - Virtual Station that triggered the event (only exported for PF6000-Handheld)
  - Carrier (only exported for PF6000-StepSync)
  - Channel (only exported for PF6000-StepSync)
- ***"/settings"*** - Settings and configurations (used by Import)

For fieldbus exported settings and configurations:

- General Fieldbus configuration (including IP address)
- Fieldbus configuration
- Fieldbus mapping (Virtual station mapping to ProcessDataFrame)

- ***"jsonConfigurations.zip"*** - Multistep Tightening and Loosening programs are exported as .json files (to be used with MID2500)
- ***"atlas_sys_d.zip"*** - Logfiles from Drive application
- ***"atlas_sys_i.zip"*** - Logfiles from IT application
- ***"atlas_protocol_log.zip"*** – Logfiles from external protocol adapters
- ***"ExportInfo.txt"*** - Text document containing information about the IAM and Controller

- ***"atlas_plc.zip"*** - PLC configuration
- ***“licenseInformation.zip”*** – License Information and System Capabilities

How to Export "All Controller Information"

1. On the Home view, select the **Controller** Tab. Then, on the left side, select the **Export/Import** Tab .
2. In the **Export** window, open the drop-down menu and select **All controller information**.
3. In the **Export** window, select **Export**.
   At the end of the exporting process, an exporting pop-up window confirms that the export is done.
   A ***PF/IXBExport_<IAM name>_<datetime>.tar.gz*** file is automatically downloaded.

Exporting "Settings and Configurations"

It is possible to export only controller configurations and settings.

The exported data are stored in a compressed file identified with the IAM name and exported date and time.
The data in the file include all configurations and settings of the controller, so that the export file can be imported and setup another controller with the same or newer release version.
The exported data include information about the IAM and Controller, and also pre-formatted Multistep Tightening and Loosening programs to be used with the MID2500 solution.

How to Export "Settings and Configurations"

1. On the Home view, select the **Controller** Tab. Then, on the left side, select the **Export/Import** Tab .
2. In the **Export** window, open the drop-down menu and select **Settings and configurations**.
3. In the **Export** window, select **Export**.
   At the end of the exporting process, an exporting pop-up window confirms that the export is done.
   A ***PFExport_<IAM name>_<datetime>.tar.gz*** file is automatically downloaded.

Exporting "Logs from Connected Tools"

The export of tool logs enables a service technician to share the tool log data with Atlas Copco Service personnel to troubleshoot problems with the tool(s).

It is possible to export tool logs from the following tools: STB, SRB and TBP/TBP-S.

To export the tool logs, the tool has to be connected to the controller. It is not necessary for the tool to be assigned to a Virtual Station.

All data included in the tool log export is stored in a file "PFExport_<IAM name>_<datetime>.tar.gz", which includes the following files and directories:

- ***"atlas_tool_i.zip"*** – All available results

  For each connected tool an individual files is created. The file format for tool log files is "tool-<tool type>-<tool serial number>.log"
- ***"ExportInfo.txt"*** - Text document containing information about the IAM, Controller and connected tools

How to Export "Logs from Connected Tools"

1. On the Home view, select the **Controller** Tab. Then, on the left side, select the **Export/Import** Tab .
2. In the **Export** window, open the drop-down menu and select **Logs from connected tools**.
3. In the **Export** window, select **Export**.
   At the end of the exporting process, an exporting pop-up window confirms that the export is done.
   A ***PFExport_<IAM name>_<datetime>.tar.gz*** file is automatically downloaded.

Exporting "Results"

It is possible to export only tightening results from the controller.

How to Export "Results"

1. On the Home view, select the **Controller** Tab. Then, on the left side, select the **Export/Import** Tab .
2. In the **Export** window, open the drop-down menu and select **Results**.
3. In the **Export** window, select **Export**.
   At the end of the exporting process, an exporting pop-up window confirms that the export is done.
   In case of a multi-spindle systems (fixtured), the exported file automatically downloaded is in a .zip format, otherwise it is in a .csv format.

Importing Controller Configurations and Settings

When users import controller configuration and settings, existing configurations and settings are replaced by the imported controller configuration and settings.

The following configurations are not imported or deselected:

- Controller Network settings are not imported
- Results and Events are not imported
- License Assignment is not imported
- Assigned task in Virtual Station/s is deselected
- ***"jsonConfigurations.zip"*** (Multistep Tightening and Loosening programs) is not imported
- ***"licenseInformation.zip"*** (License Information and System Capabilities) is not imported

How to Import Controller Configurations and Settings

1. On the Home view, select the **Controller** Tab. Then, on the left side, select the **Export/Import** Tab .

2. In the **Import** window, select **Import**.

   An **Information** pop-up window confirms that all setting for tightening program, batch, accessories, and controller will be replaced with the settings of the imported file.
   However, settings for network, PIN, results, and events will not be imported.

   Select **Continue**.

3. In the **Import** pop-up window, select **Choose File**. Then, select the file to be imported on the controller.

   At the end of the importing process, the controller will restart automatically.

   If the importing process is interrupted before it has started, or the file disappears, the user is informed and the controller has to be restarted (to assure it is in a valid state).
   If the importing process is interrupted, but the file is not corrupt and exist, the import can be completed.

Automated Backup

The **Automated Backup** window enables or disables sFTP export.

By default, **Enable sFTP export** switch is set to OFF.
When turning ON **Enable sFTP export** switch, an export file is created 10 minutes after the last configuration change.
If **Enable sFTP export** switch is set to ON on system startup, an export file is automatically created within 2-3 minutes. The export file is created within 2-3 minutes to reflect changes that might have been done before the system was shutdown.

The old Backup file is deleted before the new Backup file is available.

The data in the exported file include all configurations and settings of the controller.

The sFTP users can retrieve the exported file stored in the following directory of the system: */Export/<export file name>*.

A system supporting sFTP is needed.

To retrieve the file sFTP users do not need to use any password.

The username for sFTP users is as follows:

Username	**autoexport**

StepSync

Controller features, such as the Low Reaction Tightening Strategies and controller-wide functions among others, require licenses distributed through the Functionality Management System (FMS). Whereas configuration of features is possible without specific licenses, the assignment and use of those features will require the correct license to be installed on the controller. Please refer to Licenses (FMS) for more detailed information on licenses.

StepSync requires ToolsTalk 2 to configure.

With the StepSync function it is possible to connect several PF6000 Controllers together and run synchronized tightenings. The first controller in the configuration is called the Sync Reference and handles all the tightening and data reporting. Up to 5 additional PF6000 controllers are then connected to the Sync Reference via a PF6000 daisy-chain cable (see Setting up StepSync (hardware) and are called Sync Members, their only function is to handle the tools.

Sync Reference

The Sync Reference controller is the brain in the system. It handles the tightening settings and all data reporting. It also handles the configuration for the complete system and the connection to ToolsTalk and ToolsNet. All accessories or fieldbuses are connected directly to the Sync Reference

Sync Member

The Sync Member controller works as a drive without extra functionality. The IT part is not running and it is not possible to connect any external accessories or protocols to a Sync Member. Each Sync Member has a channel number assigned to it. The channel number is used to identify the tool and drive within the Hardware Layout Configuration in ToolsTalk 2, as well as to select the ones that should be included in the tightening in Sync Mode, and also used for result reporting. It is also used for error events to make it possible to identify the faulty part.

Tightenings

It is only possible to run Multistep tightening programs. To be able to synchronize tightenings between each tool, synchronization points are used. At these points, the tools will wait for each other before continuing with the next step in the tightening program. A tightening program can contain up to 10 steps (not counting the synchronization points). **Note that the assignment of tightening programs can only take place through ToolsTalk 2. The controller does not provide possibilities to assign tightening programs.**

Licensing

The StepSync function is an FMS feature. It is only the Sync Reference that requires a license, making it possible to change any PF6000 Controller into a Sync Member without any additional licenses. The Sync Reference license is an add-on FMS controller feature.

If the Sync Reference license is removed, no tightenings can be performed in StepSync mode. If connection to the license server is lost, the license will continue to operate for 48 hours. The controller will check for a valid Sync Reference license every hour.

StepSync User Interface

The StepSync user interface is a simplified version of the regular POWER FOCUS 6000 interface. For detailed descriptions on the various interface elements, please refer to the dedicated chapters and sections in this manual describing those. Note that the user interface is only accessible on the Sync Reference.

Not all functions in the various menu items are available in the StepSync interface. The following functions are accessible and editable in the interface:

- **Tool**: all information available.
- **Virtual Station**: all functions accessible, except creation of new Virtual Stations, assignment of Tasks (tightening program), and assignment of tool among others.
- **Configurations**: all functions available.
- **StepSync (Controller)**: all functions available. Note that there is an extra section here called Channels where information on the tools connected to the Sync Reference and Sync Members is given.
- **Reports**: Events (view all events).
- **Settings**: the following functions are not available:
    - Tightening
    - Wireless
    - Events
- **Diagnostics**: menu specific to StepSync/Flex.
- **License assignment**: all functions available.

Configuring StepSync

The configuration of the Sync Reference and all Sync Members needs to be completed before performing the hardware set-up.

Configuring the Sync Reference

1. Select the **Controller** menu, then select the **StepSync** tab.
2. In the StepSync section, select **No Sync**

   The **Step Sync Mode** window appears.
3. Select **Sync Reference**

   The **Step Sync Mode** window closes.
4. Select **Apply**.

   The controller will reboot and boot into the StepSync configuration, which is a simplified version of the regular PF6000 GUI.

Enabling StepSync

In order for StepSync to work, it has to be enabled on the Sync Reference. There are two ways to enable StepSync:

a. Set the I/O signal Enable Operation (10055) to High, or

b. In the Sync reference, go to **Configurations**, then to the **General Virtual Station** tab, and click on **Edit** for the configuration in question. Then, in the **Fixtured Stations** field, set **Auto Enable** to **Always**.

If StepSync has not been enabled, at runtime the user will be presented with an error message saying "Unable to start, enable signal is low."

Configuring the Sync Member

1. Select the **Controller** menu, then select the **StepSync** tab.
2. In the StepSync section, select **No Sync**

   The **Step Sync Mode** window appears.
3. Select **Sync Member**

   The **Step Sync Mode** window closes.

4. In the **Channel** field, set the channel number for the Sync Member by selecting the channel number. Then select the appropriate channel for the Sync Member.

   The channel numbers of the Sync Members in the same set-up must be unique.

5. Select **Apply**.

   The controller will reboot and boot into the Sync Member configuration, which will only display the Sync Member's channel number.

Switching back to regular PF6000 mode (exiting StepSync)

1. Select the **PF6 FlexSystem** menu, then select the **StepSync** tab.
2. In the StepSync section, select **Sync Reference**

   The **Step Sync Mode** window appears.

3. Select **No Sync**

   The **Step Sync Mode** window closes.

4. Select **Apply**.

   The controller will reboot and boot into the regular configuration.

Setting up StepSync (hardware)

Note that software configuration needs to be done before hardware set-up is completed in order to avoid possible set-up conflicts.

The StepSync function allows several POWER FOCUS 6000 to be connected in order to run synchronized tightenings.

1. Make sure each controller has been configured correctly (see StepSync Configuration for more information).
2. Using a PF6000 daisy-chain cable, connect the Sync Reference Com Port B to the first Sync Member's Com Port A.
3. Using another PF6000 daisy-chain cable, connect the first Sync Member's Com Port B to the second Sync Member's Com Port A. Do the same for all subsequent controllers.

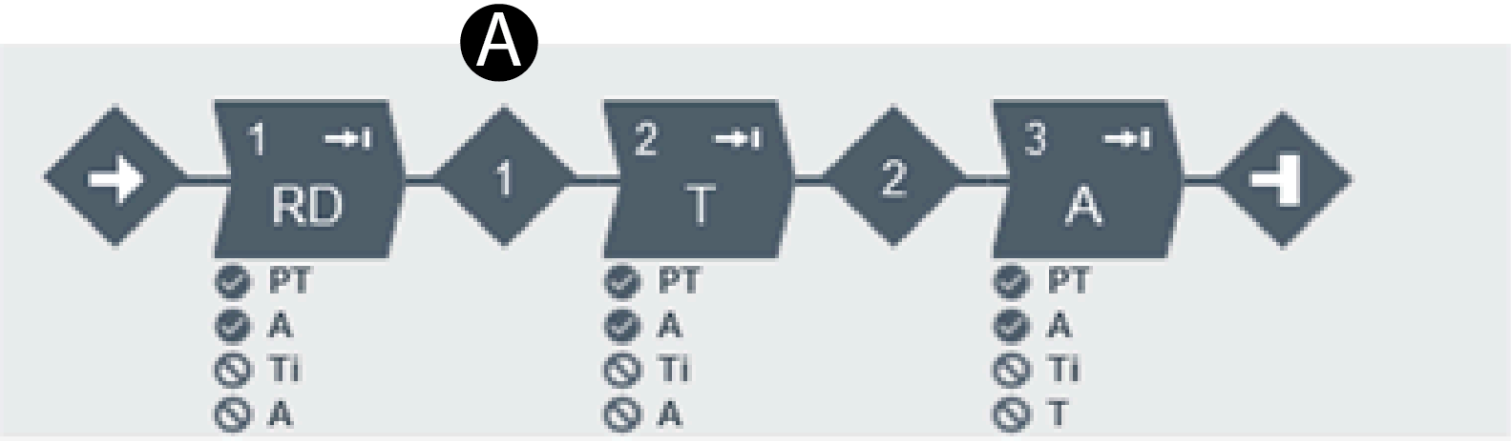
   A StepSync system can be configured with a maximum of 5 Sync Members.



A	Sync Reference	D	Connected to Com Port A
B	Sync Member	E	PF6000 daisy-chain cable
C	Connected to Com Port B		

StepSync Tightenings

The only possible tightening programs to use in conjunction with StepSync are **Multistep tightening programs**. To synchronization between the tools in the set-up, Synchronization points are used. At these points, the tools will wait for each other before continuing with the next step in the Multistep tightening program. Note that assigning tightening programs to the different tools can only take place in ToolsTalk 2.



Example of a Multistep tighteningprogram for StepSync

A	Synchronization point

A tightening program can consist of a maximum of 10 steps (not counting the Synchronization points).

Available steps

- Tighten to Angle
- Tighten to Torque
- Tighten to Torque plus Angle
- Tighten to DynaTork
- Wait
- Socket Release
- Tighten to Torque or Angle
- Loosen to Angle
- Loosen to Torque
- Rundown
- Tighten to Yield M2
- Tighten to Yield
- Tighten to Torque and Angle
- Thread cutting to torque
- Engage

Available Monitors

- Angle
- Peak Torque
- Shut Off Torque
- Torque rate and deviation
- Torque in angle window
- Post view torque high
- Post view torque los
- Angle from Yield
- Prevailing Torque
- Shut Off Current
- Post Thread cut angle
- Post Thread cut peak torque
- Stick Slip Detection
- Time

Available Step Restrictions

- Maximum Torque
- Maximum Angle
- Cross Thread
- Rescinding Torque
- Torque Gradient
- Torque in Angle View
- Torque vs Current Deviation

Reject Management

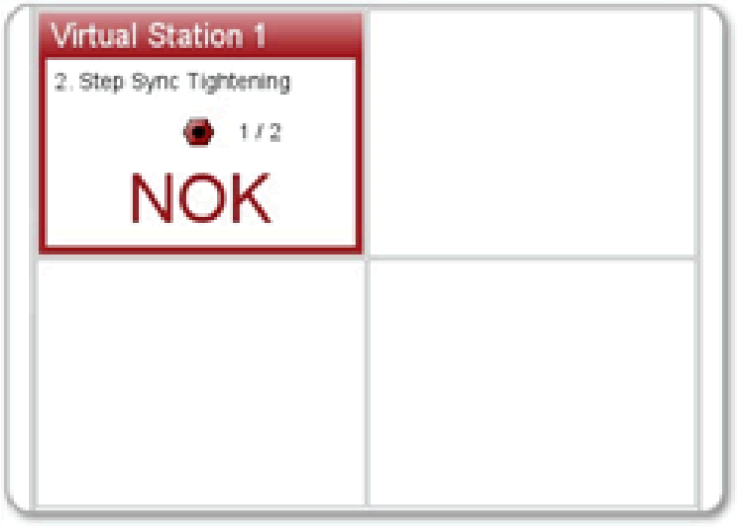
Action if failure	**Description**
End all	• All channels will end the tightening and report status NOK. • The tightening that did not have an error itself will report additional info **Terminated by other bolt**.
Continue OK	• The failing channels will end the tightening with status NOK. • The remaining channels will continue with the rest of the tightening program.

StepSync Results

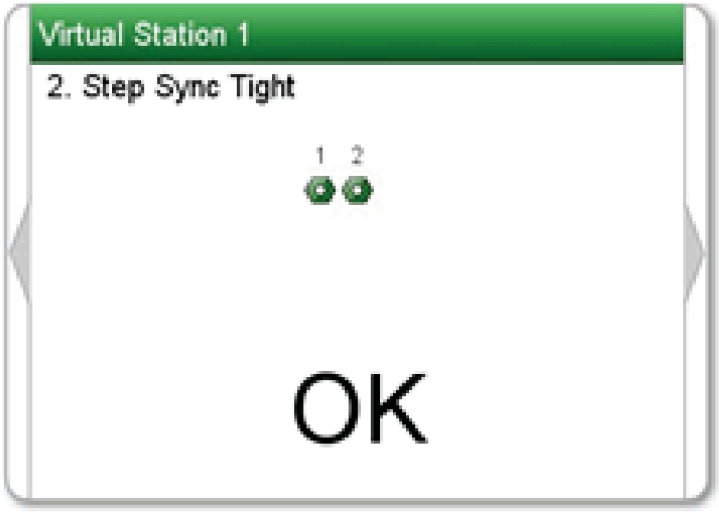
The results for all the tools in the StepSync tightening will be shown on the controller GUI of the Sync Reference and in its corresponding Web GUI. The GIU on the Sync Members will not show any results.

There are three different Result views. The first shows an overview of the total status for the entire tightening (OK or NOK) and the total number of OK and NOK bolts. The second shows the status for each bolt separately, and the third also shows the torque and angle values for each bolt.



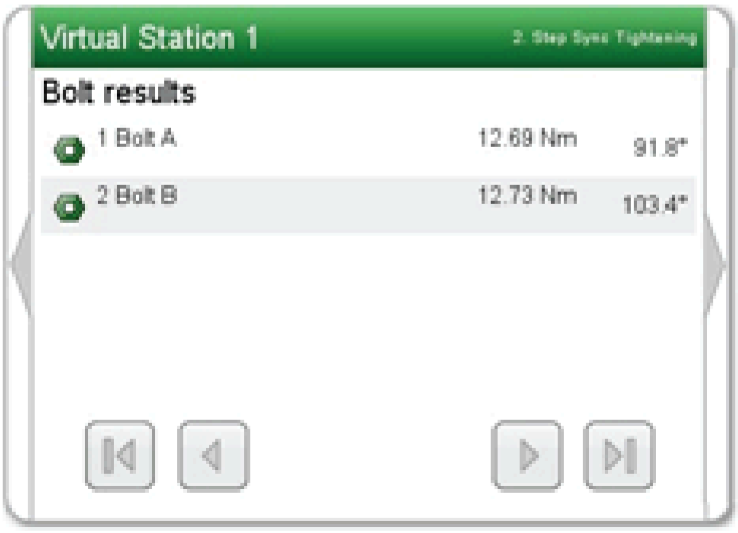


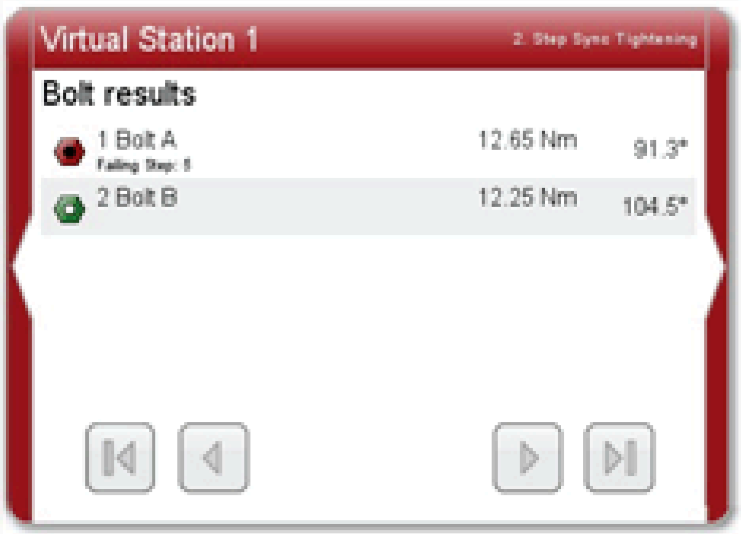
Example of Overall Status View





Example of Overall Status view with Bolt Status





Example of Detailed Status view

Step Sync Signals

The StepSync system supports the same I/O signals listed in the tables below. These can be mapped in fieldbus configuration and accessory configuration. Some are also available through Open Protocol.

Input Signals

Abort Sequence - 10012

When a Batch sequence abort request is received, the Batch sequence functionality aborts the batch sequence only after getting the ongoing tightening result.

Name in SoftPLC: ABORT_BATCH_SEQUENCE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Batch Decrement - 10002

Incrementally decreases the batch counter by one.

Name in SoftPLC: BATCH_DECREMENT

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE

- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Batch Increment - 10001

Incrementally increases the batch counter by one.

Name in SoftPLC: BATCH_INCREMENT

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Bypass Tightening Program - 10008

Skips the next tightening program in the running batch sequence.

Name in SoftPLC: BYPASS_PSET

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE

- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Disable Fieldbus - 10049

Disables the fieldbus.

Name in SoftPLC: DISABLE_FIELDBUS

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Disable tool - 30000

If the signal is set to True, a tool is immediately stopped and locked.

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE

- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Dynamic Batch Size - 10074

Name in SoftPLC: DYNAMIC_BATCH_SIZE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Fieldbus Lock Loosening - 20021

A Virtual Station is locked when starting a loosening if the signal is set from a connected and supported accessory.
An ongoing loosening is aborted immediately when Fieldbus Lock Loosening is set to True, due to the Stop Drive setting.

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Fieldbus Lock Tightening - 20020

A Virtual Station is locked when starting a tightening if the signal is set from a connected and supported accessory.
An ongoing tightening is aborted immediately when Fieldbus Lock Tightening is set to True, due to the Stop Drive setting.

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Flush Read Result Queue - 30005

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

ID for Dynamic Batch Size - 10073

Name in SoftPLC: DYNAMIC_BATCH_SIZE_TPID

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	1	16
TreatZeroAsOne	State	Integer	1	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Lock Loosening - 20003

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Lock Tightening - 20002

Tool locked for tightening by digital input.

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Lock Tool Active High - 20004

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Lock Tool Active Low - 20061

Locks the tool when this signal is low.

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Master Unlock - 10005

Unlocks most locks defined in lock page.

Name in SoftPLC: MASTER_UNLOCK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Pulse Stop - 10030

If this signal is generated any ongoing tightening or loosening will be stopped. Used in combination with 10024 or 10072.

Name in SoftPLC: TIGHTENING_STOP_PULSE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Read Result Handshake Ack - 30004

Enable the Read Result Handshake feature in the Fieldbus device for making the controller available for the signal Rear Result Handshake Ack.

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Reset All Identifiers - 10115

In Source batch string used to reset all received string identifiers from string receiving sequence at once. In other worktasks clears VIN number.

Name in SoftPLC: RESET_ALL_IDENTIFIERS

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Reset Batch - 10003

Resets the batch counter to 0. No batch OK (nxOK). If batch OK is activated, it will be deactivated.

Name in SoftPLC: RESET_BATCH

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Reset Batch Sequence - 10053

Resets the Batch Sequence. Unlocks a tool that is locked by Tool Lock on Complete.

Name in SoftPLC: RESET_BATCH_SEQUENCE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Reset Latest Identifier - 10114

In Source batch string used to reset latest received string from string receiving sequence. In other worktasks clears VIN number.

Name in SoftPLC: RESET_LATEST_IDENTIFIER

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Reset Sequence Status - 10118

Resets signals Batch Sequence Done/OK/NOK and Sequence Aborted.

Name in SoftPLC: RESET_SEQUENCE_STATUS

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE

- I/O Expander: TRUE

Reset Too Many NOK - 10013

Reset the batch after receiving lock Too Many NOK

Name in SoftPLC: RESET_TOO_MANY_NOK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input - 10020

Selects Tightening Program withing Source Tightening/Batch within sequence.

Name in SoftPLC: SELECT_INPUT_VALUE

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	1	16
TreatZeroAsOne	State	Integer	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE
- Stacklight: FALSE

- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Select Input and Dynamic Batch Size - 30007

It is used to set the Batch Size for a specific "Identifier Number" in a Source Tightening Task, running "External batch control".

Batch size can be set to 1-250.

If Batch size is set to 0, it is treated as infinite batch. The user is not able to un-set a Batch back to a state where it has no size, once it has been set.

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	16	16
TreatZeroAsOne	State	Integer	16	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Select Input Bit 0 - 10016

Name in SoftPLC: SEL_INPUT_BIT_0

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 1 - 10017

Name in SoftPLC: SEL_INPUT_BIT_1

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 2 - 10018

Name in SoftPLC: SEL_INPUT_BIT_2

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 3 - 10019

Name in SoftPLC: SEL_INPUT_BIT_3

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 4 - 10066

Name in SoftPLC: SEL_INPUT_BIT_4

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE

- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 5 - 10067

Name in SoftPLC: SEL_INPUT_BIT_5

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 6 - 10068

Name in SoftPLC: SEL_INPUT_BIT_6

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE

- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 7 - 10069

Name in SoftPLC: SEL_INPUT_BIT_7

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 8 - 10070

Name in SoftPLC: SEL_INPUT_BIT_8

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE

- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 9 - 10071

Name in SoftPLC: SEL_INPUT_BIT_9

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Loosening - 10029

Selects loosening as default operation mode and used in combination with Start Tools -10028 signal.

Name in SoftPLC: SELECT_LOOSENING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE

- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Next Identifier Number - 10116

It is possible to use the signal Select Next Identifier Number when a task in the virtual station is configured as:

- **Batch Sequence**
- **Source Tightening**
- **Source Batch**
  - **Number Identifier** method
  - **String Identifier** method

ST Selector configurable functions **Take Next** and **Take Previous** enable the input signals **Select Next Identifier Number** and **Select Previous Identifier Number**.

Batch Sequence selected as Virtual Station Task

If **Free Order** switch has been enabled, the signal Select Next Identifier Number can select different batches within the selected sequence.

Before selecting batches, it is mandatory that they have the identifier number assigned. If a batch does not have the identifier number assigned, the signal Select Next Identifier Number cannot select it, even if **Free Order** switch is enabled.

It enables looping through the batches that have a configured identifier number.
If identifier number is "None", it is possible to select it only after all Batches with configured identifier number are completed.

It is possible to do looping, but 0 is skipped. When a batch is finished, it is no longer selectable.

For example, in case of batches with assigned identifier numbers 1,2,4,5, the signal runs in loop: 1,2,4,5,1,2,4... as long as the batches are not finished.

Source Tightening selected as Virtual Station Task

The signal selects the next identifier number from the list of tightening programs specified in the Source Tightening task.
The selection runs from the currently selected identifier number to the next larger one.

When the biggest identifier number is selected, this signal selects 0; after 0, the signal selects the next bigger identifier number.

If 0 is selected as identifier number, the tool is locked.

If the identifier number has been added to the Source Tightening list, but no tightening program has ever been assigned to it, it is skipped while looping through the Source Tightening list.

If the tightening program is assigned to an identifier number and then it is removed from the list of tightening programs, it is still possible to select this identifier number. In this case, the tool is locked because there is not a specific tightening program.

When **Selector Mode** switch is set to **Confirm**, the socket selector needs to be assigned and configured. All tightening programs can be selected, but before running them, appropriate socket must be lifted from the socket selector.

Source Batch selected as Virtual Station Task

In *Sources* > *Batch Sequence* > *Source Batch*, when the identifier method is set to **Number**, the signal Select Next Identifier Number selects sequences from a list of sequences shown in **Source Batch** task.

It is possible to do looping through 0. The signal Select Next Identifier Number selects only the identifier numbers assigned to sequences.

For example, if there are 4 sequences available with identifier numbers 1,2,4, and 8, the signal Select Next Identifier Number iterates and selects 1,2,4,8,0,1,2...

The identifier numbers not defined are not selected.

In *Sources* > *Batch Sequence* > *Source Batch*, when the identifier method is set to **String**, it is necessary to select the sequence through external sources (like scanner or Open Protocol). The signal Select Next Identifier Number is able to select the batches within the selected sequence.

Name in SoftPLC: SELECT_NEXT_ID_NUMBER

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Previous Identifier Number - 10117

It is possible to use the signal Select Previous Identifier Number when a task in the virtual station is configured as:

- **Batch Sequence**
- **Source Tightening**
- **Source Batch**
  - **Number Identifier** method
  - **String Identifier** method

ST Selector configurable functions **Take Next** and **Take Previous** enable the input signals **Select Next Identifier Number** and **Select Previous Identifier Number**.

Batch Sequence selected as Virtual Station Task

If **Free Order** switch has been enabled, the signal Select Previous Identifier Number can select different batches within the selected sequence.

Before selecting batches, it is mandatory that they have the identifier number assigned. If a batch does not have the identifier number assigned, the signal Select Previous Identifier Number cannot select it, even if **Free Order** switch is enabled.

It enables looping through the batches that have a configured identifier number.
If identifier number is "None", it is possible to select it only after all Batches with configured identifier number are completed.

It is possible to do looping, but 0 is skipped. When a batch is finished, it is no longer selectable.

For example, in case of batches with assigned identifier numbers 1,2,4,5, the signal runs in loop: 5,4,2,1,5,4,2... as long as the batches are not finished.

Source Tightening selected as Virtual Station Task

The signal selects the previous identifier number from the list of tightening programs specified in the Source Tightening task.
The selection runs from the currently selected identifier number to the previous lower one.

When the smallest identifier number is selected, this signal selects 0; after 0, the signal selects the next smaller identifier number.

If 0 is selected as identifier number, the tool is locked.

If the tightening program is assigned to an identifier number and then it is removed from the list of tightening programs, it is still possible to select this identifier number. In this case, the tool is locked because there is not a specific tightening program.

When **Selector Mode** switch is set to **Confirm**, the socket selector needs to be assigned and configured. All tightening programs can be selected, but before running them, appropriate socket must be lifted from the socket selector.

Source Batch selected as Virtual Station Task

In *Sources* > *Batch Sequence* > *Source Batch*, when the identifier method is set to **Number**, the signal Select Previous Identifier Number selects sequences from a list of sequences shown in **Source Batch** task.

It is possible to do looping through 0. The signal Select Previous Identifier Number selects only the identifier numbers assigned to sequences.

For example, if there are 4 sequences available with identifier numbers 1,2,4, and 8, the signal Select Previous Identifier Number iterates and selects 8,4,2,1,0,8,4...

The identifier numbers not defined are not selected.

In *Sources* > *Batch Sequence* > *Source Batch*, when the identifier method is set to **String**, it is necessary to select the sequence through external sources (like scanner or Open Protocol). The signal Select Previous Identifier Number is able to select the batches within the selected sequence.

Name in SoftPLC: SELECT_PREVIOUS_ID_NUMBER

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Start Loosening - 10011

Active signal starts loosening. Once digital input goes inactive the loosening must be stopped.

Name in SoftPLC: START_LOOSENING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Start Tightening - 10010

Active signal starts tightening. Once input goes inactive the tightening must be stopped.

Name in SoftPLC: START_TIGHTENING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Start Tightening Pulse - 10024

The tightening starts at signal. Runs until the tightening is finished, or until the 30 sec timeout in tightening program occurs.

Name in SoftPLC: TIGHTENING_START_PULSE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE

- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Start Tools - 10028

Active signal which starts the tool (default operation mode is tightening). As soon as signal goes inactive the tool must be stopped. Used in combination with Select Loosening - 10029 signal.

Name in SoftPLC: START_DRIVE_CONTINIOUS

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

To SoftPLC - 10065

Name in SoftPLC: TO_PLC

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	uint8 array	1	1

- Fieldbus: FALSE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE

- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Unlock Tool on Complete - 10051

Unlocks a tool that is locked by "Tool Lock on Complete".

Name in SoftPLC: UNLOCK_TOOL_ON_COMPLETE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Unlock Tool on Disable - 10059

Name in SoftPLC: UNLOCK_TOOL_ON_DISABLE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE

- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Output Signals

Active Identifier String - 186

Set when an identifier string has been received and accepted by the work-task; it is necessary that even sequence or tightening program are running.
If running Source batch-string, it is set when all scans have been received and a sequence had been selected. In that case it includes concatenated string consisted of saved positions.
For other work-tasks it includes the “VIN” number.

Name in SoftPLC: ACTIVE_IDENTIFIER_STRING

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Active Identifier String 1 - 188

Signal corresponding to the first configured string in Source batch-string.
Active Identifier String 1 signal is sent once a scanning sequence is done and a sequence has been selected, thus the identifier parts are active.
The strings is filtered with saved position.
Only sent when running Source batch string.

Name in SoftPLC: ACTIVE_ID_STRING_1

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Active Identifier String 2 - 189

Signal corresponding to the second configured string in Source batch-string.
Active Identifier String 2 signal is sent once a scanning sequence is done and a sequence has been selected, thus the identifier parts are active.
The strings is filtered with saved position.
Only sent when running Source batch string.

Name in SoftPLC: ACTIVE_ID_STRING_2

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Active Identifier String 3 - 190

Signal corresponding to the third configured string in Source batch-string.
Active Identifier String 3 signal is sent once a scanning sequence is done and a sequence has been selected, thus the identifier parts are active.
The strings is filtered with saved position.
Only sent when running Source batch string.

Name in SoftPLC: ACTIVE_ID_STRING_3

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE

- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Active Identifier String 4 - 191

Signal corresponding to the fourth configured string in Source batch-string.
Active Identifier String 4 signal is sent once a scanning sequence is done and a sequence has been selected, thus the identifier parts are active.
The strings is filtered with saved position.
Only sent when running Source batch string.

Name in SoftPLC: ACTIVE_ID_STRING_4

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Batch Completed - 30

The batch counter is equal to the batch size number. Result can be OK or NOK.

Name in SoftPLC: BATCH_COMPLETED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Batch Completed NOK - 37

Batch finished with status NOK.

Name in SoftPLC: BATCH_COMPLETED_NOK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Batch Completed OK - 36

Batch finished with status OK.

Name in SoftPLC: BATCH_COMPLETED_OK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Batch Count - 31

Current number in the batch. Can only be viewed on a display.

Name in SoftPLC: BATCH_COUNT

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Batch Running - 32

Indicates that a batch in a batch sequence is running.

Name in SoftPLC: BATCH_RUNNING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Batch Sequence Completed NOK - 46

Batch sequence finished with status NOK.

Name in SoftPLC: BATCH_SEQUENCE_NOK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Batch Sequence Completed OK - 45

Batch sequence finished with status OK.

Name in SoftPLC: BATCH_SEQUENCE_OK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Batch Sequence Done - 48

Indicates when a sequence is completed, both in case Batch Sequence Completed OK and Batch Sequence Completed NOK.

Name in SoftPLC: BATCH_SEQUENCE_COMPLETED

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	Event	Boolean	1	1
Invert	Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE

- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Batch Sequence Running - 47

Indicates if the Batch Sequence is running or not.

Name in SoftPLC: BATCHSEQUENCE_RUNNING

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Bolt Tightening Status - 79

Name in SoftPLC: BOLT_TIGHTENING_STATUS

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	uint32 array	32	32
FordResultStatus	State		4	4

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

This signal contains subsignals, refer to Subsignals - Output for all subsignals.

Channel Hardware Status - 81

Name in SoftPLC: CHANNEL_HARDWARE_STATUS

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	uint32 array	1	64

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

This signal contains subsignals, refer to Subsignals - Output for all subsignals.

Channel Tightening Status - 80

Name in SoftPLC: CHANNEL_TIGHTENING_STATUS

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	uint32 array	1	64
FordResultStatus	State		4	4

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

This signal contains subsignals, refer to Subsignals - Output for all subsignals.

Configuration Version - 88

Name in SoftPLC: CONFIGURATION_VERSION

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE

- I/O Expander: FALSE

Controller Switched On - 42

Set to true at start up of IO Exchange

Name in SoftPLC: IO_ON

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Current Running Batch - 180

Shows the index of the current running batch in a sequence. If socket selector is used it will show zero if none, more than one or wrong socket is selected. For source tightening it will show 1 if batch mode is used and a batch is running.

Name in SoftPLC: CURRENT_RUNNING_BATCH_IX

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE

- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Cycle Complete - 77

Name in SoftPLC: CYCLE_COMPLETE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Cycle NOK - 76

Name in SoftPLC: CYCLE_NOK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE

- I/O Expander: TRUE

Cycle OK - 75

Name in SoftPLC: CYCLE_OK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Cycle Ready To Start - 82

Name in SoftPLC: CYCLE_READY_TO_START

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Cycle Running - 78

Name in SoftPLC: CYCLE_RUNNING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Emergency Stop - 20036

Name in SoftPLC: EMERGENCY_STOP

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Event Code - 30001

Relay an event when it is triggered. Momentary, on for two cycle times.

Name in SoftPLC: EVENT_CODE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Event Code Severity - 30003

Event Code Severity is an output signal which is activated when the triggered event has severity of error or warning.

Name in SoftPLC: EVENT_CODE_SEVERITY

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Event Present - 161

Indicates if event is triggered. It is only triggered on accessories if event requires an ACK.

Name in SoftPLC: EVENT_PRESENT

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Fieldbus AsyncData From PF - 107

Name in SoftPLC:

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	uint8 array	48	2048

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Fieldbus Disconnected - 96

Name in SoftPLC: FIELDBUS_DISCONNECTED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

From SoftPLC - 10064

Allocated bytes for data transfer from PLC to accessories.

Name in SoftPLC: FROM_PLC

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	uint8 array	8	8

Devices

- Fieldbus:FALSE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Last Received Identifier String - 187

Set directly when an identifier has been received in the work-task.
For Source batch-string, it is set at every scanning in scan process, thus it is changed for every scanning and sent even if it does not match in length.
String set is in raw format and not only "saved positions" in the string.
For other work-tasks this signal is equal to Active Identifier String signal.

Name in SoftPLC: LAST_RECEIVED_ID_STRING

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE



To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Loosening is Locked - 28

The loosening is disabled.

Name in SoftPLC: LOOSENING_IS_LOCKED

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE

- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Loosening NOK - 74

NOK loosening took place.

Name in SoftPLC: LOOSENING_NOK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Loosening OK - 70

OK loosening took place.

Name in SoftPLC: LOOSENING_OK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Max Consecutive NOK Reached - 35

Indicates Max coherent NOK tightening counter is reachead.

Name in SoftPLC: MAX_COHERENT_NOK_REACHED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

No System Error - 83

Name in SoftPLC: NO_SYSTEM_ERROR

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

No System Warning - 102

Name in SoftPLC: NO_SYSTEM_WARNING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Program Start - 132

Defines the starting level for a tightening cycle.

Name in SoftPLC: PROGRAM_START

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Read Result Queue Flushed - 30006

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Received Identifier 1 - 192

Signal corresponding to the first configured string in Source batch-string.
Active Identifier String 1 signal is sent in the order the strings/identifiers are received by the system as soon as a string has been received. If running in forced order scan, it is in the configured order, but if running free

order scan, 1 might not correspond to the first configured string, but to the first received string.
The strings is the raw received string and not have the "saved position" applied.
Only sent when running Source batch string.

Name in SoftPLC: RECEIVED_IDENTIFIER_1

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Received Identifier 2 - 193

Signal corresponding to the second configured string in Source batch-string.
Active Identifier String 2 signal is sent in the order the strings/identifiers are received by the system as soon as a string has been received. If running in forced order scan, it is in the configured order, but if running free order scan, 2 might not correspond to the second configured string, but to the second received string.
The strings is the raw received string and not have the "saved position" applied.
Only sent when running Source batch string.

Name in SoftPLC: RECEIVED_IDENTIFIER_2

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Received Identifier 3 - 194

Signal corresponding to the third configured string in Source batch-string.
Active Identifier String 3 signal is sent in the order the strings/identifiers are received by the system as soon as a string has been received. If running in forced order scan, it is in the configured order, but if running free order scan, 3 might not correspond to the third configured string, but to the third received string.
The strings is the raw received string and not have the "saved position" applied.
Only sent when running Source batch string.

Name in SoftPLC: RECEIVED_IDENTIFIER_3

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE

- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Received Identifier 4 - 195

Signal corresponding to the fourth configured string in Source batch-string.
Active Identifier String 4 signal is sent in the order the strings/identifiers are received by the system as soon as a string has been received. If running in forced order scan, it is in the configured order, but if running free order scan, 4 might not correspond to the fourth configured string, but to the fourth received string.
The strings is the raw received string and not have the "saved position" applied.
Only sent when running Source batch string.

Name in SoftPLC: RECEIVED_IDENTIFIER_4

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Remaining Batch - 33

Remaining tightenings in a batch. Can only be viewed on a display.

Name in SoftPLC: REMAINING_BATCH

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Selected Mode Id - 72

Name in SoftPLC: SELECTED_MODE_ID

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	1	32
TreatZeroAsOne	State	Integer	1	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE

- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Selected Sequence Bit 0 - 139

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_0

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 1 - 140

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_1

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE

- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 2 - 141

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_2

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 3 - 142

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_3

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE

- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 4 - 143

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_4

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 5 - 144

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_5

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE

- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 6 - 145

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_6

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 7 - 146

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_7

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE

- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 8 - 147

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_8

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 9 - 163

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_9

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE

- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Id - 84

Shows the index of the selected batch sequence.

Name in SoftPLC: SELECTED_BATCH_SEQUENCE_ID

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	1	16
TreatZeroAsOne	State	Integer	1	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Sequence Aborted - 160

Output signal indicating if sequence was aborted.

Name in SoftPLC: SEQUENCE_ABORTED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Size of Sequence - 181

Shows the size of the currently running sequence. Only set when a sequence is loaded and not reset when sequence is done.

Name in SoftPLC: SIZE_OF_RUNNING_SEQUENCE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Software Major Version - 86

Name in SoftPLC: SOFTWARE_MAJOR_VERSION

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Software Minor Version - 87

Name in SoftPLC: SOFTWARE_MINOR_VERSION

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Software Release Version - 85

Version of the software running.

Name in SoftPLC: SOFTWARE_RELEASE_VERSION

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Station Ready - 71

Indicates when the Virtual Station is ready.

Name in SoftPLC: STATION_READY

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Test Bolt Activated - 91

Name in SoftPLC: SELECTED_MODE_ID

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Tightening is Locked - 27

The tightening is disabled; it is not possible to make any tightening.

Name in SoftPLC: TIGHTENING_IS_LOCKED

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Tightening NOK - 4

At least one result of the tightening is outside the specified limits.

Name in SoftPLC: TIGHTENING_NOK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tightening OK - 3

The result of the tightening is within the specified limits.

Name in SoftPLC: TIGHTENING_OK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE

- TLS Tag: TRUE
- I/O Expander: TRUE

Tool Loosening - 22

Indicates that the tool is loosening.

Name in SoftPLC: TOOL_LOOSENING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tool Tightening - 21

Indicates that the tool is tightening.

Name in SoftPLC: TOOL_TIGHTENING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE

- TLS Tag: TRUE
- I/O Expander: TRUE

Channel Command - 10054

Name in SoftPLC: CHANNEL_COMMAND

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	uint32 array	1	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

This signal contains subsignals, refer to Subsignals - Input for all the subsignals.

Disable Test Bolt - 10057

Name in SoftPLC: DISABLE_TESTBOLT

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE

- I/O Expander: TRUE

Enable Operation - 10055

Name in SoftPLC: ENABLE_OPERATION

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Fieldbus AsyncData To PF - 10077

Name in SoftPLC:

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	uint8 array	16	2048

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE

- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Reset Cycle Status - 10056

Name in SoftPLC: RESET_CYCLE_STATUS

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Reset System Error - 10062

Name in SoftPLC: RESET_SYSTEM_ERROR

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE

- I/O Expander: TRUE

Start Loosening, Pulse - 10072

Name in SoftPLC: SELECT_PREVIOUS_ID_NUMBER

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Start Tools, Pulse - 10113

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

StepSync compatible tools

The following tools are supported by StepSync:

Tool Family	Supported Models
Tensor STR	ETV, ETD, ETP

Tensor ST	ETV, ETD, ETP
Tensor SL	ETV, ETD, ETP, ETF
Tensor SR	ETV, ETD, ETP
QST	All (Excluding Dual Transducer - CTT, CTA, CTTA)

StepSync CAN Accessories

The following CAN accessories are supported by a PF6000 Step Sync system:

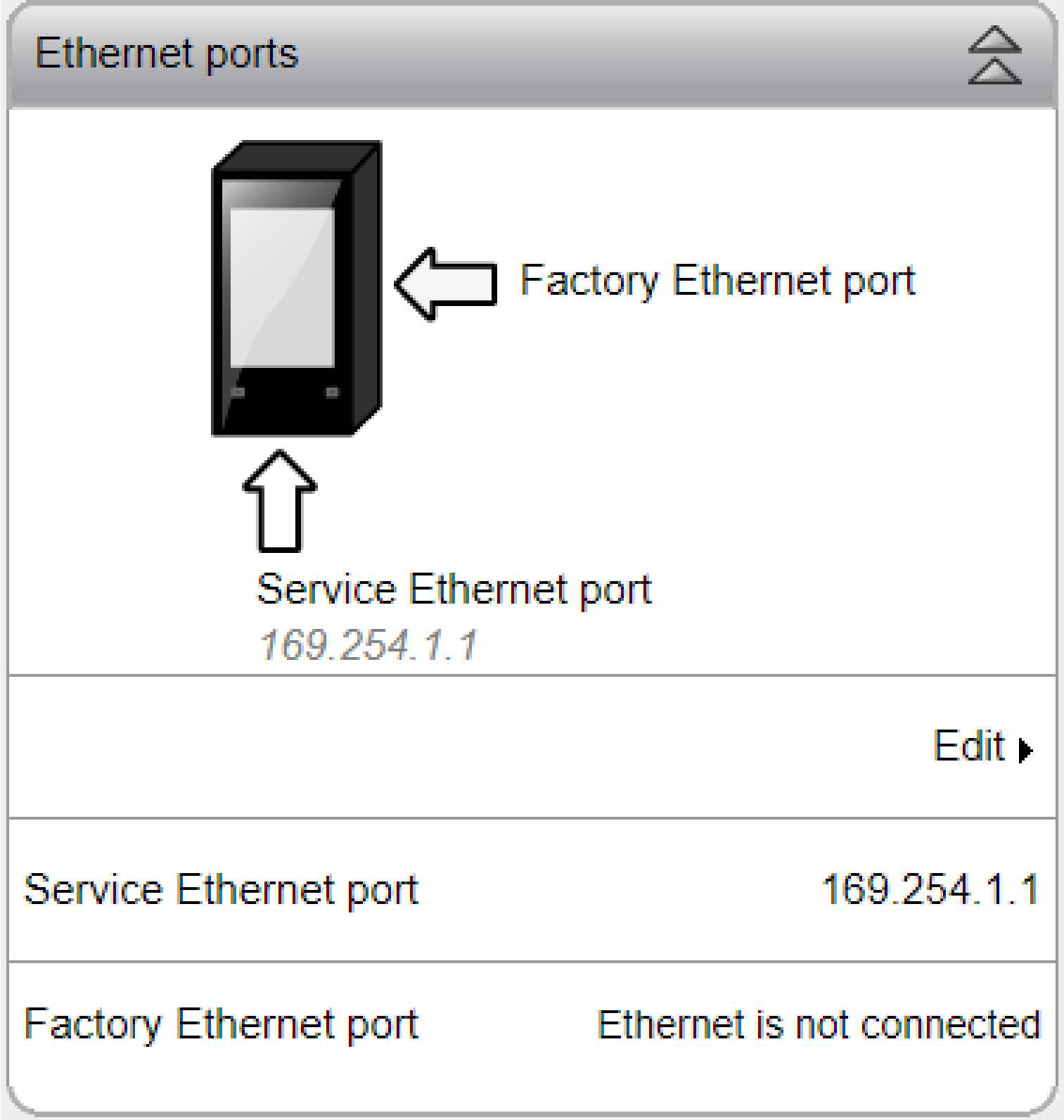
- Internal I/O
- I/O Expander
- Operator Panel
- Stack light
- Indicator box

These accessories can only be connected to the Sync Reference. No accessories can be connected to Sync Members.

Working with the Settings Tab

Configuration of the Network

The POWER FOCUS 6000 can be set up to be accessed from the Atlas Copco software ToolsTalk or from a web browser on a Local Area Network (LAN). It can also be accessed directly from a connected PC. It uses the IPv4 protocol.



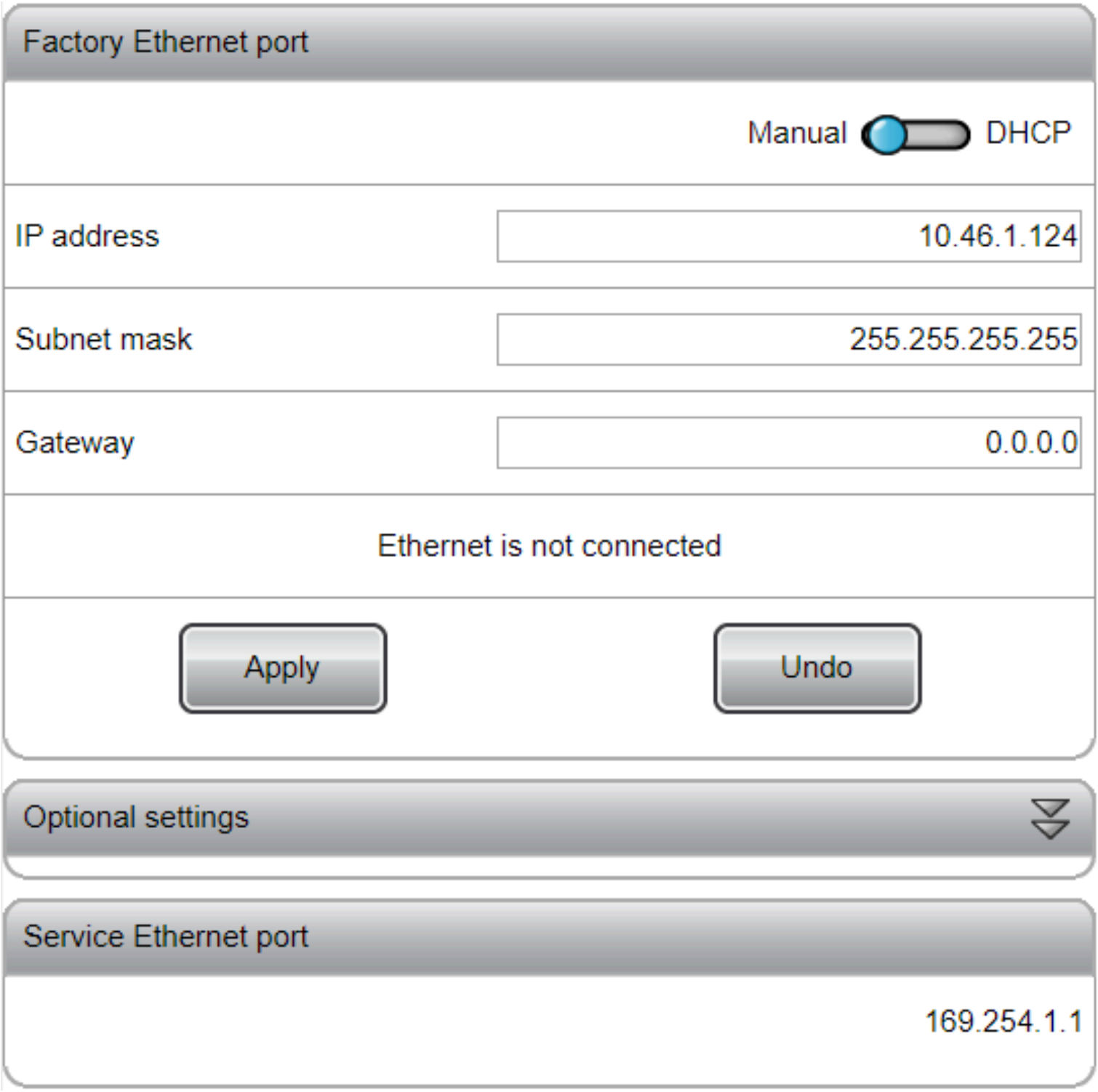
To access and alter the Ethernet settings, select **Edit**.

Only the Factory Ethernet port can be configured. The Service Ethernet port has a designated IP address, 169.254.1.1, that must not be connected to the local network.

Accessing the Controller On Lan

Select the **Settings** menu, and click on **Edit** to access the Factory Ethernet port window. There you can alter the Ethernet settings.

Connect the network cable to the Factory Ethernet port and then either manually specify the required information or, if available, use the information provided by the DHCP server. Required information is:



- IP address
- Subnet mask
- Gateway

This information is provided by the local system administrator.

When using the manual option there are optional settings available for the use of **DNS servers**.

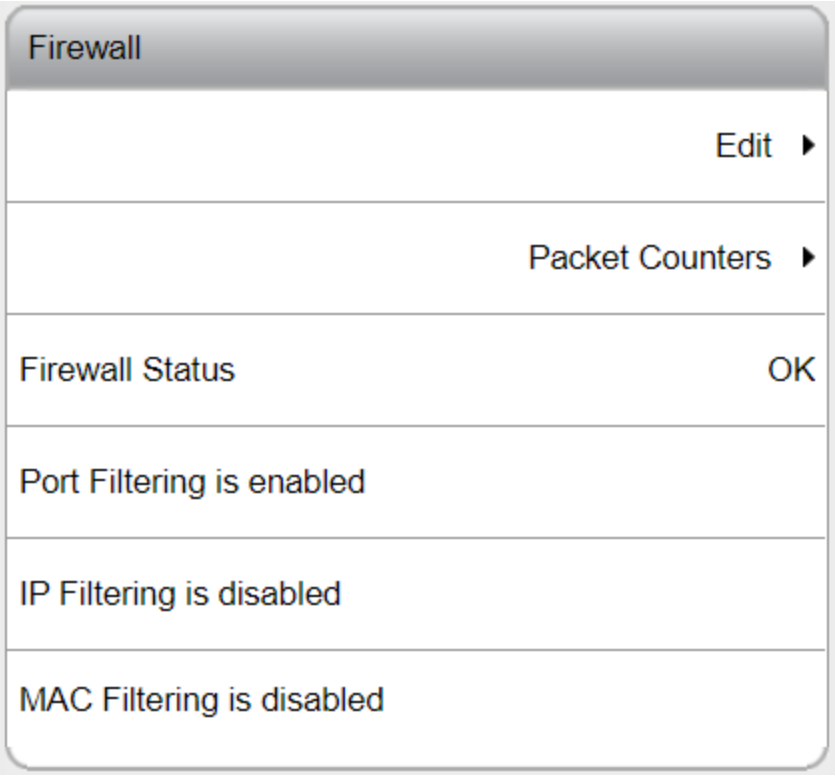
Accessing the Controller Through a Web GUI

Connect the PC with a straight-through Ethernet cable (RJ45) to the Service Ethernet port. Access the controller with the IP address from a web browser.

About the Firewall

The POWER FOCUS 6000 can be set up to use a firewall. The firewall is based on the trusted host principle, and only allows incoming connections via ports that are enabled, or addresses that are white-listed.

By default, the firewall is disabled.



The firewall applies only to incoming connections on the Factory Ethernet Port.

Activating and configuring the firewall

To activate and configure the firewall, select **Edit**.

In the top container, activate the general firewall feature by setting it to **On**.
In the remaining containers, configure any of the following firewall layers:

- **Port Filtering (layer 4 firewall)**. Opening a service on the controller - you can specify which services are reachable through the firewall.
- **IP Filtering (layer 3 firewall)**. Specifying a trusted host by IP- you can specify an IP that is considered trusted on the network and can access all the services.
- **MAC Filtering (layer 2 firewall)**. Specifying a trusted host by MAC.

When activating the general firewall feature, **Port Filtering (layer 4 firewall)** and all its predefined services are enabled by default.

A connection is allowed, when any of the firewall layers accepts it. When no firewall layer is enabled, all incoming connections are allowed through.

Further firewall configuring is done by enabling/disabling connections through the predefined services specified, by adding TCP or UDP ports manually and/or by white-listing IP/MAC addresses.

Port Filtering (layer 4 firewall)

When **Port Filtering (layer 4 firewall)** sets Firewall rules, and TCP and UDP ports.

Port Filtering (layer 4 firewall) can be turned **ON** or **OFF**.
When **Port Filtering (layer 4 firewall)** is **ON**, the firewall is performing packet filtering based on destination port, and packets sent to an open port are immediately accepted. Non-matching packets are also processed by the other firewall types (IP Filtering and MAC Filtering) before being eventually rejected.
When **Port Filtering (layer 4 firewall)** is **OFF**, port filtering is disabled and all the other settings are hidden.

Predefined services have their own enable-switches:

- Open ports for web services (TCP 80, TCP 8080)
- Open ports for SSH and SFTP (TCP 22)
- Open ports for wireless tools (UDP 6677, TCP 6678)
- Open ports for accessories (TCP 25000)
- Additional TCP ports
- Additional UDP ports

Predefined service	**Description**
Open ports for web (TCP 80, TCP 8080)	Ports required for web services so the controller is accessible over the factory network. Setting **Open ports for web (TCP 80, TCP 8080)** to **Off**, triggers a warning that the connection with the Web HMI can be lost.
Open ports for SSH and SFTP (TCP 22)	Port required for SSH and SFTP functionality on the Factory Ethernet Port.
Open ports for wireless tools (UDP 6677, TCP 6678)	Ports required for wireless tools to connect to the controller over the factory network.
Open ports for accessories (TCP 25000)	Ports required for accessories to communicate with the controller over the factory network. This applies to Socket Selector 6.
Open additional TCP ports	Accepted are both comma-separated ports and port ranges using a dash (-). Example: when entering **1,2,3,4-10**, all ports between 1 and 10 are opened. Invalid port entries trigger an immediate pop-up warning. Ports are automatically sorted after pressing the **Apply** button.
Open additional UDP ports	

When using **Open Protocol**, the ports to be opened must be added manually in the **Open additional TCP ports** entry box. For example: 4545,4546,4547 (depending on the ports configured in Virtual Station > Virtual Station 1 > Protocols > Open Protocol > Server Port).

When using an **NTP server**, port 123 must be added manually in the **Open additional UDP ports** entry box.

Multiple ports can be added by using comma separation. Port ranges can be added by using a dash.

IP Filtering (layer 3 firewall)

IP Filtering (layer 3 firewall) allows specifying trusted hosts or networks by entering their IP addresses in the **IP White List** entry box. To access the entry box, set the switch to **On**. Accepted entries are lists of IP addresses or network addresses in the form of IP tables, that is, host IP addresses or network IP addresses. The network mask can be entered as mask length (for example, /24) or as network IP address (for example, /255.255.255.0). Packets coming from a white-listed IP address are immediately allowed. Other packets are screened by the other firewall layers (Port Filtering and MAC Filtering).



IP address white-list example

Due to security issues, entering host names or network names is not accepted.

Note that processes like NATing (Network Address Translation) may change source IP addresses. Consult your local network administrator when white-listing a host based on source IP address is required.

MAC Filtering (layer 2 firewall)

MAC Filtering (layer 2 firewall) allows specifying trusted hosts or networks by entering their MAC addresses in the **MAC White List** entry box. To access the entry box, set the switch to **On**. Accepted entries are comma-separated lists of MAC addresses. Packets coming from a whitelisted MAC address are immediately allowed. Other packets are screened by the other firewall layers (Port Filtering and IP Filtering).



MAC address white-list example

Invalid entries trigger an immediate pop-up warning.

Note that routing may change source MAC addresses. Consult your local network administrator when white-listing a host based on source MAC address is required.

Packet counters

To display the Firewall statistics for each firewall layer, select **Settings > Network > Firewall - Packet Counters**.

The **Update** section includes the following buttons:

- **Refresh** – used to refresh the displayed packet counters.
- **Reset** – used to reset the packet counters to zero.

Both buttons are implemented with a switch that automatically resets itself to the original position after performing the action.

The **Accepted Packet Counters** section displays the counters for each of the firewall types and for rejected packets.

- **Port Filtering** – displays the packet counter for packets accepted by the Port Filtering firewall type.
- **IP Filtering** – displays the packet counter for packets accepted by the IP Filtering firewall type.
- **MAC Filtering** – displays the packet counter for packets accepted by the MAC Filtering firewall type.
- **Rejected** – displays the packet counter for packet that were rejected.

The packets accepted, and thus counted, by the Port, IP and MAC Filtering rules only include the initial packets that establish a connection.
The Rejected packets are all counted and displayed.

Firewall status

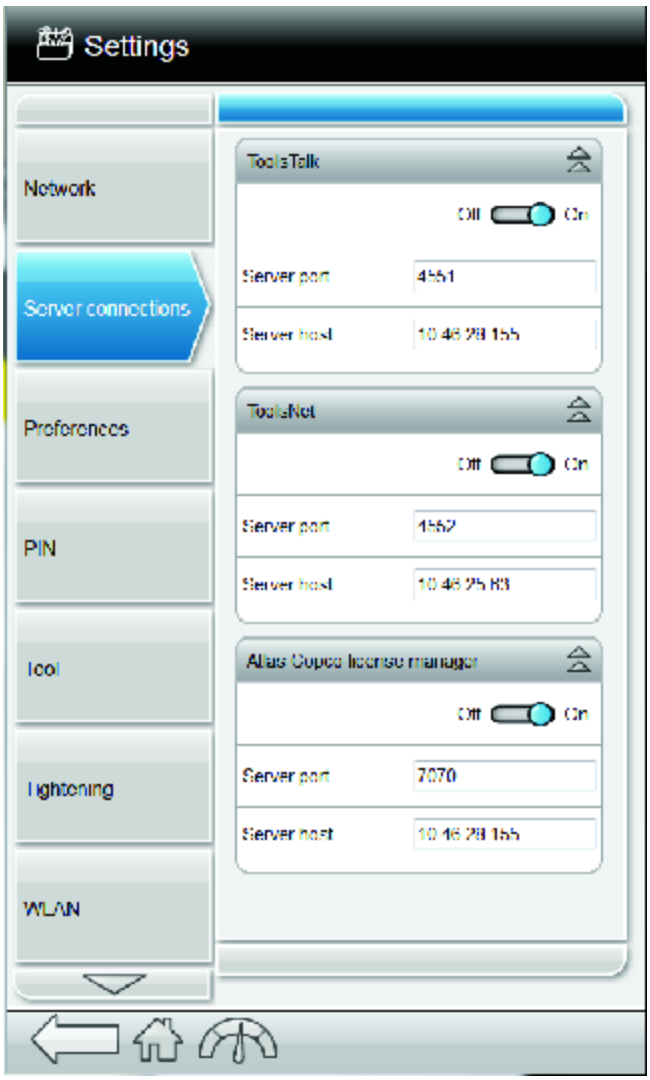
The status of the general firewall feature and its firewall layers is shown in the **Firewall** main view directly under Settings > Network.

Status	Description
OK	The firewall is enabled and the firewall configuration is applied.
Disabled	The firewall is disabled and the firewall configuration is not applied.
Configuration Error	The firewall is enabled, but the firewall configuration is not applied due to an internal error. For safety reasons, the fail-open policy is applied, meaning all connections are allowed through.

When the general firewall status is **OK**, the status (**Enabled** / **Disabled**) for the respective firewall layers is also shown.

Configuration of the Protocol

The POWER FOCUS 6000 can be set up to communicate with servers running an Atlas Copco license manager as well as the two Atlas Copco softwares ToolsTalk and ToolsNet. ToolsTalk is used to configure one or several controllers. ToolsNet is used to handle result reporting.



Configuring ToolsTalk Communication

To connect a controller to ToolsTalk, configure and activate the ToolsTalk protocol settings on the controller.

Parameters for ToolsTalk communication

Field	Description
On/Off	Enables/Disables communication with the ToolsTalk server
Server host	ToolsTalk server IP address
Server port	ToolsTalk server port

Configuring ToolsNet Communication

To connect a controller to ToolsNet for collection of tightening results, configure and activate the ToolsNet protocol settings in the controller.

Field	Description
On/Off	Enables/Disables communication with the ToolsNet server
Server host	ToolsNet server IP address
Server port	ToolsNet server port

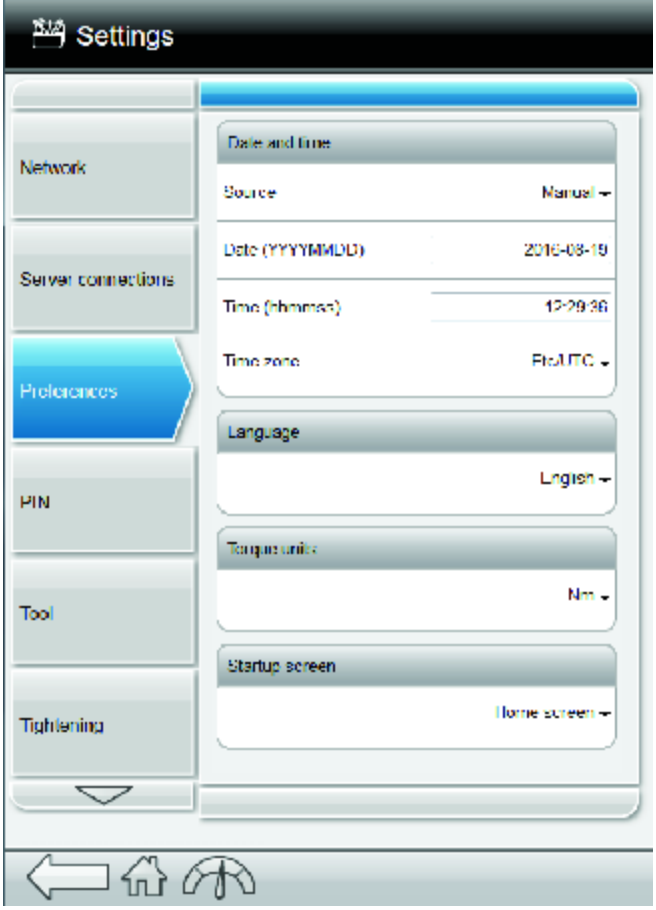
Configuring a License Manager

The Atlas Copco license manager is connected to a controller and the protocol settings are activated on the controller from the **Server connections** tab in the **Settings** menu.

Field	Description
On/Off	Enables/Disables communication with the Atlas Copco license manager.
Server host	Atlas Copco license manager server IP address
Server port	Atlas Copco license manager server port

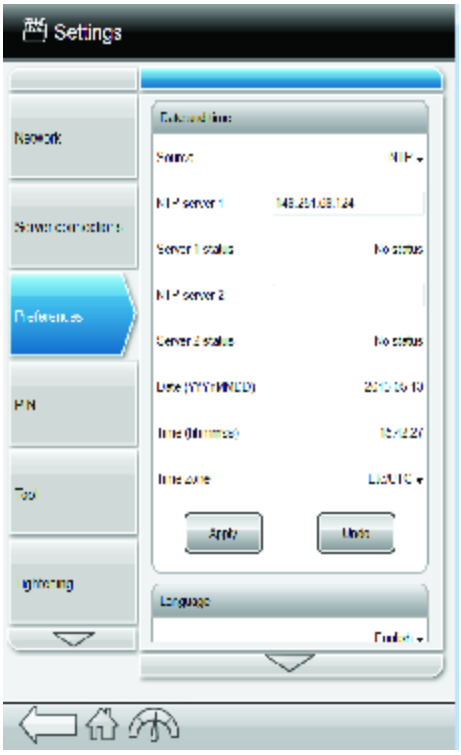
Configuration of the Preferences

Preferences contains general settings such as date and time, language, torque unit, and startup screen.



Configuring the Date and Time

Date and time must be set in order for events and results to get the correct time stamp for when they occurred.



9007201068760971

The time is retrieved from one of three available sources:

- **Manual**

- **NTP**
- **ToolsNet**

When the source is set to **Manual** the date, time, and time zone are set manually.

When the source is set to **NTP**, the date and time is retrieved from an NTP server defined in the GUI.

When the source is set to **ToolsNet**, the date and time is retrieved fron the ToolsNet server.

Parameters to set date and time

Field	Description
Source	Source to retrieve the time from.
Date	Date entered manually if the source is set to manual.
Time	Time entered manually if the source is set to manual.
Time zone	The time zone; either the location or a standard time zone such as UTC (coordinated universal time)
NTP Server	IP-address of an NTP server providing date and time for the controller.

Configuring the Displayed Controller Language

The controller GUI is translated into twelve languages. To change the language of the GUI:

1. Tap or click on the arrow beside the name of the language currently in use.
2. Choose a language from the list.

The language change will take effect immediately.

Available GUI languages

Language	As displayed in controller
English	English
Czech	Čeština
German	Deutsch
Spanish	Español
French	Français
Korean	한국어
Italian	Italiano
Japanese	日本語
Portuguese	Português
Russian	Русский
Swedish	Svenska

Language	As displayed in controller
Chinese	中文

Configuring the Displayed Torque Unit

Choose the unit to use for torque values and results. Torque results are displayed in the chosen unit both after a tightening is performed and when stored in the results list.

To change the torque unit used in the controller GUI:

1. Tap or click on the arrow beside the name of the unit currently in use.
2. Choose a unit from the list.

The torque unit change will take effect immediately.

Available torque units

Unit	Description
cNm	centinewton metre
dNm	decinewton metre
Nm	newton metre
kNm	kilonewton metre
in·lbf	inch-pound force
ft·lbf	foot-pound force
in·ozf	inch ounce-force
ft·ozf	foot ounce-force
gf·cm	gram-force centimetre
kgf·cm	kilogram-force centimetre
kgf·m	kilogram-force metre

Configuring the Startup Screen

The default screen at startup of the controller is the Home screen. It is possible to change startup screen to the Result screen.

A change of startup screen in the settings requires a restart of the controller or a refresh of the web GUI.

Configuration of the PIN Settings

The PIN code prevents unauthorized usage of the controller or accidental changes.

If enabled, a PIN code is required when accessing the controller either from the controller-GUI or Web-GUI.

Configuring the PIN

It is possible to have one or many different PIN configurations on the controller. Users can decide whether or not to activate one or several PIN configurations at the same time.

Each PIN configuration consists of a four-digit number based PIN, a user name and a switch for enabling or disabling the user/PIN.

When PIN is enabled and the screen is locked, a locked padlock icon is shown at the upper-right corner of the GUI and the user is able to browse the GUI with read-only access only. Any GUI widgets that can be used to change any settings is greyed out or disabled.

The screen lock is automatically turned on after a certain time of inactivity, configurable by the user.
The minimum value of the inactivity time is 20 sec and the maximum value is 600 sec. The inactivity time is configurable and applies to all PIN configurations.

After a system startup, the controller is locked if the PIN is turned on, regardless of the current inactivity time.

The users and PIN configured apply also to the Service Port (169.254.1.1).
To enable PIN protection on the Service Port, set **Use PIN for Service Port** to **On**.

Each controller can register up to 10 users.
The PIN of each configuration has to be unique. It is required to have at least one configuration to be able to enable the PIN functionality on the controller. When a new PIN configuration has been added, the PIN must be entered twice to make sure that the correct digits have been entered.

The PIN can be configured from the Embedded controller-GUI, Web-based controller-GUI or Tools Talk 2.

Adding New Users

1. On the **Home** view, select the **Settings** Tab. Then, select **PIN**.
2. In the PIN window, select **Configure**.
3. Select the **Plus** icon at the upper-right corner of the GUI; the **PIN-User Name** window appears (if no user is stored in the controller) or is updated (if, at least, one user is stored in the controller).
4. Select the user name; the **User** window appears.
   Enter the Name and the PIN of the user, and then confirm the PIN.

   The User Name must be unique.

The PIN in both fields (Enter PIN and Confirm PIN) need to match for the changes to be applied. By default, dots are indicated in both the text box, but these are just placeholders and need to be replaced with actual PIN codes.

5. Select **Apply**.

Enabling Users

1. On the **Home** view, select the **Settings** Tab. Then, select **PIN**.
2. In the **PIN** window, select **Configure**.
3. In the **PIN-User Name** window, select the check box to the left of the user name to be enabled.

   PIN can also be enabled by clicking on the user name and setting the **Enabled** switch to **On**.

Activating the PIN configuration

1. On the **Home** view, select the **Settings** Tab. Then, select **PIN**.
2. In the **PIN** window, select **Configure**.
3. In the **PIN-activating** window, set the boolean switch to On.

   The PIN can only be activated when at least one user/PIN is enabled. If no user/PIN is enabled, a **Warning** pop-up window appears.

4. Enter the **Inactivity Timeout** (in seconds), which defines the slot of time after which the screen is automatically locked up.

   Default value for Inactivity Timeout is 120 seconds: this is a global setting, and cannot be set on a per user basis.

Unlocking the controller-GUI or Web-GUI

1. On the **Home** view, select the Padlock icon at the upper-right corner of the GUI. A pop-up window with a numeric keypad appears.
2. Enter the configured PIN code and select OK.

When the PIN is enabled and the screen has been unlocked, an Open Padlock icon appears at the upper-right corner of the GUI. The controller-GUI or Web-GUI can be locked again manually, by selecting the Open Padlock icon

Disabling Users

1. On the **Home** view, select the **Settings** Tab. Then, select **PIN**.
2. In the PIN window, select **Configure**.
3. In the **PIN-User Name** window, clear the check box to the left of the user name to be disabled.

   PIN can also be disabled by clicking on the user name and setting the **Enabled** switch to Off.

Deleting Users

1. On the **Home** view, select the **Settings** Tab. Then, select **PIN**.
2. In the PIN window, select **Configure**.
3. In the **PIN-User Name** window, select the red Delete icon to the right of the user name.

Configuration of the Tool Alarms

Alarms are set to control when to perform maintenance or calibration on the tools connected to the controller.

The tool service interval and other information are found in the tool view on the **Tool** menu.

Different tool alarms

Field	Description
Service indicator alarm	Enables an alarm for when the service interval for the tool is reached.
Tool lock after alarm	Lock the tool when the service interval is reached.
Calibration alarm	Enables the tool calibration alarm for all tools connected to the controller.

Configuration of the Wireless Settings

The Wireless settings in the controller activates the use of a WLAN and Bluetooth.

1. In the **Settings** menu, select the **Wireless** tab.

2. Depending on your tool (WLAN-equipped tools are marked IRC-W, while Bluetooth-equipped tools are marked IRC-B) set **Enabled** to **On**.

Configurations of the Events Settings

It is possible to configure the events available in the controller as either or several of:

- Acknowledged
- Logged
- Displayed

Configuration of the Fieldbus

The fieldbus section consists of information about the fieldbus type in use. This part is hardware dependent and read-only. The configuration section with general settings for the fieldbus in use is possible to edit.

The fieldbus mapping and the assigning of fieldbus maps to virtual stations are done with ToolsTalk. For more information refer to the ToolsTalk configurations manual.

Creating a General Fieldbus Configuration

When a new fieldbus module is installed in the controller, General Fieldbus Configuration settings can be setup directly via the GUI, without the need of using ToolsTalk 2.

For configurations related to the fieldbus frame and connecting a fieldbus configuration to a Virtual Station, ToolsTalk 2 will still be needed.

1. Go to the **Settings** menu, and then select **Fieldbus**.
2. Select the **Create Config** button.

   If no Fieldbus module is installed this button will not be visible.

3. Configure the following parameters:
   - **Set by network**: OFF/ON
   - **Read result handshake**: OFF/ON
   - **Lock tool when fieldbus offline**: OFF/ON
   - **Sync on task selected**: OFF/ON
     - **OFF** - Task changes made in the Virtual Station are ignored.
     - **YES** - Task changes made in the Virtual Station are synced with the Fieldbus module.
4. Depending on the installed module type, enter the Fieldbus communication specific settings:

- **IP Address**
- **Subnet mask**
- **Gateway**

5. A new Configuration is created.

> If a Fieldbus configuration already exists on the controller, this will have to be removed before creating a new configuration. When the configuration has been removed, instead of a **Remove** button there will be a **Create Config** button.

Configuration of the Results

The **Results** menu allows the user to configure the label names for results displayed in the **Results list**.

Changing Result Status names

1. Go to **Settings**, then **Results**, and click on **Customized detailed status**.
2. Find the Status name you want to alter.
3. Write the new name in the corresponding field in the *New status name* on the right.

Factory Reset Controller

It is possible to undo the controller to the original factory settings.

> All settings, events, configurations and historical data are deleted when the controller is reset. Do a factory reset only when you are completely sure that this is required.

Performing a Controller Factory Reset

1. On the **Home** view, select the **Settings** Tab. Then, on the left, select **Reset**.
2. In the **Factory Reset Controller** window, select **Reset**.

   A pop-up window appears warning that all data will be deleted. Then, select **Yes**.

   The controller restarts to activate the new settings.

Operation

In this section, you can find step-by-step information about how to operate the product.

Remote Start and Emergency Stop

Remote Start Configuration

A tightening can be started remotely from an accessory in both single and multiple controller configurations. The switch to activate remote start is found on the connector panel located behind the front access door of the controller.

Whenever using remote start you must enable an emergency stop solution for safety reasons. For more information about emergency stop, see Emergency stop (EM Stop) in the product instructions for POWER FOCUS 6000.

When using a tool with some type of safety handle (such as a trigger start button or a safety lever), remote start must be disabled by setting the switch to Off. This is done to ensure that it is not possible to override the safety function within the tool.

Emergency Stop

The supply disconnecting device may serve as an emergency stop when it is readily accessible to the operator and it is of the type described in EN 60204-1:2006, 5.3.2 a), b), c) or d). When intended for such use, the supply disconnecting device shall be colored red and have a yellow background. (Ref. EN 60204-1:2006, 10.7.5).

The POWER FOCUS 6000 provides an infrastructure to build an Emergency Stop function with redundant breaking according to **EN ISO 13849-1 category 3 PL d**. The Emergency Stop function must be used when using remote start functionality.

The Emergency Stop functionality can be used with a supply-disconnecting device (such as an Emergency Stop button). When the Emergency Stop button is activated, it breaks the supply voltage to the controller.

A diagnose of the system is run automatically at the start of the controller. This is done both after an emergency stop and at a normal start.

The Emergency Stop function is used with either a single controller or up to 10 controllers in a single emergency stop chain. In a multiple controller configuration, the Emergency Stop signal is distributed from the first controller to all interconnected controllers using the I/O bus interface. The last controller in the chain returns a feedback signal to indicate that all controllers have received the Emergency Stop signal. The event **Emergency Stop** is displayed.

For the Emergency Stop there is a 24V DC output through the Emergency Stop interface on the connector panel.

Cabling

Emergency Stop Button Cables

Cable dimensions for the emergency stop button

Single/Multiple controllers	Dimension	Maximum length
Single	0.7 mm^2 cable	400 meters

Single/Multiple controllers	Dimension	Maximum length
Multiple	1.5 mm^2 cable	50 meters

I/O Cables

For connecting multiple controllers with I/O cables distributing the emergency stop signal, observe the maximum length according to the following table:

Cable dimensions for I/O cables

AWG 22 cable	Maximum total length
4 controllers	200 meters
5 controllers	140 meters
6 controllers	100 meters
8 controllers	70 meters
10 controller	50 meters

Pin Configurations for Emergency Stop

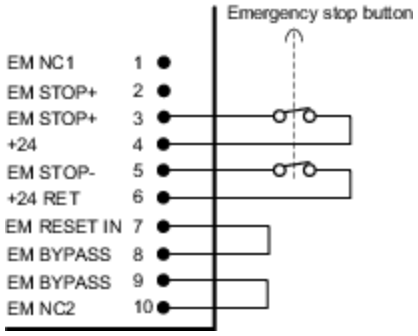
The Power Focus has an external EM Stop interface and I/O bus on the connector panel located behind the front access door.

The PIN configuration differs depending on whether it is a single or multiple controller solution. Furthermore, for the single controller, the PIN configuration differs depending on whether the controller is equipped with an EM Stop button or not.

The following sections describe the available PINs on the connecting panel, and the use of the different PINs to connect an EM Stop button.

Single Controller with Emergency Stop Button

Connector: Phoenix, 6-pin Headers 3.5mm pitch

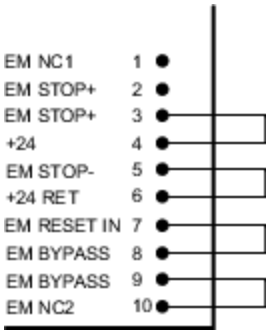
Use the following pins to attach an EM Stop button:		
Pin	**Use**	
1	Do not use	 *Connections for a single controller*
2	Do not use	
3	Attach an emergency button between pin 3 and pin 4	
4	See pin 3	
5	Attach an emergency button between pin 5 and pin 6	
6	See pin 5	
7	Connect a jumper between pin 7 and pin 8	
8	See pin 7	
9	Connect a jumper between pin 9 and pin 10	
10	See pin 9	

Single Controller without Emergency Stop Button

Connector: Phoenix, 6-pin Headers 3.5mm pitch

⚠ WARNING

Remote start switch must be set to OFF for this configuration

Use the following PIN configuration:		
Pin	**Use**	
1	Do not use	 *Connections with no EM stop*
2	Do not use	
3	Connect a jumper between pin 3 and pin 4	
4	See pin 3	
5	Connect a jumper between pin 5 and pin 6	
6	See pin 5	
7	Connect a jumper between pin 7 and pin 8	
8	See pin 7	
9	Connect a jumper between pin 9 and pin 10	
10	See pin 9	

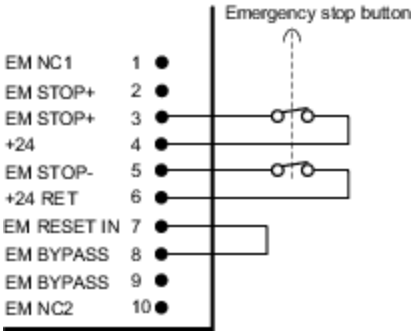
Multiple Controllers with Emergency Stop Buttons

The PIN configuration differs depending on the location of the controller in the EM Stop chain.

First Controller with an Emergency Stop Button Connected

EM Stop button connector: Phoenix, 6-pin Headers 3.5mm pitch

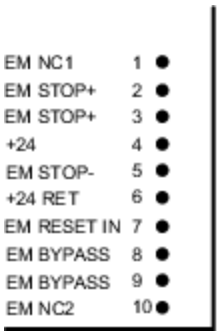
EM Stop I/O cable connector: Molex Micro-Fit, 5-pin

Use the following pin configuration:		
Pin	**Use**	
1	Do not use	 *Connections for the first controller*
2	Do not use	
3	Attach an emergency button between pin 3 and pin 4	
4	See pin 3	
5	Attach an emergency button between pin 5 and pin 6	
6	See pin 5	
7	Connect a jumper between pin 7 and pin 8	
8	See pin 7	
9	Do not use	
10	Do not use	

Controllers Between First and Last

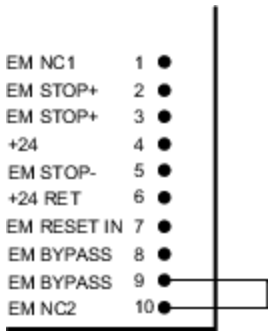
EM Stop I/O cable connector: Molex Micro-Fit, 5-pin

Remove plug or use the following pin configuration:

Pin	Use	
1	Do not use	 No pins connected *Connections for middle controllers*
2	Do not use	
3	Do not use	
4	Do not use	
5	Do not use	
6	Do not use	
7	Do not use	
8	Do not use	
9	Do not use	
10	Do not use	

Last Controller

EM Stop I/O cable connector: Molex Micro-Fit, 5-pin

Use the following pin configuration:		
Pin	**Use**	
1	Do not use	 *Connections for last controller*
2	Do not use	
3	Do not use	
4	Do not use	
5	Do not use	
6	Do not use	
7	Do not use	
8	Do not use	
9	Connect a jumper between pin 9 and pin 10	
10	See pin 9	

DIG IN/OUT Connectors

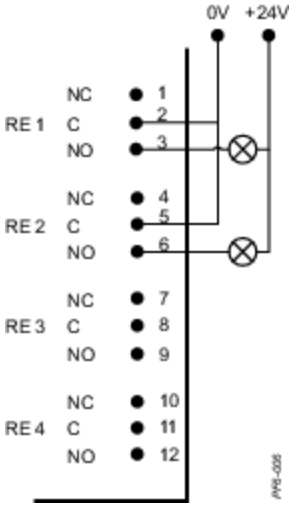
The POWER FOCUS 6000 uses the same hardware accessories (Stacklight, Operator panel etc.) as the Power Focus 4000 system. However, the digital input and output connectors are configured differently and use a different plug. In order to rewire the plug from Power Focus 4000 to POWER FOCUS 6000 correctly, use the connector descriptions in the following sections.

Digital Output Connectors

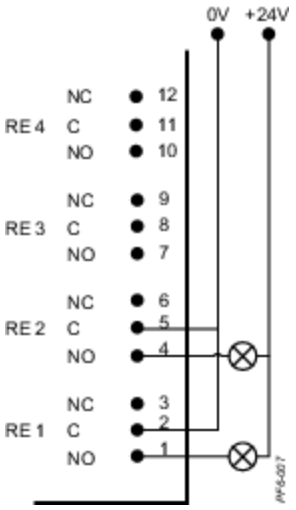
The POWER FOCUS 6000 has a connector with four configurable internal digital outputs (DIG OUT) that are located behind the front access door.

Digital Output Connector

For the POWER FOCUS 6000.

Pin	Relay	Function	
1		Normally closed	 *Connectors for output*
2	Relay 1	Common	
3		Normally open	
4		Normally closed	
5	Relay 2	Common	
6		Normally open	
7		Normally closed	
8	Relay 3	Common	
9		Normally open	
10		Normally closed	
11	Relay 4	Common	
12		Normally open	

Digital Output Connector for Power Focus 4000

Pin	Relay	Function	
12		Normally closed	
11	Relay 4	Common	
10		Normally open	
9		Normally closed	
8	Relay 3	Common	
7		Normally open	
6		Normally closed	
5	Relay 2	Common	
4		Normally open	
3		Normally closed	
2	Relay 1	Common	
1		Normally open	

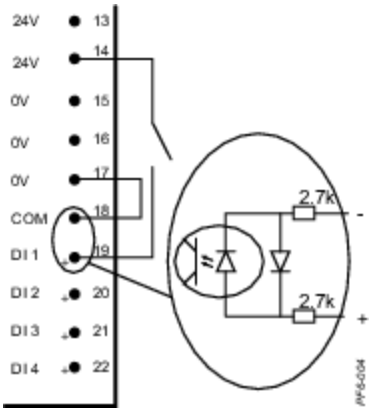
Connectors for output

Digital Input Connectors

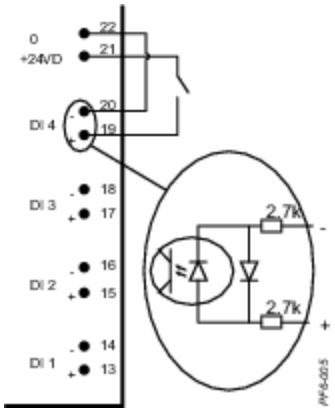
The POWER FOCUS 6000 has a connector with four configurable internal digital inputs (DIG IN) that are located behind the front access door.

Digital Input Connector

For POWER FOCUS 6000.

Pin	Function	
13	24V	
14	24V	
15	0V	
16	0V	
17	0V	
18	Digital input -	
19	Digital input 1 +	
20	Digital input 2 +	
21	Digital input 3 +	
22	Digital input 4 +	

Digital Input Connector for Power Focus 4000

Pin	Function	
22	GND (+24VDC isolated)	
21	+24VDC isolated	
20	Digital input 4 -	
19	Digital input 4 +	
18	Digital input 3 -	
17	Digital input 3 +	
16	Digital input 2 -	
15	Digital input 2 +	
14	Digital input 1 -	
13	Digital input 1 +	

Reports and Statistics

In this section, you can learn about available reports and statistics.

Working with the Reports Tab

Results

This section describes how to access tightening results on the POWER FOCUS 6000 controller and how to read the information given in the different result views. It describes both the live results view available after each tightening and the historical results view available in **Results** on the **Reports** menu.

When a tightening is performed, the results are stored on the controller. Results can also be sent to an external system such as ToolsNet or exported for analysis using the export function.

Live Results

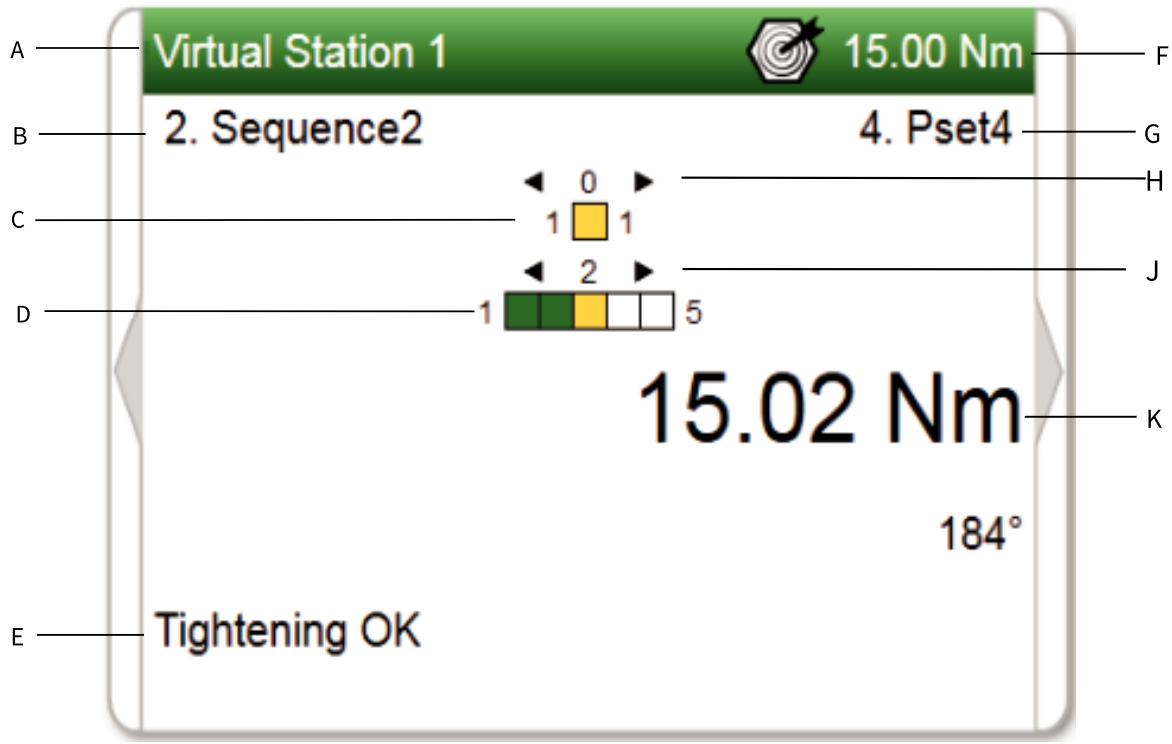
The **Live Results** pop up window shows results from the different virtual stations on the controller in the upper four as well as the lower four panes. The reason for this is that you can choose two different result views for the same virtual station to be shown at the same time.

Select a result pane to open a window where you can step through the different result views by clicking the arrows at the side of the result window.

Result View - Numbers

The first window will display the result in numbers.

Point and click on image to see more information:

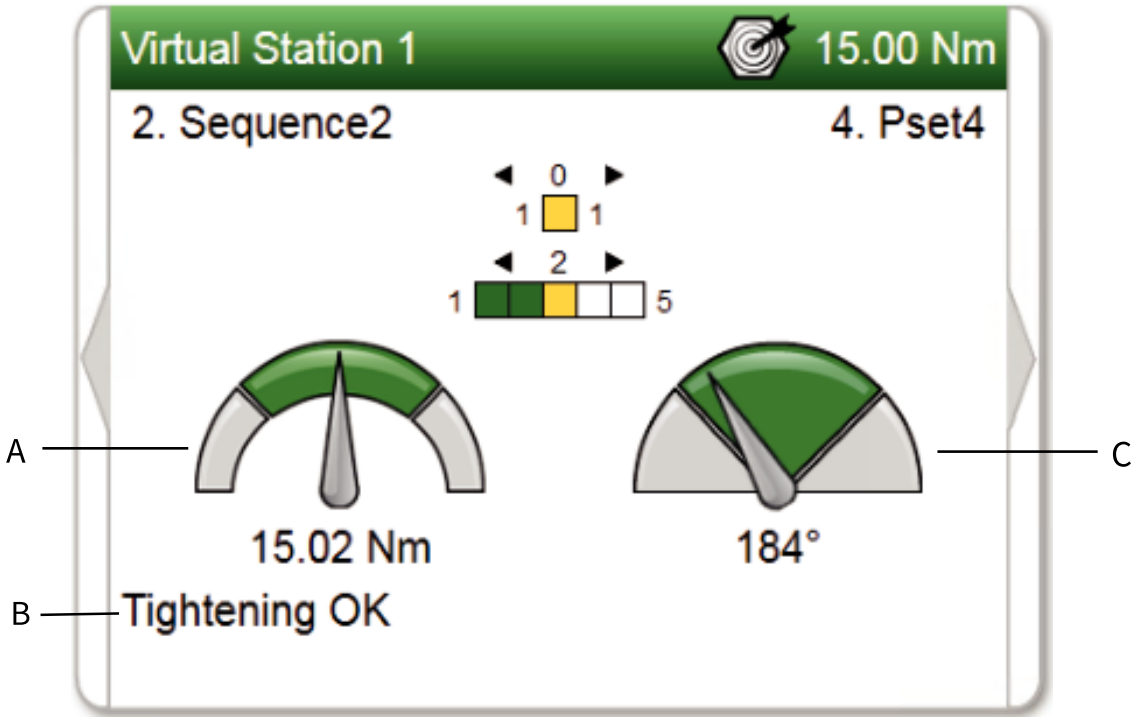


A	Virtual station name
B	Batch sequence name
C	Batches in sequence • An OK batch is colored green. • An ongoing batch is colored yellow. • An NOK batch is colored red.
D	Tightenings in batch • An OK tightening is colored green. • An ongoing tightening is colored yellow. • An NOK tightening is colored red.
E	Result status An NOK tightening will give a detailed status of the unsuccessful tightening.
F	Target torque/angle
G	Tightening program name
H	Number of completed batches in sequence
J	Number of completed tightenings in a batch
K	Tightening result

Result View - High-Low Result

The graphic display shows whether the result is high, low or within the set limits.

Point and click on image to see more information:

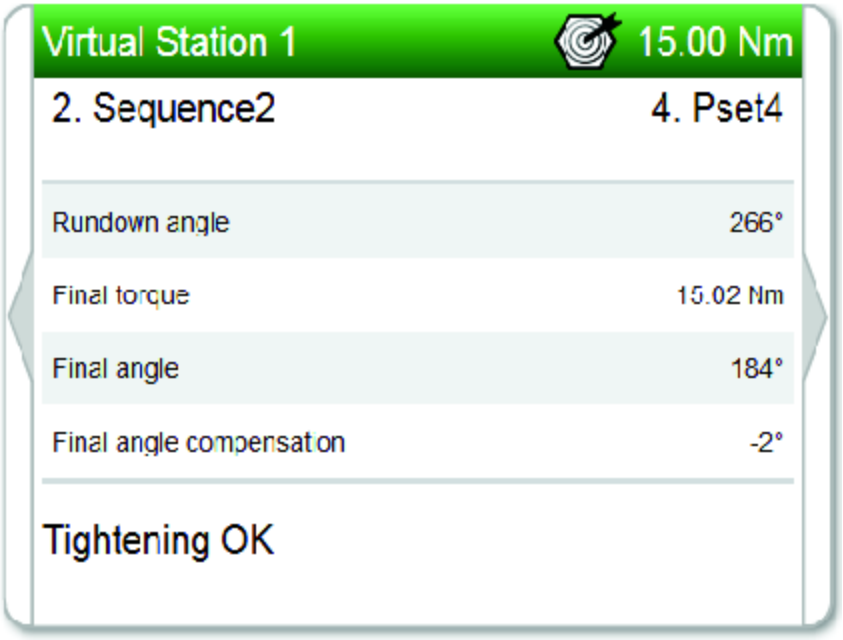


A	Graphic display showing if the tightening result is too high or too low with respect to the given limits for the tightening program. Torque value.
B	Result status
C	Angle value

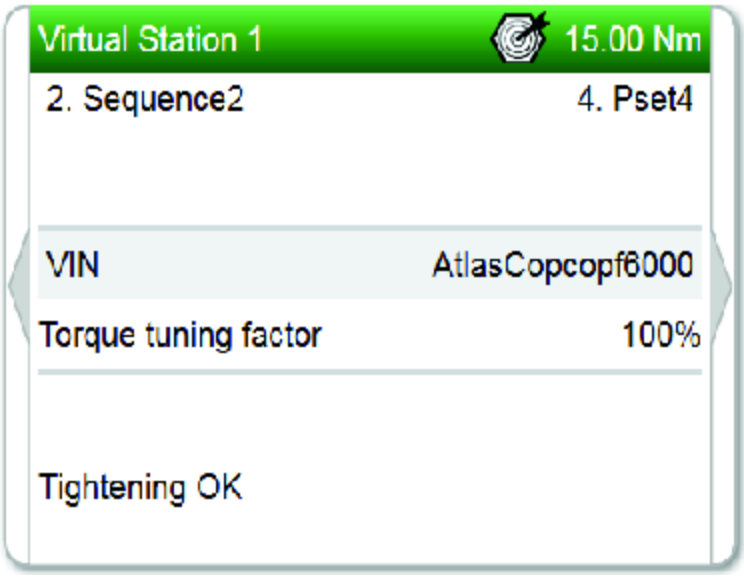
If the tightening is NOK, a detailed reason will be given.

Result View - Extensive Results

The extensive results views will display some additional tightening results.

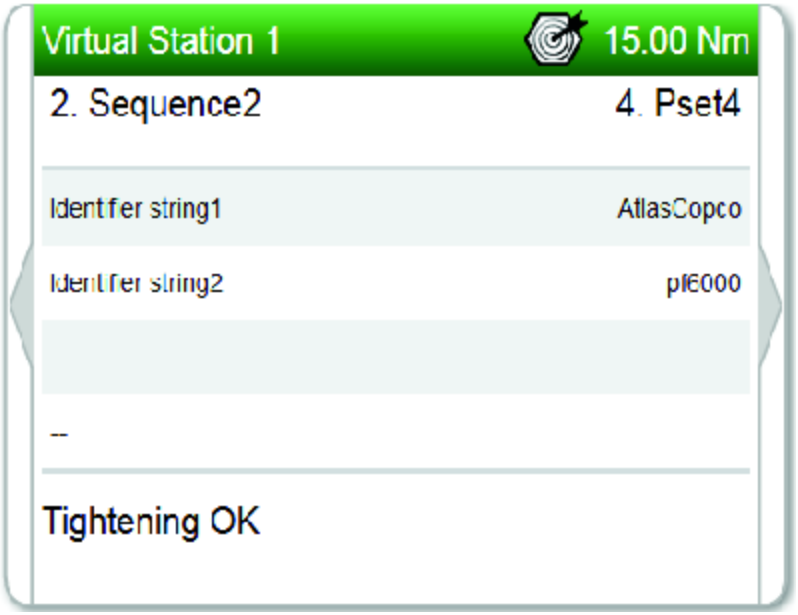


The second view always shows the identifiers (VIN). If the first screen is already full with parameters, the rest of the parameters are shown on the second screen.



Result View - Identifier Strings

This result view shows the identifier strings included in a multiple barcode scan.



Result View - Trace

With the trace result view, one can learn better how the tightening behaves, in order to make adjustments to the tightening program. Depending on the tightening strategy, the trace will display different tightening parameters.

The trace result is available as two different graphs: torque/time and torque/angle.

Result View - Result Reporter

The list shows the values from the result reporters. If there is a result reporter defined for a program monitor/restriction, the value from that monitor/restriction is reported. If there is no result reporter defined for a program monitor/restriction, the value from the latest executed result reporter in main path is reported.

Evaluation order if several reporters of the same type are defined in a program:

1. result reporter on program monitor/program restriction.
2. result reporter on monitor/restriction of the last executed step in main path.

Values on the highest level of the multistep result set by the corresponding result reporter:

- final angle set by result reporter final angle
- final torque set by result reporter final torque
- current set by result reporter current

Stored Results

The controller stores the result for every tightening or loosening performed.

Showing Stored Results

1. On the Home view, select the **Reports** Tab. On the left side, **Results** is automatically selected.

2. In the **Results** window, select **View all results**.
   The results list shows with the following information:
   - **Date**: date and time of the tightening performed.
   - **Virtual Station**: Virtual Station which the tightening was performed with.
   - **Tightening Program**: Tightening Program column shows Multistep Tightening Program name, or Batch Sequence name followed by the Tightening Program name within the Batch Sequence.
   - **Result**: Torque / Angle result.
   - **Limits**: Limits column shows values only when the user sets Step Monitor or Step Restriction, or Program Monitor or Program Restrictions.

     Step Monitors, Step Restrictions, Program Monitors and Program Restrictions are applicable for Final Torque and Final Angle.
   - **Details**: Tightening / loosening result details.

In the **Limits** column, the minimum / maximum value can be red colored.
In this case, the red colored value means that any of the following has occurred:

- The measured value is lower than the minimum value set in the Multistep Program.
- The measured value is higher than the maximum value set in the Tightening Program.

Showing and Reading Result Traces

1. On the Home view, select the **Reports** Tab. On the left side, **Results** is automatically selected.

2. In the **Results** window, select **View all results**.
   The results list shows in the **Results** window.

3. Select the necessary result.
   The tightening trace shows in the **Trace Result View** window.

Trace Result View window shows, step by step, the tightening life-cycle.
When the tightening is NOK, **Trace Result View** window shows which Step Monitor or Step Restriction caused it.
On the trace graph, the Step Monitor or Step Restriction that caused the NOK tightening in the Step level, is red colored.



On the upper-right corner of the trace graph, select the left-arrow / right-arrow to show the necessary trace graph.

The following trace graphs are available:

- Torque / Time
- Torque / Angle
- Angle / Time
- Speed / Time
- Speed / Angle
- Gradient / Time (when the tightening program is configured to make a gradient trace)
- Gradient / Angle (when the tightening program is configured to make a gradient trace)
- Current / Time
- Current / Angle

Step lines are upon the trace graph.

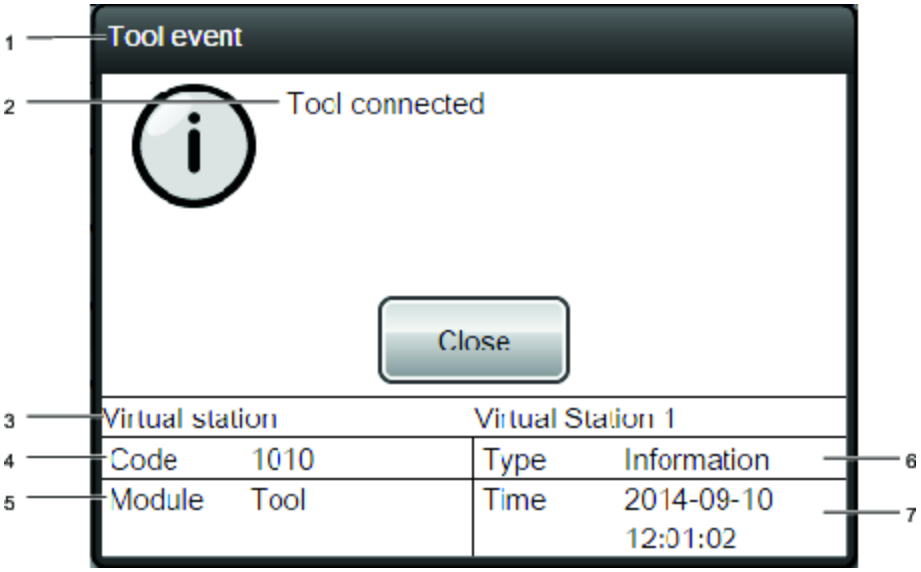
On the trace graph, it is possible to zoom in/out, move the trace, and read x-axis and y-axis values on a specific point.
On the lower-left corner of the trace graph, select "+" to zoom in , "-" to zoom out, or the "square icon" to reset the zoom level back to the default view.

On the lower part of the **Trace Result View** window, select the necessary step to open a pop up window with the detailed step information.

Events

Reading the Information Given in an Event

An event contains information that describes the occurred event as well as some system information to help describe what has happened, where and when.



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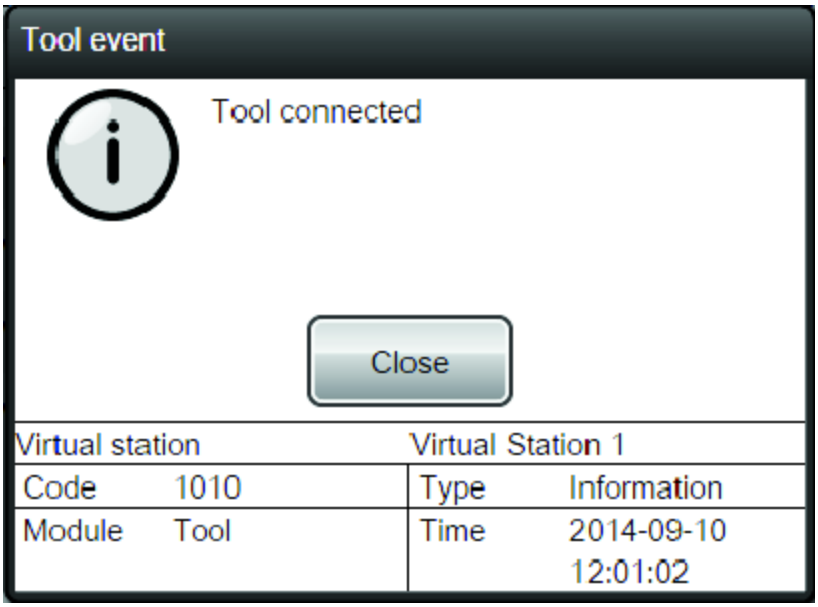
1	**Heading** - Describes what part of the system the event concerns.
2	**Event name** - A short descriptive text of the event.
3	**Virtual station** - If the event is related to a virtual station on the controller the virtual station name will be displayed.
4	**Code** - A unique four-digit number that identifies the event.
5	**Module** - Describes in what part of the system the event concerns.
6	**Type** - Information, Warning or Error.
7	**Time** - Date and time when the event occurred.

Event Types

Events are divided into three types; **Information**, **Warnings** or **Errors**.

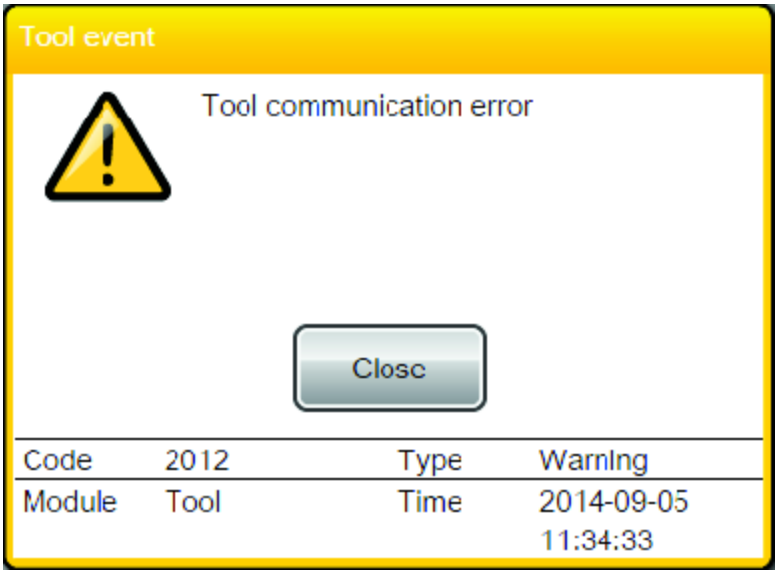
Event Information

Information events signal a noteworthy event that has occurred from actions performed by the user or the system. Information events do not require any specific user actions.



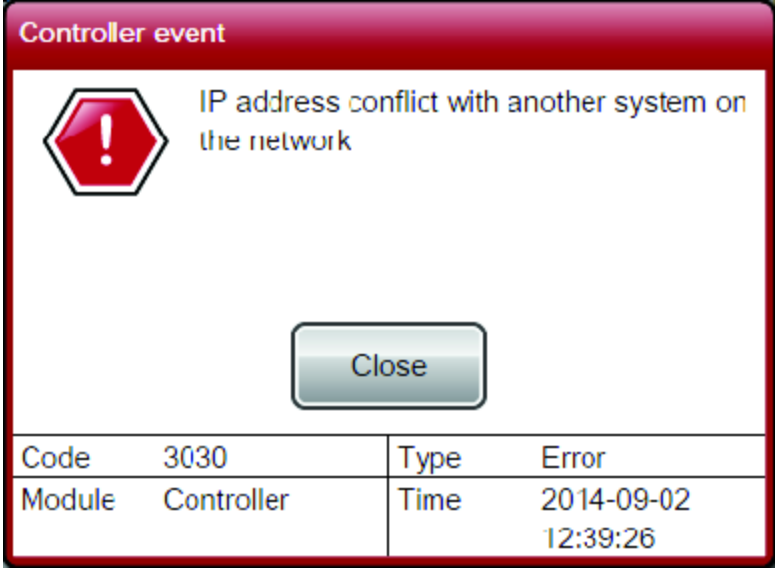
Event Warnings

Warning events signal a potentially serious condition that could affect the system performance or result in injury.



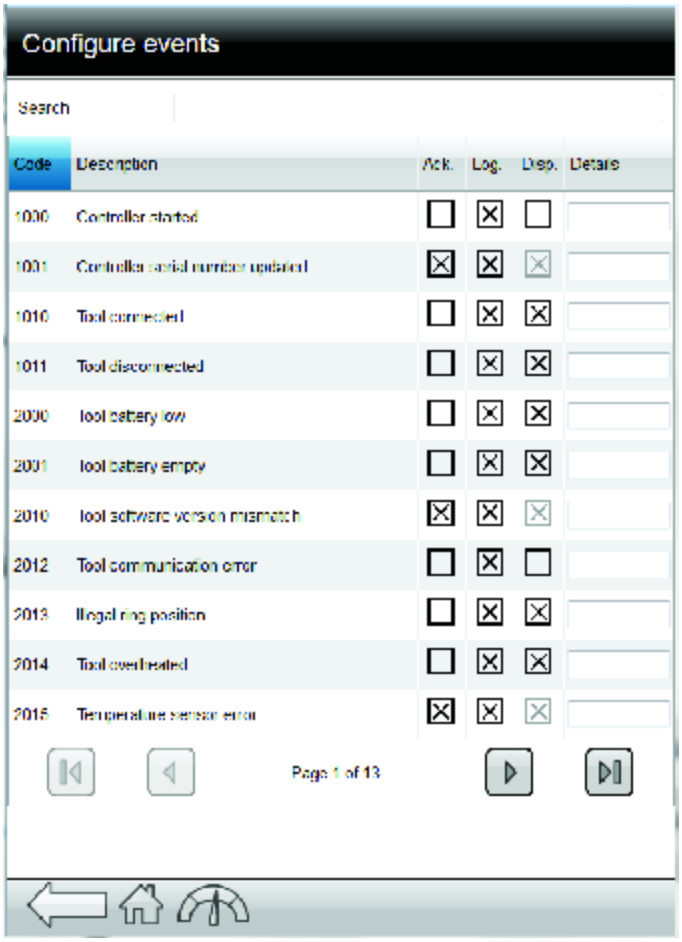
Event Errors

Event Errors signal a serious condition, such as a failed service, that almost exclusively requires the user to make changes to the setup or the configuration in order to continue.



Configuration of Events

Each event has a default setting for whether they should be acknowledged (Ack), logged (Log) or displayed (Disp). These settings can be configured in **Events** on the **Settings** menu.



Some options cannot be changed and they are greyed out.

Event Codes

Events are used to notify the user of certain state changes or occurrences in the system. They are of different types and require different kinds of actions.

Some of the procedures described can only be performed by an Atlas Copco authorized service provider.

Event code	Group	Description
1000-1999	Controller, Tool	Controller and Tool events.
2000-2999	Tool	Tool events.
3000-3999	Controller, Drive, Channel, Configuration	Controller and Drive events, and Step sync events.
4000-4999	Process	Tightening process events.
5000-5999	Configuration	Program configuration events.
6000-6999	Accessory	Accessory events.
7000-7999	Message	Messages.

Table heading	Description
Event code	The unique event number.
Type	Type of event: • Info • Warning • Error
Name	A descriptive name of the event.
Description	A short description of the event and why it occurred.
Procedure	If applicable the procedure contains an instruction on how to clear the event.
A - Acknowledge	Tells the user whether the event has to be acknowledged or not before you can proceed. The value in this list is the default value.
L - Log	Tells the user whether the event is to be saved in the event log or not. The value in this list is the default value.
D - Display	Tells the user whether the event is to be displayed on the screen or not. The value in this list is the default value.

Event			Description	Procedure	Log	Display	Ack
Code	Type	Name					
1000	Info	Controller started	The controller is started.	N/A	X		

Event			Description	Procedure	Log	Display	Ack
Code	Type	Name					
1001	Warning	Controller serial number updated	Generated at start-up if IT-board box serial number (controller serial number) differs from AUX-board box serial number. AUX-board is considered to be non-replaceable in field. The controller will reboot when the serial number is updated.	Replace IT-board or box.	X	X	X
1010	Info	Tool connected	A tool is connected.	N/A	X	X	
1011	Info	Tool disconnected	A tool is disconnected.	N/A	X	X	
1012	Info	Tool connection rejected	OpenProtocol tool rejected controller connection.	Check if another controller is connected to the tool.	X	X	
2000	Warning	Battery low		Replace battery.	X	X	
2001	Warning	Battery empty		Replace battery.	X	X	
2002	Warning	Tool battery health low	SRB or TBP tool battery health problem is detected.	Replace battery	X	X	
2004	Warning	Tool is not of the preferred type	Tool has been replaced by a tool with a different Tool max torque.	Change tool			
2006	Warning	Tool backup battery health low	The backup battery in the tool has too poor performance.	The backup battery should be replaced.	X		X
2007	Warning	Tool backup battery missing	SRB or TBP tool backup battery is missing.	Insert battery	X	X	
2008	Warning	Tool backup battery error	SRB or TBP tool backup battery error detected.	Replace battery	X	X	
2009	Warning	Backup battery voltage low	The controller's backup battery is almost empty	Replace battery	X	X	
2010	Error	Tool software version mismatch	Tool and controller software versions not compatible.	Service tool - update tool software.	X	X	X
2012	Warning	Tool communication disturbance	Communication between tool and controller interrupted.	Relocate antenna placement.	X		
2013	Warning	Illegal ring position	Tool direction switch in faulty position.	If occurring frequently - service tool.	X	X	

Event			Description	Procedure	Log	Display	Ack
Code	Type	Name					
2014	Warning	Tool overheated	Tool overheated. SRB and TBP tools only.	Allow tool to cool down.	X	X	
2015	Error	Tool temperature sensor error	SRB and TBP tools only.	Service tool.	X	X	
2016	Warning	Tool pulse unit overheated	SRB or TBP tool pulse unit overheated. Tool is not locked, but the warning is displayed whenever the tool is started as long as the pulse unit temperature is over threshold.	Allow tool to cool down	X	X	
2019	Warning	Tool could not start motor	For SRB and TBP tools. Tool motor failure.		X	X	
2020	Warning	Tool requires motor tuning	Tool requires motor tuning.	Perform a motor tuning.	X	X	
2021	Warning	Motor tuning failed	Motor tuning failed.	Complete motor tuning or service the tool.	X		
2022	Info	Motor tuning completed	Motor tuning completed.	N/A	X		
2023	Warning	The tool requires open end tuning	The tool requires open end tuning.	Perform open end tuning.	X	X	
2024	Warning	Open end tuning failed	Open end tuning failed.	Try to perform open end tuning one more time. If it fails again, service the tool.	X		
2025	Info	Open end tuning successful	Open end tuning successful.	N/A	X		
2026	Warning	Open end position failed	Open end position failed.	Press the trigger again and wait for the positioning to be completed. If it fails again, service the tool.	X	X	
2027	Warning	Usage limited due to high tool temperature	Temperature limit has been reached. Tightening has been inhibited to reduce risk for tool shutting down due to overheating.	Wait until tool temperature has been reduced.	X	X	
2030	Error	Tool memory failure, change tool	Tool memory corrupt.	Service the tool.	X	X	X
2031	Error	Tool accessory memory corrupt	Tool accessory memory corrupt.	Service the tool accessory.	X	X	X

Event			Description	Procedure	Log	Display	Ack
Code	**Type**	**Name**					
2040	Error	System check failure			X	X	X
2041	Error	Torque transducer error	Will be generated either on calibration error or if tool reports transducer error.	Service the tool.	X	X	
2042	Error	Angle transducer error		Service the tool.	X	X	X
2043	Error	Tool ground fault error		Service the tool.	X	X	X
2044	Info	Tool service interval expired	Indicates that servicing of the tool is needed. Triggered when the number of set tightenings has been exceeded.	Perform service of tool.	X	X	
2045	Warning	Tool calibration data invalid	If validation of calibration data fails.	Service tool.	X	X	
2046	Info	Tool, next calibration date has passed	Indicates that calibration of tool is needed. Triggered when calibration alarm is enabled in settings and the current time is greater than next calibration date.	Service tool.	X	X	
2047	Info	Auto update of servicedata checksum	Indicates that service data checksum has been updated automatically.	N/A	X	X	
2048	Info	Tool calibration value updated by QA device	Tool calibration was updated when a calibration with a QA device was performed		X	X	
2050	Error	Tool parameter file not supported	Required tool parameters are missing.	Update tool parameters.	X	X	
2060	Info	Unexpected trigger behavior	Used to prevent start of tool if accessory is connected.	N/A	X	X	
2071	Error	Tool memory corrupt	Tool descriptor is corrupt.	Service the tool.	X	X	
2072	Info	Unknown device connected			X	X	

Event			Description	Procedure	Log	Display	Ack
Code	Type	Name					
2073	Warning	Tool trigger supervision failure	HW channel failure. Mismatch between hardware and software of tool trigger.		X	X	
2074	Warning	Tool indicator board failure	Tool indicator board failure.	Service the tool.	X	X	
2075	Warning	Tool fan voltage failure	Tool fan voltage failure.	Service the tool.	X	X	
2076	Warning	Tool accessory bus voltage failure	Tool accessory bus voltage failure.	Service the tool.	X	X	
2077	Warning	Tool trigger sensor error	Tool trigger sensor error.	Service the tool.	X	X	
2078	Info	Tool Tightening program updated	Tool locked due to tightening program update.		X	X	
2079	Error	Tool cable not supported	Tool cable is corrupt. The chip in the cable is not responding or is damaged.	Switch cable.	X	X	
2080	Error	Tool battery failure	DC voltage too high or too low. Battery failure.	Contact the Atlas Copco service representative and send back battery to Atlas Copco (do not reuse it!).	X	X	
2081	Error	Tool current limit reached	The current limit has been reached and the drive is disabled.	Service the tool.	X	X	
2082	Error	Tool current measurement error	Current measurement error. Current cannot be measured with a reliable result.	Service the tool.	X	X	
2083	Error	Tool internal error	Various internal hardware errors for STB.	Service the tool.	X	X	
2084	Error	Tool internal software error	Various internal software errors for STB.	Service the tool.	X	X	
2085	Error	Tool RBU error	An RBU error was detected by the tool software.	Check that the RBU is correctly installed. If error is still present then service the tool.	X	X	
2086	Error	Tool stall	Tool motor is stalling.	Service the tool.	X	X	

Event			Description	Procedure	Log	Display	Ack
Code	Type	Name					
2087	Warning	Tool motor current high	SRB or TBP tool motor current limit is exceeded, and the tool is locked. Tool will enter failsafe mode.		X	X	
2088	Warning	Tool battery current high	SRB or TBP tool battery current is too high.		X	X	
2089	Warning	Tool drive voltage low	SRB or TBP tool drive voltage is below the monitored lower voltage limit.		X	X	
2090	Warning	Tool drive voltage high	SRB or TBP tool drive voltage is above monitored higher voltage limit.		X	X	
2091	Warning	Tool main board error	SRB or TBP tool main board internal error.		X	X	
2092	Warning	Tool power module error	SRB or TBP tool power module internal error		X	X	
2093	Warning	Pulse unit oil level low	The oil level of the connected pulse tool is low.	Service the tool	X	X	
2094	Warning	Pulse unit oil level empty	The oil level of the connected pulse tool is below required operational level	Service the tool	X	X	X
2095	Warning	Tool battery communication lost	SRB or TBP tool lost communication with battery.	Make sure battery is seated correctly. Otherwise change battery	X	X	
2096	Error	Tool battery software version mismatch	SRB or TBP tool battery software incompatible with tool software.	Update software.	X	X	
2100	Info	STwrench smartHead removed	STwrench smartHead has been removed.	Reconnect smartHead and restart the wrench.	X	X	
2101	Warning	Wrench tightening when locked	A wrench tightening was performed when the tool status was locked in the controller.	Wait until the tool status in controller is unlocked.	X	X	
3000	Error	Controller internal software error	Software error in the controller.	Contact service.	X	X	X
3001	Error	Controller clock battery empty	Internal battery is getting close to end of life.	Replace battery	X	X	X

Event			Description	Procedure	Log	Display	Ack
Code	Type	Name					
3010	Warning	System overheated	The controller is overheated.	Cool down.	X	X	
3011	Warning	Drive overheated Controller hardware		Cool down.	X	X	
3013	Warning	Usage limited due to high controller temperature	Temperature limit has been reached. Tightening has been inhibited to reduce risk for controller shutting down due to overheating.	Wait until controller temperature has been reduced.	X	X	
3020	Warning	Controller hardware failure			X	X	
3021	Warning	System voltage problem	DC voltage too high or too low.	N/A	X	X	
3030	Error	IP address conflicting with another node on the network	The set IP address is in use by another device on the same network.	Change IP address on one of the devices.	X	X	
3031	Info	Network cable unplugged	The carrier of the factory port is lost (cable disconnected).	Check the cable connection.	X	X	
3032	Info	Pairing started	Tool pairing started.	N/A	X	X	
3033	Info	Pairing successful	Tool pairing successful.	N/A	X	X	
3034	Error	Pairing unsuccessful: no tool found	The controller found no tool to pair with when scanning for radio peers.	Set the tool in pairing mode and try again.	X	X	
3035	Error	Pairing unsuccessful: more than one tool found	The controller found more than one tool when scanning for radio peers.	Ensure that only one tool is in pairing mode when starting the pairing mode on the controller.	X	X	
3036	Error	Pairing unsuccessful: Communication error	The controller experienced a loss of connection, an unexpected answer or timeout during the pairing process.	Try to perform pairing one more time. If it fails again, service the tool.	X	X	
3037	Info	Pairing unsuccessful: Tool slot is full		Clear one tool slot	X	X	
3040	Warning	Emergency stop	Drive disabled due to emergency stop.	Reset emergency stop.	X	X	

Event			Description	Procedure	Log	Display	Ack
Code	**Type**	**Name**					
3050	Info	System clock updated	System clock has been updated.	N/A	X		
3051	Error	System clock error	Wrong time read from hardware Real Time Clock (RTC).	Change RTC battery.	X	X	X
3052	Warning	Remote start configuration error	Mismatch between HW and SW remote start configuration.	Check and verify that HW dip switch matches the selected start source.	X	X	
3053	Info	Drive connected	StepSync drive has been connected.		X	X	
3054	Info	Drive disconnected	StepSync drive disconnected.		X	X	
3055	Warning	Mode configuration error	Generated when selected mode is configured wrongly. E.g. configuring two bolts with the same bolt number or the same channel, incomplete mode configuration	Check Toolstalk2 for mode configuration error	X	X	
3056	Warning	Unable to start, tool or drive is missing	Generated when a used channel is missing a drive or tool.	Check Channel Menu on the HMI. Connect missing drive or tool.	X	X	
3057	Info	Unable to start, channel is already in use	Generated when a needed channel has been allocated to another virtual station		X	X	
3058	info	No mode selected		Select mode	X	X	
3059	Warning	Failed to connect to Atlas Copco License Manager	Indicates that the controller failed to connect to the local license manager to get licenses.	Check local network. If it fails again, service the controller.	X	X	
3084	Error	Soft PLC runtime error	eCLR has terminated in an uncontrolled way.		X	X	
3150	Error	Software IAM incompatibility	IAM is incompatible with the software installed on the controller.	Replace IAM.	X	X	X

Event			Description	Procedure	Log	Display	Ack
Code	Type	Name					
3160	Error	Failed to activate newly installed software	Something went wrong during the activation. When the newly installed software starts, a fallback to the previous working software happens. This happens when the new software fails to start for three times and only during software installation.	Take an export and contact Atlas Copco for further assistance. Note down the software version you are trying to install as well as the software version that is working.	X	X	X
3161	Error	Started on unexpected software partition	The controller has started on the inactive software side and not on the expected software side.	Note down the software information (on the Home page of the controller, select Controller > Software). Try to restart the controller and make sure its running on correct software when started again. If error persists, do an export and contact Atlas Copco.	X	X	X
3500	Error	Generic license manager error	Inconsistency detected in the feature management system used.	Contact Atlas Copco representative.	X	X	X
3501	Error	License Manager Synchronization Error			X	X	X
3502	Info	License Manager Synchronization Done			X		
3503	Warning	License manager: another source in use	License is used by another source.	Check license assignment	X	X	
3504	Warning	License manager restart needed		Restart license manager	X	X	
3505	Info	USB license synchronization started			X		
3506	Error	USB license synchronization error			X		

Event			Description	Procedure	Log	Display	Ack
Code	**Type**	**Name**					
3507	Info	USB license synchronization done			X		
3508	Info	One or more of your licenses are about to expire. Please make sure you have a license server configured		Update licenses	X	X	
3511	Warning	One of your licenses has a different license definition	Inconsistency detected in a license to be used.	Contact Atlas Copco representative.	X	X	
3550	Warning	License is missing		Install the correct license	X	X	
4010	Info	Tool locked by digital input	The tool is locked by a digital input signal.	N/A	X	X	
4011	Info	Tool locked by open protocol	The tool is locked by open protocol.	N/A	X	X	
4012	Info	Tool locked by field bus	The tool is locked by the field bus.	N/A	X	X	
4013	Info	Tool locked by socket selector	Tool is locked when the socket selector is disconnected from the Virtual Station.	Unlock by Master unlock	X	X	
4014	Info	Tool locked by Soft PLC	Soft PLC signal locked the tool.	Unlock by Master Unlock	X	X	
4015	Info	Loosening disabled	Loosening is disabled in the tightening program		X	X	
4016	Info	Tightening disabled			X	X	
4017	Info	Loosening not configured	Loosening is not configured in the selected tightening program	Select different tightening program	X	X	
4020	Info	Too many NOK tightenings	Maximum consecutive NOK tightenings in batch is exceeded		X	X	
4025	Info	No Tightening program selected	No tightening program selected.	Select tightening program or batch sequence.	X	X	
4030	Info	Batch sequence aborted	The batch sequence has been aborted.		X	X	

Event			Description	Procedure	Log	Display	Ack
Code	**Type**	**Name**					
4031	Info	Max time to complete batch sequence reached.			X	X	
4032	Info	Max time to complete first tightening reached.			X	X	
4035	Info	Locked by line control			X	X	
4040	Info	Locked by alternative identifier	Tool locked by alternative identifier.		X	X	
4050		Invalid socket configuration	Tightening program assigned to multiple sockets.	Tightening program assigned to multiple sockets	X	X	
4060	Info	Tool locked on batch complete	When running a batch with flag Tool lock on batch sequence complete this event is generated when the user press the trigger.	Unlock with signal Unlock Tool on complete.	X	X	
4070	Info	Process enter manual mode	Indicates that manual mode has been activated for a virtual station				
4071	Info	Process enter automatic mode	Indicates that automatic mode has been entered for a virtual station				
4500	Info	Result DriveError	Internal driver error or driver loss detected.				
4501	Info	Result Rehit	Attempt to tighten an already tightened bolt when Rehit detection is on.				
4502	Info	Result Soft Start Torque Low	Soft start torque below minimum level.				
4503	Info	Result Soft Start Torque High	Soft start torque exceeded maximum level.				
4504	Info	Result Self Tap Torque High	Selftap torque exceeded maximum level.				
4505	Info	Result Self Tap Torque Low	Selftap torque below minimum limit.				

Event			Description	Procedure	Log	Display	Ack
Code	**Type**	**Name**					
4506	Info	Result Safety Torque Low	Automatically calculated torque value to ensure torque sensor is mounted correctly.				
4507	Info	Result Rundown Torque High	Rundown torque exceeded maximum level.				
4508	Info	Result Rundown Angle High	Rundown angle exceeded maximum level.				
4509	Info	Result Rundown Time High	Rundown time exceeded maximum limit.				
4510	Info	Result Rundown Time Low	Rundown time below minimum limit.				
4511	Info	Result Rundown Torque Low	Rundown torque below minimum level.				
4512	Info	Result Rundown Angle Low	Rundown angle below minimum level.				
4513	Info	Result Final Torque High	Final step torque exceeded maximum level.				
4514	Info	Result Final Angle High	Final step angle exceeded maximum level.				
4515	Info	Result Final Torque Low	Final step torque below minimum level.				
4516	Info	Result Final Angle Low	Final step angle below minimum level.				
4517	Info	Result Tightening Timeout	Tightening time limit exceeded. For General Tightening Strategies max tightening time is 30 seconds. For Multistep max tightening time depends on step restriction Maximum Time Limit. Error code is dependent on tightening stage.	Redo tightening.			

Event			Description	Procedure	Log	Display	Ack
Code	Type	Name					
4518	Info	Result Trigger Lost	Tool trigger was released before target was reached. For General Tightening Strategies it is not allowed to release the trigger before the tightening stage has finished. For Multistep, the error is displayed when trigger is lost before the target in a specific step is reached.				
4519	Info	Premature torque loss	Socket has slipped off the nut.				
4520	Info	Result Target Reached Before Final Step	Target torque reached before final step in tightening program.				
4521	Info	Result Post View Torque Low	Post view torque below minimum level.				
4522	Info	Result Post View Torque High	Post view torque exceeded maximum level.				
4523	Info	Result Post View Torque Interval Not Reached	Post view torque interval not reached.				
4524	Info	Result Torque Compensation Interval Not Reached	Torque compensation interval angle before rundown end not reached.				
4525	Info	Result Tool movement exceeded	from a NOK tightening detailed status.				
4526	Info	Result SafetyCurrMon Sensor Mismatch	Current monitoring error.				
4527	Info	Result Tool movement exceeded					
4528	Info	Result Soft Start Angle High	Soft start angle exceeded maximum level (Four Step).				
4529	Info	Result Soft Start Angle Low	Soft start angle below minimum level (Four Step).				

Event			Description	Procedure	Log	Display	Ack
Code	**Type**	**Name**					
4530	Info	Result First Angle High	First step angle exceeded maximum level (Four Step).				
4531	Info	Result First Angle Low	First step angle below minimum level (Four Step).				
4532	Info	Result First Torque High	First step torque exceeded maximum level (Four Step).				
4533	Info	Result First Torque Low	First step torque below minimum level (Four Step).				
4534	Info	Result First Time High	First step time exceeded maximum level (Four Step).				
4535	Info	Result First Time Low	First step time below minimum level (Four Step).				
4536	Info	Result Final Time High	Final step time exceeded maximum level (Four Step).				
4537	Info	Result Final Time Low	Final step time below minimum level (Four Step).				
4538	Info	Result Final Supervision Torque Low	Final Supervision Torque was not reached.				
4539	Info	Result Soft Start Time High	Soft start time exceeded maximum level (Four Step).				
4540	Info	Result Soft Start Time Low	Soft start time below minimum level (Four Step).				
4543	Info	Result Snug Monitor High	Wrench only. Monitor detected snug value exceeded.				
4545	Info	Result No Residual Torque	Wrench only. Residual torque was under threshold.				
4546	Info	Result Overspeed	Wrench only. Wrench gyro failed to measure angle due to high speed.				
4547	Info	Result Effective Loosening	Wrench only. Wrench detected unexpected loosening.				
4548	Info	Result Final Less Than Target	Final torque is below target torque set in tightening program.				

Event			Description	Procedure	Log	Display	Ack
Code	**Type**	**Name**					
4549	Info	TurboTight time limit exceeded	TurboTight time limit exceeded.				
4550	Info	Result Rundown Pulses High	Maximum number of rundown pulses is exceeded.				
4551	Info	Result Rundown Pulses Low	Rundown is completed before the minimum number of rundown pulses is reached.				
4552	Info	Result Final Pulses High	maximum number of pulses is exceeded.				
4553	Info	Result Final Pulses Low	Tightening is completed before the minimum number of pulses is reached.				
4554	Info	Current at shutoff high	Current at shut off exceeded Current Limit High.				
4555	Info	Current at shutoff low	Shut off current measured was below Current Limit Low				
4556	Info	Uncategorized multistep error.	An error in the multistep configuration, often in conjunction with tool validation.				
4557	Info	Result overload			X	X	
5010	Warning	Invalid Tightening program parameter value	The parameter in the selected tightening program are invalid.	Check the configuration of the selected tightening program to find and change the value of the parameter.	X	X	
5020	Info	Main trigger is not the active start source	Generated when configured for push start only and user presses main trigger. Will be generated until user presses the push start.	Press push start to start the tool.	X	X	
5030	Info	Tightening program complexity exceeds tool Capacity	The selected tightening program is too complex for the STB tool used. Tool will be locked.	Reduce complexity of the tightening program, or choose different program	X	X	

Event			Description	Procedure	Log	Display	Ack
Code	**Type**	**Name**					
6010	Info	Accessory connected	Accessory is connected to the controller.			X	X
6020	Info	Accessory disconnected	Accessory is disconnected from the controller.			X	X
6021	Warning	Fieldbus offline	No communication with fieldbus.		X	X	X
6030	Warning	Accessory address collision	Two or more accessories with the same address are connected.	Change address on accessory.	X	X	X
6040	Warning	Accessory communication error	Intermittent communication error with accessory.	Check cables and connectors.	X	X	
6041	Warning	Fieldbus error	Communication error with fieldbus.		X	X	X
6050	Info	Wrong socket selected	Generated when no or incorrect socket is selected.		X	X	
6090	Warning	Barcode scanner could not be identified	When no unique serial number is found.	Configure the barcode reader device.	X	X	X
7010	Info	Message text to display	General event for displaying of messages.	None			X
8200	Info	Failed to Open Serial Port	Serial port to be used could not be opened.	Check serial port connections.		X	
8214	Error	EHMI Software version mismatch	EHMI software version does not match in compatibility with the controller.	Update the software version of the EHMI.	X		X

NOK Results List

Error message	Description	GUI location
Drive error	Internal driver error or driver loss detected.	**N/A**
Rehit	Attempt to tighten an already tightened bolt.	**Tightening parameters (Edit) > Rehit detection**
Soft start torque below min	Soft start torque below minimum level.	**[Four Step] Tightening parameters (Edit) > (Step 1) Soft Start > Torque min**

Error message	Description	GUI location
Soft start torque above max	Soft start torque exceeded maximum level.	**Tightening parameters (Edit) > (Step 1) Soft Start > Torque max**
Selftap torque above max	Selftap torque exceeded maximum level.	**Tightening parameters (Edit) > (Step 2) Selftap > Torque max**
Selftap torque below min	Selftap torque below minimum limit.	**Tightening parameters (Edit) > (Step 2) Selftap > Torque min**
Safety torque limit low	Automatically calculated torque value to ensure torque sensor is mounted correctly.	**N/A**
Rundown torque above max	Rundown torque exceeded maximum level.	**Tightening parameters (Edit) > (Step 2) Rundown torque limits > Torque max**
Rundown angle above max	Rundown angle exceeded maximum level.	**Tightening parameters (Edit) > (Step 2) Rundown angle limits > Angle max**
Rundown exceeded max time limit	Rundown time exceeded maximum limit.	**Tightening parameters (Edit) > (Step 2) Rundown angle limits > Time max**
Rundown below min time limit	Rundown time below minimum limit.	**Tightening parameters (Edit) > (Step 2) Rundown angle limits > Time min**
Rundown torque below min	Rundown torque below minimum level.	**Tightening parameters (Edit) > (Step 2) Rundown torque limits > Torque min**
Rundown angle below min	Rundown angle below minimum level.	**Tightening parameters (Edit) > (Step 2) Rundown angle limits > Angle min**
Final step torque above max	Final step torque exceeded maximum level.	**Tightening parameters (Edit) > (Step 3) Final step > Torque limits Manual > Torque max**
Final step angle above max	Final step angle exceeded maximum level.	**Tightening parameters (Edit) > (Step 3) Final step > Angle max**
Final step torque below min	Final step torque below minimum level.	**Tightening parameters (Edit) > (Step 3) Final step > Torque limits Manual > Torque min**
Final step angle below min	Final step angle below minimum level.	**Tightening parameters (Edit) > (Step 3) Final step > Angle max**
Tightening timeout	Tightening time limit exceeded.	**[Multistep] Tightening parameters (Edit) > Step dependent** **[Other tightening programs]: fixed parameter set to 30 seconds**
Trigger lost	Tool trigger was released before target was reached.	**[Multistep]: trigger release before tightening step target has been reached** **[Other tightening programs]: trigger release before tightening stage has finished**

Error message	Description	GUI location
Slip off	Socket has slipped off the nut.	**Tightening parameters (Edit) > (Step 3) Tightening parameters > Slipoff detection time**
Target reached before final step	Target torque reached before final step in tightening program.	**Target torque**
Post view torque below min	Post view torque below minimum level.	**Tightening parameters (Edit) > (Step 2) Post view torque > Torque min**
Post view torque above max	Post view torque exceeded maximum level.	**Tightening parameters (Edit) > (Step 2) Post view torque > Torque max**
Post view torque interval not reached	Post view torque interval not reached.	**Tightening parameters (Edit) > (Step 2) Post view torque > Torque min length**
Torque compensation interval not reached	Torque compensation interval angle before rundown end not reached.	**Tightening parameters (Edit) > (Step 3) Torque compensation > Torque compensation point**
Tool movement exceeded	Tool was moved beyond set angle limits.	**Tightening parameters (Edit) > (Step 1) TrueAngle compensation (On); Tool movement limits > Positive/Negative**
Current monitoring error	Current monitoring error.	**Tightening parameters (Edit) > (Step 1) Current monitoring (On)**
Soft start angle above max	Soft start angle exceeded maximum level.	**[Four Step] Tightening parameters (Edit) > (Step 1) Soft start > Angle max**
Soft start angle below min	Soft start angle below minimum level (Four Step).	**[Four Step] Tightening parameters (Edit) > (Step 1) Soft start > Angle min**
First step angle high	First step angle exceeded maximum level (Four Step).	**[Four Step] Tightening parameters (Edit) > (Step 3) First step > First angle max**
First step angle low	First step angle below minimum level (Four Step).	**[Four Step] Tightening parameters (Edit) > (Step 3) First step > First angle min**
First step torque high	First step torque exceeded maximum level (Four Step).	**[Four Step] Tightening parameters (Edit) > (Step 3) First step > First torque max**
First step torque below min	First step torque below minimum level (Four Step).	**[Four Step] Tightening parameters (Edit) > (Step 3) First step > First torque min**
First step exceeded max time limit	First step time exceeded maximum level (Four Step).	**[Four Step] Tightening parameters (Edit) > (Step 3) First step > Time max**
First step below min time limit	First step time below minimum level (Four Step).	**[Four Step] Tightening parameters (Edit) > (Step 3) First step > Time min**
Final step exceeded max time limit	Final step time exceeded maximum level (Four Step).	**[TurboTight, Four Step] Tightening parameters (Edit) > (Step 3) Final step > Time max**
Final step below min time limit	Final step time below minimum level (Four Step).	**[TurboTight, Four Step] Tightening parameters (Edit) > (Step 3) Final step > Time min**

Error message	Description	GUI location
Low torque at final supervision	Final Supervision Torque was not reached.	**[Four Step] Tightening parameters (Edit) > (Step 3) Torque limits (manual) > Torque min**
Soft start exceeded max time limit	Soft start time exceeded maximum level (Four Step).	**[Four Step] Tightening parameters (Edit) > (Step 1) Soft start > Time max**
TurboTight time limit exceeded	TurboTight time limit exceeded.	**[TurboTight] Tightening parameters (Edit) > (Step 3) Final step > Time max**
Snug monitor high	Wrench only. Monitor detected snug value exceeded.	**Tightening parameters (Edit) > Rundown stage (Step 2) Rundown complete > Rundown complete torque**
No residual torque	Wrench only. Residual torque was under threshold.	**[TurboTight] + [TensorPulse] Tightening parameters (Edit) > (Step 3) > Tightening parameters > Residual torque correlation factor**
Overspeed	Wrench only. Wrench gyro failed to measure angle due to high speed.	**N/A**

Troubleshooting and Service

This section provides assistance in troubleshooting problems, should they arise, and contains information to help you maintain and service the product.

Troubleshooting: WLAN and Bluetooth

Problem	Possible cause	Solution
Failed pairing (WLAN)	Tool has been restarted and lost connection to the controller	Pair tool with the controller
Failed pairing (WLAN)	Other tools are being paired at the same time	Make sure all other tools have exited pairing mode
Failed pairing (WLAN)	Tool is out of range	Move the tool closer to the controller and make sure you have a clear line of sight to the controller
Failed pairing (Bluetooth)	Other tools are being paired at the same time	Make sure all other tools have exited pairing mode
Failed pairing (Bluetooth)	Tool is out of range	Move the tool closer to the controller and make sure you have a clear line of sight to the controller
Failed pairing (Bluetooth)	Interference from other tools	The Bluetooth module can be sensitive; make sure to move other Bluetooth devices further away from the controller, or switch them off if possible
Failed pairing (Bluetooth)	All six slots have been filled and all six tools have been assigned to a Virtual Station	Remove one of the existing paired tools from the Virtual Station (in the **Virtual Station** menu, in the **Tool** field)

Problem	Possible cause	Solution
Tool disappeared from the Tool list (Bluetooth)	When pairing additional tools, existing tools will disappear from the connected tools list (in the **Tools** menu)	Press the tool trigger to make it appear in the list again
Tool disappeared from the Tool list (Bluetooth)	Tools may disappear from the list when the tool has been outside radio coverage	Make sure to be inside the radio coverage area and press the tool trigger to make it appear in the list again

Reference

In this section, you can find miscellaneous useful information.

Terms and Definitions

Term	Synonym	Definition	Note
batch		multiple tightening using the same tightening program and socket	
batch sequence	sequence	multiple tightening using a combination of different tightening programs and sockets	
controller GUI		user interface at controller buttons or touch screen	
event		controller and tool status signals	
final angle		actual measured angle value at the end of the tightening cycle	
final torque		actual measured torque value at the end of the tightening cycle	
GUI		user interface made up of interactive graphical elements such as windows, icons and symbols on a display	
HMI	Human Machine Interface	user interface to tool or controller	The HMI can be a computer web-based interface or controller touch screen.
IAM	Intelligent Application Module	removable module in controller containing program, configuration parameters and tightening results	
line structure		sorting and grouping controllers in structures, folders or sub-folders in ToolsTalk	The line structure is a method for improving the visibility of a large group of controllers in a structured manner.

Term	Synonym	Definition	Note
post view torque		function for monitoring and detecting torque maximum and minimum values before rundown is complete	One purpose of post view torque is the use of a self-locking nut.
Tightening program	Parameter set	configuration of parameters and values to control and monitor a single tightening action, and to store the tightening result	
push		transfer of data saved in ToolsTalk to the controller memory	
QIF	Quality Integrated Fastening	fully integrated line of nutrunners, controllers, accessories and process monitoring tools to guarantee high quality and traceability of tightening in industrial assembly systems	QIF was developed at Atlas Copco and is preferably used in motor vehicle industry and other assembly situations where many joints are critical. The QIF concept also includes process monitoring and documentation.
QIF accessory		accessory for operator communication and guidance used in QIF	Accessory products used for communication between system and operator. For example: scanner, operator panel, stacklight and socket selector. The communication provides improved quality and traceability in the assembly process.
quick step		tightening strategy	A tightening strategy to reduce the joint's preload scatter by combining an initial step with a given speed and torque and then reducing the speed in the final step.
Re-hit detection		detection of re-tightening of an already tightened joint	
rotate		tightening strategy which rotates the tool head.	Rotate is mainly used for test or demonstration purposes.
rundown complete		end of the rundown step, when the screw head is in contact with the surface and the tightening step begins	
rundown step		step when a bolt enters the thread until the bolt head touches the surface	
snug		screw or bolt is approximately finger-tight to the surface	
socket selector		QIF accessory, consisting of a socket tray with lamps, that can be used to guide an operator to the correct socket	

Term	Synonym	Definition	Note
soft start		start tightening at slow speed during a specified rotation angle	The function helps the bolt to enter the thread in a well controlled way and may prevent unwanted ergonomic tool movement when the trigger is pressed.
stacklight		QIF accessory, which handles the communication between operator and controller through digital signals like lamps, buttons, switches and buzzer	
target		desired result of a tightening	The target is expressed in torque or angle.
target angle		desired angle value at the end of the tightening cycle, measured from a reference point	
target torque		desired torque value at the end of the tightening cycle	
three step		tightening strategy	A tightening strategy to reduce the joint's preload scatter and relaxation effects with an initial step with a given speed and torque followed by a short loosening step before the final tightening at reduced speed.
tightening step		step from when a bolt head has reached the surface until the tightening has reached the desired target torque or target angle	
tightening strategy		algorithm which continuously controls and monitors the tightening process	The user can select a strategy optimized for the joint and program certain parameters.
TurboTight		tightening strategy	A tightening strategy based on the tool's maximum speed to perform fast and ergonomic tightening. The strategy requires only a target torque value to be set.
two step		tightening strategy	A tightening strategy to reduce the joint's preload scatter and relaxation effects with an initial step with a given speed and torque, followed by a short-term stop, before the final tightening at reduced speed.
web GUI		user interface to controller through web browser window from a remote computer	
virtual station	virtual controller	software abstraction of a physical controller to behave like multiple controllers	A controller can have only one cable tool connected to it, but several wireless tools. Each tool is connected to its own virtual station.

Term	Synonym	Definition	Note
Virtual station type		License containing a bundle of controller features.	This license is required for running a virtual station.
Virtual station feature		License for individual features.	Can be used to complement Virtual station type licenses.
Controller feature		License for controller-wide features, such as Soft PLC and StepSync.	Are assigned to an entire controller and can be used by all virtual stations.

Input Signals

Abort Sequence - 10012

When a Batch sequence abort request is received, the Batch sequence functionality aborts the batch sequence only after getting the ongoing tightening result.

Name in SoftPLC: ABORT_BATCH_SEQUENCE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Acknowledge Events - 10004

Acknowledge of an event.

Name in SoftPLC: ACKNOWLEDGE_EVENT

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Activate Tool Scanner - 10075

Activates the tool scanner through an external source.

Name in SoftPLC: ACTIVATE_TOOL_SCANNER

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Batch Decrement - 10002

Incrementally decreases the batch counter by one.

Name in SoftPLC: BATCH_DECREMENT

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Batch Increment - 10001

Incrementally increases the batch counter by one.

Name in SoftPLC: BATCH_INCREMENT

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Bypass Identifier - 10123

In source batch string used to bypass an identifier string in string receiving sequence.

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Bypass Tightening Program - 10008

Skips the next tightening program in the running batch sequence.

Name in SoftPLC: BYPASS_PSET

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Disable Fieldbus - 10049

Disables the fieldbus.

Name in SoftPLC: DISABLE_FIELDBUS

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Disable tool - 30000

If the signal is set to True, a tool is immediately stopped and locked.

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Disable Tool Scanner - 10119

Disables tool scanner when scanning by tool trigger when signal is set. It is still possible to scan by using the scan button but the scan string is ignored.

Name in SoftPLC: DISABLE_TOOL_SCANNER

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Dynamic Batch Size - 10074

Name in SoftPLC: DYNAMIC_BATCH_SIZE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

External OK - 10063

Name in SoftPLC: EXTERNAL_OK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Fieldbus Lock Loosening - 20021

A Virtual Station is locked when starting a loosening if the signal is set from a connected and supported accessory.
An ongoing loosening is aborted immediately when Fieldbus Lock Loosening is set to True, due to the Stop Drive setting.

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Fieldbus Lock Tightening - 20020

A Virtual Station is locked when starting a tightening if the signal is set from a connected and supported accessory.
An ongoing tightening is aborted immediately when Fieldbus Lock Tightening is set to True, due to the Stop Drive setting.

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Flush Read Result Queue - 30005

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE

- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

ID for Dynamic Batch Size - 10073

Name in SoftPLC: DYNAMIC_BATCH_SIZE_TPID

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	1	16
TreatZeroAsOne	State	Integer	1	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE



To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Lock Loosening - 20003

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE

- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Lock Tightening - 20002

Tool locked for tightening by digital input.

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Lock Tool Active High - 20004

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE

- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Lock Tool Active Low - 20061

Locks the tool when this signal is low.

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Manual Mode - 10061

Used to set the Virtual Station in manual mode.

If the signal is True (high) the signal 101 - Manual mode is high.
If the signal is False (low) the signal 101 - Manual mode is low.

Name in SoftPLC: SET_MANUAL_MODE

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE

- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Master Unlock - 10005

Unlocks most locks defined in lock page.

Name in SoftPLC: MASTER_UNLOCK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Pulse Stop - 10030

If this signal is generated any ongoing tightening or loosening will be stopped. Used in combination with 10024 or 10072.

Name in SoftPLC: TIGHTENING_STOP_PULSE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Read Result Handshake Ack - 30004

Enable the Read Result Handshake feature in the Fieldbus device for making the controller available for the signal Rear Result Handshake Ack.

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Reset All Identifiers - 10115

In Source batch string used to reset all received string identifiers from string receiving sequence at once. In other worktasks clears VIN number.

Name in SoftPLC: RESET_ALL_IDENTIFIERS

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Reset Batch - 10003

Resets the batch counter to 0. No batch OK (nxOK). If batch OK is activated, it will be deactivated.

Name in SoftPLC: RESET_BATCH

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Reset Batch Sequence - 10053

Resets the Batch Sequence. Unlocks a tool that is locked by Tool Lock on Complete.

Name in SoftPLC: RESET_BATCH_SEQUENCE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Reset Bistable Relay - 10022

Reset the bistable relay output.

Name in SoftPLC: RESET_BISTABLE_RELAY

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Reset Latest Identifier - 10114

In Source batch string used to reset latest received string from string receiving sequence. In other worktasks clears VIN number.

Name in SoftPLC: RESET_LATEST_IDENTIFIER

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Reset Relays - 10120

Resets all signals.

Name in SoftPLC: RESET_RELAYS

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Reset Sequence Status - 10118

Resets signals Batch Sequence Done/OK/NOK and Sequence Aborted.

Name in SoftPLC: RESET_SEQUENCE_STATUS

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Reset Too Many NOK - 10013

Reset the batch after receiving lock Too Many NOK

Name in SoftPLC: RESET_TOO_MANY_NOK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input - 10020

Selects Tightening Program withing Source Tightening/Batch within sequence.

Name in SoftPLC: SELECT_INPUT_VALUE

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	1	16
TreatZeroAsOne	State	Integer	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Select Input and Dynamic Batch Size - 30007

It is used to set the Batch Size for a specific "Identifier Number" in a Source Tightening Task, running "External batch control".

Batch size can be set to 1-250.

If Batch size is set to 0, it is treated as infinite batch. The user is not able to un-set a Batch back to a state where it has no size, once it has been set.

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	16	16
TreatZeroAsOne	State	Integer	16	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE

- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Select Input Bit 0 - 10016

Name in SoftPLC: SEL_INPUT_BIT_0

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 1 - 10017

Name in SoftPLC: SEL_INPUT_BIT_1

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE

- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 2 - 10018

Name in SoftPLC: SEL_INPUT_BIT_2

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 3 - 10019

Name in SoftPLC: SEL_INPUT_BIT_3

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 4 - 10066

Name in SoftPLC: SEL_INPUT_BIT_4

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 5 - 10067

Name in SoftPLC: SEL_INPUT_BIT_5

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 6 - 10068

Name in SoftPLC: SEL_INPUT_BIT_6

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 7 - 10069

Name in SoftPLC: SEL_INPUT_BIT_7

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 8 - 10070

Name in SoftPLC: SEL_INPUT_BIT_8

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Input Bit 9 - 10071

Name in SoftPLC: SEL_INPUT_BIT_9

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Loosening - 10029

Selects loosening as default operation mode and used in combination with Start Tools -10028 signal.

Name in SoftPLC: SELECT_LOOSENING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Next Identifier Number - 10116

It is possible to use the signal Select Next Identifier Number when a task in the virtual station is configured as:

- **Batch Sequence**
- **Source Tightening**
- **Source Batch**
  - **Number Identifier** method
  - **String Identifier** method

ST Selector configurable functions **Take Next** and **Take Previous** enable the input signals **Select Next Identifier Number** and **Select Previous Identifier Number**.

Batch Sequence selected as Virtual Station Task

If **Free Order** switch has been enabled, the signal Select Next Identifier Number can select different batches within the selected sequence.

Before selecting batches, it is mandatory that they have the identifier number assigned. If a batch does not have the identifier number assigned, the signal Select Next Identifier Number cannot select it, even if **Free Order** switch is enabled.

It enables looping through the batches that have a configured identifier number.
If identifier number is "None", it is possible to select it only after all Batches with configured identifier number are completed.

It is possible to do looping, but 0 is skipped. When a batch is finished, it is no longer selectable.

For example, in case of batches with assigned identifier numbers 1,2,4,5, the signal runs in loop: 1,2,4,5,1,2,4... as long as the batches are not finished.

Source Tightening selected as Virtual Station Task

The signal selects the next identifier number from the list of tightening programs specified in the Source Tightening task.
The selection runs from the currently selected identifier number to the next larger one.

When the biggest identifier number is selected, this signal selects 0; after 0, the signal selects the next bigger identifier number.

If 0 is selected as identifier number, the tool is locked.

If the identifier number has been added to the Source Tightening list, but no tightening program has ever been assigned to it, it is skipped while looping through the Source Tightening list.

If the tightening program is assigned to an identifier number and then it is removed from the list of tightening programs, it is still possible to select this identifier number. In this case, the tool is locked because there is not a specific tightening program.

When **Selector Mode** switch is set to **Confirm**, the socket selector needs to be assigned and configured. All tightening programs can be selected, but before running them, appropriate socket must be lifted from the socket selector.

Source Batch selected as Virtual Station Task

In *Sources* > *Batch Sequence* > *Source Batch*, when the identifier method is set to **Number**, the signal Select Next Identifier Number selects sequences from a list of sequences shown in **Source Batch** task.

It is possible to do looping through 0. The signal Select Next Identifier Number selects only the identifier numbers assigned to sequences.

For example, if there are 4 sequences available with identifier numbers 1,2,4, and 8, the signal Select Next Identifier Number iterates and selects 1,2,4,8,0,1,2...

The identifier numbers not defined are not selected.

In *Sources* > *Batch Sequence* > *Source Batch*, when the identifier method is set to **String**, it is necessary to select the sequence through external sources (like scanner or Open Protocol). The signal Select Next Identifier Number is able to select the batches within the selected sequence.

Name in SoftPLC: SELECT_NEXT_ID_NUMBER

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE

- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Select Previous Identifier Number - 10117

It is possible to use the signal Select Previous Identifier Number when a task in the virtual station is configured as:

- **Batch Sequence**
- **Source Tightening**
- **Source Batch**
  - **Number Identifier** method
  - **String Identifier** method

ST Selector configurable functions **Take Next** and **Take Previous** enable the input signals **Select Next Identifier Number** and **Select Previous Identifier Number**.

Batch Sequence selected as Virtual Station Task

If **Free Order** switch has been enabled, the signal Select Previous Identifier Number can select different batches within the selected sequence.

Before selecting batches, it is mandatory that they have the identifier number assigned. If a batch does not have the identifier number assigned, the signal Select Previous Identifier Number cannot select it, even if **Free Order** switch is enabled.

It enables looping through the batches that have a configured identifier number.
If identifier number is "None", it is possible to select it only after all Batches with configured identifier number are completed.

It is possible to do looping, but 0 is skipped. When a batch is finished, it is no longer selectable.

For example, in case of batches with assigned identifier numbers 1,2,4,5, the signal runs in loop: 5,4,2,1,5,4,2... as long as the batches are not finished.

Source Tightening selected as Virtual Station Task

The signal selects the previous identifier number from the list of tightening programs specified in the Source Tightening task.
The selection runs from the currently selected identifier number to the previous lower one.

When the smallest identifier number is selected, this signal selects 0; after 0, the signal selects the next smaller identifier number.

If 0 is selected as identifier number, the tool is locked.

If the tightening program is assigned to an identifier number and then it is removed from the list of tightening programs, it is still possible to select this identifier number. In this case, the tool is locked because there is not a specific tightening program.

When **Selector Mode** switch is set to **Confirm**, the socket selector needs to be assigned and configured. All tightening programs can be selected, but before running them, appropriate socket must be lifted from the socket selector.

Source Batch selected as Virtual Station Task

In *Sources* > *Batch Sequence* > *Source Batch*, when the identifier method is set to **Number**, the signal Select Previous Identifier Number selects sequences from a list of sequences shown in **Source Batch** task.

It is possible to do looping through 0. The signal Select Previous Identifier Number selects only the identifier numbers assigned to sequences.

For example, if there are 4 sequences available with identifier numbers 1,2,4, and 8, the signal Select Previous Identifier Number iterates and selects 8,4,2,1,0,8,4...

The identifier numbers not defined are not selected.

In *Sources* > *Batch Sequence* > *Source Batch*, when the identifier method is set to **String**, it is necessary to select the sequence through external sources (like scanner or Open Protocol). The signal Select Previous Identifier Number is able to select the batches within the selected sequence.

Name in SoftPLC: SELECT_PREVIOUS_ID_NUMBER

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Set Bistable Relay - 10021

Set the bistable relay output.

Name in SoftPLC: SET_BISTABLE_RELAY

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Socket Selector External Green Light - 10046

Controls green lights when socket selector is in external mode (how multiple physical devices are mapped to logical sockets are defined by the socket selector resource configuration).

- Byte0 - logical sockets 1-4
- Byte1 - logical sockets 5-8
- Byte2 - logical sockets 9-12
- Byte3 - logical sockets 13-16
- Byte4 - logical sockets 17-20
- Byte5 - logical sockets 21-24
- Byte6 - logical sockets 25-28
- Byte7 - logical sockets 29-32

2 bits per socket, 00=off, 01=flash, 10=solid

Name in SoftPLC: SOCKET_SEL_EXT_GREEN_LIGHT

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	uint64	1	64
SocketLedControlTwoDevices	State	uint64	1	64

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Socket Selector External Red Light - 10047

Controls red lights when socket selector is in external mode (how multiple physical devices are mapped to logical sockets are defined by the socket selector resource configuration).

- Byte0 - logical sockets 1-4
- Byte1 - logical sockets 5-8
- Byte2 - logical sockets 9-12
- Byte3 - logical sockets 13-16
- Byte4 - logical sockets 17-20
- Byte5 - logical sockets 21-24
- Byte6 - logical sockets 25-28
- Byte7 - logical sockets 29-32

2 bits per socket, 00=off, 01=flash, 10=solid

Name in SoftPLC: SOCKET_SEL_EXT_RED_LIGHT

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	uint64	1	64
SocketLedControlTwoDevices	State	uint64	1	64

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE

- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Soft PLC Lock Loosening - 20041

This signal is used to lock loosening from the SoftPLC.

Name in SoftPLC: LOCK_LOOSENING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Soft PLC Lock Tightening - 20040

This signal is used to lock tightening from the SoftPLC.

Name in SoftPLC: LOCK_TIGHTENING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Start Loosening - 10011

Active signal starts loosening. Once digital input goes inactive the loosening must be stopped.

Name in SoftPLC: START_LOOSENING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Start Tightening - 10010

Active signal starts tightening. Once input goes inactive the tightening must be stopped.

Name in SoftPLC: START_TIGHTENING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE

- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Start Tightening Pulse - 10024

The tightening starts at signal. Runs until the tightening is finished, or until the 30 sec timeout in tightening program occurs.

Name in SoftPLC: TIGHTENING_START_PULSE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Start Tools - 10028

Active signal which starts the tool (default operation mode is tightening). As soon as signal goes inactive the tool must be stopped. Used in combination with Select Loosening - 10029 signal.

Name in SoftPLC: START_DRIVE_CONTINIOUS

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE

- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

To SoftPLC - 10065

Name in SoftPLC: TO_PLC

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	uint8 array	1	1

- Fieldbus: FALSE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Unlock Tool on Complete - 10051

Unlocks a tool that is locked by "Tool Lock on Complete".

Name in SoftPLC: UNLOCK_TOOL_ON_COMPLETE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE

- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Unlock Tool on Disable - 10059

Name in SoftPLC: UNLOCK_TOOL_ON_DISABLE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Output Signals

Active Identifier String - 186

Set when an identifier string has been received and accepted by the work-task; it is necessary that even sequence or tightening program are running.
If running Source batch-string, it is set when all scans have been received and a sequence had been selected. In that case it includes concatenated string consisted of saved positions.
For other work-tasks it includes the “VIN” number.

Name in SoftPLC: ACTIVE_IDENTIFIER_STRING

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Active Identifier String 1 - 188

Signal corresponding to the first configured string in Source batch-string.
Active Identifier String 1 signal is sent once a scanning sequence is done and a sequence has been selected, thus the identifier parts are active.
The strings is filtered with saved position.
Only sent when running Source batch string.

Name in SoftPLC: ACTIVE_ID_STRING_1

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE

- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Active Identifier String 2 - 189

Signal corresponding to the second configured string in Source batch-string.
Active Identifier String 2 signal is sent once a scanning sequence is done and a sequence has been selected, thus the identifier parts are active.
The strings is filtered with saved position.
Only sent when running Source batch string.

Name in SoftPLC: ACTIVE_ID_STRING_2

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Active Identifier String 3 - 190

Signal corresponding to the third configured string in Source batch-string.
Active Identifier String 3 signal is sent once a scanning sequence is done and a sequence has been selected, thus the identifier parts are active.
The strings is filtered with saved position.
Only sent when running Source batch string.

Name in SoftPLC: ACTIVE_ID_STRING_3

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Active Identifier String 4 - 191

Signal corresponding to the fourth configured string in Source batch-string.
Active Identifier String 4 signal is sent once a scanning sequence is done and a sequence has been selected, thus the identifier parts are active.
The strings is filtered with saved position.
Only sent when running Source batch string.

Name in SoftPLC: ACTIVE_ID_STRING_4

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Batch Completed - 30

The batch counter is equal to the batch size number. Result can be OK or NOK.

Name in SoftPLC: BATCH_COMPLETED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Batch Completed NOK - 37

Batch finished with status NOK.

Name in SoftPLC: BATCH_COMPLETED_NOK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Batch Completed OK - 36

Batch finished with status OK.

Name in SoftPLC: BATCH_COMPLETED_OK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Batch Count - 31

Current number in the batch. Can only be viewed on a display.

Name in SoftPLC: BATCH_COUNT

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Batch Running - 32

Indicates that a batch in a batch sequence is running.

Name in SoftPLC: BATCH_RUNNING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Batch Sequence Completed NOK - 46

Batch sequence finished with status NOK.

Name in SoftPLC: BATCH_SEQUENCE_NOK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Batch Sequence Completed OK - 45

Batch sequence finished with status OK.

Name in SoftPLC: BATCH_SEQUENCE_OK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Batch Sequence Done - 48

Indicates when a sequence is completed, both in case Batch Sequence Completed OK and Batch Sequence Completed NOK.

Name in SoftPLC: BATCH_SEQUENCE_COMPLETED

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	Event	Boolean	1	1
Invert	Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Batch Sequence Running - 47

Indicates if the Batch Sequence is running or not.

Name in SoftPLC: BATCHSEQUENCE_RUNNING

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE

- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Bistable Relay - 40

Bistable Relay is a signal controlled by the inputs "Set Bistable Relay" and "Reset Bistable Relay".
After receiving the input "Set Bistable Relay", Bistable Relay signal is set to True.
After receiving the input "Reset Bistable Relay", Bistable Relay signal is set to False.

If "Set Bistable Relay" or "Reset Bistable Relay" goes low, the Bistable relay keeps its state.
The state for the Bistable relay changes when "Set Bistable Relay" or "Reset Bistable Relay" goes high.

After restarting the controller, the Bistable relay is set to False as default.

Name in SoftPLC: BISTABLE_RELAY

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Calibration Alarm - 138

The Calibration alarm from the Tool maintenance configuration. Provides a reminder for when it is time to calibrate the tool.

Name in SoftPLC: CALIBRATION_ALARM

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Configuration Version - 88

Name in SoftPLC: CONFIGURATION_VERSION

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE

- TLS Tag: FALSE
- I/O Expander: FALSE

Controller Switched On - 42

Set to true at start up of IO Exchange

Name in SoftPLC: IO_ON

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Current Running Batch - 180

Shows the index of the current running batch in a sequence. If socket selector is used it will show zero if none, more than one or wrong socket is selected. For source tightening it will show 1 if batch mode is used and a batch is running.

Name in SoftPLC: CURRENT_RUNNING_BATCH_IX

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE

- ST Selector: TRUE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Direction Switch CCW - 13

The direction switch on the tool is turned in counter clockwise direction.

Name in SoftPLC: DIRECTION_SWITCH_CCW

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Direction Switch CW - 12

The direction switch on the tool is turned in clockwise direction.

Name in SoftPLC: DIRECTION_SWITCH_CW

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE

- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Emergency Stop - 20036

Name in SoftPLC: EMERGENCY_STOP

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Event Code - 30001

Relay an event when it is triggered. Momentary, on for two cycle times.

Name in SoftPLC: EVENT_CODE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE

- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Event Code Severity - 30003

Event Code Severity is an output signal which is activated when the triggered event has severity of error or warning.

Name in SoftPLC: EVENT_CODE_SEVERITY

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Event Present - 161

Indicates if event is triggered. It is only triggered on accessories if event requires an ACK.

Name in SoftPLC: EVENT_PRESENT

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE

- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Fieldbus Disconnected - 96

Name in SoftPLC: FIELDBUS_DISCONNECTED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Final Angle - 31003

Actual measured Angle value at the end of the tightening cycle.

Name in SoftPLC: FINAL_ANGLE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	16	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE

- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Final Angle - 8

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Float	0	0

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Final Angle Status - 31006

Name in SoftPLC: FINAL_ANGLE_STATUS

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	2	8
StatusAsChar	State	Integer	2	8

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE

- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Final Measured Current - 31017

Current at the measurement step of final angle and final torque. It is sent when a result is available.

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	Event	Integer	32	32
FixedPointToDecimal	Event	Integer	32	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Final Target Speed - 31020

The target speed of the last step of the tightening program.

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Integer	16	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE

- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Final Target Torque - 31015

Gets the target torque of the tightening program for a performed tightening. The value is copied from the program of the tightening result and is published after the tightening.

The Multistep programs retrieve the Target Torque from the last tightening step in the tightening program defined as Step Category "Final".

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	Event	Integer	32	32
FixedPointToDecimal	Event	Integer	32	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Final Torque - 31002

Actual measured torque value at the end of the tightening cycle.

Name in SoftPLC: FINAL_TORQUE

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	32	32
FixedPointToDecimal	State	Integer	32	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Final Torque - 5

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Float	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Final Torque Status - 31009

Name in SoftPLC: FINAL_TORQUE_STATUS

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	2	8
StatusAsChar	State	Integer	2	8

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

First Target Torque - 31019

Retrieves the first target torque after a completed tightening.

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	Event	Integer	32	32
FixedPointToDecimal	Event	Integer	32	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE

- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

From SoftPLC - 10064

Allocated bytes for data transfer from PLC to accessories.

Name in SoftPLC: FROM_PLC

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	uint8 array	8	8

Devices

- Fieldbus:FALSE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

High Angle - 10

Angle result is too high.

Name in SoftPLC: HIGH_ANGLE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE

- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

High Torque - 7

Torque result is higher than maximum torque limit.

Name in SoftPLC: HIGH_TORQUE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Identifier Received - 100

Name in SoftPLC: IDENTIFIER_RECEIVED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE

- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Last Received Identifier String - 187

Set directly when an identifier has been received in the work-task.
For Source batch-string, it is set at every scanning in scan process, thus it is changed for every scanning and sent even if it does not match in length.
String set is in raw format and not only "saved positions" in the string.
For other work-tasks this signal is equal to Active Identifier String signal.

Name in SoftPLC: LAST_RECEIVED_ID_STRING

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE



To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

License Server Connection Lost - 134

Indicates that the connection to the Atlas Copco license server has been lost or the synchronization has failed. The signal is cleared when the License manager synchronization has been done successfully

Name in SoftPLC: LICENSE_SERVER_CONN_LOST

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Loosening Disabled - 184

Loosening Disabled is an output signal which is activated when the loosening is externally locked by any of the following signals:

- 20003 - Lock Loosening
- 20004 - Lock Tool Active High
- 20033 - Line Control Lock
- 20018 - Open Protocol Lock
- 20021 - Fieldbus Lock Loosening
- 20041 - Soft PLC Lock Loosening
- 20061 - Lock Tool Active Low

Name in SoftPLC: LOOSENING_DISABLED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE

- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Loosening Enabled - 185

Loosening Disabled is an output signal which is activated when the loosening is not externally locked by any of the following signals:

- 20003 - Lock Loosening
- 20004 - Lock Tool Active High
- 20033 - Line Control Lock
- 20018 - Open Protocol Lock
- 20021 - Fieldbus Lock Loosening
- 20041 - Soft PLC Lock Loosening
- 20061 - Lock Tool Active Low

Name in SoftPLC: LOOSENING_ENABLED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Loosening is Locked - 28

The loosening is disabled.

Name in SoftPLC: LOOSENING_IS_LOCKED

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Loosening NOK - 74

NOK loosening took place.

Name in SoftPLC: LOOSENING_NOK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE

- I/O Expander: TRUE

Loosening OK - 70

OK loosening took place.

Name in SoftPLC: LOOSENING_OK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Low Angle - 9

Angle result is lower than minimum angle limit.

Name in SoftPLC: LOW_ANGLE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE

- I/O Expander: TRUE

Low Torque - 6

Torque result is lower than minimum torque limit.

Name in SoftPLC: LOW_TORQUE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Manual Mode - 101

Indicates on any supported and configured accessory the Virtual Station status for manual mode

Name in SoftPLC: MANUAL_MODE

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE

- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Max Consecutive NOK Reached - 35

Indicates Max coherent NOK tightening counter is reachead.

Name in SoftPLC: MAX_COHERENT_NOK_REACHED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Open End in Open Position - 89

Open End tool in open position.

Name in SoftPLC: OPEN_END_IN_OPEN_POSITION

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE

- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Open Protocol Disconnected - 95

If Open Protocol is set to off in the Virtual Station, "Open Protocol Disconnected" signal is set to False.
If Open Protocol is turned on in the Virtual Station the "Open Protocol Disconnected" signal is set to True.
When at least one client (several Open Protocol clients can connect to the same Virtual Station) is connected the "Open Protocol Disconnected" signal is set to False.

Name in SoftPLC: OPEN_PROTOCOL_DISCONNECTED

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Pass-Through Identifier - 104

Output signal for sending a scanned string from a scanner to an external device.

Name in SoftPLC: BARCODE_ID_PASSTHROUGH

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Program End - 168

This signal indicates the torque level when the tightening cycle is complete. A timer - Program end timeout - starts when the torque falls below this level. Tightening is complete when the torque has fallen below the level for Program end torque and stayed there until Program end timeout has been reached.

Name in SoftPLC: PROGRAM_END

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Program Start - 132

Defines the starting level for a tightening cycle.

Name in SoftPLC: PROGRAM_START

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Pulse Tool Alarm Oil Level Empty - 167

Oil level supervision configured in the Tool maintenance, provides a mechanism to remind the users when it is time to fill up oil on a pulse tool. The signal does not notify the user when the trigger gets pressed. The signal is cleared when tool is disconnected; then, it is sent again from the tool if the condition prevails next time the tool is connected.

Name in SoftPLC: TOOL_OIL_LEVEL_EMPTY

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE

- I/O Expander: TRUE

PVT Compensate Value - 31029

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	Event	Integer	32	32
FixedPointToDecimal	Event	Integer	32	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Read Result Queue Flushed - 30006

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE

- I/O Expander: FALSE

Ready to Start - 29

If a tool is connected to the virtual station, there is not any active tightening locks, emergency stop is not activated, and a valid Tightening Program is selected, this signal indicates that it is possible to start a tightening.

Name in SoftPLC: READY_TO_START

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Received Identifier 1 - 192

Signal corresponding to the first configured string in Source batch-string.
Active Identifier String 1 signal is sent in the order the strings/identifiers are received by the system as soon as a string has been received. If running in forced order scan, it is in the configured order, but if running free order scan, 1 might not correspond to the first configured string, but to the first received string.
The strings is the raw received string and not have the "saved position" applied.
Only sent when running Source batch string.

Name in SoftPLC: RECEIVED_IDENTIFIER_1

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Received Identifier 2 - 193

Signal corresponding to the second configured string in Source batch-string.
Active Identifier String 2 signal is sent in the order the strings/identifiers are received by the system as soon as a string has been received. If running in forced order scan, it is in the configured order, but if running free order scan, 2 might not correspond to the second configured string, but to the second received string.
The strings is the raw received string and not have the "saved position" applied.
Only sent when running Source batch string.

Name in SoftPLC: RECEIVED_IDENTIFIER_2

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE

- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Received Identifier 3 - 194

Signal corresponding to the third configured string in Source batch-string.
Active Identifier String 3 signal is sent in the order the strings/identifiers are received by the system as soon as a string has been received. If running in forced order scan, it is in the configured order, but if running free order scan, 3 might not correspond to the third configured string, but to the third received string.
The strings is the raw received string and not have the "saved position" applied.
Only sent when running Source batch string.

Name in SoftPLC: RECEIVED_IDENTIFIER_3

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Received Identifier 4 - 195

Signal corresponding to the fourth configured string in Source batch-string.
Active Identifier String 4 signal is sent in the order the strings/identifiers are received by the system as soon as a string has been received. If running in forced order scan, it is in the configured order, but if running free order scan, 4 might not correspond to the fourth configured string, but to the fourth received string.
The strings is the raw received string and not have the "saved position" applied.
Only sent when running Source batch string.

Name in SoftPLC: RECEIVED_IDENTIFIER_4

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Rehit - 31014

Name in SoftPLC: FIELDBUS_TIGHTENING_REHIT

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Remaining Batch - 33

Remaining tightenings in a batch. Can only be viewed on a display.

Name in SoftPLC: REMAINING_BATCH

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Rundown Angle - 31038

Value of the rundown angle.

Name in SoftPLC: RUNDOWN_ANGLE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Integer	16	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Rundown Angle High - 165

This signal is active if the rundown angle on the program level is higher than the set one.

Name in SoftPLC: RUNDOWN_ANGLE_HIGH

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Rundown Angle Low - 166

This signal is active if the rundown angle on the program level is lower than the set one.

Name in SoftPLC: RUNDOWN_ANGLE_LOW

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Selected Sequence Bit 0 - 139

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_0

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 1 - 140

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_1

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 2 - 141

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_2

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 3 - 142

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_3

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 4 - 143

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_4

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 5 - 144

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_5

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 6 - 145

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_6

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 7 - 146

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_7

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 8 - 147

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_8

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Bit 9 - 163

Bit pattern showing selected sequence.

Name in SoftPLC: SELECTED_SEQUENCE_BIT_9

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Sequence Id - 84

Shows the index of the selected batch sequence.

Name in SoftPLC: SELECTED_BATCH_SEQUENCE_ID

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	1	16
TreatZeroAsOne	State	Integer	1	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE



To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Selected Tightening Program - 69

The actual id of a selected tightening program; 0 if no tightening program selected.

Name in SoftPLC: SELECTED_PSET_ID

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	1	16
TreatZeroAsOne	State	Integer	1	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Selected Tightening Program Bit 0 - 148

Bit pattern showing selected tightening program.

Name in SoftPLC: SELECTED_PROGRAM_BIT_0

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE

- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Tightening Program Bit 1 - 149

Bit pattern showing selected tightening program.

Name in SoftPLC: SELECTED_PROGRAM_BIT_1

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Tightening Program Bit 2 - 150

Bit pattern showing selected tightening program.

Name in SoftPLC: SELECTED_PROGRAM_BIT_2

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE

- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Tightening Program Bit 3 - 151

Bit pattern showing selected tightening program.

Name in SoftPLC: SELECTED_PROGRAM_BIT_3

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Tightening Program Bit 4 - 152

Bit pattern showing selected tightening program.

Name in SoftPLC: SELECTED_PROGRAM_BIT_4

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE

- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Tightening Program Bit 5 - 153

Bit pattern showing selected tightening program.

Name in SoftPLC: SELECTED_PROGRAM_BIT_5

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Tightening Program Bit 6 - 154

Bit pattern showing selected tightening program.

Name in SoftPLC: SELECTED_PROGRAM_BIT_6

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE

- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Tightening Program Bit 7 - 155

Bit pattern showing selected tightening program.

Name in SoftPLC: SELECTED_PROGRAM_BIT_7

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Tightening Program Bit 8 - 156

Bit pattern showing selected tightening program.

Name in SoftPLC: SELECTED_PROGRAM_BIT_8

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE

- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Selected Tightening Program Bit 9 - 157

Bit pattern showing selected tightening program.

Name in SoftPLC: SELECTED_PROGRAM_BIT_9

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: FALSE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: TRUE

Sequence Aborted - 160

Output signal indicating if sequence was aborted.

Name in SoftPLC: SEQUENCE_ABORTED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE

- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Service Indicator Alarm - 137

Service alarm configured in the Tool maintenance, provides a mechanism to remind the users when it is time to service the tool.

Name in SoftPLC: SERVICE_INDICATOR_ALARM

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Size of Sequence - 181

Shows the size of the currently running sequence. Only set when a sequence is loaded and not reset when sequence is done.

Name in SoftPLC: SIZE_OF_RUNNING_SEQUENCE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: TRUE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Socket Selector Disconnected Lock - 20039

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Software Major Version - 86

Name in SoftPLC: SOFTWARE_MAJOR_VERSION

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE

- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Software Minor Version - 87

Name in SoftPLC: SOFTWARE_MINOR_VERSION

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Software Release Version - 85

Version of the software running.

Name in SoftPLC: SOFTWARE_RELEASE_VERSION

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE

- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Start Final Angle - 31016

The Start Final Angle torque value is shown if available. It is sent when a result is available.

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	32	32
FixedPointToDecimal	State	Integer	32	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Station Ready - 71

Indicates when the Virtual Station is ready.

Name in SoftPLC: STATION_READY

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Thread Direction CCW - 26

Selected tightening program has counterclockwise chosen as thread direction.

Name in SoftPLC: THREAD_DIRECTION_CCW

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tightening Date - 31030

Tightening date in the format YYYY:MM:DD.

Name in SoftPLC: TIGHTENING_DATE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	String	80	80

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Tightening Date Day - 31032

Day of month when the tightening was performed.

Name in SoftPLC: TIGHTENING_DATE_DAY

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Integer	8	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Tightening Date Month - 31033

Month when the tightening was performed.

Name in SoftPLC: TIGHTENING_DATE_MONTH

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Integer	8	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Tightening Date Year - 31034

Year when the tightening was performed.

Name in SoftPLC: TIGHTENING_DATE_YEAR

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Integer	16	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Tightening Disabled - 182

Tightening Disabled is an output signal which is activated when the tightening is externally disabled by any of the following signals:

- 20002 - Lock Tightening
- 20004 - Lock Tool Active High
- 20033 - Line Control Lock
- 20018 - Open Protocol Lock
- 20020 - Fieldbus Lock Tightening
- 20040 - Soft PLC Lock Tightening
- 20061 - Lock Tool Active Low

Name in SoftPLC: TIGHTENING_DISABLED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tightening Done - 31010

Name in SoftPLC: TIGHTENING_DONE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE

- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Tightening Enabled - 183

Tightening Enabled is an output signal which is activated when the tightening is not externally disabled by any of the following signals:

- 20002 - Lock Tightening
- 20004 - Lock Tool Active High
- 20033 - Line Control Lock
- 20018 - Open Protocol Lock
- 20020 - Fieldbus Lock Tightening
- 20040 - Soft PLC Lock Tightening
- 20061 - Lock Tool Active Low

Name in SoftPLC: TIGHTENING_ENABLED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tightening is Locked - 27

The tightening is disabled; it is not possible to make any tightening.

Name in SoftPLC: TIGHTENING_IS_LOCKED

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Tightening NOK - 4

At least one result of the tightening is outside the specified limits.

Name in SoftPLC: TIGHTENING_NOK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tightening OK - 3

The result of the tightening is within the specified limits.

Name in SoftPLC: TIGHTENING_OK

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tightening Program Max Angle - 31004

Name in SoftPLC: MAX_ANGLE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	16	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Tightening Program Max Torque - 31007

Name in SoftPLC: MAX_TORQUE

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	32	32
FixedPointToDecimal	State	Integer	32	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Tightening Program Min Angle - 31005

Name in SoftPLC: MIN_ANGLE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	16	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE

- I/O Expander: FALSE

Tightening Program Min Torque - 31008

Name in SoftPLC: MIN_TORQUE

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Integer	32	32
FixedPointToDecimal	State	Integer	32	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Tightening Time - 31031

Tightening time in the format hh:mm:ss.

Name in SoftPLC: TIGHTENING_TIME

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	String	64	64

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE

- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Tightening Time High - 135

Indicates if NOK tightenings occurred due to execution time exceeding the maximum allowed.

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Tightening Time Hour - 31035

Hour when the tightening was performed.

Name in SoftPLC: TIGHTENING_TIME_HOUR

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Integer	8	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE

- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Tightening Time Low - 136

Indicates if NOK tightenings occurred due to execution time lowering the minimum allowed.

Tightening Time Low signal works only for Tightening Programs.

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Tightening Time Minute - 31037

Minute when the tightening was performed.

Name in SoftPLC: TIGHTENING_TIME_MINUTES

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Integer	8	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE

- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Tightening Time Second - 31036

Second when the tightening was performed.

Name in SoftPLC: TIGHTENING_TIME_SEC

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Integer	8	16

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Tool Battery Low - 90

Name in SoftPLC: TOOL_BATTERY_LOW

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE

- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tool Connected - 73

Indicates if a tool is connected or not to a Virtual Station.

Name in SoftPLC: TOOL_CONNECTED

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Tool Disabled - 158

Tool Disabled is an output signal which is activated when the tool is externally disabled by any of the following signals:

- 20002 - Lock Tightening
- 20003 - Lock Loosening
- 20004 - Lock Tool Active High
- 20033 - Line Control Lock
- 20018 - Open Protocol Lock
- 20020 - Fieldbus Lock Tightening

- 20021 - Fieldbus Lock Loosening
- 20040 - Soft PLC Lock Tightening
- 20041 - Soft PLC Lock Loosening
- 20061 - Lock Tool Active Low

Name in SoftPLC: TOOL_DISABLED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tool Enabled - 159

Tool Enabled is an output signal which is activated when the tool is not externally disabled by any of the following signals:

- 20002 - Lock Tightening
- 20003 - Lock Loosening
- 20004 - Lock Tool Active High
- 20033 - Line Control Lock
- 20018 - Open Protocol Lock
- 20020 - Fieldbus Lock Tightening
- 20021 - Fieldbus Lock Loosening
- 20040 - Soft PLC Lock Tightening
- 20041 - Soft PLC Lock Loosening
- 20061 - Lock Tool Active Low

Name in SoftPLC: TOOL_ENABLED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tool Function Button Pressed - 179

Output signal tracking the Function button state. The signal is set when the Function button is pressed and cleared when the Function button is released. Not for critical use in case of battery tools.

Name in SoftPLC: FUNCTION_BUTTON_PRESSED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Tool Health OK - 103

Tool Health OK is High when there is no tool error present, while Tool Health OK is Low when any of the following tool errors are set:

- Tool Overheated
- Tool Requires motor tuning
- Open End not tuned
- Tool parameter file not supported
- Tool battery empty
- Tool trigger supervision failure
- Tool cable not supported
- Tool memory failure
- Tool memory corrupt
- Tool service interval expired
- Tool software version mismatch

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE



To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Tool Loosening - 22

Indicates that the tool is loosening.

Name in SoftPLC: TOOL_LOOSENING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tool Rotation CCW - 25

Tool rotation direction is counterclockwise for left-handed threaded screws.

Name in SoftPLC: TOOL_ROTATION_CCW

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tool Rotation CW - 24

Tool rotation direction is clockwise for right-handed threaded screws.

Name in SoftPLC: TOOL_ROTATION_CW

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tool Running - 23

Indicates that the tool is rotating (clockwise [CW] or counter-clockwise [CCW]).

Name in SoftPLC: TOOL_RUNNING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tool Serial Number Numeric - 31021

Integer part of the serial number.

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	32	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Tool Tag Identifier - 94

Name in SoftPLC: TOOLTAG_IDENTIFIER

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Tool Tightening - 21

Indicates that the tool is tightening.

Name in SoftPLC: TOOL_TIGHTENING

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Total Number of Tightenings - 31018

Total number of the tightenings performed by the tool over its entire lifetime.

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Integer	8	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Trigger pressed - 11

Indicates that the tool trigger has been pressed.

Name in SoftPLC: TRIGGER_PRESSED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Virtual Station Name - 105

Provides the virtual station name.

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Input/Output Signals

Clear Results - 39

Clears status of other signals set to next tightening.

Name in SoftPLC: CLEAR_RESULTS

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Disable Open Protocol Commands - 10060

Disables the possibility to send commands over Open Protocol to the Virtual Station.

Name in SoftPLC: DISABLE_OPEN_PRTCOL_CMDS

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE



To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

External Identifier - 10045

The string sent in External identifier is included in the result as VIN number. It is possible to provide up to 2 identifiers to be passed from Fieldbus for task selection.

Name in SoftPLC: EXTERNAL_IDENTIFIER

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	String	8	800
IdentifierU32Hnw	State	String	8	800
IdentifierU32	State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

External Monitored 1 - 10035

External Monitored 1 is an Input/Output signal that is not attached to any specific feature in the controller and can be used for customer specific needs.

Name in SoftPLC: EXTERNAL_MONITORED_1

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

External Monitored 2 - 10036

External Monitored 2 is an Input/Output signal that is not attached to any specific feature in the controller and can be used for customer specific needs.

Name in SoftPLC: EXTERNAL_MONITORED_2

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

External Monitored 3 - 10037

External Monitored 3 is an Input/Output signal that is not attached to any specific feature in the controller and can be used for customer specific needs.

Name in SoftPLC: EXTERNAL_MONITORED_3

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

External Monitored 4 - 10038

External Monitored 4 is an Input/Output signal that is not attached to any specific feature in the controller and can be used for customer specific needs.

Name in SoftPLC: EXTERNAL_MONITORED_4

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

External Monitored 5 - 10039

External Monitored 5 is an Input/Output signal that is not attached to any specific feature in the controller and can be used for customer specific needs.

Name in SoftPLC: EXTERNAL_MONITORED_5

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

External Monitored 6 - 10040

External Monitored 6 is an Input/Output signal that is not attached to any specific feature in the controller and can be used for customer specific needs.

Name in SoftPLC: EXTERNAL_MONITORED_6

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.
Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

External Monitored 7 - 10041

External Monitored 7 is an Input/Output signal that is not attached to any specific feature in the controller and can be used for customer specific needs.

Name in SoftPLC: EXTERNAL_MONITORED_7

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

External Monitored 8 - 10042

External Monitored 8 is an Input/Output signal that is not attached to any specific feature in the controller and can be used for customer specific needs.

Name in SoftPLC: EXTERNAL_MONITORED_8

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	Boolean	1	1
Invert	State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Fieldbus Keep Alive - 30002

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Flash Tool Green Led (external protocol) - 10058

Name in SoftPLC: FLASH_TOOL_GREEN_LED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Generic IO 1 - 50

Input/Output 1 used for Open Protocol.

Name in SoftPLC: GENERIC_IO_1

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Generic IO 10 - 59

Input/Output 10 used for Open Protocol.

Name in SoftPLC: GENERIC_IO_10

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Generic IO 2 - 51

Input/Output 2 used for Open Protocol.

Name in SoftPLC: GENERIC_IO_2

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Generic IO 3 - 52

Input/Output 3 used for Open Protocol.

Name in SoftPLC: GENERIC_IO_3

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Generic IO 4 - 53

Input/Output 4 used for Open Protocol.

Name in SoftPLC: GENERIC_IO_4

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Generic IO 5 - 54

Input/Output 5 used for Open Protocol.

Name in SoftPLC: GENERIC_IO_5

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Generic IO 6 - 55

Input/Output 6 used for Open Protocol.

Name in SoftPLC: GENERIC_IO_6

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Generic IO 7 - 56

Input/Output 7 used for Open Protocol.

Name in SoftPLC: GENERIC_IO_7

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Generic IO 8 - 57

Input/Output 8 used for Open Protocol.

Name in SoftPLC: GENERIC_IO_8

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Generic IO 9 - 58

Input/Output 9 used for Open Protocol.

Name in SoftPLC: GENERIC_IO_9

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	8

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: TRUE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Generic Rising Edge 1 - 169

Generic Input/Output signal.

Name in SoftPLC: GENERIC_RISING_EDGE_1

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Generic Rising Edge 10 - 178

Generic Input/Output signal.

Name in SoftPLC: GENERIC_RISING_EDGE_10

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Generic Rising Edge 2 - 170

Generic Input/Output signal.

Name in SoftPLC: GENERIC_RISING_EDGE_2

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Generic Rising Edge 3 - 171

Generic Input/Output signal.

Name in SoftPLC: GENERIC_RISING_EDGE_3

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Generic Rising Edge 4 - 172

Generic Input/Output signal.

Name in SoftPLC: GENERIC_RISING_EDGE_4

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Generic Rising Edge 5 - 173

Generic Input/Output signal.

Name in SoftPLC: GENERIC_RISING_EDGE_5

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Generic Rising Edge 6 - 174

Generic Input/Output signal.

Name in SoftPLC: GENERIC_RISING_EDGE_6

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Generic Rising Edge 7 - 175

Generic Input/Output signal.

Name in SoftPLC: GENERIC_RISING_EDGE_7

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Generic Rising Edge 8 - 176

Generic Input/Output signal.

Name in SoftPLC: GENERIC_RISING_EDGE_8

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Generic Rising Edge 9 - 177

Generic Input/Output signal.

Name in SoftPLC: GENERIC_RISING_EDGE_9

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Event	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: FALSE
- I/O Expander: TRUE

Socket Lifted - 10014

Is generated when a unique socket is lifted on socket selector (integer = socket ID), no socket is lifted (integer = 0) or when more than one is lifted (integer = 0).

Name in SoftPLC: SOCKET_LIFTED

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Integer	1	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Socket Lifted Raw - 10043

Added to support backwards compatibility with PF4000 in certain protocols for socket lifted notifications (as opposed to Socket Lifted 10013). Integer is bit pattern for all lifted sockets (regardless of flashing or how many is lifted).

Name in SoftPLC: SOCKET_LIFTED_RAW

Converter	Signal Type	Value Type	Size Min [bit]	Size Max [bit]
Standard	State	uint64	1	32
SocketSelectorTwoDevices	State	uint64	1	32

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE

- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

To avoid duplicating signals, it is possible to define **Value Converters**.

Converters are used to support more than one representation of the same signal (for example Angle/Torque Status can both be represented bitwise or as a status character).

Tool in Production Space - 93

Name in SoftPLC: TOOL_IN_PRODUCT_SPACE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE
- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

Tool in Work Space - 92

Name in SoftPLC: TOOL_IN_WORK_SPACE

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	Boolean	1	1

Devices

- Fieldbus: TRUE
- Indicator Box: TRUE
- Internal I/O: TRUE
- Operator Panel: TRUE
- Tool Functions: TRUE

- ST Selector: FALSE
- Stacklight: TRUE
- TLS Tag: TRUE
- I/O Expander: TRUE

User ID - 10050

Name in SoftPLC: USER_ID

Signal Type	Value Type	Size Min [bit]	Size Max [bit]
State	String	8	800

Devices

- Fieldbus: TRUE
- Indicator Box: FALSE
- Internal I/O: FALSE
- Operator Panel: FALSE
- Tool Functions: FALSE
- ST Selector: FALSE
- Stacklight: FALSE
- TLS Tag: FALSE
- I/O Expander: FALSE

Third Party Licenses

List of Third-Party Licenses

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Software	Version	Licenses
acl	2.2.52	• GPL v2.0 • LGPL v2.1
alsa-lib	1.1.2	• GPL v2.0 • LGPL v2.1
alsa-state	0.2.0	• MIT
alsa-tools	1.1.0	• GPL v2.0 • LGPL v2.0

Software	Version	Licenses
alsa-utils	1.1.2	• GPL v2.0
anybus	1.1	• Proprietary
atftp	0.7.1 + gitAUTOINC + be3291a18c	• GPL v2.0
attr	2.4.47	• GPL v2.0 • LGPL v2.1
barebox	2018.06.0	• GPL v2.0
base-files	3.0.14	• GPL v2.0
base-files-px2-base	1.0	• MIT
base-passwd	3.5.29	• GPL v2.0
bash	4.3.30	• GPL v3.0
bash-completion	2.4	• GPL v2.0
bluez5	5.41	• GPL v2.0 • LGPL v2.1
boost	1.61.0	• MIT • BSL v1.0 • Python v2.0
busybox-px2base	1.24.1	• GPL v2.0 • bzip v2.0
bzip2	1.0.6	• bzip v2.0
ca-certificates	20160104	• GPL v2.0 • MPL v2.0
cppunit	1.13.1	• LGPL v2.1
cryptodev-linux	1.8	• GPL v2.0
curl	7.50.1	• MIT
db	3.0.35	• AGPL v3.0
dbus	1.10.10	• GPL v2.0 • AFL v2.0
dhcp	4.3.4	• ISC
dosfstools	4.0	• GPL v3.0
dt-utils	2017.03.0	• GPL v2.0

Software	Version	Licenses
e2fsprogs	1.43	• GPL v2.0 • LGPL v2.0 • BSD • MIT
ecryptfs-tools	1.0	• GPL v1.0
elfutils	0.166	• GPL v3.0 • Elfutils-Exception
eudev	3.2.2	• GPL v2.0 • LGPL v2.1
expat	2.2.0	• MIT
fbset	2.1	• GPL v2.0
fb-test	1.1.0	• GPL v2.0
fcgi	2.4.0	• OML
finit	3.1	• MIT
firmware-imx	5.4	• Proprietary
flac	1.3.1	• GPL v2.0 • LGPL v2.1 • BSD • GFDL v1.2
flatbuffers	1.9.0	• Apache v2.0
fruit	3.4.0 + gitAUTOINC + ece0f7218c	• Apache v2.0
fuse	2.9.4	• GPL v2.0 • LGPL v2.0
gcc-runtime	6.2.0	• GPL v3.0 with GCC exception
gdb	8.0.1	• GPL v2.0 • LGPL v2.0 • GPL v3.0 • LGPL v3.0
gdbm	1.12	• GPL v3.0
glib-2.0	2.48.2	• LGPL v2.0 • BSD • Public Domain License

Software	Version	Licenses
glibc	2.24	• GPL v2.0 • LGPL v2.1
gmp	6.1.1	• GPL v2.0 • LGPL v3.0
gnutls	3.5.3	• GPL v3.0 • LGPL v2.1
grep	2.25	• GPL v3.0
gstreamer1.0	1.8.3	• LGPL v2.0
gstreamer1.0-plugins-base	1.8.3	• GPL v2.0 • LGPL v2.0
hostpad	2.6	• GPL v2.0 • BSD
htop	1.0.3	• GPL v2.0
icu	57.1	• ICU
init-ifupdown	1.0	• GPL v2.0
initscripts	1.0	• GPL v2.0
iproute2	4.7.0	• GPL v2.0
iptables	1.6.0	• GPL v2.0
ipwatchd	1.2	• GPL v2.0
iw	4.7	• BSD
json-spirit	4.08	• MIT
keyutils	1.5.9	• GPL v2.0
kmod	23 + gitAUTOINC + 65a885df5f	• GPL v2.0 • LGPL v2.1
kmsfbwrap-px2base	12.0	• GPL v2.0
libarchive	3.2.2	• BSD
libbsd	0.8.3	• BSD v4 Clause • ISC • Public Domain License
libcap	2.25	• GPL v2.0 • BSD
libdrm	2.4.70	• MIT

Software	Version	Licenses
libestr	0.1.10	• LGPL v2.1
libevent	2.0.22	• BSD
libfastjson	0.99.4	• MIT
libffi	3.2.1	• MIT
libgcc	6.2.0	• GPL v3.0 with GCC exception • GPL v3.0
libgcrypt	1.7.3	• GPL v2.0 • LGPL v2.1 • GPL v3.0
libgpg-error	1.24	• GPL v2.0 • LGPL v2.1
libidn	1.33	• LGPL v3.0 • LGPL v2.1 • GPL v3.0
libite	2.0.2	• BSD • ISC • MIT
libjpeg-turbo	1.5.0	• BSD v3 Clause
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libogg	1.3.2	• BSD
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libpng	1.6.24	• Libpng
librcf	2.2.0.0	• GPL v2.0
libsamplerate0	0.1.8	• GPL v2.0
libsndfile1	1.0.27	• LGPL v2.1
libtinyxml	2.6.2	• Zlib
libtirpc	1.0.1	• BSD
libuev	2.2.0	• MIT

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libusb1	1.0.20	• LGPL v2.1
libvorbis	1.3.5	• BSD
libxml2	2.9.4	• MIT
libxslt	1.1.29	• MIT
lighttpd	1.4.51	• BSD
linux-atlas	4.14	• GPL v2.0
linux-libc-headers	4.14.13	• GPL v2.0
logrotate	3.9.1	• GPL v2.0
lua	5.1.5	• MIT
luabind	git	• MIT
lzo	2.09	• GPL v2.0
lzop	1.03	• GPL v2.0
memlog	2.0	• MIT
mesa	12.0.1	• MIT
mg	20161005	• Public Domain License
minizip	1.2.8	• Zlib
mmc-utils	0.1	• GPL v2.0
mtd-utils	1.5.2	• GPL v2.0
nano	2.2.5	• GPL v3.0
ncurses	6.0 + 20160625	• MIT
netbase	5.3	• GPL v2.0
netcat-openbsd	1.105	• BSD v3 Clause
nettle	3.2	• GPL v2.0 • LGPL v3.0
nfs-utils	2.1.1	• GPL v2.0 • BSD • MIT
ntp	4.2.8p8	• NTP
openssh	7.6p1	• BSD
openssl	1.0.2n	• openSSL
opkg	0.3.3	• GPL v2.0
opkg-arch-config	1.0	• MIT

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opkg-utils	0.3.2 + gitAUTOINC + 3ffece9bf1	• GPL v2.0
orc	0.4.25	• BSD v3 Clause • BSD v2 Clause
os-release	1.0	• MIT
packagegroup-atlas-qt5	1.0	• MIT
packagegroup-atlas-sxb	1.0	• MIT
packagegroup-base	1.0	• MIT
packagegroup-core-boot	1.0	• MIT
packagegroup-core-eclipse-debug	1.0	• MIT
packagegroup-core-nfs	1.0	• MIT
packagegroup-core-ssh-openssh	1.0	• MIT
packagegroup-px2it	1.0	• MIT
parted	3.2	• GPL v3.0
perl	5.22.1	• GPL v1.0 • Artistic v1.0
pm-utils	1.4.1	• GPL v2.0
poco	1.9.0	• BSL v1.0
pointercal	0.0	• MIT
popt	1.16	• MIT
procps	3.3.12	• GPL v2.0 • LGPL v2.0
protobuf	2.6.1 + gitAUTOINC + bba83652e1	• BSD v3 Clause
python	2.7.12	• Python v2.0
qtbase	5.7.1 + gitAUTOINC + a55f36211e	• BSD • GPL v2.0 • GPL v3.0 • GFDL v1.3 • LGPL v3.0 • The Qt Company Commercial • The Qt Company LGPL Exception v1.0

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qtdeclarative	5.7.1 + gitAUTOINC + 2a992040e2	• BSD • GPL v2.0 • GPL v3.0 • GFDL v1.3 • LGPL v3.0 • The Qt Company Commercial • The Qt Company LGPL Exception v1.0
qtlocation	5.7.1 + gitAUTOINC + de5be121d8	• BSD • GPL v2.0 • LGPL v2.1 • GFDL v1.3 • LGPL v3.0 • The Qt Company LGPL Exception v1.1
qtsensors	5.7.1 + gitAUTOINC + 5a57beaaa5	• BSD • GPL v2.0 • GPL v3.0 • GFDL v1.3 • LGPL v3.0 • The Qt Company Commercial • The Qt Company LGPL Exception v1.0
qtwebkit	5.7.1 + gitAUTOINC + 76e2732f01	• BSD • GPL v2.0 • LGPL v2.0
qtwebsockets	5.7.1 + gitAUTOINC + 60cede232a	• GFDL v1.3 • LGPL v2.1 • LGPL v3.0 • The Qt Company LGPL Exception v1.1
qtxmlpatterns	5.7.1 + gitAUTOINC + 89dbcc4f80	• BSD • GPL v2.0 • GPL v3.0 • GFDL v1.3 • LGPL v3.0 • The Qt Company Commercial • The Qt Company LGPL Exception v1.0
rauc	0.4	• LGPL v2.1

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readline	6.3	• GPL v3.0
rpcbind	0.2.3	• BSD
rsync	3.1.2	• GPL v3.0
rsyslog	8.22.0	• Apache v2.0 • GPL v3.0 • LGPL v3.0
run-postinsts	1.0	• MIT
shadow	4.2.1	• BSD • Artistic v1.0
shadow-security	4.2.1	• MIT
sqlite3	3.14.1	• Public Domain License
squashfs-tools	5.7.1 + gitrAUTOINC + 9c1db6d13a	• Public Domain License • GPL v2.0
st-load	1.0	• Public Domain License
stm32flash	git	• GPL v2.0
strace	4.13	• BSD
sysfsutils	2.1.0	• GPL v2.0 • LGPL v2.1
sysvinit-bootlogd	2.88dsf	• GPL v2.0
tcf-agent	1.4.0 + gitAUTOINC + 2dddd5f440	• EDL v1.0 • EPL v1.0
tcpdump	4.7.4	• BSD
tcp-wrappers	7.6	• BSD
tslib	1.1	• LGPL v2.0
tzdata	2016i	• BSD • BSD v3 Clause • Public Domain License
u-boot-atlas	2017.09	• GPL v2.0
u-boot-fw-utils	2017.09	• GPL v2.0
unzip	6.0	• BSD v3 Clause
usbutils	008	• GPL v2.0

Software	Version	Licenses
util-linux	2.28.1	• BSD • GPL v2.0 • LGPL v2.1
wireless-tools	30.pre9	• BSD • GPL v2.0 • LGPL v2.1 • MPL v1.1
wpa-supplicant	2.5	• BSD
xerces-c	2.7.0	• Apache v2.0
xz	5.2.2	• GPL v2.0 • LGPL v2.1 • GPL v3.0 with autoconf exception • Public Domain License
yaml-cpp	0.6.2	• MIT
zip	3.0	• BSD v3 Clause
zlib	1.2.8	• Zlib

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