ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Pilz PSS 3056-1* at our website: ***Click HERE***

Programmable Safety Systems
PSS-Range

PSS 3056 Series
Installation Manual
Item No. 19 025



The spirit of safety.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

All rights to this manual are reserved by Pilz GmbH & Co. KG. Copies may be made for internal purposes.

In the interests of continual technical advancement we reserve the right to amend specifications without prior notice. No responsibility accepted for errors or omissions.

The names of products, goods and technologies used in this manual are trademarks of the companies concerned.

VII, 01/00

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Contents

Introduction 1-1
Definition of symbols 1-1

Safety Regulations 2-1
Supplying power to the PSS 2-1
Supplying the I/Os 2-3
Installation 2-4
Connections 2-5

Electromagnetic Compatibility (EMC) 3-1
Overview 3-1
Making the installation EMC-compatible 3-2
Connecting the earth cables 3-2
Cabling 3-3
Equipotential bonding 3-4
Screened cables 3-4
Suppression of inductive loads 3-5
Insulation voltage test 3-5
Miscellaneous 3-6
Installing within an enclosure or wall-mounting 3-6
Testing the EMC-compatibility of an installation 3-7

Installation 4-1
Installing the system 4-1
Installing the system in a control cabinet 4-2

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Contents

Connecting the Inputs and Outputs 5-1
Configuration of the screw terminals and connector description 5-1
Notes on wiring 5-5
On-board digital inputs 5-6
Configuration of the standard PSS 3056 5-7
Example: Single-channel, failsafe input device, unchecked 5-8
Example: Dual-channel input devices, unchecked 5-10
Example: Single-channel, failsafe input device, with test pulse 5-12
Example: Dual-channel, failsafe input device, with test pulse 5-14
On-board single-pole 2 A outputs/test pulses 5-16
Configuration of the standard PSS 3056 5-17
On-board dual-pole 2 A outputs 5-18
Configuration of the standard PSS 3056 5-19

Interfaces 6-1
PG programming interface 6-1
RS 232 user interface 6-1
PSS SB 3056: SafetyBUS p interface 6-2

Appendix 7-1
Changes to the Installation Manual 7-1

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Introduction

This installation manual contains all the information you need to install a PSS system from the PSS 3056 series. It gives safety guidelines which should be followed during installation and also describes the installation procedure and measures which can be taken to ensure EMC compliance. Examples are also given to show how the on-board inputs and outputs should be connected.

This installation manual is valid for the standard PSS 3056, as well as the PSS 3056-1, PSS 3056-2 and PSS SB 3056. If you are using the PSS SB 3056 you should also refer to the “SafetyBUS p Installation Manual”.
As the individual units differ only in the number and configuration of the different on-board I/Os and available interfaces, examples shown relate to the standard PSS 3056 unit. They can be used on all versions of the PSS 3056, unless stated otherwise.

Throughout this manual, the term “safety system” or simply “PSS” will be used to refer to programmable safety systems in the PSS 3056 series.

Definition of symbols

Information in this manual which is of particular importance can be identified as follows:



DANGER!

This warning must be heeded! It warns of a **hazardous situation which poses an immediate threat of serious injury and death**, and indicates preventive measures which can be taken.



WARNING!

This warning must be heeded! It warns of a **hazardous situation which could lead to serious injury and death**, and indicates preventive measures which can be taken.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Introduction



CAUTION!

This refers to a hazard which can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures which can be taken.



NOTICE

This describes a situation in which the unit(s) could be damaged and also provides information on preventive measures which can be taken.



INFORMATION

This gives advice on applications and provides information on special features, as well as highlighting areas within the text which are of particular importance.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Safety Regulations

To ensure that the safety system functions correctly, please follow the safety guidelines given below:

- Electrical connections should be made by a qualified electrical engineer who is familiar with the information in this manual as well as the relevant regulations concerning health and safety at work.
- Ensure VDE and local regulations are met, especially those relating to safety. The relevant safety regulations for the respective application must also be met.



- **CAUTION!**
  Electrostatic discharge can damage components on the PSS. Ensure against discharge before touching the terminal strips, e.g. by touching an earthed, conductive surface or by wearing an earthed armband.
- Ensure all the requirements of the relevant trade associations are met.
- Ensure the wiring instructions in Chapter 5 are followed.
- The internal power supply on the safety system must not be connected to any other devices.
- If the system is altered in any way, such as exchanging a component or carrying out soldering work, the guarantee, and any approval, will be rendered invalid.
- The date of manufacture can be found on the test label.

Supplying power to the PSS

- The safety system requires a 24 VDC supply.
  Check that the voltage supplied from the external power supply corresponds.



- **CAUTION!**
  The tolerance on the supply voltage for the system's power supply is +10 % or -15 % maximum. Safe operation cannot be guaranteed outside this range.
- Overvoltage and spikes of interference can damage the PSS power supply. If this occurs the unit will switch to a safe condition. Please refer to the relevant EMC-measures described in Chapter 3.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Safety Regulations

- To achieve the lowest possible residual ripple (< ± 1.2 V), we recommend that you install a three-phase bridge rectifier or regulated supply.
- The external 24 V power supply must be capable of supplying a minimum of 8 A for approximately 1 s.
- The fuse between the external and the PSS power supply protects the cabling. The size of the fuse will depend on the cable cross section and on local regulations.



- **WARNING!**
  Safe electrical isolation must be ensured for the external 24 V supply. Failure to do so could result in electric shock. Power supplies must conform to DIN VDE 0551 / EN 60 742 and DIN VDE 0160.
- The external 24 V supply should be connected to the PSS power supply as shown in the diagram below. The external supply should be earthed in accordance with local regulations.
  If the external supply is also being used to supply the I/Os, the 0 V output should be earthed as shown in the section entitled “Supplying the input/ outputs”.

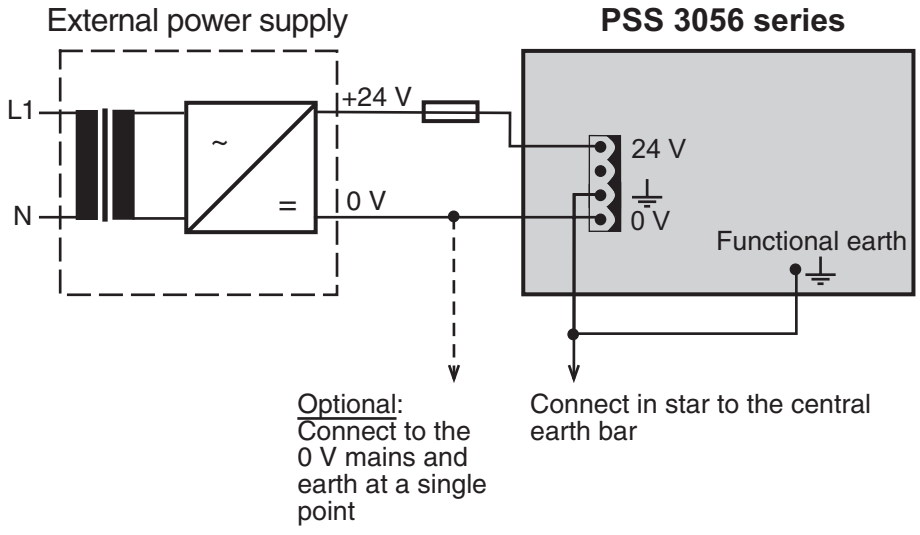


Fig. 2-1: Supplying the system

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Supplying the I/Os

- The digital inputs and outputs require a 24 V supply (see connection diagrams in Chapter 5). Check that the voltage supplied from the external power supply corresponds
- We recommend that the PSS and the I/Os are fed through two separate power supplies. This will mean that any breaks in the supply to the I/Os can be kept away from the CPU.
- The external 24 V power supply must be capable of supplying a maximum current which is calculated from the sum of all the inputs multiplied by 10 mA, plus the total current from the maximum number of outputs that can be driven simultaneously.



- **CAUTION!**
  The tolerance on the supply voltage for the PSS power supply is + 20 % or -15 % maximum. Safe operation cannot be guaranteed outside this range.
- To achieve the lowest possible residual ripple (< ± 1.2 V), we recommend that you install a three-phase bridge rectifier or regulated supply.
- The fuse between the external power supply and the supply terminals on the outputs protects the cabling. The size of the fuse will depend on the cable cross section and on local regulations.



- **WARNING!**
  Safe electrical isolation must be ensured for the external 24 V supply. Failure to do so could result in electric shock. Power supplies must conform to DIN VDE 0551 / EN 60 742 and DIN VDE 0160.
- The external power supply should be connected to the supply terminals on the I/Os as shown overleaf.
  There must be no direct connection between “N” and the 0 V output on the external power supply.
  The 0 V connections on all the 24 V power supplies should be connected and the 0 V mains earthed at a single point. The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with the relevant national regulations (such as EN 60 204, VDE 0113, NFPA 79-1991:17-7, NEC: Article 250, for example).

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Safety Regulations

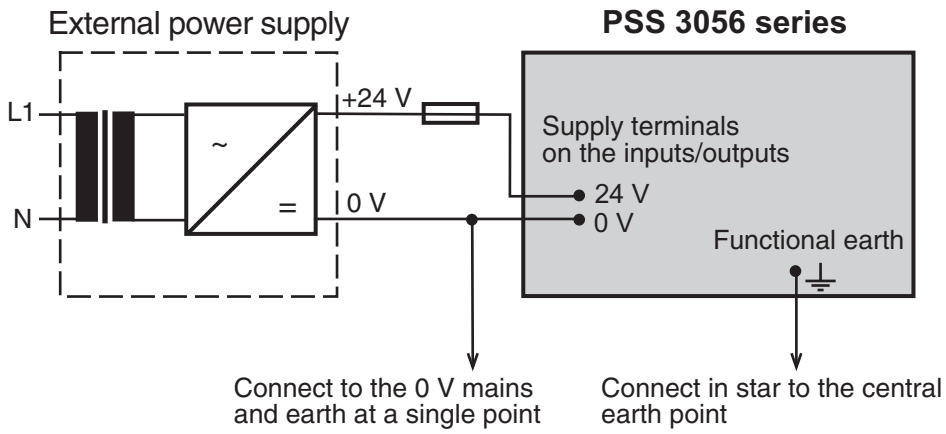


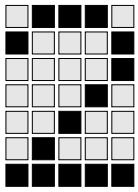
Fig. 2-2: Connecting the power supply to the I/Os

Installation

- The system should be installed in an enclosure (e.g. control cabinet) which conforms to the protection class required.
- When installing the unit in an enclosure such as a control cabinet, the technical specifications below must be taken into account:

Protection type (EN 60 529, 10/91)	IP 20
Protection class (DIN VDE 0106, Part 1/A1, 04/90)	1
Mounting position	Vertical
Ambient temperature (DIN IEC 68-2-14, 06/87)	0 ... 60 °C
Storage temperature (EN 60 068-2-1/-2, 03/93)	-25 ... +70 °C
Relative humidity (DIN IEC 68-2-30, 09/86)	Max. 95 % r.h.
Condensation	Not permitted
Vibration (EN 60 068-2-6, 04/95)	Frequency range: 10 ... 100 Hz Amplitude: 0.1 mm, max. 5g
Shock (DIN IEC 68-2-29)	30g, 11 ms/10g, 16 ms
EMC	EN 50 082-2, 03/95 EN 55 011 A, 08/96

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

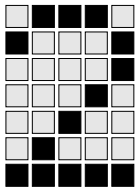


- Ensure there is sufficient ventilation to prevent heat building up within the control cabinet.
- In extreme ambient conditions, additional measures may be required in order to keep within the prescribed value range (e.g. air-conditioning within the control cabinet).
- The safety system must be installed in such a way that buttons and switches cannot be operated unintentionally.

Connections

- Cable layout must meet the EMC-guidelines stated in Chapter 3.
- Each supply terminal should have its own power supply cable as shown in the connection diagrams (do not make through-connections).
- All supply terminals must be supplied with the voltages they require, otherwise it will not be possible to carry out the module test (error message will be generated).
- The current at each slot connector should be 10 A maximum.
- Screened cables are not required for digital I/Os.
- Minimum ranges for cable cross sections on field connection terminals in mm^2, in accordance with EN 61 131-2, 08/94:
  - Digital inputs: 0.5 (AWG20) ... 1.5 (AWG16)
  - Digital outputs: 0.5 (AWG20) ... 2.0 (AWG14)
  - Power supply: 1.5 (AWG16) ... 2.5 (AWG12)
  - Earth: 1.5 (AWG16) ... 2.5 (AWG12)
- Use copper wiring.
- The torque setting on the connection terminals should be 0.5 ... 0.6 Nm.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com



Notes

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Electromagnetic Compatibility (EMC)

Overview

The safety system is designed to be installed within an electromagnetic industrial environment. To ensure electromagnetic compatibility the correct procedures must be carried out when installing the system.

A device is electromagnetically compatible if:

- It functions without error in a given electromagnetic environment.
- It does not adversely affect its own environment.

Electromagnetic interference reaches the system through:

- Radiated fields
- Power supply
- Earth cabling
- Bus
- Interfaces
- Input and output cables

The interference can be transferred from the source to the receiver (interference sink) via the coupling routes.

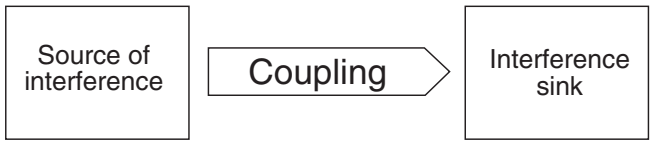


Fig. 3-1: Electromagnetic interference

Interference reaches the interference sink (e.g. the PSS 3056) in various ways:

- DC coupling
  This occurs if the source and sink of interference have common cable connections. The common cable presents complex resistances, inducing potential differences. Possible sources of interference are switches/ relays, running motors or varying potentials for other systems on the same power supply.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

- Capacitive (electrical) coupling
  A different potential between the source and interference sink (e.g. two cables) creates an electrical field. Cross-coupling is proportional to the rate of voltage change.
  Possible sources of interference are contactors, static discharge, parallel signal cables.
- Inductive (magnetic) coupling
  A live cable produces a magnetic field which surrounds both the live and neighbouring cables. Interference voltage is induced. Cross-coupling is proportional to the rate of current change.
  Possible sources of interference are mains cables running in parallel, live cables, high frequency cables, inductors, transformers, motors.
- Electromagnetic coupling
  A cable can emit a signal as a radio wave. This wave is then picked up by another cable.
  Possible sources of interference are transmitters such as radios, sparks from spark plugs, welding equipment etc.



NOTICE

Stronger HF transmitters should only be operated at a distance of more than 0.6 m.

- Static discharge
  Static discharge occurs where there are very high differences in potential between two points. If the two points are brought closer together or if the potential difference is increased, discharges can occur in the air gaps.
  Possible sources of interference are people who are statically charged from a synthetic carpet, for example.

Making the installation EMC-compatible

Connecting the earth cables

PSS safety systems all meet protection class 1 (DIN VDE 0106, Part 1/A1, 04/90). The prescribed earth points are designed for your safety and to guarantee compliance with noise resistance requirements.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

- The housing should be connected to the earth conductor “PE”. A cable cross section of at least 2.5 mm^2 should be used. Connections should be kept as short as possible.
- Always connect the earth conductor “PE” to the central earth point in star form.
- The 0 V connections on all the 24 V power supplies should be connected and the 0 V mains earthed at a single point. The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with the relevant national regulations (such as EN 60 204, VDE 0113, NFPA 79-1991:17-7, NEC: Article 250, for example).
- Connections should be protected from corrosion.
- Flexible earthing straps should be used on moving earth parts (e.g. machine parts, gates). Ensure these earthing straps are as short and wide as possible.

Cabling

It is possible to differentiate between cables according to their function. The following groups exist:

- Group 1: Data and supply lines for DC voltages below 60 V and AC voltages below 25 V
- Group 2: Data and supply lines for DC voltages from 60 V to 400 V and AC voltages from 25 V to 400 V
- Group 3: Supply lines above 400 V

Cabling inside buildings:

- The cable groups listed above should be laid separately.
- Cables of the same group can be laid within the same cable duct.
- Lines from group 1 and group 2 should be laid in separate groups or in cable ducts which are at least 10 cm apart.
- Lines from group 1 and group 3 should be laid in separate groups or in cable ducts which are at least 50 cm apart.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

- Data and signal lines should be laid as close as possible to an earthed surface.

Cabling to open air systems:

- As far as possible use metal conduits. These should be electrically connected and earthed.
- Ensure there is sufficient protection against lightning by:
  - Using metal conduits earthed at both ends, or concrete cable ducts with reinforcements connected across the joints.

Equipotential bonding

Potential differences can occur through potential connected couplings between the safety system and peripheral devices or cable shields, which are connected at either end and have different earth connections. In order to avoid interference, equipotential bonding cables must be installed. In doing so, you must ensure the following:

- Select a low impedance equipotential bonding cable.
- If the safety system and peripheral devices are connected with screened signal cables which are earthed at either end, the impedance is calculated as follows:

  Impedance equipotential bonding cable = 10% of screen impedance.
- Select the following as standard values for the cross section of the equipotential bonding cable:
  16 mm^2 for equipotential bonding cables up to 200 m in length.
  25 mm^2 for equipotential bonding cables over 200 m in length.
- Use copper or galvanised steel equipotential bonding cable.
- Connect equipotential bonding cables to the earth conductor over as wide a surface area as possible.
- As short a distance as possible should be kept between the equipotential bonding cable and signal cable.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Screened cables

Interference currents arising from electrical, magnetic or electromagnetic fields of interference must be diverted to cable screens via the earth bars connected to the enclosure. Please remember the following:

- Connect the screens with low impedence to the earth conductor.
- Use cables with braided screening, with a minimum cover area of 80%.
- For high frequency areas connect the screen at both ends.
- For low frequency areas connect the screen at one end; this is also valid when laying cables without equipotential bonding or using foil screens.
- Use metal or metallised plugs to connect cables for serial data transfer.
- The screen must have no connection to the connector housing if it is not located at the end of the cable.
- At the point where the cable enters the cabinet, connect the screen to the earth bar, without making a break in the cable. Use metal cable clamps which cover the screen over a wide surface area.
  Take the screen as far as the module, but do not lay it on top of the module

Suppression of inductive loads

Suppression should not be used to protect the semiconductor outputs.

Insulation voltage test

The PSS systems from the PSS 3056 series are connected to the functional earth through protective elements on the supply voltage. Insulation voltage tests can only be carried out with voltages up to approximately 42 V.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Electromagnetic Compatibility (EMC)

Miscellaneous

Connecting the programming device

The programming device requires a mains connection in each cabinet. The mains connection must be connected to the same distributor as the earth conductor for the cabinet.

Lighting inside the cabinet

Use low interference panel lighting for inside the control cabinet.



NOTICE
Fluorescent lamps should be avoided as they create interference fields. However, if it is absolutely necessary to use fluorescent lamps, the guidelines listed below should be followed:

- Place shield screening over the lamp.
- Used screened cable.
- Install a metal-sheathed switch.
- Use a mains filter or screened power supply cable.

Installing within an enclosure or wall-mounting

Care must be taken to avoid interference when installing the unit within an enclosure or wall-mounting:

- Shielding, earth conductor bars and the base module rack should be attached to metal parts in order to divert any coupled interference on to large metal areas. For wall-mounting we recommend that the overall potential surfaces are made of steel.
- For varnished or anodised metal parts you should use special contact plates or remove the protective coating.
- Install an earth bar for the cable screens.
- The earth bar can also be used as the ground conductor bar.
- Connect the earth bar to the mounting plate over a wide surface area and with low impedance.

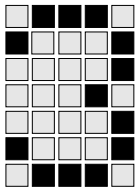
Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Testing the EMC-compatibility of an installation

Use the following list to check that the safety system has been installed to conform with EMC-regulations.

Check	Action	Done
Before installation:		
Are there areas with a high probability of interference? (e.g. computers running, process control areas, distribution cabinets, cable casing, frequency converters, hand-held radios etc.)	Make detailed plans for EMC protection in these areas.	
Are areas where computers are running and areas such as process control rooms sufficiently shielded from electromagnetic coupling?	If necessary shield the whole area.	
Have you, or the installer, sufficient knowledge where cable layout is concerned?	Some important points: Lay cables close to earth, keep clear of other electrical equipment, keep cables in ducts separate from other parts of the installation, keep cables as short as possible.	
Is the supply voltage free of interference?	Build in a mains filter where interference may occur.	
EMC characteristics of individual units / all units once installed?	Test under operating conditions, e.g. while hand-held radios are in use, or HF frequency generators are close by. Test static discharge with operating personnel, test mutual interference between units under different operating conditions.	

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com



Check	Action	Done
During installation:		
Earthed parts connected correctly?	Most important are the connections to base module racks, racking bars, earth conductors and earth bars. Inactive metal parts should be connected over a wide surface area and earthed to a central point. With insulated metal: Remove insulation or use special contact fixings. Protect the connection from corrosion. Connect the cabinet doors to the body of the cabinet using earthing straps.	
Are the cables laid correctly?	Separate cables into groups. Supply and signal leads must be laid separately.	
Are the shields connected correctly?	Use shielded cables for analogue and data leads. Use metallic plugs. Connect cable shields to earth bar at point of entry to cabinet. Connect cable shields over a wide surface area and with low impedance.	
Equipotential bonding carried out?	Equipotential bonding cables should be laid if the installation extends over a wide area.	
Are inductive loads switched?	Inductive loads not switched by the PSS 3056 must be wired with suppression elements.	
24 VDC power supply?	The power supply must conform to DIN VDE 0551 / EN 60 742 and DIN VDE 0160.	

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Installing the system

Drill 4 x M5 or M6 holes in the mounting plate of the control cabinet as shown in Fig. 4-1 (tolerance: +/-0.3 mm/0.012"). Screw the PSS to the mounting plate using washers.

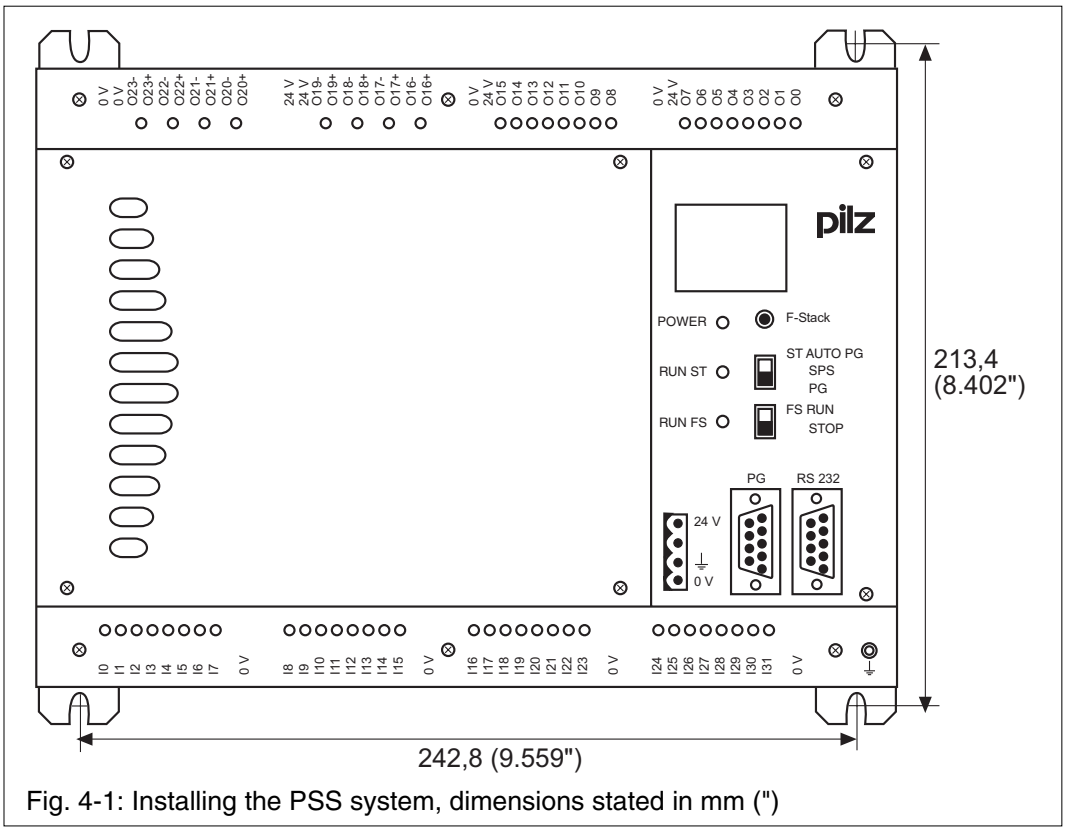


Fig. 4-1: Installing the PSS system, dimensions stated in mm (")

Dimensions in mm ("):
H x W x D: 223 x 277 x 155 (8.78" x 10.91" x 6.10")

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Installing the system in a control cabinet

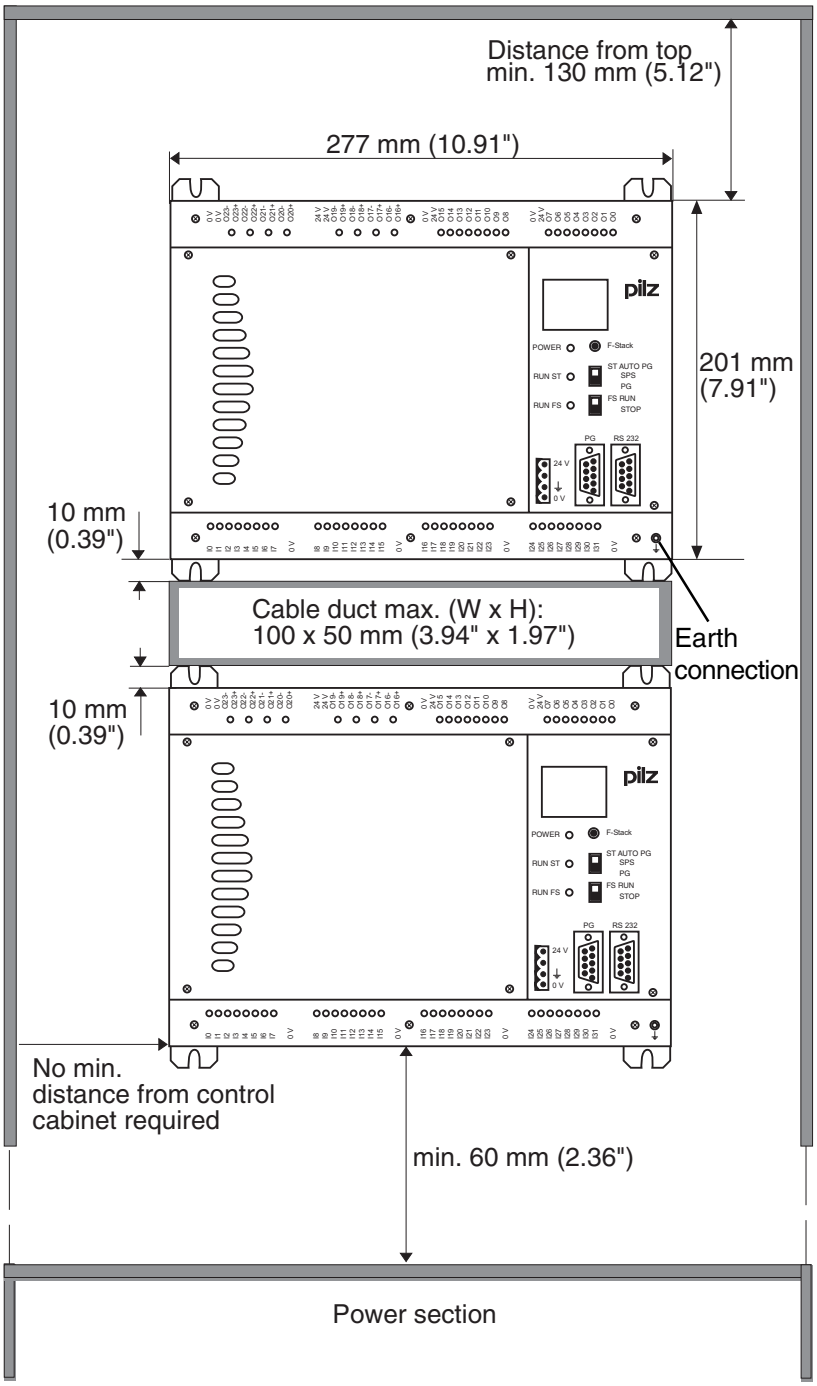


Fig. 4-2: Installing the PSS system in a control cabinet, dimensions stated in mm (")

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Connecting the Inputs and Outputs

Configuration of the screw terminals and connector description

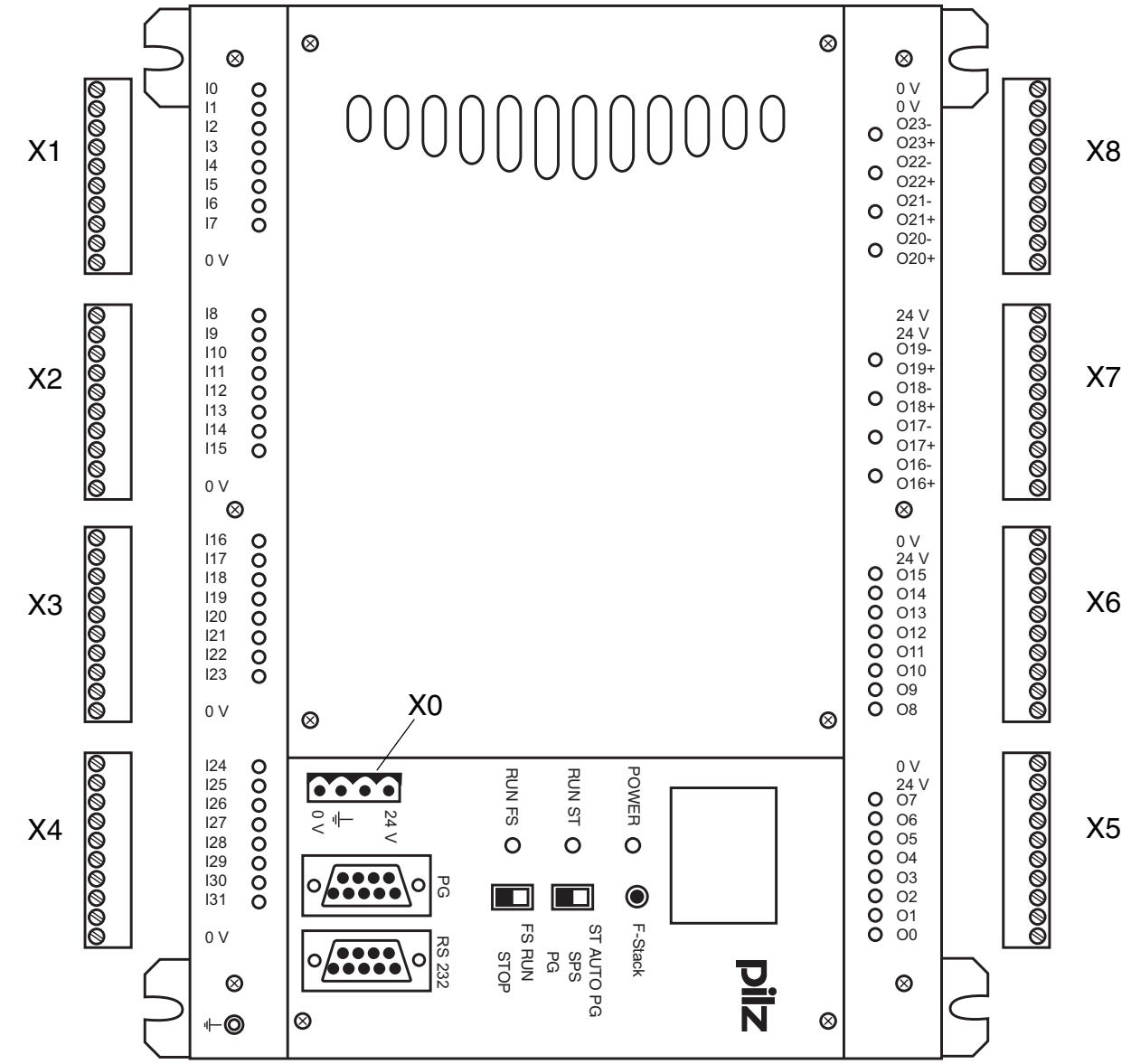


Fig. 5-1: Terminal configuration on the standard PSS 3056

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Connecting the Inputs and Outputs

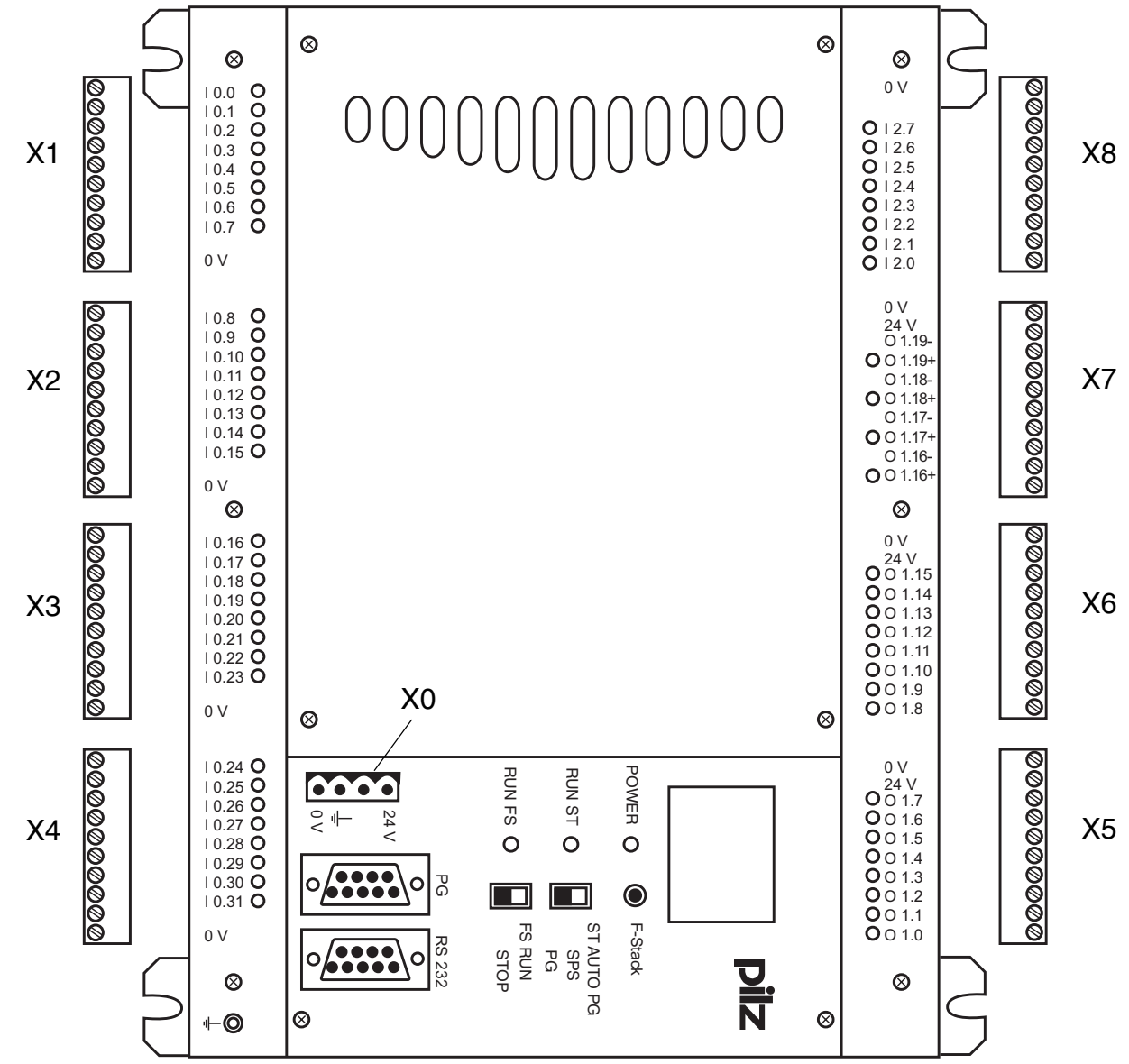


Fig. 5-2: Terminal configuration on the PSS 3056-1

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

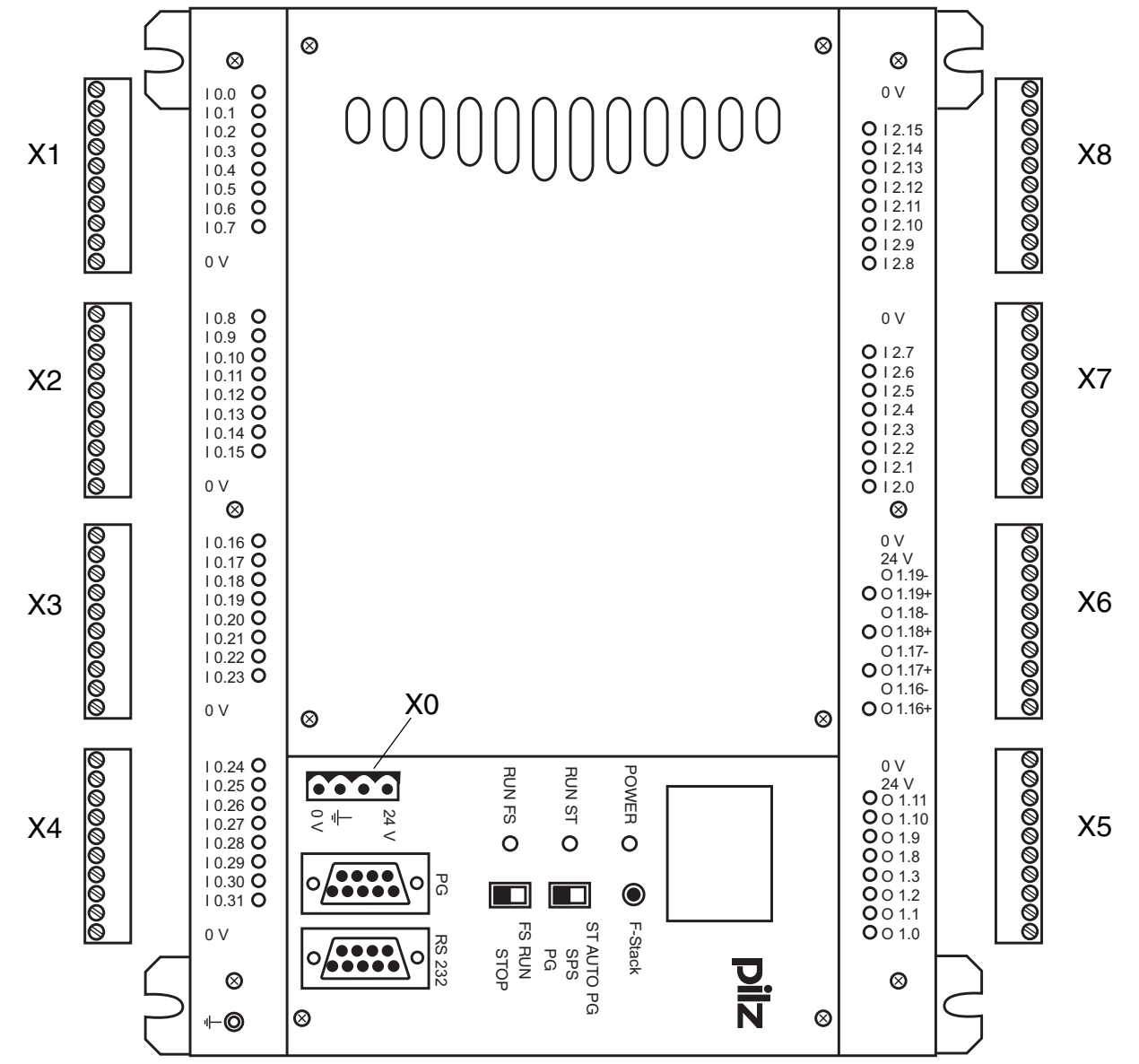


Fig. 5-3: Terminal configuration on the PSS 3056-2

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Connecting the Inputs and Outputs

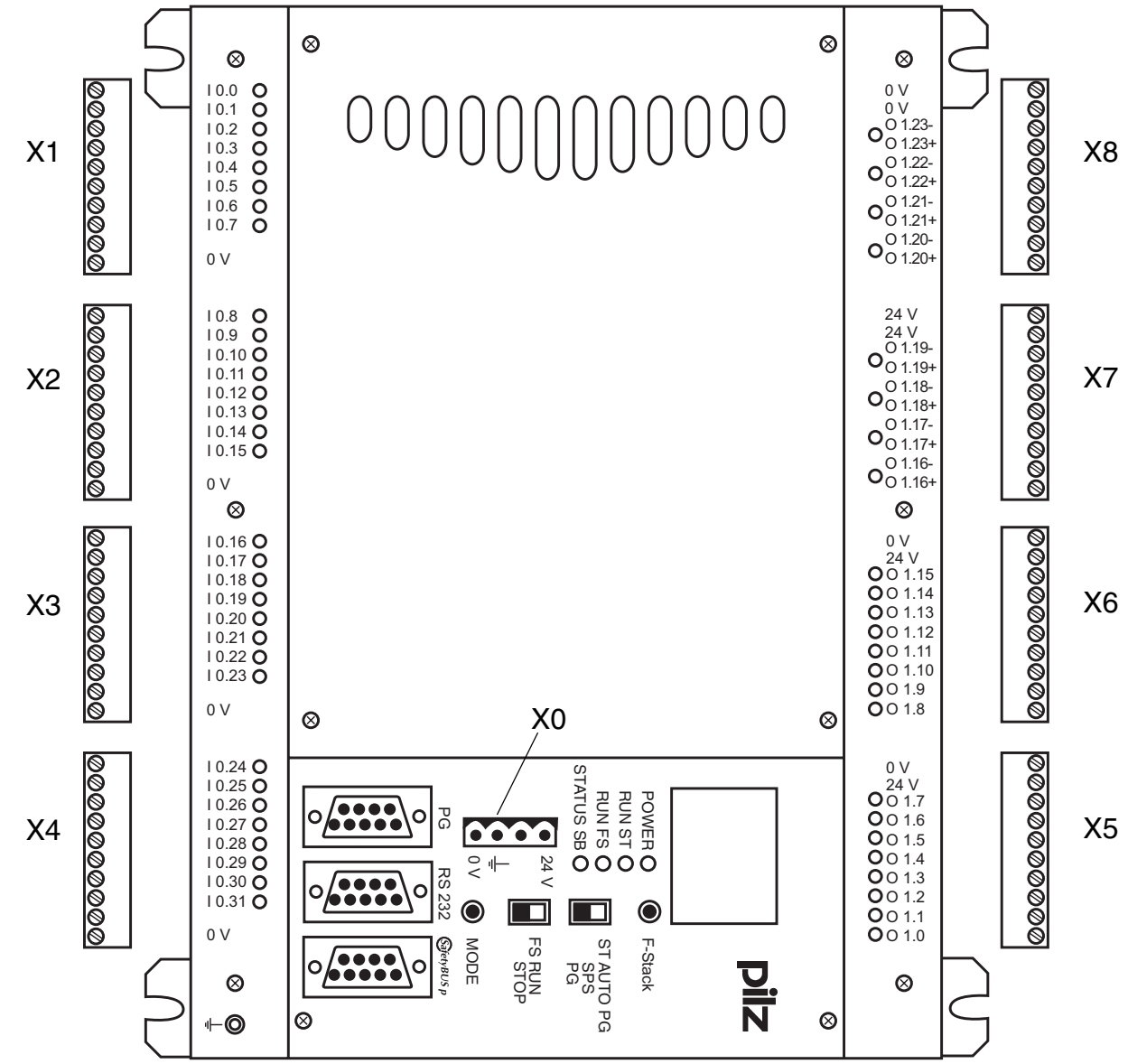


Fig. 5-4: Terminal configuration on the PSS SB 3056 (identical to the standard PSS 3056)

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Notes on wiring

Where safety-relevant applications are concerned, it is essential that short circuits and line breaks are unable to cause a hazardous condition within a plant.

The way in which this is done will depend on the degree of hazard within the plant itself, the switching frequency of the input devices and the level of safety of the input devices and actuators. These points must be assessed in conjunction with the relevant standards or approvals body (e.g. BG or TÜV).

The following terms are important:

- Test pulses
  These are signals which change status on several occasions within a period of time.
- Single-channel safe input devices
  These are positively-driven normally-closed contacts which open on actuation (failsafe principle).
- Elimination of short circuits between signals
  This is possible within electrically-enclosed areas and also outside electrically-enclosed areas for signals conducted in different multicore cables. However, all components must meet the relevant regulations in accordance with EN, DIN and VDE.
- In principle, the possibility of earth faults and line breaks occurring cannot be eliminated.

If a dual-pole switching output on the PSS is used to drive the actuators, a test for short circuits and line breaks will automatically be carried out during each cycle. For this purpose the actuator will be switched off for approximately 100 µs. When using single-pole outputs or test pulses, a switch-off test will only be carried out if designed into the self-check.

With multi-channel pulsed input devices, short circuits and line breaks can be detected via feasibility checks in the control program.

The input test on the programmable safety system uses test pulses to enable the system's operating program to carry out a test to detect short circuits and line breaks. The following pages contain details of connection examples which may be of use when wiring the unit.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Connecting the Inputs and Outputs

On-board digital inputs

	PSS 3056 PSS SB 3056	PSS 3056-1	PSS 3056-2
Number	32	40	48
Configuration	I0.0 - I0.31	I0.0 - I0.31 I2.0 - I2.7	I0.0 - I0.31 I2.0 - I2.15

Features:

- One 0 V terminal per slot needs to be connected.
  This means that on the standard PSS 3056 and on the PSS SB 3056, one 0 V terminal belonging to inputs I0 - I31 must be connected. On the PSS 3056-1 and PSS 3056-2, one 0 V terminal belonging to inputs I0.0 - I0.31 **and** one 0 V terminal belonging to inputs I2.0 - I2.7 / I2.0 - I2.15 must be connected.
- Only input signals which operate in accordance with the zero signal principle (on switching off) are permitted for safety-related applications.
- Signals may be connected using unscreened cables.

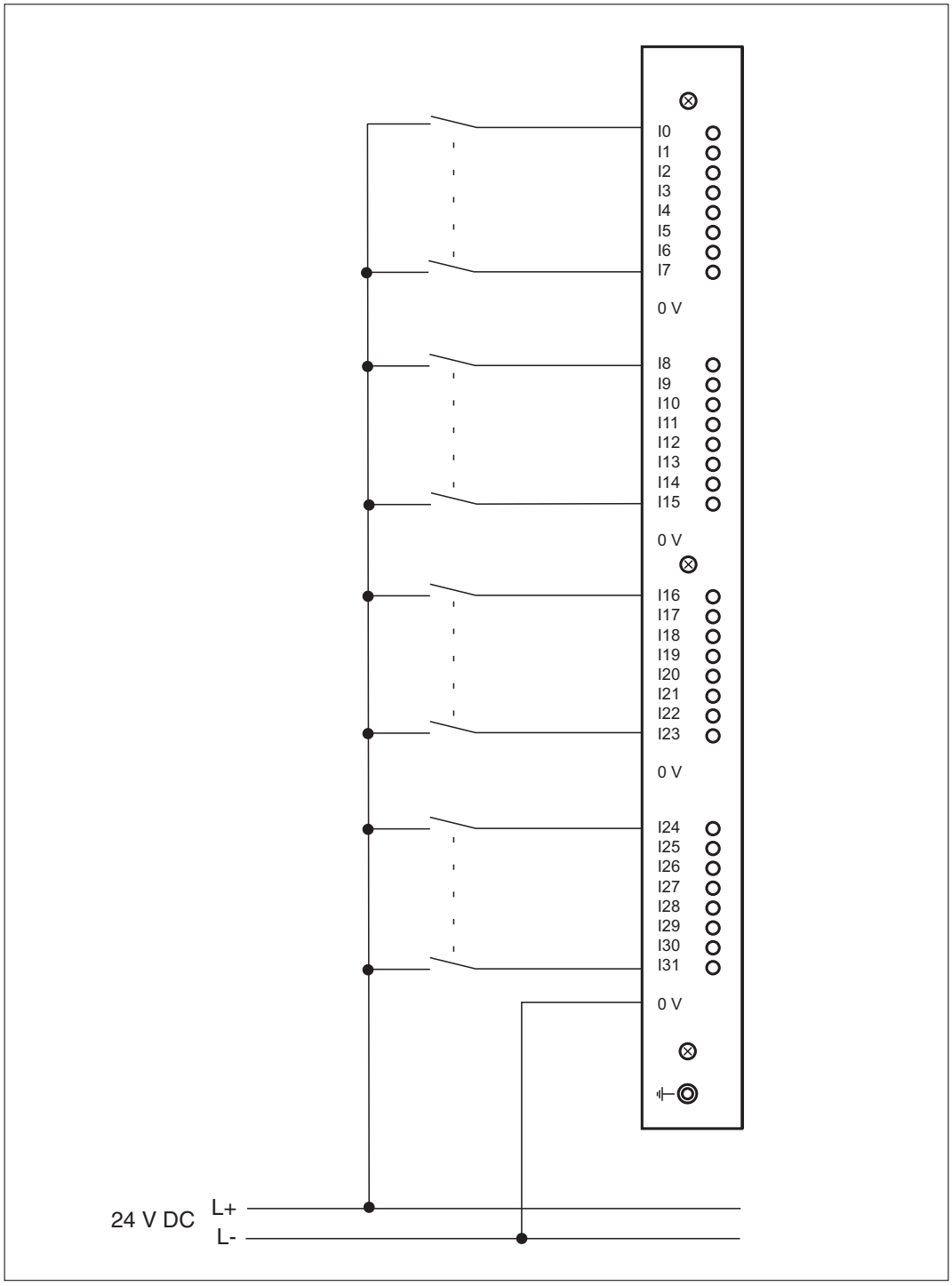


CAUTION!

The connection shown overleaf is only approved for non-safety applications. The connection of safe input devices for safety-relevant applications is described later in the chapter.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Configuration of the standard PSS 3056



Please ensure safety regulations and EMC guidelines are observed!

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Example: Single-channel, failsafe input device, unchecked

Features:

- The input device must be approved for failsafe applications.
- Please read the instructions provided with the input device.

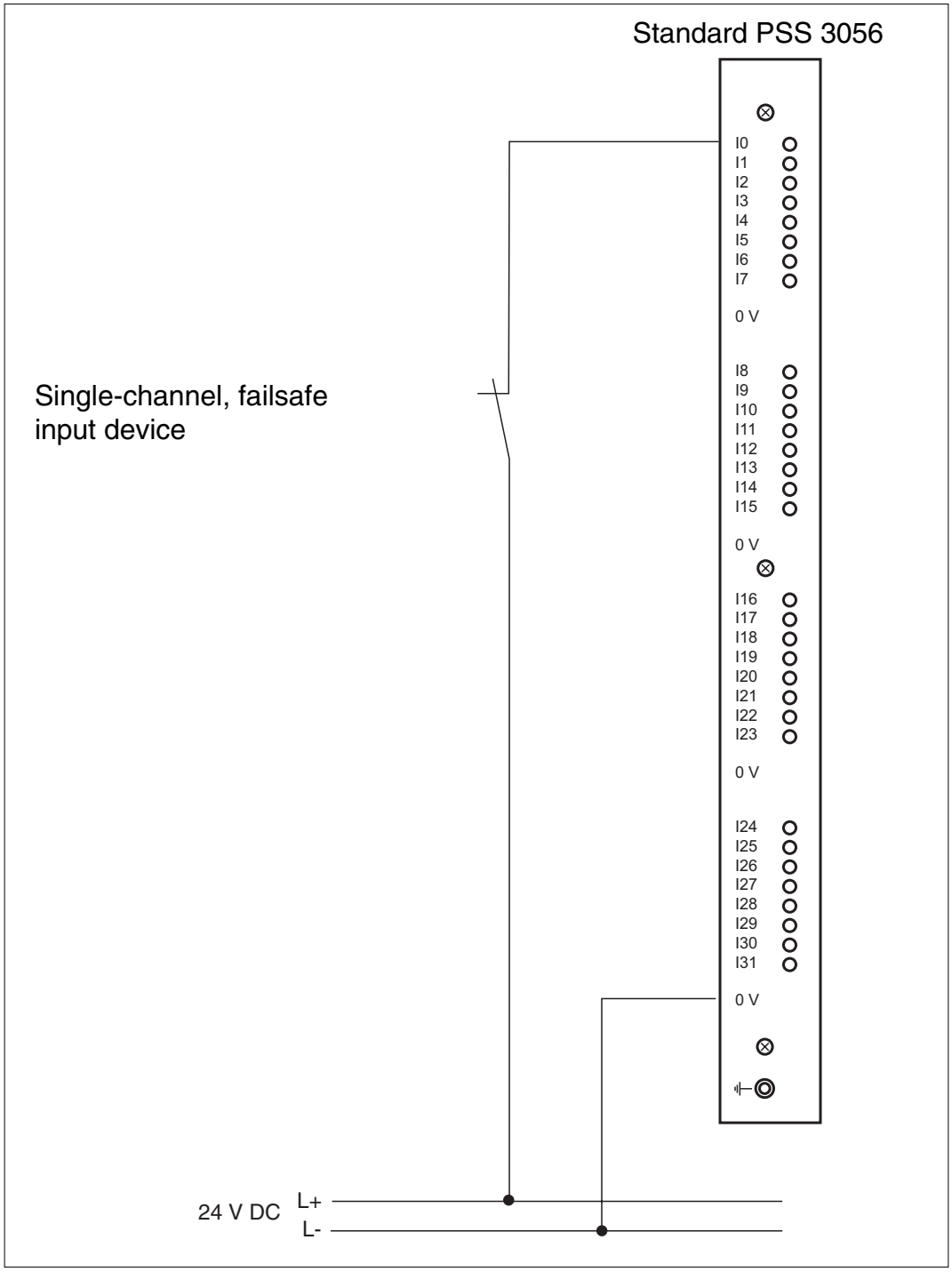


CAUTION!

The connection shown overleaf is only approved for non-safety applications. The connection of safe input devices for safety-relevant applications is described later in the chapter.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Example: Single-channel, failsafe input device, unchecked



Please ensure safety regulations and EMC guidelines are observed!

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Example: Dual-channel input devices, unchecked

Features:

- This type of connection is mainly used for signal inputs with frequent operation.
- The functionality of both input device channels should be monitored in the user program via feasibility checks (see example in the Programming Manual).
- The possibility of short circuits occurring between adjacent connector terminals cannot be eliminated. For this reason, the two identical (homogenous) channels on an input device must **not** be connected to adjacent inputs.
- If you are using input devices with different (diverse) channels, adjacent inputs may be used. Short circuits will be detected in the application program via the feasibility check (see example in the Programming Manual).

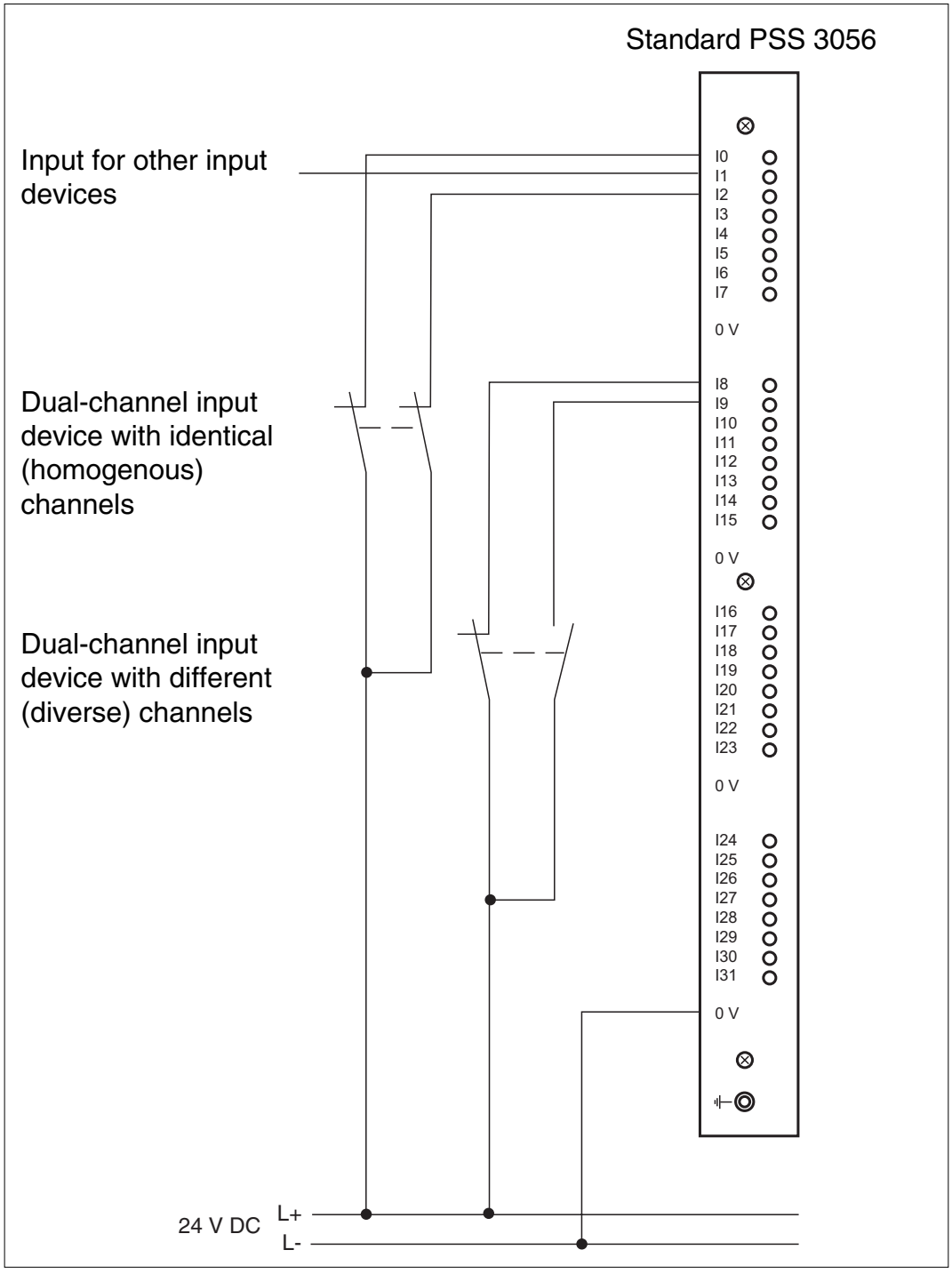


CAUTION!

It will not be possible to detect short circuits in the cable between the input device/input and the L+ line, nor short circuits between several input devices. Depending on the type of input device connected, this could create a risk to both personnel and machinery (e.g. emergency stop). You should always ensure that the unit is suitably wired to eliminate the risk of short circuits.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Example: Dual-channel input devices, unchecked



Please ensure safety regulations and EMC guidelines are observed!

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Example: Single-channel, failsafe input device, with test pulse

Features:

- The input device must be approved for failsafe applications.
- Please read the instructions provided with the input device.
- The test pulse must be allocated to the input via the configurator on the programming device.
- Testing will detect short circuits between lines L+ and L-, and also between the pulsed outputs.
- Only input devices with N/C contacts can be tested.
- Cable runs:
  - 200 m
  - With 1 kOhm resistance parallel to input: max. 800 m

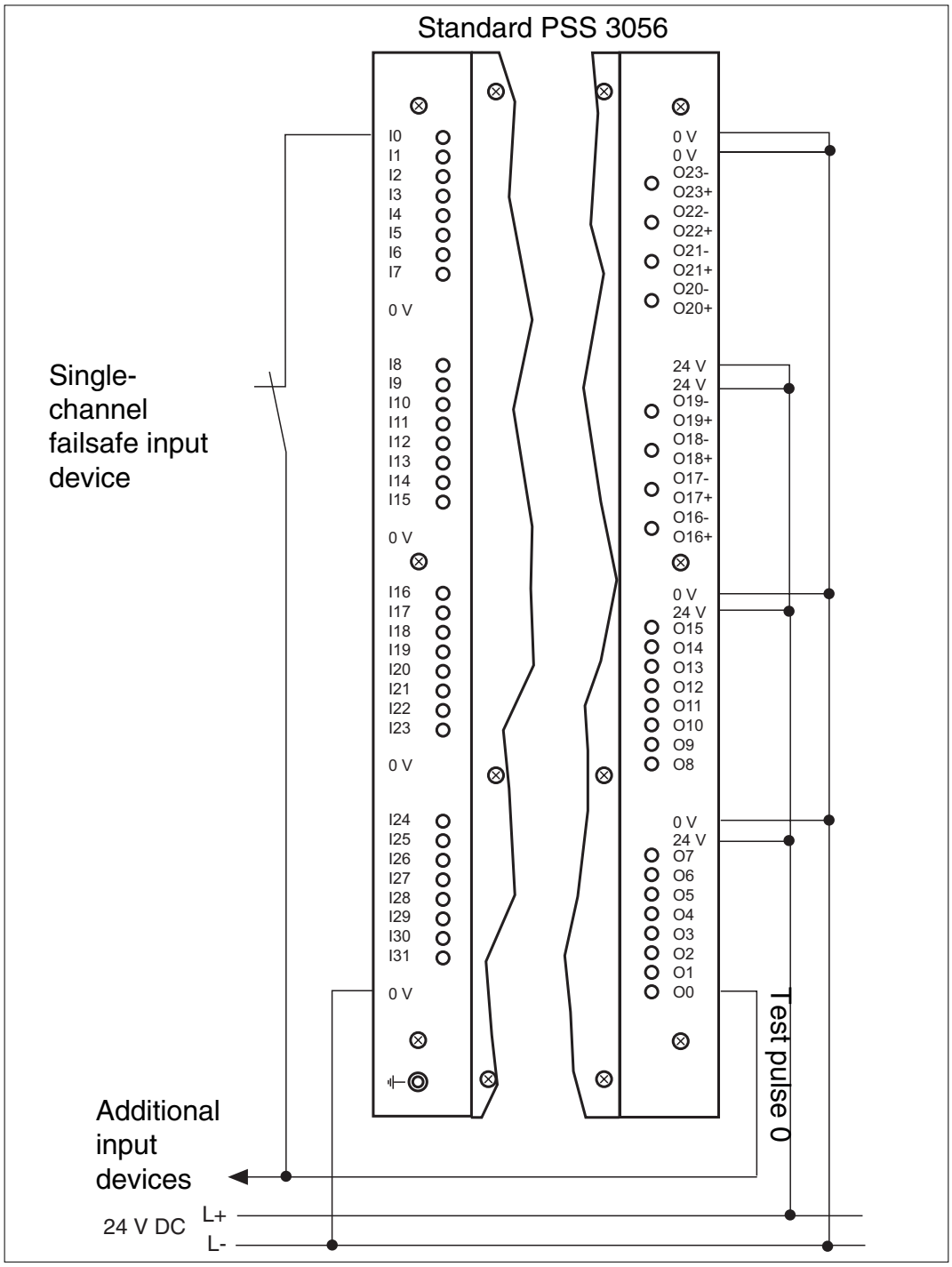


CAUTION!

Short circuits between the cable from the signal to the input device and the cable from the input device to the input will **not** be detected.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Example: Single-channel, failsafe input device, with test pulse



Please ensure safety regulations and EMC guidelines are observed!

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

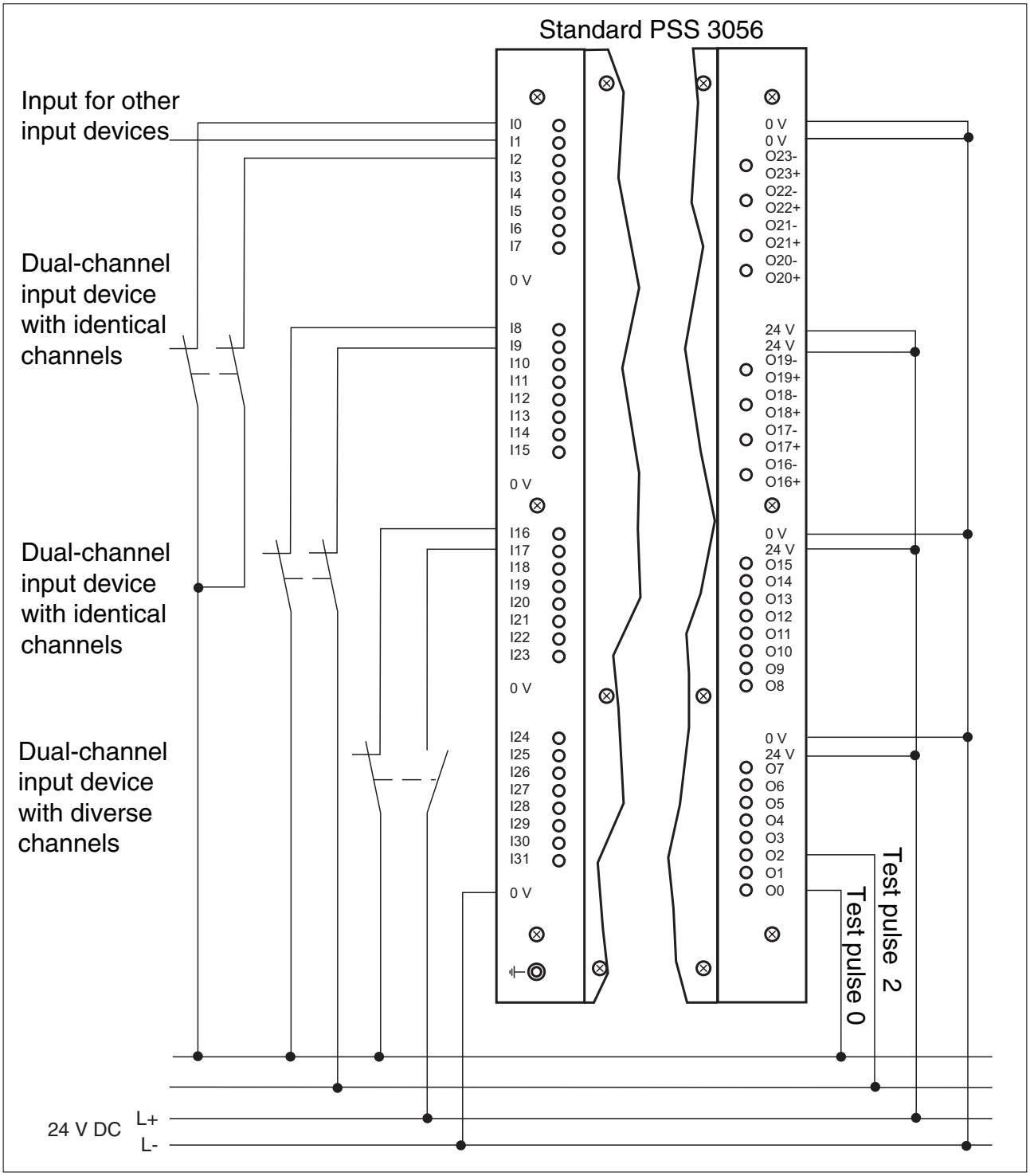
Example: Dual-channel, failsafe input device, with test pulse

Features:

- This type of connection is mainly used for signal inputs with infrequent operation.
- The operating system will detect all shorts between contacts and short circuits to L+ and L-.
- Short circuits across the contact can be detected via the feasibility check in the application program.
- The test pulse must be allocated to the input via the configurator on the programming device.
- Only input devices with N/C contacts can be tested (in the case of diverse channels, only the N/C contact).
- On input devices with identical channels, each channel should be given a separate signal, where possible. This will ensure that all short circuits are detected, with the exception of short circuits which short out the input device (cable from the signal to the input device and cable from the input device to the input).
- If the input device has only one signal, a short circuit between the cables from the input device to the inputs will **not** be detected. You should always ensure that the unit is suitably wired to avoid the risk of this type of short circuit.
- Cable runs:
  - 200 m
  - With 1 kOhm resistance parallel to input: max. 800 m

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Example: Dual-channel, failsafe input device, with test pulse



Please ensure safety regulations and EMC guidelines are observed!

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Connecting the Inputs and Outputs

On-board single-pole 2 A outputs/test pulses

	PSS 3056 PSS SB 3056	PSS 3056-1	PSS 3056-2
Number	16	16	8
Configuration	O1.0 - O1.15	O1.0 - O1.15	O1.0 - O1.3 O1.8 - O1.11

Features:

- The outputs are push-pull outputs. Do **not** use the push-pull level to drive a load to L-, otherwise the switch off test will detect a connection to L+ and will register an error.
- The outputs can be configured as test pulse outputs or single-pole 2 A outputs in groups of 8 (standard PSS 3056, PSS 3056-1 and PSS SB 3056) or 4 (PSS 3056-2). The following configuration is set automatically, depending on the number of test pulses configured in the programming device:

  Standard PSS 3056, PSS 3056-1 and PSS SB 3056:
  Number ≤ 8: O1.00 ... O1.07 are test pulse outputs
  O1.08 ... O1.15 are single-pole 2 A outputs
  Number > 8: O1.00 ... O1.15 are test pulse outputs
  Number = 0: O1.00 ... O1.15 are single-pole 2 A outputs
  PSS 3056-2:
  Number ≤ 4: O1.00 ... O1.03 are test pulse outputs
  O1.08 ... O1.11 are single-pole 2 A outputs
  Number > 4: O1.00 ... O1.03 and O1.08 ... O1.11 are test pulse outputs
  Number = 0: O1.00 ... O1.03 and O1.08 ... O1.11 are single-pole 2 A outputs
- Two adjacent inputs must not be connected to the same test pulse.



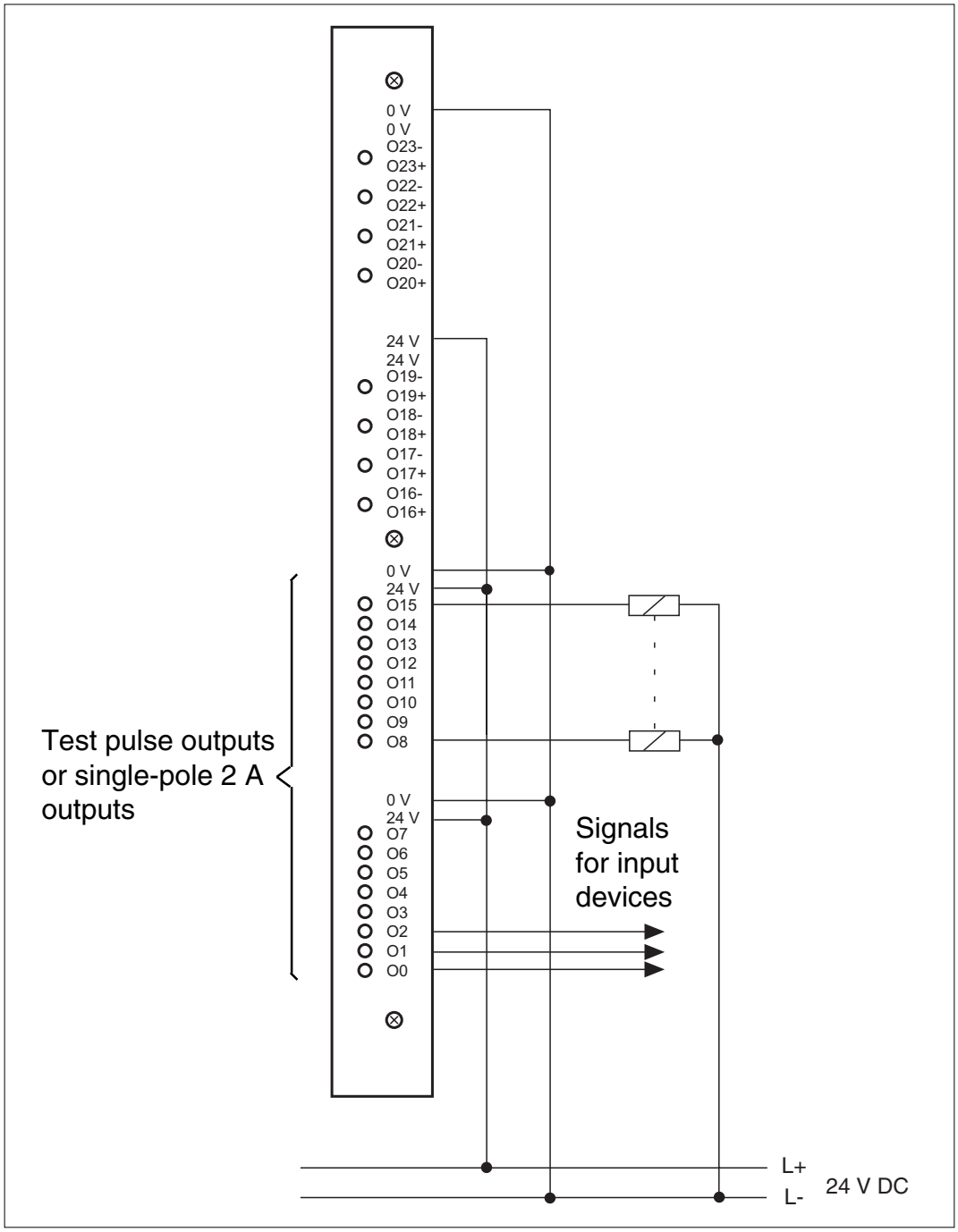
NOTICE
When using single-pole outputs, always ensure that line or cable breaks and short circuits between lines can always be detected, or ensure they cannot occur by using appropriate wiring.

- Outputs configured as 2 A outputs have monitoring inputs available under the same address. These can be used for feasibility checks.
- If cable runs are greater than 200 m with a cable cross section of 1.5 mm^2, or cable runs are greater than 300 m with a cable cross section of 2.5 mm^2, the operating system will not detect a short circuit to earth.
- If cable runs are greater than 800 m, interference from switching operations in 24 VDC signals may affect the test pulse outputs.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

- Each output is protected against short circuit, overload and overtemperature. Outputs are designed for resistive and inductive loads.

Configuration of the standard PSS 3056



Please ensure safety regulations and EMC guidelines are observed!

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Connecting the Inputs and Outputs

On-board dual-pole 2 A outputs

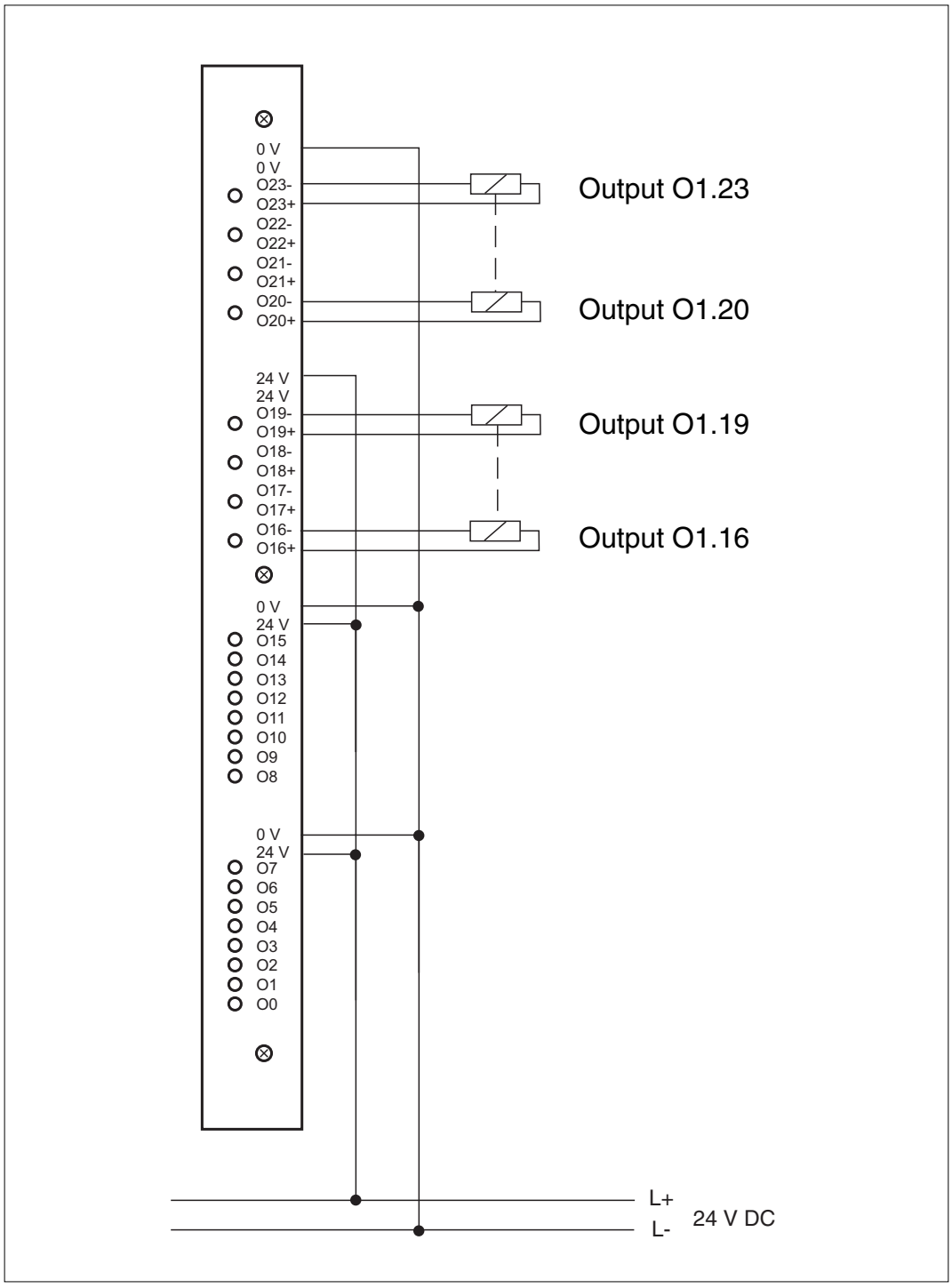
	PSS 3056 PSS SB 3056	PSS 3056-1	PSS 3056-2
Number	8	4	4
Configuration	O1.16 - O1.23	O1.16 - O1.19	O1.16 - O1.19

Features:

- The outputs are dual-pole switching 2 A outputs.
- The operating system of the programmable safety system tests the outputs during each cycle. Any short circuits or open circuits to the load will be detected.
- During testing, the load is isolated from the supply for 100 ... 200 µs in each cycle (depending on the load and the line length).
  The load must not switch off during this time.
  Outputs that are switched off are switched on for approximately 100 µs, in order to test the monitoring inputs. The load must not switch on during this time.
- To avoid overloading the contacts, the current at the connection terminals should be 10 A maximum.
- The maximum continuous current over all the outputs is 10 A.
- Error messages can occur when testing outputs on which the contactors are smaller than the recommended load. The error messages are triggered by too high an inductance on the contactors. In this case it helps to have a 1 kOhm resistor connected in parallel to the contactor coil.
- Each output is protected against short circuit, overload and overtemperature. Outputs are designed for resistive and inductive loads.

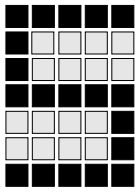
Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Configuration of the standard PSS 3056



Please ensure safety regulations and EMC guidelines are observed!

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com



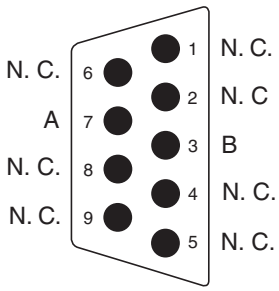
Notes

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Interfaces

PG programming interface

The programming interface is an RS 485 interface, enabling communication between the programming device and the PSS safety system.

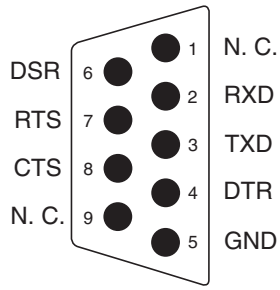


N.C. = no connection

Fig. 6-1: Configuration of the programming interface

RS 232 user interface

The user interface operates to the RS 232C standard and can be individually configured. A detailed description of the interface can be found in the “FS System Description” and “ST System Description” which form part of the “PSS-Range System Manual”.



N.C. = no connection

Fig. 6-2: Configuration of the user interface

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

PSS SB 3056: SafetyBUS p interface

Connection to SafetyBUS p is via a male 9-pin D-Sub connector. Detailed information on SafetyBUS p can be found in the SafetyBUS p manual.

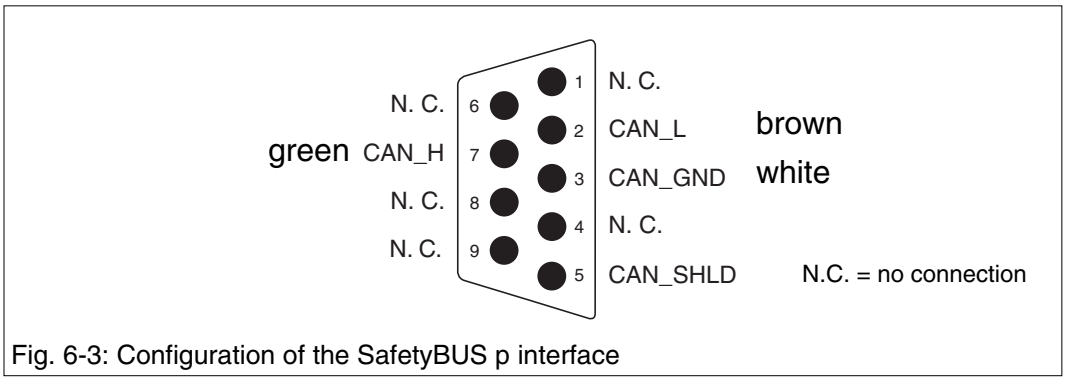


Fig. 6-3: Configuration of the SafetyBUS p interface

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Appendix

Changes to the Installation Manual

Changes from version IV to version V

The Installation Manual was completely revised and is now also valid for the PSS SB 3056.

The most significant changes are as follows:

- Chapter entitled "Safety Regulations" was restructured and the contents corrected.
- Page 3-3, description of how to earth the 0 V supply was added.
- Page 3-3, section entitled "Cabling" was amended.
- Page 3-5, section entitled "Suppression of inductive loads" was amended.
- Page 5-1 to 5-4, connector descriptions for the PSS terminal blocks was added.
- Chapter 5 was completely revised.
- Chapter 6 was added to include a description of the interface configurations.

Changes from version V to version VI

Page 3-5, section entitled "Insulation voltage test" was added.

Changes from version V to version VI

- Page 2-4, Condensation is not permitted.
- Page 2-5, the use of wiring which can withstand insulation temperatures of 75° C is no longer specified.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Appendix

Notes

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

A
Pilz Ges.m.b.H.
Modecenterstraße 14
1030 Wien
Austria
Telephone: 01 7986263-0
Telefax: 01 7986264
E-Mail: pilz@pilz.at

AUS
Pilz Australia
Industrial Automation LP.
9/475 Blackburn Road
Mt. Waverley, Melbourne VIC 3149
Australia
Telephone: 03 95446300
Telefax: 03 95446311
E-Mail: safety@pilz.com.au

B L
Pilz Belgium
Bijenstraat 4
9051 Gent (Sint-Denijs-Westrem)
Belgium
Telephone: 09 3217570
Telefax: 09 3217571
E-Mail: info@pilz.be

BR
Pilz do Brasil Sistemas Eletrônicos
Industriais Ltda.
Rua Ártico, 123 - Jd. do Mar
09726-300
São Bernardo do Campo - SP
Brazil
Telephone: 11 4337-1241
Telefax: 11 4337-1242
E-Mail: pilz@pilzbr.com.br

CH
Pilz Industrieelektronik GmbH
Gewerbepark Hintermättli
Postfach 6
5506 Mägenwil
Switzerland
Telephone: 062 88979-30
Telefax: 062 88979-40
E-Mail: pilz@pilz.ch

D
Pilz GmbH & Co. KG
Sichere Automation
Felix-Wankel-Straße 2
73760 Ostfildern
Germany
Telephone: 0711 3409-0
Telefax: 0711 3409-133
E-Mail: pilz.gmbh@pilz.de

DK
Pilz Skandinavien K/S
Ellegaardvej 25 L
6400 Sonderborg
Denmark
Telephone: 74436332
Telefax: 74436342
E-Mail: pilz@pilz.dk

E
Pilz Industrieelektronik S.L.
Camí Ral, 130
Polígono Industrial Palou Nord
08400 Granollers
Spain
Telephone: 938497433
Telefax: 938497544
E-Mail: pilz@pilz.es

F
Pilz France Electronic
1, rue Jacob Mayer
BP 12
67037 Strasbourg Cedex
France
Telephone: 03 88104000
Telefax: 03 88108000
E-Mail: siege@pilz-france.fr

FIN
Pilz Skandinavien K/S
Pakilantie 61
00660 Helsinki
Finland
Telephone: 09 27093700
Telefax: 09 27093709
E-Mail: pilz.fi@pilz.dk

GB
Pilz Automation Technology
Willow House, Medlicott Close
Oakley Hay Business Park
Corby
Northants NN18 9NF
United Kingdom
Telephone: 01536 460766
Telefax: 01536 460866
E-Mail: sales@pilz.co.uk

I
Pilz Italia Srl
Via Meda 2/A
22060 Novedrate (CO)
Italy
Telephone: 031 789511
Telefax: 031 789555
E-Mail: info@pilz.it

IRL
Pilz Ireland Industrial Automation
Cork Business and Technology Park
Model Farm Road
Cork
Ireland
Telephone: 021 4346535
Telefax: 021 4804994
E-Mail: sales@pilz.ie

J
Pilz Japan Co., Ltd.
Shin-Yokohama Fujika Building 5F
2-5-9 Shin-Yokohama
Kohoku-ku
Yokohama 222-0033
Japan
Telephone: 045 471-2281
Telefax: 045 471-2283
E-Mail: pilz@pilz.co.jp

MEX
Pilz de Mexico, S. de R.L. de C.V.
Circuito Pintores # 170
Cd. Satelite
C.P. 53100
Naucalpan de Juarez, Edo. de Mexico
Mexico
Telephone: 55 5572 1300
Telefax: 55 5572 4194
E-Mail: info@mx.pilz.com

NL
Pilz Nederland
Postbus 186
4130 ED Vianen
Netherlands
Telephone: 0347 320477
Telefax: 0347 320485
E-Mail: info@pilz.nl

NZ
Pilz New Zealand
3 Kohanga Road
Managere Bridge
Auckland
New Zealand
Telephone: 09-6345350
Telefax: 09-6345350
E-Mail: t.catterson@pilz.co.nz

P
Pilz Industrieelektronik S.L.
R. Eng Duarte Pacheco, 120
4 Andar Sala 21
4470-174 Maia
Portugal
Telephone: 229407594
Telefax: 229407595
E-Mail: pilz@pilz.es

PRC
Pilz China Representative Office
Rm. 302
No. 88 Chang Shu Road
Shanghai 200040
China
Telephone: 021 62493031
Telefax: 021 62493036
E-Mail: sales@pilz.com.cn

ROK
Pilz Korea Office
402 Samsung Midas Officetel
775-1, Janghang-Dong,
Ilsan-Gu, Koyang-Si
Kyungki-Do 411-837
Korea
Telephone: 031 8159541
Telefax: 031 8159542
E-Mail: info@pilzkorea.co.kr

SE
Pilz Skandinavien K/S
Energigatan 10 B
43437 Kungsbacka
Sweden
Telephone: 0300 13990
Telefax: 0300 30740
E-Mail: pilz.se@pilz.dk

TR
Pilz Elektronik Güvenlik Ürünleri
ve Hizmetleri Tic. Ltd. Şti.
Tan iş Merkezi
Kükürtlü Caddesi No: 67
C-Blok Daire: 1
16080 Bursa
Turkey
Telephone: 0224 2360180
Telefax: 0224 2360184
E-Mail: pilz.tr@pilz.de

USA
Pilz Automation Safety L.P.
7150 Commerce Boulevard
Canton
Michigan 48187
USA
Telephone: 734 354-0272
Telefax: 734 354-3355
E-Mail: info@pilzusa.com

...
In many countries we are represented by sales partners.

Please refer to our Homepage for further details or contact our headquarters.

www
www.pilz.com

Pilz GmbH & Co. KG
Sichere Automation
Felix-Wankel-Straße 2
73760 Ostfildern, Germany
Telephone: +49 711 3409-0
Telefax: +49 711 3409-133
E-Mail: pilz.gmbh@pilz.de

pilz
more than automation
safe automation

19 025-03/04 Printed in Germany

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP