

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.

Visit our website - *Click HERE*

Harmony SCU
HMI Controller
Hardware Guide

09/2020



EIO0000001232.08

www.schneider-electric.com

Schneider Electric

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

You agree not to reproduce, other than for your own personal, noncommercial use, all or part of this document on any medium whatsoever without permission of Schneider Electric, given in writing. You also agree not to establish any hypertext links to this document or its content. Schneider Electric does not grant any right or license for the personal and noncommercial use of the document or its content, except for a non-exclusive license to consult it on an "as is" basis, at your own risk. All other rights are reserved.

All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

© 2020 Schneider Electric. All rights reserved.

Table of Contents

	Safety Information	7
	About the Book	9
Part I	**HMISCU System**	15
Chapter 1	**HMISCU General Overview**	17
	Package Contents	18
	Parts Identification and Functions	21
	System Architecture	24
	Certifications and Standards	26
	Devices Overview	29
Chapter 2	**HMISCU System General Implementation Rules**	33
	Introduction	34
	Installation Requirements	37
	Environmental Characteristics	39
	Wiring Rules and Recommendations	41
	Wiring to the DIO Terminal Block	45
	Grounding the System	48
Chapter 3	**HMISCU Description**	53
3.1	Rear Module Features	54
	Real Time Clock (RTC)	54
3.2	I/O Management	55
	Input Management	56
	Output Management	59
Chapter 4	**Device Connectivity**	63
	System Design	64
	Interface Accessories	66
Chapter 5	**HMISCU Installation**	69
5.1	Mechanical Requirements	70
	Dimensions	71
	Panel Cut-Out Dimensions and Installation	77
	Installation Procedures	81
	Mounting Positions	87
	Mounting Clearances	88
	DIN Rail	90
	Installing and Removing the Rear Module on a DIN Rail	91

5.2 Electrical Requirements 94
Power Supply Characteristics and Wiring 95
Connecting the Power Cord 98
Connecting the Power Supply 101
5.3 USB Port 103
USB Data Transfer Cable - USB Driver Installation 104
USB (Type A) 106
USB (mini-B) 109
Part II HMISCU Controller and Display Modules 113
Chapter 6 HMISCU•A5 (type DIO) 115
Presentation 116
Digital Inputs 119
Digital Outputs 122
Chapter 7 HMISCU•B5 (type DIO and AIO) 125
Presentation 126
Digital Inputs 129
Digital Outputs 131
Analog Inputs and Analog Outputs 134
Chapter 8 Display Modules 139
HMI Overview 139
Part III HMISCU Controller Panels 143
Chapter 9 Communication Interface 145
Ethernet Port 146
CANopen Master Unit 148
Serial Link Port (COM1) 152
Chapter 10 Specifications 155
10.1 General Specifications 156
General Specifications 156
10.2 Functional Specifications 157
Display 158
Digital Inputs 159
Digital Outputs 162
Analog Inputs and Analog Outputs 165
Internal Circuits 170
Memory and Touch Panel 172
Part IV Settings 173
Chapter 11 Connecting the HMISCU to a PC 175
Connecting the Controller to a PC 175

Chapter 12 Configuring the HMISCU 179
Types of Settings 180
System Settings 181
Offline Settings 185
Diagnostics Settings 188
Chapter 13 Troubleshooting 191
Troubleshooting Checklists 192
Self Test List 194
Chapter 14 Maintenance 195
Regular Cleaning 196
Periodic Check Points 198
Glossary 199
Index 203

Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book

At a Glance

Document Scope

The purpose of this document is to:

- Show you how to install and operate your HMI controller.
- Show you how to connect the HMI controller to a programming device equipped with SoMachine software.
- Help you understand how to interface the HMI controller and other devices.
- Help you become familiar with the HMI controller features.

Validity Note

This document has been updated with the release of SoMachine V4.3 and Vijeo Designer V6.2 SP2.

The technical characteristics of the devices described in the present document also appear online. To access the information online:

Step	Action
1	Go to the Schneider Electric home page *www.schneider-electric.com*.
2	In the **Search** box type the reference of a product or the name of a product range. ● Do not include blank spaces in the reference or product range. ● To get information on grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the **Product Datasheets** search results and click on the reference that interests you. If you entered the name of a product range, go to the **Product Ranges** search results and click on the product range that interests you.
4	If more than one reference appears in the **Products** search results, click on the reference that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the datasheet.
6	To save or print a datasheet as a .pdf file, click **Download XXX product datasheet**.

The characteristics that are described in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.

Related Documents

Title of Documentation	Reference Number
Harmony SCU HMI Controller Programming Guide	EIO0000001240 (eng), EIO0000001241 (fre), EIO0000001242 (ger), EIO0000001243 (spa), EIO0000001244 (ita), EIO0000001245 (chs)
Harmony SCU HMI Controller PLCSystem Library Guide	EIO0000001246 (eng), EIO0000001247 (fre), EIO0000001248 (ger), EIO0000001249 (spa), EIO0000001250 (ita), EIO0000001251 (chs)
Harmony SCU HMI Controller HSC Library Guide	EIO0000001512 (eng), EIO0000001513 (fre), EIO0000001514 (ger), EIO0000001515 (spa), EIO0000001516 (ita), EIO0000001517 (chs)
Harmony SCU HMI Controller PTO/PWM Library Guide	EIO0000001518 (eng), EIO0000001519 (fre), EIO0000001520 (ger), EIO0000001521 (spa), EIO0000001522 (ita), EIO0000001523 (chs)
Harmony SCU HMI Quick Reference Guide	S1B90406 (Eng)

You can download these technical publications and other technical information from our website at https://www.se.com/ww/en/download/ .

Product Related Information

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

LOSS OF CONTROL

- Consider the potential failure modes of control paths in the machine control system design. Examples of potential failure modes of control paths are the possibility of backlight failure, unanticipated link transmission delays or failures, the operator being unable to control the machine, the operator making errors in the control of the machine.
- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.[1]
- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems" or their equivalent governing your particular location.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Cybersecurity Best Practices

To help keep your Schneider Electric products secure and protected, we recommend that you implement the cybersecurity best practices. Following the recommendations may help significantly reduce cybersecurity risk of your company. For the recommendations, refer to the following URL:*https://www.se.com/en/download/document/7EN52-0390/*

Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in this manual, or that appear in or on the products themselves, are generally derived from the terms or definitions of international standards.

In the area of functional safety systems, drives and general automation, this may include, but is not limited to, terms such as *safety*, *safety function*, *safe state*, *fault*, *fault reset*, *malfunction*, *failure*, *error*, *error message*, *dangerous*, etc.

Among others, these standards include:

Standard	Description
IEC 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2015	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2013	Safety of machinery: Electro-sensitive protective equipment. Part 1: General requirements and tests.
ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
ISO 13850:2015	Safety of machinery - Emergency stop - Principles for design
IEC 62061:2015	Safety of machinery - Functional safety of safety-related electrical, electronic, and electronic programmable control systems
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: General requirements.

Standard	Description
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Requirements for electrical/electronic/programmable electronic safety-related systems.
IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Software requirements.
IEC 61784-3:2016	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions.
2006/42/EC	Machinery Directive
2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive

In addition, terms used in the present document may tangentially be used as they are derived from other standards such as:

Standard	Description
IEC 60034 series	Rotating electrical machines
IEC 61800 series	Adjustable speed electrical power drive systems
IEC 61158 series	Digital data communications for measurement and control – Fieldbus for use in industrial control systems

Finally, the term *zone of operation* may be used in conjunction with the description of specific hazards, and is defined as it is for a *hazard zone* or *danger zone* in the *Machinery Directive* (*2006/42/EC*) and *ISO 12100:2010*.

NOTE: The aforementioned standards may or may not apply to the specific products cited in the present documentation. For more information concerning the individual standards applicable to the products described herein, see the characteristics tables for those product references.

Part I
HMISCU System

Overview

This part describes how to use HMISCU system.

What Is in This Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
1	HMISCU General Overview	17
2	HMISCU System General Implementation Rules	33
3	HMISCU Description	53
4	Device Connectivity	63
5	HMISCU Installation	69

Chapter 1
HMISCU General Overview

Overview

This chapter provides general information about the HMISCU system architecture and its components.

What Is in This Chapter?

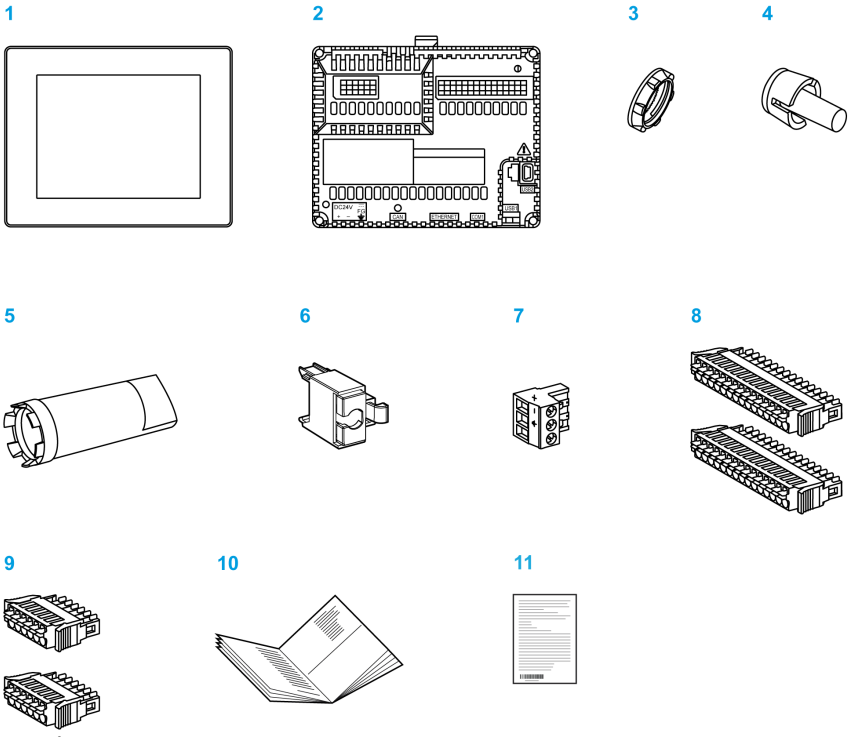
This chapter contains the following topics:

Topic	Page
Package Contents	18
Parts Identification and Functions	21
System Architecture	24
Certifications and Standards	26
Devices Overview	29

Package Contents

HMISCU Package Contents

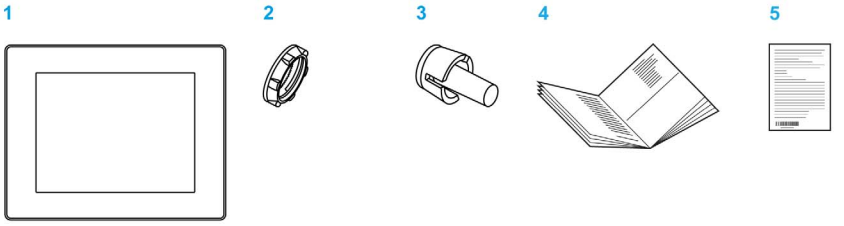
Verify that all items shown in the figure are present in your package:



1 Display module
2 Rear module
3 Display installation nut (attached to the display module)
4 Anti-rotation tee
5 Socket wrench
6 USB clamp type A
7 DC power supply connector
8 I/O connector 15-pin x 2
9 I/O connector 6-pin x 2
10 HMISCU Installation Guide
11 Warning / Caution information

Display Module Package Contents

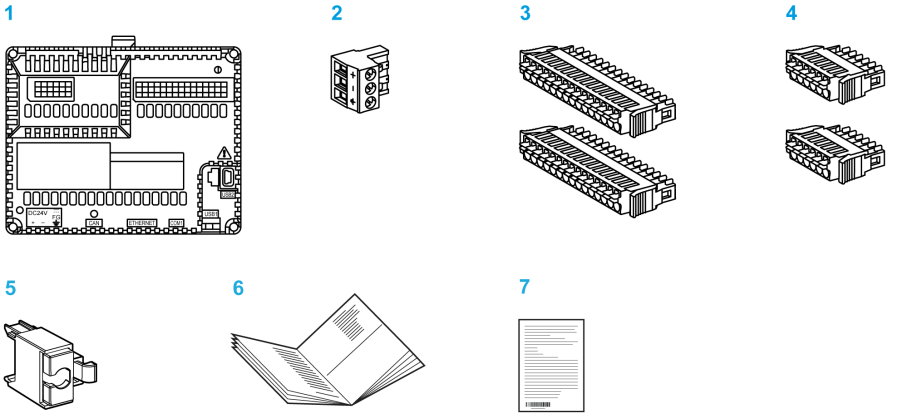
Verify that all items shown in the figure are present in your package:



1 Display module
2 Display installation nut (attached to the display module)
3 Anti-rotation tee
4 HMISCU Installation Guide
5 Warning / Caution information

Rear Module Package Contents

Verify that all items shown in the figure are present in your package:



1 Rear module
2 DC power supply connector
3 I/O connector 15-pin x 2
4 I/O connector 6-pin x 2
5 USB clamp type A
6 HMISCU Installation Guide
7 Warning / Caution information

Product Label Sticker

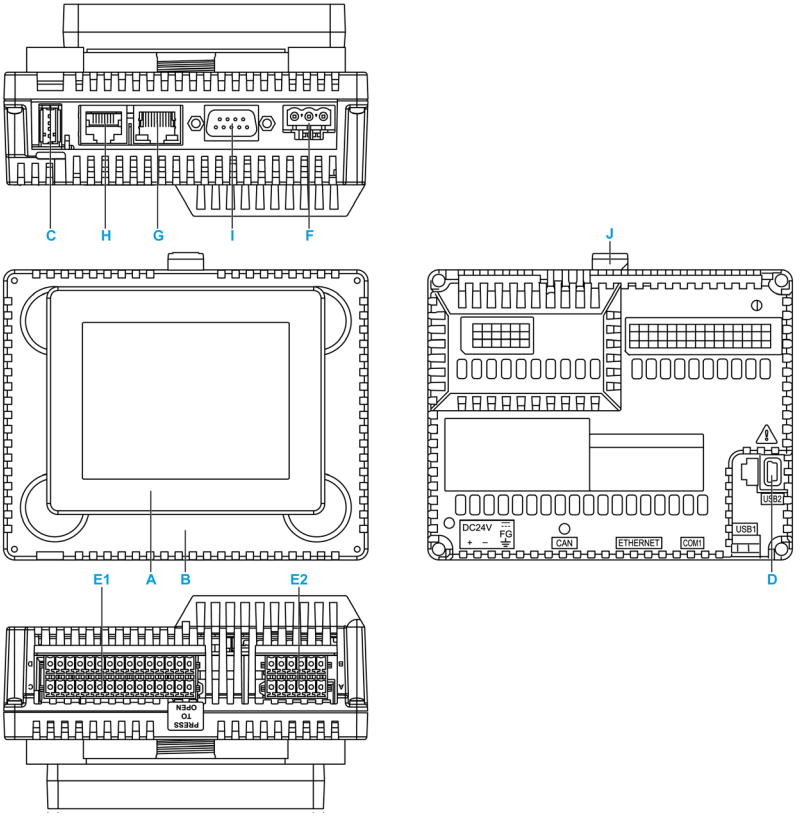
You can identify the product version (PV), revision level (RL), and the software version (SV) from the product label on the panel.

The following diagram is a representation of a typical label:



Parts Identification and Functions

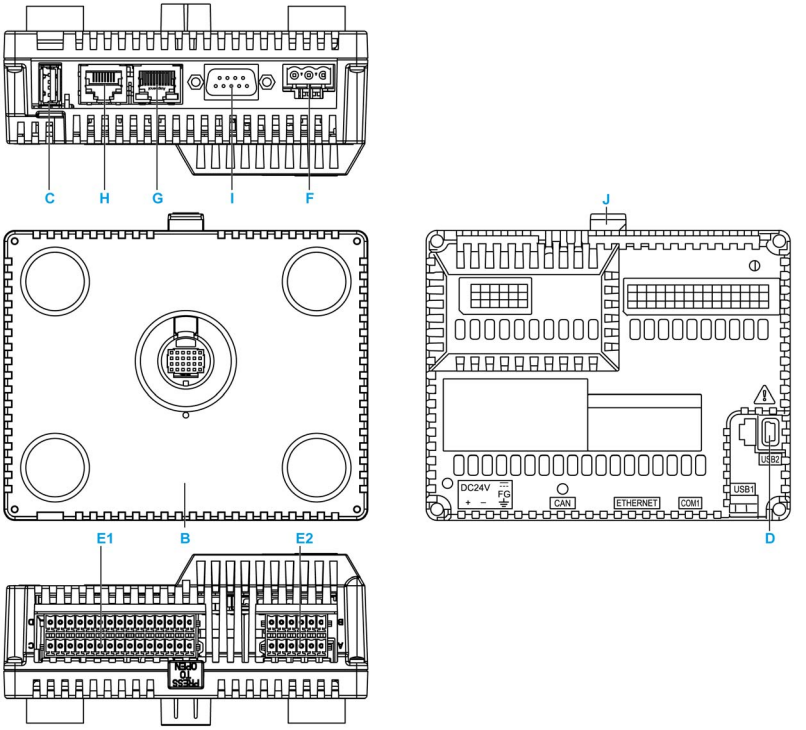
HMISCU Parts Identification



Part	Description
A	Display module *(see page 139)*
B	Rear module *(see page 113)*
C	USB (type A) port (USB1) *(see page 103)*
D	USB (type mini B) port (USB2)
E1	I/O terminal block 1 *(see page 116)*
E2	I/O terminal block 2 *(see page 116)*
F	DC power supply connector *(see page 95)*
G	Ethernet connector *(see page 146)*

Part	Description
H	Serial link (RS-232C/485) *(see page 152)*
I	CANopen connector
J	Yellow button lock

Rear Module Parts Identification



Part	Description
B	Rear module *(see page 113)*
C	USB (type A) port (USB1) *(see page 103)*
D	USB (type mini B) port (USB2)
E1	I/O terminal block 1 *(see page 116)*
E2	I/O terminal block 2 *(see page 116)*
F	DC power supply connector *(see page 95)*
G	Ethernet connector *(see page 146)*

Part	Description
H	Serial link (RS-232C/485) *(see page 152)*
I	CANopen connector
J	Yellow button lock

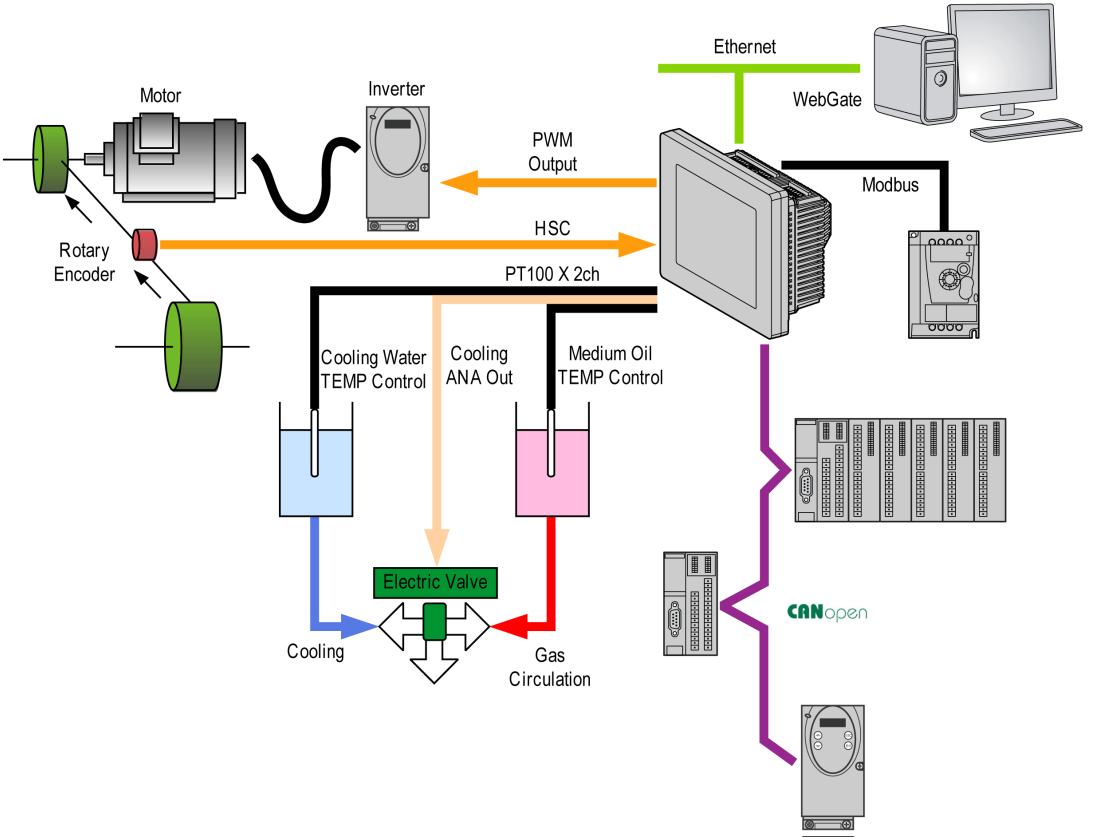
System Architecture

Introduction

The HMISCU system is a compact control system with the HMI and I/O embedded. The HMISCU system offers an all-in-one solution for an optimized configuration and an expandable architecture.

Architecture Example

The following figure provides an example of the HMISCU hardware environment:



HMISCU System Architecture

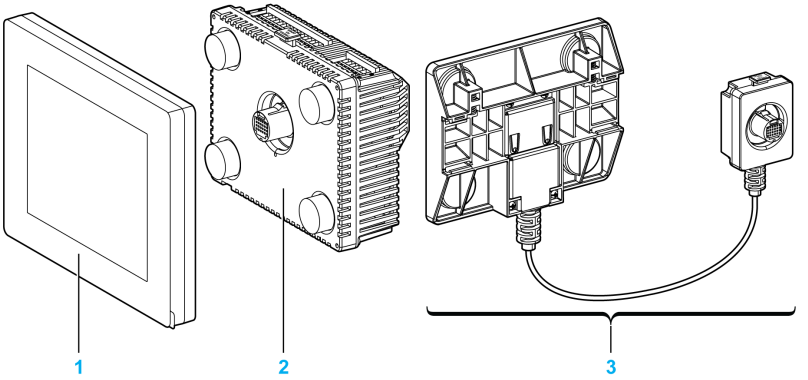
Optimized configuration and flexibility is provided by the association of:

- rear module that provides the logic and HMI functions
- front module that provides the display feature *(see page 139)*
- display module/rear module separation cable allows you to separate the display module from the rear module

Application requirements determine the architecture of your HMISCU system:

- high speed counter (HSC) inputs
- pulse width modulation (PWM) outputs
- pulse train output (PTO) outputs

The figure shows the components of the HMISCU system:



1 Display module
2 Rear module
3 Display module/rear module separation cable

Certifications and Standards

Introduction

Schneider Electric submitted this product to certification by third-party agencies. These agencies have certified this product as meeting the following standards.

For detailed information, contact your local distributor or see the catalog and marking on the product.

Agency Certifications for HMISCU Unit

HMISCU unit is certified by the Underwriters Laboratory according to:

- UL 508 and CSA C22.2 n° 142 for Industrial Control Equipment
- ANSI/ISA 12.12.01 and CSA C22.2 n° 213 for Electrical Equipment for Use in Class I, Division 2 Hazardous Locations

For detailed information, contact your local distributor or see the catalog & marking on the product.

Conditions of Acceptability and Handling Cautions for HMISCU Unit

The HMISCU unit is suitable for use in hazardous locations in accordance with Class I, Division 2 standards. All relevant local, state, and regional codes must be followed.

CE Markings

This product conforms to the necessary requirements of the following Directives for applying the CE label:

- 2006/95/EC Low Voltage Directive
- 2004/108/EC EMC Directive

This conformity is based on compliance with EN/IEC61131-2.

Hazardous Substances

HMISCU unit is designed for compliance with:

- WEEE, Directive 2012/19/EU
- RoHS, Directives 2011/65/EC
- RoHS China, Standard SJ/T 11363-2006
- REACh Regulation 2006/121/EC

⚠ CAUTION

ENVIRONMENTAL HAZARDS TO THE EQUIPMENT

- Allow the device to reach the surrounding air temperature, not exceeding 50 °C (122 °F), before turning the device on.
- Do not turn on the device if condensation has occurred inside the device. After it is completely dry again, the device may be turned on.
- Do not expose the device to direct sunlight.
- Do not obstruct the vents in the device casing.
- Remove any dust from the device before turning it on.
- Ensure that the cable installation fasteners are not damaged. Replace them, if necessary.
- Mount the device into an enclosure that meets the IP65 level of protection.

Failure to follow these instructions can result in injury or equipment damage.

⚠ WARNING

POTENTIAL FOR EXPLOSION IN HAZARDOUS LOCATIONS

- Verify that the power, input, and output (I/O) wiring are in accordance with Class I, Division 2 wiring methods.
- Do not substitute components that may impair compliance to Class I, Division 2.
- Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- Securely lock externally connected units and each interface before turning on the power supply.
- Do not, connect, or disconnect USB cable unless area is known to be non-hazardous.
- Potential electrostatic charging hazard: wipe the front panel of the terminal with a damp cloth before turning ON.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Interfaces are: COM1, Ethernet, USB1 and USB2.

⚠ WARNING

POTENTIAL FOR EXPLOSION IN HAZARDOUS LOCATIONS

- Do not disconnect while circuit is live.
- Potential electrostatic charging hazard: wipe the front panel of the terminal with a damp cloth before turning ON.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Devices Overview

Overview

HMISCU has various powerful features. This HMI controller can service a wide range of applications.

The software configuration and programming is accomplished with SoMachine and is described in the SoMachine Programming Guide *(see Harmony SCU, HMI Controller, Programming Guide)*.

HMISCU Range

Reference	Digital Input	Digital Output	Analog Input	Analog Output	Screen Size
HMISCU6A5 *(see page 115)*	14 regular inputs and 2 fast inputs (HSC)	8 regular outputs and 2 fast outputs (PTO)(1)	No	No	8.9 cm (3.5 in.)
HMISCU8A5 *(see page 115)*					14.48 cm (5.7 in.)
HMISAC *(see page 115)*					No
HMISCU6B5 *(see page 125)*	6 regular inputs and 2 fast inputs (HSC)	6 regular outputs and 2 fast outputs (PTO)(1)	2 analog inputs (12-bit plus sign SAR ADC) and 2 analog inputs (16-bit), for temperature	2 analog outputs (12-bit)	8.9 cm (3.5 in.)
HMISCU8B5 *(see page 125)*					14.48 cm (5.7 in.)
HMISBC *(see page 125)*					No
HMIS65 *(see page 139)*	No				8.9 cm (3.5 in.)
HMIS85 *(see page 139)*	No				14.48 cm (5.7 in.)

1 The fast outputs can be used either as regular outputs or as fast outputs for Pulse Train Output (PTO), Pulse Width Modulation (PWM) functions, or reflex output for high speed counter (HSC).

The HMISAC and HMISBC are replacement rear modules. The HMIS65 and HMIS85 are screen replacement modules. The table shows for equivalence:

Replacement Rear Module		Replacement Screen		Equivalent Full Module
HMISAC	+	HMIS65 (3.5 inch)	=	HMISCU6A5
HMISAC	+	HMIS85 (5.7 inch)	=	HMISCU8A5
HMISBC	+	HMIS65 (3.5 inch)	=	HMISCU6B5
HMISBC	+	HMIS85 (5.7 inch)	=	HMISCU8B5

Display Module/Rear Module Separation Cable Range

Reference	Cable Length
HMIZSURDP *(see page 76)*	3 m (9.84 ft.)
HMIZSURDP5 *(see page 76)*	5 m (16.40 ft.)
HMIZSURDP10 *(see page 76)*	10 m (32.81 ft.)
NOTE: The outer diameter of the cable is 8 mm (0.13 in.). To assemble this product, you need 20 mm (0.78 in.) more space to bend the cable in the end of the rubber.	

Key Features

Programming languages

The HMISCU is supported by and programmed with the SoMachine, which supports the following IEC61131-3 programming languages:

- IL: Instruction List
- ST: Structured Text
- FBD: Function Block Diagram
- SFC: Sequential Function Chart
- LD: Ladder Diagram

SoMachine can also be used to program the HMISCU controller using CFC (Continuous Function Chart) language.

Power Supply *(see page 94)*

The power supply of the HMISCU is 24 Vdc.

Real Time Clock *(see page 54)*

The HMISCU includes a Real Time Clock (RTC) system.

Memory *(see page 172)*

Embedded Input/Output

The following embedded I/O types are available, depending on the controller reference:

- Regular input
- Fast input (HSC)
- Regular output
- Fast output (PTO/PWM)
- Analog input
- Temperature input
- Analog output

NOTE: Frequency Generator (FG) is not supported.

Embedded communication features

4 types of communication ports are available on the rear panel:

- Ethernet port
- USB port
- Serial link port
- CANopen port

For more details, refer to the chapter Communication Interface *(see page 145)*.

Chapter 2
HMISCU System General Implementation Rules

Overview

This chapter describes the installation requirements, wiring rules and recommendations, and the environmental specifications of the controller.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Introduction	34
Installation Requirements	37
Environmental Characteristics	39
Wiring Rules and Recommendations	41
Wiring to the DIO Terminal Block	45
Grounding the System	48

Introduction

Before You Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

⚠ WARNING

UNGUARDED MACHINERY CAN CAUSE SERIOUS INJURY

- Do not use this controller and related software on equipment that does not have point-of-operation protection.
- Do not reach into machinery during operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The HMISCU controller and related software is used to control various industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, and so on, in some applications, more than one processor may be required, as when backup redundancy is needed.

Only the user can be aware of all the conditions and factors present during the setup, operation, and maintenance of the machine; therefore, only the user can determine the automation equipment and the related safeties and interlocks that can be properly used. When selecting automation and control equipment and related software for a particular application, the user should refer to the applicable local and national standards and regulations.

In some applications, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter pinch points or other hazardous areas and serious injury can occur. The HMISCU controller and related software products alone cannot protect an operator from injury. For this reason, this equipment cannot be substituted for or take the place of point-of-operation protection. Ensure that appropriate safeties and mechanical/electrical interlocks related to point of operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use appropriate safety interlocks where personnel and/or equipment hazards exist.
- Install and operate this equipment in an enclosure appropriately rated for its intended environment and secured by a keyed or tooled locking mechanism.
- Use the sensor and actuator power supplies only for supplying power to the sensors or actuators connected to the module.
- Power line and output circuits must be wired and fused in compliance with local and national regulatory requirements for the rated current and voltage of the particular equipment.
- Do not use this equipment in safety-critical machine functions unless the equipment is otherwise designated as functional safety equipment and conforming to applicable regulations and standards.
- Do not disassemble, repair, or modify this equipment.
- Do not connect any wiring to unused connections, or to connections designated as No Connection (N.C.).

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of this document, and are not included in any wiring diagrams, installation examples, application examples, programming examples, or other representations that may be included in this and other related documents.

Start-Up and Test

Before using electrical control and automation equipment for regular operation after installation, the system should be given by a start-up test qualified personnel to verify correct operation of the equipment. It is important that the arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

⚠ WARNING

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Verify that the completed system is free from all short circuits and grounds, except those grounds installed according to local and national regulations. If high-potential voltage testing is necessary, follow recommendations in equipment documentation to help prevent accidental equipment damage or injury.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove ground from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

Operation and Adjustments

There are hazards that can be encountered if this equipment is improperly operated or adjusted, regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components. It may be possible to mis-adjust this equipment and thereby produce unintended consequences. Only those operational adjustments required by the operator should be accessible to the operator. Access to other controls should be restricted to help prevent unauthorized changes in operating characteristics or machine behavior. Restrict access to such adjustments only to qualified personnel familiar with the machinery in use, and familiar with the instructions of equipment manufacturers for all of the electrical equipment employed. Use the instructions from the manufacturers as a guide for functional, electrical, or other like adjustments.

Installation Requirements

Before Starting

Read and understand this chapter before beginning the installation of your HMISCU.

Disconnecting Power

All options and modules should be assembled and installed before installing the control system on a mounting rail, onto a mounting plate or in a panel. Remove the control system from its mounting rail, mounting plate or panel before disassembling the equipment.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

Programming Considerations

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Operating Environment

This equipment has been designed to operate outside of any hazardous location. Only install this equipment in zones known to be free of a hazardous atmosphere.

⚠ DANGER

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use appropriate safety interlocks where personnel and/or equipment hazards exist.
- Install and operate this equipment in an enclosure appropriately rated for its intended environment and secured by a keyed or tooled locking mechanism.
- Use the sensor and actuator power supplies only for supplying power to the sensors or actuators connected to the module.
- Power line and output circuits must be wired and fused in compliance with local and national regulatory requirements for the rated current and voltage of the particular equipment.
- Do not use this equipment in safety-critical machine functions unless the equipment is otherwise designated as functional safety equipment and conforming to applicable regulations and standards.
- Do not disassemble, repair, or modify this equipment.
- Do not connect any wiring to unused connections, or to connections designated as No Connection (N.C.).

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Environmental Characteristics

Enclosure Requirements

HMISCU system components are designed as Zone B, Class A industrial equipment according to IEC/CISPR Publication 11. If they are used in environments other than those described in the standard, or in environments that do not meet the specifications in this manual, the ability to meet electromagnetic compatibility requirements in the presence of conducted and/or radiated interference may be reduced.

All HMISCU system components meet European Community (CE) requirements for open equipment as defined by EN61131-2. You must install them in an enclosure designed for the specific environmental conditions and to minimize the possibility of unintended contact with hazardous voltages. Use a metal enclosure to improve the electromagnetic immunity of your HMISCU system. Use enclosures with a keyed locking mechanism to minimize unauthorized access.

Environmental Characteristics

HMISCU meets CE requirements as indicated in the table below, and is intended for use in a Pollution Degree 2 industrial environment.

The table below gives the general environmental characteristics:

Characteristic	Specification	
Standard compliance	IEC61131-2	
Ambient operating temperature for the display and the rear module	Vertical installation	0...50 °C (32...122 °F)
	Horizontal installation	0...40 °C (32...104 °F)
Storage temperature		- 20...60 °C (- 4...140 °F)
Storage altitude		0...10,000 m (0...32,808 ft)
Operating altitude		0...2,000 m (0...6,560 ft)
Relative humidity		5...85% w/o condensation (non-condensing, wet bulb temperature 39 °C (102.2 °F) or less)
Degree of pollution	IEC60664	2
Degree of protection	IEC61131-2	IP20 with protective covers in place
Corrosion immunity		No
Corrosive gases		Free of corrosive gases
Air purity (dust)		≤ 0.1 mg/m^3 (10^{-7} oz/ft^3) (non-conductive levels)
Atmospheric pressure		800...1,114 hPa (2000 m (6,561 ft) or lower)

Characteristic	Specification	
Vibration resistance	Mounted on a DIN rail	3.5 mm (0.138 in.) fixed amplitude from 5...8.4 Hz 9.8 m/s^2 (1 g_n) fixed acceleration from 8.4...150 Hz
	Mounted on a panel	10 mm (0.394 in.) fixed amplitude from 5...8.6 Hz 29.4 m/s^2 (3 g_n) fixed acceleration from 8.6...150 Hz
Mechanical shock resistance	Mounted on a DIN rail	147 m/s^2 (15 g_n) for a duration of 11 ms
	Mounted on a panel	294 m/s^2 (25 g_n) for a duration of 6 ms
Connection type		Removable terminal block
Connector insertion/removal cycles		50

Electromagnetic Susceptibility

The HMISCU system meets electromagnetic susceptibility specifications as indicated in the table:

Characteristic	Specification	Range
Electrostatic discharge	IEC/EN 61000-4-2	8 kV (air discharge) 6 kV (contact discharge)
Electromagnetic fields	IEC/EN 61000-4-3	10 V/m (80 MHz...3 GHz)
Fast transients burst	IEC/EN 61000-4-4	Power lines: 2 kV Digital I/O: 1 kV Relay outputs: 2 kV Ethernet line: 1 kV COM line: 1 kV CAN line: 1 kV
Surge immunity	IEC/EN 61000-4-5	Power supply: CM: 1 kV; DM: 0.5 kV Digital I/O: CM: 1 kV; DM: 0.5 kV Shielded cable: 1 kV CM = common drive DM = differential drive
Immunity to conducted disturbances, induced by radio- frequency fields	IEC/EN 61000-4-6	10 Veff (0.15...80 MHz)
Conducted emission	EN 55011 (IEC/CISPR11)	150...500 kHz, quasi peak 79 dBµV
		500 kHz...30 MHz, quasi peak 73 dBµV
Radiated emission	EN 55011 (IEC/CISPR11)	30...230 MHz, 10 m @ 40 dBµV/m quasi peak
		230 MHz...1 GHz, 10 m @ 47 dBµV/m quasi peak

Wiring Rules and Recommendations

Introduction

There are several rules that must be followed when wiring the HMISCU system.

Wiring Guidelines

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

The following rules must be applied when wiring a HMISCU system:

- I/O and communication wiring must be kept separate from the power wiring. Route these 2 types of wiring in separate cable ducting.
- Verify that the operating conditions and environment are within specification.
- Use proper wire sizes to meet voltage and current requirements.
- Use copper conductors (highly recommended).
- Use twisted-pair, shielded cables for analog, and/or fast I/O.
- Use twisted-pair, shielded cables for networks, and fieldbus.

- For the power connector, refer to DC power supply wiring diagram *(see page 96)*.
- To help prevent malfunctions due to noise, separate all control, communication and power lines by placing them in separate ducts.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use shielded cables for all fast I/O, analog I/O, and communication signals.
- Ground cable shields for all fast I/O, analog I/O, and communication signals at a single point[1].
- Route communications and I/O cables separately from power cables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

[1]Multipoint grounding is permissible if connections are made to an equipotential ground plane dimensioned to help avoid cable shield damage in the event of power system short-circuit currents.

For more details, refer to Grounding Shielded Cables *(see page 48)*.

The wire sizes to use with the removable terminal blocks is 0.20 to 0.81 mm^2 (AWG 24 to 18).

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the power supplies.

Failure to follow these instructions will result in death or serious injury.

Terminal Block

Plugging a terminal block into the incorrect rear module can cause an electric shock or unintended operation of the application and/or can damage the rear module.

⚠⚠ DANGER

ELECTRIC SHOCK OR UNINTENDED EQUIPMENT OPERATION

Connect the terminal blocks to their designated location.

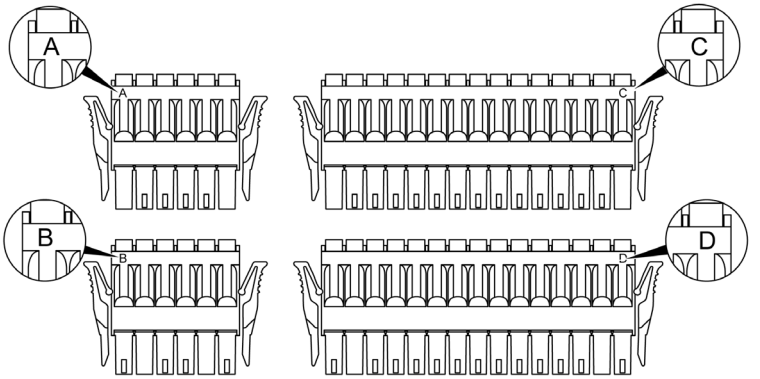
Failure to follow these instructions will result in death or serious injury.

Avoid temperature changes on the thermocouple's connection terminal. Temperature measurements may not be accurate due to temperature changes in the cold junction.

NOTE: When installing the terminal blocks to the rear module, please keep the display module unmounted.

NOTE: To help prevent a terminal block from being inserted incorrectly, clearly and uniquely code and label each terminal block and rear module.

The figure shows the labels on each terminal block:



NOTE: Terminal blocks A, B, C, and D can only use the respective connectors A, B, C, and D.

Protecting Outputs from Inductive Load Damage

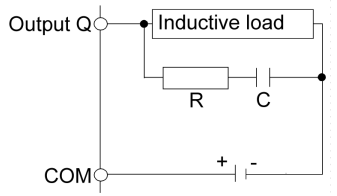
Depending on the load, a protection circuit may be needed for the outputs on the controllers and certain modules. Inductive loads using DC voltages may create voltage reflections resulting in overshoot that will damage or shorten the life of output devices.

⚠ CAUTION
OUTPUT CIRCUIT DAMAGE DUE TO INDUCTIVE LOADS Use an appropriate external protective circuit or device to reduce the risk of inductive direct current load damage. **Failure to follow these instructions can result in injury or equipment damage.**

If your controller or module contains relay outputs, these types of outputs can support up to 240 Vac. Inductive damage to these types of outputs can result in welded contacts and loss of control. Each inductive load must include a protection device such as a peak limiter, RC circuit or flyback diode. Capacitive loads are not supported by these relays.

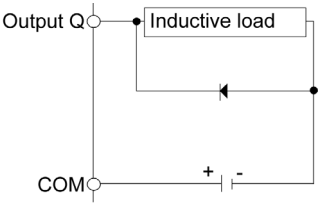
⚠ WARNING
RELAY OUTPUTS WELDED CLOSED ● Always protect relay outputs from inductive alternating current load damage using an appropriate external protective circuit or device. ● Do not connect relay outputs to capacitive loads. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Protective circuit A: this protection circuit can be used for DC load power circuits.



- C represents a value from 0.1 to 1 µF.
- R represents a resistor of approximately the same resistance value as the load.

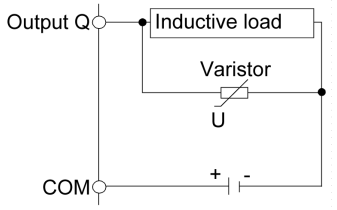
Protective circuit B: this protection circuit can be used for DC load power circuits.



Use a diode with the following ratings:

- Reverse withstand voltage: power voltage of the load circuit x 10.
- Forward current: more than the load current.

Protective circuit C: this protection circuit can be used for DC load power circuits.



- In applications where the inductive load is switched on and off frequently and/or rapidly, ensure that the continuous energy rating (J) of the varistor exceeds the peak load energy by 20% or more.

Wiring to the DIO Terminal Block

Introduction

Wiring Rules and Recommendations. *(see page 41)*

⚠ CAUTION
EQUIPMENT DAMAGE Be sure to remove the terminal blocks from the equipment prior to wiring. **Failure to follow these instructions can result in injury or equipment damage.**

Screwdriver Required to Wire Terminal Blocks

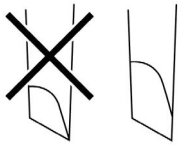
Recommended type: 1891348-1 (Tyco Electronics AMP)

If another manufacturer is used, be sure the part has the following dimensions:

- point depth: 1.5 mm *(0.06 in.)*
- point height: 2.4 mm *(0.09 in.)*

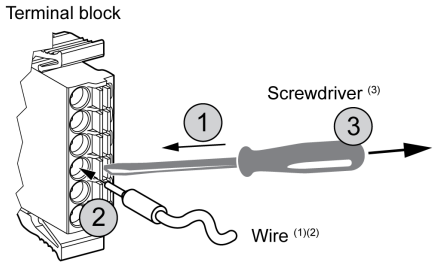
Point shape must be DIN5264A and meet standard DN EN60900.

Also, the screwdriver tip must be flat, as indicated, to access the narrow hole of the terminal block:



The terminal blocks are a spring clamp type.

Procedure



Use the following procedure to connect the wires to the terminal blocks:

Step	Action
1	Insert the screwdriver into the square-shaped hole. This will open the wire's round-shaped hole.
2	Hold the screwdriver and insert the wire into the wire's round-shaped hole.
3	Take out the screwdriver from the square-shaped hole. The round-shaped hole will then close, and the wire will be held securely in place.

NOTE: To remove the wire, reinsert the screwdriver into the square-shaped hole and when the wire's spring clamp releases, pull out the wire.

(1) Wire should be 0.20...0.81 mm^2 (AWG 24...18), with the end twisted. Applicable wire style are UL1015 and UL1007.

(2) Strip 7.0 mm *(0.28 in)* of jacket from the wire. Strip only the amount of jacket required. If too much jacket is removed, the ends may short against each other or against the terminals, which can create an electric short. If not enough jacket is removed, the wire may not make sufficient contact with the terminal.

Insert each wire completely into its opening. Improper insertion can lead to a loss of unit power or short circuit, either against the wire filaments or against the terminals, or to over heating of the wire and terminal.

(3) Do not rotate the point of the screwdriver inside the square-shaped opening. It may damage the equipment.

⚠ WARNING

IMPROPER WIRING PRACTICES CAN MAKE EQUIPMENT INOPERABLE

- Use only the specified wire sizes for I/O channels and power supplies.
- Prepare wires and make connections as specified in this documentation.
- Do not connect more than one wire per terminal block connector.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Grounding the System

Overview

To minimize the effects of electromagnetic interference, cables carrying the fast Input/Output, analog Input/Output, and Serial communication signals must be shielded.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use shielded cables for all fast I/O, analog I/O, and communication signals.
- Ground cable shields for all fast I/O, analog I/O, and communication signals at a single point[1].
- Route communications and I/O cables separately from power cables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

[1]Multipoint grounding is permissible if connections are made to an equipotential ground plane dimensioned to help avoid cable shield damage in the event of power system short-circuit currents.

The use of shielded cables requires compliance with the following wiring rules:

- For protective ground (PE) connections, metal conduit or ducting can be used for part of the shielding length, provided there is no break in the continuity of the ground connections. For functional ground (FE), the shielding is intended to attenuate electromagnetic interference and the shielding must be continuous for the length of the cable. If the purpose is both functional and protective, as is often the case for communication cables, the cable must have continuous shielding.
- Wherever possible, keep cables carrying one type of signal separate from the cables carrying other types of signals or power.

Protective Ground (PE) on the Backplane

The protective ground (PE) is connected to the conductive backplane by a heavy-duty wire, usually a braided copper cable with the maximum allowable cable section.

Functional Ground on the DIN Rail

The DIN rail for your HMISCU system is common with the functional ground plane and must be mounted on a conductive backplane.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Connect the DIN rail to the functional ground (FE) of your installation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Shielded Cables Connections

Cables carrying the fast I/O, analog I/O, and fieldbus communication signals must be shielded. The shielding must be securely connected to ground. The fast I/O and analog I/O shields may be connected either to the functional ground (FE) or to the protective ground (PE) of your HMISCU logic controller. The fieldbus communication cable shields must be connected to the protective ground (PE) with a connecting clamp secured to the conductive backplane of your installation.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK

- The grounding terminal connection (PE) must be used to provide a protective ground at all times.
- Make sure that an appropriate, braided ground cable is attached to the PE/PG ground terminal before connecting or disconnecting the network cable to the equipment.

Failure to follow these instructions will result in death or serious injury.

The shielding of the cables must be connected to the protective ground (PE).

⚠ DANGER

HAZARD OF ELECTRIC SHOCK

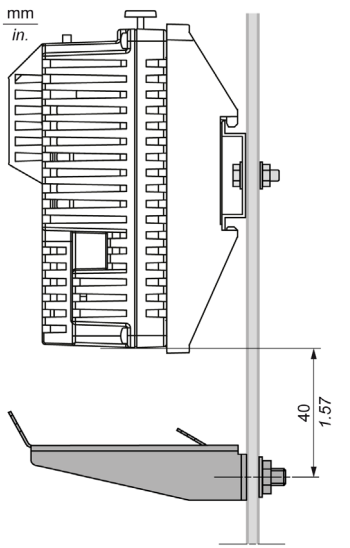
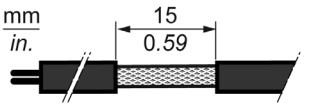
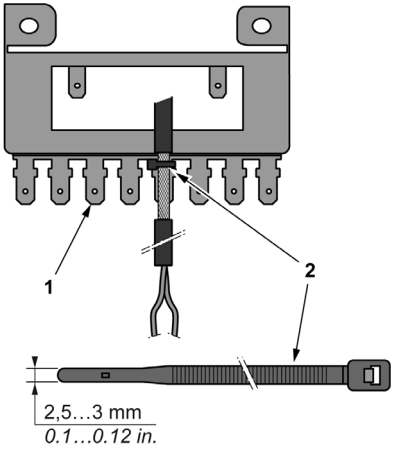
Make sure that cables are securely connected to the protective ground (PE).

Failure to follow these instructions will result in death or serious injury.

NOTE: The functional ground of the Ethernet connection is internal.

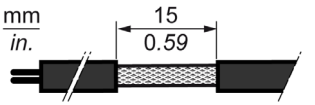
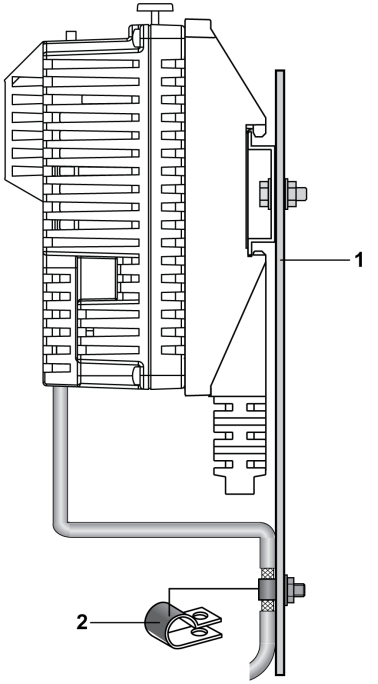
Functional Ground (FE) Cable Shielding

To connect the shield of a cable through the grounding bar:

Step	Description	
1	Install the grounding bar directly on the conductive backplane below the HMISCU rear module as illustrated.	
2	Strip the shielding for a length of 15 mm (0.59 in.).	
3	Tightly clamp on the blade connector **(1)** using nylon fastener **(2)** (width 2.5...3 mm (0.1...0.12 in.)) and appropriate tool.	

Protective Ground (PE) Cable Shielding

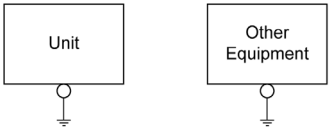
To ground the shield of a cable through a grounding clamp:

Step	Description	
1	Strip the shielding for a length of 15 mm (0.59 in.)	
2	Attach the cable to the conductive backplane plate **(1)** by attaching the grounding clamp **(2)** to the stripped part of the shielding as close as possible to the HMISCU rear module.	

NOTE: The shielding must be clamped securely to the conductive backplane to ensure a good contact.

Exclusive Grounding

Connect the frame ground (FG) terminal on the power plug to an exclusive ground.



Grounding Procedure

Step	Action
1	Check that the grounding resistance is less than 100 Ω.
2	Create the connection point as close to the unit as possible, and make the wire as short as possible. When using a long grounding wire, replace the thin wire with a thicker wire, and place it in a duct.

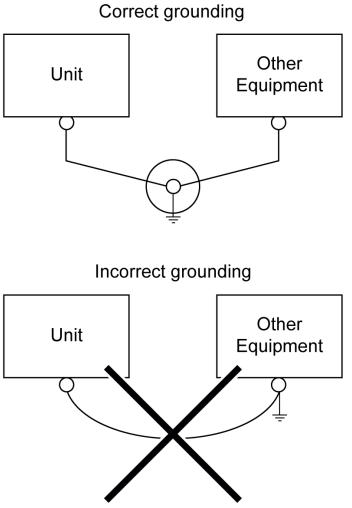
Common Grounding

Precautions:

Electromagnetic interference (EMI) can be created if the devices are improperly grounded. Electromagnetic interference (EMI) can cause loss of communication.

Do not use common grounding, except for the authorized configuration described below.

If exclusive grounding is not possible, use a common connection point.



Chapter 3
HMISCU Description

Overview

This chapter describes the HMISCU features.

What Is in This Chapter?

This chapter contains the following sections:

Section	Topic	Page
3.1	Rear Module Features	54
3.2	I/O Management	55

Section 3.1
Rear Module Features

Real Time Clock (RTC)

Overview

The HMISCU controllers include an RTC to provide system date and time information, and to support related functions requiring a real-time clock.

Variations in operating conditions can cause a clock shift:

Ambient Temperature	Accuracy
0°C (32 °F)	-1...2.5 minutes
25°C (77 °F)	-2.5...2.5 minutes
50°C 122 °F)	-5.5...2.5 minutes

RTC Battery

The controller has one RTC battery.

In the event of a power interruption, the backup battery retains the time and date for the controller.

The table describes the characteristics of the RTC battery:

Use	In the event of a transient power outage, the battery powers the RTC.
Duration of backup	At least 60 days at 25 °C max (77 °F). At higher temperatures, the duration of backup is reduced.
Battery monitoring features	Yes

NOTE: This battery is not replaceable.

Section 3.2
I/O Management

What Is in This Section?

This section contains the following topics:

Topic	Page
Input Management	56
Output Management	59

Input Management

Overview

The HMISCU includes 2 fast inputs.

The following functions are configurable on regular and/or fast inputs:

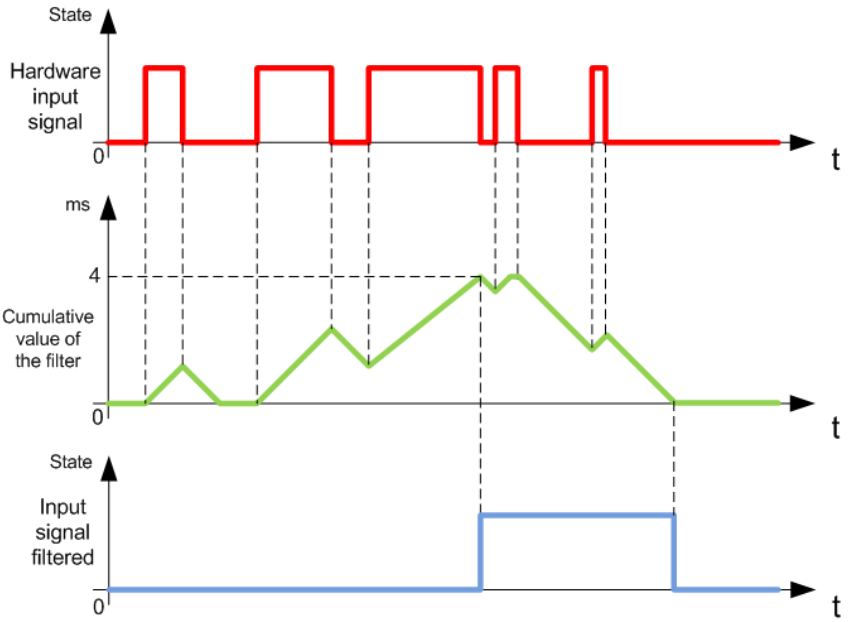
- Filters (depends on the function associated with the input).
- 2 fast inputs can be either latched or used for events (rising edge, falling edge, or both) and thus be linked to an external task (up to 2).
- Any digital input can be used for the Run/Stop function.
- Some of the inputs can be used by HSC, PTO, and PWM functions.

NOTE: All inputs by default can be used as regular inputs.

Integrator Filter Principle

The integrator filter is designed to reduce the effect of noise. Setting a filter value allows the controller to ignore sudden changes of input levels caused by noise.

The following timing diagram illustrates the integrator filter effects for a value of 4 ms:

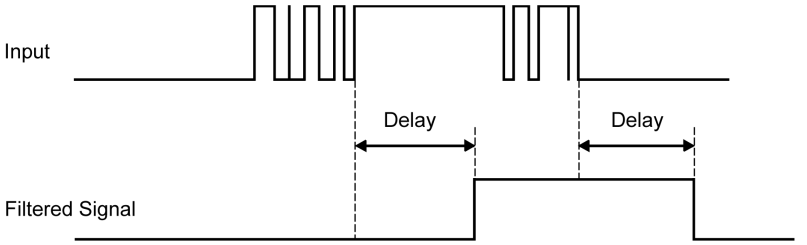


NOTE: The value selected for the filter's time parameter specifies the cumulative time in ms that must elapse before the input can be 1.

Bounce Filter Principle

The bounce filter is designed to reduce the bouncing effect at the inputs. Setting a bounce filter value allows the controller to ignore sudden changes of input levels caused by noise. The bounce filter is only available on the fast inputs.

The following timing diagram illustrates the anti-bounce filter effects:



Bounce Filter Availability

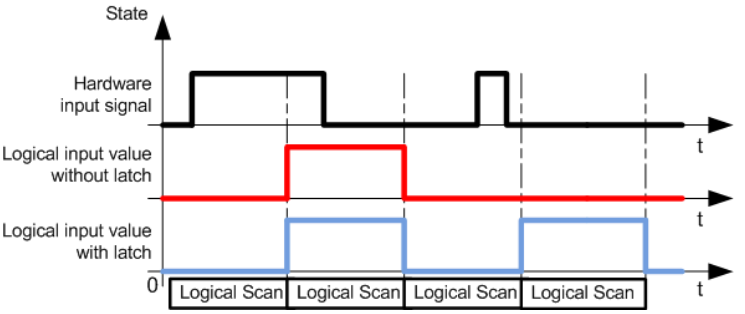
You can use the bounce filter on a fast input when:

- Using a latch or event.
- No HSC is enabled.

Latching

Latching is a function that can be assigned to the HMISCU fast inputs. Use this function to memorize (or latch) any pulse with a duration less than the HMISCU scan time. When a pulse is shorter than one scan, the controller latches the pulse, which is then updated in the next scan. This latching mechanism only recognizes rising edges. Falling edges cannot be latched. Assigning inputs to latch with the I/O configuration screen in SoMachine.

The following timing diagram illustrates the latching effects:



Event

You can associate an input configured for Event with an External Task *(see Harmony SCU, HMI Controller, Programming Guide)*.

RUN/STOP

Use the Run/Stop function to start or stop a program using an input:

- When the configured Run/Stop input is at logic 0, the controller is put into a Stop state and any outside command to enter the Run state is ignored.
- A rising edge (passing from 0 to 1) of the Run/Stop input starts the application as the controller enters the Run state.
- Run/Stop commands to SoMachine may also be issued from the HMI via touch switches on a panel. Refer to Commanding State Transitions *(see Harmony SCU, HMI Controller, Programming Guide)*.
- Vijeo Designer has an Controller Lockout feature for added safety, which will help prevent Run when active (this has priority over all methods of RUN). Refer to Controller Lockout feature *(see Harmony SCU, HMI Controller, Programming Guide)*.
- When the configured Run/Stop input is at logic 1, then the controller program is running unless otherwise commanded by SoMachine (Run/Stop commands from SoMachine are allowed).

⚠ WARNING

UNINTENDED MACHINE OR PROCESS START-UP

- Verify the state of security of your machine or process environment before applying power to the Run/Stop input.
- Use the Run/Stop input to help prevent the unintentional start-up from a remote location.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

For more information, refer to Embedded I/O configuration *(see Harmony SCU, HMI Controller, Programming Guide)*.

Output Management

Introduction

The HMISCU Controller includes regular outputs and fast outputs.

The following output functions are configurable on fast outputs:

- pulse train output (PTO)
- pulse width modulation (PWM)

NOTE: By default, all outputs can be used as regular outputs.

Fast Output Management Availability

The information refers to all HMISCU Controllers with fast outputs:

Function		PTO / PWM
Channel Number		Channel Name
Transistor output	FQ0	PTO0 Output0
	FQ1	PTO1 Output1

Fallback Modes (Behavior for Outputs in Stop)

When the controller enters the STOP or EXCEPTION state for any reason, the local outputs are set to the fallback values. 2 modes are available:

Set all outputs to default: Each output is set to the configured default value, either 0 or 1 (initially set to 0 in the configuration).

Keep current values: Each output remains in its current state.

The fallback settings that may be configured (fallback to 0, fallback to 1, or fallback to the current state) do not apply to fast outputs if these outputs are configured for embedded function. If a detected error results in the controller entering fallback mode, these outputs will assume a value of 0 regardless of the configured fallback setting.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Design and program your system so that controlled equipment assumes a safe state when the controller enters fallback mode if you use fast outputs for embedded function.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE:

- Fallback configuration for outputs does not apply when fast outputs are used for embedded function. In these cases fallback value is always 0.
- In case of fallback for PTO embedded function, any ongoing move is aborted and ramp-down to 0 (controlled stop feature).

Short-circuit or Over-Current on Outputs

In the case of short-circuit or over-current on outputs, there are 2 groups of outputs:

- Group 3: fast outputs
- Group 1 and 2: relay outputs

There is a short circuit protection for Group 1 from outputs to V-. However there is no other short circuit protection on the outputs.

For HMISCU•A5 (type DIO), in the case of short-circuit or over-current on outputs, there are different considerations for the 2 groups of outputs:

- Group 3 (FQ0 to FQ1): 2 fast outputs
- Group 1 and 2 (DQ0 to DQ7): 8 regular outputs

For HMISCU•B5 (type DIO and AIO), in the case of short-circuit or over-current on outputs, there are different considerations for the 2 groups of outputs:

- Group 3 (FQ0 to FQ1): 2 fast outputs
- Group 1 and 2 (DQ0 to DQ5): 6 regular outputs

NOTE: Groups are defined in terminal block description in the presentation of each controller chapter.

The table describes the detection:

If...	then...
you have a short-circuit at 0 V on group 3	group 3 automatically goes into thermal protection mode (all fast, PWM outputs set to 0 and PTO outputs run an immediate stop) and then periodically rearmed every 10 seconds to test the connection state (see warning below).
you have a short-circuit at 24 V on group 3	group 3 automatically goes into protection mode and is then periodically rearmed every 200 microseconds to test the connection state.

NOTE: The information in the table does not apply to relay outputs.

For more information on protecting outputs, refer to your controller wiring diagram and to the general wiring rules *(see page 41)*.

NOTE: The short-circuit diagnostic for each category is provided by the function GetshortcutStatus *(see Harmony SCU, HMI Controller, PLCSystem Library Guide)*.

The regular outputs of this equipment do not have built-in reverse polarity protection. Incorrectly connecting polarity can permanently damage the output circuits or otherwise result in unintended operation of the equipment.

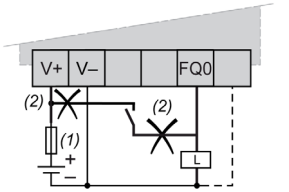
NOTICE

DAMAGE TO FAST OUTPUTS

- Ensure the use of adequate protection against short-circuits on the power supply to the fast outputs.
- Do not connect positive voltage to any of the DC fast output terminals.
- Comply with the wiring diagrams immediately that follow this message.

Failure to follow these instructions can result in equipment damage.

Example of incorrect wiring:



1 2 A fast-blow fuse
2 Incorrect wiring

⚠ WARNING

UNINTENDED MACHINE START-UP

Inhibit the automatic rearming of outputs if this feature is an undesirable behavior for your machine or process.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Wiring Considerations

NOTE: The power supply of PTO/PWM circuit runs before the system power runs, otherwise the error of PTO/PWM occurs.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Wire the outputs correctly according to the wiring diagram.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

If your controller or module contains relay outputs, these types of outputs can support up to 240 Vac. Inductive damage to these types of outputs can result in welded contacts and loss of control. Each inductive load must include a protection device such as a peak limiter, RC circuit or flyback diode. Capacitive loads are not supported by these relays.

⚠ WARNING

RELAY OUTPUTS WELDED CLOSED

- Always protect relay outputs from inductive alternating current load damage using an appropriate external protective circuit or device.
- Do not connect relay outputs to capacitive loads.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Chapter 4
Device Connectivity

Introduction

This chapter presents the equipment you can connect to the HMISCU panel.

What Is in This Chapter?

This chapter contains the following topics:

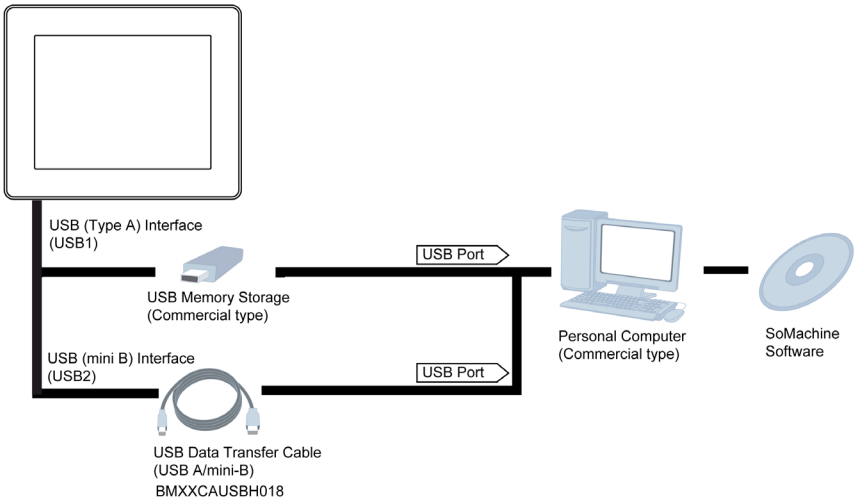
Topic	Page
System Design	64
Interface Accessories	66

System Design

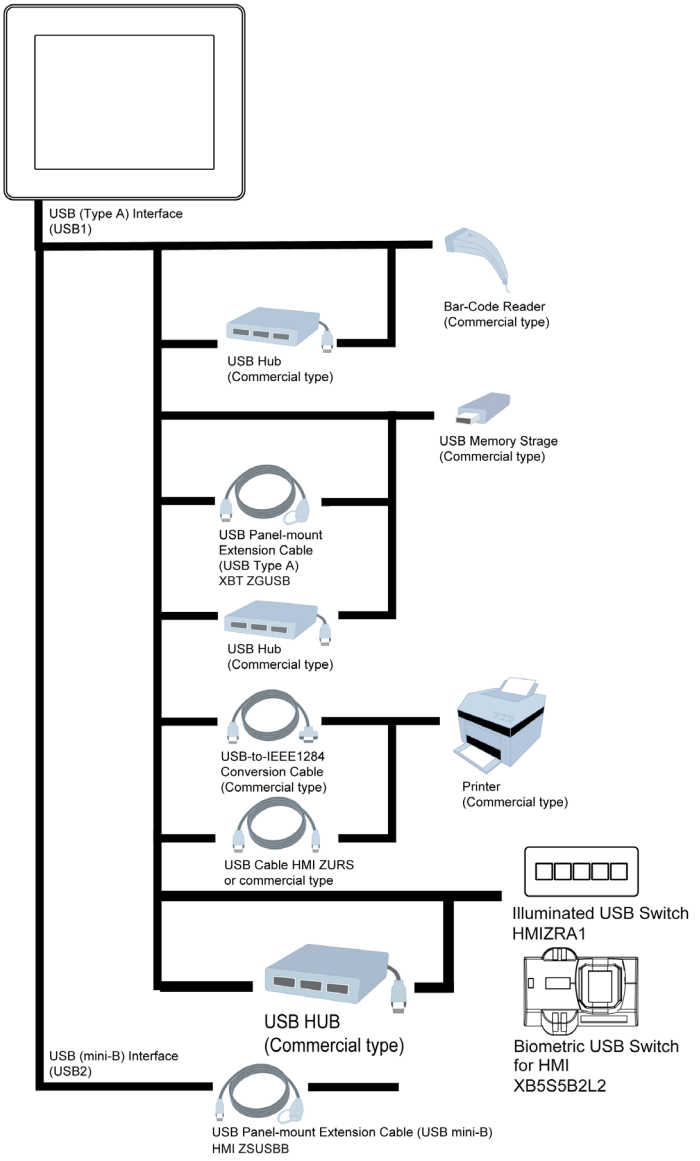
Introduction

The following diagrams represent the main selection of equipment you can connect to the panels.

Edit Mode Peripherals



Run Mode Peripherals - USB Type A/Mini B Interface



Interface Accessories

Serial Interface Items

Reference Number	Description
XBTZ9780 (2.5 m/8.20 ft) **XBTZ9782** (10 m/32.80 ft)	Connects COM1 to Premium, Micro or Twido PLC.
XBTZ9980 (2.5 m/8.20 ft) **XBTZ9982** (10 m/32.8 ft)	Connects COM1 to Modicon M238, M258, or M340
VW3A8306	Connects COM1 to derivation box TSXSCA62
VW3A8306R10	Connects COM1 to ATV drives, a hub LU9GC3 or fieldbus taps TWDXCAT3RJ or TWDXCAISO
XBTZG939 + **XBTZ988** or **XBTZ9715**	Connects COM1 port to Advantys STB
XBTZG939	Cable adapter COM1, RJ45
XBTZ968 **XBTZ9680** **XBTZ9681**	Connects COM1 port with XBTZ adapter to Premium, Micro or Twido PLC
XBTZ9710	Connects COM1 port with XBTZ adapter to Quantum PLC
XBTZ9711	Connects COM1 port with XBTZ adapter to Momentum PLC
XBTZ908	Connects COM1 port with XBTZ adapter to derivation box TSXSCA62
XBTZ938	Connects COM1 port with XBTZ adapter to ATV drives, a hub LU9GC3 or fieldbus taps TWDXCAT3RJ or TWDXCAISO
XBTZ918	Connects COM1 port with XBTZ adapter to Premium SCY
XBTZ988	Connects COM1 port with XBTZ adapter to Advantys STB
XBTZ9733	Connects COM1 to Rockwell DF1 Logix PLC
XBTZ9734	Connects COM1 to Rockwell DH485 Logix PLC
XBTZ980 or **HMIZ950** (without adaptor)	Connects COM1 with XBT Z adapter to Mitsubishi PLC FX series CPU
XBTZ9743	Connects COM1 to Omron PLC Sysmac Link series
XBTZ9730 **XBTZ9731**	Connects COM1 with XBT Z adapter to Rockwell DF1 PLC
XBTZ9732	Connects COM1 with XBT Z adapter to Rockwell DH485 PLC
XBTZ9740	Connects COM1 with XBT Z adapter to Omron PLC Sysmac Link series

USB Interface Items

Reference Name	Reference Number	Description
USB extension cable	XBTZGUSB	Extends a USB Type A host interface on a cabinet with waterproofing
	HMIZSUBB	Extends a USB mini B host interface on a cabinet with waterproofing
USB conversion cable	HMIZURS	Converts a USB Type A host interface to RS-232
USB data transfer cable	XBTZG935	Connects the panel to a personal computer for transferring screen data and user programs
	BMXXCAUSBH018	Connects the USB Mini-B USB to a USB terminal port of a PC

Software

Reference Name	Description
Vijeo Designer (Version 6.1 SP3 or later)	Software installed on a PC for creating HMI project data
SoMachine	Software used to create HMI project data. It is installed on a personal computer.

Maintenance Options

Reference Name	Reference Number	Description
USB STD A holder	HMIZSCPL2	Fastens onto a USB interface and prevents the USB cable from being disconnected.
USB mini B holder	HMIZSCPL4	Fastens onto a USB interface and prevents the USB cable from being disconnected.
Power supply connector	XBTZGPWS1	Set of 5 power connectors
Protection	HMIZS61	Set of 5 screen protective sheets. These are for the small display module (3.5 in.)
	HMIZSU62	Set of 5 screen protective sheets. These are for the large display module (5.7 in.)
Accessory kit	HMIZSUKIT	Accessory Kit for HMISCU, contains: ● USB standard Type A cable holder ● USB mini B cable holder ● Anti-rotation tee ● 2 panel adaptors
Tightening wrench	ZB5AZ905	Wrench for tightening the head fixing nut.
Head mounting nut	ZB5AZ901	Set of 10 nuts diameter 22 mm (0.86 in.)

CANopen Cables and Connectors Parts

Reference Name	Reference Number	Description
Recommended cable connector	TSXCANKCDF180T	Straight connector with terminal selector switch.
	TSXCANKCDF90T TSXCANKCDF90TP	Right-angled connector with terminal selector switch.
Recommended transfer cable	TSXCANCA50 TSXCANCA00	Cable for CANopen (IEC60332-1) 50 m/100 m (164.04 ft/328.08 ft).
	TSXCANCB50 TSXCANCB100	UL-approved cable for CANopen (IEC60332-2) 50 m/100 m (164.04 ft/328.08 ft).
Preassemble cord set cables - 2 sub D9 female connectors	TSXCANCADD03	0.3 m (0.98 ft)
	TSXCANCADD1	1 m (3.28 ft)
	TSXCANCADD3	3 m (9.84 ft)
	TSCANCADD5	5 m (16.40 ft)
Preassemble cord set cables - 1 Sub D9 and 1 RJ45 connectors	TSXCANCBDD03	0.3 m (0.98 ft)
	TSXCANCBDD1	1 m (3.28 ft)
	TSXCANCBDD3	3 m (9.84 ft)
	TSXCANCBDD5	5 m (16.40 ft)

NOTE: Please use your own cables or cable connectors with your own responsibility.

Chapter 5
HMISCU Installation

Overview

This chapter provides installation safety guidelines, device dimensions, mounting instructions, and environmental specifications.

What Is in This Chapter?

This chapter contains the following sections:

Section	Topic	Page
5.1	Mechanical Requirements	70
5.2	Electrical Requirements	94
5.3	USB Port	103

Section 5.1
Mechanical Requirements

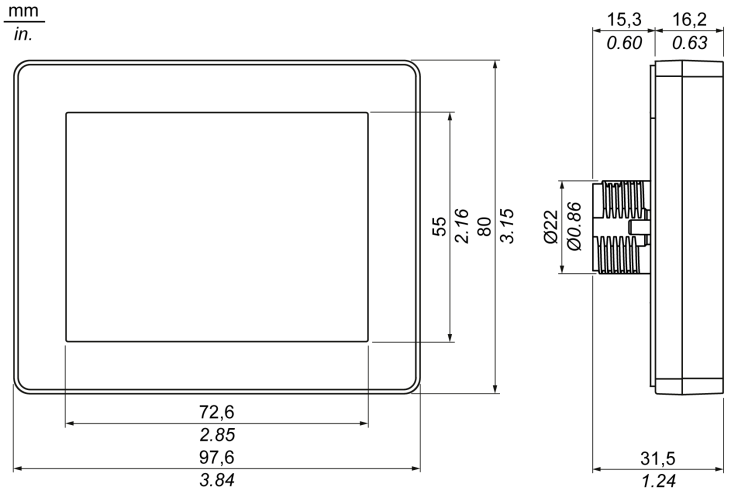
What Is in This Section?

This section contains the following topics:

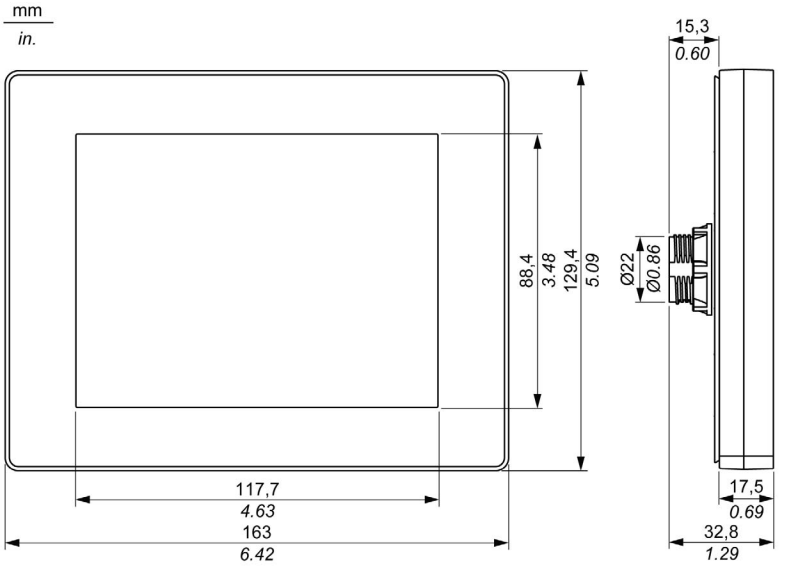
Topic	Page
Dimensions	71
Panel Cut-Out Dimensions and Installation	77
Installation Procedures	81
Mounting Positions	87
Mounting Clearances	88
DIN Rail	90
Installing and Removing the Rear Module on a DIN Rail	91

Dimensions

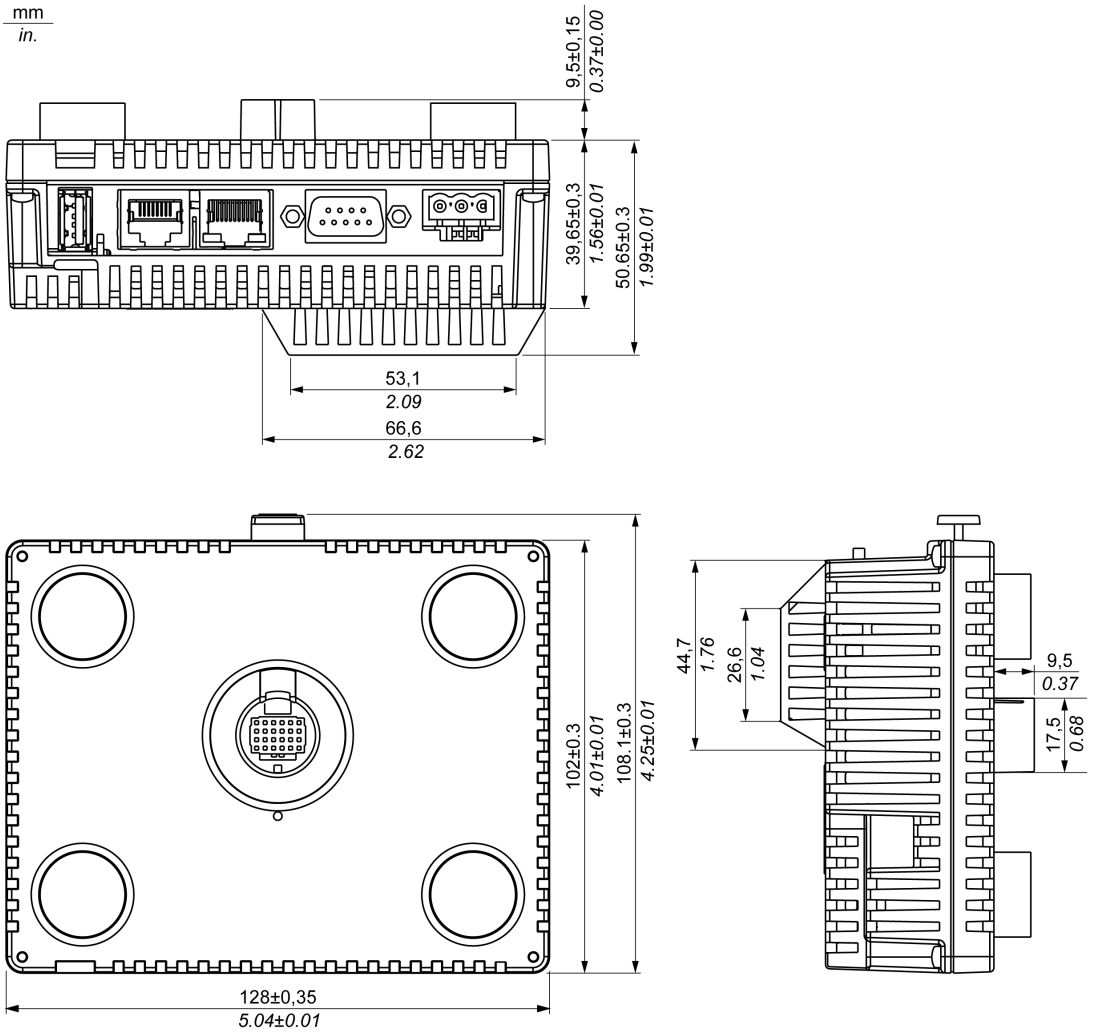
3.5 Inches Display Module



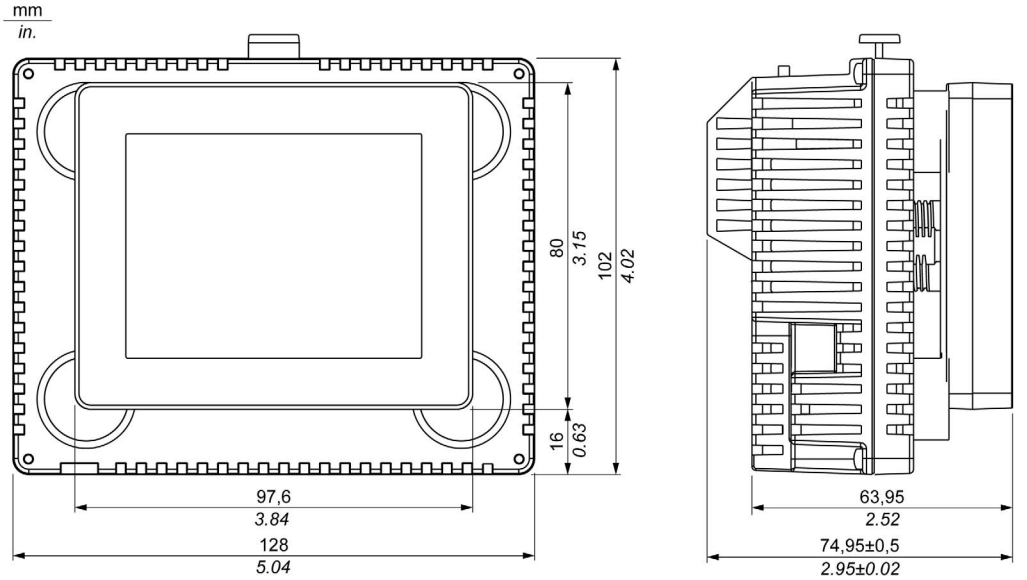
5.7 Inches Display Module



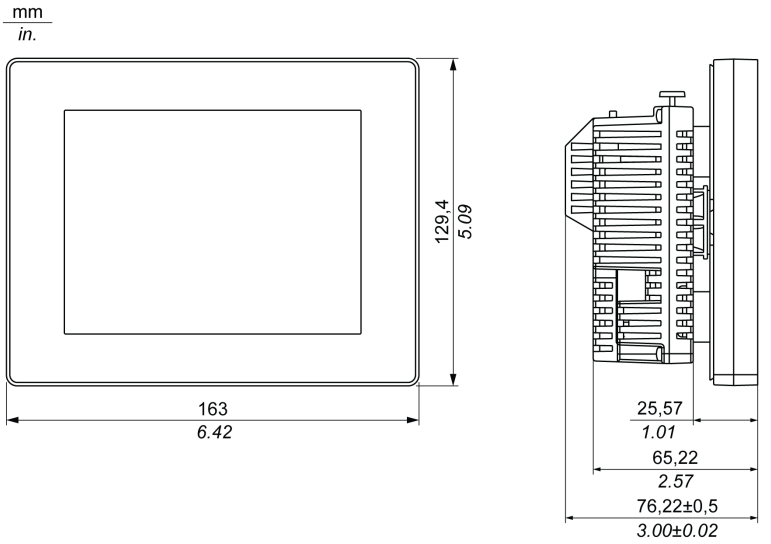
Rear Module


mm
in.
9,5±0,15
0.37±0.00
39,65±0,3
1.56±0.01
50.65±0.3
1.99±0.01
53,1
2.09
66,6
2.62
102±0,3
4.01±0.01
108.1±0.3
4.25±0.01
128±0,35
5.04±0.01
44,7
1.76
26,6
1.04
9,5
0.37
17,5
0.68

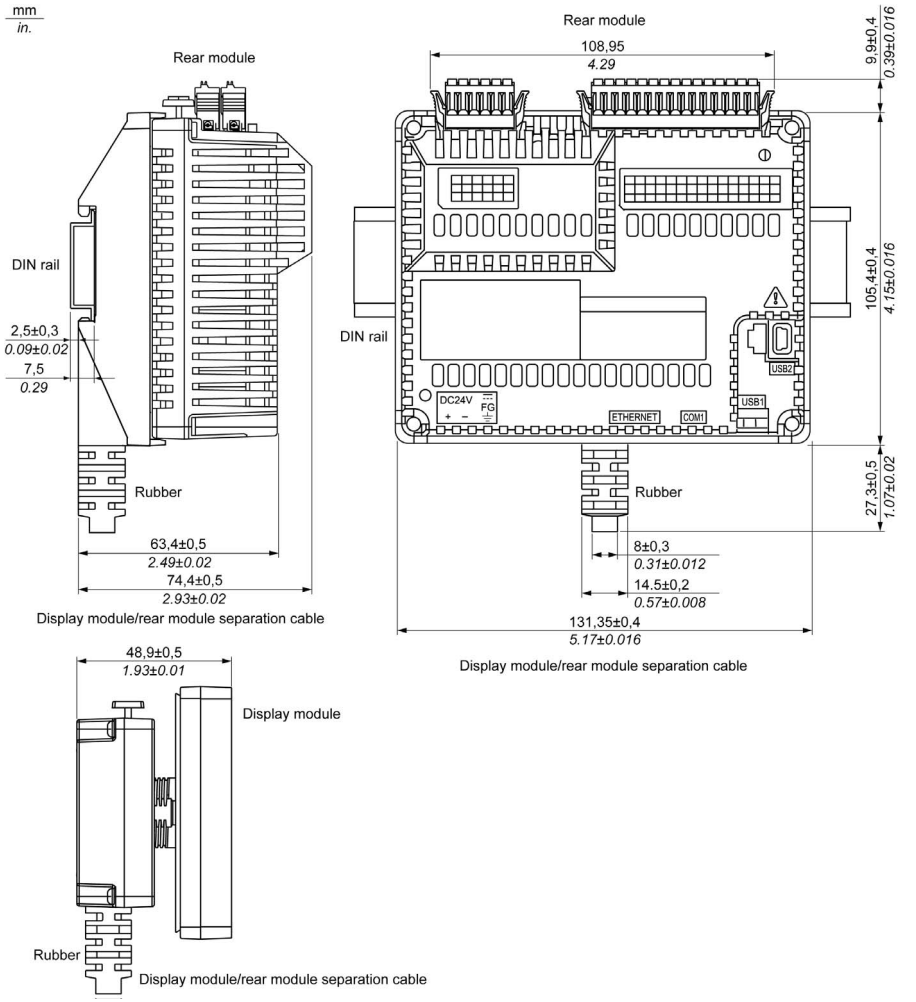
3.5 Inches Display Module and Rear Module



5.7 Inches Display Module and Rear Module



Display Module/Rear Module Separation Cable



NOTE:

Use this display module/rear module separation cable when the rear module is installed on the rail:

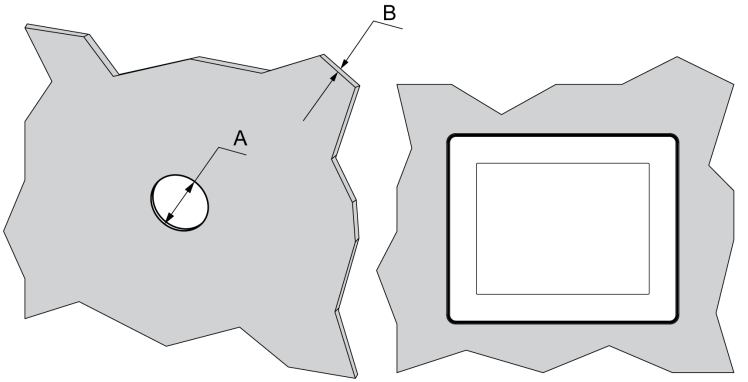
- The outer diameter of the cable is 8 mm (0.31 in.).
- The cable has 3 versions: 3 m (9.84 ft), 5 m (16.4 ft), and 10 m (32.8 ft).
- To assemble this product, you need 20 mm (0.78 in.) more space to bend the cable in the end of the rubber.

Panel Cut-Out Dimensions and Installation

Inserting a Display Module Without an Anti-Rotation Tee

Create a panel cut-out and insert the display module into the panel from the front.

The figure shows the panel cut-out:



Cut-out dimensions for mounting on a flat surface:

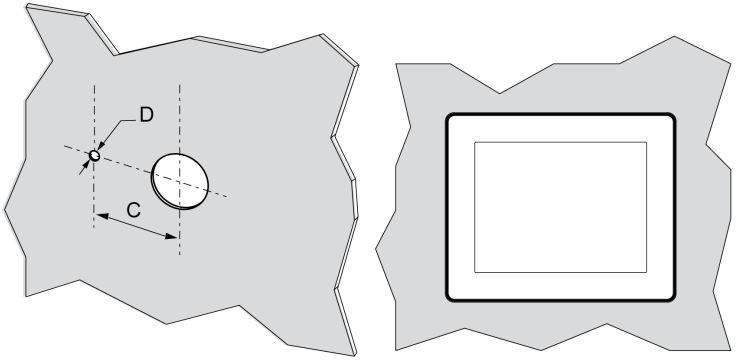
A	B (1)	B (2)
$22.50^{0/-0.30}$ mm ($0.88^{0/-0.01}$ in.)	1.5...6 mm (0.06...0.23 in.)	3...6 mm (0.11...0.23 in.)
(1) Steel sheet **(2)** Glass fiber reinforced plastics (minimum GF30)		

NOTE: Without the tee option, the display module supports a rotating torque of 2.5 N•m (22.12 lb-in).

Inserting a Display Module With an Anti-Rotation Tee

Create a panel cut-out and insert the display module into the panel from the front.

The figure shows the panel cut-out for a HMISCU Controller using a tee:



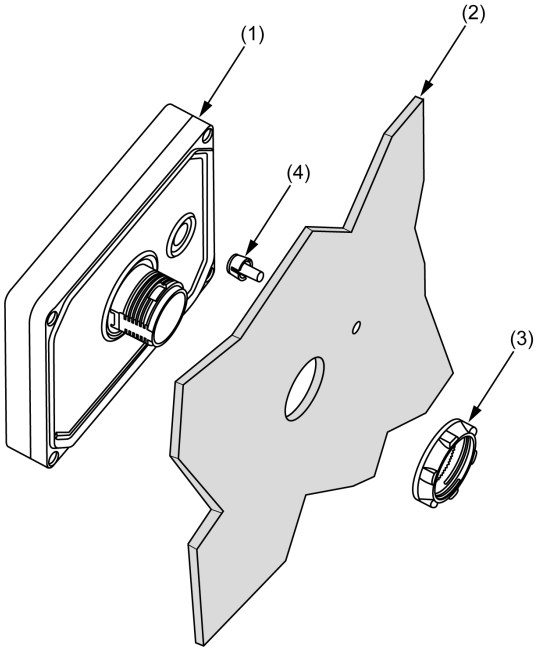
Cut-out dimensions for mounting on a flat surface:

C	D
$30^{0/-0.20}$ mm ($1.18^{0/-0.0007}$ in.)	$4^{0/-0.20}$ mm ($0.15^{0/-0.007}$ in.)

NOTE: With the tee option, the display module supports a rotating torque of 6 N•m (53.10 lb-in).

Installing the HMISCU Display

The figure shows the assembly:



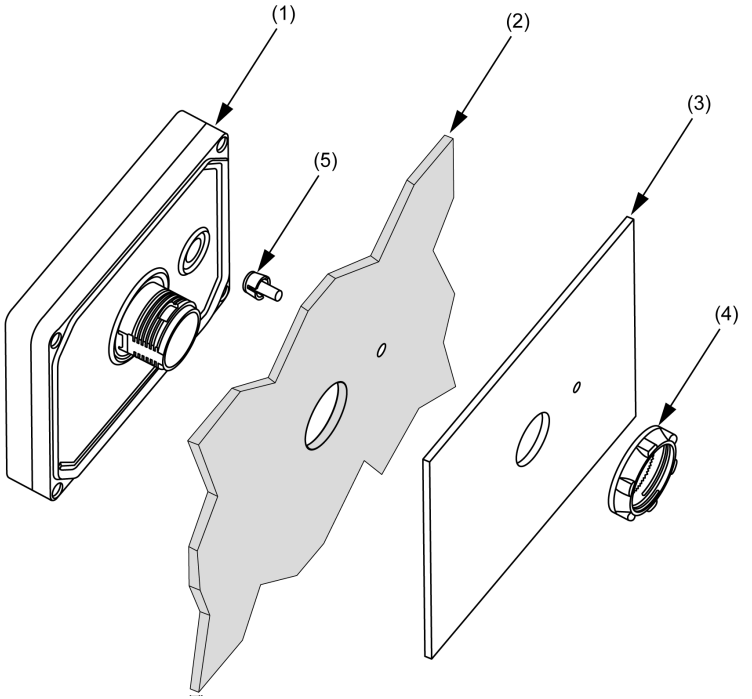
(1) Display module
(2) Panel
(3) Display installation nut
(4) Anti-rotation tee

Installing the HMISCU Display with an Adaptor

The panel adaptor, supplied in the accessory kit HMIZSUKIT, allows mounting the product on a:

- steel sheet support with a thickness between 1 and 1.5 mm (0.039 in. and 0.059 in.)
- plastic support with a thickness between 1 and 3 mm (0.039 in. and 0.118 in.)
- glass fiber reinforced plastic with a thickness between 2 and 3 mm (0.078 in. and 0.118 in.)

The figure shows the assembly with the HMI adaptor:



(1) Display module
(2) Panel
(3) Panel adaptor
(4) Display installation nut
(5) Anti-rotation tee

Installation Procedures

Installing the HMISCU Controller

In order to correctly run an application on the Harmony SCU, both the display module and the rear module must be connected.

⚠ DANGER

POTENTIAL FOR EXPLOSION

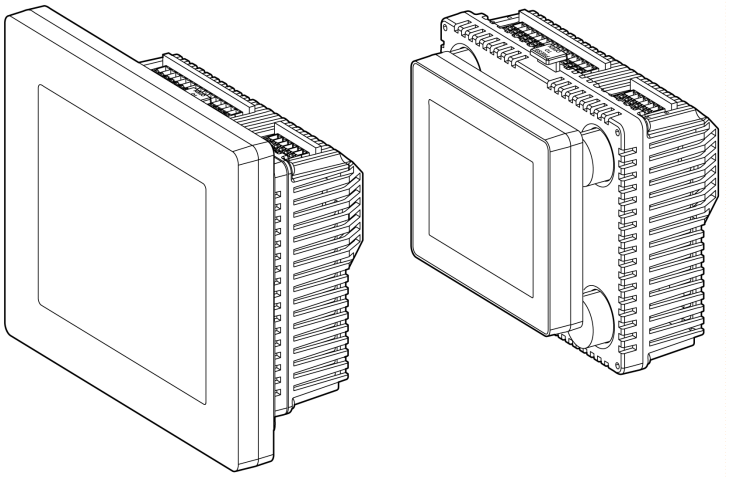
- Do not connect or disconnect while circuit is live.
- Potential electrostatic charging hazard: wipe the front panel of the terminal with a damp cloth before turning ON.

Failure to follow these instructions will result in death or serious injury.

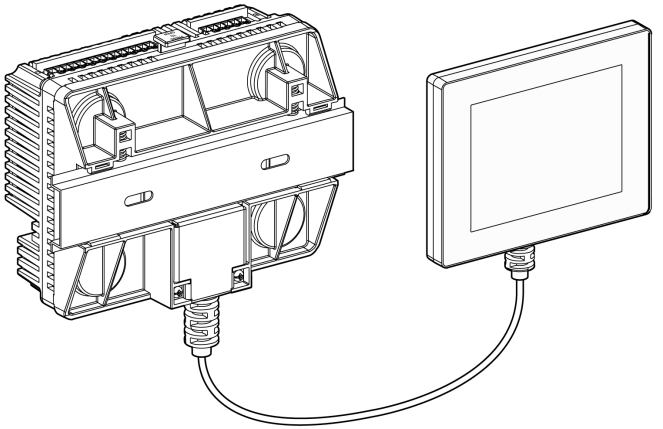
If you power up the rear module without connecting the display module, the logic controller does not start and all outputs remain in the initial state. The power must be off before connecting the modules.

There are 2 ways to install the HMISCU.

Installing the HMISCU on the panel:



Installing the rear module on a DIN rail with a display module/rear module separation cable:



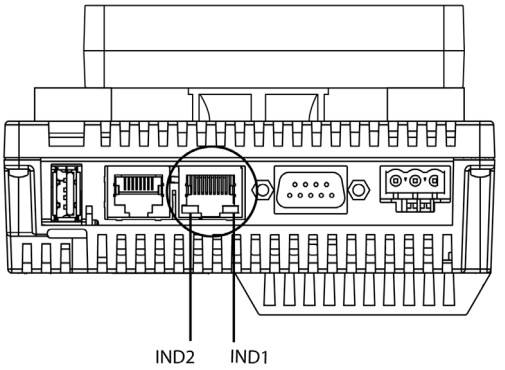
HMISCU Setup Procedure

Mount the unit in an enclosure that provides a clean, dry, robust, and controlled environment (IP65 enclosure or UL508 4x, if indoors). *(see page 39)*

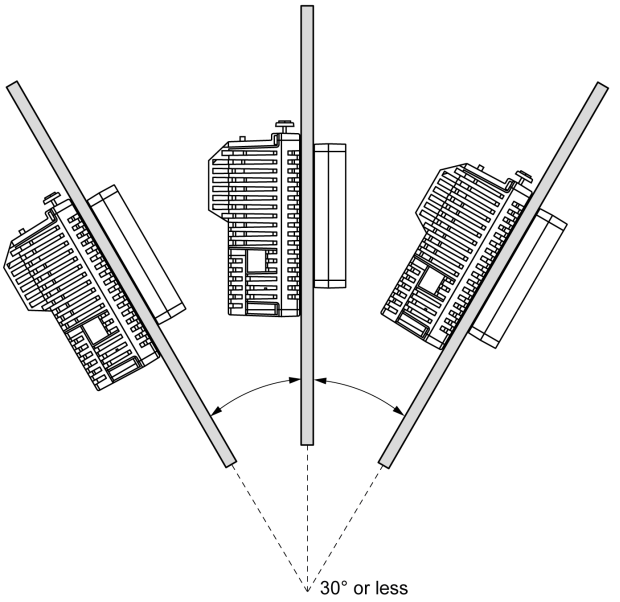
Before installing the HMISCU verify that:

- The installation panel or cabinet surface is flat (planarity tolerance: 0.5 mm (0.019 in.)), in good condition and has no jagged edges. Metal reinforcing strips may be attached to the inside of the panel, near the panel cut-out, to increase the rigidity.
- The panel is designed to avoid any induced vibration resonance on the rear module exceeding a punctual factor of 10 and avoids any induced permanent vibration resonance.
  To reduce the resonance use the panel adaptor accessory.
- The ambient operating temperature and the ambient humidity are within their specified ranges *(see page 39)*. (When installing the panel in a cabinet or enclosure, the ambient operation temperature is the internal temperature of the cabinet or enclosure).

- The heat from surrounding equipment does not cause the unit to exceed its specified operating temperature *(see page 39)*.
- When installing the display module in a horizontal position, the display must be on the top side:

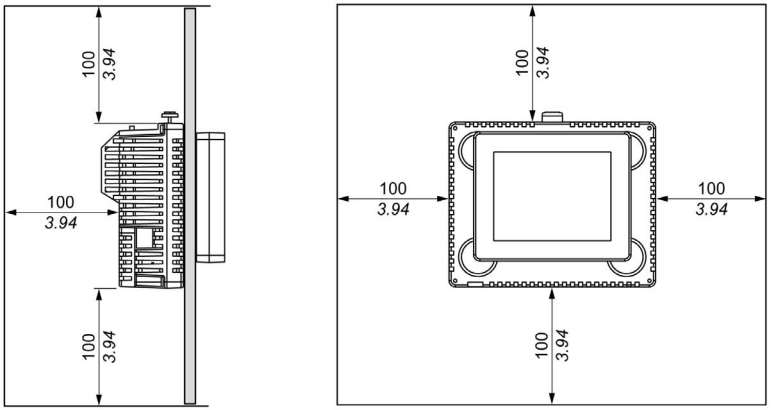


- The panel face is not inclined more than 30° when installing the unit in a slanted panel:



- The power plug is positioned vertically when the unit is vertically installed.
- The unit is at least 100 mm (3.94 in.) away from adjacent structures and other equipment for easier maintenance, operation, and improved ventilation:

mm
in.



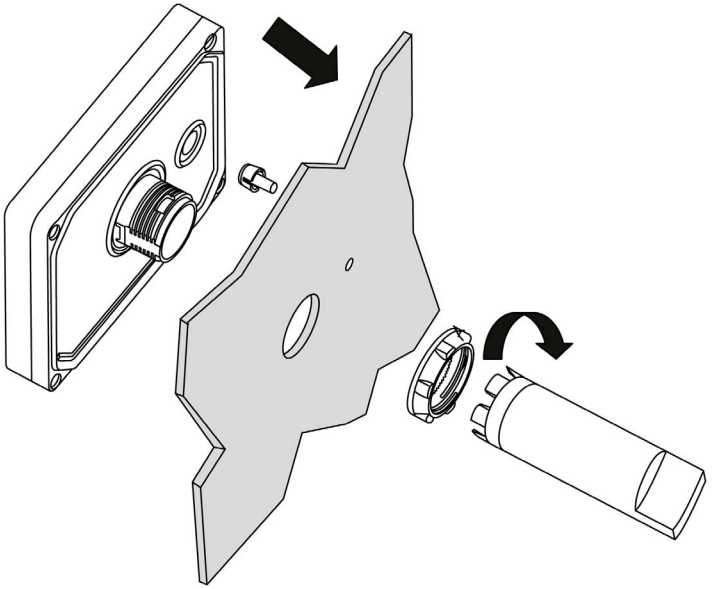
Pressure Differences

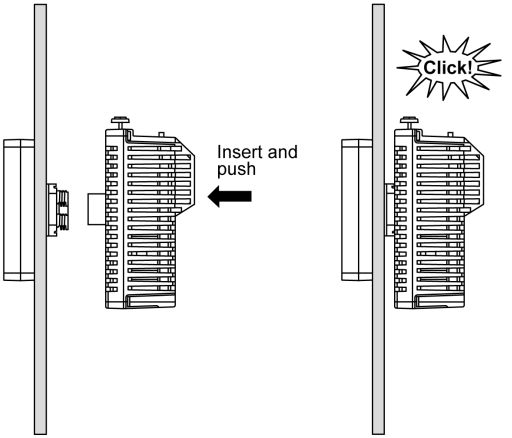
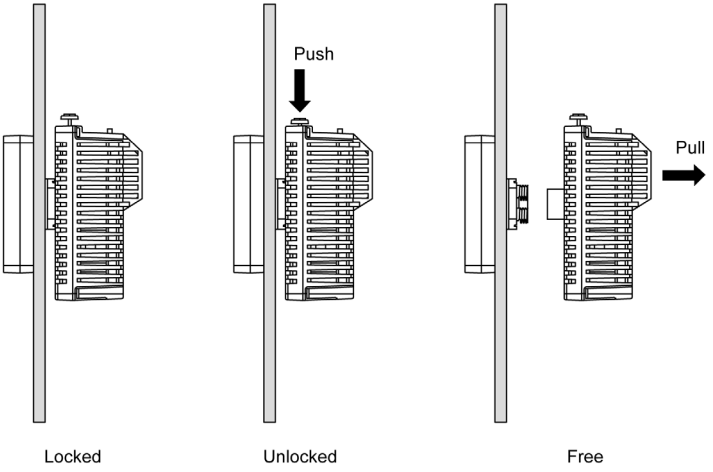
When applying and installing this product, it is important that steps are taken to eliminate any pressure difference between the inside and the outside of the enclosure in which this product is mounted. Higher pressure inside the enclosure can cause delamination of the front membrane of the display. Even a small pressure difference inside the enclosure act on the large area of the membrane and can result in sufficient force to delaminate the membrane and thus cause detected failure of the touch capability. Pressure differences can often occur in applications where there are multiple fans and ventilators moving air at different rates in different rooms.

Follow the techniques to ensure that the product function is not impacted by mis-application:

1. Seal all conduit connections inside of the enclosure, especially those that lead to other rooms that are at a different pressure.
2. Where applicable, install a small weep hole at the bottom of the enclosure to allow equalization of the internal and external pressure.

Step	Action
1	Place the unit on a clean and level surface with the display panel facing downward.
2	The support thickness depends on the material: ● Metallic: between 1.5 and 6 mm (0.059 in. and 0.236 in.) ● Plastic: between 3 and 6 mm (0.118 in. and 0.236 in.) If the thickness is between 1 and 1.5 mm (0.039 in. and 0.059 in.) for a metallic support or between 1 and 3 mm (0.039 in. and 0.118 in.) for plastic, use the panel adaptor supplied in accessory kit HMIZSUKIT *(see page 67)* (sold separately).

Step	Action
3	Create the correct sized holes required to install the unit, using the Panel Cut-Out Dimension and Installation *(see page 77)*.
4	Insert the display module (with the tee, if required) into the panel hole:  Use a torque between 1.2 and 2 N•m (10.62 lb-in and 17.70 lb-in) to screw the nut with the tightening wrench.

Step	Action
5	Insert and push the rear module until it locks into place: 
6	To remove the rear module, push the yellow button to unlock it, and then pull out the rear module: 

NOTICE

EQUIPMENT DAMAGE

Be sure to remove the rear module from the display module without twisting.

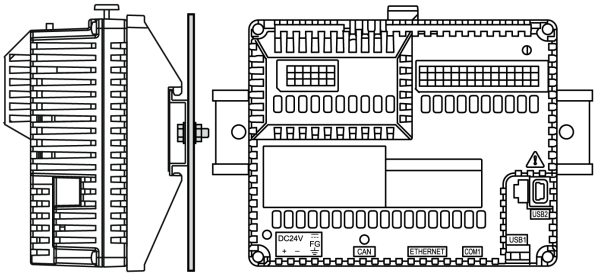
Failure to follow these instructions can result in equipment damage.

Mounting Positions

Correct Mounting Position

If the display module is mounted separately, the rear module must be mounted vertically:

Vertical Mounting

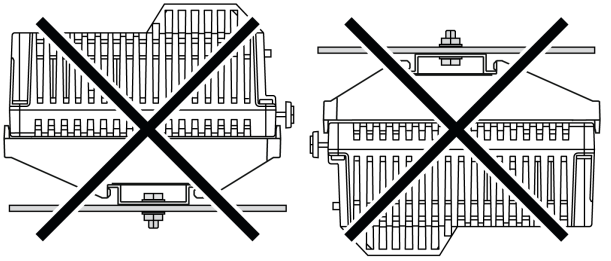


NOTE: Keep adequate spacing for proper ventilation to maintain an ambient temperature between 0...50 °C (32...122 °F).

Incorrect Mounting Position

The rear module should only be positioned as shown in the correct mounting position figure to help ensure adequate air flow through the product.

The figures show incorrect mounting positions:



Mounting Clearances

Spacing

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Place devices dissipating the most heat at the top of the cabinet and ensure adequate ventilation.
- Avoid placing this equipment next to or above devices that might cause overheating.
- Install the equipment in a location providing the minimum clearances from all adjacent structures and equipment as directed in this document.
- Install all equipment in accordance with the specifications in the related documentation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

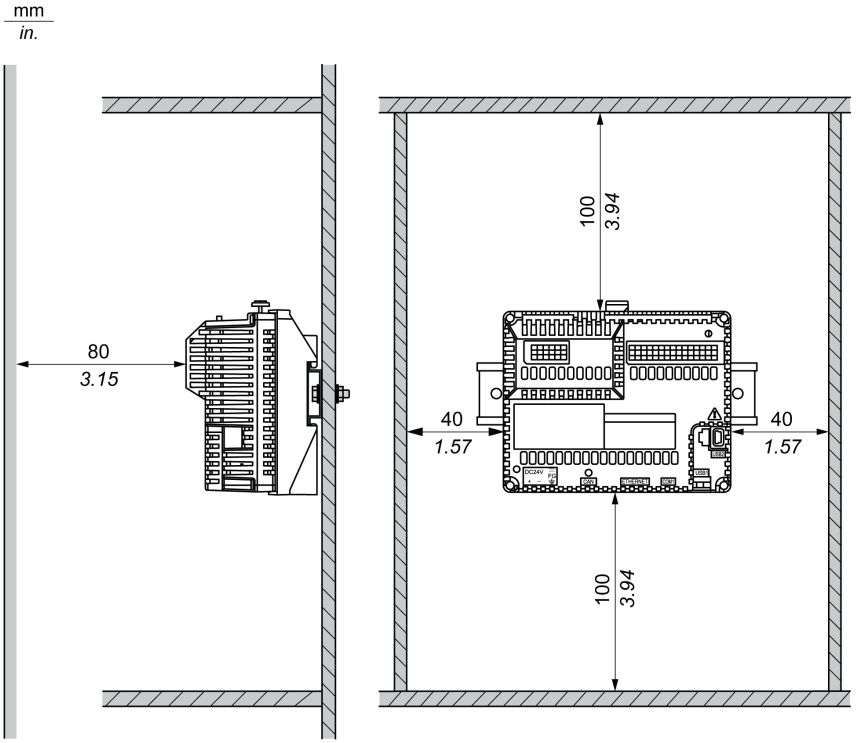
NOTE: Keep adequate spacing for proper ventilation to maintain an ambient temperature between 0...50 °C (32...122 °F) for vertical installation and 0...40 °C (32...104 °F) for horizontal installation.

Mounting and Keeping HMISCU Ventilated

The rear module has been designed as an IP20 product and must be installed in an enclosure. The clearances must be respected when installing the product:

- Between the rear module and all sides of the cabinet (including the panel door).
- Between the rear module terminal blocks and the wiring ducts. This distance reduces Electromagnetic Interference (EMI) between the controller and the wiring ducts.
- Between the rear module and other heat generating devices installed in the same cabinet.

The figure shows the minimum clearances for the HMISCU controller:

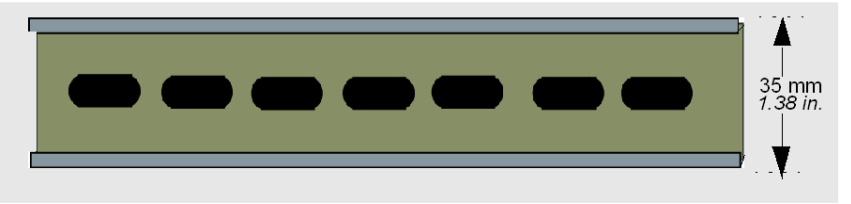


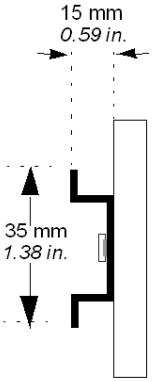
DIN Rail

Dimensions of the DIN Rail

You can mount the controller and its expansion parts on a DIN rail. A DIN rail can be attached to a smooth mounting surface or suspended from a EIA rack or a NEMA cabinet.

The DIN rail measures 35 mm (*1.38 in.*) high and 15 mm (*0.59 in.*) deep, as shown below:





Recommended Equipment

Rail Depth	Catalog Reference Number
15 mm (*0.59 in.*)	AM1DE200
	AM1ED200
8 mm (*0.31 in.*)	AM1DP200

Installing and Removing the Rear Module on a DIN Rail

Overview

This section describes how to install and remove the rear module on a DIN rail.

NOTE: The HMISCU should always have the display module and controller module connected for an application to function properly.
If the rear module is powered without it being directly connected (or connected with a separation cable) to the display module, the PLC Logic goes into the STOP mode with I/Os in a fallback mode.

⚠ DANGER

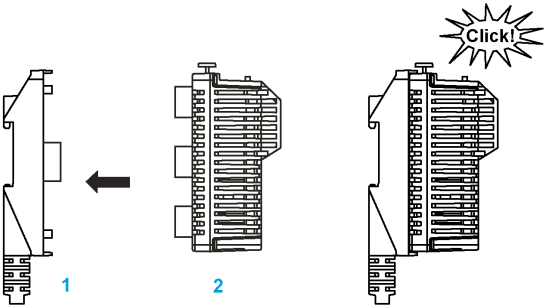
POTENTIAL FOR EXPLOSION

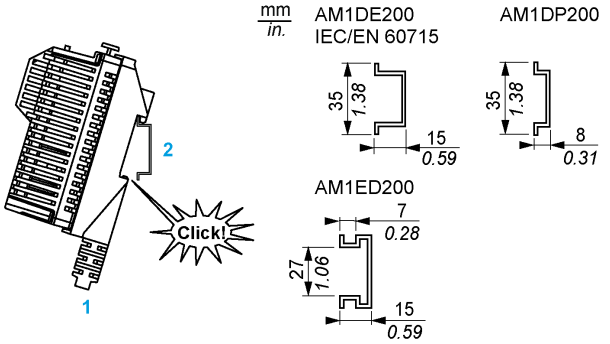
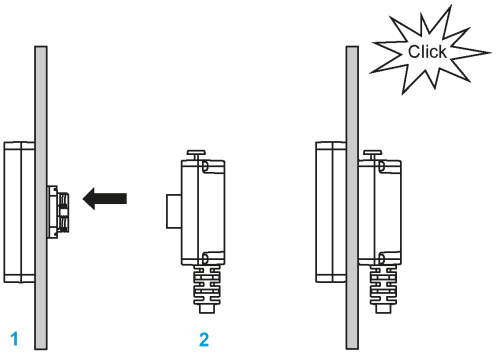
- Do not connect or disconnect while circuit is live.
- Potential electrostatic charging hazard: wipe the front panel of the terminal with a damp cloth before turning ON.

Failure to follow these instructions will result in death or serious injury.

Installing the Rear Module on a DIN Rail

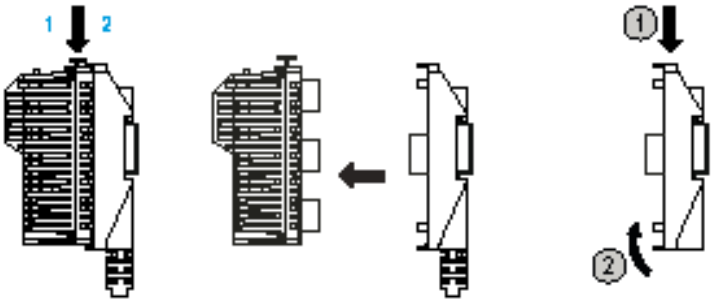
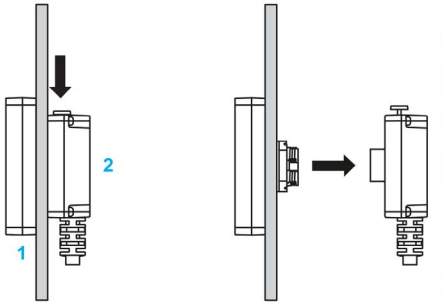
The following procedure describes how to install the rear module on a DIN rail:

Step	Action
1	Using screws to fasten the DIN rail to a panel surfaces.
2	Affix the display module/rear module separation cable to the rear module.  **1** Display module/rear module separation cable **2** Rear module **NOTE:** To assemble this product, you need 20 mm (0.78 in.) more space to bend the cable in the end of the rubber *(see page 30)*.

Step	Action
3	Position the top groove of the rear module on the top edge of the DIN rail and press the assembly against the DIN rail until you hear the DIN rail clip click into place.  **1** Rear module **2** Rail **NOTE:** Type AB1AB8P35 or equivalent terminal block end clamps help minimize sideways movement and improve the shock and vibration characteristics of the controller assembly.
4	Install the display on the cabinet and affix the display module/rear module separation cable to the display.  **1** Display module **2** Display module/rear module separation cable

Removing the Rear Module from a DIN Rail

The following procedure describes how to remove the rear module from a DIN rail:

Step	Action
1	Push down the yellow lock button of the rear module and remove it from the display module/rear module separation cable.  **1** Rear module **2** Display module/rear module separation cable
2	Push down the lock button of the display module/rear module separation cable and remove it from the display module.  **1** Display module **2** Display module/rear module separation cable

Section 5.2
Electrical Requirements

What Is in This Section?

This section contains the following topics:

Topic	Page
Power Supply Characteristics and Wiring	95
Connecting the Power Cord	98
Connecting the Power Supply	101

Power Supply Characteristics and Wiring

Overview

This section provides the wiring diagrams and the characteristics of the DC power supply.

Power Supply Voltage Range

If the specified voltage range is not maintained, outputs may not switch as expected. Use appropriate safety interlocks and voltage monitoring circuits.

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the power supplies.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

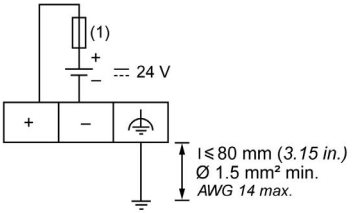
Do not exceed any of the rated values specified in the environmental and electrical characteristics tables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

DC Power Supply Characteristics

Reference		Specification	
Voltage	rated	24 Vdc	
	range	20.4...28.8 Vdc	
Power interruption time		10 ms at 20.4 Vdc	
Inrush current		65 A at 25 °C (77 °F), 300 µs duration over half peak	
Continuous output power	with display	HMISCU6A5 and HMISCU8A5: 12.6 W	HMISCU6B5 and HMISCU8B5: 12.6 W
	without display	HMISAC: 11 W	HMISBC: 11 W
Insulation resistance		500 Vdc, 10 MΩ or more	
Isolation between DC power supply and internal logic, I/O, and protective ground (PE)		500 Vdc for 1 minute	
Power supply reverse protection		Yes	

DC Power Supply Wiring Diagram



1 Use an external, slow-blow, 2 A type T fuse.

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the power supplies.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the environmental and electrical characteristics tables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Power Interruption

The duration of power interruptions where the HMISCU continues normal operation is variable depending upon the load to the power supply of the controller, but generally a minimum of 10 ms is maintained as specified by IEC standards.

If there is a minimum load on the controller power supply, the interruption can be as long as 400 ms.

When planning the management of the power supplied to the controller, you must consider the duration due to the fast cycle time.

There could potentially be many scans of the logic and consequential updates to the I/O image table during the power interruption, while there is no external power supplied to the inputs, the outputs or both depending on the power system architecture and power interruption circumstances.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Individually monitor each source of power used in the HMISCU system including input power supplies, output power supplies, and the power supply to the controller to allow appropriate system shutdown during power system interruptions.
- The inputs monitoring each of the power supply sources must be unfiltered inputs.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Connecting the Power Cord

Introduction

Follow these instructions when supplying power to the unit:

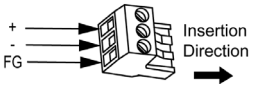
- When the frame ground (FG) terminal is connected, verify the wire is grounded. Not grounding the unit can result in excessive Electromagnetic Interference (EMI). Grounding is required to meet EMC level immunity.
- The shield ground (SG) and FG terminals are connected internally in the unit.
- Remove power before wiring to the power terminals of the unit.
- The unit uses 24 Vdc power. Using any other level of power can damage both the power supply and the unit.
- Since the unit is not equipped with a power switch, connect a power switch to the unit's power supply.
- Field wiring terminal marking for wire type (75 °C (167 °F) copper conductors only).

Power Cord Preparation

Before using your power cord:

- Verify that the ground wire is the same gauge or heavier than the power wires.
- Do not use aluminum wires for the power cord for power supply.
- If the conductor end (individual) wires are not twisted correctly, the end wires may either short loop to each other or against an electrode. To avoid this, use D25CE/AZ5CE cable ends.
- Use wires that are 0.75 to 2.5 mm^2 (18 to 12 AWG) for the power cord, and twist the wire ends before attaching the terminals.
- The conductor type is solid or stranded wire.
- To reduce electromagnetic noise, make the power cord as short as possible.

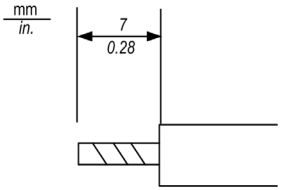
Power Plug



Connection	Wire
+	24 Vdc
-	0 Vdc
FG	Grounded terminal connected to the unit chassis

Connecting the Power Cord

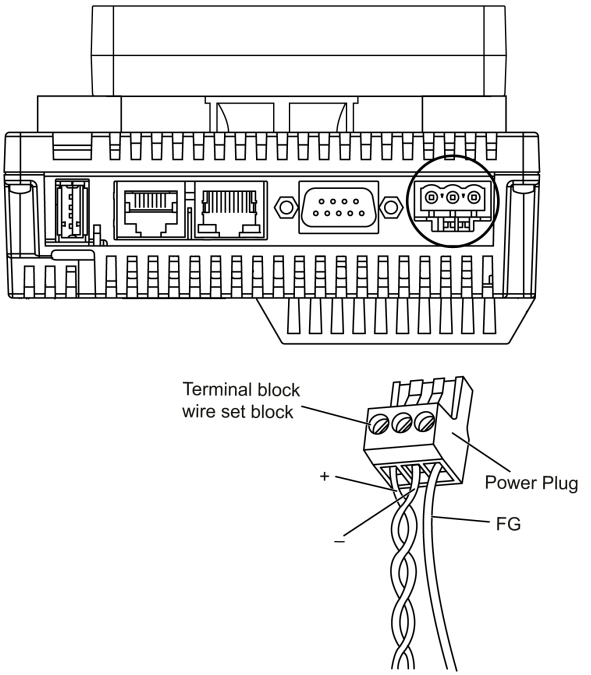
The table explains how to connect the power plug:

Step	Action
1	Remove the power cord from the power supply.
2	Remove the power plug from the unit.
3	Remove 7 mm (0.28 in.) of the vinyl cover of each of the power cord wires. 
4	If using stranded wire, twist the ends. Tinning the ends with solder reduces the risk of fraying and enhances electrical transfer.
5	Connect the wires to the power plug by using a flat-blade screwdriver (size 0.6 x 3.5 mm (0.02 x 0.14 in)).
6	Torque the mounting screws: 0.5...0.6 N•m (4.4...5.2 lb-in).
7	Replace the power plug to the power connector.

NOTE:

- Do not solder the wire directly to the power receptacle pin.
- The power supply cord must meet the specification shown above. Twist the power cords together, up to the power plug, for EMC compliance.
- Use field wiring terminal marking for wire type (75 °C (167 °F) copper conductors only).

The figure shows the connection of the power cord:



Connecting the Power Supply

Precautions

- Use the power plug to connect the power cord to the power connector on the side of the rear module.
- Use a regulated power supply with a Class 2 power supply between the line and the ground.
- Do not bundle the power supply cord with, or keep close to, main circuit lines (high voltage, high current), or input/output signal lines.
- Connect a lightning surge absorber to handle power surges.

Excessive stress on the power connection or attempting to install a rear module with the power cables connected may disconnect, or cause damage, to the power connections. This can cause short circuits, fire, or unintended equipment operation.

⚠ WARNING

SHORT CIRCUITS, FIRE, OR UNINTENDED EQUIPMENT OPERATION

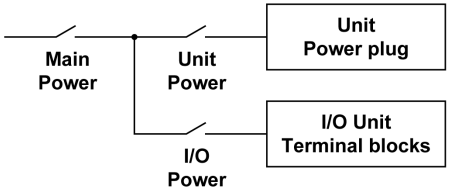
Avoid excessive force on the power cable to prevent accidental disconnections:

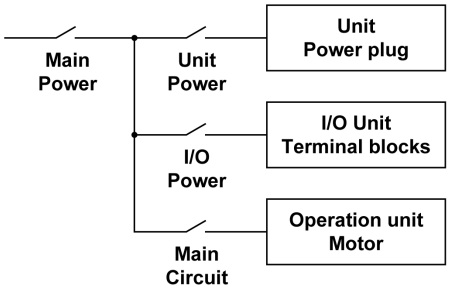
- Securely attach power cables to the panel or cabinet.
- Use the designated torque to tighten the rear module terminal block screws.
- Install and fasten the rear module on the installation panel or cabinet prior to connecting power supply and communication lines.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Power Supply Connections

For maintenance purpose, use the following connection diagram to set up your power supply connections:

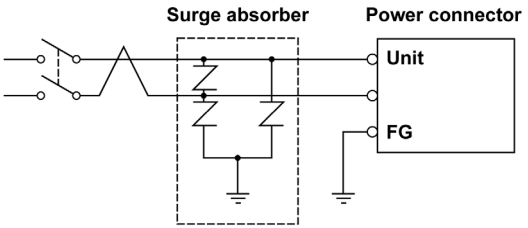




NOTE:

- Ground the surge absorber separately from the rear module.
- Select a surge absorber that has a maximum circuit voltage greater than the peak voltage of the power supply.

The diagram illustrates a lightning surge absorber connection:



Section 5.3
USB Port

Overview

This section presents the USB port.

What Is in This Section?

This section contains the following topics:

Topic	Page
USB Data Transfer Cable - USB Driver Installation	104
USB (Type A)	106
USB (mini-B)	109

USB Data Transfer Cable - USB Driver Installation

Important Information

Follow these instructions to avoid damage to the cable connector or the unit:

- Do not connect the USB data transfer cable until told to do so in the instructions.
- Insert the connector at the correct angle when connecting the USB data transfer cable to the PC or to the unit.
- Hold the connector, not the cable itself when disconnecting the cable.
- Use the port designated during installation. If the cable is unplugged from the port designated during installation and connected to a different port, the Operating System (OS) will not recognize the new port.
- Restart the PC and quit all resident applications before reinstalling the software if the installation does not complete successfully.

NOTE: Vijeo Designer must be installed before installing the USB driver.

Installation Procedure

Step	Action
1	Insert the Vijeo Designer Installation CD-ROM into your CD-ROM drive. The setup window for Vijeo Designer opens automatically. If not, at the Windows **Start** menu, click **Run** and type **x:\install.exe** (where x is your CD-ROM drive name).
2	In the **install** menu, select **USB Driver**.
3	Select the driver you want to install from the window that appears. For the USB cable, select **Install USB driver for...**.
4	A popup window appears stating the installation of the driver was successful.
5	Connect the USB cable to the computer. Windows automatically detects the cable and states that the device is ready to use.

Post-Installation Check

Perform the following check after installation:

Step	Action
1	On the target machine, check that the USB cable is physically connected to the USB port.
2	On the PC, check that the USB cable is physically connected to the USB port.
3	On the desktop, right-click **My Computer** and click **Properties**.
4	In **System Properties** dialog box, select **Hardware** tab, and then click **Device Manager**.
5	In **Device Manager**, the USB link cable is displayed below the USB controller.

Troubleshooting

Detected Problem/Symptom	Solution
The USB cable is not recognized.	Connect the cable correctly, or restart your PC. Also, when connecting a USB hub, connect it directly to your PC USB.
Overcurrent occurred.	
The plug and play is not functioning correctly.	
You are unable to use the USB cable after connecting it to a USB hub.	The power supplied from the hub may be insufficient. Check that the hub is self-powered.
	Connect the cable directly to the PC USB port.
After installation, a **?** is displayed when you try to confirm the cable status via the Device Manager.	The driver has not been installed correctly. Uninstall the driver and reinstall it.

Uninstalling the USB Driver

Step	Action
1	Click the USB device icon, **Stop USB link cable**, in the Windows task tray and then click **Stop USB link cable (BMXXCAUSBH018)** for Windows 2000, or **Safely remove USB link cable (BMXXCAUSBH018)** for Windows XP.
2	When the **Safe To Remove Hardware** message box appears, remove the USB download cable.
3	Click **OK** to close the message box.

USB (Type A)

Introduction

⚠ WARNING

RISK OF EXPLOSION IN HAZARDOUS LOCATIONS

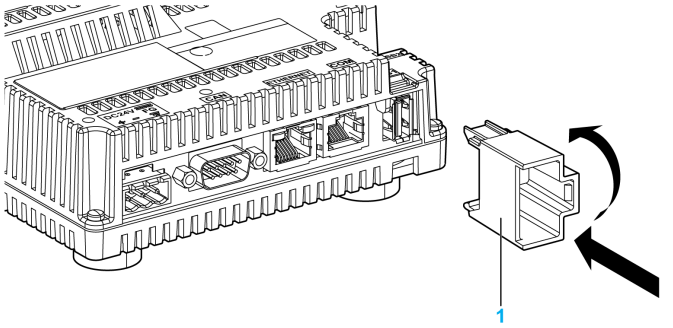
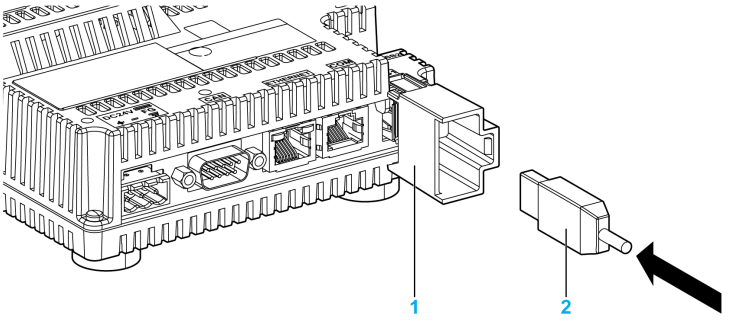
In hazardous locations as described in ANSI/ISA - 12.12.01:

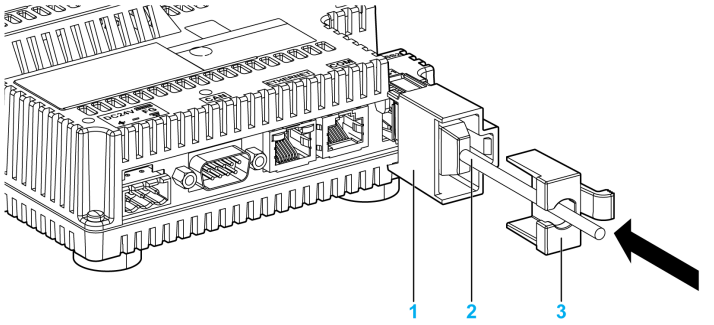
- Confirm that the USB cable has been attached with the USB cable clamp before using the USB host interface.
- Remove power before attaching or detaching any connector(s) to or from the unit.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

When using a USB device, you can attach a USB holder to the USB interface on the side of the unit to help prevent the USB cable from being disconnected.

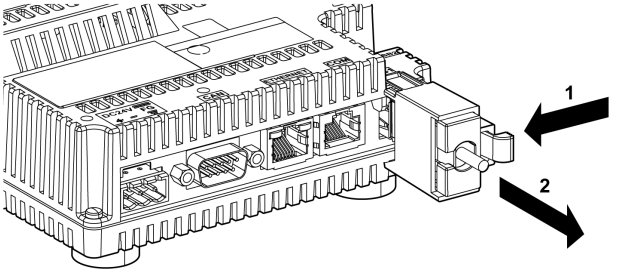
Attaching the USB Holder

Step	Action
1	Attach the USB holder to the USB host interface on the rear module. Hook the upper pick of the USB holder to the attachment hole of the main unit, and insert the lower pick as shown below to affix the USB holder.  **1** USB holder
2	Insert the USB cable into the USB host interface.  **1** USB holder **2** USB cable

Step	Action
3	Attach the USB cover to fix the USB cable in place. Insert the USB cover into the tab of the USB holder.  **1** USB holder **2** USB cable **3** USB cover

Removing the USB Holder

Push the tab of the USB holder to the left and then remove the USB cover.



USB (mini-B)

Introduction

⚠ WARNING

RISK OF EXPLOSION IN HAZARDOUS LOCATIONS

In hazardous locations as described in ANSI/ISA - 12.12.01:

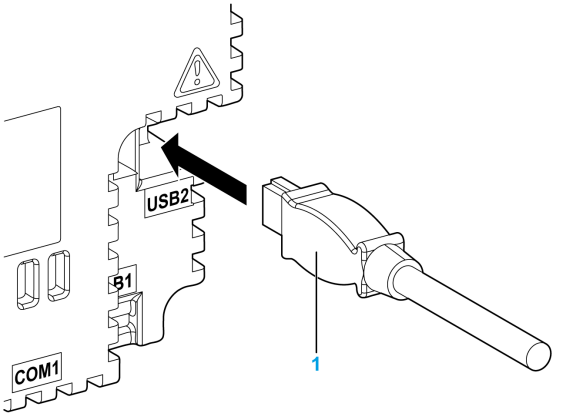
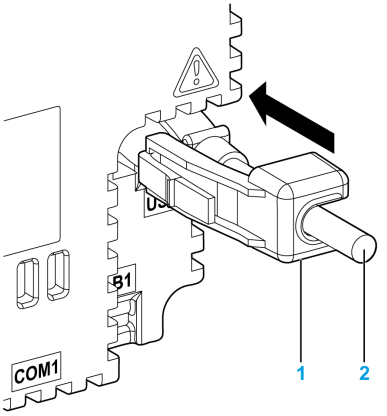
- Confirm that the USB cable has been attached with the USB cable clamp before using the USB host interface.
- Remove power before attaching or detaching any connector(s) to or from the unit.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

When using a USB device, you can attach a USB holder to the USB interface on the unit to help prevent the USB cable from being disconnected.

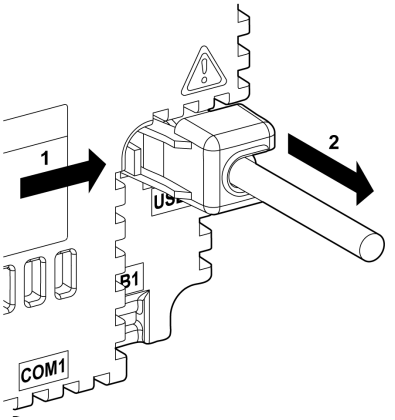
NOTE: The USB holder is supplied in the accessory kit HMIZSUKIT (sold separately).

Attaching the USB Holder

Step	Action
1	Insert the USB cable into the USB host interface.  **1** USB cable
2	Attach the USB holder to fix the USB cable in place.  **1** USB holder **2** USB cable

Removing the USB Holder

Push down the tab of the USB holder and then remove the USB holder.



Part II
HMISCU Controller and Display Modules

Overview

This part describes the HMISCU Controller and the display modules.

What Is in This Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
6	HMISCU•A5 (type DIO)	115
7	HMISCU•B5 (type DIO and AIO)	125
8	Display Modules	139

Chapter 6
HMISCU•A5 (type DIO)

Overview

This chapter describes the HMISCU•A5 (type DIO) and HMISAC. The HMISAC rear module is available individually as just the rear module and that the HMIS65 and HMIS65 display modules can be also ordered separately.

What Is in This Chapter?

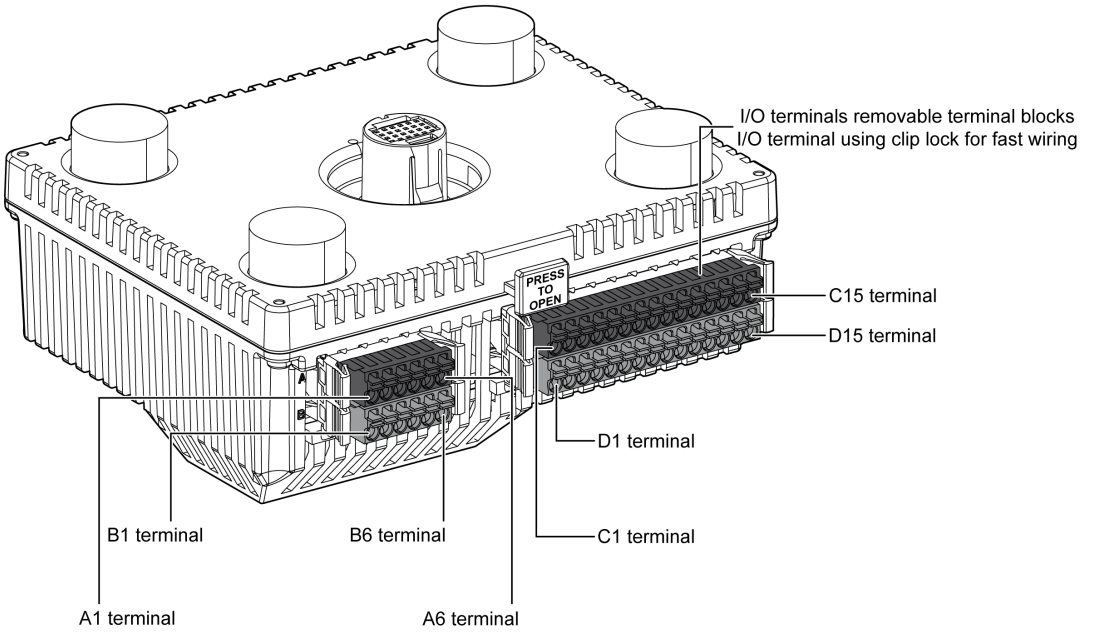
This chapter contains the following topics:

Topic	Page
Presentation	116
Digital Inputs	119
Digital Outputs	122

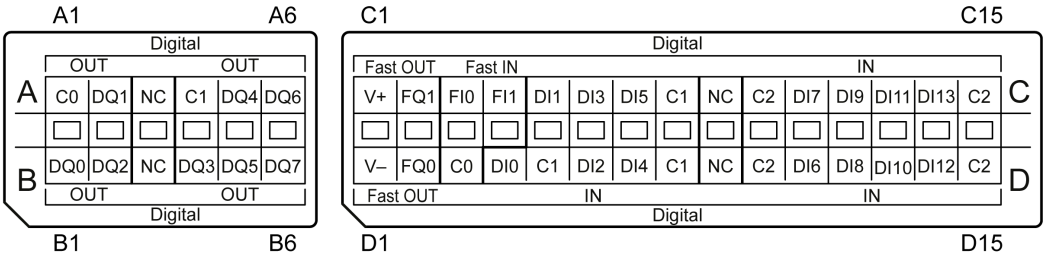
Presentation

Terminal Blocks

The figure shows the terminal blocks:

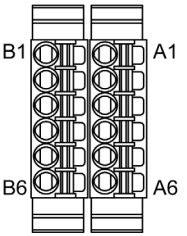


The figure shows the pin assignment of the terminal blocks:

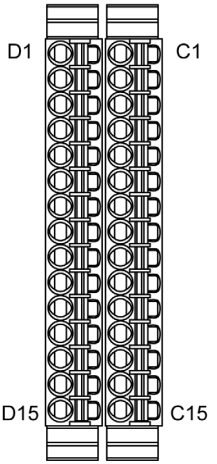


NOTE: Confirm the connector label ABCD and the stamp ABCD on the unit before wiring.

The table shows the group and signal names of the terminal blocks:

Pin Arrangement	Group	Pin	Signal Name	Group	Pin	Signal Name
	1	A1	C0	1	B1	DQ0
		A2	DQ1		B2	DQ2
		A3	NC		B3	NC
	2	A4	C1	2	B4	DQ3
		A5	DQ4		B5	DQ5
		A6	DQ6		B6	DQ7

The table shows the group and signal names of the terminal blocks:

Pin Arrangement	Group	Pin	Signal Name	Group	Pin	Signal Name
	3	C1	V+	3	D1	V-
		C2	FQ1		D2	FQ0
	4	C3	FI0	4	D3	C0
		C4	FI1	5	D4	DI0
	5	C5	DI1		D5	C1
		C6	DI3		D6	DI2
		C7	DI5		D7	DI4
		C8	C1		D8	C1
		C9	NC		D9	NC
	6	C10	C2	6	D10	C2
		C11	DI7		D11	DI6
		C12	DI9		D12	DI8
		C13	DI11		D13	DI10
		C14	DI13		D14	DI12
		C15	C2		D15	C2

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

Digital Inputs

Overview

The rear module is equipped with 16 digital inputs.

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the power supplies.

Failure to follow these instructions will result in death or serious injury.

Input Management Functions Availability

The table describes the possible usage of the rear module inputs:

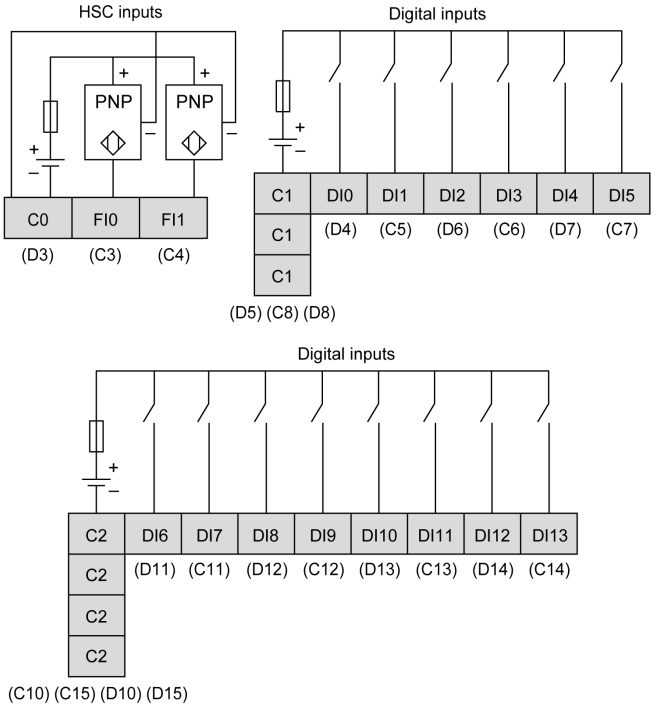
Function		Input Function				HSC/PTO/PWM Function		
		None	Run/Stop	Latch	Event			
Filter Type		Integrator	Integrator	Bounce	Bounce	HSC	PTO	PWM
Fast Input[1]	FI0	X	X	X	X	A	–	–
	FI1	X	X	X	X	B/EN	–	–
Regular Input	DI0	X	X	–	–	SYNC	–	–
	DI1	X	X	–	–	CAP	–	–
	DI2	X	X	–	–	–	AUX - Drive Ready	EN
	DI3	X	X	–	–	–	–	SYNC
	DI4	X	X	–	–	–	–	EN
	DI5	X	X	–	–	–	–	SYNC
	DI6	X	X	–	–	–	–	–
	DI7	X	X	–	–	–	–	–
	DI8	X	X	–	–	–	–	–
	DI9	X	X	–	–	–	–	–
	DI10	X	X	–	–	–	–	–
	DI11	X	X	–	–	–	–	–
	DI12	X	X	–	–	–	–	–
	DI13	X	X	–	–	–	–	–

X Yes
– No
1 Can also be used as a regular input

NOTE: You can use filters and functions to manage the HMI controller inputs *(see Harmony SCU, HMI Controller, Programming Guide)*.

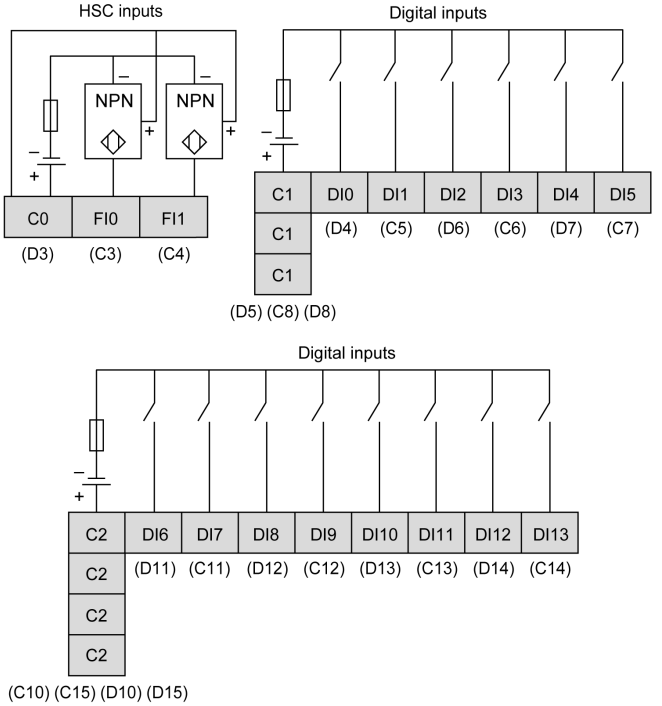
Wiring Diagram

The figure describes the wiring diagram of the HMISCU6A5, HMISCU8A5, and HMISAC digital input sink type (positive logical):



NOTE: The digital inputs are sink type (positive logical).

The figure describes the wiring diagram of the HMISCU6A5, HMISCU8A5, and HMISAC digital input source type (negative logical):



NOTE: The digital inputs are source type (negative logical).

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Use the sensor and actuator power supply only for supplying power to sensors or actuators connected to the module.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Digital Outputs

Overview

The rear module is equipped with 8 relay outputs and 2 transistor outputs that you can manage *(see page 59)*.

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the power supplies.

Failure to follow these instructions will result in death or serious injury.

Output Management Functions Availability

The table describes the possible usage of the rear module outputs:

Function		Output Function		
		None/RUN/STOP	Latch/Event	PWM/PTO/HSC
Filter Type		Integrator	Bounce	
Fast Output[1]	FQ0	X	X	X
	FQ1	X	X	X
Digital Output	DQ0	X	–	–
	DQ1	X	–	–
	DQ2	X	–	–
	DQ3	X	–	–
	DQ4	X	–	–
	DQ5	X	–	–
	DQ6	X	–	–
	DQ7	X	–	–

X Yes
– No
1 Can also be used as a regular output

Fast Output Wiring Diagram

For additional information about fast output protection, refer to Protecting Outputs from Inductive Load Damage *(see page 42)*.

⚠ WARNING

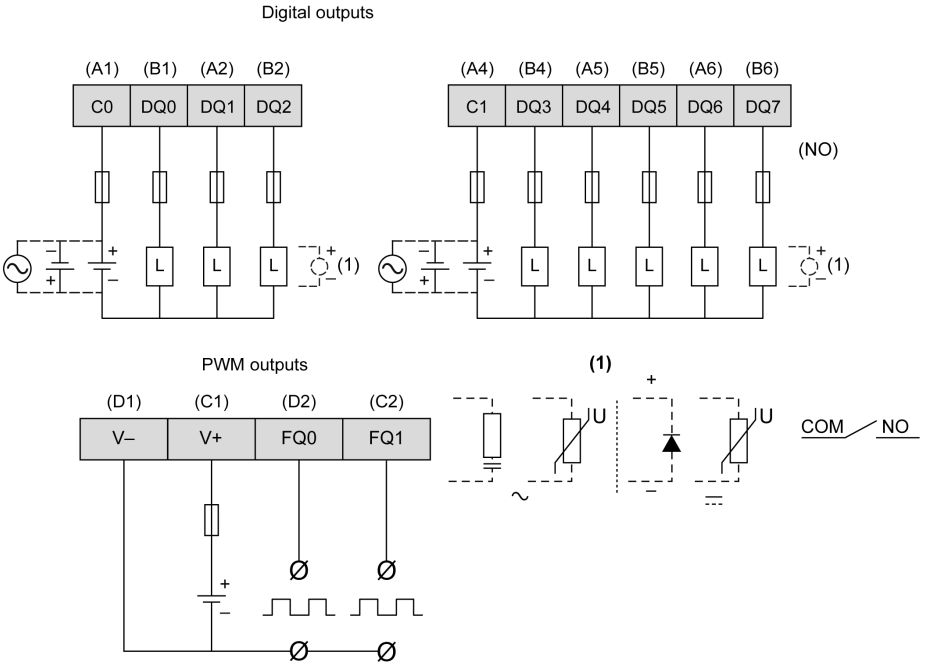
UNINTENDED EQUIPMENT OPERATION

Wire the outputs correctly according to the wiring diagram.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Wiring Diagram

The figure describes the wiring diagram of the HMISCU6A5, HMISCU8A5 and HMISAC digital outputs:



To improve the life time of the contacts, and to protect from potential damage by reverse EMF when using inductive load, connect:

- a free wheeling diode in parallel to each inductive DC load
- an RC snubber in parallel of each inductive AC load

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Chapter 7
HMISCU•B5 (type DIO and AIO)

Overview

This chapter describes the HMISCU•B5 (type DIO and AIO) and HMISBC. The HMISBC rear module is available individually as just the rear module and that the HMIS65 and HMIS65 display modules can be also ordered separately.

What Is in This Chapter?

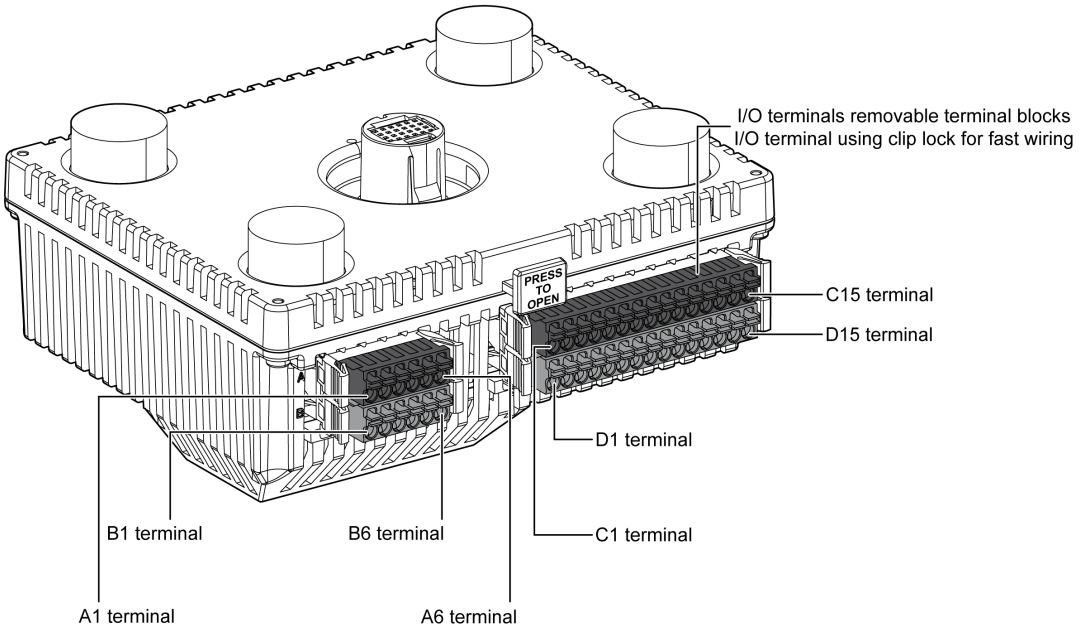
This chapter contains the following topics:

Topic	Page
Presentation	126
Digital Inputs	129
Digital Outputs	131
Analog Inputs and Analog Outputs	134

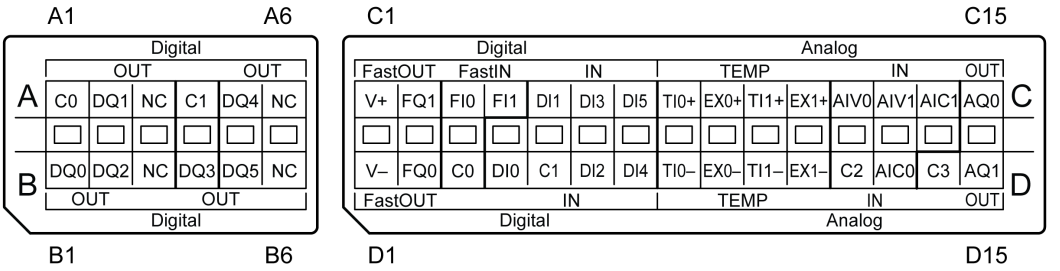
Presentation

Terminal Blocks

The figure shows the terminal blocks:

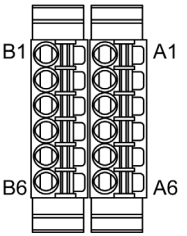


The figure shows the pin assignment of the terminal blocks:

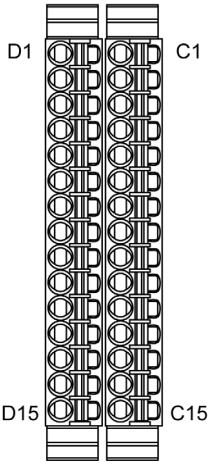


NOTE: Confirm the connector label ABCD and the stamp ABCD on the unit before wiring.

The table shows the group and the signal name of the terminal blocks:

Pin Arrangement	Group	Pin	Signal Name	Group	Pin	Signal Name
	1	A1	C0	1	B1	DQ0
		A2	DQ1		B2	DQ2
		A3	NC		B3	NC
	2	A4	C1	2	B4	DQ3
		A5	DQ4		B5	DQ5
		A6	NC		B6	NC

The table shows the group and signal names of the terminal blocks:

Pin Arrangement	Group	Pin	Signal Name	Group	Pin	Signal Name
	3	C1	V+	3	D1	V-
		C2	FQ1		D2	FQ0
	4	C3	FI0	4	D3	C0
		C4	FI1	5	D4	DI0
	5	C5	DI1		D5	C1
		C6	DI3		D6	DI2
		C7	DI5		D7	DI4
	6	C8	TI0+	6	D8	TI0-
		C9	EX0+		D9	EX0-
		C10	TI1+		D10	TI1-
		C11	EX1+		D11	EX1-
	7	C12	AIV0	7	D12	C2
		C13	AIV1		D13	AIC0
		C14	AIC1	8	D14	C3
	8	C15	AQ0		D15	AQ1

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

Digital Inputs

Overview

The rear module is equipped with eight digital inputs.

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the power supplies.

Failure to follow these instructions will result in death or serious injury.

Input Management Functions Availability

The table describes the possible usage of the rear module inputs:

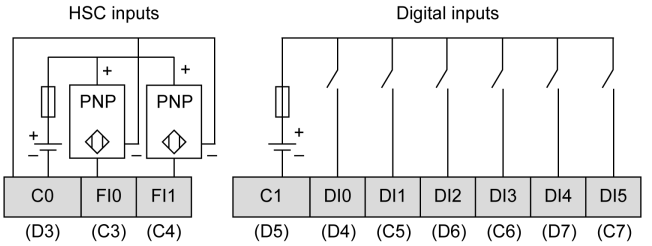
Function		Input Function				HSC/PTO/PWM Function		
		None	Run/Stop	Latch	Event			
Filter Type		Integrator	Integrator	Bounce	Bounce	HSC	PTO	PWM
Fast Input[1]	FI0	X	X	X	X	A	–	–
	FI1	X	X	X	X	B/EN	–	–
Regular Input	DI0	X	X	–	–	SYNC	–	–
	DI1	X	X	–	–	CAP	–	–
	DI2	X	X	–	–	–	AUX - Drive Ready	EN
	DI3	X	X	–	–	–	–	SYNC
	DI4	X	X	–	–	–	–	EN
	DI5	X	X	–	–	–	–	SYNC

X Yes
– No
1 Can also be used as a regular input

NOTE: You can use filters and functions to manage the HMI controller inputs *(see Harmony SCU, HMI Controller, Programming Guide)*.

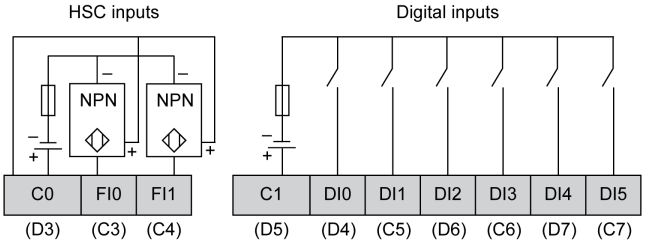
Wiring Diagram

The figure describes the wiring diagram of the HMISCU6B5, HMISCU8B5, and HMISBC digital input sink type (positive logical):



NOTE: The digital inputs are sink type (positive logical).

The figure describes the wiring diagram of the HMISCU6B5, HMISCU8B5, and HMISBC digital input source type (negative logical):



NOTE: The digital inputs are source type (negative logical).

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Use the sensor and actuator power supply only for supplying power to sensors or actuators connected to the module.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Digital Outputs

Overview

The rear module is equipped with 6 relay outputs and 2 transistor outputs that you can manage *(see page 59)*.

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the power supplies.

Failure to follow these instructions will result in death or serious injury.

Output Management Functions Availability

The table describes the possible usage of the rear module outputs:

Function		Output Function		
		None/Run/Stop	Latch/Event	PWM/PTO/HSC
Filter Type		Integrator	Bounce	
Fast Output[1]	FQ0	X	X	X
	FQ1	X	X	X
Digital Output	DQ0	X	–	–
	DQ1	X	–	–
	DQ2	X	–	–
	DQ3	X	–	–
	DQ4	X	–	–
	DQ5	X	–	–

X Yes
– No
1 Can also be used as a regular output

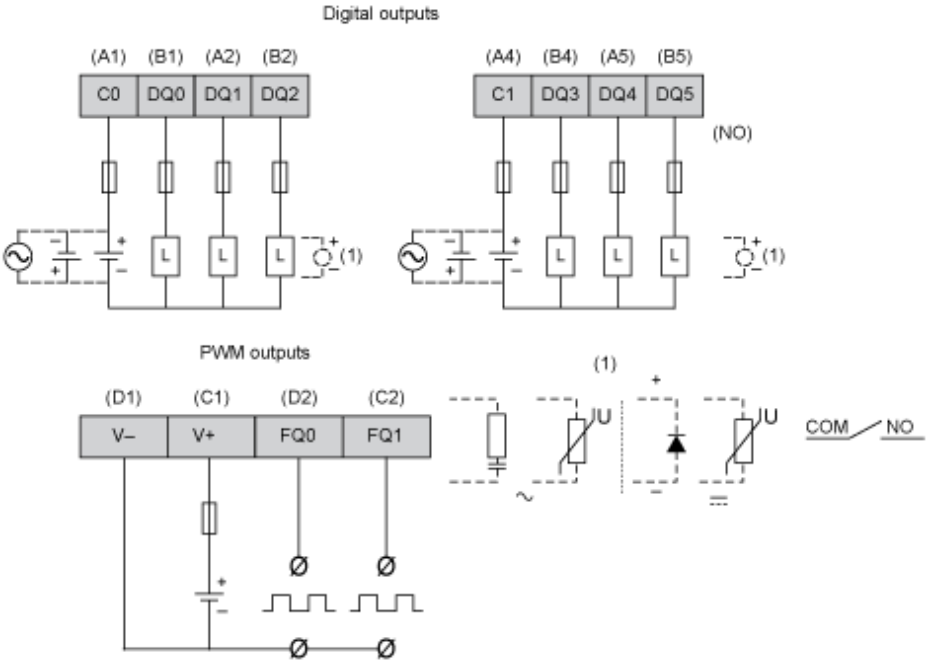
Fast Output Wiring Diagram

For additional information about fast output protection, refer to Protecting Outputs from Inductive Load Damage *(see page 42)*.

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION
Wire the outputs correctly according to the wiring diagram.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Wiring Diagram

The figure describes the wiring diagram of the HMISCU6B5, HMISCU8B5 and HMISBC digital outputs:



To improve the life time of the contacts, and to protect from potential damage by reverse EMF when using inductive load, connect:

- a free wheeling diode in parallel to each inductive DC load
- an RC snubber in parallel of each inductive AC load

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION
Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Analog Inputs and Analog Outputs

Overview

The rear module is equipped with:

- 2 temperature analog inputs (16-bit) configurable
- 2 analog inputs (13-bit) configurable
- 2 analog outputs (12-bit) configurable

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the power supplies.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the environmental and electrical characteristics tables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Analog Features

There are different terminal connection points for each type of analog signal.

Since current and voltage requires different adjustment values, you also need to configure the desired type of input or output signal:

- -10...10 Vdc voltage signal (default).
- 0...10 Vdc voltage signal
- 0...20 mA current signal.
- 4...20 mA current signal.

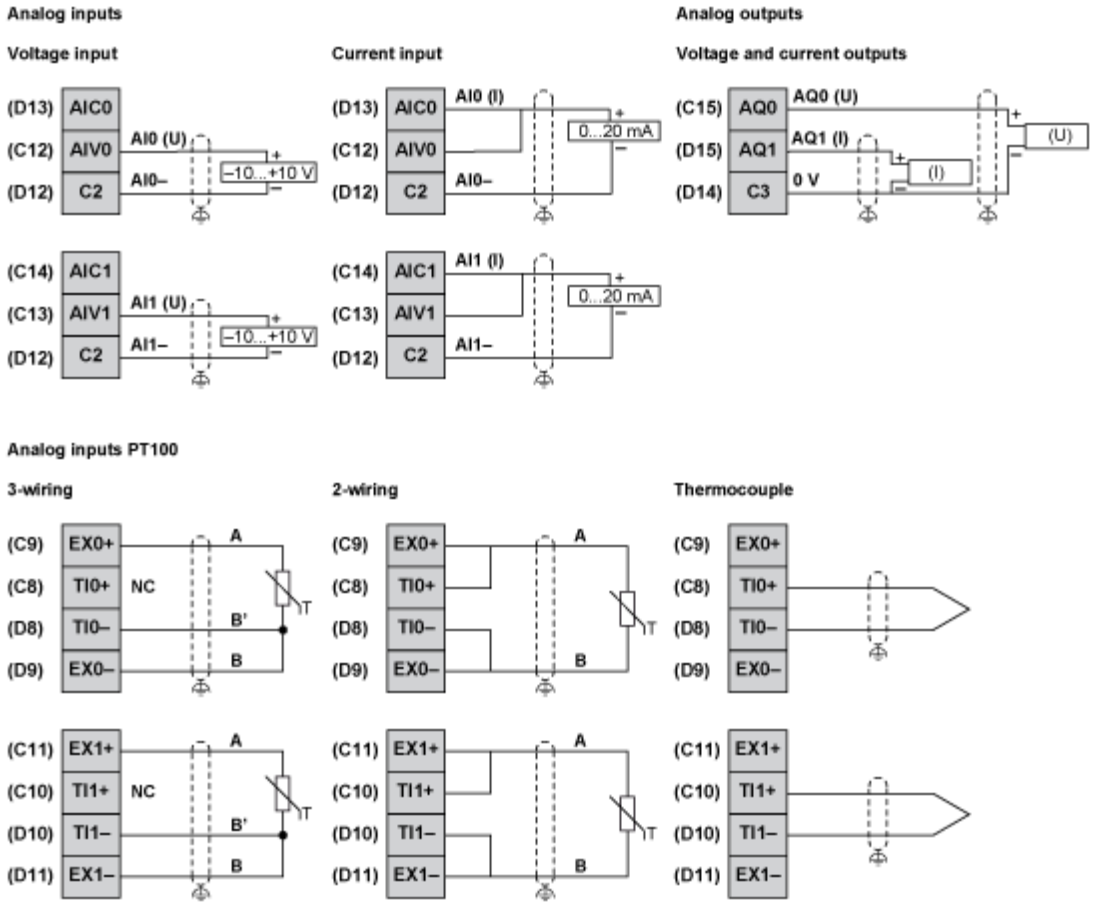
The temperature measurement values are converted into numeric values that can be processed by the controller. For temperature measurements, the temperature rear module returns the measured value in 0.1 °C (0.18 °F) steps.

The table shows the analog features:

Number and Type of Channels	Digital Converter Resolution	Voltage/Current
2 inputs	12-bit + sign	-10...10 Vdc (digital value -4096 to 4095)
	13-bit	0...10 Vdc (digital value 0 to 8192) 0...20 mA (digital value 0 to 8192) 4...20 mA (digital value 0 to 8192)
2 inputs	16-bit	RTD (Resistance Temperature Detector): PT100/1000/NI100/1000 Thermocouple: J, K, R, B, S, T, E, N
2 outputs	12-bit	-10...10 Vdc (digital value -2048 to 2047) 0...10 Vdc (digital value 0 to 4095) 0...20 mA (digital value 0 to 4095) 4...20 mA (digital value 0 to 4095)

Wiring Diagram

The figure describes the wiring diagram of the rear module analog inputs and analog outputs:



⚠ WARNING
UNINTENDED EQUIPMENT OPERATION
Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use shielded cables for all fast I/O, analog I/O, and communication signals.
- Ground cable shields for all fast I/O, analog I/O, and communication signals at a single point[1].
- Route communications and I/O cables separately from power cables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

[1]Multipoint grounding is permissible if connections are made to an equipotential ground plane dimensioned to help avoid cable shield damage in the event of power system short-circuit currents.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use shielded cables for all fast I/O, analog I/O and communication signals.
- Ground cable shields for all analog I/O, fast I/O and communication signals at a single point[1].
- Route communication and I/O cables separately from power cables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Chapter 8
Display Modules

HMI Overview

Introduction

The HMISCU is a Human Machine Interface product that has an operating voltage of 24 Vdc.

The table describes the HMISCU characteristics:

Part Number	Screen Size	Screen (Pixel) Resolution	Color Definition	Screen Technology
HMISCU6A5	8.9 cm (3.5 in.)	320 x 240 (QVGA)	65 K colors and LED back-light	Thin-Film transistor technology (TFT)
HMISCU6B5				
HMIS65				
HMISCU8A5	14.48 cm (5.7 in.)			
HMISCU8B5				
HMIS85				

Critical Systems, Detected Alarms, and Handling Requirements

Critical detected alarm indicators and system functions require independent and redundant protection hardware and/or mechanical interlocks.

If the unit for any reason becomes inoperative (for example, an inoperative back-light) it may be difficult or impossible to identify operation. Operations that may present a hazard if not immediately executed, such as emergency stop, must be provided independently of the unit. The design of the control system must take into account an inoperative unit (back-light) and the operator is maybe unable to control the machine or respond to detected errors with the unit.

When the power is cycled, wait at least 10 seconds before restoring the power to the HMI unit. Switching the power OFF and ON can quickly damage the unit.

NOTE: The HMISCU should always have the display module and controller module connected for an application to function properly.
If the rear module is powered without it being directly connected (or connected with a separation cable) to the display module, the PLC Logic goes into the STOP mode with I/Os in a fall-back mode.

Instructions for plugging and unplugging two-piece target machines for the two-piece Harmony target machines HMISCU (HMISAC and HMISBC).

⚠ DANGER

POTENTIAL FOR EXPLOSION

- Do not connect or disconnect while circuit is live.
- Potential electrostatic charging hazard: wipe the front panel of the terminal with a damp cloth before turning ON.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

UNINTENDED MACHINE OPERATION

- Do not attach or detach the front display module while the rear module is connected to the power.
- Do not connect or disconnect the HMISURDPxx display module separation cable while the rear module is connected to the power.
- Ensure that the front module is securely attached before applying power to the rear module.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

LOSS OF CONTROL

- Consider the potential failure modes of control paths in the machine control system design. Examples of potential failure modes of control paths are the possibility of backlight failure, unanticipated link transmission delays or failures, the operator being unable to control the machine, the operator making errors in the control of the machine.
- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.[1]
- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems" or their equivalent governing your particular location.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use this equipment as the only means of control for critical system functions such as motor start/stop or power disconnect.
- Do not use this equipment as the only notification device for critical alarms, such as device overheating or overcurrent.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Handling the LCD

The following characteristics are specific to the LCD and are considered normal behavior:

- LCD screen may show unevenness in the brightness of certain images or may appear different when seen from outside the specified viewing angle. Extended shadows, or cross-talk, may also appear on the sides of screen images.
- LCD screen pixels may contain black and white-colored spots and color display may seem to have changed over time.
- When the same image is displayed on the screen for a long period, an after-image may appear when the image is changed. If this happens, turn off the unit, wait 10 seconds, and then restart it.

NOTE: Do not display the same image for a long time. Change the screen image periodically.

⚠ CAUTION

SERIOUS EYE AND SKIN INJURY

The liquid present in the LCD contains an irritant:

- Avoid direct skin contact with the liquid.
- Wear gloves when you handle a broken or leaking unit.
- Do not use sharp objects or tools in the vicinity of the LCD touch panel.
- Handle the HMI carefully to prevent puncture, bursting, or cracking of the HMI material.

Failure to follow these instructions can result in injury or equipment damage.

If the HMI is damaged and any liquid comes in contact with your skin, immediately rinse the area with running water for at least 15 minutes.

If the liquid gets in your eyes, immediately rinse your eyes with running water for at least 15 minutes and consult a doctor.

Using Touch Panel Correctly

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Operate the touch panel with only one finger.
- Do not activate two or more points of the touch panel simultaneously.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Use only one finger to select an object on the touch panel.

If the touch panel receives pressure at two or more points at the same time, an unintended object could be selected.

Part III
HMISCU Controller Panels

Overview

This part describes how to use HMISCU controller panels.

What Is in This Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
9	Communication Interface	145
10	Specifications	155

Chapter 9
Communication Interface

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Ethernet Port	146
CANopen Master Unit	148
Serial Link Port (COM1)	152

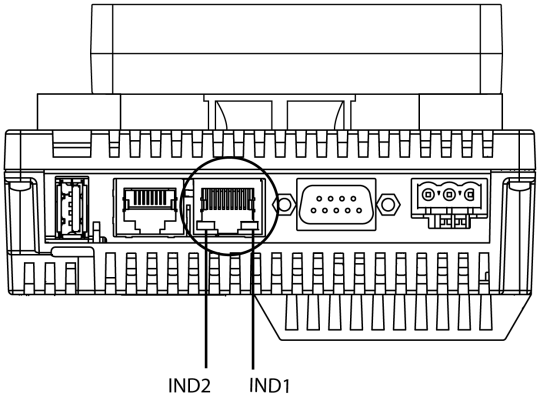
Ethernet Port

Introduction

The HMISCU is equipped with an IEEE802.3 compliant Ethernet communication port that transmits and receives data at 10 Mbps or 100 Mbps.

Ethernet Port Connector

The figure shows the location of the RJ45 Ethernet port on the rear module:



Do not confuse the RJ45 Ethernet connector with the RJ45 serial port.

NOTE: Ethernet networks must be installed by a trained and qualified person.

NOTE: One to one (1:1) connections must be made with a hub or a switch. It is possible to use the 1:1 connection with a cross cable depending on the connected PCs and network cards.

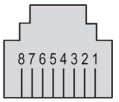
Characteristics

The table describes the different Ethernet characteristics:

Characteristic	Description
Connector type	RJ45
Driver	• 10 M half duplex (auto negotiation) • 100 M full duplex (auto negotiation)
Cable type	Shielded
Automatic cross-over detection	Yes

Pin Assignment

The figure shows the RJ45 Ethernet connector pin assignment:



The table describes the RJ45 Ethernet connector pins:

Pin	Signal
1	TD+
2	TD-
3	RD+
4	–
5	–
6	RD-
7	–
8	–

NOTE: The HMISCU supports the MDI/MDIX auto-crossover cable function. You do not have to use special Ethernet crossover cables to connect devices directly to this port (connections without an Ethernet hub or switch).

Status LEDs

The table describes the Ethernet status LEDs operation:

Label	Description	LED		
		Color	Status	Description
IND1	Ethernet status	Green	Off	No connection or subsequent transmission failure.
			On	Data transmission is available.
IND2	Ethernet activity	Green	Off	No data transmission.
			On	Data transmission is occurring.

CANopen Master Unit

CANopen Capabilities

The table describes the HMISCU CANopen master features:

Maximum number of slaves on the bus	16 CANopen slave devices
Maximum length of CANopen fieldbus cables	According to the CAN specification (see Cable Length and Transmission Speed).
Maximum number of PDOs managed by the master	32 TPDOs + 32 RPDOs

For each additional CANopen slave:

- The application size increases by an average of 10 kbytes, which can result in a memory size overload.
- The configuration initialization time at the startup increases, which can lead to a watchdog condition.

Although HMISCU does not restrict you from doing so, you should not exceed 16 CANopen slave modules (and/or 32 TPDOs and 32 RPDOs) for sufficient performance tolerance and to avoid performance degradation.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect more than 16 CANopen slave devices to the controller.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTICE

DEGRADATION OF PERFORMANCE

Do not exceed 32 TPDOs and 32 RPDOs for the HMISCU Controller.

Failure to follow these instructions can result in equipment damage.

Characteristics

The table describes the CAN characteristics:

Characteristic	Description
Standard	CAN-CiA (ISO 11898-2:2002 Part 2)[1]
Connector type	Sub-D9, 9 pins male
Protocol supported	CANopen

Characteristic	Description
CAN power distribution	No
Maximal cable length	See table below[4]
Isolation	See note[2]
Bit rate	See table below[4]
Line termination	No. See note[3]

[1] Part 1 and Part 2 of ISO 11898:2002 are equivalent to ISO 11898:1993.

[2] The isolation of the rear module is 500 Vac RMS between the module and the terminal blocks connected to the rear module. The two parts reference the same functional ground (FE) through specific components designed to reduce effects of electromagnetic interference. These components are rated at 30 Vdc or 60 Vdc. This effectively reduces isolation of the entire system from the 500 Vac RMS.

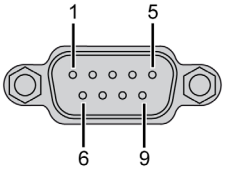
[3] A resistor (R) is needed on each end of the CAN field bus.

[4] The table describes the maximum cable lengths:

Baud rate		800 Kbit/s	250 Kbit/s	125 Kbit/s	50 Kbit/s	20 Kbit/s	10 Kbit/s
Maximum cable length	m	25	250	500	1000	2500	5000
	ft.	82.02	820.20	1640.41	3280.83	8202.07	16404.15

Pin Assignment

The graphic describes the pins of the CANopen interface:



The table describes the pins of the CANopen interface:

PIN	Signal	Description
1	N.C.	Reserved
2	CAN_L	CAN_L bus Line (Low)
3	CAN_GND	CAN 0 Vdc
4	N.C.	Reserved
5	CAN_SHLD	N.C.
6	GND	0 Vdc

PIN	Signal	Description
7	CAN_H	CAN_H bus Line (High)
8	N.C.	Reserved
9	N.C.	Reserved

The shield is connected to pin 6, the 0 Vdc pin.

NOTE: Pin 9 is not connected internally. The controller does not provide power on CAN_V+.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Status LED

The table describes the CAN status LED:

Marking	Description	LED	
		Color	Description
CAN STS	CANopen status	Green / Red	See CAN STS status LED below

The table describes the CAN STS status LED:

CAN0 LED	CANopen Status	Description
OFF	No CANopen configured	CANopen is not active in the application.
Single flash red / with green ON	Acceptable detected error limit threshold has been reached	The controller has detected that the maximum number of error frames has been reached or exceeded.
Double flash red / with green ON	Node Guarding or Heartbeat event	The controller has detected either a Node Guarding or Heartbeat exception for the CANopen master or slave device.
Red ON	Bus off	The CANopen bus is stopped.
Green ON	The CANopen bus is operational.	

NOTE: CanOpen LED is mounted alongside the cover.

CANopen Data Transfer Settings

The CANopen networking concept is based on the international standard CAN. CANopen is defined as a uniform application layer by the DS301 specifications of the CiA (CAN in Automation).

CANopen Cable Arrangement

The CANopen interface uses a D-SUB 9-pin plug connector. The plug is assigned with the CAN_H, CAN_L and, CAN_GND connections. CAN_H and CAN_L are the two conductors of the CAN bus. CAN_GND is the common reference potential.

NOTE:

- The resistance of the cable value must be 70 mΩ/m (1.77 mΩ/in.) or less.
- To minimize signal reflections from the end of the cable, a 120 Ω. (5%, 1/4 W maximum) line termination must be placed at both ends of the bus.

CANopen Communication Cable and Connectors

NOTE: CANopen communication cables and cable connectors are not supplied with the CANopen Master Unit. The user must prepare the cables.

Recommended Cable Connector

D-SUB (DIN41652) connector compliant with CANopen Standard (CiA DR-303-1)

CANopen Recommended Transfer Cable

Transfer cable (a twisted pair cable with a shield) compliant with CANopen Standard (CiA DR-303-1)

Serial Link Port (COM1)

Introduction

The serial link port is used to communicate with devices via RS-232 or RS-485.

NOTE: Vijeo Designer has many serial protocols supported as well that can be used independently of SoMachine if the COM1 port is not required for use within SoMachine.

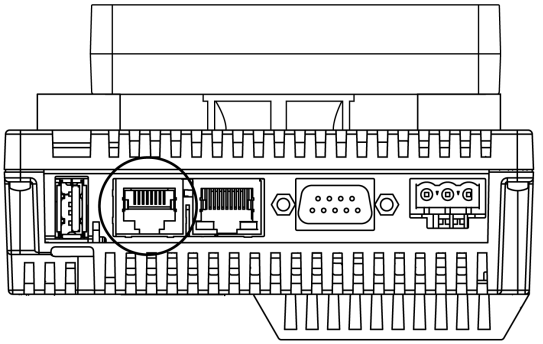
This isolated serial port allows HMISCU controller component to communicate with 2 protocols:
SoMachine for link with SoMachine compliant device (routing or variable access)
Modbus in order to meet the needs of master/slave architectures with Schneider Electric or third-party devices

NOTE: Under most circumstances, you should avoid connecting multiple instances of SoMachine to the same controller via the serial line, Ethernet and/or the USB port simultaneously. It is possible that conflicts could arise in actions taken by the various instances of SoMachine such as program, configuration or data edits, or control commands to the controller or its application. For more information, see the programming guide for your particular controller.

NOTE: If the user chooses to use Vijeo Designer serial protocols, they must delete any nodes (Modbus/SoMachineNetwork) under the COM1 node in their SoMachine Editor project.

Serial Port Connector

The figure shows the location of the RJ45 serial port on the rear module:



Do not confuse the RJ45 serial port with the RJ45 Ethernet connector.

RS-232C Characteristics

Characteristic	Description
Connector type	RJ45
Isolation	Non-isolated
Baud rates	9600, 19200, 38400, 57600, 115,200 bps

Characteristic		Description
Protocol supported		• Modbus (RTU) • SoMachine
Cable	Type	Shielded
	Maximum length	15 m (49 ft)
5 Vdc power supply for RS-485		No

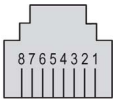
NOTE: The maximum baud rate for the serial link port depends on the protocol used.

RS-485 Characteristics

Characteristic		Description
Connector type		RJ45
Isolation		Non-isolated
Baud rates		9600, 19200, 38400, 57600, 115,200 bps
Protocol supported		• Modbus (RTU) • SoMachine
Cable	Type	Shielded
	Maximum length	200 m (656 ft)
Polarization		Configured via software to connect when the node is configured as a master. 560 Ω or 5.11 kΩ resistors are optional.
5 Vdc power supply for RS-485		No

Pin Assignment

The figure shows the pins of the RJ45 connector:



The table describes the pin assignment of the RJ45 connector:

Pin	RS-232C	RS-485	Description
1	RxD	N.C.	Received data (RS-232C)
2	TxD	N.C.	Transmitted data (RS-232C)
3	N.C.	N.C.	Not connected
4	N.C.	D1	Differential data (RS-485)
5	N.C.	D0	Differential data (RS-485)

Pin	RS-232C	RS-485	Description
6	RTS	RTS	Ready to send
7	N.C.	N.C.	Not connected
8	GND	GND	Signal ground

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Chapter 10
Specifications

Overview

This chapter presents the HMISCU specifications.

What Is in This Chapter?

This chapter contains the following sections:

Section	Topic	Page
10.1	General Specifications	156
10.2	Functional Specifications	157

Section 10.1
General Specifications

General Specifications

Electrical Specifications

The table shows the electrical specifications of HMISCU:

Part Number	Rated Input Voltage	Input Voltage Limits	Acceptable Voltage Drop	Power Consumption	In-Rush Current	Voltage Endurance between power terminal and frame ground (FG)	Insulation Resistance between power terminal and FG
HMISCU6A5	24 Vdc	20...28.8 Vdc	≤ 10 ms at 20.4 Vdc	≤ 9 W	≤ 30 A at 28.8 Vdc	500 Vdc for 1 minute	10 MΩ or higher at 500 Vdc
HMISCU6B5				≤ 10 W			
HMISCU8A5				≤ 12 W			
HMISCU8B5				≤ 13 W			

Environmental Specifications

The table shows the environmental specifications of HMISCU:

Characteristic	Specification	
Protection (front panel)	IP65f - (IEC 60529)	
Protection structure	Type 4X indoor, installed on a panel	
Protection (rear panel)	IP 20 - (IEC 60529)	
Cooling method	Natural air circulation	
Weight	HMISCU6A5: 496 g (17.49 oz) HMISCU8A5: 749 g (29.42 oz)	HMISCU6B5: 531 g (18.73 oz) HMISCU8B5: 784 g (27.65 oz)
Color	Front module: PT404Rear module: RAL 7032	
Material	HMISCU6A5 ● front module: PC/PBT ● rear module: PC/PBT HMISCU8A5 ● front module: PAA+GF ● rear module: PC/PBT	HMISCU6B5 ● front module: PC/PBT ● rear module: PC/PBT HMISCU8B5 ● front module: PAA+GF ● rear module: PC/PBT

Section 10.2
Functional Specifications

Overview

This section presents the HMISCU functional specifications of the display, memory, and I/O.

What Is in This Section?

This section contains the following topics:

Topic	Page
Display	158
Digital Inputs	159
Digital Outputs	162
Analog Inputs and Analog Outputs	165
Internal Circuits	170
Memory and Touch Panel	172

Display

Display Specifications

The table shows the display specifications of the HMISCU:

Items	HMISCU6A5 HMISCU6B5 HMIS65	HMISCU8A5 HMISCU8B5 HMIS85
Type	Color TFT LCD	
Resolution (pixels)	320 x 240 (QVGA)	
Active display area (W x H)	70.56 x 52.92 mm (2.78 x 2.08 in.)	115.2 x 86.4 mm (4.53 x 3.40 in.)
Colors	65536 colors	
Backlight	White LED	
	Lifetime: 50,000 hours when dimmed to 50% brightness. Ambient temperature = 25 °C (77 °F)	
	Non-exchangeable	
	LED ON / OFF control, adjustable screen saver activation time	
Brightness adjustment	16 levels of adjustment available via touch panel in the configuration menu	
Brightness on LCD surface	White LED: 350 cd/m^2 (33 cd/ft^2) maximum	
Viewing angle	• 60 degrees: left, right • 40 degrees: up • 60 degrees: down (Test condition: contrast ratio > 2)	• 80 degrees: left, right • 70 degrees: up • 70 degrees: down (Test condition: contrast ratio > 2)
System embedded language character sets	ASCII: (Code page 850) alphanumeric (including european characters) Chinese: (GB2312-80 codes) simplified Chinese fonts Taiwanese: (Big 5 codes) Traditional Chinese fonts	
Character sizes (2)	Vijeo fonts: • 8x8, 6x10, 8x13, 13x23, 28x50, 16x16, 32x32 pixel fonts Vijeo-S fonts: • Scalable 1 to 255 pixels For more information on supported font styles, see Vijeo Designer Online Help.	
Font sizes	Width can be expanded 1...8 times. Height can be expanded 1/2 and 1...8 times.	
8 x 8 pixels	40 characters per row x 30 rows	
8 x 16 pixels	40 characters per row x 15 rows	
16 x 16 pixels	20 characters per row x 15 rows	
32 x 32 pixels	10 characters per row x 7 rows	

Digital Inputs

Digital Input Characteristics

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the environmental and electrical characteristics tables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The table describes the characteristics of the digital inputs:

Characteristic		Value
		Standard
Rated current		5 mA
Inrush values	Voltage	30 Vdc
	Current	6.29 mA max.
Input impedance		4.9 kΩ
Input type		Sink/Source
Rated voltage		24 Vdc
Input range		0...28.8 Vdc
Input limit values	Voltage at state 1	> 15 Vdc (15...28.8 Vdc)
	Voltage at state 0	< 5 Vdc (0...5 Vdc)
	Current at state 1	> 2.5 mA
	Current at state 0	< 1.0 mA
Isolation (photo coupler)	Between channels	Photo coupler isolation
	Between channels and internal logic	500 Vdc
Filtering		Bounce filter, (4 µs, 40 µs) and cumulative filter Nx0.5 ms (60 ≥ N ≥ 0)
IEC61131-2 edition 3 type		Type 1
Compatibility		Supports 2 wire and 3 wire sensors
Cable type and length		Shielded: Maximum 100 m (328 ft) Non-shielded: 50 m (164 ft) Shielded cables are used for HSC input.
Protection against over voltage		Possible up to 30 Vdc, limited 1 hour per day

Characteristic	Value
	Standard
Terminal blocks	Type: 3.5 mm (0.137 in.) pitch Terminal blocks are removable
Input paralleling	No

HSC Digital Input Characteristics

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the environmental and electrical characteristics tables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The table describes the characteristics of the HSC inputs:

Characteristic		Value
Rated current	Voltage	24 Vdc
	Current	7.83 mA
Inrush values	Voltage	30 Vdc
	Current	9.99 mA
Input impedance		3.2 kΩ
Input type		Sink/Source
Rated voltage		24 Vdc
Input range		0...28.8 Vdc
Input limit values	Voltage at state 1	> 15 Vdc
	Voltage at state 0	< 5 Vdc
	Current at state 1	> 5 mA
	Current at state 0	< 1.5 mA
Isolation (Photo coupler)	Between channels	Photo coupler isolation
	Between channels and internal logic	500 Vdc
Filtering		Bounce filter, (none, 4 µs, 40 µs) and cumulative filter Nx0.5 ms (63 ≥ N ≥ 0)
IEC61131-2 edition 3 type		Type 1
Compatibility		Supports 2 wire and 3 wire sensors

Characteristic		Value
Cable	Type	Shielded
	Length	Maximum 10 m (33 ft)
Protection against over voltage		Possible up to 30 Vdc, limited 1 hour per day
Terminal blocks		Type: 3.5 mm (0.137 in.) pitch Terminal blocks are removable
HSC maximum frequency		• 50 kHz is the maximum frequency for either single or quadrature counting modes • Duty Rate: 45...55%
HSC supported operation modes		• Single phase • Quadrature x2 • Quadrature x4 • Reverse Quadrature x2 • Reverse Quadrature x4
Response time	Capture input	1 ms
	Preset input	1 ms
	Transistor reflex output	5 µs
Input paralleling		No

Digital Outputs

Relay Output Characteristics

The table describes the characteristics of the relay outputs:

Characteristic		Value
Rated voltage		24 Vdc, 220 Vac
Output range		5...30 Vdc, 100...250 Vac
Rated current		Maximum 2 A for each point
Current/group (4 points)		4 A
Inrush values	Maximum switching voltage	250 Vac, 30 Vdc
	Current/point	5 A
Isolation		Relay coil
Maximum output frequency	with maximum load	0.1 Hz
	without load	5 Hz
Timing data	Operate (at nominal voltage)	Maximum 10 ms
	Release (at nominal voltage)	Maximum 5 ms
Resistive load		2 A/point for 24 Vdc/220 Vac
Mechanical life		20 million operation minimum at 25 °C (77 °F) for maximum current and voltage ratings
Cable length		Non-shielded: 150 m (492 ft)
Protection against short circuit		No
Terminal blocks		Type: 3.5 mm (0.137 in.) pitch Terminal blocks are removable
NOTE: Refer to Protecting Outputs from Inductive Load Damage *(see page 42)* for additional information on this topic.		

PTO/PWM Output Characteristics

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the environmental and electrical characteristics tables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The table describes the characteristics of the PTO/PWM outputs:

Characteristic		Value	
Output type		Push/Pull	
Rated voltage		24 Vdc	
PTO power supply input range		19.2...28.8 Vdc	
PTO power supply reverse protection		Yes	
PTO/PWM output current	Standard output	0.3 A	
	Fast output	50 mA	
Response time for original input		2 ms	
Isolation resistance	Between fast outputs and internal logic	> 10 MΩ	
	Between power supply port and protective ground (PE) = 500 Vdc	> 10 MΩ	
Residual voltage	for I = 0, 1 A	< 1.5 Vdc	
Minimum load impedance		80 Ω	
Maximum PTO output frequency		50 KHz	
Maximum PWM output frequency		65 kHz	
Accuracy / PWM mode	Frequency	Duty	Duty when error >1%
	10...100 Hz	0...100%	<0.1% & >99.9%
	101...1000 Hz	1...99%	<1% & >99%
	1.001...20 kHz	5...95%	<5% & >95%
	20.001...45 kHz	10...90%	<10% & >90%
	45.001...65 kHz	15...85%	<15% & >85%
PWM mode duty rate step		1% full range	
Duty cycle range		0...100%	

Characteristic		Value
Cable	Type	Shielded, including 24 Vdc power supply
	Length	Maximum 5 m (16 ft)
Terminal blocks		Type: 3.5 mm (0.137 in.) pitch Terminal blocks are removable
NOTE: When using the acceleration/deceleration pulse output, there is a 1% maximum error for the frequency.		

Analog Inputs and Analog Outputs

Analog Input Characteristics

The table describes the characteristics of the analog inputs:

Characteristic		Voltage Input	Current Input
Number of maximum input channels		2	
Input type		Single-ended	
Input range		-10... 10 Vdc/0...10 Vdc	0...20 mA/4...20 mA
Input impedance		> 1 MΩ	250 ± 0.11% Ω
Sample duration time		10 ms per channel + 1 scan time	
Total input system transfer time		20 ms + 1 scan time	
Input tolerance	Maximum deviation at 25 °C (77 °F) without electromagnetic disturbance	± 1% of the full scale	
	Maximum deviation	± 2.5% of the full scale	
Digital resolution		12 bit plus sign	
Temperature drift		± 0.06% of the full scale	
Common mode characteristics		80 db	
Cross talk		60 db	
Non-linearity		± 0.4% of full scale	
Input value of LSB		5 mV	10 µA
Maximum allowed overload (no damages)		± 30 Vdc (less than 5 minutes) ± 15 Vdc (No damage)	± 30 mA dc
Protection type		Photo coupler between input and internal circuit	
Cable	Type	Shielded	
	Length	3 m (9.84 ft) is in compliance with electromagnetic immunity. **NOTE:** Compliance to electromagnetic immunity standards is limited to a 3 m (9.84 ft) cable length. In all cases, a maximum cable length of 10 m (32.80 ft) should not be exceeded.	
Terminal blocks		Type: 3.5 mm (0.137 in.) pitch Terminal blocks are removable	

Analog Output Characteristics

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the environmental and electrical characteristics tables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The table describes the characteristics of the analog outputs:

Characteristic		Voltage Output	Current Output
Maximum number of outputs		2	
Output range		-10... 10 Vdc/0...10 Vdc	0...20 mA / 4...20 mA
Load impedance		> 2 kΩ	< 300 Ω
Application load type		Resistive load	
Settling time		10 ms	
Total output system transfer time		10 ms + 1 scan time	
Output tolerance	Maximum deviation at 25 °C (77 °F) without electromagnetic disturbance	± 1% of the full scale	
	Maximum deviation	± 2.5% of the full scale	
Digital resolution		12-bit	
Temperature drift		± 0.06% of the full scale	
Output ripple		± 50 mV	
Cross talk		60 db	
Non-linearity		± 0.5% of the full scale	
Output value of LSB		6 mV	12 µA
Protection type		Photo coupler between input and internal circuit	
Output protection		Short circuit protection	Open circuit protection
Output behavior if input power supply is less than the power failed threshold		Set to 0	
Cable	Type	Shielded	
	Length	3 m (9.84 ft) is in compliance with electromagnetic immunity. **NOTE:** Compliance to electromagnetic immunity standards is limited to a 3 m (9.84 ft) cable length. In all cases, a maximum cable length of 10 m (32.80 ft) should not be exceeded.	
Terminal blocks		Type: 3.5 mm (0.137 in.) pitch Terminal blocks are removable	

Analog RTD Input Characteristics

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the environmental and electrical characteristics tables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The table describes the characteristics of the analog RTD inputs:

Input Characteristics		
Input sensor type		PT100/PT1000/NI100/NI1000
Input temperature range		PT100/PT1000: -200...600 °C (-328...1112 °F) NI100/NI1000: -50...200 °C (-58...392 °F)
Measuring current	PT100/NI100	1.12 mA ± 3.5%
	PT1000/NI1000	0.242 µA ± 3.5%
Input impedance		Typically 10 MΩ
Sample duration time		10 ms +1 cycle time
Wiring type		2/4-wire or 3-wire connection configured by software for each input
Conversion mode		Sigma delta type
Input filter		Low pass (1st order)
Resolution of temperature value		0.1 °C (0.18 °F)
Detection type		Open circuit (detection on each channel)
Input tolerance*	Maximum deviation at 25 °C (77 °F) without electromagnetic disturbance	± 5 °C (41 °F)
	Maximum deviation at 25...50 °C (77...122 °F)	PT type: ± 5.6 °C (42.08 °F) NI type: ± 5.2 °C (41.36 °F)
Temperature drift		30 ppm/°C
Digital resolution		16-bit
Rejection in differential mode	50/60 Hz	Typically 60 dB
Common mode rejection		Typically 80 dB
Isolation between channels		Not isolated
Permitted input signal		±5 Vdc max.
Cable length	PT100/NI100	< 20 Ω
	PT1000/NI1000	< 200 Ω

Input Characteristics	
Terminal blocks	Type: 3.5 mm (0.137 in.) pitch Terminal blocks are removable
Noise resistance - cable	Shielded cable is necessary
* Excluding errors caused by the wiring	

Analog Thermocouple Input Characteristics

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the environmental and electrical characteristics tables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The table describes the characteristics of the analog thermocouple inputs:

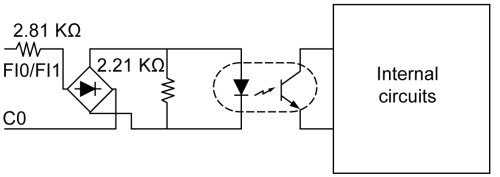
Input Characteristics	
Input sensor type	Thermocouple
Input type range (1)	J (-200...760 °C) (-328...1400 °F) K (-240...1370 °C) (-400...2498 °F) R (0...1600 °C) (32...2912 °F) B (200...1800 °C) (392...3272 °F) S (0...1600 °C) (32...2912 °F) T (-200...400 °C) (-328...752 °F) E (-200...900 °C) (-328...1652 °F) N (-200...1300 °C) (-328...2372 °F)
Input impedance	Typically 10 MΩ
Sample duration time	10 ms +1 cycle time
Conversion mode	Sigma delta type
Digital resolution	16-bit
Input filter	Low pass 1st order
Resolution temperature value	0.1 °C (0.18 °F) (Type J)
Detection type	Open circuit (detection on each channel)
(1) Temperature measurement on PCB at terminal block for cold junction compensation.	

Input Characteristics		
Input tolerance	Maximum deviation at 25 °C (77 °F) without electromagnetic disturbance	Type K, R, B, S,N (including CJC): ± 9.2 °C (48.56 °F)Type J, E (including CJC): ± 8.2 °C (46.76 °F)Type T (including CJC): ± 7.2 °C (44.96 °F)
	Maximum deviation at 25...50 °C (77...122 °F)	Type K, R, B, S,N (including CJC): ± 10.5 °C (50.9 °F)Type J, E (including CJC): ± 9.1 °C (48.38 °F)Type T (including CJC): ± 7.7 °C (45.86 °F)
Temperature drift		30 ppm/°C
Input tolerance - terminal temperature compensation		± 5 °C (41 °F) after 10 minutes.
Cold junction compensation in the temperature range (0...50 °C (122 °F))		Internal cold junction error: +/- 6 °C (42.8 °F) after operating 45 minutes.
Rejection in differential mode	50/60 Hz	Typically 60 dB
Common mode rejection		Typically 80 dB
Isolation between channels		Not isolated
Permitted input signal		± 5 Vdc max.
Warm up time		45 minutes
Terminal blocks		Type: 3.5 mm (0.137 in.) pitch Terminal blocks are removable
Noise resistance - cable		Shielded cable is necessary
(1) Temperature measurement on PCB at terminal block for cold junction compensation.		

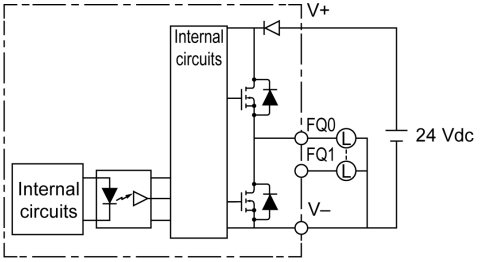
Internal Circuits

HMISCU•A5 (type DIO) Internal Circuit

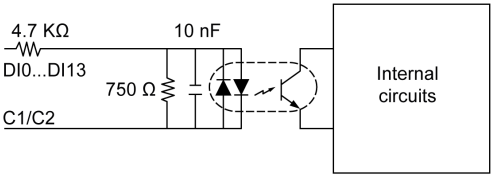
The circuit configuration of FI0, FI1 is shown as follows:



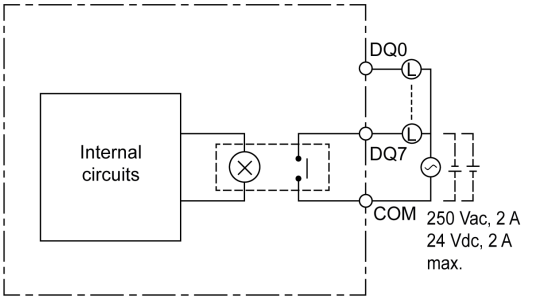
The circuit configuration of FQ0 and FQ1 is shown as follows:



The circuit configuration from DI0 to DI13 is shown as follows:

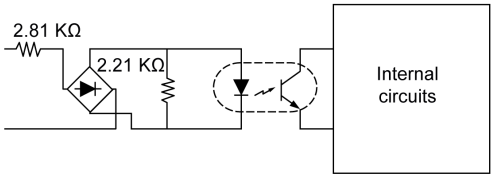


The circuit configuration from DQ0 to DQ7 is shown as follows:

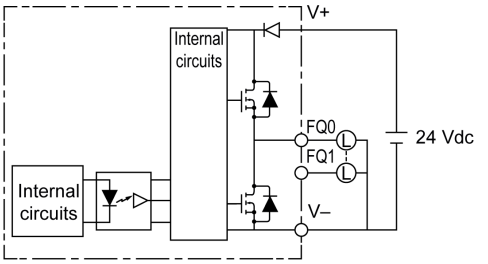


HMISCU•B5 (type DIO and AIO) Internal Circuit

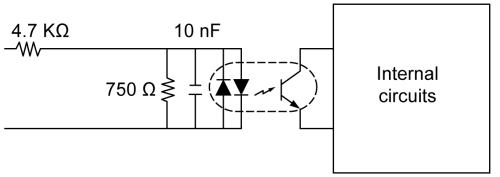
The circuit configuration of FI0, FI1 is shown as follows:



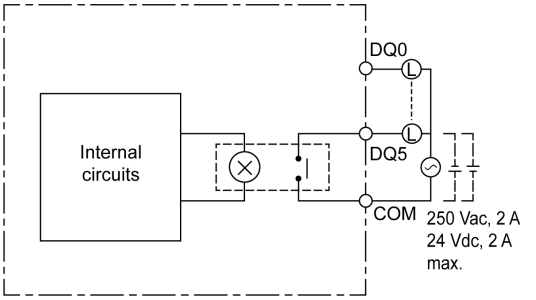
The circuit configuration of FQ0 and FQ1 is shown as follows:



The circuit configuration from DI0 to DI5 is shown as follows:



The circuit configuration from DQ0 to DQ5 is shown as follows:



Memory and Touch Panel

Memory

The table shows the memory specifications of HMISCU:

Items	Type	Element	Specification
Main Flash Memory (128MB)	FLASH EPROM	Vijeo Designer Runtime OS	64 MB
		HMI Application	58 MB
		CoDeSys Engine	4 MB
		Controller Application	2 MB
Application Run Memory	DRAM	–	128 MB
Data Backup (Alarms, Retentive Variables)	Non-volatile SRAM[1]	–	128 kbytes
(1) Non-volatile SRAM does not require battery power for data backup. The internal battery in the HMISCU is only required for Real Time Clock (RTC).			

Memory Back-Up Management

Vijeo Designer alarm data and variable logging is automatically stored in non-volatile SRAM in a first-in-last-out format. The number of datum stored in the SRAM is user-defined. This data from SRAM can also be optionally backed up in removable media when a user-defined number of new data points is logged and/or can also be triggered by an action.

Clock

Variations in operating conditions (i.e. varying ambient temperature) can cause a clock shift. (Refer to the topic Real Time Clock *(see page 54)* for details.)

Touch Panel

The table shows the touch-panel specifications of HMISCU:

Items	Specification
Type	Analog resistive film type (Metal Tab, Gold-plated)
Lifetime	1 million touches or more

Part IV
Settings

Overview

This part describes the settings available on the target machine as well as how to debug the unit.

What Is in This Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
11	Connecting the HMISCU to a PC	175
12	Configuring the HMISCU	179
13	Troubleshooting	191
14	Maintenance	195

Chapter 11
Connecting the HMISCU to a PC

Connecting the Controller to a PC

Overview

To transfer, run, and monitor applications, using either a USB cable or an Ethernet connection, connect the controller to a computer that has minimum version on SoMachine and Vijeo-Designer 6.1 SP3 add-on installed.

NOTICE
INOPERABLE EQUIPMENT Always connect the communication cable to the PC before connecting it to the controller. **Failure to follow these instructions can result in equipment damage.**

USB Mini-B Port Connection

Attach the data transfer cable (BMXXCAUSBH018) to the USB port to allow data transfer from the computer to the unit.

TSXCNAMUM3P: This USB cable is suitable for short duration connections like quick updates or retrieving data values.

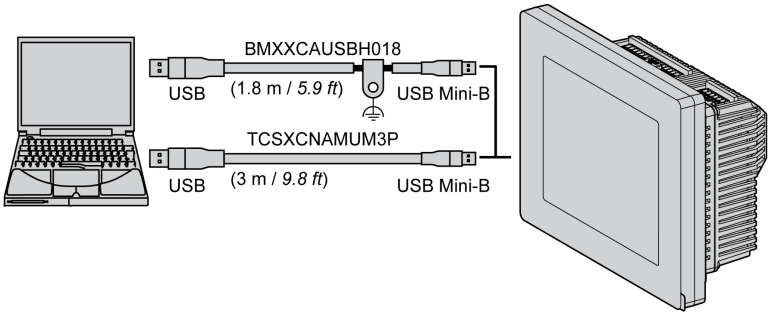
BMXXCAUSBH018: Grounded and shielded, this USB cable is suitable for long duration connections.

NOTE: You can connect 1 controller to the PC at a time.

Use the USB mini-B programming port to connect a PC with a USB host port. Using a typical USB cable, this connection is suitable for quick updates of the program or short duration connections to perform maintenance and inspect data values. It is not suitable for long term connections such as commissioning or monitoring without the use of specially adapted cables to help minimize electromagnetic interference.

⚠ WARNING
INOPERABLE EQUIPMENT OR UNINTENDED EQUIPMENT OPERATION ● You must use a shielded USB cable secured to the functional ground (FE) of the system for any long term connections. ● Do not connect more than one controller at a time using USB connections. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

The figure shows the USB connection to a PC:



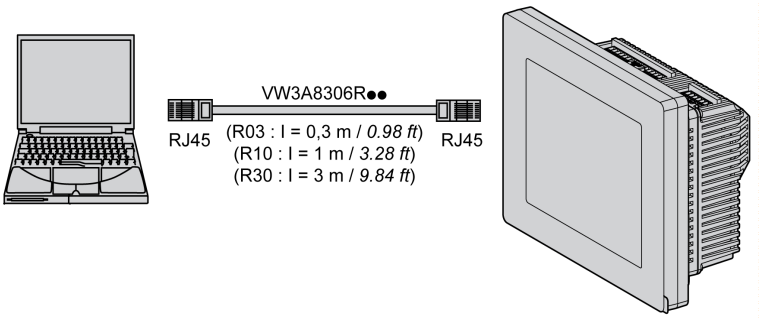
To connect the USB cable to your controller, do the following:

Step	Action
1	**a** If making a long term connection using a USB cable with a ground shield connection, securely connect the shield connector to the functional ground (FE) or protective ground (PE) of your system before connecting the cable to your controller and your PC. **b** If making a short term connection using a non-grounded USB cable, proceed to step 2.
2	Connect the USB cable connector to the PC.
3	Connect the mini connector of the USB cable to the controller USB connector.

Ethernet Port Connection

You can also connect the controller to a PC using an Ethernet cable.

The figure shows the Ethernet connection to a PC:



To connect the controller to the PC, do the following:

Step	Action
1	Connect your Ethernet cable to the PC.
2	Connect your Ethernet cable to the Ethernet port on the controller.

Chapter 12
Configuring the HMISCU

Overview

This chapter presents the settings on the HMISCU.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Types of Settings	180
System Settings	181
Offline Settings	185
Diagnostics Settings	188

Types of Settings

Introduction

You can use the **Settings** menu to configure the unit.

Depending on how you use your HMISCU, you can display the **Settings** menu using three different methods:

- Use a **Switch**,
- Use a **Touch Animation**
- Touch the top-left corner of the panel when powering up,
- Touch two corners of the panel successively while the application is running.

You can select which methods your application uses in the Vijeo Designer editor's Target properties.

Calling Up the Settings Menu

Step	Action
1	Set up any combination of the following methods for displaying the **Settings** menu. ● Action: Create a switch and add the Configuration System Operation. See the Vijeo Designer online help for more information on creating a switch. ● There are actually 3 methods available to bring up the configuration: **Top Left Corner** In **Target** properties, set **To Configuration** to **Top Left Corner**. **Top Left/2 Corner** In **Target** properties, set **To Configuration** to **Top Left/2 Corner**. **2 Corner** In **Target** properties, set **To Configuration** to **2 Corner** (touch two corners successively. If you set **To Configuration** to **None** and do not create a switch to display the **Settings** menu, then there is no way to configure the unit at run time.
2	Connect the power supply.
3	Depending on what you set up in Step 1, you can display the **Configuration** menu using one of the following methods: ● Action: Touch the switch set up with the Configuration system operation. ● Top-Left Corner: Touch the top-left corner of the screen within ten seconds after the unit begins starting up. ● Touch two corners successively: Touch successively the top left corner then the bottom right corner within half a second. The touch area is 50 dots by 50 dots. Vijeo Designer Runtime restarts and displays the Settings menu.
4	The **Settings** menu contains 3 tabs: **Offline**, **System**, **Diagnostics** and **To Run Mode**. Click a tab to display its settings.

System Settings

Introduction

You can change system settings while the user application is still running.

Stylus

Use the Stylus to calibrate the screen:

Step	Action
1	In the **Setting** menu, touch the **System** tab.
2	Touch the **Stylus** button.
3	Touch the center of the cross-hairs several times to complete calibration of the screen.

Changing the Date/Time

Step	Action
1	In the **Setting** menu, touch the **System** tab.
2	Touch the **Date/Time** button.
3	Touch any of the **Year**, **Month** or **Day** fields and a data entry keypad is displayed. Use this keypad to define the selected date setting.
4	Touch any of the **Hour**, **Minutes** or **Seconds** fields and a data entry keypad is displayed. Use this keypad to define the selected time setting.
5	In the **Time Zone** tab touch the up/down arrows to select the desired time zone.
6	Select the **Auto. adjust clock for daylight saving time** check box to choose adjusting clock for daylight saving time changes automatically.
7	In the **DST** tab touch the up/down arrows to select the desired daylight saving time type: • **Date**: the DST is added, or subtracted, on the exact date chosen. • **Rule**: the DST is added, or subtracted, on a specific weekday in the month.
8	Touch the **Amount** field and a data entry keypad is displayed. Use this keypad to define the desired daylight saving time amount (minutes).
9	Touch the **OK** button to validate your configuration or configure the parameters of daylight saving time by Date *(see page 182)* or by Rule *(see page 182)*.

Daylight Saving Time Setting by Date

If **Date** is selected in step 7 of Changing the Date/Time *(see page 181)*, follow this procedure to set the daylight saving time parameters:

Step	Action
1	Follow the procedure of Changing the Date/Time *(see page 181)* until step 9.
2	In **Add Time** touch the up/down arrows to select the desired month and touch the right field to display the keypad to define the desired day to add time. In **@** touch any of the fields to display the keypad and define the hour to add time.
3	In **Subtract Time** touch the up/down arrows to select the desired month and touch the right field to display the keypad to define the desired day to subtract time. In **@** touch any of the fields to display the keypad and define the hour to subtract time.

Daylight Saving Time Setting by Rule

If **Rule** is selected in step 7 of Changing the Date/Time *(see page 181)*, follow this procedure to set the daylight saving time parameters:

Step	Action
1	Follow the procedure of Changing the Date/Time *(see page 181)* until step 9.
2	In **Add Time** touch the up/down arrows to select the desired day and the desired month to add time. In **@** touch any of the fields to display the keypad and define the hour to add time.
3	In **Subtract Time** touch the up/down arrows to select the desired day and the desired month to subtract time. In **@** touch any of the fields to display the keypad and define the hour to subtract time.

Forcing a Restart

Step	Action
1	In the **Setting** menu, touch the **System** tab.
2	Touch the **Restart** button, the following message appears: **Are you sure you want to restart the operating system?**.
3	Touch the **Restart** button to restart the unit or the **Cancel** button to return to the **System** menu.

Selecting a Language

The following table describes how to select the language used for the Settings menu, the run-time messages and user application.

Step	Action
1	In the **Setting** menu, touch the **System** tab.
2	Touch the **Language** button.
3	Touch the up/down arrows to select the desired languages for: ● System, ● User Application, ● Keyboard Language. The languages available in the language settings are defined in theVijeo Designer editor.
4	Touch **OK** to validate.

Displaying Version Information

Step	Action
1	In the **Setting** menu, touch the **System** tab.
2	Touch the **Ver. Info** button, version information displays: ● Vijeo Designer Run-time Version, ● Vijeo Designer Version, ● Build number.

Displaying Memory Statistics

Step	Action
1	In the **Setting** menu, touch the **System** tab.
2	Touch the **Memory** button. ● DRAM describes the amount of memory currently being used by the application. ● Main Flash indicates the amount of internal memory (flash memory) required to store the run-time system files and the user application.

Brightness Control

Step	Action
1	In the **Setting** menu, touch the **System** tab.
2	Touch the **Brightness** button.
3	Touch the up/down arrows to adjust the brightness. **NOTE:** Reducing the brightness could increase the life span of the backlight.

Offline Settings

Introduction

You cannot change the offline settings while a user application is running.

Changing the Network Settings

Step	Action
1	In the **Setting** menu touch the **Offline** tab.
2	Touch the **Network** button and the following message appears: **Working with Offline Settings will stop the user application and run-time. Continue?**
3	Touch the **OK** to restart the system or the **Cancel** button to return to the **System** menu.
4	In the **Static IP** tab, touch any of **IP Address**, **Subnet Mask** or **Default Gateway** fields, and in the numerical keypad, enter the desired parameters and validate by touching **Enter** button.
5	In the **DHCP** tab, touch the **Enable DHCP** check box to obtain configuration information from the network. This reduces system administration workload, allowing devices to be added to the network with little or no manual intervention.
6	In the **MAC/DNS** tab: ● Touch **Obtain DNS Setting** check box to translate names into IP addresses. ● Touch any of **IP Address** fields, and in the numerical keypad, enter the desired IP address and validate by touching **Enter** button.
7	In **Static IP** tab touch **Ok** to validate.

Changing the Buzzer Settings

Step	Action
1	In the **Setting** menu touch the **Offline** tab.
2	Touch the **Buzzer** button and the following message appears: **Working with Offline Settings will stop the user application and run-time. Continue?**
3	Touch the **OK** to restart the system or the **Cancel** button to return to the **System** menu.
4	Touch the desired buzzer mode. The factory setting is **When Press Touch Object**. ● **None**: Selecting this turns the buzzer off. ● **When Press Touch Object**: The buzzer only sounds when a Touch Object is pressed.

Changing Backlight Control

Step	Action
1	In the **Setting** menu touch the **Offline** tab.
2	Touch the **Backlight** button and the following message appears: **Working with Offline Settings will stop the user application and run-time. Continue?**
3	Touch the **OK** to restart the system or the **Cancel** button to return to the **System** menu.
4	In the **Backlight** control, define the backlight operations. • **Wait**: To extend the life of the backlight, you can set up the unit so that it turns off the backlight when the panel is inactive (idle) for the defined period of time, (Idle means the unit panel has not been pressed). The factory setting for this item is off. • **Enable Touch if Backlight Burned Out**: This setting defines whether the touch panel is enabled or disabled when a backlight burnout is detected. When this feature is cleared and the backlight burns out, touch inputs are ignored to help prevent operation detected errors. The factory setting for this item is off.
5	To turn the **Backlight** off automatically after a specified period of time, select the **Wait** check box and then set the idle time.

Self Test

Step	Action
1	In the **Setting** menu, touch the **Offline** tab.
2	Touch the **Self Test** button and the following message appears: **Working with Offline Settings will stop the user application and run-time. Continue?**
3	Touch the **OK** to restart the system or the **Cancel** button to return to the **System** menu.
4	In the **Self Test** control, touch: • **Char. Pattern**: to check the characters in each font set available on the unit. Use this test when characters (usually 2-byte characters) do not display properly. **Ok** appears if there is no detected error. **NG** appears if there is a detected error. • **Disp. Pattern**: to test your LCD screen with some graphical test patterns. • **Touch Panel**: to test the touch panel cells. Each cell highlights when it is pressed during the test. • **COM 1**: to test the COM 1 port connector. **Ok** appears if there is no detected error. **NG** appears if an error is detected. • **Video memory**: to test hardware memory.

Driver Configuration

Step	Action
1	In the **Setting** menu, touch the **Offline** tab.
2	Touch the **IO Manager** button and the following message appears: **Working with Offline Settings will stop the user application and run-time. Continue?**
3	Touch the **OK** to restart the system or the **Cancel** button to return to the **System** menu.
4	In the **IO Manager** control, touch the **Driver Config** button.
5	In the **Driver Config** control: **Select Driver**: touch the up/down arrow to select the desired driver.
6	Set the parameters of the selected driver.

Equipment Configuration

Step	Action
1	In the **Setting** menu, touch the **Offline** tab.
2	Touch the **IO Manager** button and the following message appears: **Working with Offline Settings will stop the user application and run-time. Continue?**
3	Touch the **OK** to restart the system, or the **Cancel** button to return to the **Setting** menu.
4	In the **IO Manager** control, touch the **Equipment Config** button.
5	In the **Equipment Config** control: **Select Equipment**: touch the up/down arrow to select the desired equipment.
6	Set the parameters of the selected equipment.

Diagnostics Settings

Introduction

The HMISCU units are equipped with a number of diagnostic features that can be used to check the systems and the interfaces for any problems.

Diagnostics

See the Vijeo Designer online help for information on accessing the **Diagnostics Settings** menu.

Variables

Use the **Variable** menu to check that the application is running correctly. The following table describes how to get to the **Variable** menu:

Step	Action
1	In the **Settings** menu, touch the **Diagnostics** tab.
2	Touch the **Variable** button.
3	**Select Equipment**: touch the up/down arrow to select the equipment whose variables you want to test.
4	In the **Variable** menu, touch the **Go Offscan** button, the following message appears: **Warning: Entering the Variable Test screen pauses communication with all equipment. Continue?**
5	Touch the **OK** button to restart the system, or the **Cancel** button to return to the **Variable** menu.
6	If **Go Onscan** is pressed, the test reads the value for each variable associated with the selected equipment. If any of the variables detects a problem, because of a detected error in the equipment or a time-out, the event log displays a message with the name of the variable.
7	After you complete testing variables from one equipment, you can continue testing variables for other equipment connected to the target machine.
8	Alternatively, you can test all equipment at once by selecting **Test All** in the Select Equipment drop-down list.
9	Touch the **Return** button to return to the **Diagnostics** menu.

Statistics

Use the **Statistics** menu to check the connection between equipment. The following table describes how to get to **Statistics** menu:

Step	Action
1	In the **Settings** menu, touch the **Diagnostics** tab.
2	Touch the **Statistics** button. **NOTE:** When you write any value to this system control word, touch the **Rollover** button to: ● Copy the values in the current statistic variables to the previous statistic variables. ● Reset current statistic variables to zero.
3	In **Show Stats for:** touch the up/down arrow to select the equipment whose variable statistics you want to show.
4	Touch the right arrow button to view the next display.
5	Touch the **Go Offscan** button to start the test.
6	Touch the right arrow button to view the next display.
7	**Total Good**: the total number of received variables without detected error. **Total Bad**: the total number of detected errors of all types. **Total Count**: Total Good + Total Bad. **No Reply**: no reply was received in response to the request. **Chksum Fail**: received a request or response **(1)** with an incorrect checksum. **Wrong Addr.**: received a request or response **(1)** with an incorrect address. **Error Resp.**: received a detected error response from the equipment. **(1)**: Master-type drivers send out requests and receive responses. Slave-type drivers receive requests and send responses.
8	Touch the next arrow button to view the next display.
9	**Inv. Resp.**: received a response that contained a protocol detected error. **Init. Fail**: initializing communications with the equipment was unsuccessful. **Write Fail**: writing a new value to the equipment was unsuccessful. **Intrn Error**: internal driver detected error indicates improper driver configuration or driver problem. **Xmit Fail**: transmitting a request or response was unsuccessful. **Unsupp. Req.**: received a request for an unsupported service. **Inv. Request**: received a request that contained a protocol detected error.
10	Touch the **Return** button to return to the **Diagnostics** menu or the previous arrow button to view the previous display.

Chapter 13
Troubleshooting

Overview

This chapter describes how to find and resolve detected problems with the HMISCU units.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Troubleshooting Checklists	192
Self Test List	194

Troubleshooting Checklists

Introduction

When there is a detected problem, go through the checklist and follow the instructions given.

Here are the main detected problems that may occur when using HMISCU unit.

- Panel display is blank,
- Connected equipment cannot be used,
- Panel does not respond or responds very slowly,
- Panel beeps when powered on,
- Cannot change the date or time.

NOTE: Contact your local Schneider Electric vendor or your local distributor.

Panel Display is Blank

If the unit display is blank, perform the following:

Step	Check/Operation	Solution
1	Are all Vijeo Designer screens downloaded?	You may have to download the screens again.
2	Is the Initial Panel ID set up correctly in Vijeo Designer?	Enter the Initial Panel ID in the Vijeo Designer editor and download again.
3	Is the unit using the correct rated voltage?	Verify the power supply connections and levels.
4	Is the power supply off or disconnected?	Follow the instructions in this manual for reconnecting the power supply.
5	Is the backlight lit?	Potential detected problem with the unit. Contact your local distributor.
6	Is the detected problem resolved?	If none of the previous steps fixed the blank panel display detected problem, then verify the hardware.

Connected Equipment Cannot be Used

If the unit does not communicate with connected equipment, perform the following:

Step	Check/Operation	Solution
1	Is the power supply off or disconnected?	Verify the power supply connections and levels.
2	Do the **Driver** and **Equipment** settings in Vijeo Designer match the actual equipment you are trying to communicate with?	In the Vijeo Designer editor Navigator window's **Project** tab, expand the I/O Manager node to enter the correct configuration settings for the Driver and Equipment nodes.
3	Is the communication cable connected correctly?	Refer to the associated protocol manual for information about cable diagrams.
4	Is the detected problem resolved?	If none of the previous steps fixed the communication detected problem, then verify the hardware.

Unit does not respond when pressed

If the unit is either not responding when pressed or if its response time is very slow, perform the following:

Step	Check/Operation	Solution
1	Disconnect all the cables except the power cable.	-
2	In the **Settings** menu, press the **Offline** tab and then press the **Self Test** icon. Run the Touch Panel test.	If the test is unsuccessful, there is a detected problem with the hardware.
3	If touch response is slow, does it happen on a specific panel?	If the panel displays the values of a large number of equipment variables, you may want to redesign the panel and separate the variables into different panels and download again.
4	If touch response is slow, the HMI controller may be very busy communicating with external equipment.	To resolve this detected problem, try each of the following in the Vijeo Designer editor and download again. ● If you are using serial communication, verify the communication speed between the HMI and equipment is optimized. ● In the equipment or scan group properties, reduce the Scan Rate to Slow. This will reduce the frequency of variable updates to 1000 ms. ● If you use many equipment variables in application scripts, you may want to change the script to a panel script so that the variables are active only when the information is necessary. If none of the above works, then you may have to reduce the number of external variables in the project. If none of the proposed options work, contact your Schneider Electric support for optimizing your project.

HMI beeps when powered ON

A continuous beep from the HMI means that system files are corrupted. To resolve this detected problem, go to the Vijeo Designer Start menu and run Recovery on the HMI machine.

Self Test List

Introduction

The HMISCU units are equipped with a number of diagnostic features that can be used to check the systems and the interfaces for any detected errors.

Self Test

From the **Settings** menu, touch the **Offline** button and then the **Self Test** icon. **Self Test** menu appears. See the Vijeo Designer online help for information on accessing the **Offline** tab.

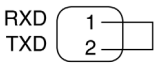
Self Tests

The following tests can be accessed from the **Self Test** menu.

Test	Description
Char. Pattern	Checks the characters in each font set available on the unit. Use this test when characters (usually double-byte characters) do not display properly. **OK** appears if there is no detected error; **NG** appears if there is a detected error.
Disp. Pattern	Use this test when your drawings are not displayed properly.
Touch Panel	Tests the touch panel cells. Each cell highlights when it is pressed during the test.
COM 1	Checks if the serial port (RS-232C and RS-485) is working properly. To run the check, you may need to connect a loopback cable (see below). **OK** appears if there is no detected error; a detected error message appears if there is an error.
Video Memory	Use this test to check the video memory (memory used for screen display). Run this test when the screen does not display properly. **OK** appears if there is no detected error; **NG** appears if there is a detected error.

Wiring for COM 1 tests

When testing the serial port, depending on which port and which communication format you are testing, you may need to attach a loopback cable with wiring as defined below:

RS-232C	RS-485
HMISCU in COM1 	Loopback not required for HMISCU COM1.

Chapter 14
Maintenance

Overview

This chapter explains how to maintain your HMISCU units.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Regular Cleaning	196
Periodic Check Points	198

Regular Cleaning

Cleaning the Display

NOTICE
EQUIPMENT DAMAGE ● Power off the unit before cleaning it. ● Do not use hard or pointed objects to operate the touch panel since it can damage the panel surface. ● Do not use paint thinner, organic solvents, or a strong acid compound to clean the unit. **Failure to follow these instructions can result in equipment damage.**

When the surface or the frame of the display gets dirty, soak a soft cloth in water with a neutral detergent, wring the cloth tightly, and wipe the display.

Chemical Substances

The products in the table can be used when cleaning the unit:

Kinds of Fluid	Company	Product Designation	Concentration	Temperature °C (°F)	pH Value
Cleaning agents in the food and beverage industry	Ecolab	Topmaxx 422	5	40 (104)	1% : pH=13
	Ecolab	P3 Topax M 95	5	40 (104)	1% : pH=12.3
	Ecolab	P3 Oxonia Active	3	40 (104)	
	Ecolab	P3 Topax 52 FR	5	40 (104)	1% : pH=2
	Ecolab	P3 Topax 36	5	40 (104)	–
	Ecolab	P3 Luboklar MH	0.7	40 (104)	–
	Johnson Diversey	Divosan 2000	1	25 (77)	100% : pH=7
	Johnson Diversey	Diverfoam Septiplus	5	25 (77)	3% : pH=8.3
	Johnson Diversey	Acifoam	5	25 (77)	1% : pH=2.2
	Johnson Diversey	HD Plus Foam	5	25 (77)	1% : pH=12.9
	Johnson Diversey	Oxofoam	5	25 (77)	1% : pH=12.7
	Johnson Diversey	Endoroplus VE6	5	25 (77)	1% : pH=12.1
	Johnson Diversey	Endoroforce VE2	5	25 (77)	1% : pH=12.5
	Johnson Diversey	Endorocid VE10	5	25 (77)	1% : pH=2
Diverse	–	Water	100	50 (122)	–
		Milk	100	25 (77)	
		Methanol	10	25 (77)	
Oils	–	ASTM 1	100	25 (77)	
		IRM 902	100	25 (77)	
		IRM 903	100	25 (77)	
		Cerechlor/IRM 903	50/50	25 (77)	
		Syntopon B	3	25 (77)	
Cutting oils	Ecocut	HBN 16LE	Pure	25 (77)	
	Quakercool	7101 H	Emulsion	25 (77)	
	Quakercool	2769	Soluble / synthetic	25 (77)	
	Quakercool	3750 H	Micro-emulsion	25 (77)	

Periodic Check Points

Operation Environment

Refer to the Environmental Specifications *(see page 39)*.

Electrical Specifications

The input voltage must be within 20.4 to 28.8 Vdc.

Related Items

- Are all power cords and cables connected properly? Are there any loose cables?
- Are all display installation nuts holding the unit securely?

Glossary

A

analog input

Converts received voltage or current levels into numerical values. You can store and process these values within the logic controller.

analog output

Converts numerical values within the logic controller and sends out proportional voltage or current levels.

C

CANopen

An open industry-standard communication protocol and device profile specification (EN 50325-4).

continuous function chart language

A graphical programming language (an extension of the IEC61131-3 standard) based on the function block diagram language that works like a flowchart. However, no networks are used and free positioning of graphic elements is possible, which allows feedback loops. For each block, the inputs are on the left and the outputs on the right. You can link the block outputs to inputs of other blocks to create complex expressions.

control network

A network containing logic controllers, SCADA systems, PCs, HMI, switches, ...

Two kinds of topologies are supported:

- flat: all modules and devices in this network belong to same subnet.
- 2 levels: the network is split into an operation network and an inter-controller network.

These two networks can be physically independent, but are generally linked by a routing device.

D

DIN

(*Deutsches Institut für Normung*) A German institution that sets engineering and dimensional standards.

E

EIA rack

(*electronic industries alliance rack*) A standardized (EIA 310-D, IEC 60297, and DIN 41494 SC48D) system for mounting various electronic modules in a stack or rack that is 19 inches (482.6 mm) wide.

EN

EN identifies one of many European standards maintained by CEN (*European Committee for Standardization*), CENELEC (*European Committee for Electrotechnical Standardization*), or ETSI (*European Telecommunications Standards Institute*).

F

FE

(functional Earth) A common grounding connection to enhance or otherwise allow normal operation of electrically sensitive equipment (also referred to as functional ground in North America).

In contrast to a protective Earth (protective ground), a functional earth connection serves a purpose other than shock protection, and may normally carry current. Examples of devices that use functional earth connections include surge suppressors and electromagnetic interference filters, certain antennas, and measurement instruments.

function block diagram

One of the 5 languages for logic or control supported by the standard IEC 61131-3 for control systems. Function block diagram is a graphically oriented programming language. It works with a list of networks where each network contains a graphical structure of boxes and connection lines representing either a logical or arithmetic expression, the call of a function block, a jump, or a return instruction.

I

IEC

(*international electrotechnical commission*) A non-profit and non-governmental international standards organization that prepares and publishes international standards for electrical, electronic, and related technologies.

IEC 61131-3

Part 3 of a 3-part IEC standard for industrial automation equipment. IEC 61131-3 is concerned with controller programming languages and defines 2 graphical and 2 textual programming language standards. The graphical programming languages are ladder diagram and function block diagram. The textual programming languages include structured text and instruction list.

instruction list language

A program written in the instruction list language that is composed of a series of text-based instructions executed sequentially by the controller. Each instruction includes a line number, an instruction code, and an operand (see IEC 61131-3).

IP 20

(*ingress protection*) The protection classification according to IEC 60529 offered by an enclosure, shown by the letter IP and 2 digits. The first digit indicates 2 factors: helping protect persons and for equipment. The second digit indicates helping protect against water. IP 20 devices help protect against electric contact of objects larger than 12.5 mm, but not against water.

L

ladder diagram language

A graphical representation of the instructions of a controller program with symbols for contacts, coils, and blocks in a series of rungs executed sequentially by a controller (see IEC 61131-3).

M

master/slave

The single direction of control in a network that implements the master/slave mode.

N

NEMA

(*national electrical manufacturers association*) The standard for the performance of various classes of electrical enclosures. The NEMA standards cover corrosion resistance, ability to help protect from rain, submersion, and so on. For IEC member countries, the IEC 60529 standard classifies the ingress protection rating for enclosures.

P

PE

(*Protective Earth*) A common grounding connection to help avoid the hazard of electric shock by keeping any exposed conductive surface of a device at earth potential. To avoid possible voltage drop, no current is allowed to flow in this conductor (also referred to as *protective ground* in North America or as an equipment grounding conductor in the US national electrical code).

PWM

(*pulse width modulation*) A fast output that oscillates between off and on in an adjustable duty cycle, producing a rectangular wave form (though you can adjust it to produce a square wave).

R

RJ45

A standard type of 8-pin connector for network cables defined for Ethernet.

RPDO

(*receive process data object*) An unconfirmed broadcast message or sent from a producer device to a consumer device in a CAN-based network. The transmit PDO from the producer device has a specific identifier that corresponds to the receive PDO of the consumer devices.

RS-232

A standard type of serial communication bus, based on 3 wires (also known as EIA RS-232C or V.24).

RS-485

A standard type of serial communication bus, based on 2 wires (also known as EIA RS-485).

S

SFC

(*sequential function chart*) A language that is composed of steps with associated actions, transitions with associated logic condition, and directed links between steps and transitions. (The SFC standard is defined in IEC 848. It is IEC 61131-3 compliant.)

ST

(*structured text*) A language that includes complex statements and nested instructions (such as iteration loops, conditional executions, or functions). ST is compliant with IEC 61131-3.

T

terminal block

(*terminal block*) The component that mounts in an electronic module and provides electrical connections between the controller and the field devices.

TPDO

(*transmit process data object*) An unconfirmed broadcast message or sent from a producer device to a consumer device in a CAN-based network. The transmit PDO from the producer device has a specific identifier that corresponds to the receive PDO of the consumer devices.

Index

Symbols

peripherals
  edit mode, *64*
  run mode, *65*

A

accessories, *66*

C

certifications and standards, *26*
communication interface, *145*
communication ports
  serial port, *152*
connecting the power cord, *98*
connecting the power supply, *101*

D

devices overview, *29*
diagnostics settings, *188*

E

edit mode peripherals, *64*
electrical requirements
  installation, *94*
electromagnetic susceptibility, *40*
ethernet
  cable port connector, *146*

F

fallback modes, *59*
features
  key features, *30*
filter
  bounce filter, *57*
  integrator filter, *56*

G

grounding the system, *48*

H

HMISCU•A5 (type DIO), *115*
HMISCU•B5 (type DIO and AIO), *125*

I

I/O management, *55*
inductive load, output protection
  output protection, inductive load, *43*
input management, *56*
installation, *69*
  electrical requirements, *94*
  mechanical requirements, *70*
  procedures, *81*

L

latching, *57*

M

main features, *29*
maintenance
  check points, *198*
  cleaning, *196*
mechanical requirements
  installation, *70*
mounting clearances, *88*
mounting positions, *87*

O

output management, *59*

P

parts identification and functions, *21*
power plug, *98*
power supply characteristics and wiring, *95*
programming languages, *30*

R

read before starting
    environmental characteristics, *39*
    installation requirements, *37*
real time clock, *54*
RTC, *54*
run mode peripherals, *65*

S

self test, *194*
serial port
    communication port, *152*
settings
    menu, *180*
short-circuit or over-current on outputs, *60*
specifications
    display, *158*
    general, *156*
system settings, *181*

T

troubleshooting, *192*

U

USB
    data transfer cable, *104*
    driver installation, *104*
    type A, *106*
    type mini-B, *109*

W

wiring rules and recommendations, *41*

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