EWCM 9000 PRO (HF)

Hardware Guide

Original instructions

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03/2023



www.eliwell.com

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As part of a group of responsible, inclusive companies, we are updating our communications that contain non-inclusive terminology. Until we complete this process, however, our content may still contain standardized industry terms that may be deemed inappropriate by our customers.

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Safety Information

Important Information

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 and Eliwell 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.

Qualification of Personnel

Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product.

The qualified person must be able to detect possible hazards that may arise from parameterization, modifying parameter values and generally from mechanical, electrical, or electronic equipment. The qualified person must be familiar with the standards, provisions, and regulations for the prevention of industrial accidents, which they must observe when designing and implementing the system.

Intended Use

The products described or affected by this document, together with software, accessories, and options, are controllers, intended for commercial HVAC machines according to the instructions, directions, examples, and safety information contained in the present document and other supporting documentation.

The product may only be used in compliance with all applicable safety regulations and directives, the specified requirements, and the technical data.

Prior to using the product, you must perform a risk assessment in view of the planned application. Based on the results, the appropriate safety-related measures must be implemented.

Since the product is used as a component in an overall machine or process, you must ensure the safety of persons by means of the design of this overall system.

Operate the product only with the specified cables and accessories. Use only genuine accessories and spare parts.

Any use other than the use explicitly permitted is prohibited and can result in unanticipated hazards.

Prohibited Use

Any use other than that expressed above under Permitted use is strictly prohibited.

The relay contacts supplied are of an electromechanical type and subject to wear. Functional safety protection devices, specified in international or local standards, must be installed externally to this device.

Liability and Residual Risks

The liability of Schneider Electric and Eliwell is limited to the proper and professional use of this product under the guidelines contained in the present and other supporting documents, and does not extend to damages caused by (but not limited to):

- Unspecified installation/use and, in particular, in contravention of the safety requirements of established legislation or specified in this document;
- Use on equipment which does not provide adequate protection against electrocution, water and dust in the actual installation conditions;
- Use on equipment in which dangerous components can be accessed without the use of specific tools;
- Installation/use on equipment which does not comply with established legislation and standards.

Disposal

The appliance (or the product) must be disposed of separately in compliance with the local standards in force on waste disposal.

About the Book

Document Scope

This document describes the EWCM 9000 PRO (HF) devices used to control compressor racks, including information on installation and wiring.

NOTE: Read and understand this document and all related documents, page 9 before installing, operating, or maintaining your device.

Validity Note

This document has been updated for the release of FREE Studio Plus V1.5.0.

For product compliance and environmental information (RoHS, REACH, PEP, EOLI, etc.), go to https://www.eliwell.com/en/Support/Green-Premium.html.

The technical characteristics of the devices described in the present document also appear online. To access the information online, go to the Eliwell home page www.eliwell.com.

Related Documents

Title of documentation	Reference number
FREE Studio Plus - Operating Guide	9MA10256 (ENG)
FREE Advance 7/18 IO – Instruction Sheet	9IS54609
FREE Advance 28/42 IO – Instruction Sheet	9IS54473
FREE Advance 28/42 IO isolated – Instruction Sheet	9IS54655
FREE EVE6000 / EVE10200 Expansion module – Instruction Sheet	9IS54478
FREE AVK1000000500 Monochrome Display – Instruction Sheet	9IS54800
FREE EVS Plugin – Instruction Sheet	9IS54405

You can download these technical publications, the present document and other technical information from our website www.eliwell.com.

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.

This equipment has been designed to operate outside of any hazardous location, and exclusive of applications that generate, or have the potential to generate, hazardous atmospheres. Only install this equipment in zones known to be free, at all times, of hazardous atmospheres.

⚠DANGER

POTENTIAL FOR EXPLOSION

- Install and use this equipment in non-hazardous locations only.
- Do not install and use this equipment in applications capable of generating hazardous atmospheres, such as those applications employing flammable refrigerants.

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

For information concerning the use of control equipment in applications capable of generating hazardous materials, consult your local, regional, or national standards bureau or certification agency.

⚠WARNING

LOSS OF CONTROL

- 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 Eliwell 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.

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.
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.

Overview

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EWCM 9000 PRO (HF) Range Overview

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EWCM 9000 PRO (HF) Offer Overview

General Description

EWCM 9000 PRO (HF) Logic Controller are suitable for customized applications designed to control simple or complex machines:

- Compressor rack
- Heat pump

The EWCM 9000 PRO (HF) offer is made of:

- Controllers, page 15
- Expansion modules, page 16
- Communication modules, page 17
- Remote displays, page 18
- Accessories, page 19

Programming Software

In association with the controllers hardware, the FREE Studio Plus development tool is available to program and customize applications.

You can download FREE Studio Plus - Programming software for FREE Advance Logic Controller from Eliwell web site download center.

The use of several programming languages in accordance with IEC 61131-3 regulations (programming standard for industrial control), makes it possible to develop new algorithms or entire programs easily, which can then be uploaded to the EWCM 9000 PRO (HF) controllers via a PC and a Programming cable, helping to provide confidentiality with appropriate security.

For more information, refer to Connection Types, page 143.

Controller Range Overview

Type Code

Controller type code:

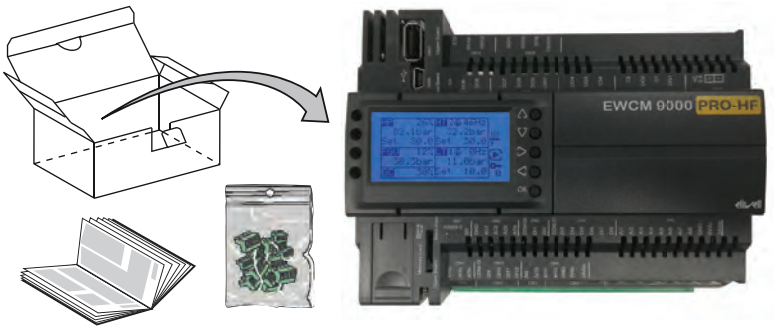
Type code description							
EPB01FCTA500	EP	B0	1	F	CTA	5	00
Product family	EWCM 900 PRO series						
Model		B0 = 42 I/O Relay Isolated BS = 42 I/O SSR Relay Isolated					
Display			0 = Blind / External display option 1 = Embedded Display				
Programmable				FREE Programmable			
CO2					CTA = CO2 Transcritical CTB = CO2 Transcritical 2.0 CXX = Compressor Rack unit, empty Application		
Power supply						24 Vac/dc	
Customization							00 = standard other values = variants & customization on demand

Controllers References

Reference	Display	Inputs/Outputs				Micro SD card	USB		Communication		
		DI	DO	AI	AO		USB A	USB Mini-B	2 RS-485	1 Ethernet	1 CAN Exp. bus
42 Inputs/Outputs, page 43											
EPB00FCTA500	-	12	12	12	6	✓	✓	✓	✓	✓	✓
EPBS0FCTA500			10 + 2 SSR								
EPB01FCTA500			12								
EPBS1FCTA500			10 + 2 SSR								
EPB01FCXX500			12								

The controller runs on 24 Vac/dc power supply.

EWCM 9000 PRO (HF) Delivery Content



Expansion Modules Range Overview

Type Code

Expansion module type code:

Type code description							
EP4S0024V500	EP	4S	0	0	24V	5	00
Product family	EWCM 900 PRO series Expansion						
Model		40 = EXP 4D PRO 14 I/O RELAY 4S = EXP 4D PRO 25 IO SSR					
Display			0 = Blind / External display option 1 = Embedded Display				
Programmable				0 = Accessories			
Options					000 = expansion/not programmed 24V = SSR OUT 24 VAC-DC LIV = SSR OUT LINE VOLTAGE 110-230 VAC		
Power supply						B =24Vac, 20...38 Vdc 5 = 24 Vac/dc	
Customization							00 = standard other values = variants & customization on demand

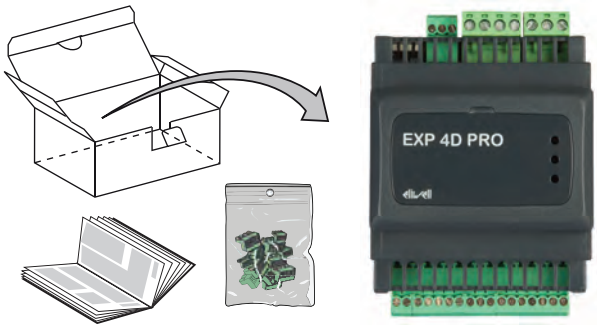
Expansion Modules References

Reference	**Inputs/Outputs**				**1 CAN Exp. bus**	**1 TTL**(1)	**Compatible controllers**
	DI	**DO**	**AI**	**AO**			
14 Inputs/Outputs, page 46							
EP4000000B00	4	4	2	2	✓	✓	EPB•••C••500
25 Inputs/Outputs, page 48							

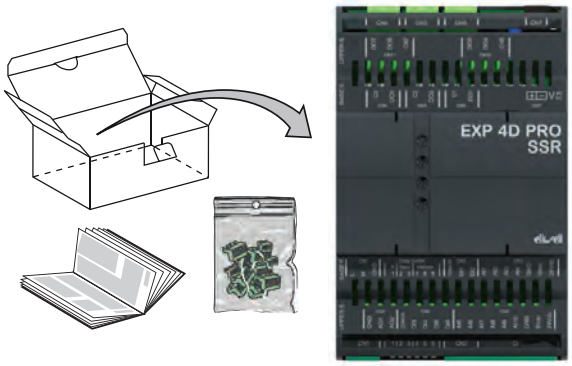
Reference	Inputs/Outputs				1 CAN Exp. bus	1 TTL[1]	Compatible controllers
	DI	DO	AI	AO			
EP4S0024V500	6	4 + 3 SSR	10	2	✓	-	EPB•••C••500
EP4S00LIV500	6	4 + 3 SSR	10	2	✓	-	EPB•••C••500

The expansion modules run on 24 Vac/dc power supply.

EP4000000B00 Delivery Content



EP4S00••V500 Delivery Content



Communication Modules Range Overview

Overview

This section presents communication modules.

Communication Modules References

Reference	Description	Terminal type	Compatible controllers
EVS00CA000000	CAN	2 screw terminal blocks	EPB•••C••500

Reference	Description	Terminal type	Compatible controllers
EVS0LON000000	LonWorks	1 screw terminal block	
EVS00R4000000	Modbus SL (RS-485)	2 screw terminal blocks	
EVS10R2000000	RS-232 serial link, Relay output	1 SUB-D 9 1 screw terminal block	
EVS00BM000000	Modbus SL, and BACnet MS/TP	2 screw terminal blocks	
EVS00ET000000	Ethernet, Modbus TCP, and BACnet/IP	1 RJ45	
EVS00EB000000	Ethernet, Modbus TCP, BACnet/IP, Modbus SL, and BACnet MS/TP	1 RJ45 2 screw terminal blocks	

For further information about communication modules, refer to the FREE EVS Plugin Instruction Sheet 9IS54405.

Remote Display Range Overview

Type Code

Remote display type code:

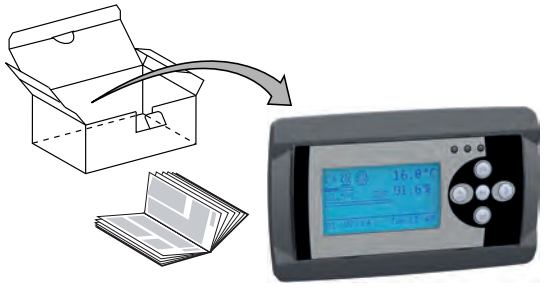
Type code description							
EPKE10000000	EP	KE	1	0	000	0	00
Product family	EWCM 900 PRO series Expansion						
Physical feature		K0 = EVK KE = EVK extended range					
Physical feature			1 = Embedded Display				
Programmable				0 = Accessories			
Options					000 = non programmable		
Power supply						0 = from other device	
Customization							00 = standard other values = variants & customization on demand

Remote Displays Reference

Reference	Embedded sensors			1 RS-485	1 USB Micro-B	1 CAN	Compatible controllers
	Temperature	Humidity	Presence				
EPKE10000000, page 92	-	-	-	-	-	✓	EPB•••C••500
EPK010000000, page 93	-	-	-	-	-	✓	EPB•••C••500

The remote display runs on 24 Vac/dc power supply.

EPK•10000000 Delivery Content



Accessories

Overview

This section describes the accessories.

Mounting and Wiring Accessories References

Description		Use	Reference
Vertical surface support for display	White	To install a EPK•10000000 on a vertical surface	EVA00WMRC0000
	Gray		EVA00WMRC0001
12 clips-on lock		To install the EPB•••C••500 controllers and the expansion modules on a panel surface, page 36	AVA00PMCL0000

Global Features

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Before Starting

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Before Starting

Before Starting

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

Pay particular attention in conforming to any safety information, different electrical requirements, and normative standards that would apply to your machine or process in the use of this equipment.

The use and application of the information contained herein require expertise in the design and programming of automated control systems. Only you, the user, machine builder or integrator, can be aware of all the conditions and factors present during installation and setup, operation, and maintenance of the machine or process, and can therefore determine the automation and associated equipment and the related safeties and interlocks which can be effectively and properly used. When selecting automation and control equipment, and any other related equipment or software, for a particular application, you must also consider any applicable local, regional or national standards and/or regulations.

⚠ WARNING

REGULATORY INCOMPATIBILITY

Ensure that all equipment applied and systems designed comply with all applicable local, regional, and national regulations and standards.

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

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

The products described in this manual have been designed and tested using Eliwell programming, configuration, and maintenance software products.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software approved by Eliwell 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, and exclusive of applications that generate, or have the potential to generate, hazardous atmospheres. Only install this equipment in zones known to be free, at all times, of hazardous atmospheres.

⚠DANGER

POTENTIAL FOR EXPLOSION

- Install and use this equipment in non-hazardous locations only.
- Do not install and use this equipment in applications capable of generating hazardous atmospheres, such as those applications employing flammable refrigerants.

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

For information concerning the use of control equipment in applications capable of generating hazardous materials, consult your local, regional, or national standards bureau or certification agency.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Install and operate this equipment according to the conditions described in the Environmental Characteristics.

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

Installation Considerations

⚠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: JDYX2 or JDYX8 fuse types are UL-recognized and CSA approved.

The EWCM 9000 PRO (HF) controllers are intended for Top Hat Section Rail (DIN rail) mounting or panel mounting.

Care must be taken to avoid damage from electrostatic sources when handling this equipment. In particular exposed connectors and, in some cases, exposed printed circuit boards are exceptionally vulnerable to electrostatic discharge.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION DUE TO ELECTROSTATIC DISCHARGE DAMAGE

- Keep equipment in the protective conductive packaging until you are ready to install the equipment.
- Only install equipment in approved enclosures and / or locations that prevent casual access and provide electrostatic discharge protection.
- Use a conductive wrist strap or equivalent field force protective device attached to an earth ground when handling sensitive equipment.
- Always discharge yourself by touching a grounded surface or approved antistatic mat before handling the equipment.

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

Wiring Best Practices

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Wiring Best Practices

Wiring Best Practices

The following information describes the wiring guidelines and associated best practices to be respected when using a EWCM 9000 PRO (HF) controller.

⚠⚠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

- 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.

Wiring Guidelines

The following rules must be applied when wiring EWCM 9000 PRO (HF) offer product range:

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

Use shielded, properly grounded cables for all analog and high-speed inputs or outputs and communication connections. If you do not use shielded cable for these connections, electromagnetic interference can cause signal degradation. Degraded signals can cause the controller or attached modules and equipment to perform in an unintended manner.

⚠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.

[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.

NOTE: Surface temperatures may exceed 60 °C (140 °F). Route primary wiring (wires connected to power mains) separately and apart from secondary wiring (extra low voltage wiring coming from intervening power sources). If that is not possible, double insulation is required such as conduit or cable gains.

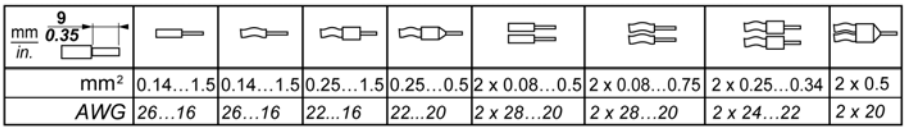
Rules for Screw Terminal Block

The following table presents the cable types and wire sizes for a 5.08 mm (0.20 in.) or 5.00 mm (0.197 in.) pitch screw terminal block:

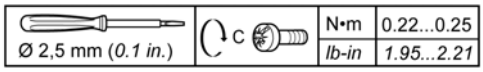
mm / in. (7 / 0.28)								
mm^2	0.2…2.5	0.2…2.5	0.25…2.5	0.25…2.5	2 x 0.2…1	2 x 0.2…1.5	2 x 0.25…1	2 x 0.5...1.5
AWG	*24…14*	*24…14*	*22...14*	*22...14*	*2 x 24…18*	*2 x 24…16*	*2 x 22…18*	*2 x 20...16*

Ø 3,5 mm (*0.14 in.*)	
N•m	0.5...0.6
lb-in	*4.42...5.31*

The following table presents the cable types and wire sizes for a 3.81 mm (0.15 in.) or 3.50 mm (0.14 in.) pitch screw terminal block:



mm²	0.14…1.5	0.14…1.5	0.25…1.5	0.25…0.5	2 x 0.08…0.5	2 x 0.08…0.75	2 x 0.25…0.34	2 x 0.5
AWG	*26…16*	*26…16*	*22…16*	*22…20*	*2 x 28…20*	*2 x 28…20*	*2 x 24…22*	*2 x 20*



N•m	0.22...0.25
lb-in	*1.95...2.21*

The use of copper conductors is required.

⚠⚠DANGER

LOOSE WIRING CAUSES ELECTRIC SHOCK

- Tighten connections in conformance with the torque specifications.
- Do not insert more than one wire per connector of the terminal block unless using the cable ends (ferrules) specified above.

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

⚠WARNING

FIRE HAZARD

- Use only the recommended wire sizes for the current capacity of the I/O channels and power supplies.
- For relay output wiring up to 2 A, use conductors of at least 0.5 mm² (AWG 20) with a temperature rating of at least 80 °C (176 °F).
- For relay output wiring of 3 A, use conductors of at least 1.5 mm² (AWG 16) with a temperature rating of at least 80 °C (176 °F).
- For common conductors of relay output wiring of 9 A, or relay output wiring greater than 3 A, use conductors of at least 2.0 mm² (AWG 12) with a temperature rating of at least 80 °C (176 °F).

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

Protecting Outputs from Inductive Load Damage

Depending on the load, a protection circuit may be needed for the relay outputs. 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.

Choose a protection circuit from the following diagrams according to the power supply used. Connect the protection circuit to the outside of the controller or relay output module.

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.

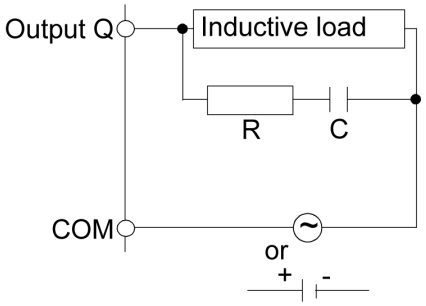
⚠WARNING

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.

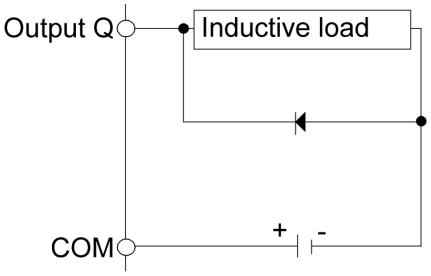
Protective circuit A: this protection circuit can be used for both AC and DC load power circuits.



C Value from 0.1 to 1 µF

R Resistor of approximately the same resistance value as the load

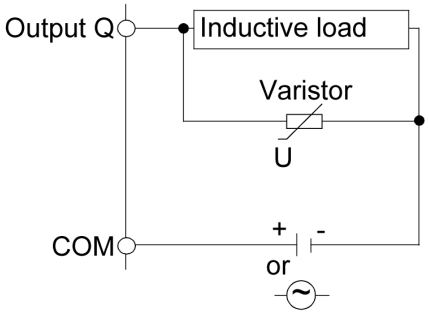
Protective circuit B: this protection circuit can be used for DC load power circuits.



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 both AC and DC load power circuits.



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

NOTE: Place protection devices as close to the load as possible.

Special Handling Considerations

Care must be taken to avoid damage from electrostatic sources when handling this equipment. In particular exposed connectors and, in some cases, exposed printed circuit boards are exceptionally vulnerable to electrostatic discharge.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION DUE TO ELECTROSTATIC DISCHARGE DAMAGE

- Keep equipment in the protective conductive packaging until you are ready to install the equipment.
- Only install equipment in approved enclosures and / or locations that prevent casual access and provide electrostatic discharge protection.
- Use a conductive wrist strap or equivalent field force protective device attached to an earth ground when handling sensitive equipment.
- Always discharge yourself by touching a grounded surface or approved antistatic mat before handling the equipment.

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

Analog Inputs-Probes

Temperature probes have no connection polarity and can be extended using a normal bipolar cable.

The extension of the probes wiring influences the electromagnetic compatibility (EMC) of the instrument.

Verify the polarity for probes which have a specific connection polarity.

NOTICE

INOPERABLE EQUIPMENT

Verify all wiring connections before applying power.

Failure to follow these instructions can result in equipment damage.

Do not power any connected devices that are externally powered without also applying power to the EWCM 9000 PRO (HF).

NOTICE

INOPERABLE EQUIPMENT

Ensure that the controller has power applied when applying power to other connected and externally powered devices.

Failure to follow these instructions can result in equipment damage.

Signal leads (probes, digital inputs, communication, and the electronic supply) must be routed separately from power cables.

Installation

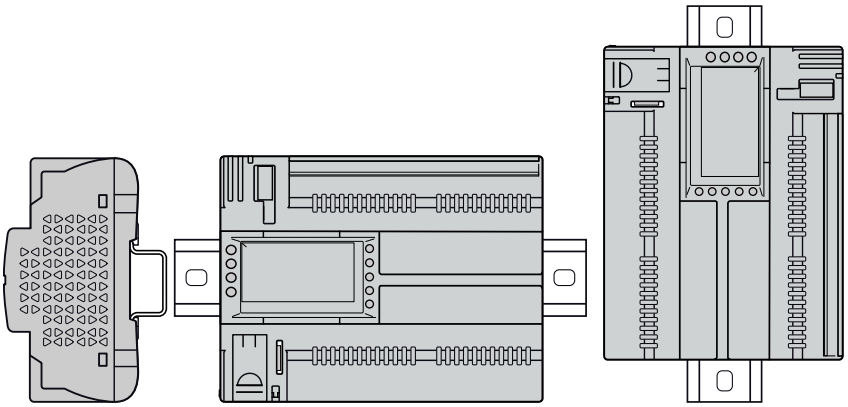
What's in This Chapter

EPB•••C••500 Controllers Mounting Positions 30
EP4000000B00/EP4S00••V500 Expansion Modules Mounting Positions 31
Controllers and Expansion Modules Clearances 32
Top Hat Section Rail (DIN Rail) 33
Controllers and Expansion Modules Installation 35
EPK•10000000 Remote Display Installation 37

EPB•••C••500 Controllers Mounting Positions

Correct Mounting Position

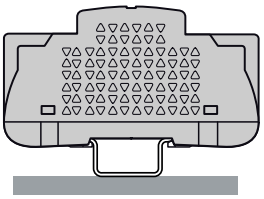
EPB•••C••500 controllers should be mounted horizontally or vertically on a vertical plane as shown in the figure below:



Acceptable Mounting Position

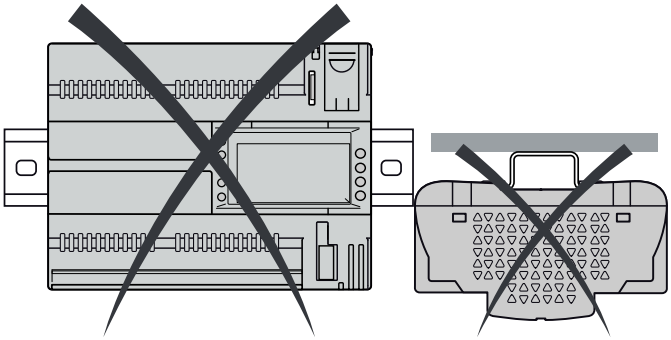
EPB•••C••500 controllers can be mounted horizontally upward with a temperature derating (maximum ambient temperature: 60 °C (140 °F)).

EPBS1FCTA500 controllers can be mounted horizontally upward with a temperature derating (maximum ambient temperature: 55 °C (131 °F)).



Incorrect Mounting Position

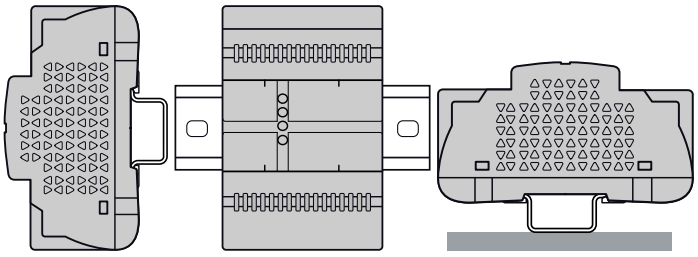
EPB•••C••500 controllers cannot be mounted horizontally backward:



EP4000000B00/EP4S00••V500 Expansion Modules Mounting Positions

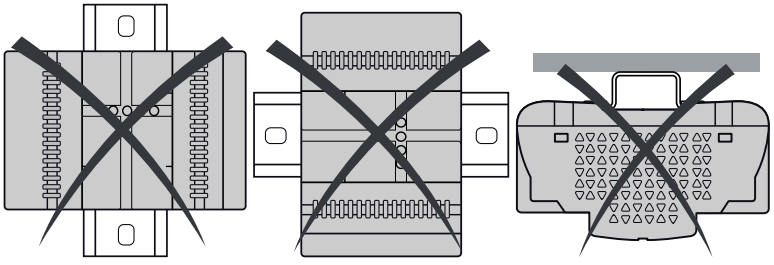
Correct Mounting Position

EP4000000B00/EP4S00••V500 expansion modules must be mounted horizontally on a vertical plane or horizontally upward as shown in the figure below:



Incorrect Mounting Position

EP4000000B00/EP4S00••V500 expansion modules cannot be mounted neither vertically, nor horizontally backward:



Controllers and Expansion Modules Clearances

Minimum Clearances

⚠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.

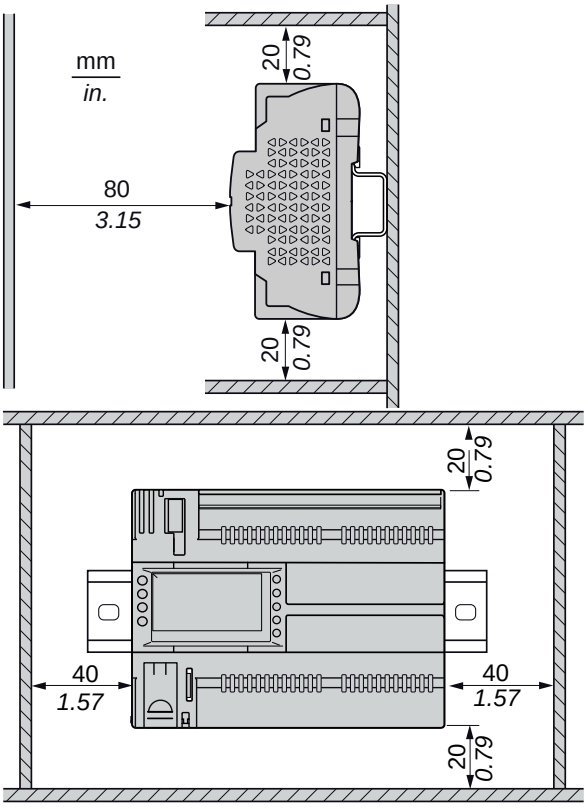
Failure to follow these instructions can result in death, serious injury, or equipment damage.

EWCM 9000 PRO (HF) controllers and expansion modules have been designed as IP20 products and must be installed in an enclosure appropriately rated for its intended environment and secured by a keyed or tooled locking mechanism.

There are 3 types of clearances between:

- The EWCM 9000 PRO (HF) device and the sides of the cabinet (including the panel door).
- The EWCM 9000 PRO (HF) device terminal blocks and the wiring ducts. This distance reduces electromagnetic interference between the controller and the wiring ducts.
- The EWCM 9000 PRO (HF) device and other heat generating devices installed in the same cabinet.

The following figure shows the minimum clearances that apply to EWCM 9000 PRO (HF) references:



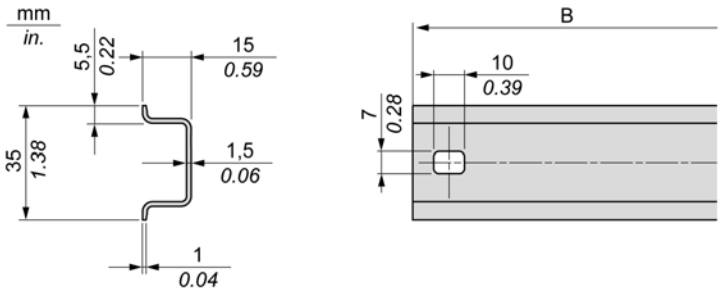
Top Hat Section Rail (DIN Rail)

Dimensions of Top Hat Section Rail (DIN Rail)

You can mount the controller and expansion module on a 35 mm (1.38 in.) top hat section rail (DIN rail). It can be attached to a smooth mounting surface or suspended from a EIA rack or mounted in a NEMA cabinet.

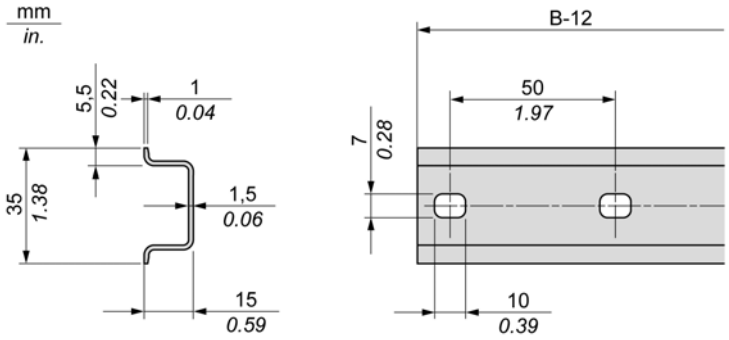
Symmetric Top Hat Section Rails (DIN Rail)

The following illustration and table show the references of the top hat section rails (DIN rail) for the wall-mounting range:



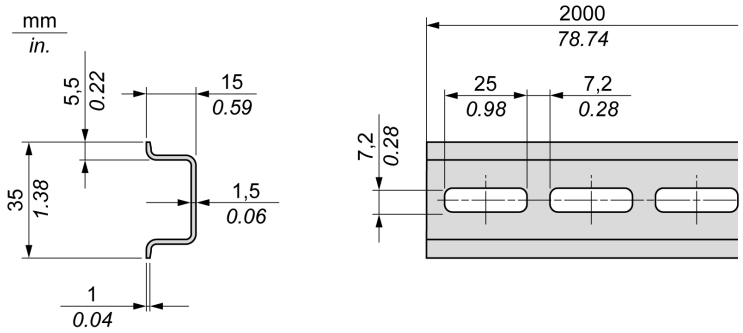
Schneider Electric Reference	Type	Rail length (B)
NSYSDR50A	A	450 mm (17.71 in.)
NSYSDR60A	A	550 mm (21.65 in.)
NSYSDR80A	A	750 mm (29.52 in.)
NSYSDR100A	A	950 mm (37.40 in.)

The following illustration and table show the references of the symmetric top hat section rails (DIN rail) for the metal enclosure range:



Schneider Electric Reference	Type	Rail length (B-12 mm)
NSYSDR60	A	588 mm (23.15 in.)
NSYSDR80	A	788 mm (31.02 in.)
NSYSDR100	A	988 mm (38.89 in.)
NSYSDR120	A	1188 mm (46.77 in.)

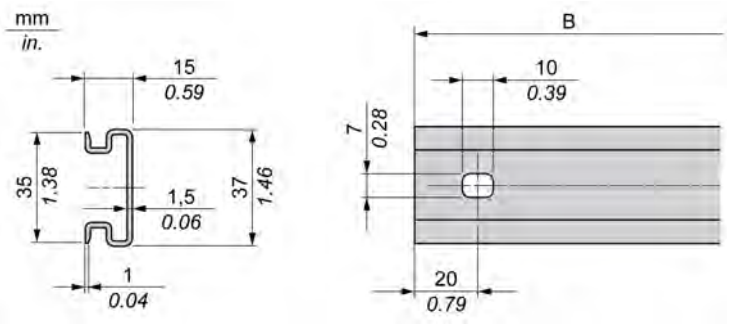
The following illustration and table shows the references of the symmetric top hat section rails (DIN rail) of 2000 mm (78.74 in.):



Schneider Electric Reference	Type	Rail length
NSYSDR200[1]	A	2000 mm (78.74 in.)
NSYSDR200D[2]	A	
1 Unperforated galvanized steel **2** Perforated galvanized steel		

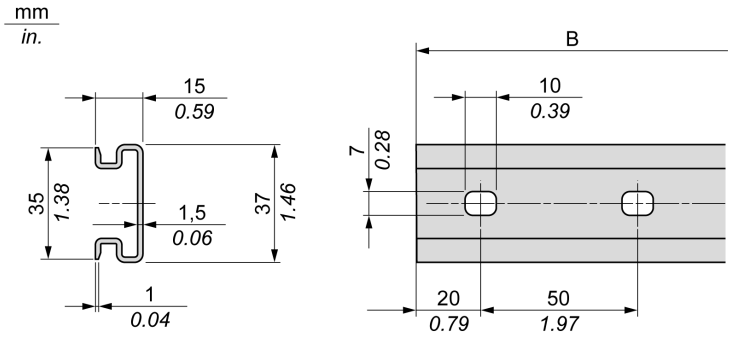
Double-Profile Top Hat Section Rails (DIN Rail)

The following illustration and table show the references of the double-profile top hat section rails (DIN rails) for the wall-mounting range:



Schneider Electric Reference	Type	Rail length (B)
NSYDPR25	W	250 mm (9.84 in.)
NSYDPR35	W	350 mm (13.77 in.)
NSYDPR45	W	450 mm (17.71 in.)
NSYDPR55	W	550 mm (21.65 in.)
NSYDPR65	W	650 mm (25.60 in.)
NSYDPR75	W	750 mm (29.52 in.)

The following illustration and table show the references of the double-profile top hat section rails (DIN rail) for the floor-standing range:



Schneider Electric Reference	Type	Rail length (B)
NSYDPR60	F	588 mm (23.15 in.)
NSYDPR80	F	788 mm (31.02 in.)
NSYDPR100	F	988 mm (38.89 in.)
NSYDPR120	F	1188 mm (46.77 in.)

Controllers and Expansion Modules Installation

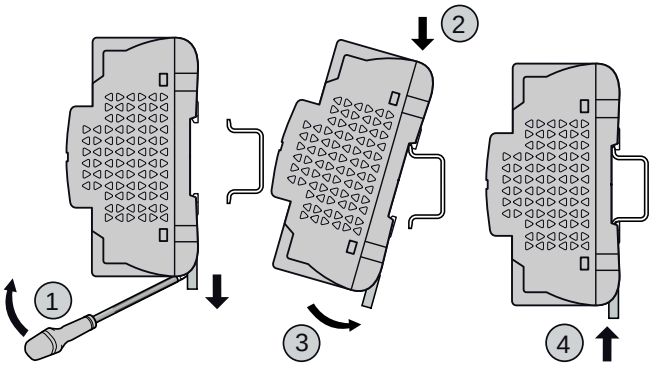
Overview

This section describes how to install and remove a EWCM 9000 PRO (HF) controller or expansion module from a top hat section rail (DIN rail).

Installing on a Top Hat Section Rail (DIN Rail)

The following procedure describes how to install a controller or an expansion module on a top hat section rail (DIN rail):

Step	Action
1	Move the two spring docking devices to their standby position (use a screwdriver to press against the relative compartments).
2	Position the top groove of the controller or the expansion modules on the top edge of the Top Hat Section Rail (DIN rail).
3	Press the assembly against the Top Hat Section Rail (DIN rail).
4	Press the spring docking devices to put them into the locked position.



Removing from a Top Hat Section Rail (DIN Rail)

The following procedure describes how to remove a controller or an expansion module from a top hat section rail (DIN rail):

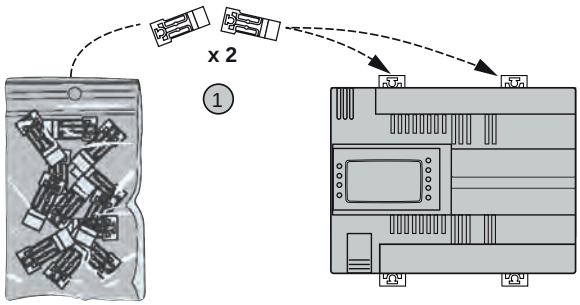
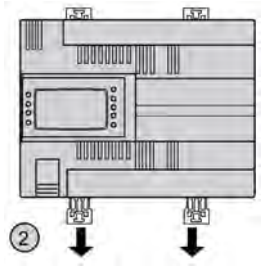
Step	Action
1	Remove the power from the controller or the expansion module.
2	Insert a flat screwdriver into the spring docking devices.
3	Pull down the spring docking device to move it to its standby position.
4	Pull the controller or the expansion module from the top hat section rail (DIN rail) from the bottom.

Panel Installation

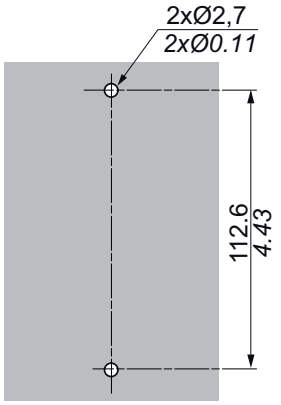
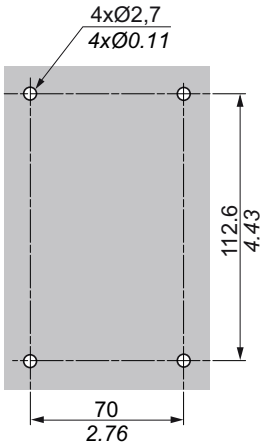
To install the controllers and expansion modules on a panel you must use clip-on locks.

NOTE: Upper clip-on locks are not provided with the logic controllers and must be ordered separately, page 19. Only one additional upper clip-on lock is necessary for EP4000000B00.

The following procedure shows how to install a EPB•••C••500controller on a panel using the clip-on locks. The same procedure shall be followed for the EP4000000B00/EP4S00••V500:

Step	Action
1	Install the 2 upper clip-on locks 
2	Move the 2 lower clip-on locks to their standby position 
3	Secure the device in position with 4 screws. Refer to the mounting holes layout, page 37.

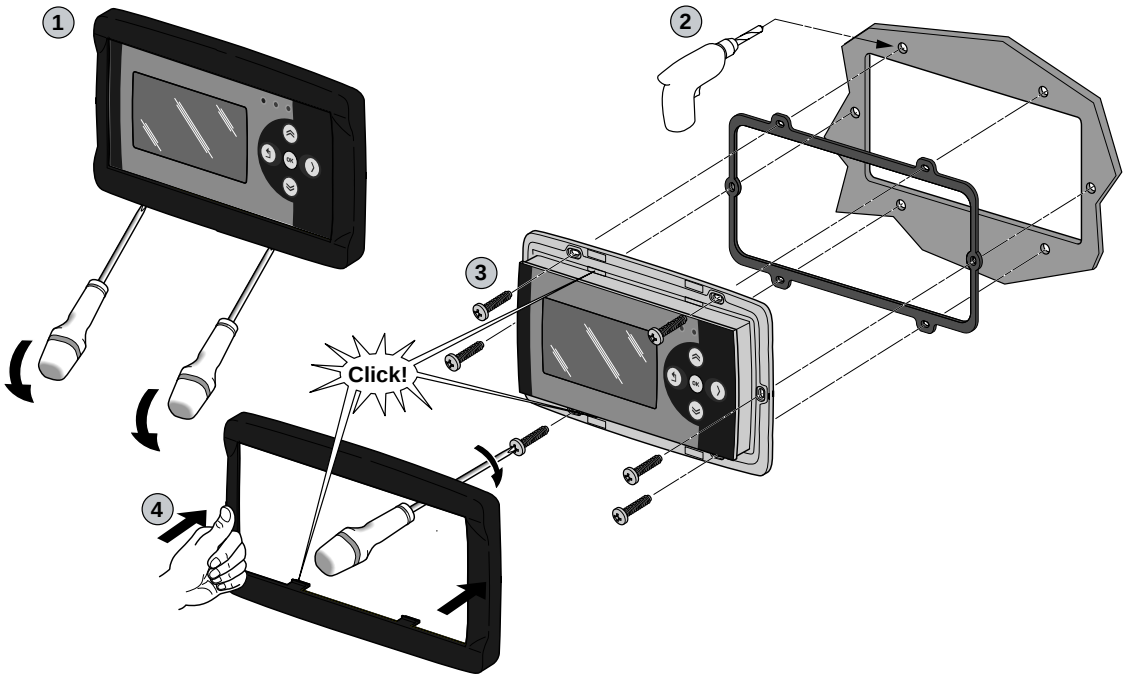
Mounting Holes Layout

EP4000000B00 EP4S00••V500	EPB•••C••500
	

EPK•10000000 Remote Display Installation

EPK•10000000 Panel Installation

The EPK•10000000 remote display can be mounted horizontally on a vertical panel.



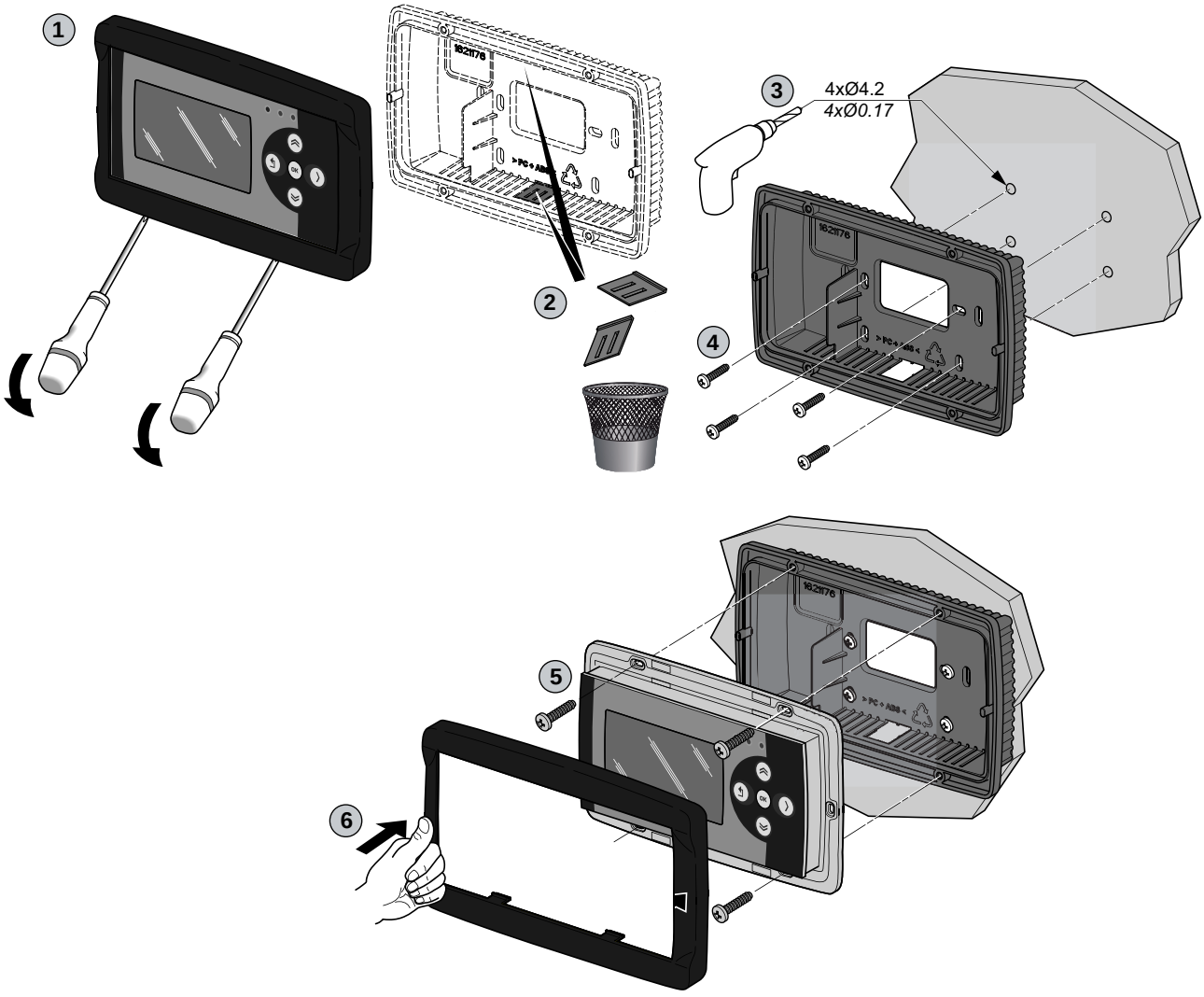
NOTE: The gasket is present only on EPKE10000000.

The following procedure explain how to install a EPK•10000000 remote display on a panel:

Step	Action
1	Open unit by pulling on bottom side of the display
2	Make a hole using the mounting hole layout. Drill, at the specified spacing, 6 holes using the mounting hole layout, page 39. Insert cable in central hole of the panel. Strip each wire 6 mm (0.24 in.) from end. Connect each wire according to wiring chart, page 24.
3	Place the seal, insert the unit in the hole, and fix it with the 6 screws.
4	Gently align cover to top of base and snap in place.

EPK•10000000 Vertical Surface Installation

The EPK•10000000 remote display can be mounted horizontally on a vertical surface using EVA00WMRC0000 or EVA00WMRC0001 accessory.

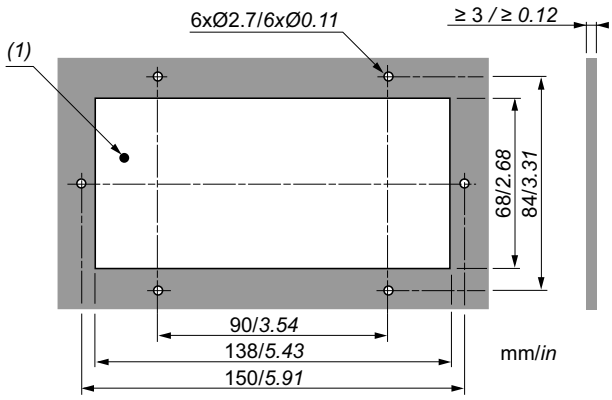


The following procedure explain how to install EPK•10000000 remote display on a vertical surface:

Step	Action
1	Open unit by pulling on bottom side of the display
2	On the EVA00WMRC000• accessory, use the two side slots, one at the bottom and one at the top, under the pre-formatted removable doors, preventing the opening of holes in the wall.
3	Drill, at the specified spacing, 4 holes using the mounting hole layout, page 39.
4	Place the EVA00WMRC000• accessory and fix it with the 4 screws Pull cables 150 mm (5.90 in.) out from EVA00WMRC000• side slots. Strip each wire 6 mm (0.24 in.) from end. Connect each wire according to wiring chart, page 24.
5	Insert the EPK•10000000 remote display in the EVA00WMRC000• accessory, and fix it with the 4 screws.
6	Gently align cover to top of base and snap in place.

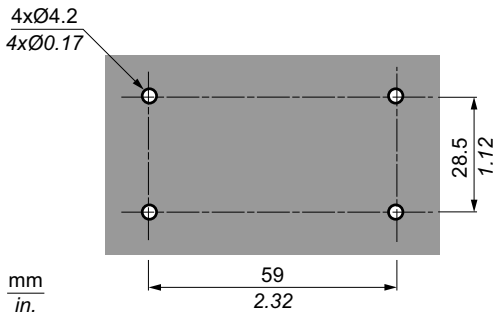
Mounting Holes Layout

Mounting hole layout for EPK•10000000 Panel Installation:



1: Panel cut out

Mounting hole layout for EPK•10000000 Vertical Surface Installation with EVA00WMRC000• accessory:



Controllers and Expansion Modules

What's in This Part

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EPB•••C••500 Controllers Description 43
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Electrical Characteristics and Wiring Diagrams 50
User Interface 88

Environmental Characteristics

What's in This Chapter

Environmental Characteristics 41

Environmental Characteristics

Technical Data

The EWCM 9000 PRO (HF) controller offer components meet European Community (CE) requirements for open equipment. You must install them in an enclosure or other location designed for the specific environmental conditions and to minimize the possibility of unintended contact with hazardous voltages. Use metal enclosures to improve the electromagnetic immunity of your EWCM 9000 PRO (HF) system. This equipment meets CE requirements as indicated in the following tables.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified within this chapter.

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

Controller and Expansion Modules Specifications

Characteristics	Specification	EPB00FCTA500	EPBS0FCTA500	EPB01FCTA500	EPBS1FCTA500	EPB01FCXX500	EP400000B00	EP4S0024V500	EP4S00LIV500
The product complies with the following harmonized Standards	EN 60730-1 / EN 60730-2-9	✓							
Construction of control	Electronic automatic Incorporated Control	✓							
Purpose of control	Operating control (non-safety-related)	✓							
Mounting	Top Hat Section Rail (DIN rail)	✓							
	Optional panel mounting (with accessories)	✓							
Type of action	1.B	✓							
	1.Y	-	✓	-	✓	-		✓	
Type of disconnection or suspension for each circuit	Micro disconnection	✓							
Pollution degree	2 (normal)	✓							
Over-voltage category	II	✓							
Rated impulse voltage	2500 V	✓						-	✓
	500 V	-						✓	-
Period of electric stress on the insulating parts	Long period, EN 60730	✓							
Power supply	24 Vac (+/- 10 %) 50 Hz / 60 Hz 20…38 Vdc	-					✓		

Characteristics	Specification	EPB00FCTA500	EPBS0FCTA500	EPB01FCTA500	EPBS1FCTA500	EPB01FCXX500	EP4000000B00	EP4S0024V500	EP4S00LIV500
	(non-isolated)								
	24 Vac (+/- 10 %) 50 Hz / 60 Hz 20…38 Vdc (isolated)			✓			-		
Power Consumption	13 VA / 9 W			-				✓	
	16 VA / 7 W			-			✓	-	
	25 VA / 14 W			✓			-		
Insulation class	II				✓				
Ambient operating temperature	-20…55 °C (-4…131 °F)	-	✓ (1)	-	✓ (1)	-			
	-20…60 °C (-4…140 °F)	✓ (1)	-	✓ (1)	-	✓ (1)	-		
	-20…65 °C (-4…149 °F)			✓ (2)			-	✓	
	-10...60 °C (14...140 °F)			-			✓	-	
Ambient operating humidity (non-condensing)	5…95 %			✓			-		
	5...90 %			-				✓	
	10...90 %			-			✓	-	
Ambient storage temperature	-30…70 °C (-22…158 °F)			✓			-	✓	
	-20 ... 85 °C (-4...185 °F)			-			✓	-	
Ambient storage humidity (non-condensing)	5…95 %				✓				
Temperature for ball pressure test	125 °C (257 °F)				✓				
Insulation material group	IIIa				✓				
Fire-resistance category	D				✓				
Software class and structure	A				✓				
Operating altitude	0...2000 m (0...6560 ft)				✓				
Digital outputs	Refer to the label on the device				✓				
Degree of protection by enclosure	IP20				✓				

(1) If mounted horizontally on the horizontal plane.

(2) If mounted horizontally on the vertical plane.

EPB•••C••500 Controllers Description

What's in This Chapter

EPB•••C••500.....43

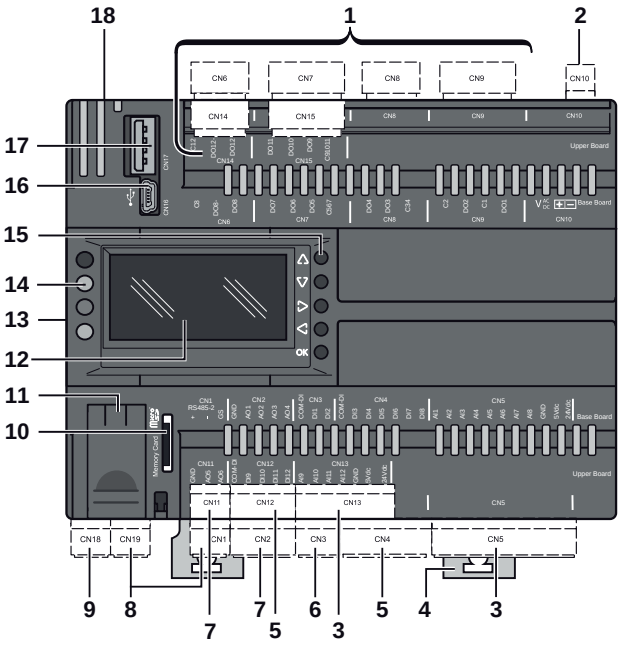
EPB•••C••500

Overview

Reference	Description
EPB00FCTA500	EWCM 9000 PRO (HF) 42B /CO2T Isolated
EPBS0FCTA500	EWCM 9000 PRO (HF) 42B SSR /CO2T Isolated
EPB01FCTA500	EWCM 9000 PRO (HF) 42B /CO2T Isolated
EPBS1FCTA500	EWCM 9000 PRO (HF) 42D SSR /CO2T Isolated
EPB01FCXX500	EWCM 9000 PRO-HF 42D Isolated

Physical Description

The following illustration presents the EPB•••C••500 controller:



Number	Name	Description	
1	CN6	DO8	High voltage relay digital output 250 Vac 3 A SPDT, page 60
	CN7	DO5…DO7	High voltage relay digital output 250 Vac 3 A SPST, page 57
	CN8	DO3…DO4	
	CN9	DO1…DO2	• EPB00FCTA500/EPB01FCTA500/EPB01FCXX500: High voltage relay digital output 250 Vac 3 A SPST, page 57 • EPBS1FCTA500/EPBS0FCTA500: High voltage SSR digital output 240 Vac 0.5 A, page 59
	CN14	DO12	High voltage relay digital output 250 Vac 3 A SPDT, page 60
	CN15	DO9…DO11	High voltage relay digital output 250 Vac 3 A SPST, page 57
2	CN10	24 Vac/dc power supply, page 51	

Number	Name	Description	
3	CN5	Power out	+24 Vdc power out for analog inputs, max current 150 mA (3) +5 Vdc power out for ratiometric analog inputs, max current 50 mA (2)(3)
		AI1…AI8	Analog inputs are configurable as, page 62: • NTC resistive input or digital input • Current analog input • Voltage analog input • PTC resistive input • Pt1000 resistive input
	CN13	AI9…AI12	Identical to CN5.
		Power out	
4	-	Clip-on lock, page 35	
5	CN4	DI3…DI8	Regular digital input opto-isolated, page 55
	CN12	DI9…DI12	
6	CN3	DI1…DI2	Fast digital input, pulse/frequency counter up 2 kHz, opto-isolated, page 54
7	CN2	AO1…AO2	Low voltage (SELV) analog outputs 0…10 Vdc, page 73
		AO3…AO4	Low voltage SELV analog outputs, configurable as, page 71: • Current modulation analog output • Current ON/OFF analog output • Voltage modulation analog output • PWM open collector
	CN11	AO5…AO6	Low voltage (SELV) analog outputs 0…10 Vdc, page 73
8	CN1	RS-485 serial port-2, page 79	
	CN19	RS-485 serial port-1, page 79	
9	CN18	CAN expansion bus master, page 75	
10	-	Micro SD memory card slot, page 85	
11	-	Service battery door, page 87	
12	-	User interface - Display, page 88 (1)	
13	-	Communication module connector, page 17	
14	-	User interface - LEDs, page 88 (1)	
15	-	User interface - Keys, page 88 (1)	
16	CN16	USB type Mini-B female for PC connection, page 81	
17	CN17	USB type A female for a mass storage device (FAT32), page 81	
18	CN20	Ethernet Modbus TCP/IP or BACnet IP, page 82	

(1) Only for EPB01FCTA500/EPB01FCXX500/EPBS1FCTA500.

(2) 0-5 V Ratiometric: ratiometric range is 0.5 V to 4.5 V. Maximum current at +5 Vdc is 50 mA.

(3) The maximum current value is the sum between the maximum currents supplied by the corresponding terminals in the CN5 connector and in the CN13 connector.

NOTICE

INOPERABLE EQUIPMENT

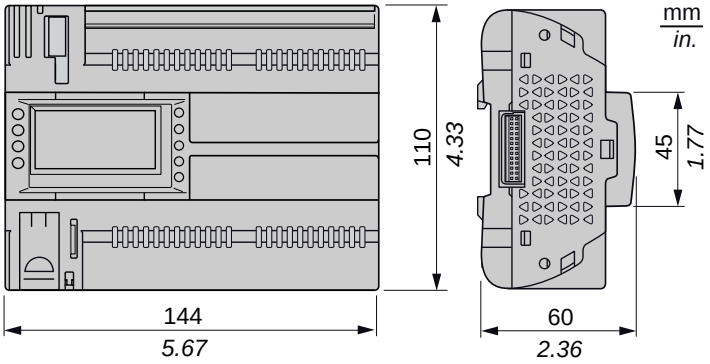
Configure the analog inputs and outputs, and related parameters, according to the physical types of resources connected.

Failure to follow these instructions can result in equipment damage.

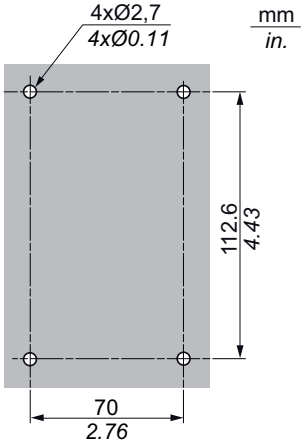
For more details, refer to analog inputs configuration, page 62 and analog outputs configuration, page 71.

For more information about the wiring, refer to wiring best practices, page 24.

Dimensions



Mounting Holes Layout



EP4000000B00 / EP4S00••V500 Expansion Modules Description

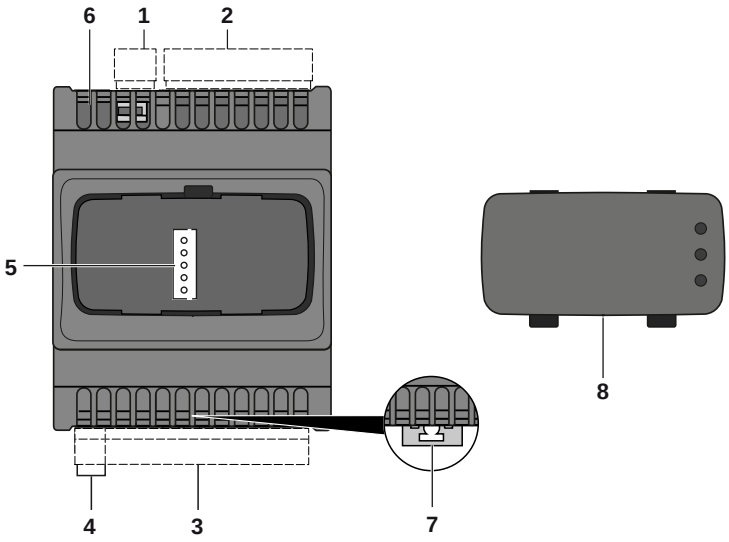
What's in This Chapter

EP4000000B00.....46
EP4S00••V500.....48

EP4000000B00

Physical Description

The following illustration presents the EP4000000B00 expansion module:



Number	Description	
1	CAN expansion bus slave, page 75	
2	DO1…DO4	High voltage relay digital output 250 Vac 3 A SPST, page 57
3	Power out	+24 Vdc power out for analog inputs, max current 125 mA +5 Vdc power out for ratiometric analog inputs, max current 50 mA (1)
	AI1…AI4	Analog inputs are configurable as, page 71: • NTC resistive input or digital input • Current analog input • Voltage analog input • PTC resistive input • Pt1000 resistive input
	DI1…DI4	Fast digital input, pulse/frequency counter up 2 kHz, opto-isolated, page 54
	AO1…AO2	Low voltage SELV analog outputs, configurable as, page 71: • Current modulation analog output • Current ON/OFF analog output • Voltage modulation analog output • PWM open collector
4	24 Vac/dc non-isolated power supply, page 51	
5	TTL Port (Service only)	
6	CAN configuration 4-position DIP switches, page 76	
7	Clip-on lock, page 35	

Number	Description
8	Front door
(1) 0-5 V Ratiometric: ratiometric range is 0.5 V to 4.5 V. Maximum current at +5 Vdc is 50 mA.	

NOTICE

INOPERABLE EQUIPMENT

Configure the analog inputs and outputs, and related parameters, according to the physical types of resources connected.

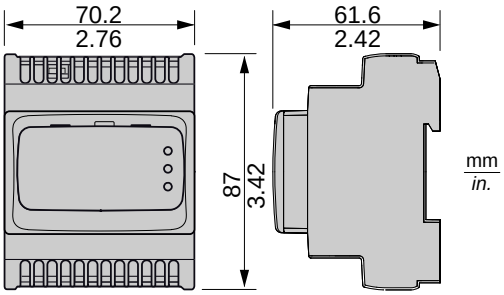
Failure to follow these instructions can result in equipment damage.

For more details, refer to analog inputs configuration, page 62 and analog outputs configuration, page 71.

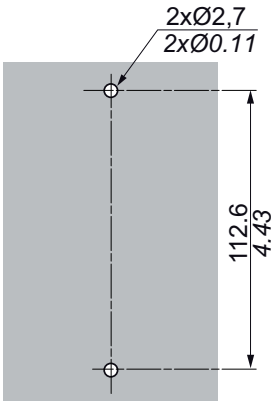
For more information about the wiring, refer to wiring best practices, page 24.

For details about Expansion module troubleshooting, refer to the section EP4S00••V500 Expansion Modules User Interface, page 89.

Dimensions



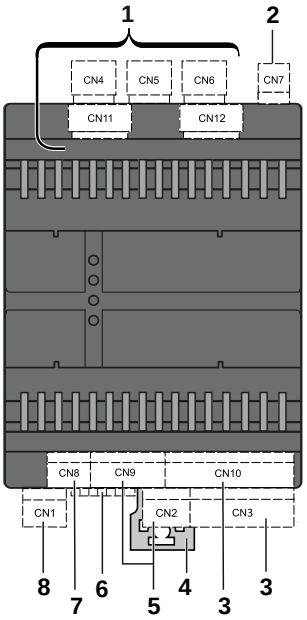
Mounting Holes Layout



EP4S00••V500

Physical Description

The following illustration presents the EP4S00••V500 expansion module:



Number	Name	Description	
1	CN4	DO3	High voltage SSR digital output, page 59
	CN5	DO2	
	CN6	DO1	
	CN11	DO6…DO7	High voltage relay digital output 250 Vac 3 A SPST, page 57
	CN12	DO4…DO5	
2	CN7	24 Vac/dc non-isolated power supply, page 51	
3	CN3	Power out	+24 Vdc power out for analog inputs, max current 125 mA (2)(3) +5 Vdc power out for ratiometric analog inputs, max current 50 mA (1)(3)
		AI1…AI4	Analog inputs are configurable as, page 71: • NTC resistive input or digital input • Current analog input • Voltage analog input • PTC resistive input • Pt1000 resistive input
	CN10	AI5…AI10	Identical to CN3.
		Power out	
4	-	Clip-on lock, page 35	
5	CN2	DI1…DI2	Fast digital input, pulse/frequency counter up 2 kHz, opto-isolated, page 54
	CN9	DI3…DI6	Regular digital input opto-isolated, page 55
6	-	CAN configuration 6-position DIP switches, page 77	
7	CN8	AO1…AO2	Low voltage SELV analog outputs, configurable as, page 71: • Current modulation analog output • Current ON/OFF analog output • Voltage modulation analog output • PWM open collector

Number	Name	Description
8	CN1	CAN expansion bus slave, page 75

(1) Maximum current at +5 Vdc is 50 mA.

(2) Maximum current at +24 Vdc is 125 mA.

(3) The maximum current value is the sum between the maximum currents supplied by the corresponding terminals in the CN3 connector and in the CN10 connector.

NOTE: When several probes are connected to the same analogue input, make sure that their absorption is not greater than the maximum current that can be supplied; for example, it is not possible to connect 3 probes (with 20 mA absorption) to a 50 mA supply.

NOTICE

INOPERABLE EQUIPMENT

Configure the analog inputs and outputs, and related parameters, according to the physical types of resources connected.

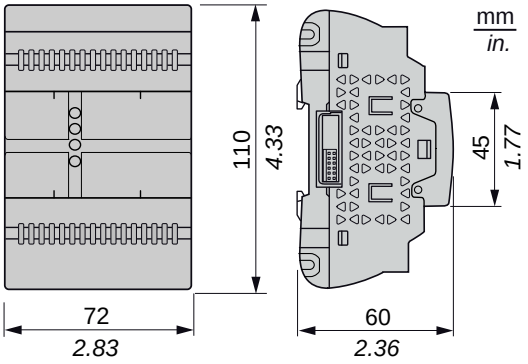
Failure to follow these instructions can result in equipment damage.

For more details, refer to analog inputs configuration, page 62 and analog outputs configuration, page 71.

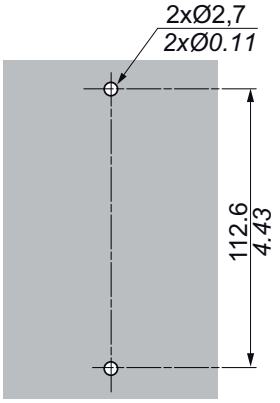
For more information about the wiring, refer to wiring best practices, page 24.

For details about Expansion module troubleshooting, refer to the section EP4S00••V500 Expansion Modules User Interface, page 89.

Dimensions



Mounting Holes Layout



Electrical Characteristics and Wiring Diagrams

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Power Supply....51
Digital Input....53
Digital Output....56
Analog Inputs....61
Analog Outputs....70
Communication....75
Memory....85
RTC (Real-Time Clock)....87

From time to time, new input modules, output modules, or other devices are made available that are not documented in the present documentation. For information on new devices, contact your local Eliwell representative.

NOTICE

INOPERABLE EQUIPMENT

Update the controller firmware to the latest version every time you install a newly released Input/Output expansion module or other device to this equipment.

Failure to follow these instructions can result in equipment damage.

NOTE: For more information on how to update the controller firmware, contact your local Eliwell representative.

Applying incorrect current or voltage levels on EPB•••C••500 controllers and EP4000000B00 / EP4S00••V500 expansion modules inputs and outputs could damage the electronic circuitry. Further, connecting a current input device to an analog input configured for voltage, and vice versa, could damage the electronic circuitry.

NOTICE

INOPERABLE EQUIPMENT

- Do not apply current above 30 mA to the analog inputs of the expansion module.
- Do not apply voltages above 24 Vdc and less than -7 Vdc to the analog inputs of the expansion module.
- Do not mismatch the applied signal with the analog input configuration.

Failure to follow these instructions can result in equipment damage.

Applying incorrect current or voltage levels on EPB•••C••500 controllers analog inputs and outputs could damage the electronic circuitry. Further, connecting a current input device to an analog input configured for voltage, and vice versa, could damage the electronic circuitry.

NOTICE

INOPERABLE EQUIPMENT

- Do not apply voltages above 11 Vdc to the analog inputs of the controller or Input/Output expansion module when analog input is configured as 0-10V input.
- Do not apply current above 25 mA to the analog inputs of the controller or Input/Output expansion module when analog input is configured as 0-20 mA or 4-20 mA input.
- Do not mismatch applied signal with analog input configuration.

Failure to follow these instructions can result in equipment damage.

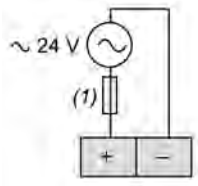
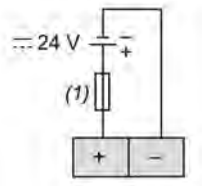
Power Supply

Power Supply

Controllers and Expansion Modules Power Supply

References	Power supply characteristics		Maximum power consumption
EPB•••C••500 controllers	Isolated	24 Vac (+/- 10 %) - 50/60 Hz	25 VA
		20...38 Vdc	14 W
EP4000000B00 expansion module	Non-isolated	24 Vac (+/- 10 %) - 50/60 Hz	16 VA
		20…38 Vdc	7 W
EP4S00••V500 expansion module	Isolated	24 Vac (+/- 10 %) - 50/60 Hz	13 VA
		20…38 Vdc	9 W

Power supply wiring diagram:

24 Vac	24 Vdc
	

(1) Type T fuse 2 A.

(1) EP4000000B00 Type T fuse 1.5 A.

Pitch of the terminal block	Cabling length
3.50 mm (0.14 in.)	10 m (32.8 ft)

NOTICE

INOPERABLE EQUIPMENT

Do not connect a power cable longer than 10 m (32.8 ft).

Failure to follow these instructions can result in equipment damage.

For more information about the wiring, refer to Best wiring practices, page 24.

The power supplies for the EPB•••C••500 must be rated Safety Extra Low Voltage (SELV) according to IEC 61140. These sources of power are isolated between the electrical input and output circuits of the power supply as well as simple separation from ground (earth), PELV, and other SELV systems.

⚠DANGER

GROUND LOOP CAUSING ELECTRIC SHOCK AND/OR INOPERABLE EQUIPMENT

- Do not connect the 0 V power supply/transformer connection supplying this equipment to any external ground (earth) connection.
- Do not connect any 0 V or ground (earth) of the sensors and actuators connected to this equipment to any external ground connection.
- If necessary, use separate power supplies/transformers to power sensors or actuators isolated from this equipment.

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

In all cases, if the specified voltage range is not maintained, the products may not function as intended. Use appropriate safety interlocks and voltage monitoring circuits.

⚠WARNING

POTENTIAL OF OVERHEATING AND FIRE

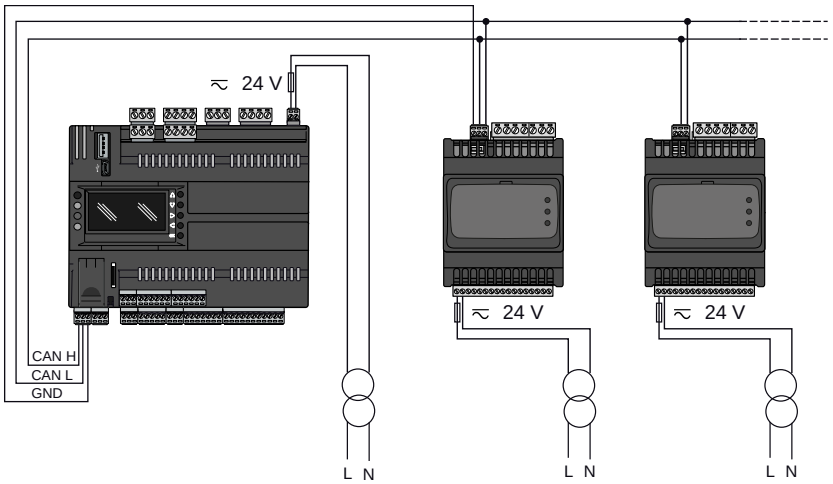
- Do not connect the equipment directly to line voltage.
- Use only isolating SELV, Class 2 power supplies / transformers to supply power to this equipment.

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

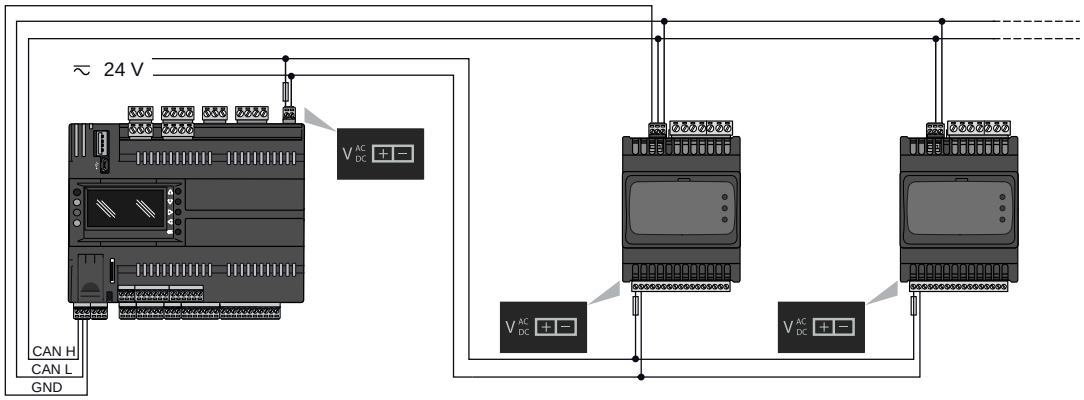
Power Supply and Field bus Wiring Restriction For Non Isolated Controllers and Expansion Modules

EPB•••C••500/EP4000000B00 power supply inputs are not isolated. If you connect the GND connection of the RS-485 network or the CAN expansion bus across multiple devices, you must use separate, isolated power supplies. Alternatively, if you are interconnecting the equipment to a single power supply, do not connect the RS-485 or CAN GND signal. Pay special attention when connecting serial lines. Miswiring may lead to inoperable equipment.

CAN network example with separate power lines:

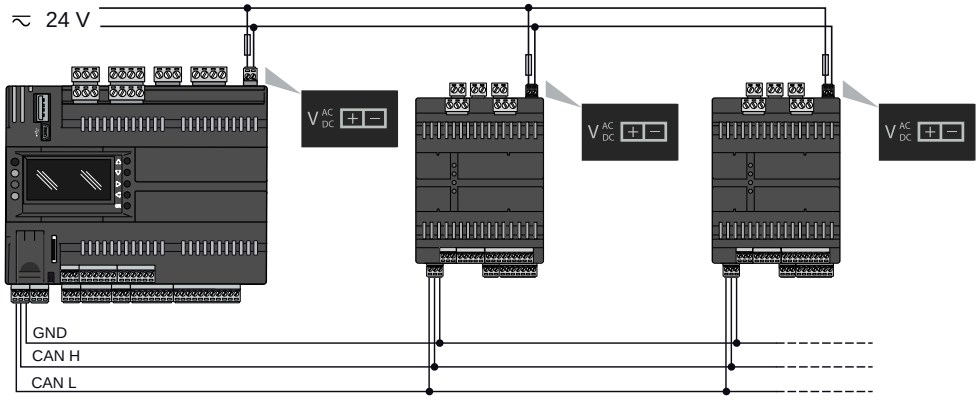


CAN network example with common power line and GND signal not connected (EP4000000B00 expansions):



NOTE: EPB•••C••500 power supply inputs are isolated. GS connection of the RS-485 network or the GND connection of the CAN expansion bus across multiple devices must be connected regardless of the power supply type and wiring.

CAN network example with common power line and GND signal connected (EP4S00••V500 expansions):



Digital Input

Digital Inputs

This table presents the digital inputs of controllers and expansion modules:

Description	EPB00FCTA500	EPBS0FCTA500	EPB01FCTA500	EPBS1FCTA500	EPB01FCXX500	EP4000000B00	EP4S0024V500	EP4S00LIV500
Fast digital inputs, page 54	2	2	2	2	2	-	-	-
Regular digital inputs, page 55	10	10	10	10	10	4	6	6

These devices have analog inputs that can be configured as dry contact digital inputs. For more details, refer to the configuration of analog inputs, page 62.

NOTE: The commons COM_DI are not internally connected together.

Fast Digital Inputs

Overview

If fast digital inputs are used as regular digital inputs, refer to regular digital inputs wiring diagram, page 55.

Characteristics

The table indicates the digital inputs characteristics:

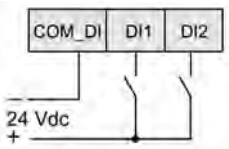
Characteristic	Value	
	Used as fast input	**Used as regular input**
Type	Digital input	
Power draw (maximum)	5 mA	
Working voltage	+0…38 Vdc	+0…38 Vdc 0…24 Vac +/-10 % 50/60 Hz
Pulse detection minimum length	Positive pulse 0.15 ms	Positive or negative pulse: • EPB•••C••500: 20 ms
Maximum frequency measurement	2 kHz	-
Logic type	Digital inputs work in positive logic	Digital inputs work in positive or negative logic
Level 1	+20…38 Vdc	+20…38 Vdc 24 Vac +/-10 % 50/60 Hz
Level 0	+0…4 Vdc	+0…4 Vdc 0…3 Vac 50/60 Hz

Logic type description

Logic type	Active state
Positive logic	Output supplies current (source output) Current flows to the input (sink input)
Negative logic	Output draws current (sink output) Current flows from the input (source input)

Wiring Diagram Example

EPB•••C••500 (CN3) fast digital input:

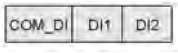


Pitch of the terminal block	Cabling length
3.50 mm (0.14 in)	10 m (32.808 ft)

For more information about the wiring, refer to Best wiring practices, page 24.

Related Devices and Connectors

The table indicates the related devices and connectors:

Related Device	Connector		Label	Description
EPB•••C••500	CN3		COM-DI	Common for digital inputs 1…2
			DI1…DI2	Regular digital inputs 1…2

Regular Digital Inputs

Characteristics

The table indicates the digital inputs characteristics:

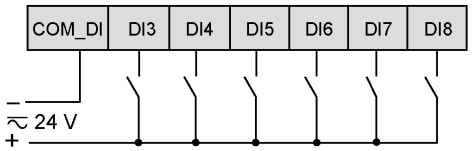
Characteristic	Value
Type	Digital input
Power draw (maximum)	5 mA
Working voltage	+0…38 Vdc 0…24 Vac +/-10 % 50/60 Hz
Pulse detection minimum length	• EPB•••C••500 positive or negative pulse ◦ DI3…DI8: 20 ms ◦ DI9…DI12: 40 ms • EP4000000B00 positive or negative pulse ◦ DI1…DI4: 20 ms • EP4S00••V500 positive or negative pulse ◦ DI1…DI2: 20 ms ◦ DI3…DI6: 40 ms
Logic type	Digital inputs work in positive logic • EPB•••C••500/EP4000000B00/EP4S00••V500: Digital inputs work in positive or negative logic
Level 1	+20…38 Vdc 24 Vac +/-10 % 50/60 Hz
Level 0	+0…4 Vdc 0…3 Vac 50/60 Hz

Logic type description:

Logic type	Active state
Positive logic	Output supplies current (source output) Current flows to the input (sink input)
Negative logic	Output draws current (sink output) Current flows from the input (source input)

Wiring Diagram Example

EPB•••C••500 (CN4) regular digital input:

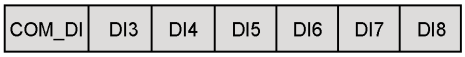
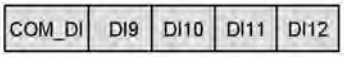
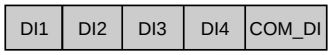
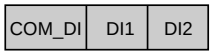


Pitch of the terminal block	Cabling length
3.50 mm (0.14 in)	10 m (32.808 ft)

For more information about the wiring, refer to Best wiring practices, page 24.

Related Devices and Connectors

The table indicates the related devices and connectors:

Related Device	Connector	Label	Description
EPB•••C••500	CN4 	COM-DI	Common for digital inputs 3…8
		DI3…DI8	Regular digital inputs 3…8
	CN12 	COM-DI	Common for digital inputs 9…12
		DI9…DI12	Regular digital inputs 9…12
EP4000000B00	- 	COM-DI	Common for digital inputs 1…4
		DI1…DI4	Regular digital inputs 1…4
EP4S00••V500	CN2 	COM-DI	Common for digital inputs 1…2
		DI1…DI2	Regular digital inputs 1…2
	CN9 	COM-DI	Common for digital inputs 3…6
		DI3…DI6	Regular digital inputs 3…6

Digital Output

Digital Output

This table presents the digital outputs of controllers and expansion modules:

Description	EPB00FCTA500	EPBS0FCTA500	EPB01FCTA500	EPBS1FCTA500	EPB01FCXX500	EP4000000B00	EP4S0024V500	EP4S00LIV500
High voltage relay SPST digital output, page 57	10	8	10	8	10	3	4	4
High voltage Solid-state relay digital output, page 59	-	2	-	2	-	-	3	3
High voltage relay SPDT digital output, page 60	2	2	2	2	2	1	-	-

These devices have analog outputs that can be configured as low voltage (SELV), open collector outputs. For more details, refer to the configuration of analog inputs, page 62.

NOTE: The commons C*x* are not internally connected together.

High Voltage Relay SPST Digital Output

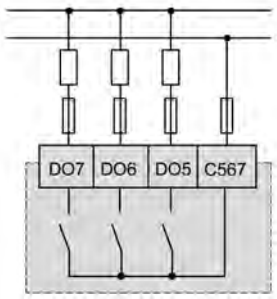
Characteristics

The table indicates the digital outputs characteristics:

Characteristic	Value
Maximum voltage	250 Vac
Maximum current	3 A resistive load, 2 FLA / 12 LRA
Minimum switching capacity	100 mA / 5 Vdc
Electrical durability conforming to UL60730	100 000 cycles, 3 A at 250 Vac

Wiring Diagram Example

EPB•••C••500 (CN7) SPST relay output:

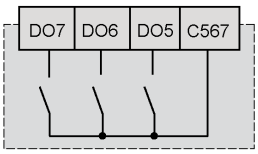
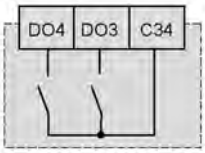
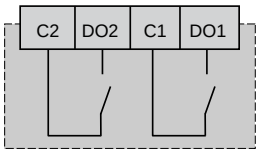
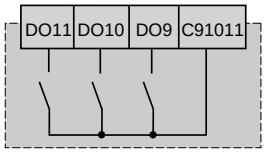
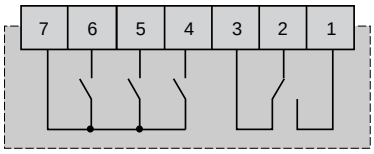
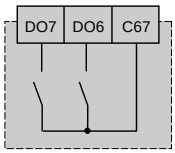
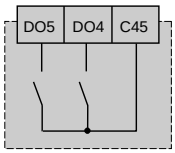


Pitch of the terminal block
5.00 mm (0.197 in)

For more information about the wiring, refer to Best wiring practices, page 24.

Related Devices and Connectors

The table indicates the related devices and connectors:

Related Device	Connector		Label	Description
EPB•••C••500	CN7		C567	Common for output relays 5…7 Maximum current: 9 A
			DO5…DO7	Output relays 5…7
	CN8		C34	Common for output relays 3…4 Maximum current: 6 A
			DO3…DO4	Output relays 3…4
EPB00FCTA500 EPB01FCTA500 EPB01FCXX500	CN9		C1	Common for output relays 1 Maximum current: 3 A
			C2	Common for output relays 2 Maximum current: 3 A
			DO1…DO2	Output relays 1…2
EPB•••C••500	CN15		C91011	Common for output relay 9…11 Maximum current: 9 A
			DO9…DO11	Output relays 9…11
EP4000000B00	-		1	SPDT Output relay DO1 - Normally open, page 60
			2	Common for SPDT Output relay DO1, page 60
			3	SPDT Output relay DO1 - Normally closed, page 60
			4	Output relay DO2 - Normally open
			5	Output relay DO3 - Normally open
			6	Output relay DO4 - Normally open
			7	Common for output relay DO2…DO4 Maximum current: 10 A
EP4S00••V500	CN11		C67	Common for output relays 6...7 Maximum current: 6 A
			DO6…DO7	Output relays 6...7
	CN12		C45	Common for output relays 4...5 Maximum current: 6 A
			DO4…DO5	Output relays 4...5

High Voltage Solid-State Relay Digital Output

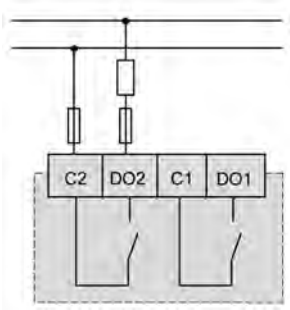
Characteristics

The table indicates the SSR output characteristics:

Characteristic	Value **EPBS0FCTA500** **EPBS1FCTA500** **EP4S00LIV500**	Value **EP4S0024V500**
Nominal voltage	75…240 Vac	24 Vac/Vdc
Maximum current	0.5 A	2 A
Switching rate range	45…65 Hz	-
Minimum switching capacity	20 mA	-

Wiring Diagram Example

EPBS0FCTA500/EPBS1FCTA500 (CN9) SSR output:

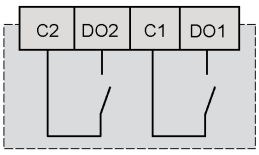
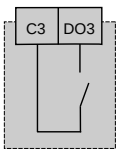


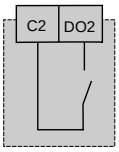
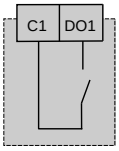
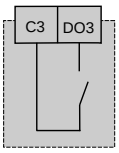
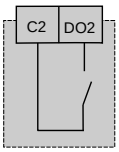
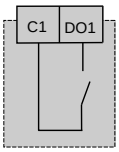
Pitch of the terminal block
5.00 mm (0.197 in)

For more information about the wiring, refer to Best wiring practices, page 24.

Related Devices and Connectors

The table indicates the related devices and connectors:

Related Device	Connector		Label	Description
EPBS0FCTA500 EPBS1FCTA500	CN9		C1	Common for SSR output 1 Maximum current: 0.5 A
			C2	Common for SSR output 2 Maximum current: 0.5 A
			DO1…DO2	SSR Outputs 1…2
EP4S00LIV500	CN4		C3	Common for SSR output 3 Maximum current: 0.5 A
			DO3	SSR Outputs 3

Related Device	Connector		Label	Description
	CN5		C2	Common for SSR output 2 Maximum current: 0.5 A
			DO2	SSR Outputs 2
	CN6		C1	Common for SSR output 1 Maximum current: 0.5 A
			DO1	SSR Outputs 1
EP4S0024V500	CN4		C3	Common for SSR output 3 Maximum current: 2 A
			DO3	SSR Outputs 3
	CN5		C2	Common for SSR output 2 Maximum current: 2 A
			DO2	SSR Outputs 2
	CN6		C1	Common for SSR output 1 Maximum current: 2 A
			DO1	SSR Outputs 1

High Voltage Relay SPDT Digital Output

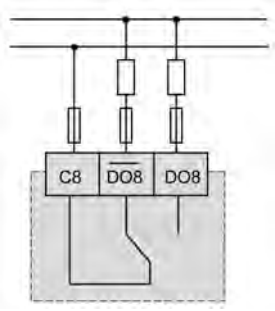
Characteristics

The table indicates the digital outputs characteristics:

Characteristic	Value
Maximum voltage	250 Vac
Maximum current	3 A resistive load, NO contact: 2.2 FLA / 13.2 LRA
Minimum switching capacity	300 mA, resistive load
Electrical durability conforming to UL60730	100 000 cycles

Wiring Diagram Example

EPB•••C••500 (CN6) SPDT relay output:

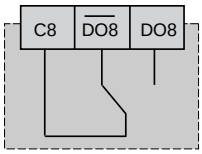
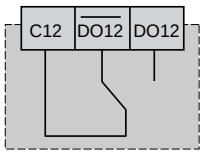
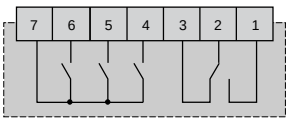


Pitch of the terminal block
5.00 mm (0.197 in)

For more information about the wiring, refer to Best wiring practices, page 24.

Related Devices and Connectors

The table indicates the related devices and connectors:

Related Device	Connector		Label	Description
EPB•••C••500	CN6		C8	Common for output relays 8 Maximum current: 3 A
			DO8	Output relay 8 - Normally open
			DO8-	Output relay 8 - Normally closed
	CN14		C12	Common for output relay 12 Maximum current: 3 A
			DO12	Output relay 12 - Normally open
			DO12-	Output relay 12 - Normally closed
EP4000000B00	-		1	Output relay DO1 - Normally open
			2	Common for output relay DO1 Maximum current: 10 A
			3	Output relay DO1 - Normally closed
			4	SPST Output relay DO2 - Normally open, page 57
			5	SPST Output relay DO3 - Normally open, page 57
			6	SPST Output relay DO4 - Normally open, page 57
			7	Common for SPST output relay DO2…DO4, page 57

Analog Inputs

Analog Inputs

This table presents the analog inputs of controllers and expansion modules:

Description	EPB00FCTA500	EPBS0FCTA500	EPB01FCTA500	EPBS1FCTA500	EPB01FCXX500	EP400000B00	EP4S0024V500	EP4S00LIV500
Configurable analog inputs or digital input.	12	12	12	12	12	4	4	4

Analog Inputs

Overview

Controllers analog inputs are identified as AI1…AI*x*.

The inputs are configurable in pairs, AI1- AI2 is the first pair, AI3-AI4 is the second pair, and so on, up to the last pair. Both AIs of a pair must be configured in order to belong to the same type group.

Using the parameter *Cfg_Aix*, an analog input AI*x* can be configured to acquire a signal by a physical resource (probe, digital input, voltage/current signal) as specified in the following table:

Type group	*Cfg_Aix*	Description
NTC resistive input, page 65 or Digital input, page 70	0	NTC (NK103), 10 kΩ at 25 °C, BETA value 3977
	1	Digital input
	2	NTC (103AT-2), 10 kΩ at 25 °C, BETA value 3435
	7	hΩ (NTC)(1)
Current input, page 67	3	4…20 mA
	11	0…20 mA
Voltage input 0…10 Vdc, page 69	4	0…10 Vdc
Voltage input 0…5 Vdc, page 69	5	0…5 Vdc Ratiometric
	10	0…5 Vdc
Resistive input, page 66	6	Pt1000
	8	daΩ (Pt1000)(2)
	9	PTC (KTY81-121)

(1) Resistance value read, expressed in 0.1 kΩ, for a resistance applied to the input using the controller in NTC configuration, for example creating a divider with pull-up resistance of 10 kΩ. The resistance range for the hΩ(NTC) configuration is up to 150 kΩ.
(2) Resistance value read, expressed in 0.01 kΩ, for a resistance applied to the input using the controller in Pt1000 configuration, that is, creating a divider with pull-up resistance (2 kΩ). The resistance range for the daΩ (Pt1000) configuration is up to 3 kΩ.

The analog inputs configured as digital inputs are not isolated.

NOTICE

INOPERABLE EQUIPMENT

Only use voltage free type inputs on analog inputs configured as digital inputs.

Failure to follow these instructions can result in equipment damage.

Compatibility in Pairs

Parameters by pair:

Pairs	Parameter Set	
Pair #1	*Cfg_Ai1*	*Cfg_Ai2*
Pair #2	*Cfg_Ai3*	*Cfg_Ai4*
Pair #3	*Cfg_Ai5*	*Cfg_Ai6*
Pair #4	*Cfg_Ai7*	*Cfg_Ai8*
Pair #5	*Cfg_Ai9*	*Cfg_Ai10*
Pair #6	*Cfg_Ai11*	*Cfg_Ai12*

NOTE: The all pairs are available for EPB•••C••500. Depending on the analog inputs of the device, not all pairs are available, refer to the Related Devices and Connectors, page 64.

Compatibility table for a pair of AIs:

Example for pair #1			*Cfg_Ai1*											
			0	1	2	3	4	5	6	7	8	9	10	11
			NTC (NK103)	Digital input	NTC (103AT-2)	4…20 mA	0…10 Vdc	0…5 Vdc Ratiometric	Pt1000	hΩ (NTC)	daΩ (Pt1000)	PTC (KTY81-121)	0…5 Vdc	0…20 mA
Cfg_Ai2	0	NTC (NK103)	✓	✓	✓	-	-	-	-	✓	-	-	-	-
	1	Digital input	✓	✓	✓	-	-	-	-	✓	-	-	-	-
	2	NTC (103AT-2)	✓	✓	✓	-	-	-	-	✓	-	-	-	-
	3	4…20 mA	-	-	-	✓	-	-	-	-	-	-	-	✓
	4	0…10 Vdc	-	-	-	-	✓	-	-	-	-	-	-	-
	5	0…5 Vdc Ratiometric	-	-	-	-	-	✓	-	-	-	-	✓	-
	6	Pt1000	-	-	-	-	-	-	✓	-	✓	✓	-	-
	7	hΩ (NTC)	✓	✓	✓	-	-	-	-	✓	-	-	-	-
	8	daΩ (Pt1000)	-	-	-	-	-	-	✓	-	✓	✓	-	-
	9	PTC (KTY81-121)	-	-	-	-	-	-	✓	-	✓	✓	-	-
	10	0…5 Vdc	-	-	-	-	-	✓	-	-	-	-	✓	-
	11	0…20 mA	-	-	-	✓	-	-	-	-	-	-	-	✓

Applying not allowed configuration produces the error number 8003_h on the field value of both probes (unsigned decimal: 32771 / signed decimal: -32765).

Voltage Analog Inputs or Current Analog Inputs Configuration

According to the physical resources wired (voltage signal or current signal), inputs must be configured using the related parameters.

Analog inputs type can be configured as specified in the following table:

Parameter	Description	Range	Default value
FullScaleMin_AIx	Analog input AI*x* start of scale value	-9999…+9999	0
FullScaleMax_AIx	Analog input AI*x* full scale value	-9999…+9999	1000
Calibration_AIx	Analog input AI*x* differential	-1000…+1000	0

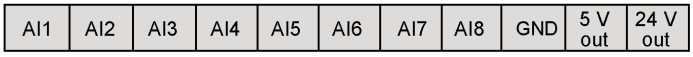
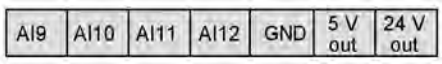
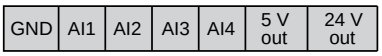
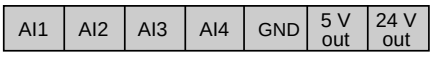
Note:

Type of probe configured	Minimum full scale AI*x*	Maximum full scale AI*x*
0/4…20 mA current probe	0/4 mA	20 mA
0…10 Vdc voltage probe	0 Vdc	10 Vdc
0…5 Vdc ratiometric probe	10 % (0.5 Vdc)	90 % (4.5 Vdc)
0…5 Vdc probe	0 Vdc	5 Vdc

For details on the values and characteristics of parameters, refer to the Parameters, page 104.

Related Devices and Connectors

The table indicates the related devices and connectors:

Related Device	Connector	Label	Description
EPB•••C••500	CN5		
		24 Vdc	+24 Vdc power out for analog inputs, max current 150 mA (1)
		5 Vdc	+5 Vdc power out for ratiometric analog inputs, max current 50 mA (1)
		GND	0 V signal ground
		AI1…AI8	Analog inputs 1… 8 or dry contact digital inputs
	CN13		
		24 Vdc	+24 Vdc power out for analog inputs, max current 150 mA (1)
		5 Vdc	+5 Vdc power out for ratiometric analog inputs, max current 50 mA (1)
		GND	0 V signal ground
		AI9…AI12	Analog inputs 9…12 for dry contact digital inputs
EP4000000B00	-		
		24 Vdc	+24 Vdc power out for analog inputs, max current 50 mA (1)
		5 Vdc	+5 Vdc power out for ratiometric analog inputs, max current 20 mA (1)
		GND	0 V signal ground
		AI1…AI4	Analog inputs 1…4 or dry contact digital inputs
EP4S00••V500	CN3		
		24 Vdc	+24 Vdc power out for analog inputs, max current 125 mA (1)
		5 Vdc	+5 Vdc power out for ratiometric analog inputs, max current 50 mA (1)
		GND	0 V signal ground
		AI1…AI4	Analog inputs 5…10 or dry contact digital inputs

Related Device	Connector	Label	Description
	CN10	AI5 | AI6 | AI7 | AI8 | AI9 | AI10 | GND | 5 V out | 24 V out	
		24 Vdc	+24 Vdc power out for analog inputs, max current 125 mA (1)
		5 Vdc	+5 Vdc power out for ratiometric analog inputs, max current 50 mA (1)
		GND	0 V signal ground
		AI5…AI10	Analog inputs 5…10 or dry contact digital inputs
(1) The maximum current value is the sum between the maximum currents supplied by the corresponding terminals in the base board connector and in the upper board connector.			

NTC Analog Input

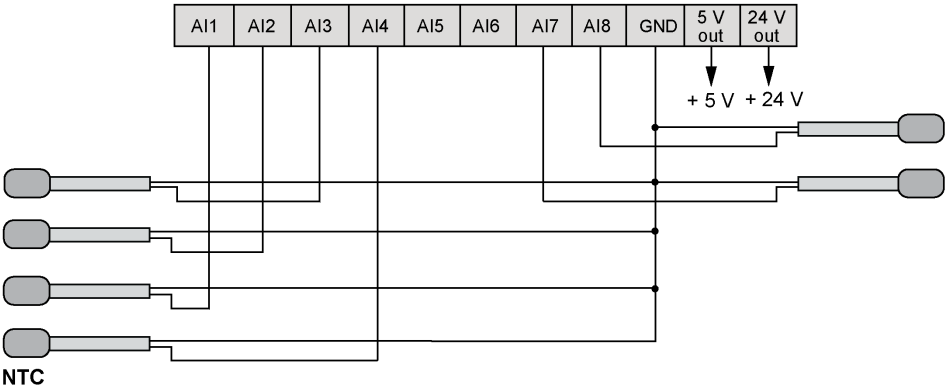
Characteristics

Using the parameter *Cfg_Aix*, an analog input AI*x* can be configured to acquire a signal by a physical resource (probe, digital input, voltage/current signal) as specified in the following table:

Cfg_Aix	Description	Accuracy Range	Accuracy	Resolution	Input Impedance
0	NTC (NK103) 10 kΩ at 25 °C BETA value 3977	-40…+137 °C (-40…+278.6 °F)			
		-40…+110 °C (-40…+230 °F)	+/-1 °C (+/-1.8 °F)	0.1 °C (0.18 °F)	10 kΩ
		+110…+137 °C (+230…+278.6 °F)	+/-1.9 °C (+/-3.42 °F)		
2	NTC (103AT-2) 10 kΩ at 25 °C BETA value 3435	-50…+110 °C (-58…+230 °F)	+/-1 °C (+/-1.8 °F)	0.1 °C (0.18 °F)	10 kΩ
7	hΩ (NTC)	0…150 kΩ			
	EPB•••C••500	0…150 kΩ	+/-0.85 kΩ	0.1 kΩ	10 kΩ
	EP4000000B00	0…70 kΩ	+/-1 kΩ		
	EP4S00••V500	70…120 kΩ	+/-2.5 kΩ		
		120…150 kΩ	+/-6 kΩ		

Wiring Diagram Example

EPB•••C••500 CN5 NTC input connection:



Pitch of the terminal block	Cabling length
3.50 mm (0.14 in)	10 m (32.808 ft)

For more information about the wiring, refer to Best wiring practices, page 24.

Resistive Analog Input

Characteristics

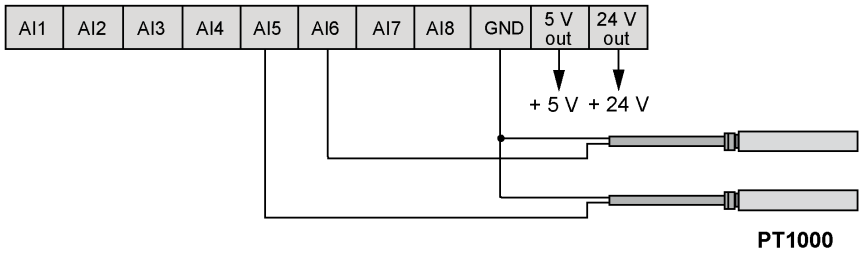
Using the parameter *Cfg_Aix*, an analog input AI*x* can be configured to acquire a signal by a physical resource (probe, digital input, voltage/current signal) as specified in the following table:

Cfg_Aix	Description	Accuracy Range	Accuracy	Resolution	Input Impedance
6	Pt1000	-200…+850 °C (-328…+1562 °F)			
	EPB•••C••500	-50…+100 °C (-58…+212 °F)	+/-1.5 °C (+/-2.7 °F)	0.1 °C (+/-0.18 °F)	2 kΩ
		+101…+400 °C (+213.8…+752 °F)	+/-2.4 °C (+/-4.32 °F)		
		+400…+850 °C (+753.8…+1562 °F)	+/-10 °C (+/-18 °F)		
	EP4000000B00 EP4S00••V500	-200…-100 °C (-328…-148 °F)	+/-5 °C (+/-9 °F)	0.1 °C (+/-0.18 °F)	
		-100…-50 °C (-148…-58 °F)	+/-3 °C (+/-5.4 °F)		
		-50…+200 °C (-58…+392 °F)	+/-1.5 °C (+/-2.7 °F)		
		+200…+600 °C (+392…+1112 °F)	+/-15 °C (+/-27 °F)		
		+600…+850 °C (+1112…+1562 °F)	+/-30 °C (+/-54 °F)		
8	daΩ (Pt1000)	0…3 kΩ	+/-25 Ω	10 Ω	2 kΩ
9	PTC (KTY81-121)	-55…+150 °C (-67…+302 °F)			

Cfg_Aix	Description	Accuracy Range	Accuracy	Resolution	Input Impedance
	EPB•••C••500	-55…+150 °C (-67…+302 °F)	+/-1.1 °C (+/-1.98 °F)	0.1 °C (0.18 °F)	2 kΩ
	EP4000000B00 EP4S00••V500	-55…+135 °C (-67…+275 °F)	+/-1.1 °C (+/-1.98 °F)	0.1 °C (0.18 °F)	
		+135…+150 °C (+275…+302 °F)	+/-3.1 °C (+/-5.58 °F)		

Wiring Diagram Example

EPB•••C••500 CN5 Pt1000 (AI5 and AI6) inputs connection:



Pitch of the terminal block	Cabling length
3.50 mm (0.14 in)	10 m (32.808 ft)

For more information about the wiring, refer to Best wiring practices, page 24.

Current Analog Input

Characteristics

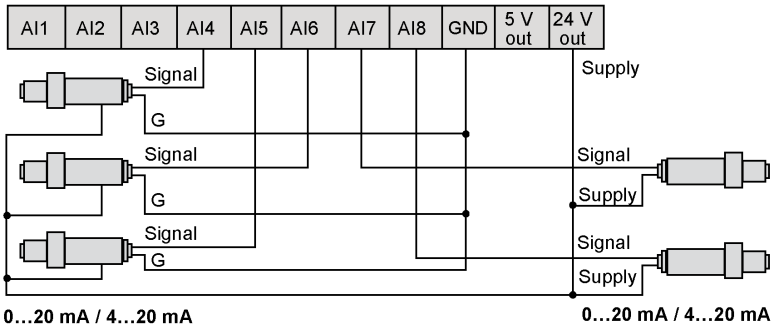
Using the parameter *Cfg_Aix*, an analog input AI*x* can be configured to acquire a signal by a physical resource (probe, digital input, voltage/current signal) as specified in the following table:

Cfg_Aix	Description	Range	Accuracy Range	Resolution	Input Impedance
3	4…20 mA	-9999…9999 Default: 0…1000	4…20 mA +/-1 % full range + 1 digit	1 digit	<150 Ω
11	0…20 mA		0…4 mA +/-2 % full range + 1 digit		
			4…20 mA +/-1 % full range + 1 digit		

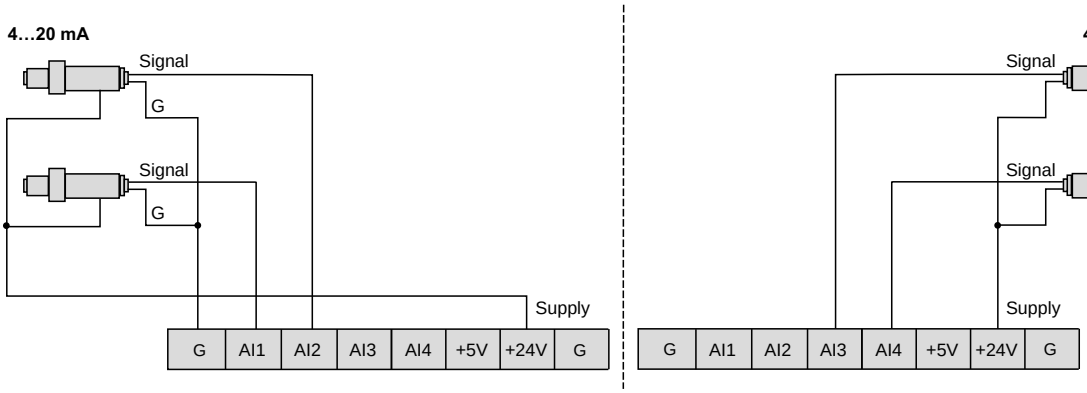
Related Device	24 Vdc max current	Max 4...20 mA Probes(1)
EPB•••C••500	150	7,0
EP4000000B00	50	2,0
EP4S00••V500	125	6,0
(1) Max probe if the 24 Vdc Out is used only to power supply the probes.		

Wiring Diagram Example

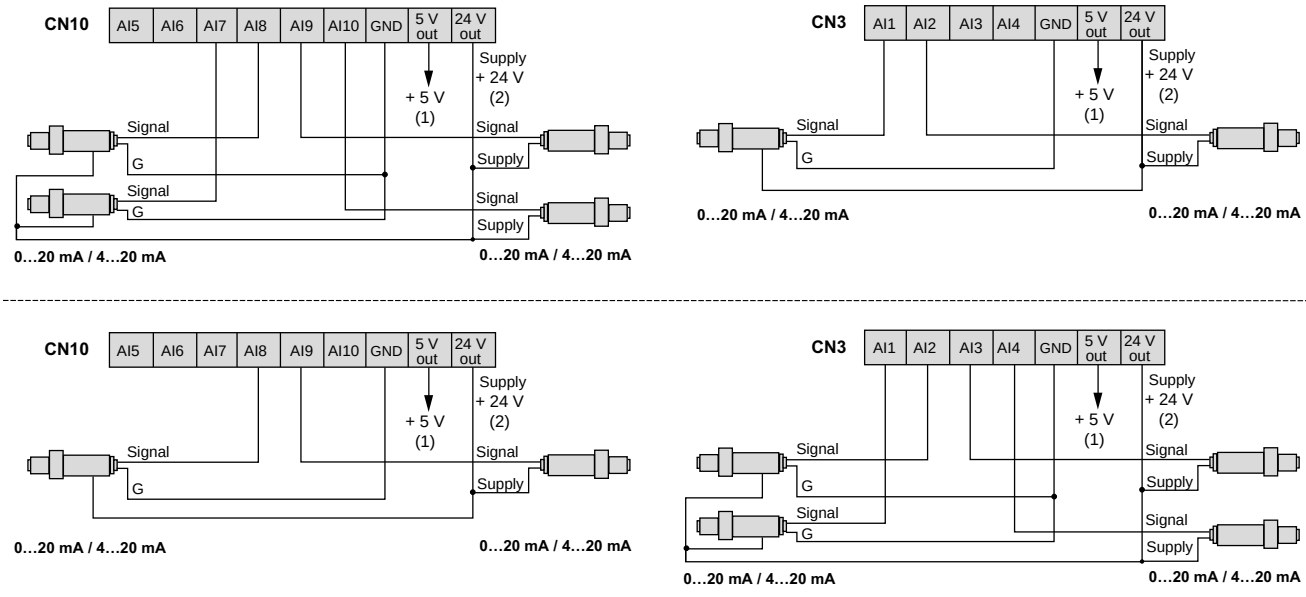
EPB•••C••500 (CN5) current input connection:



EP4000000B00 current input connection:



EP4S00••V500 (CN3 + CN10) current input connection:



(1) (CN10 + CN3) Max current: 50 mA.

(2) (CN10 + CN3) Max current: 125 mA.

You can power the transducer from the EWCM 9000 PRO (HF) (5 Vdc or 24 Vdc) or with an external supply.

For more information, refer to transducer technical data sheet.

Pitch of the terminal block	Cabling length
3.50 mm (0.14 in)	10 m (32.808 ft)

For more information about the wiring, refer to Best wiring practices, page 24.

Voltage Analog Input

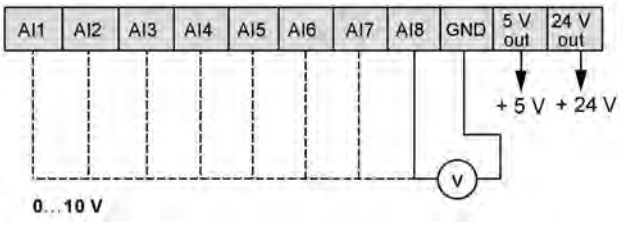
Characteristics

Using the parameter *Cfg_Aix*, an analog input AI*x* can be configured to acquire a signal by a physical resource (probe, digital input, voltage/current signal) as specified in the following table:

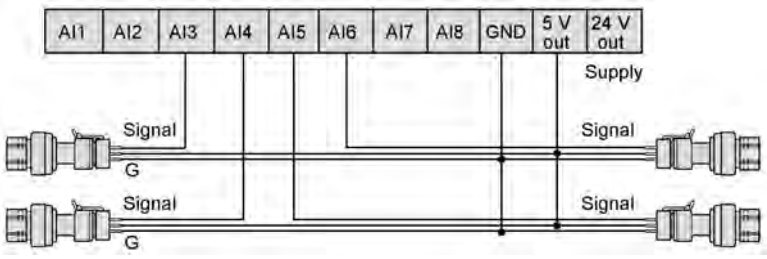
Cfg_Aix	Description	Range	Accuracy Range	Resolution	Input Impedance
4	0…10 Vdc	-9999…9999 Default: 0…1000	0…10 Vdc +/-1 % full range + 1 digit	1 digit	>10 kΩ EPB•••C••500 >20 kΩ EP4000000B00 EP4S00••V500
10	0…5 Vdc	-9999…9999 Default: 0…1000	0…5 Vdc +/-1 % full range + 1 digit	1 digit	>20 kΩ EPB•••C••500 >60 kΩ EP4000000B00 EP4S00••V500
5	0…5 Vdc Ratiometric	-9999…9999 Default: 0…1000	10 % 5 Vdc…90 % 5 Vdc +/-1 % full range + 1 digit	1 digit	>20 kΩ EPB•••C••500 >60 kΩ EP4000000B00 EP4S00••V500

Wiring Diagram Example

EPB•••C••500 (CN5) voltage input connection:



EPB•••C••500 (CN5) 0-5V ratiometric voltage input connection:



Pitch of the terminal block	Cabling length
3.50 mm (0.14 in)	10 m (32.808 ft)

For more information about the wiring, refer to Best wiring practices, page 24.

Analog Input Used as Digital Input

Characteristics

Using the parameter *Cfg_Aix*, an analog input AI*x* can be configured to acquire a signal by a physical resource (probe, digital input, voltage/current signal) as specified in the following table:

Cfg_Aix	Description	Range	Accuracy Range	Accuracy	Resolution	Input Impedance
1	Digital input(1)	-	-	-	-	10 kΩ
(1) The analog inputs configured as digital inputs are not isolated.						

The use of an external power supply with the dry contact digital inputs can result in equipment damage.

NOTICE

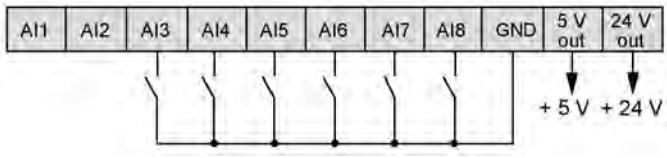
INOPERABLE EQUIPMENT

Do not apply external power supply to the dry contact digital inputs of the device.

Failure to follow these instructions can result in equipment damage.

Wiring Diagram Example

EPB•••C••500 (CN5) analog input used as digital input connection:



Pitch of the terminal block	Cabling length
3.50 mm (0.14 in)	10 m (32.808 ft)

For more information about the wiring, refer to Best wiring practices, page 24.

Analog Outputs

Analog Outputs

This table presents the analog outputs of controllers and expansion modules:

Description	EPB00FCTA500	EPBS0FCTA500	EPB01FCTA500	EPBS1FCTA500	EPB01FCXX500	EP4000000B00	EP4S0024V500	EP4S00LIV500
Low voltage (SELV) analog outputs, or Open Collector PWM outputs	2	2	2	2	2	-	2	2
Low voltage (SELV) analog outputs	4	4	4	4	4	2	-	-

Analog Outputs

Overview

Analog outputs are identified as AO1…AO*x*.

Analog outputs by device reference:

Device references	Non-configurable analog outputs	Configurable analog outputs
EPB•••C••500	AO1, AO2, AO5, and AO6	AO3, AO4
EP4000000B00	AO1, AO2	-
EP4S00••V500	-	AO1, AO2

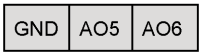
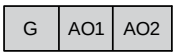
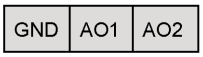
Devices are equipped with low voltage analog output (SELV) 0…10 Vdc, page 73

Using the parameter *Cfg_AOx*, configurable analog outputs AO*x* can be configured to provide a signal to a physical resource as specified in the following table:

Cfg_AOx	Description
0	Current modulation 4…20 mA, page 73
1	Current ON/OFF, page 74
2	Voltage modulation 0…10 Vdc, page 73
3	PWM open collector, page 72

Related Devices and Connectors

The table indicates the related devices and connectors:

Related Device	Connector		Label	Description
EPB•••C••500	CN2		GND	0 V signal ground
			AO1…AO4	Analog outputs 1…4
	CN11		GND	0 V signal ground
			AO5…AO6	Analog outputs 5…6
EP4000000B00	-		G	0 V signal ground
			AO1…AO2	Analog outputs 1…2
EP4S00••V500	CN8		GND	0 V signal ground
			AO1…AO2	Analog outputs 1…2

PWM Open Collector Outputs

Characteristics

PWM open collector (configurable polarity) configurable analog output characteristics:

Analog output	• Frequency • Duty cycle			Maximum Sink Current	Maximum Supplies Voltage
	Range	Accuracy	Resolution		
AO3, AO4	• 0…2000 Hz • 0.0…100.0 %	• 1 Hz • 0.1 %	• 1 Hz • 0.1 %	50 mA	24 Vdc
EPB•••C••500					
AO1, AO2					
EP4S00••V500					

Analog outputs in PWM mode can be configured as specified in the following table:

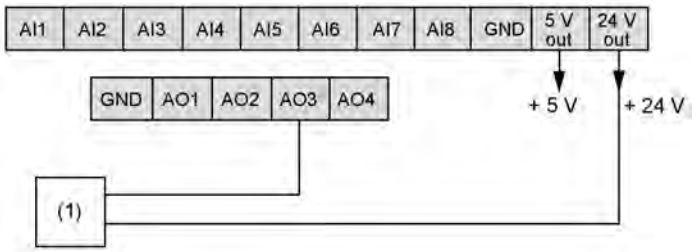
Parameter	Description	Range
PWM_frequency_AO1_AO2	PWM Frequency	0…2000 Hz
PWM_frequency_AO3_AO4		
PWM_polarity_AO1_AO2	PWM Polarity • 0 = Reversed • 1 = Direct	0, 1
PWM_polarity_AO3_AO4		

NOTE: The polarity and the frequency are common for the 2 configurable analog outputs of each device.

For details on the values and characteristics of the parameters, refer to Parameters, page 104.

Wiring Diagram Example

EPB•••C••500 (CN2) open collector PWM analog input (AO3) connection:



(1) Third-party actuator (for example: fan module) or external relay

Pitch of the terminal block	Cabling length
3.50 mm (0.14 in)	10 m (32.808 ft)

For more information about the wiring, refer to Best wiring practices, page 24.

Low Voltage (SELV) Analog Outputs

Characteristics

Voltage modulation 0…10 Vdc non-configurable analog output characteristics:

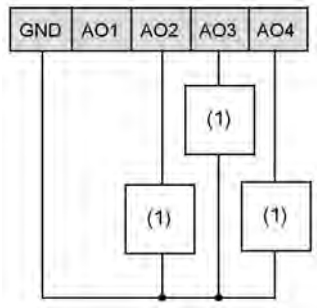
Analog output	Range	Accuracy	Resolution	Load Impedance
AO1, AO2	0…1000	+/-2 % full scale	1 digit	> 700 Ω
EP4000000B00				
AO1, AO2, AO5, and AO6				
EPB•••C••500				

Voltage modulation 0…10 Vdc configurable analog output characteristics:

Analog output	Range	Accuracy	Resolution	Load Impedance
AO1, AO2	0…1000	+/-2 % full scale	1 digit	≥700 Ω
EP4S00••V500				
AO3, AO4				
EPB•••C••500				

Wiring Diagram Example

EPB•••C••500 (CN2) Low voltage (SELV) analog outputs (AO2, AO3, and AO4) connection:



(1) Third-party actuator (for example: fan module)

Pitch of the terminal block	Cabling length
3.50 mm (0.14 in)	10 m (32.808 ft)

For more information about the wiring, refer to Best wiring practices, page 24.

Analog Current Output

Characteristics

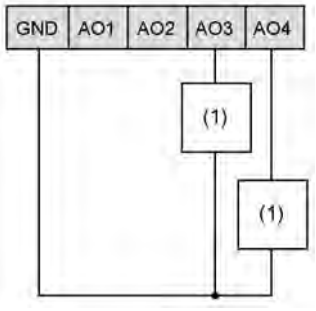
Current modulation 4…20 mA configurable analog output characteristics:

Analog output	Range	Accuracy	Resolution	Load Impedance
AO1, AO2	0…1000	+/-2 % full scale	1 digit	≤450 Ω
EP4S00••V500				
AO3, AO4				

Analog output	Range	Accuracy	Resolution	Load Impedance
EPB•••C••500				

Wiring Diagram Example

EPB•••C••500 (CN2) low voltage (SELV) analog outputs (AO3, and AO4) connection:



(1) Third-party actuator (for example: fan module)

Pitch of the terminal block	Cabling length
3.50 mm (0.14 in)	10 m (32.808 ft)

For more information about the wiring, refer to Best wiring practices, page 24.

Current ON/OFF Current Output

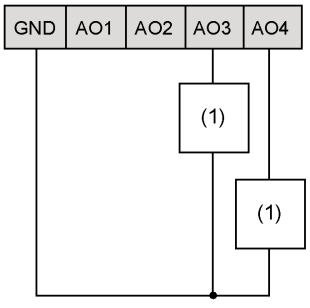
Characteristics

Current ON-OFF configurable analog output characteristics:

Analog output	Current ON	Current OFF
AO1, AO2		
EP4S00••V500	20 mA	0 mA
AO3, AO4		
EPB•••C••500	23 mA	0 mA

Wiring Diagram Example

EPB•••C••500 (CN2) current ON/OFF analog output (AO3, and AO4) connection:



(1) Third-party actuator (for example: fan module)

Pitch of the terminal block	Cabling length
3.50 mm (0.14 in)	10 m (32.808 ft)

For more information about the wiring, refer to Best wiring practices, page 24.

Communication

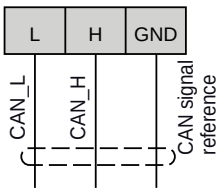
CAN Expansion Bus Port

Overview

The EPB•••C••500 controllers and EP4000000B00 / EP4S00••V500 expansion modules can be connected through the CAN expansion bus.

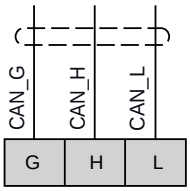
Connector

EPB•••C••500 / EP4S00••V500 CAN connector



Pitch of the terminal block
3.50 mm (0.14 in)

EP4000000B00 CAN connector



Pitch of the terminal block
3.81 mm (0.15 in)

Wiring

Use a twisted pair shielded cable with two conductors with section 0.5 mm^2 (AWG 20), plus a sheath (characteristic impedance 120 Ω) with PVC sleeve, nominal capacity between conductors 36 pF/m, nominal capacity between conductor and shield 68 pF/m.

For laying wires, comply with the indications given in standard EN 50174 on information technology wiring. Extra care must be taken in separating data transmission circuits from power lines.

The network must have a bus daisy chain topology and must have 120 Ω 1/4 W termination resistances between the CAN_H and CAN_L terminals on each of the two ends of the bus or enable those embedded on the expansion modules.

The maximum cable length depends on the communication speed set in baud:

Baud rate	Maximum network length using:	
	Embedded CAN	EVS00CA000000 module
50 kBd	1000 m (3280.83 ft)	1000 m (3280.83 ft)
125 kBd	500 m (1640.41 ft)	500 m (1640.41 ft)
250 kBd	200 m (656.17 ft)	250 m (820.21 ft)
500 kBd	30 m (98.42 ft)	60 m (196.85 ft)

NOTICE

INOPERABLE EQUIPMENT

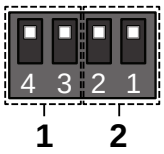
- Do not connect equipment that communicate using RS-485 serial to CAN Expansion Bus terminals.
- Do not connect equipment that communicate using CAN Expansion Bus to RS-485 terminals.

Failure to follow these instructions can result in equipment damage.

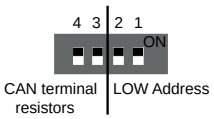
EP4000000B00 Port Configuration Using DIP Switch

The 4-position DIP switches on EP4000000B00 expansion modules is used to:

- Assert the 120 Ω termination (1)
- Set the CAN address (2)



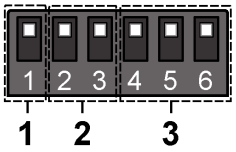
NOTE: The addressing comprises the sum of parameter *Addr_CAN_OB* (Default value: 1) plus the composite value of the 4-position DIP switches DIP1…DIP2 (4 addresses).

						DIP Switch 0 = OFF, 1 = ON	
Serial addressing	EXP 4D PRO	CAN address	Addr_ CAN_OB	+	dip value	2	1
	EXP 4D PRO 1	1	1	+	0	0	0
	EXP 4D PRO 2	2	1		1	0	1
	EXP 4D PRO 3	3	1		2	1	0
	EXP 4D PRO 4	4	1		3	1	1
	EXP 4D PRO 5	5	5		0	0	0
	EXP 4D PRO 6	6	5		1	0	1
	EXP 4D PRO 7	7	5		2	1	0
	EXP 4D PRO 8	8	5		3	1	1
	EXP 4D PRO 9	9	9		0	0	0
	EXP 4D PRO 10	10	9		1	0	1
	EXP 4D PRO 11	11	9		2	1	0
	EXP 4D PRO 12	12	9		3	1	1

EP4S00••V500 Port Configuration Using DIP Switch

The 6-position DIP switches on EP4S00••V500 expansion modules is used to:

- Assert the 120 Ω termination (1)
- Set the CAN baud rate (2)
- Set the CAN address (3)



NOTE: The addressing comprises the sum of parameter *Addr_CAN_OB* (Default value: 1) plus the composite value of the 6-position DIP switches DIP4…DIP6 (8 addresses).

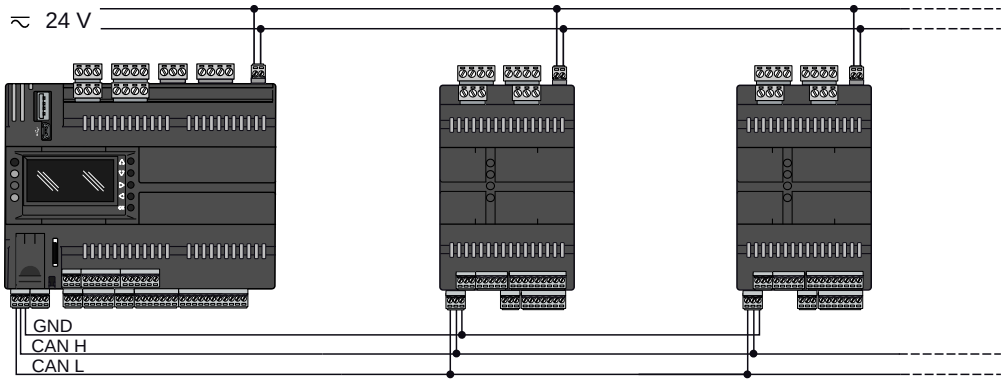
DIP number	**1**	**2**	**3**	**4**	**5**	**6**
	120 Ω	**Baud**		**Address**		
Disabled Default value		-				
Enabled						
500 kBd Default value	-			-		
250 kBd						
125 kBd						
50 kBd						
Address *Addr_CAN_OB* Default value	-					
Address *Addr_CAN_OB* + 1						
Address *Addr_CAN_OB* + 2						
Address *Addr_CAN_OB* + 3						
Address *Addr_CAN_OB* + 4						
Address *Addr_CAN_OB* + 5						
Address *Addr_CAN_OB* + 6						
Address *Addr_CAN_OB* + 7						

CAN Expansion Bus (Field) Network Connection Example

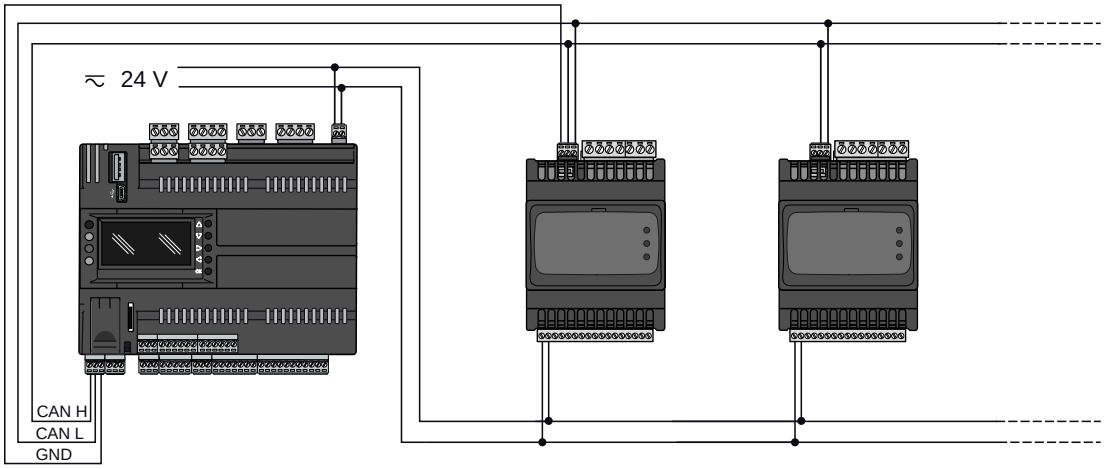
A CAN Expansion Bus (Field) network connection can be constituted by:

- Maximum 1 EPB•••C••500 functioning as master
- Maximum 12 EP4000000B00 / EP4S00••V500 functioning as slaves. This number can be reduced, depending on the number of inputs and outputs that the master can control.

Isolated power supply connection example using a EPB01FCTA500 with EP4S00••V500:



Non-isolated power supply connection example using a EPB01FCTA500 with EP4000000B00:

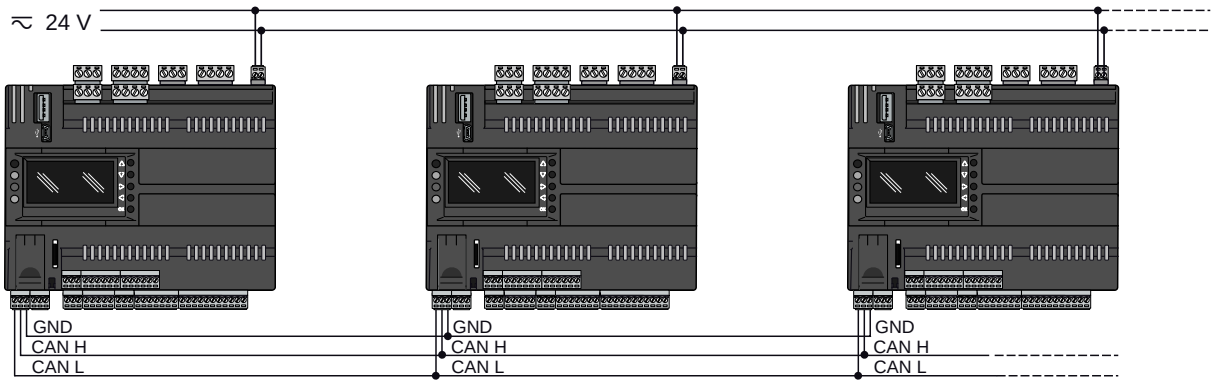


CAN Expansion Bus Connection (Network) Example

A CAN Expansion Bus (network) connection can be constituted by:

- Maximum 10 EPB•••C••500 connected in CAN binding. For more details on binding functionalities, refer to FREE Studio Plus - Operating Guide, page 9.

Isolated power supply connection example using EPB01FCTA500:



Power Supply Restriction

If you connect the GND connection of the network across multiple devices with power supply inputs that are non-isolated (EP4000000B00 / EP4S00••V500), use separate, isolated power supplies. Alternatively, if you are interconnecting the equipment to a single power supply, do not connect the GND signal. Pay special attention when connecting serial lines. Miswiring may lead to inoperable equipment.

For more details, refer to Power Supply description, page 52.

RS-485 Serial Ports

Overview

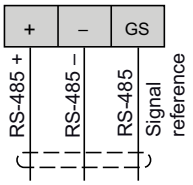
Each EPB•••C••500 controller is equipped with 2 RS-485 serial ports.

These ports permit user to communicate between the controller and a device via:

- A Modbus RTU connection when using **RS485-1**(slave) or **RS485-2** (master or slave) communication port
- A BACnet MS/TP (B-AAC profile certified BTL) connection

Connector of EPB•••C••500 Controllers

The EPB•••C••500 controllers are equipped with 2 RS-485 terminals:



NOTE: GS of the **RS485-1** and **RS485-2** terminals are internally connected and are isolated from the GND of the device.

Cables

Use a shielded and "twisted pair" cable with two 0.5 mm^2 section conductors (AWG 20), plus braid (characteristic impedance 120 Ω) with PVC sleeve, nominal capacity between conductors 36 pF/m, nominal capacity between conductor and shielding 68 pF/m.

Alternatively use a shielded and "twisted pair" cable with two 0.5 mm^2 section conductors (AWG 20), plus braid with PVC sleeve, nominal capacity between conductors 89 pF/m, nominal capacity between conductor and shielding 161 pF/m. See EN 50174 standard on IT cabling for indications on how cables must be routed.

Always follow regulations applicable to the routing and connection of cables. Separate data transmission circuits from power lines.

RS-485 network up to 1200 m in length with a maximum of 32 devices can be connected directly to the controller.This length can be extended and the number of devices for each channel increased using appropriate repeater modules.

Single terminal strip with 3 conductors: use the 3 conductors (“+”, “-“ for the signal and “GND” for the braid).

Attach the 120 Ω 1/4 W resistors between the "+" and "-" terminals of the interface and the last controller in each branch of the network.

Maximum settable speed 115200 baud.

RS-485 physical layer can be used for Modbus SL, as well as for BACnet MS/TP communication. Concurrent communication of different protocols on the same serial port is not allowed.

NOTICE

INOPERABLE EQUIPMENT

Do not communicate through Modbus SL and BACnet MS/TP concurrently on the same serial port.

Failure to follow these instructions can result in equipment damage.

NOTICE

INOPERABLE EQUIPMENT

- Do not connect equipment that communicate using RS-485 serial to CAN Expansion Bus terminals.
- Do not connect equipment that communicate using CAN Expansion Bus to RS-485 terminals.

Failure to follow these instructions can result in equipment damage.

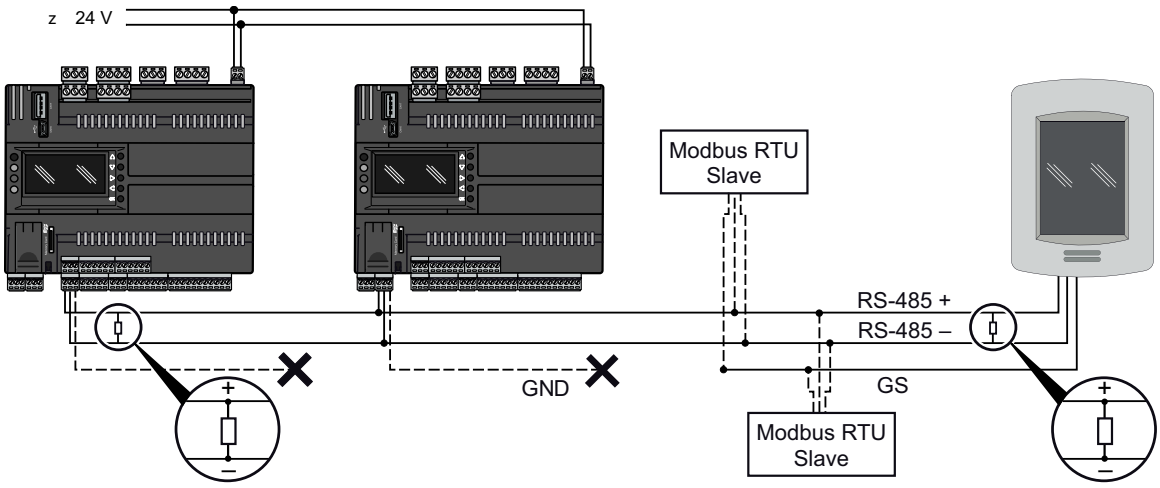
Power Supply Restriction

If you connect the GND connection of the RS-485 network across multiple devices with power supply inputs that are non-isolated, use separate, isolated power supplies. Alternatively, if you are interconnecting the equipment to a single power supply, do not connect the RS-485 GND signal. Pay special attention when connecting serial lines. Miswiring may lead to inoperable equipment.

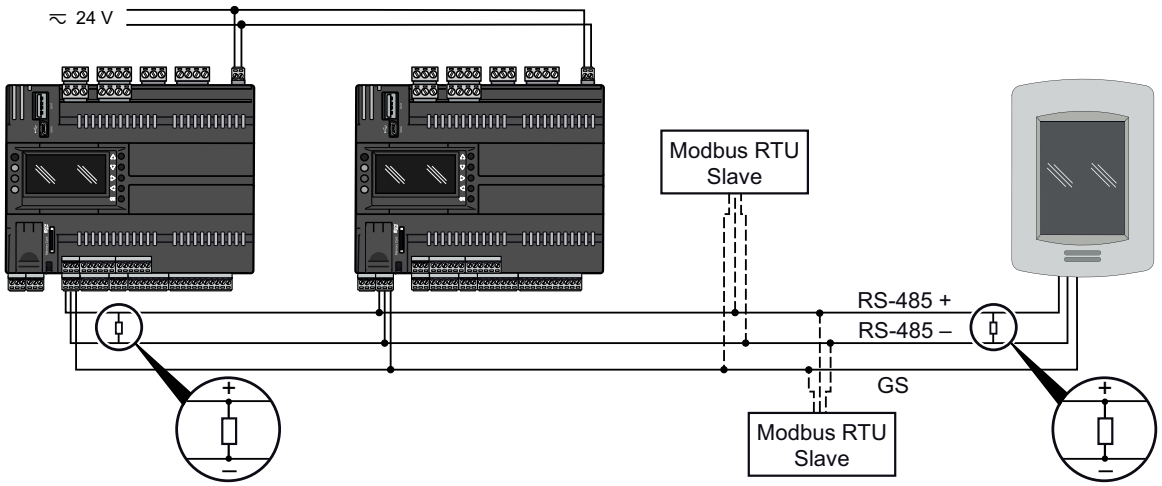
For more details, refer to Power Supply description, page 52.

Wiring Examples

The following diagram shows an RS-485 (field) architecture wiring example with non isolated controllers:



The following diagram shows an RS-485 (field) architecture wiring example with isolated controllers:



Characteristic	Definition
Type of trunk cable	Shielded cable with one twisted pair and at least a third conductor
Maximum length of bus	1000 m (3280.83 ft) at 19200 bps with a shielded and twisted cable (for example: TSXCSA•••)
Maximum number of devices (without repeater)	32 devices that are 31 slaves
Line terminators	120 Ω 1/4 W resistors

Pitch of the terminal block	Cabling length
3.50 mm (0.14 in)	1000 m (3280.83 ft)

USB Serial Ports

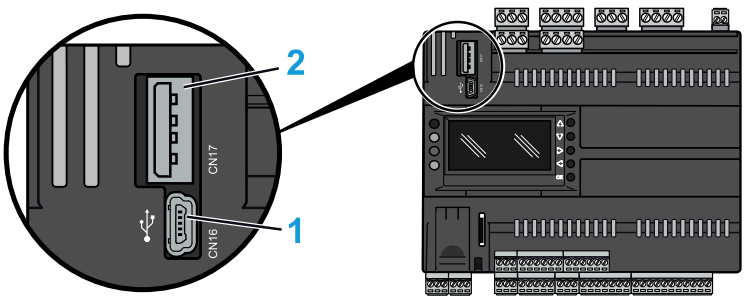
Overview

An USB type Mini-B (DEVICE) connector placed on the top-left side of the front view of the controller is used to connect the controller to a PC via Mini-B/A USB cable for debugging, commissioning, downloading, uploading with FREE Studio Plus.

For EPB•••C••500, an additional USB type A (HOST) connector is used to connect a USB memory key when downloading the application.

For further information, refer to the commissioning part, page 141.

Connector of EPB•••C••500 Controllers



1 USB type Mini-B

2 USB type A

Cabling length
30 cm (11.8 in)

Connection

The cables required for EPB•••C••500 controllers USB Mini-B are TCSXCNAMUM3P or BMXXCAUSBH018.

The EPB•••C••500 controllers can also be supplied through the Mini-B USB cable with limited functionalities related to debugging, commissioning, downloading and uploading with FREE Studio Plus. For more information, see the FREE Studio Plus, Programming Guide.

NOTE: Do not apply voltage via 24 Vac/dc while the equipment is already connected to a PC via Mini-B USB cable.

Before applying power via 24 Vac/dc power supply connection:

Step	Action
1	Disconnect the Mini-B USB cable.
2	Supply the EWCM 9000 PRO (HF) controller via its 24 Vac/dc supply.
3	Reconnect the Mini-B USB cable.

Compatibility

EWCM 9000 PRO (HF) controller is seen as a virtual COM. Serial communication is performed with a CDC profile (USB standard).

Following operating systems are compatible:

- Windows 8 / 8.1 64 bit
- Windows 10 64 bit

The driver is supplied with the FREE Studio Plus.

Ethernet Port

Overview

Each EPB•••C••500 controller is equipped by an RJ45 Ethernet port.

The RJ45 Ethernet port is available as an option for EPB•••C••500 controller, by adding a Ethernet, Modbus TCP, and BACnet/IP or a Ethernet, Modbus TCP, BACnet/IP, Modbus SL, and BACnet MS/TP communication module, page 17

Description

The Ethernet port permits user to connect the device to:

- Different controllers and/or applications exchanging variables and/or parameters (network).
- A supervision system using Modbus TCP/IP protocol.
- An IEC 61131-3 FREE Studio Plus development system.
- A BACnet/IP network, with B-AAC profile.

Concurrent communication of different protocols using the same Ethernet port is allowed (use of a web browser in addition to another Ethernet Fieldbus connection for example).

Web Functionalities

The EPB•••C••500 also features Web functionalities, offering makers of machinery and systems integrators remote access. Having a web-based connection in machines reduces support and maintenance by minimizing call-out charges. End users also benefit, as they can monitor their own systems both locally and from distance, using the graphics interface of any browser.

Main Web functionalities:

- Web-based access.
- Remote reading and support.
- Local and remote system control, including alarms management.
- Preventive and predictive maintenance.

Care must be taken and provisions made for use of this product as a control device to avoid inadvertent consequences of commanded machine operation, controller state changes, or alteration of data memory or machine operating parameters.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Configure and install the mechanism that enables the remote HMI local to the machine so that local control over the machine can be maintained regardless of the remote commands sent to the application.
- You must have a complete understanding of the application and the machine before attempting to control the application remotely.
- Take the precautions necessary to assure that you are operating remotely on the intended machine by having clear, identifying documentation within the application and its remote connection.

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

Bridge

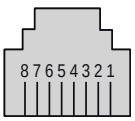
FREE Studio Plus allows monitoring of Modbus/RTU slaves, where EPB•••C••500 controller is the master Modbus/RTU.

In a FREE Studio Plus project, EPB•••C••500 controller is used as a Modbus TCP to Modbus/RTU protocol conversion element for Modbus 03_h and 10_h commands.

From FREE Studio Plus, set the connection with the device as Modbus TCP, inserting the EPB•••C••500 controller IP address and the Modbus/RTU address of the device slave.

Connector

RJ45 Ethernet pin assignment



Pin number	Signal
1	TD+
2	TD-
3	RD+
4	-
5	-

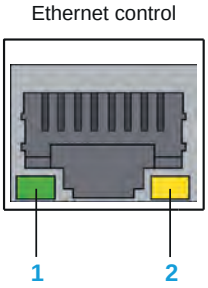
Pin number	Signal
6	RD-
7	-
8	-

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

Cabling length
100 m (328 ft)

Status LED

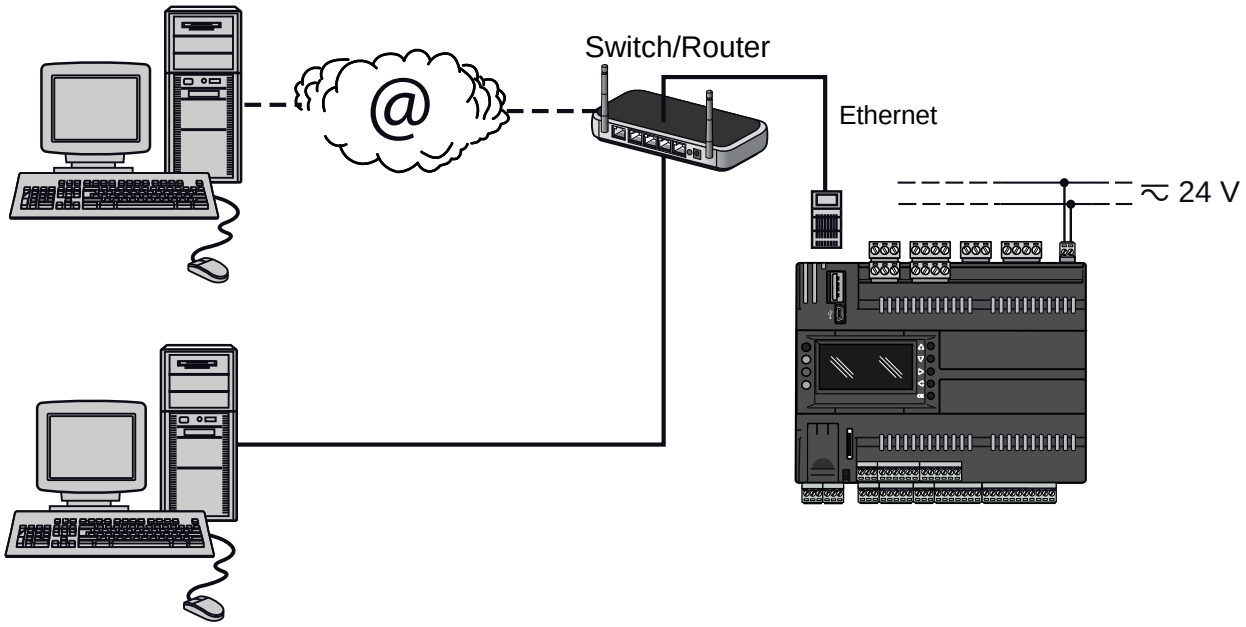
RJ45 Ethernet status LED



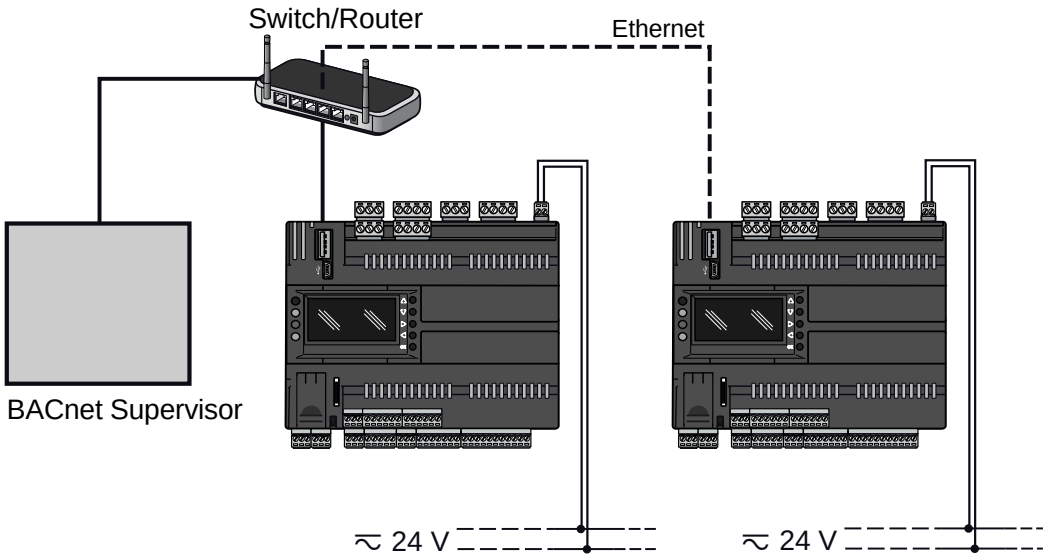
Label	Signal	LED		
		Color	Status	Description
1	Ethernet link	Green/Yellow	Off	No link
			Yellow On	Link at 10 Mb
			Green On	Link at 100 Mb
2	Ethernet activity	Green	Off	No activity
			Flashing	Activity

Architecture Wiring Examples

The following diagram shows an Ethernet architecture wiring example:



The following diagram shows a BACnet/IP architecture wiring example:



Memory

Memory

Overview

The EWCM 9000 PRO (HF) has two different ways for data storing:

- Internal memory
- External memory (through a slot to insert external memory card)

Internal Memory

The EWCM 9000 PRO (HF) has the following memory capacities:

Capacity	Type	Description
512 Kb	Flash	BIOS
96 Kb	RAM	BIOS and retain variables
8 Mb	NOR Flash	File System and BIOS
EPB•••C••500: 32 Mb	SDRAM	Application, HMI, and BIOS

NOTE: A RAM datablock (32 bit DWORD), referred to as retain memory can be addressed through FREE Studio Plus at address *%MD102.0*, and allows data to be permanently stored, as it is with the Flash memory, as long as the RTC battery is active, page 87. There is no limitation in the amount of read and write operations on this block.

External Memory

The EWCM 9000 PRO (HF) (EPB•••C••500) has a Memory Card slot for micro SD cards to, in certain cases, extend internal memory for the File System, page 121.

- Ultra High-Speed Class 1 (UHS-I) compatibility has been tested and validated with a 16 GB memory card.
- Ultra High-Speed Class 2 (UHS-II) memory cards are not supported.

Micro SD card slot characteristics:

Topic	Characteristics	Description
Supported type	Standard Capacity	Micro SD
	High Capacity	Micro SDHC
Global memory	Maximum capacity	32 GB
Speed	Supported classes	4, 6, and 10 Ultra high-speed class 1
Memory organization	Maximum size for files	4 GB
	Maximum number of files	512

When handling the micro SD card, follow the instructions below to help prevent internal data on the micro SD card from being corrupted or lost or a micro SD card malfunction from occurring:

NOTICE

INOPERABLE EQUIPMENT

- Do not store the micro SD card where there is static electricity or probable electromagnetic fields.
- Do not store the micro SD card in direct sunlight, near a heater, or other locations where high temperatures can occur.
- Do not bend the micro SD card.
- Do not drop or strike the micro SD card against another object.
- Keep the micro SD card dry.
- Do not touch the micro SD card connectors.
- Do not disassemble or modify the micro SD card.
- Use only micro SD card formatted using FAT32.

Failure to follow these instructions can result in equipment damage.

The EPB•••C••500 controller does not recognize NTFS formatted micro SD cards. Format the micro SD card on your computer using FAT32.

When using the EPB•••C••500 controller and a micro SD card, observe the following to avoid losing valuable data:

- Accidental data loss can occur at any time. Once data is lost, it cannot be recovered.
- If you forcibly extract the micro SD card, data on the micro SD card may become corrupted.
- Removing a micro SD card that is being accessed could damage the micro SD card, or corrupt its data.
- If the micro SD card is not positioned correctly when inserted into the controller, the data on the card and the controller could become damaged.

NOTICE
LOSS OF APPLICATION DATA • Backup micro SD card data regularly. • Do not remove power or reset the controller, and do not insert or remove the micro SD card while it is being accessed. • Become familiar with the proper orientation of the micro SD card when inserting it into the controller. **Failure to follow these instructions can result in equipment damage.**

RTC (Real-Time Clock)

RTC (Real-Time Clock)

RTC Description

The table indicates the functions of the RTC:

Function	Description
RTC data retention time in the event of a power outage	10 years
Drift value	≤ 30 s/month at 25 °C

Battery

The EWCM 9000 PRO (HF)Logic Controller has a removable flap placed in the lower-left side of the front view. Behind the service door, there is a battery compartment and a 5-pole male connector (reserved). However, to replace the internal battery, contact your local Eliwell representative.

⚠**WARNING**
NON USER SERVICABLE COMPONENT Do not attempt to replace the battery. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

User Interface

What's in This Chapter

EPB01FCTA500 / EPB01FCXX500 / EPBS1FCTA500 User Interface 88
EP4S00••V500 Expansion Modules User Interface 89

EPB01FCTA500 / EPB01FCXX500 / EPBS1FCTA500 User Interface

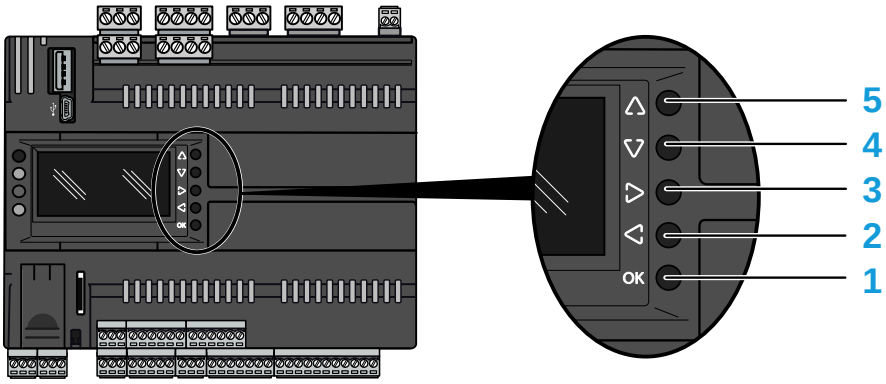
Overview

The user interface of the EPB01FCTA500 / EPB01FCXX500 / EPBS1FCTA500 controllers has 5 keys and 4 LEDs.

The EPB00FCTA500 / EPBS0FCTA500 logic controllers have no display. A EPK•10000000 remote display can be used.

Keys

The following indications refer to the EPB01FCTA500 / EPB01FCXX500 / EPBS1FCTA500 user interface.

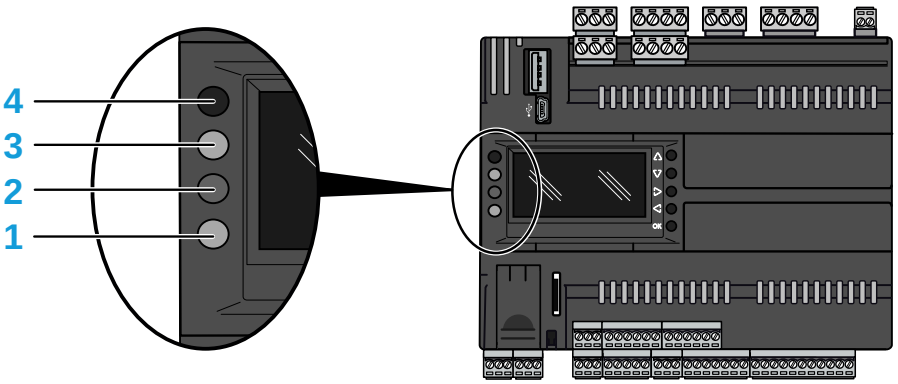


The keys can be programmed from the controller application. The following table describes the keys default setting in Edit Mode (keys are programmable from the controller application).

Description of keys actions:

Number	Key	Press once (press and release)	Press and hold
1	**OK**	• Enter/exit Edit mode • Confirm operation in Edit Mode	-
2	**LEFT**	• Move cursor to left in Edit Mode	• Exit Edit Mode without saving
3	**RIGHT**	• Move cursor to right in Edit Mode	-
4	**DOWN**	• Decrease a value in Edit Mode	-
5	**UP**	• Increase a value in Edit Mode	-

LEDs and Display



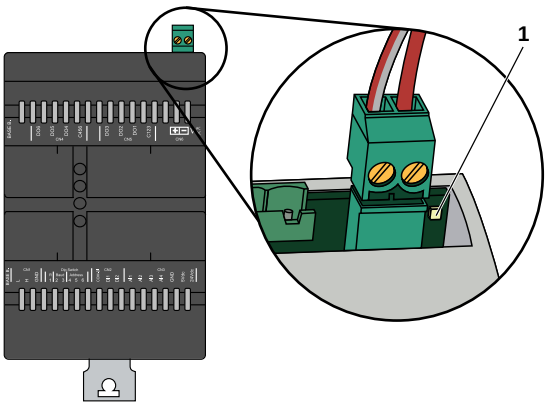
Number	LED	Color	Function
1	C	Green	Programmable from the controller application
2	B	Yellow	
3	A	Red	
4	P	Green	ON when the controller is powered

NOTE: By default, A, B, C LEDs are used for USB management.

EP4S00••V500 Expansion Modules User Interface

User Interface

The EP4S00••V500 expansion modules have an advanced LED:



1: EP4S00••V500 Expansion Module status LED.

LED State	Description
OFF	There is no power or the microcontroller is not working
ON	The EP4S00••V500 Expansion Module is powered and microcontroller runs.
Flashing	The EP4S00••V500 Expansion Module is powered and Operational. In this state, the transmission of process data via process data objects (PDOs) is possible.
Fast flashing	During a firmware upgrade. **NOTE:** At power-on/reset, the LED first flashing for a while and then stay ON.

Remote Display

What's in This Part

Environmental Characteristics 91
Remote Display Description 92
Electrical Characteristics and Wiring Diagrams 95
Display User Interface 97

Environmental Characteristics

What's in This Chapter

Environmental Characteristics 91

Environmental Characteristics

Environmental Characteristics

Characteristics	Specification	EPK010000000	EPKE10000000
The product complies with the following harmonized regulations	EN60730-1 EN60730-2-9	✓	✓
Environmental front panel rating	Type 1 enclosure	✓	✓
Degree of protection by enclosure	IP20	✓	✓
	IP65 on front panel	-	✓
Construction of control	Electronic automatic Incorporated Control	✓	✓
Purpose of control	Operating control (not safety related)	✓	✓
Mounting	Vertical surface	✓	✓
	Flush	✓	✓
Type of action	1	✓	✓
Pollution degree	2 (normal)	✓	✓
Insulation material group	IIIa	✓	✓
Over-voltage category	I	✓	✓
Rated impulse voltage	330 V	✓	✓
Ambient operating temperature	-10…55 °C (14…131 °F)	✓	-
	-20…55 °C (-4…131 °F)	-	✓
Ambient operating humidity (non-condensing)	10...90 %	✓	-
	5…95 %	-	✓
Ambient storage temperature	-20 ... 85 °C (-4 ... 185 °F)	✓	-
	-30…70 °C (-22…158 °F)	-	✓
Ambient storage humidity (non-condensing)	10…90 %	✓	-
	5…95 %	-	✓
Power supply	24 Vac +/-15 % 50/60 Hz 20...38 Vdc +/-10 %	✓	✓
Power consumption	3 VA 2 W	✓	✓
Insulation class	III	✓	✓
Software class and structure	A	✓	✓

Remote Display Description

What's in This Chapter

EPKE10000000 92
EPK010000000 93

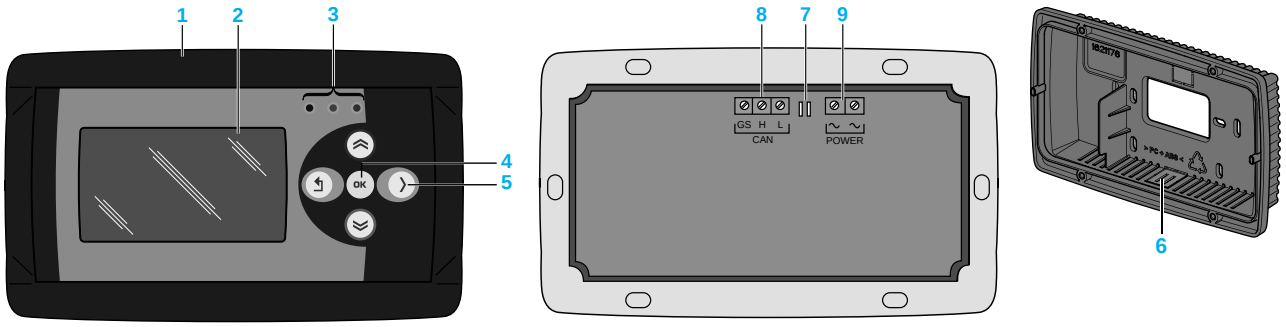
EPKE10000000

Overview

Reference	Description
EPKE10000000	EVK PRO monochrome display -20C

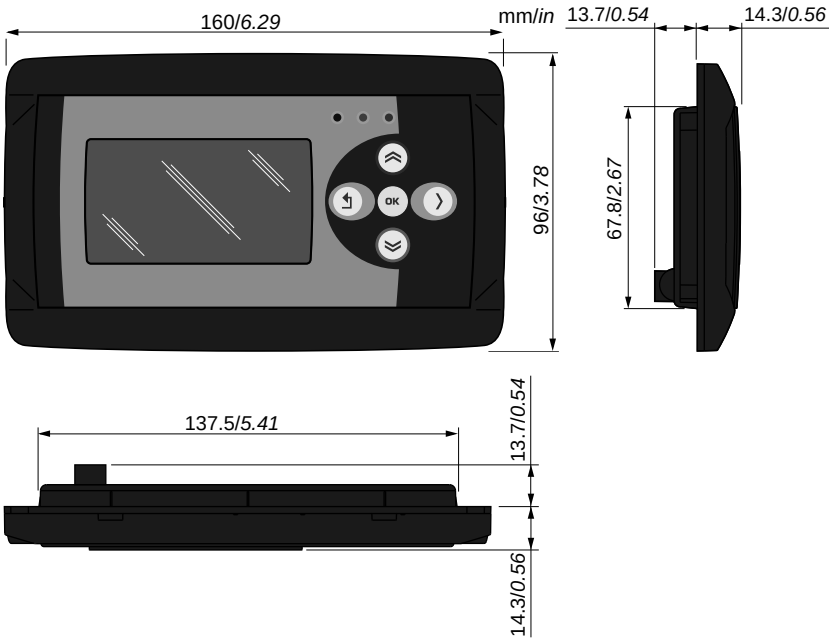
Physical Description

The following illustrations present a EPKE10000000 remote display:



Number	Description
1	Front frame
2	Display
3	Status LEDs
4	Enter key
5	4 navigation keys
6	Cables access of EVA00WMRC000•
7	CAN termination resistors
8	CAN Expansion bus port
9	Power supply

Dimensions



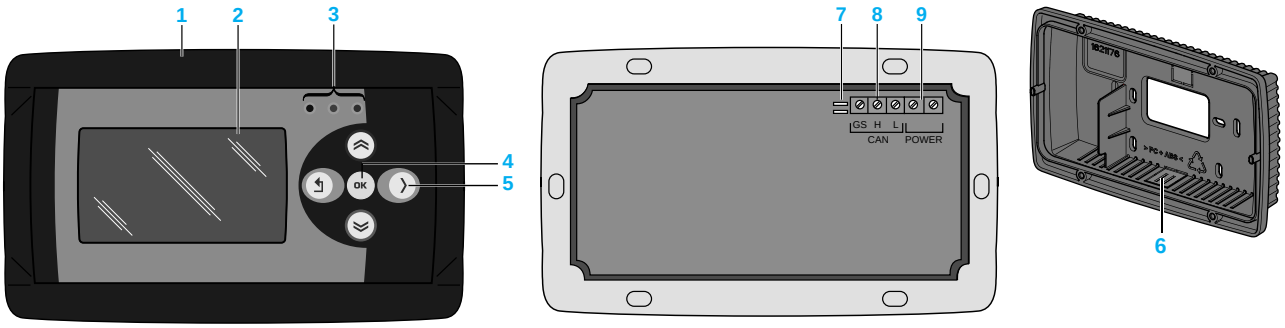
EPK010000000

Overview

Reference	Description
EPK010000000	EVK PRO display / graphical

Physical Description

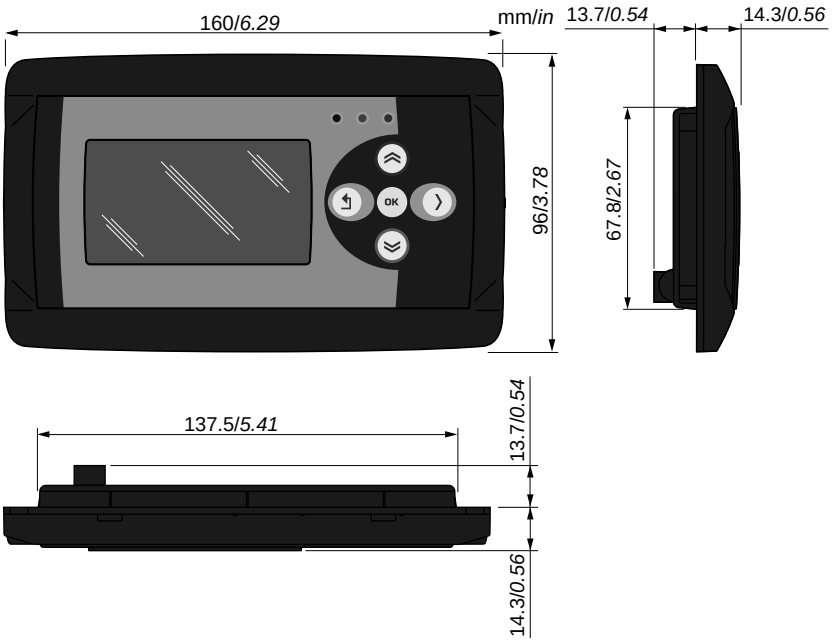
The following illustrations present a EPK010000000 remote display:



Number	Description
1	Front frame
2	Display
3	Status LEDs
4	Enter key
5	4 navigation keys
6	Cables access of EVA00WMRC000•
7	CAN termination resistors

Number	Description
8	CAN Expansion bus port
9	Power supply

Dimensions



Electrical Characteristics and Wiring Diagrams

What's in This Chapter

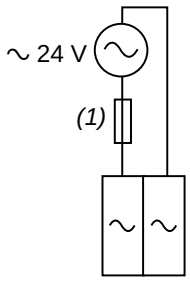
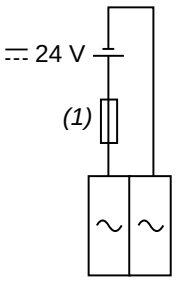
Power Supply.....95
EPK•10000000 CAN port.....96

Power Supply

EPK•10000000 Power Supply

References	Power supply characteristics
EPK•10000000	24 Vac (+/- 15 %) - 50/60 Hz 24 Vdc (+/- 10 %) 3 VA / 2 W maximum power consumption

Power supply wiring diagram:

24 Vac/dc	
	
(1) Type T fuse 200 mA	

Pitch of the terminal block	Cabling length
3.81 mm (0.15 in.)	10 m (32.808 ft)

NOTICE

INOPERABLE EQUIPMENT

Do not connect a power cable longer than 10 m (32.8 ft).

Failure to follow these instructions can result in equipment damage.

For more information about the wiring, refer to Wiring Best Practices, page 24.

⚠ DANGER

GROUND LOOP CAUSING ELECTRIC SHOCK AND/OR INOPERABLE EQUIPMENT

Do not connect the 0 V power supply/transformer connection supplying this equipment to any external ground (earth) connection.

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

In all cases, if the specified voltage range is not maintained, the products may not function as intended. Use appropriate safety interlocks and voltage monitoring circuits.

⚠WARNING

POTENTIAL OF OVERHEATING AND FIRE

- Do not connect the equipment directly to line voltage.
- Use only isolating SELV, Class 2 power supplies / transformers to supply power to this equipment.

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

EPK•10000000 CAN port

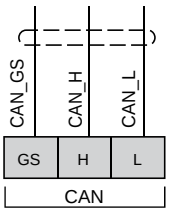
Overview

The EPK•10000000 can be connected to the controller through the CAN port.

For details, refer to CAN port description of the controller, page 75.

Connector

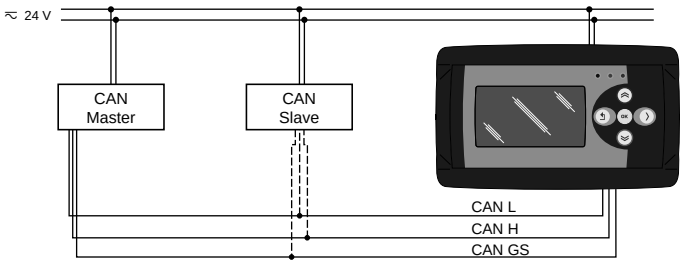
CAN connector :



NOTE: The terminals of power supply connection and the signal reference for CAN Expansion Bus (indicated as GS) are not internally connected. FUNCTIONAL isolation between them.

Architecture Wiring Examples

The following diagram shows a CAN architecture wiring example:



NOTE: Both ends of the CAN expansion bus must be terminated. In EPK•10000000, this is possible via its termination jumpers.

Display User Interface

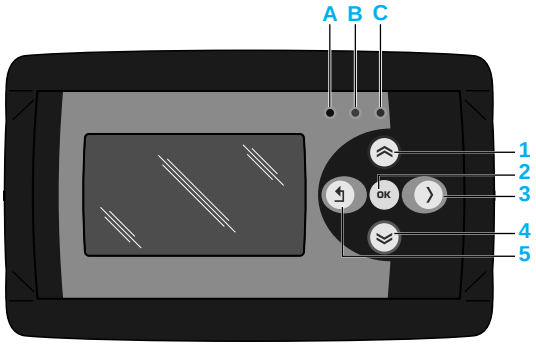
What's in This Chapter

EPK•10000000 User Interface 97
Diagnostic Menu 99
EPK•10000000 Troubleshooting 103

EPK•10000000 User Interface

Overview

The user interface of the EPK•10000000 remote display has 5 keys and 3 LEDs:



EPK•10000000 remote display can be used with:

- EPB•••C••500 logic controllers that have an embedded display

Keys

The following table describes the keys default setting in Edit Mode (keys are programmable from the controller application).

Description of keys actions:

Number	Key	Press once (press and release)	Press and hold
1	**UP**	• Scroll up • Return to previous page • Increase / modify a value in Edit Mode • Go to next label	-
2	**OK**	• Scroll down • Move to next level/menu (open folder, subfolder, parameter, value) • Enter/exit Edit mode • Confirm operation in Edit Mode	-
3	**RIGHT**	• Move cursor to right in Edit Mode	-

Number	Key	Press once (press and release)	Press and hold
4	**DOWN**	• Scroll down • Move to the next page • Decrease / modify a value in Edit Mode • Go to previous label	-
5	**LEFT/ EXIT**	• Exit menu page / go back to previous menu • Move cursor to left in Edit Mode	Exit Edit Mode without saving

LEDs and Display

LED	Color	Function
C	Green	Programmable from the controller application
B	Yellow	
A	Red	

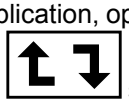
Diagnostic Menu

EPK•10000000 is factory-configured with a default Diagnostic menu that appears when the equipment is powered on.

After uploading an HMI menu from EPB•••C••500 controller, the display consist of this menu. This HMI menu was created with the software FREE Studio Plus and stored in the filesystem of the EPB•••C••500 controller.

In this case, to open the Diagnostic menu, proceed as follows:

Number	Key combination	Press and hold for 3 seconds
4 + 5	LEFT+DOWN	Open Diagnostic menu

To return to the HMI menu of the controller application, open the “HMI Management” page, move the cursor onto the  symbol and press the **OK** key.

First Power On

When the remote display is powered-on for the first time, SYSTEM INFO pages are displayed showing system status.

SYSTEM INFO

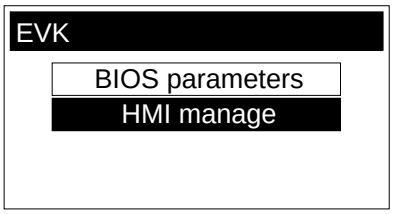
HW : version 1.0
BIOS : Msk476_18
DATE : 04/08/17
BOOT : Msk450_07

If present, the HMI menu from the controller application is displayed. If not present, the diagnostic menu is displayed.

Diagnostic Menu

Overview

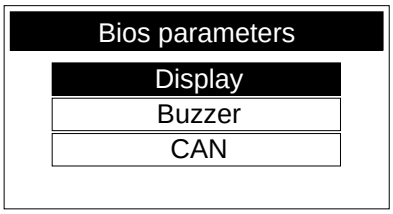
The Diagnostic menu of the EPK•10000000 remote display allows you to manage system parameters (BIOS parameters) and the interface (HMI Management).



The Diagnostic menu is composed by 2 sub-menus:

- BIOS parameters, page 99
- HMI Management, page 100

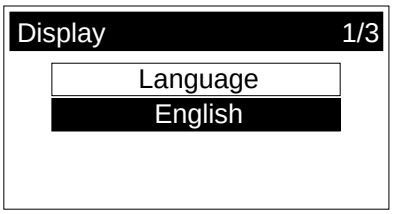
BIOS Parameters



The BIOS parameters menu permits you to:

- configure the display:
  - the language of the Diagnostic menu (Page 1/3),
  - the LCD contrast (Page 2/3),
  - the backlight time (Page 3/3)
- configure the buzzer activation on key press
- configure the CAN settings of the remote display:
  - CAN address (Page 1/2),
  - CAN baud rate (Page 2/2),

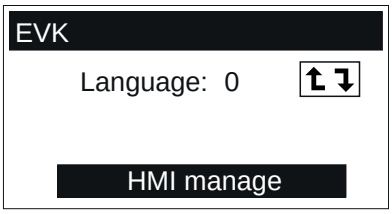
To change the language of the Diagnostic menu:

Step	Action
1	From **BIOS parameters** page, select **Display** and press **OK** key.
2	In **Display page (1/3)**, press **OK** key:  Language is in edit mode.
3	Press **UP**/**DOWN** keys to select the new language. The Diagnostic menu can be displayed in 5 languages: Italian, English, French, German, and Spanish.
4	Press **OK** key to validate the new language.
5	Press **EXIT** key to return to **BIOS parameters** menu.

See parameter HMI Management/**Hmi_Language**, page 137.

HMI Management

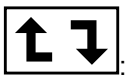
The first HMI Management page shows:



The first HMI Management page permits you to:

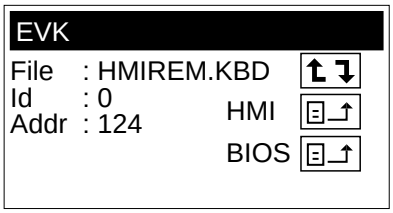
- Change the language of the HMI menu:

Step	Action
1	Select the language number and press **OK** key.
2	Press **UP**/**DOWN** keys to select the new language. The Diagnostic menu can be displayed in 5 languages: 0 = Italian, 1 = English, 2 = French, 3 = German, and 4 = Spanish.
3	Press **OK** key to validate the new language.

- : Relaunch the HMI menu in the new selected language, page 101.
- **HMI manage**: Go to the Advanced HMI Management page, page 100.

Advanced HMI Management

The Advanced HMI Management page shows the configuration of the remote display:



The Advanced HMI Management page permits you to:

File :	Launch the HMI menu stored in the remote display, if present, page 101.
HMI :	Upload HMI menu from the controller, page 102.
BIOS :	Upload BIOS from the controller, page 102.

NOTE: If the symbol

⚠ CanOpen

appears at the bottom left of the screen, refer to EPK•10000000 Troubleshooting description, page 103.

How to launch the HMI Menu

To launch the HMI menu stored in the remote display, select and press **OK** in one of the following page:

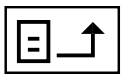
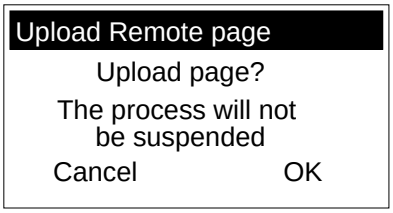
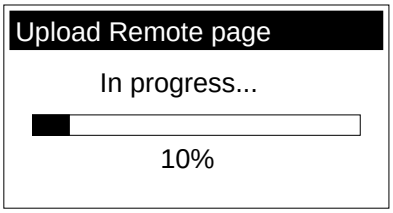
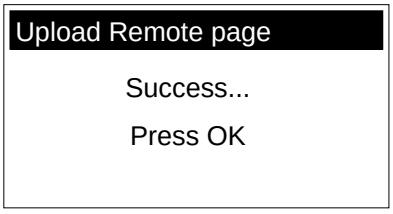
- First HMI Management, page 100
- Advanced HMI Management, page 100

Result: The remote display shows the starting page of the HMI menu (previously uploaded).

NOTE: If the controller is not in RUN state, the variable fields only display “???”.

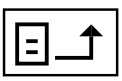
How to Upload HMI menu from the Controller

To upload HMI menu from the controller:

Step	Action
1	From **Advanced HMI Management** page, select **File** and press **OK** key to toggle between: • **HMIREM.KBD**: different HMI menu in remote display and controller • **HMIIEC.COD**: same HMI menu in remote display and controller
2	Select **HMI :**  icon and press **OK** key.
3	 Press **UP**/**DOWN** keys to select **OK** and. press **OK** key to validate.
4	Wait during the upload. 
5	If no error is detected, a confirmation message appears:  Press **OK** key to validate and return to **HMI Management** page.

How to Upload BIOS from the controller

To upload BIOS from the controller:

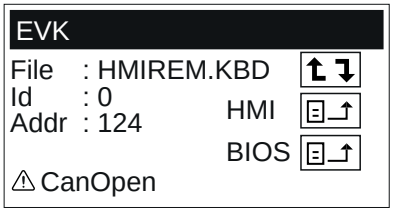
Step	Action
1	From **HMI Management** page, select **BIOS :**  icon and press **OK** key.
2	Press **UP**/**DOWN** keys to select **OK** and press **OK** key to validate.
3	Wait during the upload.
4	If no error are detected, a confirmation message appears. Press **OK** key to validate and return to **HMI Management** page.

EPK•10000000 Troubleshooting

Troubleshooting

In the Diagnostic menu, the HMI Management page shows the configuration of the EPK•10000000 remote display.

If a CAN communication error is detected, a symbol if displayed at the bottom left of the screen:



If occurs, check the communication configuration of the remote display, page 99 and the communication wiring, page 96.

Parameters

What's in This Part

Overview 105
Controller Parameter Table 107
EP4000000B00 Expansion Module Parameters Table 123
EP4S00••V500 Expansion Module Parameters Table 128
EPK•10000000 Parameters Table 137

Overview

Overview

Parameters are used to configure a EWCM 9000 PRO (HF) Logic Controller.

They can be modified with:

- Keys on:
  - EPB•••C••500 front panel
- PC with FREE Studio Plus
- Modbus SL communication

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

After any BIOS parameter modification, power cycle the device.

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

Modbus Commands and Data Areas

The following commands are implemented:

Modbus command	Description
3 (3_h)	Read multiple registers on Client side
6 (6_h)	Write single register on Client side
16 (10_h)	Write multiple registers on Client side
43 ($2B_h$)	Read Device Identification: • Vendor name • Product code • Major/minor revision

Parameters Tables

The three following tables list all information required to read, write, and decode all accessible resources in the device.

- Controller Parameter table, page 107
- Expansion Module Parameters table, page 123
- Display Parameter table, page 137

Description of columns:

Column	Description
LABEL	Indicates the label used to display the parameters in the device menu.
ADDRESS	Indicates the address of the Modbus register containing the resource to access.
DATA TYPE	Type of Data as indicated in FREE Studio Plus Installer.
CPL	When the field indicates “-1”, the value read by the register requires conversion because the value represents a number with a sign. In the other cases, the value is always positive or null. To carry out the conversion, proceed as follows: • If the value in the register is from 0 to 32767, the result is the value itself (zero and positive values). • If the value in the register is from 32768 to 65535, the result is the value of the register - 65536 (negative values).
RESET	Indicates whether the controller must be rebooted after the parameter has been modified. • Y = the controller must be rebooted to modify the parameter. • Empty "-" = the controller does not need to be rebooted to modify the parameter.
DESCRIP-TION	Description of the parameter usage.
RANGE	Describes the interval of values that can be assigned to the parameter. It can be correlated with other equipment parameters (indicated in the parameter label).
DEFAULT	Indicates the factory setting for the reference of the device.
U.M.	Indicates the unit of measurement for values converted according to the rules indicated in the CPL column. The unit of measurement shown is for example purposes only, as it may change depending on the application (for example, parameters with a U.M. in °C/bar could also have %RH.)

Controller Parameter Table

Folders

NOTE: Not all parameters listed are available depending on the accessible resources in the device.

The following tables present the controller parameters, divided into categories (folders):

Folder label
Acknowledgment, page 107
AI Calibration, page 108
AO Calibration, page 107
Analog Inputs - Base Board, page 113
Analog Inputs - Upper Board, page 115
ON Board **RS485-1**, page 116
ON Board **RS485-2**, page 117
ON Board CAN Expansion bus, page 118
RS-485 Passive Communication Module, page 118
CAN Expansion bus Passive Communication Module , page 119
RS-232 Passive Communication Module, page 119
Ethernet, page 120
Display, page 121
BACnet, page 121
FileSystem, page 121
Miscellaneous, page 122

Acknowledgment Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Par_TAB	15716	UINT	-	Y	Map code **NOTE:** RW parameter	0…65535	0	Num
Par_POLI	15717	UINT	-	Y	Model code **NOTE:** RW parameter	0…65535	1031	Num
Par_PCH	15718	UINT	-	-	Model code	0…65535	322	Num
Par_PARMOD	15719	BOOL	-	-	Parameter modified Flag indicating change to default setting: • 0 (false): map not modified • 1 (true): at least one parameter has been modified with respect to the original configuration	0, 1	0	Num

1025

AI Calibration Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Gain_10V_AI1	15527	UINT	-	-	0…10 V Calibration gain AI1	0…65535	32768	Num
Gain_10V_AI10	15590	UINT	-	-	0…10 V Calibration gain AI10	0…65535	32768	Num
Gain_10V_AI11	15597	UINT	-	-	0…10 V Calibration gain AI11	0…65535	32768	Num
Gain_10V_AI12	15604	UINT	-	-	0…10 V Calibration gain AI12	0…65535	32768	Num
Gain_10V_AI2	15534	UINT	-	-	0…10 V Calibration gain AI2	0…65535	32768	Num
Gain_10V_AI3	15541	UINT	-	-	0…10 V Calibration gain AI3	0…65535	32768	Num
Gain_10V_AI4	15548	UINT	-	-	0…10 V Calibration gain AI4	0…65535	32768	Num
Gain_10V_AI5	15555	UINT	-	-	0…10 V Calibration gain AI5	0…65535	32768	Num
Gain_10V_AI6	15562	UINT	-	-	0…10 V Calibration gain AI6	0…65535	32768	Num
Gain_10V_AI7	15569	UINT	-	-	0…10 V Calibration gain AI7	0…65535	32768	Num
Gain_10V_AI8	15576	UINT	-	-	0…10 V Calibration gain AI8	0…65535	32768	Num
Gain_10V_AI9	15583	UINT	-	-	0…10 V Calibration gain AI9	0…65535	32768	Num
Gain_5V_AI1	15526	UINT	-	-	0…5 V Calibration gain AI1	0…65535	32768	Num
Gain_5Vr_AI1	15529	UINT	-	-	0…5 $V_{ratiometric}$ Calibration gain AI1	0…65535	32768	Num
Gain_5V_AI10	15589	UINT	-	-	0…5 V Calibration gain AI10	0…65535	32768	Num
Gain_5Vr_AI10	15592	UINT	-	-	0…5 $V_{ratiometric}$ Calibration gain AI10	0…65535	32768	Num
Gain_5V_AI11	15596	UINT	-	-	0…5 V Calibration gain AI11	0…65535	32768	Num
Gain_5Vr_AI11	15599	UINT	-	-	0…5 $V_{ratiometric}$ Calibration gain AI11	0…65535	32768	Num
Gain_5V_AI12	15603	UINT	-	-	0…5 V Calibration gain AI12	0…65535	32768	Num
Gain_5Vr_AI12	15606	UINT	-	-	0…5 $V_{ratiometric}$ Calibration gain AI12	0…65535	32768	Num
Gain_5V_AI2	15533	UINT	-	-	0…5 V Calibration gain AI2	0…65535	32768	Num
Gain_5Vr_AI2	15536	UINT	-	-	0…5 $V_{ratiometric}$ Calibration gain AI2	0…65535	32768	Num
Gain_5V_AI3	15540	UINT	-	-	0…5 V Calibration gain AI3	0…65535	32768	Num
Gain_5Vr_AI3	15543	UINT	-	-	0…5 $V_{ratiometric}$ Calibration gain AI3	0…65535	32768	Num
Gain_5V_AI4	15547	UINT	-	-	0…5 V Calibration gain AI4	0…65535	32768	Num
Gain_5Vr_AI4	15550	UINT	-	-	0…5 $V_{ratiometric}$ Calibration gain AI4	0…65535	32768	Num
Gain_5V_AI5	15554	UINT	-	-	0…5 V Calibration gain AI5	0…65535	32768	Num
Gain_5Vr_AI5	15557	UINT	-	-	0…5 $V_{ratiometric}$ Calibration gain AI5	0…65535	32768	Num
Gain_5V_AI6	15561	UINT	-	-	0…5 V Calibration gain AI6	0…65535	32768	Num
Gain_5Vr_AI6	15564	UINT	-	-	0…5 $V_{ratiometric}$ Calibration gain AI6	0…65535	32768	Num
Gain_5V_AI7	15568	UINT	-	-	0…5 V Calibration gain AI7	0…65535	32768	Num
Gain_5Vr_AI7	15571	UINT	-	-	0…5 $V_{ratiometric}$ Calibration gain AI7	0…65535	32768	Num
Gain_5V_AI8	15575	UINT	-	-	0…5 V Calibration gain AI8	0…65535	32768	Num
Gain_5Vr_AI8	15578	UINT	-	-	0…5 $V_{ratiometric}$ Calibration gain AI8	0…65535	32768	Num
Gain_5V_AI9	15582	UINT	-	-	0…5 V Calibration gain AI9	0…65535	32768	Num
Gain_5Vr_AI9	15585	UINT	-	-	0…5 $V_{ratiometric}$ Calibration gain AI9	0…65535	32768	Num
Gain_mA_AI1	15528	UINT	-	-	0/4…20 mA Calibration gain AI1	0…65535	32768	Num
Gain_mA_AI10	15591	UINT	-	-	0/4…20 mA Calibration gain AI10	0…65535	32768	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Gain_mA_AI11	15598	UINT	-	-	0/4…20 mA Calibration gain AI11	0…65535	32768	Num
Gain_mA_AI12	15605	UINT	-	-	0/4…20 mA Calibration gain AI12	0…65535	32768	Num
Gain_mA_AI2	15535	UINT	-	-	0/4…20 mA Calibration gain AI2	0…65535	32768	Num
Gain_mA_AI3	15542	UINT	-	-	0/4…20 mA Calibration gain AI3	0…65535	32768	Num
Gain_mA_AI4	15549	UINT	-	-	0/4…20 mA Calibration gain AI4	0…65535	32768	Num
Gain_mA_AI5	15556	UINT	-	-	0/4…20 mA Calibration gain AI5	0…65535	32768	Num
Gain_mA_AI6	15563	UINT	-	-	0/4…20 mA Calibration gain AI6	0…65535	32768	Num
Gain_mA_AI7	15570	UINT	-	-	0/4…20 mA Calibration gain AI7	0…65535	32768	Num
Gain_mA_AI8	15577	UINT	-	-	0/4…20 mA Calibration gain AI8	0…65535	32768	Num
Gain_mA_AI9	15584	UINT	-	-	0/4…20 mA Calibration gain AI9	0…65535	32768	Num
Gain_Ntc_AI1	15524	UINT	-	-	NTC Calibration gain AI1	0…65535	32768	Num
Gain_Ntc_AI10	15587	UINT	-	-	NTC Calibration gain AI10	0…65535	32768	Num
Gain_Ntc_AI11	15594	UINT	-	-	NTC Calibration gain AI11	0…65535	32768	Num
Gain_Ntc_AI12	15601	UINT	-	-	NTC Calibration gain AI12	0…65535	32768	Num
Gain_Ntc_AI2	15531	UINT	-	-	NTC Calibration gain AI2	0…65535	32768	Num
Gain_Ntc_AI3	15538	UINT	-	-	NTC Calibration gain AI3	0…65535	32768	Num
Gain_Ntc_AI4	15545	UINT	-	-	NTC Calibration gain AI4	0…65535	32768	Num
Gain_Ntc_AI5	15552	UINT	-	-	NTC Calibration gain AI5	0…65535	32768	Num
Gain_Ntc_AI6	15559	UINT	-	-	NTC Calibration gain AI6	0…65535	32768	Num
Gain_Ntc_AI7	15566	UINT	-	-	NTC Calibration gain AI7	0…65535	32768	Num
Gain_Ntc_AI8	15573	UINT	-	-	NTC Calibration gain AI8	0…65535	32768	Num
Gain_Ntc_AI9	15580	UINT	-	-	NTC Calibration gain AI9	0…65535	32768	Num
Gain_Pt1000_AI1	15525	UINT	-	-	Pt1000 Calibration gain AI1	0…65535	32768	Num
Gain_Pt1000_AI10	15588	UINT	-	-	Pt1000 Calibration gain AI10	0…65535	32768	Num
Gain_Pt1000_AI11	15595	UINT	-	-	Pt1000 Calibration gain AI11	0…65535	32768	Num
Gain_Pt1000_AI12	15602	UINT	-	-	Pt1000 Calibration gain AI12	0…65535	32768	Num
Gain_Pt1000_AI2	15532	UINT	-	-	Pt1000 Calibration gain AI2	0…65535	32768	Num
Gain_Pt1000_AI3	15539	UINT	-	-	Pt1000 Calibration gain AI3	0…65535	32768	Num
Gain_Pt1000_AI4	15546	UINT	-	-	Pt1000 Calibration gain AI4	0…65535	32768	Num
Gain_Pt1000_AI5	15553	UINT	-	-	Pt1000 Calibration gain AI5	0…65535	32768	Num
Gain_Pt1000_AI6	15560	UINT	-	-	Pt1000 Calibration gain AI6	0…65535	32768	Num
Gain_Pt1000_AI7	15567	UINT	-	-	Pt1000 Calibration gain AI7	0…65535	32768	Num
Gain_Pt1000_AI8	15574	UINT	-	-	Pt1000 Calibration gain AI8	0…65535	32768	Num
Gain_Pt1000_AI9	15581	UINT	-	-	Pt1000 Calibration gain AI9	0…65535	32768	Num
Gain_PTC_AI1	15530	UINT	-	-	PTC Calibration gain AI1	0…65535	32768	Num
Gain_PTC_AI10	15593	UINT	-	-	PTC Calibration gain AI10	0…65535	32768	Num
Gain_PTC_AI11	15600	UINT	-	-	PTC Calibration gain AI11	0…65535	32768	Num
Gain_PTC_AI12	15607	UINT	-	-	PTC Calibration gain AI12	0…65535	32768	Num
Gain_PTC_AI2	15537	UINT	-	-	PTC Calibration gain AI2	0…65535	32768	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Gain_PTC_AI3	15544	UINT	-	-	PTC Calibration gain AI3	0…65535	32768	Num
Gain_PTC_AI4	15551	UINT	-	-	PTC Calibration gain AI4	0…65535	32768	Num
Gain_PTC_AI5	15558	UINT	-	-	PTC Calibration gain AI5	0…65535	32768	Num
Gain_PTC_AI6	15565	UINT	-	-	PTC Calibration gain AI6	0…65535	32768	Num
Gain_PTC_AI7	15572	UINT	-	-	PTC Calibration gain AI7	0…65535	32768	Num
Gain_PTC_AI8	15579	UINT	-	-	PTC Calibration gain AI8	0…65535	32768	Num
Gain_PTC_AI9	15586	UINT	-	-	PTC Calibration gain AI9	0…65535	32768	Num
Offs_Ntc_AI1	15608	INT	-1	-	NTC Calibration offset AI1	-32768…32767	0	Num
Offs_Pt1000_AI1	15609	INT	-1	-	Pt1000 Calibration offset AI1	-32768…32767	0	Num
Offs_5V_AI1	15610	INT	-1	-	0…5 V Calibration offset AI1	-32768…32767	0	Num
Offs_10V_AI1	15611	INT	-1	-	0…10 V Calibration offset AI1	-32768…32767	0	Num
Offs_mA_AI1	15612	INT	-1	-	0/4…20 mA Calibration offset AI1	-32768…32767	0	Num
Offs_5Vr_AI1	15613	INT	-1	-	0…5 $V_{ratiometric}$ Calibration offset AI1	-32768…32767	0	Num
Offs_PTC_AI1	15614	INT	-1	-	PTC Calibration offset AI1	-32768…32767	0	Num
Offs_Ntc_AI2	15615	INT	-1	-	NTC Calibration offset AI2	-32768…32767	0	Num
Offs_Pt1000_AI2	15616	INT	-1	-	Pt1000 Calibration offset AI2	-32768…32767	0	Num
Offs_5V_AI2	15617	INT	-1	-	0…5 V Calibration offset AI2	-32768…32767	0	Num
Offs_10V_AI2	15618	INT	-1	-	0…10 V Calibration offset AI2	-32768…32767	0	Num
Offs_mA_AI2	15619	INT	-1	-	0/4…20 mA Calibration offset AI2	-32768…32767	0	Num
Offs_5Vr_AI2	15620	INT	-1	-	0…5 $V_{ratiometric}$ Calibration offset AI2	-32768…32767	0	Num
Offs_PTC_AI2	15621	INT	-1	-	PTC Calibration offset AI2	-32768…32767	0	Num
Offs_Ntc_AI3	15622	INT	-1	-	NTC Calibration offset AI3	-32768…32767	0	Num
Offs_Pt1000_AI3	15623	INT	-1	-	Pt1000 Calibration offset AI3	-32768…32767	0	Num
Offs_5V_AI3	15624	INT	-1	-	0…5 V Calibration offset AI3	-32768…32767	0	Num
Offs_10V_AI3	15625	INT	-1	-	0…10 V Calibration offset AI3	-32768…32767	0	Num
Offs_mA_AI3	15626	INT	-1	-	0/4…20 mA Calibration offset AI3	-32768…32767	0	Num
Offs_5Vr_AI3	15627	INT	-1	-	0…5 $V_{ratiometric}$ Calibration offset AI3	-32768…32767	0	Num
Offs_PTC_AI3	15628	INT	-1	-	PTC Calibration offset AI3	-32768…32767	0	Num
Offs_Ntc_AI4	15629	INT	-1	-	NTC Calibration offset AI4	-32768…32767	0	Num
Offs_Pt1000_AI4	15630	INT	-1	-	Pt1000 Calibration offset AI4	-32768…32767	0	Num
Offs_5V_AI4	15631	INT	-1	-	0…5 V Calibration offset AI4	-32768…32767	0	Num
Offs_10V_AI4	15632	INT	-1	-	0…10 V Calibration offset AI4	-32768…32767	0	Num
Offs_mA_AI4	15633	INT	-1	-	0/4…20 mA Calibration offset AI4	-32768…32767	0	Num
Offs_5Vr_AI4	15634	INT	-1	-	0…5 $V_{ratiometric}$ Calibration offset AI4	-32768…32767	0	Num
Offs_PTC_AI4	15635	INT	-1	-	PTC Calibration offset AI4	-32768…32767	0	Num
Offs_Ntc_AI5	15636	INT	-1	-	NTC Calibration offset AI5	-32768…32767	0	Num
Offs_Pt1000_AI5	15637	INT	-1	-	Pt1000 Calibration offset AI5	-32768…32767	0	Num
Offs_5V_AI5	15638	INT	-1	-	0…5 V Calibration offset AI5	-32768…32767	0	Num
Offs_10V_AI5	15639	INT	-1	-	0…10 V Calibration offset AI5	-32768…32767	0	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Offs_mA_AI5	15640	INT	-1	-	0/4…20 mA Calibration offset AI5	-32768…32767	0	Num
Offs_5Vr_AI5	15641	INT	-1	-	0…5 $V_{ratiometric}$ Calibration offset AI5	-32768…32767	0	Num
Offs_PTC_AI5	15642	INT	-1	-	PTC Calibration offset AI5	-32768…32767	0	Num
Offs_Ntc_AI6	15643	INT	-1	-	NTC Calibration offset AI6	-32768…32767	0	Num
Offs_Pt1000_AI6	15644	INT	-1	-	Pt1000 Calibration offset AI6	-32768…32767	0	Num
Offs_5V_AI6	15645	INT	-1	-	0…5 V Calibration offset AI6	-32768…32767	0	Num
Offs_10V_AI6	15646	INT	-1	-	0…10 V Calibration offset AI6	-32768…32767	0	Num
Offs_mA_AI6	15647	INT	-1	-	0/4…20 mA Calibration offset AI6	-32768…32767	0	Num
Offs_5Vr_AI6	15648	INT	-1	-	0…5 $V_{ratiometric}$ Calibration offset AI6	-32768…32767	0	Num
Offs_PTC_AI6	15649	INT	-1	-	PTC Calibration offset AI6	-32768…32767	0	Num
Offs_Ntc_AI7	15650	INT	-1	-	NTC Calibration offset AI7	-32768…32767	0	Num
Offs_Pt1000_AI7	15651	INT	-1	-	Pt1000 Calibration offset AI7	-32768…32767	0	Num
Offs_5V_AI7	15652	INT	-1	-	0…5 V Calibration offset AI7	-32768…32767	0	Num
Offs_10V_AI7	15653	INT	-1	-	0…10 V Calibration offset AI7	-32768…32767	0	Num
Offs_mA_AI7	15654	INT	-1	-	0/4…20 mA Calibration offset AI7	-32768…32767	0	Num
Offs_5Vr_AI7	15655	INT	-1	-	0…5 $V_{ratiometric}$ Calibration offset AI7	-32768…32767	0	Num
Offs_PTC_AI7	15656	INT	-1	-	PTC Calibration offset AI7	-32768…32767	0	Num
Offs_Ntc_AI8	15657	INT	-1	-	NTC Calibration offset AI8	-32768…32767	0	Num
Offs_Pt1000_AI8	15658	INT	-1	-	Pt1000 Calibration offset AI8	-32768…32767	0	Num
Offs_5V_AI8	15659	INT	-1	-	0…5 V Calibration offset AI8	-32768…32767	0	Num
Offs_10V_AI8	15660	INT	-1	-	0…10 V Calibration offset AI8	-32768…32767	0	Num
Offs_mA_AI8	15661	INT	-1	-	0/4…20 mA Calibration offset AI8	-32768…32767	0	Num
Offs_5Vr_AI8	15662	INT	-1	-	0…5 $V_{ratiometric}$ Calibration offset AI8	-32768…32767	0	Num
Offs_PTC_AI8	15663	INT	-1	-	PTC Calibration offset AI8	-32768…32767	0	Num
Offs_Ntc_AI9	15664	INT	-1	-	NTC Calibration offset AI9	-32768…32767	0	Num
Offs_Pt1000_AI9	15665	INT	-1	-	Pt1000 Calibration offset AI9	-32768…32767	0	Num
Offs_5V_AI9	15666	INT	-1	-	0…5 V Calibration offset AI9	-32768…32767	0	Num
Offs_10V_AI9	15667	INT	-1	-	0…10 V Calibration offset AI9	-32768…32767	0	Num
Offs_mA_AI9	15668	INT	-1	-	0/4…20 mA Calibration offset AI9	-32768…32767	0	Num
Offs_5Vr_AI9	15669	INT	-1	-	0…5 $V_{ratiometric}$ Calibration offset AI9	-32768…32767	0	Num
Offs_PTC_AI9	15670	INT	-1	-	PTC Calibration offset AI9	-32768…32767	0	Num
Offs_Ntc_AI10	15671	INT	-1	-	NTC Calibration offset AI10	-32768…32767	0	Num
Offs_Pt1000_AI10	15672	INT	-1	-	Pt1000 Calibration offset AI10	-32768…32767	0	Num
Offs_5V_AI10	15673	INT	-1	-	0…5 V Calibration offset AI10	-32768…32767	0	Num
Offs_10V_AI10	15674	INT	-1	-	0…10 V Calibration offset AI10	-32768…32767	0	Num
Offs_mA_AI10	15675	INT	-1	-	0/4…20 mA Calibration offset AI10	-32768…32767	0	Num
Offs_5Vr_AI10	15676	INT	-1	-	0…5 $V_{ratiometric}$ Calibration offset AI10	-32768…32767	0	Num
Offs_PTC_AI10	15677	INT	-1	-	PTC Calibration offset AI10	-32768…32767	0	Num
Offs_Ntc_AI11	15678	INT	-1	-	NTC Calibration offset AI11	-32768…32767	0	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Offs_Pt1000_AI11	15679	INT	-1	-	Pt1000 Calibration offset AI11	-32768…32767	0	Num
Offs_5V_AI11	15680	INT	-1	-	0…5 V Calibration offset AI11	-32768…32767	0	Num
Offs_10V_AI11	15681	INT	-1	-	0…10 V Calibration offset AI11	-32768…32767	0	Num
Offs_mA_AI11	15682	INT	-1	-	0/4…20 mA Calibration offset AI11	-32768…32767	0	Num
Offs_5Vr_AI11	15683	INT	-1	-	0…5 $V_{ratiometric}$ Calibration offset AI11	-32768…32767	0	Num
Offs_PTC_AI11	15684	INT	-1	-	PTC Calibration offset AI11	-32768…32767	0	Num
Offs_Ntc_AI12	15685	INT	-1	-	NTC Calibration offset AI12	-32768…32767	0	Num
Offs_Pt1000_AI12	15686	INT	-1	-	Pt1000 Calibration offset AI12	-32768…32767	0	Num
Offs_5V_AI12	15687	INT	-1	-	0…5 V Calibration offset AI12	-32768…32767	0	Num
Offs_10V_AI12	15688	INT	-1	-	0…10 V Calibration offset AI12	-32768…32767	0	Num
Offs_mA_AI12	15689	INT	-1	-	0/4…20 mA Calibration offset AI12	-32768…32767	0	Num
Offs_5Vr_AI12	15690	INT	-1	-	0…5 $V_{ratiometric}$ Calibration offset AI12	-32768…32767	0	Num
Offs_PTC_AI12	15691	INT	-1	-	PTC Calibration offset AI12	-32768…32767	0	Num

AO Calibration Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Gain_10V_AO1	15692	UINT	-	-	0…10 V Calibration gain AO1	0…65535	3276-8	Num
Gain_10V_AO2	15694	UINT	-	-	0…10 V Calibration gain AO2	0…65535	3276-8	Num
Gain_10V_AO3	15696	UINT	-	-	0…10 V Calibration gain AO3	0…65535	3276-8	Num
Gain_10V_AO4	15698	UINT	-	-	0…10 V Calibration gain AO4	0…65535	3276-8	Num
Gain_10V_AO5	15700	UINT	-	-	0…10 V Calibration gain AO5	0…65535	3276-8	Num
Gain_10V_AO6	15702	UINT	-	-	0…10 V Calibration gain AO6	0…65535	3276-8	Num
Gain_mA_AO1	-	-	-	-	Not used	-	-	-
Gain_mA_AO2	-	-	-	-	Not used	-	-	-
Gain_mA_AO3	15697	UINT	-	-	0/4…20 mA Calibration gain AO3	0…65535	3276-8	Num
Gain_mA_AO4	15699	UINT	-	-	0/4…20 mA Calibration gain AO4	0…65535	3276-8	Num
Gain_mA_AO5	-	-	-	-	Not used	-	-	-
Gain_mA_AO6	-	-	-	-	Not used	-	-	-
Offs_10V_AO1	15704	INT	-1	-	0…10 V Calibration offset AO1	-32768…32767	0	Num
Offs_mA_AO1	15705	INT	-1	-	0/4…20 mA Calibration offset AO1	-32768…32767	0	Num
Offs_10V_AO2	15706	INT	-1	-	0…10 V Calibration offset AO2	-32768…32767	0	Num
Offs_mA_AO2	15707	INT	-1	-	0/4…20 mA Calibration offset AO2	-32768…32767	0	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Offs_10V_AO3	15708	INT	-1	-	0…10 V Calibration offset AO3	-32768…32767	0	Num
Offs_mA_AO3	15709	INT	-1	-	0/4…20 mA Calibration offset AO3	-32768…32767	0	Num
Offs_10V_AO4	15710	INT	-1	-	0…10 V Calibration offset AO4	-32768…32767	0	Num
Offs_mA_AO4	15711	INT	-1	-	0/4…20 mA Calibration offset AO4	-32768…32767	0	Num
Offs_10V_AO5	15712	INT	-1	-	0…10 V Calibration offset AO5	-32768…32767	0	Num
Offs_mA_AO5	15713	INT	-1	-	0/4…20mA Calibration offset AO5	-32768…32767	0	Num
Offs_10V_AO6	15714	INT	-1	-	0…10V Calibration offset AO6	-32768…32767	0	Num
Offs_mA_AO6	15715	INT	-1	-	0/4…20mA Calibration offset AO6	-32768…32767	0	Num

Analog Inputs - Base Board Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Temp_UM	15725	Enum	-	-	Temperature unit of measurement • 0 = °C • 1 = °F	0, 1	0	Num
Cfg_Ai1	15726	Enum	-	-	Type of analog input Ai1 • 0 = NTC (NK103) • 1 = DI Input • 2 = NTC (103AT) • 3 = 4…20 mA • 4 = 0…10 V • 5 = 0…5 V (Ratiometric) • 6 = Pt1000 • 7 = hΩ (NTC) • 8 = daΩ (Pt1000) • 9 = PTC • 10 = 0…5 V • 11 = 0…20 mA	0…11	2	Num
Cfg_Ai2	15727	Enum	-	-	Type of analog input Ai2 See *Cfg_Ai1*	0…11	2	Num
Cfg_Ai3	15728	Enum	-	-	Type of analog input Ai3 See *Cfg_Ai1*	0…11	2	Num
Cfg_Ai4	15729	Enum	-	-	Type of analog input Ai4 See *Cfg_Ai1*	0…11	2	Num
Cfg_Ai5	15730	Enum	-	-	Type of analog input Ai5 See *Cfg_Ai1*	0…11	2	Num
Cfg_Ai6	15731	Enum	-	-	Type of analog input Ai6 See *Cfg_Ai1*	0…11	2	Num
Cfg_Ai7	16100	Enum	-	-	Type of analog input Ai7 See *Cfg_Ai1*	0…11	2	Num
Cfg_Ai8	16101	Enum	-	-	Type of analog input Ai8	0…11	2	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
					See *Cfg_Ai1*			
FullScaleMin_Ai1	15736	INT	-1	-	Analog input Ai1 start of scale value **NOTE:** Minimum full scale: for current probes, value at 4 mA, for 0…10 V voltage probes, value at 0 V, for ratiometric probes (0…5 V), value at 10% (corresponding to 0.5 V).	-9999…+9999	0	Num
FullScaleMax_Ai1	15737	INT	-1	-	Analog input Ai1 full scale value **NOTE:** Maximum full scale for current probes, value at 20 mA, for 0…10 V voltage probes, value at 10 V, for ratiometric probes (0…5 V), value at 90% (corresponding to 4.5 V).	-9999…+9999	1000	Num
FullScaleMin_Ai2	15738	INT	-1	-	Analog input Ai2 start of scale value See *FullScaleMin_Ai1*	-9999…+9999	0	Num
FullScaleMax_Ai2	15739	INT	-1	-	Analog input Ai2 full scale value See *FullScaleMax_Ai1*	-9999…+9999	1000	Num
FullScaleMin_Ai3	15740	INT	-1	-	Analog input Ai3 start of scale value See *FullScaleMin_Ai1*	-9999…+9999	0	Num
FullScaleMax_Ai3	15741	INT	-1	-	Analog input Ai3 full scale value See *FullScaleMax_Ai1*	-9999…+9999	1000	Num
FullScaleMin_Ai4	15742	INT	-1	-	Analog input Ai4 start of scale value See *FullScaleMin_Ai1*	-9999…+9999	0	Num
FullScaleMax_Ai4	15743	INT	-1	-	Analog input Ai4 full scale value See *FullScaleMax_Ai1*	-9999…+9999	1000	Num
FullScaleMin_Ai5	15744	INT	-1	-	Analog input Ai5 start of scale value See *FullScaleMin_Ai1*	-9999…+9999	0	Num
FullScaleMax_Ai5	15745	INT	-1	-	Analog input Ai5 full scale value See *FullScaleMax_Ai1*	-9999…+9999	1000	Num
FullScaleMin_Ai6	15746	INT	-1	-	Analog input Ai6 start of scale value See *FullScaleMin_Ai1*	-9999…+9999	0	Num
FullScaleMaxAi6	15747	INT	-1	-	Analog input Ai6 full scale value See *FullScaleMax_Ai1*	-9999…+9999	1000	Num
FullScaleMin_Ai7	16106	INT	-1	-	Analog input Ai7 start of scale value See *FullScaleMin_Ai1*	-9999…+9999	0	Num
FullScaleMax_Ai7	16107	INT	-1	-	Analog input Ai7 full scale value See *FullScaleMax_Ai1*	-9999…+9999	1000	Num
FullScaleMin_Ai8	16108	INT	-1	-	Analog input Ai8 start of scale value See *FullScaleMin_Ai1*	-9999…+9999	0	Num
FullScaleMaxAi8	16109	INT	-1	-	Analog input Ai8 full scale value See *FullScaleMax_Ai1*	-9999…+9999	1000	Num
Calibration_Ai1	15748	INT	-1	-	Analog input Ai1 differential	-1000…1000	0	Digit
Calibration_Ai2	15749	INT	-1	-	Analog input Ai2 differential	-1000…1000	0	Digit

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Calibration_Ai3	15750	INT	-1	-	Analog input Ai3 differential	-1000…1000	0	Digit
Calibration_Ai4	15751	INT	-1	-	Analog input Ai4 differential	-1000…1000	0	Digit
Calibration_Ai5	15752	INT	-1	-	Analog input Ai5 differential	-1000…1000	0	Digit
Calibration_Ai6	15753	INT	-1	-	Analog input Ai6 differential	-1000…1000	0	Digit
Calibration_Ai7	16118	INT	-1	-	Analog input Ai7 differential	-1000…1000	0	Digit
Calibration_Ai8	16119	INT	-1	-	Analog input Ai8 differential	-1000…1000	0	Digit
Cfg_AO3	15758	Enum	-	-	Type of analog output AO3 • 0 = current modulation • 1 = current ON/OFF • 2 = voltage modulation • 3 = PWM mode	0…3	0	Num
Cfg_AO4	15759	Enum	-	-	Type of analog output AO4 See *Cfg_AO3*	0…3	0	Num
PWM_frequency_AO3_AO4	15769	UINT	-	Y	PWM Frequency for AO3 and AO4 in PWM mode	0…2000	1000	Hz
PWM_polarity_AO3_AO4	15770	UINT	-	-	PWM Polarity for AO3 and AO4 in PWM mode: 1 = direct,0 = reversed	0, 1	1	Num

Analog Inputs - Upper Board Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Cfg_Ai9	16102	Enum	-	-	Type of analog input Ai9 • 0 = NTC (NK103) • 1 = DI Input • 2 = NTC (103AT) • 3 = 4…20 mA • 4 = 0…10 V • 5 = 0…5 V (Ratiometric) • 6 = Pt1000 • 7 = hΩ (NTC) • 8 = daΩ (Pt1000) • 9 = PTC • 10 = 0…5 V • 11 = 0…20 mA	0…11	3	Num
Cfg_Ai10	16103	Enum	-	-	Type of analog input Ai10 See *Cfg_Ai1*	0…11	3	Num
Cfg_Ai11	16104	Enum	-	-	Type of analog input Ai11 See *Cfg_Ai1*	0…11	3	Num
Cfg_Ai12	16105	Enum	-	-	Type of analog input Ai12 See *Cfg_Ai1*	0…11	3	Num
FullScaleMin_Ai9	16110	INT	-1	-	Analog input Ai9 start of scale value	-9999…+9999	0	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
					NOTE: Minimum full scale: for current probes, value at 4 mA, for 0…10 V voltage probes, value at 0 V, for ratiometric probes (0…5 V), value at 10% (corresponding to 0.5 V).			
FullScaleMax_Ai9	16111	INT	-1	-	Analog input Ai9 full scale value **NOTE:** Maximum full scale for current probes, value at 20 mA, for 0…10 V voltage probes, value at 10 V, for ratiometric probes (0…5 V), value at 90% (corresponding to 4.5 V).	-9999…+9999	1000	Num
FullScaleMin_Ai10	16112	INT	-1	-	Analog input Ai10 start of scale value See *FullScaleMin_Ai1*	-9999…+9999	0	Num
FullScaleMax_Ai10	16113	INT	-1	-	Analog input Ai10 full scale value See *FullScaleMax_Ai1*	-9999…+9999	1000	Num
FullScaleMin_Ai11	16114	INT	-1	-	Analog input Ai11 start of scale value See *FullScaleMin_Ai1*	-9999…+9999	0	Num
FullScaleMax_Ai11	16115	INT	-1	-	Analog input Ai11 full scale value See *FullScaleMax_Ai1*	-9999…+9999	1000	Num
FullScaleMin_Ai12	16116	INT	-1	-	Analog input Ai12 start of scale value See *FullScaleMin_Ai1*	-9999…+9999	0	Num
FullScaleMax_Ai12	16117	INT	-1	-	Analog input Ai12 full scale value See *FullScaleMax_Ai1*	-9999…+9999	1000	Num
Calibration_Ai9	16120	INT	-1	-	Analog input Ai9 differential	-1000…1000	0	Digit
Calibration_Ai10	16121	INT	-1	-	Analog input Ai10 differential	-1000…1000	0	Digit
Calibration_Ai11	16122	INT	-1	-	Analog input Ai11 differential	-1000…1000	0	Digit
Calibration_Ai12	16123	INT	-1	-	Analog input Ai12 differential	-1000…1000	0	Digit

ON Board RS485-1 Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Addr_RS485_OB1	16124	INT	-	Y	On-board RS-485 serial address	0... 255	1	Num
Proto_RS485_OB1	16125	Enum	-	Y	On-board RS-485 protocol selection • 2 = uNET • 3 = Modbus/RTU	2, 3	3	Num
Databit_RS485_OB1	16126	UINT	-	Y	On-board RS-485 data bit number Fixed setting 8	8	8	Num
Stopbit_RS485_OB1	16127	UINT	-	Y	On-board RS-485 stop bit number • 1 = 1 stop bit • 2 = 2 stop bit	1, 2	1	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Parity_RS485_OB1	16128	Enum	-	Y	On-board RS-485 protocol parity • 0 = NULL • 1 = ODD • 2 = EVEN	0…2	2	Num
Baud_RS485_OB1	16129	Enum	-	Y	On-board RS-485 protocol baudrate • 0 = 9600 baud • 1 = 19200 baud • 2 = 38400 baud • 3 = 57600 baud • 4 = 76800 baud • 5 = 115200 baud	0…5	2	Num

ON Board RS485-2 Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Addr_RS485_OB	15774	UINT	-	Y	On-board RS-485 serial address	0…255	1	Num
Proto_RS485_OB	15775	Enum	-	Y	On-board RS-485 protocol selection • 2 = uNET • 3 = Modbus/RTU	2, 3	3	Num
Databit_RS485_OB	15776	UINT	-	Y	On-board RS-485 data bit number Fixed setting 8	8	8	Num
Stopbit_RS485_OB	15777	UINT	-	Y	On-board RS-485 stop bit number • 1 = 1 stop bit • 2 = 2 stop bit	1, 2	1	Num
Parity_RS485_OB	15778	Enum	-	Y	On-board RS-485 protocol parity • 0 = NULL • 1 = ODD • 2 = EVEN	0…2	2	Num
Baud_RS485_OB	15779	Enum	-	Y	On-board RS-485 protocol baudrate • 0 = 9600 baud • 1 = 19200 baud • 2 = 38400 baud • 3 = 57600 baud • 4 = 76800 baud • 5 = 115200 baud			

ON Board CAN Expansion Bus Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Addr_CAN_OB	15780	UINT	-	Y	On-board CAN Expansion bus serial address	1…127	1	Num
Baud_CAN_OB	15781	Enum	-	Y	On-board CAN Expansion protocol baudrate • 2 = 500 Kb/s • 3 = 250 Kb/s • 4 = 125 Kb/s • 5 = 125 Kb/s • 6 = 50 Kb/s	2…6	2	Num

RS-485 Passive Communication Module Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Addr_RS485_PI	15782	UINT	-	Y	RS-485 Passive Communication Module serial address	0…255	1	Num
Proto_RS485_PI	15783	Enum	-	Y	RS-485 Passive Communication Module protocol selection • 2 = uNET • 3 = Modbus/RTU	2, 3	3	Num
Databit_RS485_PI	15784	UINT	-	Y	RS-485 Passive Communication Module data bit number Fixed setting 8	8	8	Num
Stopbit_RS485_PI	15785	UINT	-	Y	RS-485 Passive Communication Module stop bit number • 1 = 1 stop bit • 2 = 2 stop bit	1, 2	1	Num
Parity_RS485_PI	15786	Enum	-	Y	RS-485 Passive Communication Module protocol parity • 0 = NULL • 1 = ODD • 2 = EVEN	0…2	2	Num
Baud_RS485_PI	15787	Enum	-	Y	RS-485 Passive Communication Module protocol baudrate • 0 = 9600 baud • 1 = 19200 baud • 2 = 38400 baud • 3 = 57600 baud • 4 = 76800 baud • 5 = 115200 baud	0…5	2	Num

CAN Expansion Bus Passive Communication Module Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Addr_CAN_PI	15788	UINT	-	Y	CAN Expansion bus Passive Communication Module serial address	1…127	1	Num
Baud_CAN_PI	15789	Enum	-	Y	CAN Expansion bus Passive Communication Module protocol baudrate • 2 = 500 Kb/s • 3 = 250 Kb/s • 4 = 125 Kb/s • 5 = 125 Kb/s • 6 = 50 Kb/s	2…6	2	Num

RS-232 Passive Communication Module Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Addr_RS232_PI	15790	UINT	-	Y	RS-232 passive Communication Module serial address	0…255	1	Num
Proto_RS232_PI	15791	Enum	-	Y	RS-232 Passive Communication Module protocol selection • 2 = uNET • 3 = Modbus/RTU	2…3	3	Num
Databit_RS232_PI	15792	UINT	-	Y	RS-232 Passive Communication Module data bit number • 7 = 7 bit • 8 = 8 bit	7…8	8	Num
Stopbit_RS232_PI	15793	UINT	-	Y	RS-232 Passive Communication Module stop bit number • 1 = 1 stop bit • 2 = 2 stop bit	1…2	1	Num
Parity_RS232_PI	15784	Enum	-	Y	RS-232 Passive Communication Module protocol parity • 0 = NULL • 1 = ODD • 2 = EVEN	0…2	2	Num
Baud_RS232_PI	15795	Enum	-	Y	RS-232 Passive Communication Module protocol baudrate • 0 = 9600 baud • 1 = 19200 baud • 2 = 38400 baud • 3 = 57600 baud • 4 = 76800 baud • 5 = 115200 baud	0…5	2	Num

Ethernet Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Port_HTTP_PI	15796	UINT	-	Y	HTTP port HTTP communication Port number Default 0 corresponds to port 80	0…65535	0	Num
Port_ETH_PI	15797	UINT	-	Y	Port TCP/IP Modbus communication port.	0…65535	65535	Num
Ip_1_ETH_PI	15798	UINT	-	-	Ethernet passive Plug-in IP address (part 1)	0…255	10	Num
Ip_2_ETH_PI	15799	UINT	-	-	Ethernet passive Plug-in IP address (part 2)	0…255	0	Num
Ip_3_ETH_PI	15800	UINT	-	-	Ethernet passive Plug-in IP address (part 3)	0…255	0	Num
Ip_4_ETH_PI	15801	UINT	-	-	Ethernet passive Plug-in IP address (part 4)	0…255	100	Num
DefGtwy_1_ETH_PI	15802	UINT	-	-	Default gateway (part 1)	0…255	10	Num
DefGtwy_2_ETH_PI	15803	UINT	-	-	Default gateway (part 2)	0…255	0	Num
DefGtwy_3_ETH_PI	15804	UINT	-	-	Default gateway (part 3)	0…255	0	Num
DefGtwy_4_ETH_PI	15805	UINT	-	-	Default gateway (part 4)	0…255	1	Num
NetMsk_1_ETH_PI	15806	UINT	-	Y	Net mask (part 1)	0…255	255	Num
NetMsk_2_ETH_PI	15807	UINT	-	Y	Net mask (part 2)	0…255	255	Num
NetMsk_3_ETH_PI	15808	UINT	-	Y	Net mask (part 3)	0…255	255	Num
NetMsk_4_ETH_PI	15809	UINT	-	Y	Net mask (part 4)	0…255	0	Num
PriDNS_1_ETH_PI	15810	UINT	-	Y	Primary DNS server (part 1)	0…255	8	Num
PriDNS_2_ETH_PI	15811	UINT	-	Y	Primary DNS server (part 2)	0…255	8	Num
PriDNS_3_ETH_PI	15812	UINT	-	Y	Primary DNS server (part 3)	0…255	8	Num
PriDNS_4_ETH_PI	15813	UINT	-	Y	Primary DNS server (part 4)	0…255	8	Num
SecDNS_1_ETH_PI	15814	UINT	-	Y	Secondary DNS server (part 1)	0…255	8	Num
SecDNS_2_ETH_PI	15815	UINT	-	Y	Secondary DNS server (part 2)	0…255	8	Num
SecDNS_3_ETH_PI	15816	UINT	-	Y	Secondary DNS server (part 3)	0…255	4	Num
SecDNS_4_ETH_PI	15817	UINT	-	Y	Secondary DNS server (part 4)	0…255	4	Num
EnableDHCP_ETH_PI	15818	BOOL	-	Y	Enable DHCP 0 = False, 1 = True	0, 1	0	Flag
MAC_1_ETH_PI	16130	UINT	-	Y	MAC address (first part)	0	0	Num
MAC_2_ETH_PI	16131	UINT	-	Y	MAC address (second part)	0…24	24	Num
MAC_3_ETH_PI	16132	UINT	-	Y	MAC address (third part)	0…187	187	Num
MAC_4_ETH_PI	16133	UINT	-	Y	MAC address (fourth part)	0…255	255	Num
MAC_5_ETH_PI	16134	UINT	-	Y	MAC address (fifth part)	0…255	255	Num

Display Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Hmi_Language	15819	UINT	-	Y	Language	0…65535	0	Num
Par_ContrLCD	15723	UINT	-	Y	LCD contrast	0…63	30	Num
Par_BackLightTime	15724	UINT	-	Y	Backlight time	0…3600	10	Sec

BACnet Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Load_BACnet_E2_ Defaults	15766	BOOL	-	Y	Load default values for BACnet parameters in EEPROM at next boot	0, 1	1	Flag
Port_BACnet_IP	15768	UINT	-	Y	BACnet/IP Port number. 0 = port 47808 65535 = BACnet stack running only on PLC side	0…65535	65535	Num

FileSystem Volumes

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
HTTP_volume	16136	Enum	-	Y	Volume of HTTP files 0 = NOR Flash 1 = micro SD card	0, 1	0	Num
DAT_volume	16137	Enum	-	Y	Volume of *.DAT and *.RAW files 0 = NOR Flash 1 = micro SD card	0, 1	0	Num
PLC_volume	16139	Enum	-	Y	Volume of PLC file 0 = NOR Flash 1 = micro SD card	0, 1	0	Num
HMI_volume	16140	Enum	-	Y	Volume of HMI file 0 = NOR Flash 1 = micro SD card	0, 1	0	Num
REM_volume	16141	Enum	-	Y	Volume of HMI Remote file 0 = NOR Flash 1 = micro SD card	0, 1	0	Num
PAR_volume	16142	Enum	-	Y	Volume of CONNEC.PAR file 0 = NOR Flash 1 = micro SD card	0, 1	0	Num

Miscellaneous

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
virtualDipSwitch	16143	UINT	-	Y	Numeric prefix for system files name	0…7	0	Num

EP4000000B00 Expansion Module Parameters Table

EP4000000B00 device is indicated as Expansion EVE 4200 in FREE Studio Plus.

Folders

NOTE: Not all parameters listed are available depending on the accessible resources in the device.

The following tables present the Expansion module parameters, divided into categories (folders):

Folder label
Acknowledgment, page 123
AI Calibration, page 123
AO Calibration, page 125
Analog Inputs, page 125
ON Board CAN Expansion bus, page 127

Acknowledgment Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Par_TAB	15716	UINT	-	-	Map code **NOTE:** RW parameter	0…65535	0	Num
Par_POLI	15717	UINT	-	-	Model code **NOTE:** RW parameter	0…65535	1025	Num
Par_PCH	15718	UINT	-	-	Model code	0…65535	262	Num

AI Calibration Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Gain_Ntc_AI1	15616	UINT	-	-	NTC calibration gain AI1	0…65535	32768	Num
Gain_Ntc_AI2	15617	UINT	-	-	NTC calibration gain AI2	0…65535	32768	Num
Gain_Ntc_AI3	15618	UINT	-	-	NTC calibration gain AI3	0…65535	32768	Num
Gain_Ntc_AI4	15619	UINT	-	-	NTC calibration gain AI4	0…65535	32768	Num
Offs_Ntc_AI1	15621	INT	-1	-	NTC calibration offset AI1	-32768…32767	0	Num
Offs_Ntc_AI2	15622	INT	-1	-	NTC calibration offset AI2	-32768…32767	0	Num
Offs_Ntc_AI3	15623	INT	-1	-	NTC calibration offset AI3	-32768…32767	0	Num
Offs_Ntc_AI4	15624	INT	-1	-	NTC calibration offset AI4	-32768…32767	0	Num
Gain_PTC_AI1	15626	UINT	-	-	PTC calibration gain AI1	0…65535	32768	Num
Gain_PTC_AI2	15627	UINT	-	-	PTC calibration gain AI2	0…65535	32768	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Gain_PTC_AI3	15628	UINT	-	-	PTC calibration gain AI3	0…65535	32768	Num
Gain_PTC_AI4	15629	UINT	-	-	PTC calibration gain AI4	0…65535	32768	Num
Offs_PTC_AI1	15631	INT	-1	-	PTC calibration offset AI1	-32768…32767	0	Num
Offs_PTC_AI2	15632	INT	-1	-	PTC calibration offset AI2	-32768…32767	0	Num
Offs_PTC_AI3	15633	INT	-1	-	PTC calibration offset AI3	-32768…32767	0	Num
Offs_PTC_AI4	15634	INT	-1	-	PTC calibration offset AI4	-32768…32767	0	Num
Gain_daOhm_AI1	15636	UINT	-	-	daOhm calibration gain AI1	0…65535	32768	Num
Gain_daOhm_AI2	15637	UINT	-	-	daOhm calibration gain AI2	0…65535	32768	Num
Gain_daOhm_AI3	15638	UINT	-	-	daOhm calibration gain AI3	0…65535	32768	Num
Gain_daOhm_AI4	15639	UINT	-	-	daOhm calibration gain AI4	0…65535	32768	Num
Offs_daOhm_AI1	15641	INT	-1	-	daOhm calibration offset AI1	-32768…32767	0	Num
Offs_daOhm_AI2	15642	INT	-1	-	daOhm calibration offset AI2	-32768…32767	0	Num
Offs_daOhm_AI3	15643	INT	-1	-	daOhm calibration offset AI3	-32768…32767	0	Num
Offs_daOhm_AI4	15644	INT	-1	-	daOhm calibration offset AI4	-32768…32767	0	Num
Gain_mA_AI1	15646	UINT	-	-	4...20 mA calibration gain AI1	0…65535	32768	Num
Gain_mA_AI2	15647	UINT	-	-	4...20 mA calibration gain AI2	0…65535	32768	Num
Gain_mA_AI3	15648	UINT	-	-	4...20 mA calibration gain AI3	0…65535	32768	Num
Gain_mA_AI4	15649	UINT	-	-	4...20 mA calibration gain AI4	0…65535	32768	Num
Offs_mA_AI1	15651	INT	-1	-	4...20 mA calibration offset AI1	-32768…32767	0	Num
Offs_mA_AI2	15652	INT	-1	-	4...20 mA calibration offset AI2	-32768…32767	0	Num
Offs_mA_AI3	15653	INT	-1	-	4...20 mA calibration offset AI3	-32768…32767	0	Num
Offs_mA_AI4	15654	INT	-1	-	4...20 mA calibration offset AI4	-32768…32767	0	Num
Gain_5V_Ratio_AI1	15656	UINT	-	-	0...5 V $_{ratiometric}$ calibration gain AI1	0…65535	32768	Num
Gain_5V_Ratio_AI2	15657	UINT	-	-	0...5 V $_{ratiometric}$ calibration gain AI2	0…65535	32768	Num
Gain_5V_Ratio_AI3	15658	UINT	-	-	0...5 V $_{ratiometric}$ calibration gain AI3	0…65535	32768	Num
Gain_5V_Ratio_AI4	15659	UINT	-	-	0...5 V $_{ratiometric}$ calibration gain AI4	0…65535	32768	Num
Offs_5V_Ratio_AI1	15661	INT	-1	-	0...5 V $_{ratiometric}$ calibration offset AI1	-32768…32767	0	Num
Offs_5V_Ratio_AI2	15662	INT	-1	-	0...5 V $_{ratiometric}$ calibration offset AI2	-32768…32767	0	Num
Offs_5V_Ratio_AI3	15663	INT	-1	-	0...5 V $_{ratiometric}$ calibration offset AI3	-32768…32767	0	Num
Offs_5V_Ratio_AI4	15664	INT	-1	-	0...5 V $_{ratiometric}$ calibration offset AI4	-32768…32767	0	Num
Gain_10V_AI1	15666	UINT	-	-	0...10 V calibration gain AI1	0…65535	32768	Num
Gain_10V_AI2	15667	UINT	-	-	0...10 V calibration gain AI2	0…65535	32768	Num
Gain_10V_AI3	15668	UINT	-	-	0...10 V calibration gain AI3	0…65535	32768	Num
Gain_10V_AI4	15669	UINT	-	-	0...10 V calibration gain AI4	0…65535	32768	Num
Offs_10V_AI1	15671	INT	-1	-	0...10 V calibration offset AI1	-32768…32767	0	Num
Offs_10V_AI2	15672	INT	-1	-	0...10 V calibration offset AI2	-32768…32767	0	Num
Offs_10V_AI3	15673	INT	-1	-	0...10 V calibration offset AI3	-32768…32767	0	Num
Offs_10V_AI4	15674	INT	-1	-	0...10 V calibration offset AI4	-32768…32767	0	Num
Gain_5V_AI1	15676	UINT	-	-	0...5 V calibration gain AI1	0…65535	32768	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Gain_5V_AI2	15677	UINT	-	-	0...5 V calibration gain AI2	0…65535	32768	Num
Gain_5V_AI3	15678	UINT	-	-	0...5 V calibration gain AI3	0…65535	32768	Num
Gain_5V_AI4	15679	UINT	-	-	0...5 V calibration gain AI4	0…65535	32768	Num
Offs_5V_AI1	15681	INT	-1	-	0...5 V calibration offset AI1	-32768…32767	0	Num
Offs_5V_AI2	15682	INT	-1	-	0...5 V calibration offset AI2	-32768…32767	0	Num
Offs_5V_AI3	15683	INT	-1	-	0...5 V calibration offset AI3	-32768…32767	0	Num
Offs_5V_AI4	15684	INT	-1	-	0...5 V calibration offset AI4	-32768…32767	0	Num
Gain_PT1000_AI1	15686	UINT	-	-	PT1000 calibration gain AI1	0…65535	32768	Num
Gain_PT1000_AI2	15687	UINT	-	-	PT1000 calibration gain AI2	0…65535	32768	Num
Gain_PT1000_AI3	15688	UINT	-	-	PT1000 calibration gain AI3	0…65535	32768	Num
Gain_PT1000_AI4	15689	UINT	-	-	PT1000 calibration gain AI4	0…65535	32768	Num
Offs_PT1000_AI1	15691	INT	-1	-	PT1000 calibration offset AI1	-32768…32767	0	Num
Offs_PT1000_AI2	15692	INT	-1	-	PT1000 calibration offset AI2	-32768…32767	0	Num
Offs_PT1000_AI3	15693	INT	-1	-	PT1000 calibration offset AI3	-32768…32767	0	Num
Offs_PT1000_AI4	15694	INT	-1	-	PT1000 calibration offset AI4	-32768…32767	0	Num

AO Calibration Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Gain_10V_AO1	15696	UINT	-	-	0...10 V calibration gain AO1	0…65535	32768	Num
Gain_10V_AO2	15697	UINT	-	-	0...10 V calibration gain AO2	0…65535	32768	Num
Offs_10V_AO1	15698	INT	-1	-	0...10 V calibration offset AO1	-32768…32767	0	Num
Offs_10V_AO2	15699	INT	-1	-	0...10 V calibration offset AO2	-32768…32767	0	Num

Analog Inputs Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Temp_UM	15725	Enum	-	-	Temperature unit of measurement • 0 = °C • 1 = °F	0, 1	0	Num
Cfg_AI1	15726	Enum	-	-	Type of analog input AI1 • 0 = NTC (NK103) • 1 = DI Input • 2 = NTC (103AT) • 3 = 4…20 mA • 4 = 0…10 V	0…10	3	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
					• 5 = 0…5 V (Ratiometric) • 6 = Pt1000 • 7 = hΩ (NTC) • 8 = daΩ (Pt1000) • 9 = PTC • 10 = 0…5 V			
Cfg_AI2	15727	Enum	-	-	Type of analogue input AI2 See *Cfg_AI1*	0…10	3= 4÷20-mA	Num
Cfg_AI3	15728	Enum	-	-	Type of analogue input AI3 See *Cfg_AI1*	0…10	2	Num
Cfg_AI4	15729	Enum	-	-	Type of analogue input AI4 See *Cfg_AI1*	0…10	2	Num
FullScaleMin_AI1	15736	INT	-1	-	Analog input AI1 start of scale value **NOTE:** Minimum full scale: for current probes, value at 4 mA, for 0…10 V voltage probes, value at 0 V, for ratiometric probes (0…5 V), value at 10% (corresponding to 0.5 V).	-9999…9999	0	Digit
FullScaleMax_AI1	15737	INT	-1	-	Analog input AI1 full scale value **NOTE:** Maximum full scale for current probes, value at 20 mA, for 0…10 V voltage probes, value at 10 V, for ratiometric probes (0…5 V), value at 90% (corresponding to 4.5 V).	-9999…9999	1000	Digit
FullScaleMin_AI2	15738	INT	-1	-	Analog input AI2 start of scale value See *FullScaleMin_AI1*	-9999…9999	0	Digit
FullScaleMax_AI2	15739	INT	-1	-	Analog input AI2 full scale value See *FullScaleMax_AI1*	-9999…9999	1000	Digit
FullScaleMin_AI3	15740	INT	-1	-	Analog input AI3 start of scale value See *FullScaleMin_AI1*	-9999…9999	0	Digit
FullScaleMax_AI3	15741	INT	-1	-	Analog input AI3 full scale value See *FullScaleMax_AI1*	-9999…9999	1000	Digit
FullScaleMin_AI4	15742	INT	-1	-	Analog input AI4 start of scale value See *FullScaleMin_AI1*	-9999…9999	0	Digit
FullScaleMax_AI4	15743	INT	-1	-	Analog input AI4 full scale value See *FullScaleMax_AI1*	-9999…9999	1000	Digit
Calibration_AI1	15748	INT	-1	-	Analogue input AI1 differential	-1000…1000	0	Digit
Calibration_AI2	15749	INT	-1	-	Analogue input AI2 differential	-1000…1000	0	Digit
Calibration_AI3	15750	INT	-1	-	Analogue input AI3 differential	-1000…1000	0	Digit
Calibration_AI4	15751	INT	-1	-	Analogue input AI4 differential	-1000…1000	0	Digit
SubCfg_AI1	16010	Enum	-	-	Sub configuration of analogue input AI1 • 0 = Low Pass Filter disabled, analog value in raw points • 1 = Low Pass Filter disabled, analog value converted	0…3	3	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
					• 2 = Low Pass Filter enabled, analog value in raw points • 3 = Low Pass Filter enabled, analog value converted			
SubCfg_AI2	16011	Enum	-	-	Sub configuration of analogue input AI2 See *SubCfg_AI1*	0…3	3	Num
SubCfg_AI3	16012	Enum	-	-	Sub configuration of analogue input AI3 See *SubCfg_AI1*	0…3	3	Num
SubCfg_AI4	16013	Enum	-	-	Sub configuration of analogue input AI4 See *SubCfg_AI1*	0…3	3	Num

ON Board CAN Expansion bus Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Addr_CAN_OB	15780	UINT	-	-	On-board CAN Expansion bus serial address	1…127	1	Num
Baud_CAN_OB	15781	Enum	-	-	On-board CAN Expansion protocol baudrate • 2 = 500 Kb/s • 3 = 250 Kb/s • 4 = 125 Kb/s • 5 = 125 Kb/s • 6 = 50 Kb/s	2…6	2	Num

EP4S00••V500 Expansion Module Parameters Table

EP4S00••V500 device is indicated as Expansion 4D PRO SSR in FREE Studio Plus.

Folders

NOTE: Not all parameters listed are available depending on the accessible resources in the device.

The following tables present the Expansion module parameters, divided into categories (folders):

Folder label
Acknowledgment, page 128
AI Calibration, page 128
AO Calibration, page 132
Analog Inputs - Base Board, page 132
Analog Inputs - Upper Board, page 134
ON Board CAN Expansion bus, page 136

Acknowledgment Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Par_TAB	15716	UINT	-	-	Map code **NOTE:** RW parameter	0…65535	0	Num
Par_POLI	15717	UINT	-	-	Model code **NOTE:** RW parameter	0…65535	1025	Num
Par_PCH	15718	UINT	-	-	Model code	0…65535	324	Num

AI Calibration Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Gain_Ntc_AI1	15524	UINT	-	-	NTC calibration gain AI1	0…65535	32768	Num
Gain_PT1000_AI1	15525	UINT	-	-	PT1000 calibration gain AI1	0…65535	32768	Num
Gain_5Vr_AI1	15526	UINT	-	-	0...5 $V_{ratiometric}$ calibration gain AI1	0…65535	32768	Num
Gain_10V_AI1	15527	UINT	-	-	0...10 V calibration gain AI1	0…65535	32768	Num
Gain_mA_AI1	15528	UINT	-	-	4...20 mA calibration gain AI1	0…65535	32768	Num
Gain_5V_AI1	15529	UINT	-	-	0...5 V calibration gain AI1	0…65535	32768	Num
Gain_PTC_AI1	15530	UINT	-	-	PTC calibration gain AI1	0…65535	32768	Num
Gain_Ntc_AI2	15531	UINT	-	-	NTC calibration gain AI2	0…65535	32768	Num
Gain_PT1000_AI2	15532	UINT	-	-	PT1000 calibration gain AI2	0…65535	32768	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Gain_5Vr_AI2	15533	UINT	-	-	0...5 V $_{ratiometric}$ calibration gain AI2	0…65535	32768	Num
Gain_10V_AI2	15534	UINT	-	-	0...10 V calibration gain AI2	0…65535	32768	Num
Gain_mA_AI2	15535	UINT	-	-	4...20 mA calibration gain AI2	0…65535	32768	Num
Gain_5V_AI2	15536	UINT	-	-	0...5 V calibration gain AI2	0…65535	32768	Num
Gain_PTC_AI2	15537	UINT	-	-	PTC calibration gain AI2	0…65535	32768	Num
Gain_Ntc_AI3	15538	UINT	-	-	NTC calibration gain AI3	0…65535	32768	Num
Gain_PT1000_AI3	15539	UINT	-	-	PT1000 calibration gain AI3	0…65535	32768	Num
Gain_5Vr_AI3	15540	UINT	-	-	0...5 V $_{ratiometric}$ calibration gain AI3	0…65535	32768	Num
Gain_10V_AI3	15541	UINT	-	-	0...10 V calibration gain AI3	0…65535	32768	Num
Gain_mA_AI3	15542	UINT	-	-	4...20 mA calibration gain AI3	0…65535	32768	Num
Gain_5V_AI3	15543	UINT	-	-	0...5 V calibration gain AI3	0…65535	32768	Num
Gain_PTC_AI3	15544	UINT	-	-	PTC calibration gain AI3	0…65535	32768	Num
Gain_Ntc_AI4	15545	UINT	-	-	NTC calibration gain AI4	0…65535	32768	Num
Gain_PT1000_AI4	15546	UINT	-	-	PT1000 calibration gain AI4	0…65535	32768	Num
Gain_5Vr_AI4	15547	UINT	-	-	0...5 V $_{ratiometric}$ calibration gain AI4	0…65535	32768	Num
Gain_10V_AI4	15548	UINT	-	-	0...10 V calibration gain AI4	0…65535	32768	Num
Gain_mA_AI4	15549	UINT	-	-	4...20 mA calibration gain AI4	0…65535	32768	Num
Gain_5V_AI4	15550	UINT	-	-	0...5 V calibration gain AI4	0…65535	32768	Num
Gain_PTC_AI4	15551	UINT	-	-	PTC calibration gain AI4	0…65535	32768	Num
Gain_Ntc_AI5	15552	UINT	-	-	NTC calibration gain AI5	0…65535	32768	Num
Gain_PT1000_AI5	15553	UINT	-	-	PT1000 calibration gain AI5	0…65535	32768	Num
Gain_5Vr_AI5	15554	UINT	-	-	0...5 V $_{ratiometric}$ calibration gain AI5	0…65535	32768	Num
Gain_10V_AI5	15555	UINT	-	-	0...10 V calibration gain AI5	0…65535	32768	Num
Gain_mA_AI5	15556	UINT	-	-	4...20 mA calibration gain AI5	0…65535	32768	Num
Gain_5V_AI5	15557	UINT	-	-	0...5 V calibration gain AI5	0…65535	32768	Num
Gain_PTC_AI5	15558	UINT	-	-	PTC calibration gain AI5	0…65535	32768	Num
Gain_Ntc_AI6	15559	UINT	-	-	NTC calibration gain AI6	0…65535	32768	Num
Gain_PT1000_AI6	15560	UINT	-	-	PT1000 calibration gain AI6	0…65535	32768	Num
Gain_5Vr_AI6	15561	UINT	-	-	0...5 V $_{ratiometric}$ calibration gain AI6	0…65535	32768	Num
Gain_10V_AI6	15562	UINT	-	-	0...10 V calibration gain AI6	0…65535	32768	Num
Gain_mA_AI6	15563	UINT	-	-	4...20 mA calibration gain AI6	0…65535	32768	Num
Gain_5V_AI6	15564	UINT	-	-	0...5 V calibration gain AI6	0…65535	32768	Num
Gain_PTC_AI6	15565	UINT	-	-	PTC calibration gain AI6	0…65535	32768	Num
Gain_Ntc_AI7	15566	UINT	-	-	NTC calibration gain AI7	0…65535	32768	Num
Gain_PT1000_AI7	15567	UINT	-	-	PT1000 calibration gain AI7	0…65535	32768	Num
Gain_5Vr_AI7	15568	UINT	-	-	0...5 V $_{ratiometric}$ calibration gain AI7	0…65535	32768	Num
Gain_10V_AI7	15569	UINT	-	-	0...10 V calibration gain AI7	0…65535	32768	Num
Gain_mA_AI7	15570	UINT	-	-	4...20 mA calibration gain AI7	0…65535	32768	Num
Gain_5V_AI7	15571	UINT	-	-	0...5 V calibration gain AI7	0…65535	32768	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Gain_PTC_AI7	15572	UINT	-	-	PTC calibration gain AI7	0…65535	32768	Num
Gain_Ntc_AI8	15573	UINT	-	-	NTC calibration gain AI8	0…65535	32768	Num
Gain_PT1000_AI8	15574	UINT	-	-	PT1000 calibration gain AI8	0…65535	32768	Num
Gain_5Vr_AI8	15575	UINT	-	-	0...5 $V_{ratiometric}$ calibration gain AI8	0…65535	32768	Num
Gain_10V_AI8	15576	UINT	-	-	0...10 V calibration gain AI8	0…65535	32768	Num
Gain_mA_AI8	15577	UINT	-	-	4...20 mA calibration gain AI8	0…65535	32768	Num
Gain_5V_AI8	15578	UINT	-	-	0...5 V calibration gain AI8	0…65535	32768	Num
Gain_PTC_AI8	15579	UINT	-	-	PTC calibration gain AI8	0…65535	32768	Num
Gain_Ntc_AI9	15580	UINT	-	-	NTC calibration gain AI9	0…65535	32768	Num
Gain_PT1000_AI9	15581	UINT	-	-	PT1000 calibration gain AI9	0…65535	32768	Num
Gain_5Vr_AI9	15582	UINT	-	-	0...5 $V_{ratiometric}$ calibration gain AI9	0…65535	32768	Num
Gain_10V_AI9	15583	UINT	-	-	0...10 V calibration gain AI9	0…65535	32768	Num
Gain_mA_AI9	15584	UINT	-	-	4...20 mA calibration gain AI9	0…65535	32768	Num
Gain_5V_AI9	15585	UINT	-	-	0...5 V calibration gain AI9	0…65535	32768	Num
Gain_PTC_AI9	15586	UINT	-	-	PTC calibration gain AI9	0…65535	32768	Num
Gain_Ntc_AI10	15587	UINT	-	-	NTC calibration gain AI10	0…65535	32768	Num
Gain_PT1000_AI10	15588	UINT	-	-	PT1000 calibration gain AI10	0…65535	32768	Num
Gain_5Vr_AI10	15589	UINT	-	-	0...5 $V_{ratiometric}$ calibration gain AI10	0…65535	32768	Num
Gain_10V_AI10	15590	UINT	-	-	0...10 V calibration gain AI10	0…65535	32768	Num
Gain_mA_AI10	15591	UINT	-	-	4...20 mA calibration gain AI10	0…65535	32768	Num
Gain_5V_AI10	15592	UINT	-	-	0...5 V calibration gain AI10	0…65535	32768	Num
Gain_PTC_AI10	15593	UINT	-	-	PTC calibration gain AI10	0…65535	32768	Num
Offs_Ntc_AI1	15608	INT	-1	-	NTC calibration offset AI1	-32768…32767	0	Num
Offs_PT1000_AI1	15609	INT	-1	-	PT1000 calibration offset AI1	-32768…32767	0	Num
Offs_5Vr_AI1	15610	INT	-1	-	0...5 $V_{ratiometric}$ calibration offset AI1	-32768…32767	0	Num
Offs_10V_AI1	15611	INT	-1	-	0...10 V calibration offset AI1	-32768…32767	0	Num
Offs_mA_AI1	15612	INT	-1	-	4...20 mA calibration offset AI1	-32768…32767	0	Num
Offs_5V_AI1	15613	INT	-1	-	0...5 V calibration offset AI1	-32768…32767	0	Num
Offs_PTC_AI1	15614	INT	-1	-	PTC calibration offset AI1	-32768…32767	0	Num
Offs_Ntc_AI2	15615	INT	-1	-	NTC calibration offset AI2	-32768…32767	0	Num
Offs_PT1000_AI2	15616	INT	-1	-	PT1000 calibration offset AI2	-32768…32767	0	Num
Offs_5Vr_AI2	15617	INT	-1	-	0...5 $V_{ratiometric}$ calibration offset AI2	-32768…32767	0	Num
Offs_10V_AI2	15618	INT	-1	-	0...10 V calibration offset AI2	-32768…32767	0	Num
Offs_mA_AI2	15619	INT	-1	-	4...20 mA calibration offset AI2	-32768…32767	0	Num
Offs_5V_AI2	15620	INT	-1	-	0...5 V calibration offset AI2	-32768…32767	0	Num
Offs_PTC_AI2	15621	INT	-1	-	PTC calibration offset AI2	-32768…32767	0	Num
Offs_Ntc_AI3	15622	INT	-1	-	NTC calibration offset AI3	-32768…32767	0	Num
Offs_PT1000_AI3	15623	INT	-1	-	PT1000 calibration offset AI3	-32768…32767	0	Num
Offs_5Vr_AI3	15624	INT	-1	-	0...5 $V_{ratiometric}$ calibration offset AI3	-32768…32767	0	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Offs_10V_AI3	15625	INT	-1	-	0...10 V calibration offset AI3	-32768…32767	0	Num
Offs_mA_AI3	15626	INT	-1	-	4...20 mA calibration offset AI3	-32768…32767	0	Num
Offs_5V_AI3	15627	INT	-1	-	0...5 V calibration offset AI3	-32768…32767	0	Num
Offs_PTC_AI3	15628	INT	-1	-	PTC calibration offset AI3	-32768…32767	0	Num
Offs_Ntc_AI4	15629	INT	-1	-	NTC calibration offset AI4	-32768…32767	0	Num
Offs_PT1000_AI4	15630	INT	-1	-	PT1000 calibration offset AI4	-32768…32767	0	Num
Offs_5Vr_AI4	15631	INT	-1	-	0...5 $V_{ratiometric}$ calibration offset AI4	-32768…32767	0	Num
Offs_10V_AI4	15632	INT	-1	-	0...10 V calibration offset AI4	-32768…32767	0	Num
Offs_mA_AI4	15633	INT	-1	-	4...20 mA calibration offset AI4	-32768…32767	0	Num
Offs_5V_AI4	15634	INT	-1	-	0...5 V calibration offset AI4	-32768…32767	0	Num
Offs_PTC_AI4	15635	INT	-1	-	PTC calibration offset AI4	-32768…32767	0	Num
Offs_Ntc_AI5	15636	INT	-1	-	NTC calibration offset AI5	-32768…32767	0	Num
Offs_PT1000_AI5	15637	INT	-1	-	PT1000 calibration offset AI5	-32768…32767	0	Num
Offs_5Vr_AI5	15638	INT	-1	-	0...5 $V_{ratiometric}$ calibration offset AI5	-32768…32767	0	Num
Offs_10V_AI5	15639	INT	-1	-	0...10 V calibration offset AI5	-32768…32767	0	Num
Offs_mA_AI5	15640	INT	-1	-	4...20 mA calibration offset AI5	-32768…32767	0	Num
Offs_5V_AI5	15641	INT	-1	-	0...5 V calibration offset AI5	-32768…32767	0	Num
Offs_PTC_AI5	15642	INT	-1	-	PTC calibration offset AI5	-32768…32767	0	Num
Offs_Ntc_AI6	15643	INT	-1	-	NTC calibration offset AI6	-32768…32767	0	Num
Offs_PT1000_AI6	15644	INT	-1	-	PT1000 calibration offset AI6	-32768…32767	0	Num
Offs_5Vr_AI6	15645	INT	-1	-	0...5 $V_{ratiometric}$ calibration offset AI6	-32768…32767	0	Num
Offs_10V_AI6	15646	INT	-1	-	0...10 V calibration offset AI6	-32768…32767	0	Num
Offs_mA_AI6	15647	INT	-1	-	4...20 mA calibration offset AI6	-32768…32767	0	Num
Offs_5V_AI6	15648	INT	-1	-	0...5 V calibration offset AI6	-32768…32767	0	Num
Offs_PTC_AI6	15649	INT	-1	-	PTC calibration offset AI6	-32768…32767	0	Num
Offs_Ntc_AI7	15650	INT	-1	-	NTC calibration offset AI7	-32768…32767	0	Num
Offs_PT1000_AI7	15651	INT	-1	-	PT1000 calibration offset AI7	-32768…32767	0	Num
Offs_5Vr_AI7	15652	INT	-1	-	0...5 $V_{ratiometric}$ calibration offset AI7	-32768…32767	0	Num
Offs_10V_AI7	15653	INT	-1	-	0...10 V calibration offset AI7	-32768…32767	0	Num
Offs_mA_AI7	15654	INT	-1	-	4...20 mA calibration offset AI7	-32768…32767	0	Num
Offs_5V_AI7	15655	INT	-1	-	0...5 V calibration offset AI7	-32768…32767	0	Num
Offs_PTC_AI7	15656	INT	-1	-	PTC calibration offset AI7	-32768…32767	0	Num
Offs_Ntc_AI8	15657	INT	-1	-	NTC calibration offset AI8	-32768…32767	0	Num
Offs_PT1000_AI8	15658	INT	-1	-	PT1000 calibration offset AI8	-32768…32767	0	Num
Offs_5Vr_AI8	15659	INT	-1	-	0...5 $V_{ratiometric}$ calibration offset AI8	-32768…32767	0	Num
Offs_10V_AI8	15660	INT	-1	-	0...10 V calibration offset AI8	-32768…32767	0	Num
Offs_mA_AI8	15661	INT	-1	-	4...20 mA calibration offset AI8	-32768…32767	0	Num
Offs_5V_AI8	15662	INT	-1	-	0...5 V calibration offset AI8	-32768…32767	0	Num
Offs_PTC_AI8	15663	INT	-1	-	PTC calibration offset AI8	-32768…32767	0	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Offs_Ntc_AI9	15664	INT	-1	-	NTC calibration offset AI9	-32768…32767	0	Num
Offs_PT1000_AI9	15665	INT	-1	-	PT1000 calibration offset AI9	-32768…32767	0	Num
Offs_5Vr_AI9	15666	INT	-1	-	0...5 V $_{ratiometric}$ calibration offset AI9	-32768…32767	0	Num
Offs_10V_AI9	15667	INT	-1	-	0...10 V calibration offset AI9	-32768…32767	0	Num
Offs_mA_AI9	15668	INT	-1	-	4...20 mA calibration offset AI9	-32768…32767	0	Num
Offs_5V_AI9	15669	INT	-1	-	0...5 V calibration offset AI9	-32768…32767	0	Num
Offs_PTC_AI9	15670	INT	-1	-	PTC calibration offset AI9	-32768…32767	0	Num
Offs_Ntc_AI10	15671	INT	-1	-	NTC calibration offset AI10	-32768…32767	0	Num
Offs_PT1000_AI10	15672	INT	-1	-	PT1000 calibration offset AI10	-32768…32767	0	Num
Offs_5Vr_AI10	15673	INT	-1	-	0...5 V $_{ratiometric}$ calibration offset AI10	-32768…32767	0	Num
Offs_10V_AI10	15674	INT	-1	-	0...10 V calibration offset AI10	-32768…32767	0	Num
Offs_mA_AI10	15675	INT	-1	-	4...20 mA calibration offset AI10	-32768…32767	0	Num
Offs_5V_AI10	15676	INT	-1	-	0...5 V calibration offset AI10	-32768…32767	0	Num
Offs_PTC_AI10	15677	INT	-1	-	PTC calibration offset AI10	-32768…32767	0	Num

AO Calibration Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Gain_10V_AO1	15692	UINT	-	-	0...10 V calibration gain AO1	0…65535	32768	Num
Gain_mA_AO1	15693	UINT	-	-	4...20 mA calibration gain AO1	0…65535	32768	Num
Gain_10V_AO2	15694	UINT	-	-	0...10 V calibration gain AO2	0…65535	32768	Num
Gain_mA_AO2	15695	UINT	-	-	4...20 mA calibration gain AO2	0…65535	32768	Num
Offs_10V_AO1	15704	INT	-1	-	0...10 V calibration offset AO1	-32768…32767	0	Num
Offs_mA_AO1	15705	INT	-1	-	4...20 mA calibration offset AO1	-32768…32767	0	Num
Offs_10V_AO2	15706	INT	-1	-	0...10 V calibration offset AO2	-32768…32767	0	Num
Offs_mA_AO2	15707	INT	-1	-	4...20 mA calibration offset AO2	-32768…32767	0	Num

Analog Inputs - Base Board Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Temp_UM	15725	Enum	-	-	Temperature unit of measurement • 0 = °C • 1 = °F	0, 1	0	Num
Cfg_AI1	15726	Enum	-	-	Type of analogue input AI1 • 0 = NTC (NK103)	0…11	2	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
					• 1 = DI Input • 2 = NTC (103AT) • 3 = 4…20 mA • 4 = 0…10 V • 5 = 0…5 V (Ratiometric) • 6 = Pt1000 • 7 = hΩ (NTC) • 8 = daΩ (Pt1000) • 9 = PTC • 10 = 0…5 V • 11 = 0…20 mA			
Cfg_AI2	15727	Enum	-	-	Type of analogue input AI2 See *Cfg_AI1*	0…11	2	Num
Cfg_AI3	15728	Enum	-	-	Type of analogue input AI3 See *Cfg_AI1*	0…11	2	Num
Cfg_AI4	15729	Enum	-	-	Type of analogue input AI4 See *Cfg_AI1*	0…11	2	Num
FullScaleMin_AI1	15736	INT	-1	-	Analog input AI1 start of scale value **NOTE:** Minimum full scale: for current probes, value at 4 mA, for 0…10 V voltage probes, value at 0 V, for ratiometric probes (0…5 V), value at 10% (corresponding to 0.5 V).	-9999…9999	0	Digit
FullScaleMax_AI1	15737	INT	-1	-	Analog input AI1 full scale value **NOTE:** Maximum full scale for current probes, value at 20 mA, for 0…10 V voltage probes, value at 10 V, for ratiometric probes (0…5 V), value at 90% (corresponding to 4.5 V).	-9999…9999	1000	Digit
FullScaleMin_AI2	15738	INT	-1	-	Analog input AI2 start of scale value See *FullScaleMin_AI1*	-9999…9999	0	Digit
FullScaleMax_AI2	15739	INT	-1	-	Analog input AI2 full scale value See *FullScaleMax_AI1*	-9999…9999	1000	Digit
FullScaleMin_AI3	15740	INT	-1	-	Analog input AI3 start of scale value See *FullScaleMin_AI1*	-9999…9999	0	Digit
FullScaleMax_AI3	15741	INT	-1	-	Analog input AI3 full scale value See *FullScaleMax_AI1*	-9999…9999	1000	Digit
FullScaleMin_AI4	15742	INT	-1	-	Analog input AI4 start of scale value See *FullScaleMin_AI1*	-9999…9999	0	Digit
FullScaleMax_AI4	15743	INT	-1	-	Analog input AI4 full scale value See *FullScaleMax_AI1*	-9999…9999	1000	Digit
Calibration_AI1	15748	INT	-1	-	Analogue input AI1 differential	-1000…1000	0	Digit
Calibration_AI2	15749	INT	-1	-	Analogue input AI2 differential	-1000…1000	0	Digit
Calibration_AI3	15750	INT	-1	-	Analogue input AI3 differential	-1000…1000	0	Digit
Calibration_AI4	15751	INT	-1	-	Analogue input AI4 differential	-1000…1000	0	Digit

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
SubCfg_AI1	16010	Enum	-	-	Sub configuration of analogue input AI1 • 0 = Low Pass Filter disabled, analog value in raw points • 1 = Low Pass Filter disabled, analog value converted • 2 = Low Pass Filter enabled, analog value in raw points • 3 = Low Pass Filter enabled, analog value converted	0…3	3	Num
SubCfg_AI2	16011	Enum	-	-	Sub configuration of analogue input AI2 See *SubCfg_AI1*	0…3	3	Num
SubCfg_AI3	16012	Enum	-	-	Sub configuration of analogue input AI3 See *SubCfg_AI1*	0…3	3	Num
SubCfg_AI4	16013	Enum	-	-	Sub configuration of analogue input AI4 See *SubCfg_AI1*	0…3	3	Num

Analog Inputs - Upper Board Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Cfg_AI5	15730	Enum	-	-	Type of analogue input AI5 • 0 = NTC (NK103) • 1 = DI Input • 2 = NTC (103AT) • 3 = 4…20 mA • 4 = 0…10 V • 5 = 0…5 V (Ratiometric) • 6 = Pt1000 • 7 = hΩ (NTC) • 8 = daΩ (Pt1000) • 9 = PTC • 10 = 0…5 V • 11 = 0…20 mA	0…11	2	Num
Cfg_AI6	15731	Enum	-	-	Type of analogue input AI6 See *Cfg_AI5*	0…11	2	Num
FullScaleMin_AI5	15744	Enum	-1	-	Analog input AI5 start of scale value **NOTE:** Minimum full scale: for current probes, value at 4 mA, for 0…10 V voltage probes, value at 0 V, for ratiometric probes (0…5 V), value at 10% (corresponding to 0.5 V).	-9999…9999	0	Digit
FullScaleMax_AI5	15745	Enum	-1	-	Analog input AI5 full scale value **NOTE:** Maximum full scale for current probes, value at 20 mA, for 0…10 V voltage probes, value at 10 V, for ratiometric	-9999…9999	1000	Digit

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
					probes (0…5 V), value at 90% (corresponding to 4.5 V).			
FullScaleMin_AI6	15746	Enum	-1	-	Analog input AI6 start of scale value See *FullScaleMin_AI5*	-9999…9999	0	Digit
FullScaleMax_AI6	15747	Enum	-1	-	Analog input AI6 full scale value See *FullScaleMax_AI5*	-9999…9999	1000	Digit
Calibration_AI5	15752	INT	-1	-	Analogue input AI5 differential	-1000…1000	0	Digit
Calibration_AI6	15753	INT	-1	-	Analogue input AI6 differential	-1000…1000	0	Digit
Cfg_AO1	15758	INT	-	-	Type of analogue output AO1 • 0 = current modulation • 1 = current ON/OFF • 2 = voltage modulation • 3 = PWM mode	0…3	0	Num
Cfg_AO2	15759	INT	-	-	Type of analogue output AO2 See *Cfg_AO1*	0…3	0	Num
PWM_frequency_AO1_AO2	15769	INT	-	-	PWM Frequency for AO1 and AO2 in PWM mode	0…2000	1000	Hz
PWM_polarity_AO1_AO2	15770	INT	-	-	PWM Polarity for AO1 and AO2 in PWM mode: • 1 = current modulation • 0 = reversed	0, 1	1	Num
SubCfg_AI5	16014	INT	-	-	Sub configuration of analogue input AI5 • 0 = Low Pass Filter disabled, analog value in raw points • 1 = Low Pass Filter disabled, analog value converted • 2 = Low Pass Filter enabled, analog value in raw points • 3 = Low Pass Filter enabled, analog value converted	0…3	3	Num
SubCfg_AI6	16015	INT	-	-	Sub configuration of analogue input AI6 See *SubCfg_AI5*	0…3	3	Num
SubCfg_AI7	16016	INT	-	-	Sub configuration of analogue input AI7 See *SubCfg_AI5*	0…3	3	Num
SubCfg_AI8	16017	INT	-	-	Sub configuration of analogue input AI8 See *SubCfg_AI5*	0…3	3	Num
SubCfg_AI9	16018	INT	-	-	Sub configuration of analogue input AI9 See *SubCfg_AI5*	0…3	3	Num
SubCfg_AI10	16019	INT	-	-	Sub configuration of analogue input AI10 See *SubCfg_AI5*	0…3	3	Num
Cfg_AI7	16100	INT	-	-	Type of analogue input AI7 See *Cfg_AI5*	0…11	2	Num
Cfg_AI8	16101	INT	-	-	Type of analogue input AI8	0…11	2	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
					See *Cfg_AI5*			
Cfg_AI9	16102	INT	-	-	Type of analogue input AI9 See *Cfg_AI5*	0…11	2	Num
Cfg_AI10	16103	INT	-	-	Type of analogue input AI10 See *Cfg_AI5*	0…11	2	Num
FullScaleMin_AI7	16106	INT	-1	-	Analog input AI7 start of scale value See *FullScaleMin_AI5*	-9999…9999	0	Digit
FullScaleMax_AI7	16107	INT	-1	-	Analog input AI7 full scale value See *FullScaleMax_AI5*	-9999…9999	1000	Digit
FullScaleMin_AI8	16108	Enum	-1	-	Analog input AI8 start of scale value See *FullScaleMin_AI5*	-9999…9999	0	Digit
FullScaleMax_AI8	16109	Enum	-1	-	Analog input AI8 full scale value See *FullScaleMax_AI5*	-9999…9999	1000	Digit
FullScaleMin_AI9	16110	Enum	-1	-	Analog input AI9 start of scale value See *FullScaleMin_AI5*	-9999…9999	0	Digit
FullScaleMax_AI9	16111	Enum	-1	-	Analog input AI9 full scale value See *FullScaleMax_AI5*	-9999…9999	1000	Digit
FullScaleMin_AI10	16112	Enum	-1	-	Analog input AI10 start of scale value See *FullScaleMin_AI5*	-9999…9999	0	Digit
FullScaleMax_AI10	16113	Enum	-1	-	Analog input AI10 full scale value See *FullScaleMax_AI5*	-9999…9999	1000	Digit
Calibration_AI7	16118	Enum	-1	-	Analogue input AI7 differential	-1000…1000	0	Digit
Calibration_AI8	16119	Enum	-1	-	Analogue input AI8 differential	-1000…1000	0	Digit
Calibration_AI9	16120	UINT	-1	-	Analogue input AI9 differential	-1000…1000	0	Digit
Calibration_AI10	16121	UINT	-1	-	Analogue input AI10 differential	-1000…1000	0	Digit

ON Board CAN Expansion bus Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Addr_CAN_OB	15780	UINT	-	-	On-board CAN Expansion bus serial address	1…127	1	Num
SendPeriodFDI1	17000	UINT	-	-	Min period of FDI1 transmission • 0 = max frequency • 65535 = not sended	0…65535	65535	ms
SendPeriodFDI2	17001	UINT	-	-	Min period of FDI2 transmission See *SendPeriodFDI1*	0…65535	65535	ms

EPK•10000000 Parameters Table

EPK•10000000 device is indicated as Keyboard AVK/EVK or Keyboard EVK-PRO in FREE Studio Plus.

Folders

The following tables present the parameters, divided into categories (folders):

Folder label
Acknowledgment, page 137
HMI Management, page 137
Display, page 138
Buzzer, page 138
Buzzer Values, page 138
Led and Backlight Values, page 139
CAN On Board, page 139

Acknowledgment Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Par_TAB	15716	UINT	-	Y	Map code **NOTE:** RW parameter	0…65535	0	Num
Par_POLI	15717	UINT	-	Y	Model code **NOTE:** RW parameter	0…65535	1025	Num
Par_PARMOD	15719	BOOL	-	-	Parameter modified • 0 = False • 1 = True At least one parameter has been modified from the original configuration	0, 1	0	Flag

HMI Management Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Hmi_Language	15989	UINT	-	-	-	0…65535	0	Num
HmiList_Current	15820	Enum	-	-	Current HMI • 0 = HMI remote 1	0…11	0	Num
HmiList_ID	15821	UINT	-	-	HMI remote navigation ID list	0…254	0	Num
HmiList_Res	15833	Enum	-	-	HMI remote navigation resource type • 3 = CAN	1…3	3	Num
HmiList_Addr	15845	UINT	-	-	HMI remote navigation resource address for CAN	0…255	124	Num

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
HmiList_File	15893	STRIN-G	-	-	HMI remote navigation file (DOS 8.3 uppercase format)	-	(1)	String
(1) Default file name: *HMIREM.KBD*								

Display Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Par_Language	15819	Enum	-	-	Display language: • 0 = Italian • 1 = English • 2 = French • 3 = German • 4 = Spanish	0…65535	1	Num
Par_ContrLCD	15723	UINT	-	Y	LCD Contrast Allows adjustment of the LCD display contrast	0…64	40	Num
Par_BackLightTime	15724	UINT	-	-	Backlight time Allows adjustment of LCD display switch-on time.	0…3600	10	Sec

Buzzer Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Buzzer_Mode	15990	Enum	-	-	Buzzer Mode: • 0 = always switched off • 1 = active on any key	0, 1	0	Num

Buzzer Values Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
BUZZER	8528	Enum	-	-	Buzzer State: • 0 = Off • 1 = On • 2 = Blink • 3 = Timed • 4 = Timed running	0…4	0	Num

Led and Backlight Values Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
LED1	8640	Enum	-	-	Led green: • 0 = Off • 1 = On • 2 = Blink	0…2	0	Num
LED2	8641	Enum	-	-	Led red: • 0 = Off • 1 = On • 2 = Blink	0…2	0	Num
LED3	8642	Enum	-	-	Led yellow: • 0 = Off • 1 = On • 2 = Blink	0…2	0	Num
BACKLIGHT	8720	Enum	-	-	Backlight: • 0 = Off • 1 = On • 2 = Blink • 3 = Timed • 4 = Timed running	0…4	0	Num

CAN On Board Folder

LABEL	ADDRESS	DATA TYPE	CPL	RESET	DESCRIPTION	RANGE	DEFAULT	U.M.
Addr_CAN_OB	15780	UINT	-	Y	On-board CAN serial address.	1…127	127	Num
Baud_CAN_OB	15781	Enum	-	Y	On-board CAN protocol baudrate: • 2 = 500 kBd • 3 = 250 kBd • 4 = 125 kBd • 5 = 125 kBd • 6 = 50 kBd	2…6	2	Num

Commissioning

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FREE Studio Plus

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General Description..... 141

Overview

Components and accessories are described below.

General Description

Overview

The FREE Studio Plus development tool makes it possible to create and customize IEC 61131-3 programs for various types of application. You can download FREE Studio Plus from Eliwell web site download center. It is intended for applications in HVAC&R.

FREE Studio Plus Component

FREE Studio Plus permits to:

- Create and manage libraries, applications, and diagnostics.
- Manage previously developed applications, upload/download applications, and modify device parameters from a serial port.

PC Connection

EWCM 9000 PRO (HF) can be connected to a PC through the USB port and a USB cable:

- Type A USB (HOST). Used to connect a USB memory key drive when downloading the application.
- Type Mini-B USB (DEVICE). Used to connect EPB•••C••500 to a PC via Mini-B/A USB cable for debugging,commissioning, downloading, and uploading with FREE Studio Plus.

The EPB•••C••500 can also be supplied through the USB cable with limited functionalities related to debugging, commissioning, downloading and uploading with FREE Studio Plus. For more information, refer to the FREE Studio Plus Operating Guide.

NOTE: Do not apply voltage via 24 Vac/dc while the equipment is already connected to a PC via Mini-B USB cable.

Before applying power via 24 Vac/dc power supply connection:

- Disconnect the Mini-B USB cable.
- Supply the EWCM 9000 PRO (HF) controller via its 24 Vac/dc power supply connector.
- Reconnect the Mini-B USB cable.

NOTE: Inactive connections are not closed automatically. If all connections are open and the cable is disconnected, a reconnect is not possible and the controller must be power cycled.

NOTICE

LOSS OF COMMUNICATION

- Close all open TCP connections between PC and the controller before disconnecting the Ethernet cable.
- Close all open TCP connections before replacing an Ethernet cable.

Failure to follow these instructions can result in equipment damage.

Controller Connection Types

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Connection with a USB Memory Key 146
Connection with a PC through Ethernet 147

First Commissioning

Overview

There are several processes to connect the PC to the EWCM 9000 PRO (HF) controller:

Protocol	Factory status	Connection with	Connector
Modbus SL	Enabled	USB/RS-485 adapter TSXCUSB485 with cable VW3A83O6D3O.	CN1 / CN19
USB		Mini-B/A USB cable	CN16 / CN17
HTTP		Ethernet cable	CN20
Modbus TCP	Disabled	Ethernet cable	CN20
BACnet IP			CN20
FTP			CN20

For reasons of Internet security, Modbus TCP / BACnet IP / FTP are disabled by default. Therefore you can manually enable Modbus TCP / BACnet IP / FTP.

However, doing so may expose your network to possible cyberattacks if you do not take additional measures to protect your enterprise. In addition, you may be subject to laws and regulations concerning cybersecurity.

⚠WARNING

UNAUTHENTICATED ACCESS AND SUBSEQUENT NETWORK INTRUSION

- Observe and respect any and all pertinent national, regional and local cybersecurity and/or personal data laws and regulations when enabling Modbus TCP / BACnet IP / FTP if you wish to communicate to third party devices on an industrial network.
- Isolate your industrial network from other networks inside your company.
- Protect any network against unintended access by using firewalls, VPN, or other, proven security measures

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

First Connection

Once the first connection between PC and EWCM 9000 PRO (HF) controller starts, FREE Studio Plus asks you to enter the default password of the web-server and to replace it by a new different one.

Lets consider that the EWCM 9000 PRO (HF) controller has 3 scenarios:

Scenario	Description	Firmware Version
		EPB•••C••500
BRAND NEW	Represents a controller just manufactured with default password of the web-server.	596.10 or greater
NOT BRAND NEW	Represents a controller already accessed by a user and which default password of the web-server has changed.	
OBSOLETE	Represents a controller already available on the market without default password settings/ restrictions	Lower than 596.10

CyberSecurity Defense-in-Depth

Schneider Electric and Eliwell adhere to industry best practices in the development and implementation of control systems. This includes a "Defense-in-Depth" approach to secure an Industrial Control System. This approach places the controllers behind one or more firewalls to restrict access to authorized personnel and protocols only.

⚠WARNING

UNAUTHENTICATED ACCESS AND SUBSEQUENT UNAUTHORIZED MACHINE OPERATION

- Evaluate whether your environment or your machines are connected to your critical infrastructure and, if so, take appropriate steps in terms of prevention, based on Defense-in-Depth, before connecting the automation system to any network.
- Limit the number of devices connected to a network to the minimum necessary.
- Isolate your industrial network from other networks inside your company.
- Protect any network against unintended access by using firewalls, VPN, or other, proven security measures.
- Monitor activities within your systems.
- Prevent subject devices from direct access or direct link by unauthorized parties or unauthenticated actions.
- Prepare a recovery plan including backup of your system and process information.

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

Replace the Default Password

Change the default password upon first use. In addition, consider carefully the implications for giving any access to other people.

⚠WARNING

UNAUTHORIZED DATA ACCESS

- Immediately change any and all default passwords to new, secure passwords.
- Do not distribute passwords to unauthorized or otherwise unqualified personnel.

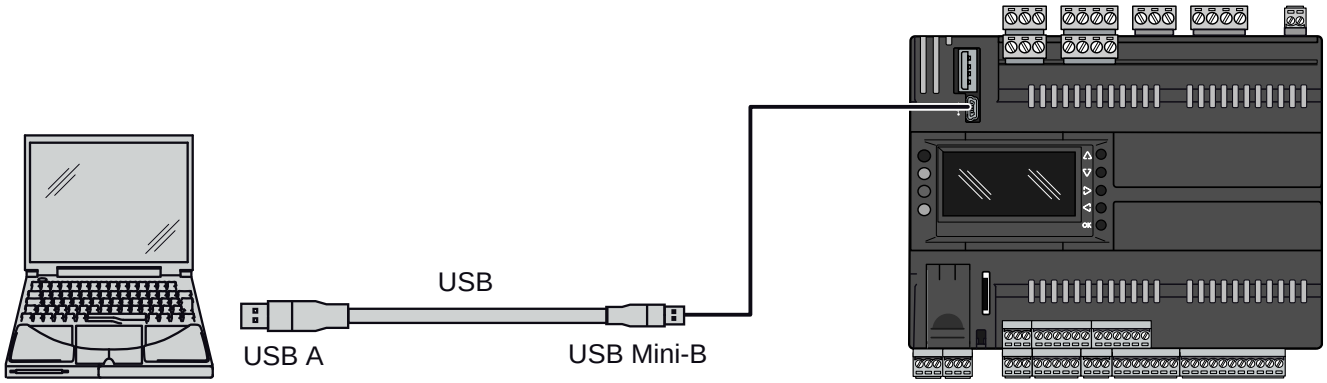
Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: A secure password is one that has not been shared or distributed to any unauthorized personnel and does not contain any personal or otherwise obvious information. Further, a mix of upper and lower case letters and numbers offer greater security. You should choose a password length of at least seven characters.

Connection with a PC through Modbus SL/USB

Connecting the PC to the Controller

Direct connection between the PC and the controller:



To connect the PC to the controller, use a type A / type Mini-B USB cable.

Following operations are possible between the PC and the controller in direct USB connection:

Data type	PC → Controller	Controller →PC
Parameters	✓	✓
Controller application	✓	✓
HMI application	✓	✓
Data file	✓	✓
BIOS	✓	-

First Commissioning

EWCM 9000 PRO (HF) first connection via Modbus Serial Line (USB device / RS-485):

Step	Action
1	Connect the PC to a **BRAND NEW** controller.
2	Launch FREE Studio Plus.
3	In the **Configuration** tab, click **On-line > Setup Communication** to configure the communication port.
4	In the **Configuration** tab, click **On-line > Connect** to connect to the controller. **NOTE:** FREE Studio Plus verifies if it is a **BRAND NEW** controller. If it is a **NOT BRAND NEW** or a **OBSOLETE** controller, the connection can be directly established.
5	Enter the default login: “administrator”
6	Enter the default password: “password”.

Step	Action
7	Enter the new password.
8	Click **OK** to validate. **Result:** If the new password is different from the default one, the connection can be directly established. You can now configure the controller and activate the communication port with the dedicated parameters, page 107.

Cybersecurity

After the first connection, you can manually enable Modbus TCP / BACnet IP / FTP.

However, doing so may expose your network to possible cyberattacks if you do not take additional measures to protect your enterprise. In addition, you may be subject to laws and regulations concerning cybersecurity.

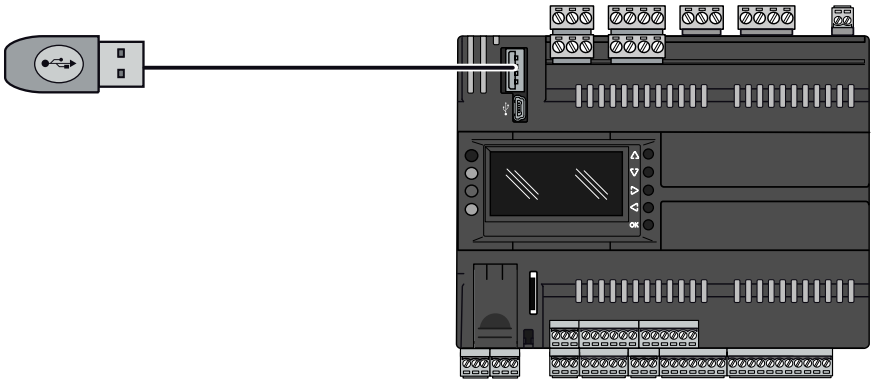
For cybersecurity details, refer to:

- CyberSecurity Defense-in-Depth, page 144.
- Replace the default password, page 144.

Connection with a USB Memory Key

Connecting a USB Memory Key to the Controller

Connection of the USB memory key to the EPB•••C••500 controller:



The USB memory key is connected on the type A USB port of the controller.

Following operations are possible between the USB memory key and the controller in direct USB connection:

Data type	Memory key→ Controller	Controller →Memory key
Parameters	✓	✓
Controller application	✓	✓
HMI application	✓	✓
Data file	✓	✓
BIOS	-	-

First Programming: USB Memory Key→ Controller

In FREE Studio Plus, at each time you select **Create USB programming files**, you must enter a new password for **BRAND NEW** controller only (new password different of the default password of the web-server).

EWCM 9000 PRO (HF) first programming via USB memory key:

Step	Action
1	Connect the USB memory key to a **BRAND NEW** controller.
2	• USB content is downloaded into the controller: yellow LED flashes during download. • When the download is completed, green LED flashes twice and switch ON to confirm successful download. **NOTE:** • If the password file does not exist in the USB memory key, the download is not executed into a **BRAND NEW** controller. • If it is a **NOT BRAND NEW** or a **OBSOLETE** controller, USB content can be directly downloaded into the controller. • If it is a **OBSOLETE** controller, the file related to the password changed must be removed.
3	Remove USB memory key.

NOTE: The USB memory key contains the default login and default password in clear text, you must pay particular attention to protect these informations.

Cybersecurity

After the first connection, you can manually enable Modbus TCP / BACnet IP / FTP.

However, doing so may expose your network to possible cyberattacks if you do not take additional measures to protect your enterprise. In addition, you may be subject to laws and regulations concerning cybersecurity.

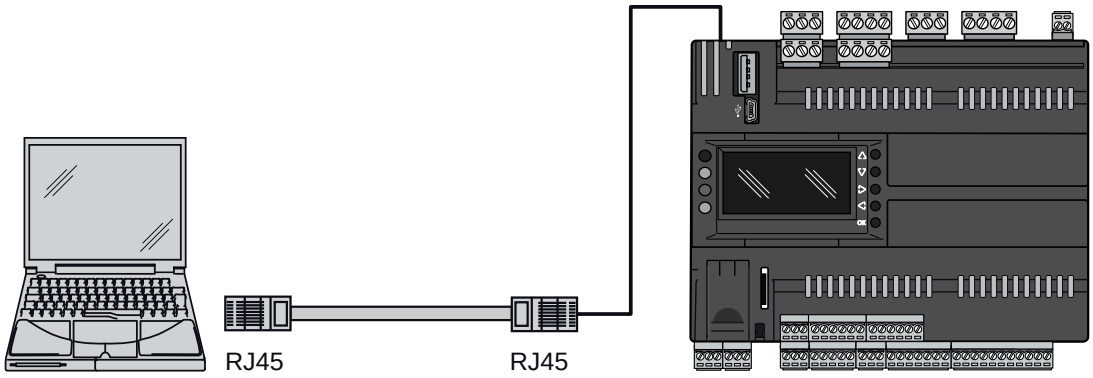
For cybersecurity details, refer to:

- CyberSecurity Defense-in-Depth, page 144.
- Replace the default password, page 144.

Connection with a PC through Ethernet

Connecting the PC to the Controller

Direct connection between the PC and the EPB•••C••500 controller:



To connect the PC to the controller, use a RJ45 Ethernet cable.

Following operations are possible between the PC and the controller in direct Ethernet connection:

Data type	PC → Controller	Controller →PC
Parameters	✓	✓
Controller application	✓	✓
HMI application	✓	✓
Data file	✓	✓
BIOS	✓	-

First Commissioning

EWCM 9000 PRO (HF) first connection via RJ45 Ethernet cable:

Step	Action
1	Connect the PC to a **BRAND NEW** controller.
2	Launch FREE Studio Plus.
3	In the **Configuration** tab, click **On-line > Setup Communication** to configure the communication port. The Modbus TCP protocol must be selected. The default IP address for a **BRAND NEW** controller is: `10.0.0.100`
4	In the **Configuration** tab, click **On-line > Connect** to connect to the controller. **NOTE:** FREE Studio Plus verifies if it is a **BRAND NEW** controller. If it is a **NOT BRAND NEW** or **OBSOLETE** controller: • If Modbus TCP enabled, the connection can be directly established. • If Modbus TCP disabled and HTTP disabled, the connection is not established. • If Modbus TCP disabled and HTTP enabled, FREE Studio Plus redirects to the webpage.
5	Enter the default login: “administrator”
6	Enter the default password: “password”.
7	Enter the new password.
8	Click **OK** to validate. **Result:** If the new password is different from the default one, the connection can be directly established. You can now configure the controller and activate the communication port with the dedicated parameters, page 107.

Cybersecurity

After the first connection, you can manually enable Modbus TCP / BACnet IP / FTP.

However, doing so may expose your network to possible cyberattacks if you do not take additional measures to protect your enterprise. In addition, you may be subject to laws and regulations concerning cybersecurity.

For cybersecurity details, refer to:

- CyberSecurity Defense-in-Depth, page 144.
- Replace the default password, page 144.

Expansion and Remote Display Connection Types

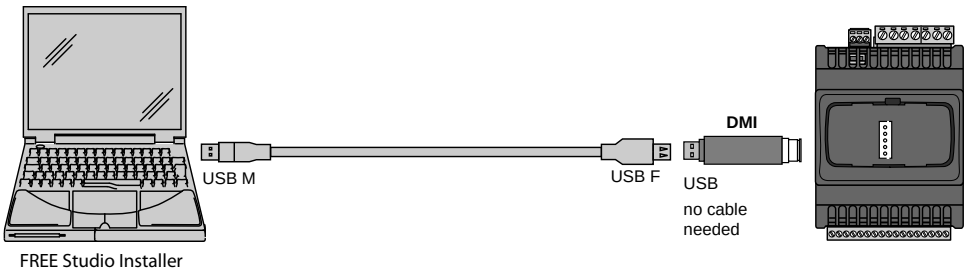
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Connection for Expansion Module and Remote display

Connecting the PC to an Expansion Module

Direct connection between the PC and an expansion module:



To connect the PC to the expansion module, use a DMI programming cable (Yellow) on the TTL port of the device.

NOTE: The Addr_CAN_OB can only be selected with FREE Studio Plus Installer and only by connecting to the expansion with the DMI.

Following operations are possible between the PC and the Expansion Module:

Data type	PC → Expansion module	Expansion module →PC
Parameters	✓	✓
Controller application	-	-
HMI application	-	-
Data file	-	-
BIOS	✓	-

Connecting the EPK•10000000 Remote Display

For commissioning, the EPK•10000000 remote display can only be connected to a controller. You can upload HMI pages and upload BIOS.

Following operations are possible between the controller and the EPK•10000000 remote display:

Data type	Controller → Remote display	Remote display → Controller
Parameters	-	-
Controller application	-	-
HMI pages	✓	-
Data file	-	-
BIOS	✓	-

For more details, refer to Diagnostic Menu, page 99.

BIOS Update

What's in This Chapter

BIOS Update 150

BIOS Update

Overview

There are several ways to update the EWCM 9000 PRO (HF) controller, EWCM 9000 PRO (HF) Expansion and EWCM 9000 PRO (HF) Display Color Touchscreen BIOS:

- Downloading into the EWCM 9000 PRO (HF) Logic Controller from USB memory key
- Downloading into the EWCM 9000 PRO (HF) Logic Controller from PC with FREE Studio Plus
- Downloading into the EWCM 9000 PRO (HF)Expansion Module from PC with FREE Studio Plus

If you remove power to the device, or there is a power outage or communication interruption during the transfer of the application, your device may become inoperative. If a communication interruption or a power outage occurs, reattempt the transfer. If there is a power outage or communication interruption during a firmware update, or if an invalid firmware is used, your device will become inoperative. In this case, use a valid firmware and reattempt the firmware update.

NOTICE

INOPERABLE EQUIPMENT

- Do not interrupt the transfer of the application program or a firmware change once the transfer has begun.
- Re-initiate the transfer if the transfer is interrupted for any reason.
- Do not attempt to place the device into service until the file transfer has completed successfully.

Failure to follow these instructions can result in equipment damage.

Download Controller BIOS from USB Memory Key

Steps to download controller BIOS from USB memory key:

Step	Action
1	Trace the BIOS file (it has the file extension .bin) in one of the following ways: • If you have FREE Studio Plus installed on your PC, BIOS is available in the following: `<C:\Programs>\Eliwell\free Studio\Catalog\FreeAdvance \Firmware_XXX` • Download `.bin` file from website - Firmware Update section.
2	Copy this file into a USB memory key (for example, `mskxxx_yy.bin`)
3	Connect USB memory key to EWCM 9000 PRO (HF), page 146. • BIOS is downloaded into EWCM 9000 PRO (HF): yellow LED flashes during download. • When the download is completed, green LED flashes twice and switch ON to confirm successful download.
4	Remove USB memory key. • EWCM 9000 PRO (HF) automatically resets and restarts. • If a SYSTEM FAULT message appears, it is related to a watchdog time-out that occurred while updating the BIOS and, in this case, can be ignored. BIOS update has been completed successfully.

EWCM 9000 PRO (HF) Logic Controller does not download a non-compliant BIOS (for example you cannot download BIOS for EWCM 9000 PRO (HF)Smart Logic Controller into a EWCM 9000 PRO (HF) Logic Controller and vice versa).

Download Controller BIOS from PC with FREE Studio Plus software

Steps to download Controller BIOS from PC:

Step	Action
1	Connect the EWCM 9000 PRO (HF) via USB, page 145, RS-485, or Ethernet, page 147 to the PC.
2	Open FREE Studio Plus software.
3	Open a existing project or create a new one.
4	Select the **Commissioning** tab.
5	In the menu, select **Target > Setup communication**.
6	Click **Connect**.
7	Click on the controller name in the **Commissioning** window.
8	Click **BIOS download**.
9	Select the `.bin` file you want to download, located in: • `<C:\Programs>\Eliwell\free Studio\Catalog\FreeAdvance \Firmware_XXX`
10	Click **Download** button. The operation may take a few minutes. If the download terminates successfully, a confirmation is displayed.
11	Disconnect the device from the PC.

Download BIOS of Controller, Expansion Module, or Touchscreen Remote Display from PC with FREE Studio Plus Installer software

Steps to download BIOS from PC:

Step	Action
1	Connect the EWCM 9000 PRO (HF) Logic Controller or the EWCM 9000 PRO (HF) Expansion Module to the PC.
2	Open FREE Studio Plus Installer software.
3	Use the **Network Scan** or add the device you want to update from the **Catalog** to the **Tree**.
4	Click **Connect**.
5	Right-click on the device name in the **Tree**.
6	Select **BIOS download**.

7	Select the `.bin` file you want to download:
	• For EWCM 9000 PRO (HF) Logic Controller, the BIOS files are located in:
	`<C:\Programs>\Eliwell\free Studio\Catalog\FreeAdvance \Firmware_XXX`
	• For EWCM 9000 PRO (HF) Expansion Module, the BIOS files are located in:
	`<C:\Programs>\Eliwell\free Studio\Catalog\TM172E\Firmware_ XXX`

8	Click **Download**. The operation may take a few minutes. If the download terminates successfully, a confirmation is displayed.
9	Disconnect the device from the PC.

Download BIOS of EPK•10000000

To download BIOS, connect the remote display to the controller, page 149 and download the BIOS via the DIAGNOSTIC Menu, page 99.

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Appendices

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NTC 10k-2 beta (25/50) 3977 Resistance Temperature Table 155
Pt1000 Resistance Temperature Table 156

NTC 10k beta 3435 Resistance Temperature Table

Celsius

T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)
-40	187 400	-13	48 590	14	15 270	41	5 630	68	2 366	95	1 108
-39	177 500	-12	46 410	15	14 680	42	5 440	69	2 296	96	1 080
-38	168 200	-11	44 350	16	14 110	43	5 257	70	2 229	97	1 052
-37	159 400	-10	42 390	17	13 570	44	5 081	71	2 164	98	1 025
-36	151 100	-9	40 500	18	13 050	45	4 912	72	2 101	99	999.0
-35	143 400	-8	38 700	19	12 560	46	4 750	73	2 040	100	973.7
-34	136 100	-7	37 000	20	12 090	47	4 594	74	1 981	101	949.0
-33	129 200	-6	35 380	21	11 630	48	4 444	75	1 925	102	925.0
-32	122 800	-5	33 850	22	11 200	49	4 300	76	1 870	103	901.8
-31	116 700	-4	32 390	23	10 780	50	4 162	77	1 817	104	879.3
-30	110 900	-3	31 000	24	10 380	51	4 027	78	1 766	105	857.4
-29	105 400	-2	29 690	25	10 000	52	3 897	79	1 716	106	836.3
-28	100 100	-1	28 440	26	9 633	53	3 773	80	1 669	107	815.7
-27	95 220	0	27 250	27	9 281	54	3 653	81	1 622	108	795.8
-26	90 570	1	26 100	28	8 945	55	3 537	82	1 577	109	776.4
-25	86 180	2	25 000	29	8 623	56	3 426	83	1 534	110	757.6
-24	82 040	3	23 960	30	8 314	57	3 319	84	1 492	111	739.2
-23	78 130	4	22 970	31	8 016	58	3 216	85	1 451	112	721.4
-22	74 440	5	22 030	32	7 730	59	3 117	86	1 412	113	704.1
-21	70 940	6	21 130	33	7 456	60	3 022	87	1 374	114	687.3
-20	67 640	7	20 280	34	7 193	61	2 929	88	1 337	115	671.0
-19	64 440	8	19 460	35	6 941	62	2 839	89	1 301	116	655.2
-18	61 420	9	18 690	36	6 700	63	2 753	90	1 266	117	639.8
-17	58 570	10	17 950	37	6 468	64	2 670	91	1 233	118	624.8
-16	55 870	11	17 230	38	6 246	65	2 589	92	1 200	119	610.3
-15	53 310	12	16 550	39	6 033	66	2 512	93	1 169	120	596.1
-14	50 880	13	15 900	40	5 829	67	2 438	94	1 138		

Fahrenheit

T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)
-40.0	187 400	8.6	48 590	57.2	15 270	105.8	5 630	154.4	2 366	203.0	1 108
-38.2	177 500	10.4	46 410	59.0	14 680	107.6	5 440	156.2	2 296	204.8	1 080
-36.4	168 200	12.2	44 350	60.8	14 110	109.4	5 257	158.0	2 229	206.6	1 052

T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)
-34.6	159 400	14.0	42 390	62.6	13 570	111.2	5 081	159.8	2 164	208.4	1 025
-32.8	151 100	15.8	40 500	64.4	13 050	113.0	4 912	161.6	2 101	210.2	999.0
-31.0	143 400	17.6	38 700	66.2	12 560	114.8	4 750	163.4	2 040	212.0	973.7
-29.2	136 100	19.4	37 000	68.0	12 090	116.6	4 594	165.2	1 981	213.8	949.0
-27.4	129 200	21.2	35 380	69.8	11 630	118.4	4 444	167.0	1 925	215.6	925.0
-25.6	122 800	23.0	33 850	71.6	11 200	120.2	4 300	168.8	1 870	217.4	901.8
-23.8	116 700	24.8	32 390	73.4	10 780	122.0	4 162	170.6	1 817	219.2	879.3
-22.0	110 900	26.6	31 000	75.2	10 380	123.8	4 027	172.4	1 766	221.0	857.4
-20.2	105 400	28.4	29 690	77.0	10 000	125.6	3 897	174.2	1 716	222.8	836.3
-18.4	100 100	30.2	28 440	78.8	9 633	127.4	3 773	176.0	1 669	224.6	815.7
-16.6	95 220	32.0	27 250	80.6	9 281	129.2	3 653	177.8	1 622	226.4	795.8
-14.8	90 570	33.8	26 100	82.4	8 945	131.0	3 537	179.6	1 577	228.2	776.4
-13.0	86 180	35.6	25 000	84.2	8 623	132.8	3 426	181.4	1 534	230.0	757.6
-11.2	82 040	37.4	23 960	86.0	8 314	134.6	3 319	183.2	1 492	231.8	739.2
-9.4	78 130	39.2	22 970	87.8	8 016	136.4	3 216	185.0	1 451	233.6	721.4
-7.6	74 440	41.0	22 030	89.6	7 730	138.2	3 117	186.8	1 412	235.4	704.1
-5.8	70 940	42.8	21 130	91.4	7 456	140.0	3 022	188.6	1 374	237.2	687.3
-4.0	67 640	44.6	20 280	93.2	7 193	141.8	2 929	190.4	1 337	239.0	671.0
-2.2	64 440	46.4	19 460	95.0	6 941	143.6	2 839	192.2	1 301	240.8	655.2
-0.4	61 420	48.2	18 690	96.8	6 700	145.4	2 753	194.0	1 266	242.6	639.8
1.4	58 570	50.0	17 950	98.6	6 468	147.2	2 670	195.8	1 233	244.4	624.8
3.2	55 870	51.8	17 230	100.4	6 246	149.0	2 589	197.6	1 200	246.2	610.3
5.0	53 310	53.6	16 550	102.2	6 033	150.8	2 512	199.4	1 169	248.0	596.1
6.8	50 880	55.4	15 900	104.0	5 829	152.6	2 438	201.2	1 138		

NTC 10k-2 beta (25/50) 3977 Resistance Temperature Table

Celsius

T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)
-39.44	323 839	-18.33	88 090	2.78	28 365	23.89	10 501	45.00	4 367	66.11	2 003
-38.33	300 974	-17.22	82 670	3.89	26 834	25.00	10 000	46.11	4 182	67.22	1 927
-37.22	279 880	-16.11	77 620	5.00	25 395	26.11	9 526	47.22	4 006	68.33	1 855
-36.11	260 410	-15.00	72 911	6.11	24 042	27.22	9 078	48.33	3 838	69.44	1 785
-35.00	242 427	13.89	68 518	7.22	22 770	28.33	8 653	49.44	3 679	70.56	1 718
-33.89	225 809	12.78	64 419	8.33	21 573	29.44	8 251	50.56	3 525	71.67	1 655
-32.78	210 443	11.67	60 592	9.44	20 446	30.56	7 866	51.67	3 380	72.78	1 594
-31.67	196 227	10.56	57 017	10.56	19 376	31.67	7 505	52.78	3 242	73.89	1 536
-30.56	183 068	9.44	53 647	11.67	18 378	32.78	7 163	53.89	3 111	75.00	1 480
-29.44	170 775	8.33	50 526	12.78	17 437	33.89	6 838	55.00	2 985	76.11	1 427
-28.33	159 488	7.22	47 606	13.89	16 550	35.00	6 530	56.11	2 865	77.22	1 375
-27.22	149 024	6.11	44 874	15.00	15 714	36.11	6 238	57.22	2 751	78.33	1 326
-26.11	139 316	5.00	42 317	16.11	14 925	37.22	5 960	58.33	2 642	79.44	1 279
-25.00	130 306	3.89	39 921	17.22	14 180	38.33	5 697	59.44	2 538	80.56	1 234
-23.89	121 939	2.78	37 676	18.33	13 478	39.44	5 447	60.56	2 438	81.67	1 190

T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)
-22.78	114 165	1.67	35 573	19.44	12 814	40.56	5 207	61.67	2 343	82.78	1 149
-21.67	106 939	0.56	33 599	20.56	12 182	41.67	4 981	62.78	2 252	83.89	1 109
-20.56	100 218	0.56	31 732	21.67	11 590	42.78	4 766	63.89	2 165	85.00	1 070
-19.44	93 909	1.67	29 996	22.78	11 030	43.89	4 561	65.00	2 082	86.11	1 034

Fahrenheit

T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)
-39	323 839	-1	88 090	37	28 365	75	10 501	113	4 367	151	2 003
-37	300 974	1	82 670	39	26 834	77	10 000	115	4 182	153	1 927
-35	279 880	3	77 620	41	25 395	79	9 526	117	4 006	155	1 855
-33	260 410	5	72 911	43	24 042	81	9 078	119	3 838	157	1 785
-31	242 427	57	68 518	45	22 770	83	8 653	121	3 679	159	1 718
-29	225 809	55	64 419	47	21 573	85	8 251	123	3 525	161	1 655
-27	210 443	53	60 592	49	20 446	87	7 866	125	3 380	163	1 594
-25	196 227	51	57 017	51	19 376	89	7 505	127	3 242	165	1 536
-23	183 068	49	53 647	53	18 378	91	7 163	129	3 111	167	1 480
-21	170 775	47	50 526	55	17 437	93	6 838	131	2 985	169	1 427
-19	159 488	45	47 606	57	16 550	95	6 530	133	2 865	171	1 375
-17	149 024	43	44 874	59	15 714	97	6 238	135	2 751	173	1 326
-15	139 316	41	42 317	61	14 925	99	5 960	137	2 642	175	1 279
-13	130 306	39	39 921	63	14 180	101	5 697	139	2 538	177	1 234
-11	121 939	37	37 676	65	13 478	103	5 447	141	2 438	179	1 190
-9	114 165	35	35 573	67	12 814	105	5 207	143	2 343	181	1 149
-7	106 939	33	33 599	69	12 182	107	4 981	145	2 252	183	1 109
-5	100 218	33	31 732	71	11 590	109	4 766	147	2 165	185	1 070
-3	93 909	35	29 996	73	11 030	111	4 561	149	2 082	187	1 034

Pt1000 Resistance Temperature Table

Celsius

T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)
-100	602.56	-49	807.03	2	1007.81	53	1205.52	104	1400.22	155	1591.91
-99	606.61	-48	811.00	3	1011.72	54	1209.36	105	1404.00	156	1595.64
-98	610.66	-47	814.97	4	1015.62	55	1213.21	106	1407.79	157	1599.37
-97	614.71	-46	818.94	5	1019.53	56	1217.05	107	1411.58	158	1603.09
-96	618.76	-45	822.90	6	1023.43	57	1220.90	108	1415.36	159	1606.82
-95	622.80	-44	826.87	7	1027.33	58	1224.74	109	1419.14	160	1610.54
-94	626.84	-43	830.83	8	1031.23	59	1228.58	110	1422.93	161	1614.27
-93	630.88	-42	834.79	9	1035.13	60	1232.42	111	1426.71	162	1617.99
-92	634.92	-41	838.75	10	1039.03	61	1236.26	112	1430.49	163	1621.71
-91	638.96	-40	842.71	11	1042.92	62	1240.09	113	1434.26	164	1625.43
-90	643.00	-39	846.66	12	1046.82	63	1243.93	114	1438.04	165	1629.15

T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)
-89	647.03	-38	850.62	13	1050.71	64	1247.77	115	1441.82	166	1632.86
-88	651.06	-37	854.57	14	1054.60	65	1251.60	116	1445.59	167	1636.58
-87	655.09	-36	858.53	15	1058.49	66	1255.43	117	1449.37	168	1640.30
-86	659.12	-35	862.48	16	1062.38	67	1259.26	118	1453.14	169	1644.01
-85	663.15	-34	866.43	17	1066.27	68	1263.09	119	1456.91	170	1647.72
-84	667.17	-33	870.38	18	1070.16	69	1266.92	120	1460.68	171	1651.43
-83	671.20	-32	874.32	19	1074.05	70	1270.75	121	1464.45	172	1655.14
-82	675.22	-31	878.27	20	1077.94	71	1274.58	122	1468.22	173	1658.85
-81	679.24	-30	882.22	21	1081.82	72	1278.40	123	1471.98	174	1662.56
-80	683.25	-29	886.16	22	1085.70	73	1282.23	124	1475.75	175	1666.27
-79	687.27	-28	890.10	23	1089.59	74	1286.05	125	1479.51	176	1669.97
-78	691.29	-27	894.04	24	1093.47	75	1289.87	126	1483.28	177	1673.68
-77	695.30	-26	897.98	25	1097.35	76	1293.70	127	1487.04	178	1677.38
-76	699.31	-25	901.92	26	1101.23	77	1297.52	128	1490.80	179	1681.08
-75	703.32	-24	905.86	27	1105.10	78	1301.33	129	1494.56	180	1684.78
-74	707.33	-23	909.80	28	1108.98	79	1305.15	130	1498.32	181	1688.48
-73	711.34	-22	913.73	29	1112.86	80	1308.97	131	1502.08	182	1692.18
-72	715.34	-21	917.67	30	1116.73	81	1312.78	132	1505.83	183	1695.88
-71	719.34	-20	921.60	31	1120.60	82	1316.60	133	1509.59	184	1699.58
-70	723.35	-19	925.53	32	1124.47	83	1320.41	134	1513.34	185	1703.27
-69	727.35	-18	929.46	33	1128.35	84	1324.22	135	1517.10	186	1706.96
-68	731.34	-17	933.39	34	1132.21	85	1328.03	136	1520.85	187	1710.66
-67	735.34	-16	937.32	35	1136.08	86	1331.84	137	1524.60	188	1714.35
-66	739.34	-15	941.24	36	1139.95	87	1335.65	138	1528.35	189	1718.04
-65	743.33	-14	945.17	37	1143.82	88	1339.46	139	1532.10	190	1721.73
-64	747.32	-13	949.09	38	1147.68	89	1343.26	140	1535.84	191	1725.42
-63	751.31	-12	953.02	39	1151.55	90	1347.07	141	1539.59	192	1729.10
-62	755.30	-11	956.94	40	1155.41	91	1350.87	142	1543.33	193	1732.79
-61	759.29	-10	960.86	41	1159.27	92	1354.68	143	1547.08	194	1736.48
-60	763.28	-9	964.78	42	1163.13	93	1358.48	144	1550.82	195	1740.16
-59	767.26	-8	968.70	43	1166.99	94	1362.28	145	1554.56	196	1743.84
-58	771.25	-7	972.61	44	1170.85	95	1366.08	146	1558.30	197	1747.52
-57	775.23	-6	976.53	45	1174.70	96	1369.87	147	1562.04	198	1751.20
-56	779.21	-5	980.44	46	1178.56	97	1373.67	148	1565.78	199	1754.88
-55	783.19	-4	984.36	47	1182.41	98	1377.47	149	1569.52	200	1758.56
-54	787.17	-3	988.27	48	1186.27	99	1381.26	150	1573.25		
-53	791.14	-2	992.18	49	1190.12	100	1385.06	151	1576.99		
-52	795.12	-1	996.09	50	1193.97	101	1388.85	152	1580.72		
-51	799.09	0	1000.00	51	1197.82	102	1392.64	153	1584.45		
-50	803.06	1	1003.91	52	1201.67	103	1396.43	154	1588.18		

Fahrenheit

T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)
-148.0	602.56	-56.2	807.03	35.6	1007.81	127.4	1205.52	219.2	1400.22	311.0	1591.91
-146.2	606.61	-54.4	811.00	37.4	1011.72	129.2	1209.36	221.0	1404.00	312.8	1595.64

T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)
-144.4	610.66	-52.6	814.97	39.2	1015.62	131.0	1213.21	222.8	1407.79	314.6	1599.37
-142.6	614.71	-50.8	818.94	41.0	1019.53	132.8	1217.05	224.6	1411.58	316.4	1603.09
-140.8	618.76	-49.0	822.90	42.8	1023.43	134.6	1220.90	226.4	1415.36	318.2	1606.82
-139.0	622.80	-47.2	826.87	44.6	1027.33	136.4	1224.74	228.2	1419.14	320.0	1610.54
-137.2	626.84	-45.4	830.83	46.4	1031.23	138.2	1228.58	230.0	1422.93	321.8	1614.27
-135.4	630.88	-43.6	834.79	48.2	1035.13	140.0	1232.42	231.8	1426.71	323.6	1617.99
-133.6	634.92	-41.8	838.75	50.0	1039.03	141.8	1236.26	233.6	1430.49	325.4	1621.71
-131.8	638.96	-40.0	842.71	51.8	1042.92	143.6	1240.09	235.4	1434.26	327.2	1625.43
-130.0	643.00	-38.2	846.66	53.6	1046.82	145.4	1243.93	237.2	1438.04	329.0	1629.15
-128.2	647.03	-36.4	850.62	55.4	1050.71	147.2	1247.77	239.0	1441.82	330.8	1632.86
-126.4	651.06	-34.6	854.57	57.2	1054.60	149.0	1251.60	240.8	1445.59	332.6	1636.58
-124.6	655.09	-32.8	858.53	59.0	1058.49	150.8	1255.43	242.6	1449.37	334.4	1640.30
-122.8	659.12	-31.0	862.48	60.8	1062.38	152.6	1259.26	244.4	1453.14	336.2	1644.01
-121.0	663.15	-29.2	866.43	62.6	1066.27	154.4	1263.09	246.2	1456.91	338.0	1647.72
-119.2	667.17	-27.4	870.38	64.4	1070.16	156.2	1266.92	248.0	1460.68	339.8	1651.43
-117.4	671.20	-25.6	874.32	66.2	1074.05	158.0	1270.75	249.8	1464.45	341.6	1655.14
-115.6	675.22	-23.8	878.27	68.0	1077.94	159.8	1274.58	251.6	1468.22	343.4	1658.85
-113.8	679.24	-22.0	882.22	69.8	1081.82	161.6	1278.40	253.4	1471.98	345.2	1662.56
-112.0	683.25	-20.2	886.16	71.6	1085.70	163.4	1282.23	255.2	1475.75	347.0	1666.27
-110.2	687.27	-18.4	890.10	73.4	1089.59	165.2	1286.05	257.0	1479.51	348.8	1669.97
-108.4	691.29	-16.6	894.04	75.2	1093.47	167.0	1289.87	258.8	1483.28	350.6	1673.68
-106.6	695.30	-14.8	897.98	77.0	1097.35	168.8	1293.70	260.6	1487.04	352.4	1677.38
-104.8	699.31	-13.0	901.92	78.8	1101.23	170.6	1297.52	262.4	1490.80	354.2	1681.08
-103.0	703.32	-11.2	905.86	80.6	1105.10	172.4	1301.33	264.2	1494.56	356.0	1684.78
-101.2	707.33	-9.4	909.80	82.4	1108.98	174.2	1305.15	266.0	1498.32	357.8	1688.48
-99.4	711.34	-7.6	913.73	84.2	1112.86	176.0	1308.97	267.8	1502.08	359.6	1692.18
-97.6	715.34	-5.8	917.67	86.0	1116.73	177.8	1312.78	269.6	1505.83	361.4	1695.88
-95.8	719.34	-4.0	921.60	87.8	1120.60	179.6	1316.60	271.4	1509.59	363.2	1699.58
-94.0	723.35	-2.2	925.53	89.6	1124.47	181.4	1320.41	273.2	1513.34	365.0	1703.27
-92.2	727.35	-0.4	929.46	91.4	1128.35	183.2	1324.22	275.0	1517.10	366.8	1706.96
-90.4	731.34	1.4	933.39	93.2	1132.21	185.0	1328.03	276.8	1520.85	368.6	1710.66
-88.6	735.34	3.2	937.32	95.0	1136.08	186.8	1331.84	278.6	1524.60	370.4	1714.35
-86.8	739.34	5.0	941.24	96.8	1139.95	188.6	1335.65	280.4	1528.35	372.2	1718.04
-85.0	743.33	6.8	945.17	98.6	1143.82	190.4	1339.46	282.2	1532.10	374.0	1721.73
-83.2	747.32	8.6	949.09	100.4	1147.68	192.2	1343.26	284.0	1535.84	375.8	1725.42
-81.4	751.31	10.4	953.02	102.2	1151.55	194.0	1347.07	285.8	1539.59	377.6	1729.10
-79.6	755.30	12.2	956.94	104.0	1155.41	195.8	1350.87	287.6	1543.33	379.4	1732.79
-77.8	759.29	14.0	960.86	105.8	1159.27	197.6	1354.68	289.4	1547.08	381.2	1736.48
-76.0	763.28	15.8	964.78	107.6	1163.13	199.4	1358.48	291.2	1550.82	383.0	1740.16
-74.2	767.26	17.6	968.70	109.4	1166.99	201.2	1362.28	293.0	1554.56	384.8	1743.84
-72.4	771.25	19.4	972.61	111.2	1170.85	203.0	1366.08	294.8	1558.30	386.6	1747.52
-70.6	775.23	21.2	976.53	113.0	1174.70	204.8	1369.87	296.6	1562.04	388.4	1751.20
-68.8	779.21	23.0	980.44	114.8	1178.56	206.6	1373.67	298.4	1565.78	390.2	1754.88
-67.0	783.19	24.8	984.36	116.6	1182.41	208.4	1377.47	300.2	1569.52	392.0	1758.56
-65.2	787.17	26.6	988.27	118.4	1186.27	210.2	1381.26	302.0	1573.25		
-63.4	791.14	28.4	992.18	120.2	1190.12	212.0	1385.06	303.8	1576.99		

T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)	T (°F)	R (Ω)
-61.6	795.12	30.2	996.09	122.0	1193.97	213.8	1388.85	305.6	1580.72		
-59.8	799.09	32.0	1000.00	123.8	1197.82	215.6	1392.64	307.4	1584.45		
-58.0	803.06	33.8	1003.91	125.6	1201.67	217.4	1396.43	309.2	1588.18		

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.

application:

A program including configuration data, symbols, and documentation.

AWG:

(*American wire gauge*) The standard that specifies wire section sizes in North America.

B

BIOS:

(*basic input output system*) Part of the firmware used during the booting process.

BOOL:

(*boolean*) A basic data type in computing. A `BOOL` variable can have one of these values: 0 (`FALSE`), 1 (`TRUE`). A bit that is extracted from a word is of type `BOOL`.

C

controller:

Automates industrial processes (also known as programmable logic controller or programmable controller).

COP:

(*Coefficient Of Performance*) It is a ratio of cooling provided to work required.

D

digital I/O:

(*digital input/output*) An individual circuit connection at the electronic module that corresponds directly to a data table bit. The data table bit holds the value of the signal at the I/O circuit. It gives the control logic digital access to I/O values.

E

EEPROM:

(*electrically erasable programmable read-only memory*) A type of non-volatile memory to store required data even when power is removed.

EIA:

(*electronic industries alliance*) The trade organization for establishing electrical/electronic and data communication standards (including RS-232 and RS-485) in the United States.

EMC:

(*electromagnetic compatibility*)

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*).

expansion bus:

An electronic communication bus between expansion I/O modules and a controller.

F

firmware:

Represents the BIOS, data parameters, and programming instructions that constitute the operating system on a controller. The firmware is stored in non-volatile memory within the controller.

FLA:

(Full-Load Amperes) Amount of current drawn by the motor at rated load and rated voltage.

flash memory:

A non-volatile memory that can be overwritten. It is stored on a special EEPROM that can be erased and reprogrammed.

H

HVAC&R:

(*heating, ventilation, and air conditioning and refrigeration)*

I

I/O:

(*input/output*)

ID:

(*identifier/identification*)

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.

IP20:

(*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. IP20 devices help protect against electric contact of objects larger than 12.5 mm, but not against water.

L

LAN:

(*local area network*) A short-distance communications network that is implemented in a home, office, or institutional environment.

LCD:

(*liquid crystal display*) Used in many HMI devices to display menus and messages to machine operators.

LED:

(*light emitting diode*) An indicator that illuminates under a low-level electrical charge.

LRA:

(Locked-Rotor Amperes) Amount of current drawn by the motor at rated voltage while its rotor is locked. This provides an indication of the inrush current during start-up.

M

Modbus SL:

(*Modbus serial line*) Implementation of the protocol over a RS-232 or RS-485 serial connection.

Modbus:

The protocol that allows communications between many devices connected to the same network.

ms:

(*millisecond*)

N

NC:

(*normally closed*) A contact pair that closes when the actuator is de-energized (no power is applied) and opens when the actuator is energized (power is applied).

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.

network:

A system of interconnected devices that share a common data path and protocol for communications.

NO:

(*normally open*) A contact pair that opens when the actuator is de-energized (no power is applied) and closes when the actuator is energized (power is applied).

NTC:

(*Negative Temperature Coefficient*)

P

PLC:

(*programmable logic controller*) An industrial computer used to automate manufacturing, industrial, and other electromechanical processes. PLCs are different from common computers in that they are designed to have multiple input and output arrays and adhere to more robust specifications for shock, vibration, temperature, and electrical interference among other things.

power supply terminals:

The power supply is connected to these terminals to provide power to the controller.

protocol:

A convention or standard definition that controls or enables the connection, communication, and data transfer between 2 computing system and devices.

Pt1000:

(*platinum 1000*) Resistance thermometers, also referred to as resistance temperature detectors, are sensors used to measure temperature by correlating electrical resistance with temperature. As the temperature changes, the resistance to an electrical current passing through them predictably changes likewise. They are characterized by their nominal resistance R0 at a temperature of 0 °C.

- Pt1000 (R0 = 1 kΩ)

PTC:

(*Positive Temperature Coefficient)*)

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). The PWM is well adapted to simulate or approximate an analog output in that it regulates the voltage of the output over its period making it useful in light dimming or speed control applications, among others.

R

RS-485:

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

RTC:

(*real-time clock*) A battery-backed time-of-day and calendar clock that operates continuously, even when the controller is not powered for the life of the battery.

S

SELV:

(*safety extra low voltage*) A system that follows IEC 61140 guidelines for power supplies is protected in such a way that voltage between any 2 accessible parts (or between 1 accessible part and the PE terminal for class 1 equipment) does not exceed a specified value under normal conditions or under inoperable conditions.

sink input:

A wiring arrangement in which the device provides current to the input electronic module. A sink input is referenced to 0 Vdc.

SL:

(*serial line*)

SPDT:

(*single-pole, double-throw*)

SPST:

(*single-pole, single-throw*)

SSR:

(*solid-state relay*)

T

terminal block:

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

U

UL:

(*underwriters laboratories*) A US organization for product testing and safety certification.

W

WORD:

A type encoded in a 16-bit format.

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