

S200L I/O and I/O 200C Hardware

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S200L I/O and I/O 200C

Hardware

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Safety Summary



Electrostatic Sensitive Device

Devices labeled with this symbol require special handling precautions as described in the installation section.

GENERAL WARNINGS

Equipment Environment

All components, whether in transportation, operation or storage, must be in a noncorrosive environment.

Electrical Shock Hazard During Maintenance

Disconnect power or take precautions to insure that contact with energized parts is avoided when servicing.

This section is mandatory reading for anyone planning to use the control system.

Be Careful – Prevent Accidents and Protect Valuable Equipment

A control system is a general tool which can be used in various processes. Responsibility for attaining and maintaining a reasonable level of safety must therefore rest with the people who engineer, operate and maintain the equipment. They must have intimate knowledge of the functions and inherent safety risks of the processes involved, and the imaginative power to anticipate situations in which accidents may occur.

Special attention should be paid to situations in which the mains supply is switched on or off, units are fitted or removed, cables are connected or disconnected, and units are reset or switched to manual operation. If possible, the process should be shut down before such actions are taken.

The level of safety can be improved considerably by taking steps to bring the process to a safe state when power supplies, communication links or parts of the control system fail. Such steps may, for instance, imply the installation of valves or relays which are spring-returned to a safe position.

Before Replacing I/O Units

Although it is possible to remove and insert I/O system units, except adapters and terminal base units, under system power, it is highly recommended that the process side power be disconnected before removing or inserting an I/O unit to avoid hazardous conditions.

S200L I/O and I/O 200C units must not be removed or inserted under system power, as hazardous conditions may occur or units may be damaged.

Maintenance

In order to avoid long shutdowns, it is advisable to keep spares of components in stock.

Always make regular backup copies of the application program.

Operating Environment

Before the system is brought on-line, find out which environmental conditions are applicable. The following points are important.

- The product must not be exposed to conditions exceeding the stated values in the technical specifications.
- The product must not be used in an environment where it is exposed to strong electrical interference. Electrical machines can produce interference which exceeds the permitted levels for the equipment, e.g. during repair work.
- All products must be handled with appropriate precautions with regard to electrostatic damage.

Important: Software

- Use the system's fault-monitoring facility to prevent mishaps and accidents.
- Check possible consequences before executing any changes.

Important: Hardware

Do not disconnect the power supply to a system which is in operation.

Signal Noise Due to Cables

Cables which might cause electrical interference (e.g. power-line cables) must not be installed close to bus cables carrying fast digital signals. Ensure a minimum distance of 100 mm (4 inches) between them inside cabinets.

Hazardous Electrical Supplies

Operations in which personnel may come into contact with high-voltage supplies should only be performed by those trained in the maintenance of electrical equipment and who are fully aware of the risks involved.

Mandatory Installation Instructions

Mandatory installation instructions in this document are marked with the symbol . Such instructions must be followed to fulfil the EMC directive.

About This User Manual

General

This User Manual describes how to configure, install and maintain Compact I/O¹ (S200L I/O and I/O 200C units). Both the modules S200L I/O and I/O 200C are same in functionality but are different in color, that is, one light grey and the other dark grey. The dark grey belongs to the I/O 200C family and the light grey belongs to the S200L I/O.

Safety

It is mandatory for all users of the control system to read the section *Safety Summary* before taking any action.

How to Read the Manual

The section *Introduction* provides an overview of the I/O system.

The section *Installation* provides mandatory rules and practical recommendations, and mounting dimensions of the units.

The section *Configuration* describes how to incorporate the S200L I/O and I/O 200C units into a control system and how to estimate the current consumption from an external power supply.

The section *Operation* describes the function and indications of S200L I/O and I/O 200C units and provides block and connection diagrams.

The last section, *Maintenance*, is intended for maintenance and service engineers.

Appendices provide technical specifications and recommended components. The CSA and UL standards for hazardous location approval and the EU directives for

1. S200L I/O and I/O 200C units together are termed as Compact I/O in this manual to ease the reading.

electromagnetic compatibility and low-voltage equipment are presented in separate appendices.

This book is not the only source of instruction for S200L I/O and I/O 200C units. A selection of training courses are offered by ABB Automation University.

Use of Warning, Caution, Information, and Tip Icons

This publication includes **Warning**, **Caution**, and **Information** where appropriate to point out safety related or other important information. It also includes **Tip** to point out useful hints to the reader. The corresponding symbols should be interpreted as follows:



Electrical warning icon indicates the presence of a hazard which could result in *electrical shock*.



Warning icon indicates the presence of a hazard which could result in *personal injury*.



Caution icon indicates important information or warning related to the concept discussed in the text. It might indicate the presence of a hazard which could result in *corruption of software or damage to equipment/property*.



Information icon alerts the reader to pertinent facts and conditions.



Tip icon indicates advice on, for example, how to design your project or how to use a certain function

Although **Warning** hazards are related to personal injury, and **Caution** hazards are associated with equipment or property damage, it should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, comply fully with all **Warning** and **Caution** notices.

Document Conventions

The following conventions are used for the presentation of material:

- The words in names of screen elements (for example, the title in the title bar of a window, the label for a field of a dialog box) are initially capitalized.
- Capital letters are used for the name of a keyboard key if it is labeled on the keyboard. For example, press the ENTER key.
- Lowercase letters are used for the name of a keyboard key that is not labeled on the keyboard. For example, the **space bar**, **comma key**, and so on.
- Press CTRL+C indicates that you must hold down the CTRL key while pressing the C key (to copy a selected object in this case).
- Press **ESC E C** indicates that you press and release each key in sequence (to copy a selected object in this case).
- The names of push and toggle buttons are boldfaced. For example, click **OK**.
- The names of menus and menu items are boldfaced. For example, the **File** menu.
 - The following convention is used for menu operations: **MenuName > MenuItem > CascadedMenuItem**. For example: select **File > New > Type**.
 - The **Start** menu name always refers to the **Start** menu on the Windows Task Bar.
- System prompts/messages are shown in the Courier font, and user responses/input are in the boldfaced Courier font. For example, if you enter a value out of range, the following message is displayed:

Entered value is not valid. The value must be 0 to30.

You may be told to enter the string TIC132 in a field. The string is shown as follows in the procedure:

TIC132

Variables are shown using lowercase letters.

sequence name

Terminology


The following is a list of terms associated with S200L I/O and I/O 200C that you should be familiar with. The list contains terms and abbreviations that are unique to ABB or have a usage or definition that is different from standard industry usage.

Term	Description
AC 800	Family of controllers such as AC 800C and AC 800M
AC 250	Advant Controller 250
Central I/O	Input/output modules mounted in the same cabinet as the controller and connected via the serial I/O bus
CB	Control Builder, a software tool for configuration and programming of AC 800 controllers
Controller	Computer-based unit for digital and/or analog control
DIN	German industrial standards (Deutsche Industrienormen)
EMC	Electromagnetic compatibility
EN	European standards
Ethernet	Network cabling system according to IEEE 802.3
Fieldbus	Databus for communication between industrial field devices such as sensors, actuators and controllers
FOUNDATION Fieldbus	Fieldbus standard based on IEC 1158-2
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
OCS	Open control system
On-board system	System with the components placed on the motherboard
PELV	Protected extra low voltage (power supply)
PM210	Basic hardware unit of AC 800C
PNO	PROFIBUS user organization (PROFIBUS Nutzerorganisation)
PROFIBUS-DP	Fieldbus standard according to EN 50170




Term	Description
Remote I/O	Input/output modules connected to the controller via a fieldbus
RS-232	Point-to-point serial data transmission standard
RTC	Real time clock
SELV	Safety extra low voltage (power supply)

Applicable Specifications

European Union Directive Compliance


Units mentioned in this document for which product or packing is marked with the  logo comply with the electromagnetic compatibility directive 89/336/EEC and the low-voltage directive 73/23/EEC. See [Appendix E, Directive Considerations](#) on page 117.

UL Listing

Units mentioned in this document are UL listed if product or packing is marked with the UL logo.  indicates UL approval for the USA, and  also for Canada. The logo  indicates UL approval for Canada only.

The applied standard is UL508, Industrial Control Equipment. Units approved for use in hazardous locations also comply with the standard UL1604. To fulfill the UL requirements for hazardous locations, the instructions in [Appendix D, Standards](#) on page 113 must be followed.

CSA Certification

Units mentioned in this document are CSA certified if product or packing is marked with the  logo. The applied standard is C22.2, No. 142-M1987.

Units approved for use in hazardous locations also comply with the standard C22.2, No. 213-M1987. To fulfill the CSA requirements for hazardous locations, the instructions in [Appendix D, Standards](#) on page 113 must be followed.

Product Release History

This manual describes the current hardware facilities and options of S200L I/O and I/O 200C. Note that you can only use the facilities permitted according to your software license.

The S200L I/O and I/O 200C family has been allocated a version number starting at 1.0. This version number is required to keep together the configuration of all units and components belonging to the S200L I/O and I/O 200C family, and will act as a reference in the future between different documents. As the S200L I/O and I/O 200C family grows in future releases, the version number will increase accordingly.

Version	Description
1.0	Initial S200L I/O release.
1.1	200-AENTR is added and S200L I/O and I/O 200C families are explained together.

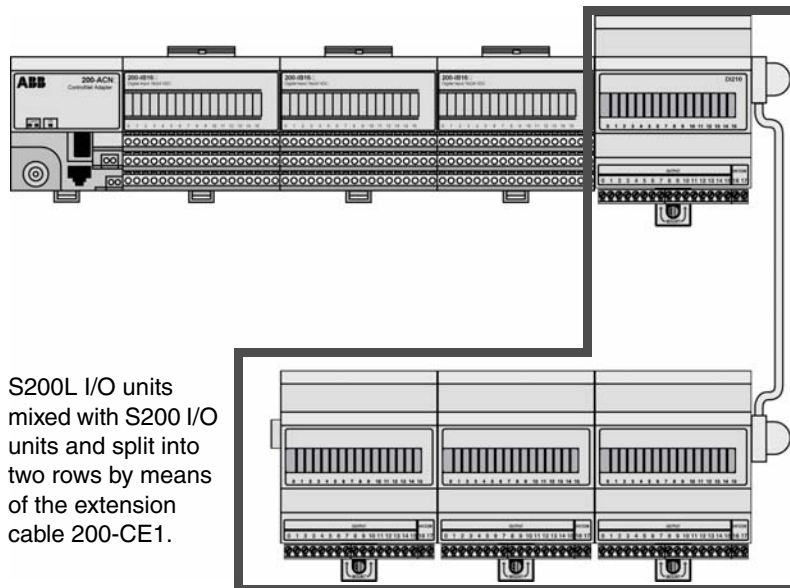
Section 1 Introduction

Product Overview

Compact I/O is a range of cost effective I/O units which can be mixed with S200 I/O units on the same DIN rail. These units can be connected to controllers through the adapters for various fieldbuses.



This manual describes the general facilities of the Compact I/O system. The use of S200L I/O and I/O 200C units and their functionality with different control platforms is dependent on certain system versions and configurations. The setting of filter constants, for instance, can be limited in some systems. Refer to the relevant manuals or product guides.



S200L I/O units mixed with S200 I/O units and split into two rows by means of the extension cable 200-CE1.

Figure 1. Configuration example

Compatibility with S200 I/O

Compact I/O units are bus compatible with S200 I/O units but because the I/O serial bus is an integral part of the S200L I/O and I/O 200C units, they cannot be replaced without physically breaking the bus. Consequently, the system power must be switched off before Compact I/O units are replaced.

External cables are connected to the units by means of detachable blocks with a total of 18 screw terminals.

Up to 8 I/O units can be plugged together on a DIN rail, but they can also be split into two rows by means of the extension cables 200-CE1 or 200-CE3.

Refer to the manual *S200 I/O, Hardware and Installation*, regarding S200 I/O units.

S200L I/O Components

The following I/O units are available:

DI210	16 digital inputs, 24 VDC, one counter input max.
DO210	16 digital outputs, 24 VDC, 600 mA
DX210	Digital combo with 10 inputs and 6 outputs
AI210	8 analog inputs, 0-20 or 4-20 mA, 12 bit resolution
AO210	4 analog outputs, 0-20 or 4-20 mA, 11 bit resolution
AX210	Analog combo with 4 inputs and 2 outputs

I/O 200C Components

200C-IB16	16 digital inputs, 24 VDC, one counter input max.
200C-OB16P	16 digital outputs, 24 VDC, 600 mA
200C-IB10xOB6P	Digital combo with 10 inputs and 6 outputs
200C-IE8	8 analog inputs, 0-20 or 4-20 mA, 12 bit resolution
200C-OE4	4 analog outputs, 0-20 or 4-20 mA, 11 bit resolution
200C-IE4xOE2	Analog combo with 4 inputs and 2 outputs

Section 2 Installation



Mandatory installation instructions in this section are marked with the symbol **M**. Such instructions must be followed to fulfil the requirements of the European Union directives.

Installation Precautions

A system installed according to the instructions in this document meets the company's environmental specifications for industrial equipment. These specifications concern electric, climatic and mechanical environment.

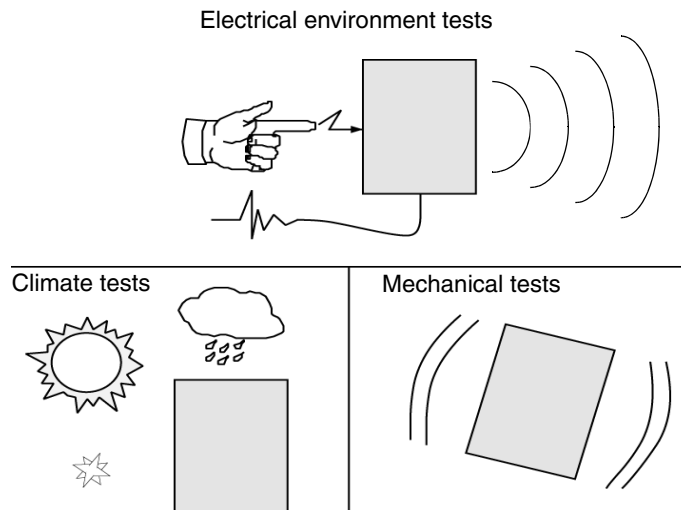


Figure 2. Environment tests

By taking the proper precautions, control systems can operate safely and reliably in normal industrial environments. Avoid locating equipment:

- where the ambient temperature is outside the range specified in the Technical Specifications.
 - where the relative humidity exceeds the range specified in the Technical Specifications.
 - where condensation may occur following sudden temperature changes.
 - where it may be exposed to high electric or magnetic fields.
 - where it may be exposed to corrosive or inflammable gases.
 - where it may be exposed to dust, conductive particles, oil mist or organic solutions.
 - where it may be exposed to direct sunlight.
 - where it may be exposed to vibration or mechanical shock.
 - where it may be exposed to water.
- Ⓜ • close to powerful high-frequency sources. Possible problems may be solved by means of external filters.

Do not use communication radios and cellular phones within one meter of the control system, as there is a risk that industrial interference levels may be exceeded, which may disturb the system.

Power Installation

Overvoltage Protection

Cables running outdoors may require overvoltage protection, see section [Devices for Extended Noise Suppression](#) on page 106. Be sure to use the correct device for each cable, otherwise the protection device may not work properly.

Contactors

Avoid mounting contactors and other disturbing equipment in the same cabinet as the control system. If this should be necessary, suppress interference (by snubbers, tranzorbs, diodes, varistors, etc.) and maintain the greatest possible distance between the system and the contactors.

Building and Power Distribution

The building in which the control system is located must be sufficiently protected against lightning, taking the local conditions into consideration.

The power distribution network must be sufficiently protected against overvoltage, taking the local conditions into consideration. In severe cases, we recommend gas discharge tubes in the main panel and varistors in the subpanel.

If the overvoltage protectors do not have a built-in inductance, the cable between the main panel and the subpanel must be longer than 10 meters.

The building should have a grounding busbar system to minimize common-mode currents. Alternatively, ground current loops must be broken by grounding shielded cables at only one end, or by using isolation amplifiers, fiber modems, etc.

Power Supply

For controllers and I/O systems, supplied by 24 V DC power supply units, see section [Power Supplies](#) on page 111.



The output from the power supply must be isolated from mains.

It is recommended that the power supply be mounted in the same cabinet as the supplied system. If the power supply does not have a mains fuse, this can be installed between the power-line filter and the 24 V DC power supply.



The controller and the I/O system should, if possible, have separate 24 V DC supplies. If separate supplies are not used, the common 24 V DC power supply should have a separate filter for the controller. If possible, use a separate power supply for analog units to ensure accuracy.



For UL approval of the entire installation the power supply must be UL approved as a “general purpose” power supply.

External Power, Communication and I/O Cables

If external power cables, for example 230 V AC or 24 V DC, and signal/communication/I/O cables run in parallel they should be separated by at least 30 cm. The distance between them may be 10 cm for a maximum length of 1 meter. See Recommended Cable Types on page 28.

Filtering

Filtering must be performed according to the figures below. Filters are here divided in type A and type B as follows:

- Type A Corresponds to a two-stage filter for mounting plate assembly
- Type B Corresponds to a one-stage filter for mounting plate assembly or DIN rail assembly

A filter of type A is required to protect the mains from emission from the control system and to protect controllers, fieldbus adapters and analog I/O units from noise from the mains. A filter of type B is used to protect controllers, fieldbus adapters and analog I/O units from disturbances from digital I/Os, since the 24 V DC process voltage for digital I/O can pick up noise from the plant. See section [Power-Line Filters](#) on page 105 for recommended filters of types A and B.



Both types attenuate superimposed high-frequency noise, but they are not overvoltage protectors and do not prevent the voltage from exceeding a certain level. Note also that it is possible to use a filter of type A in place of a type B filter.

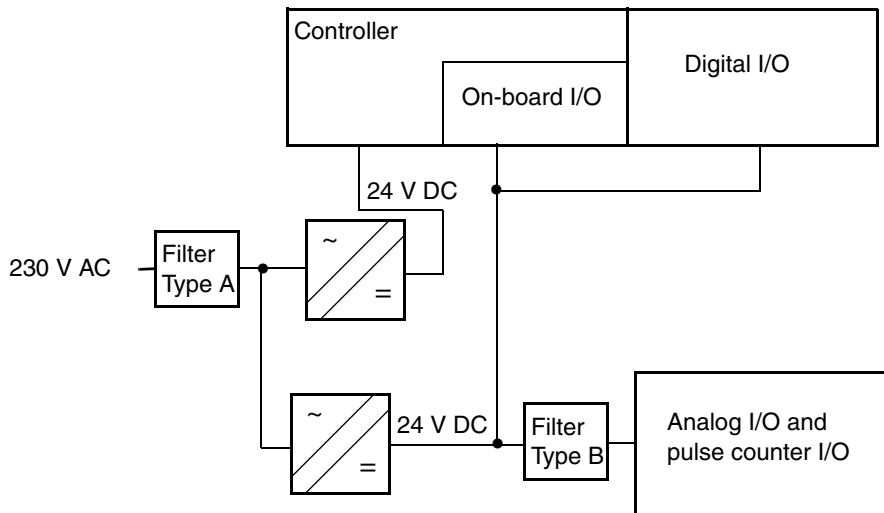


Figure 3. Filtering for a controller with central digital and analog I/O units having separate serial buses.

The controller and the I/O system are mounted in the same cabinet, without a fieldbus connection (central I/O units). The separate serial buses are supplied with power by the controller.

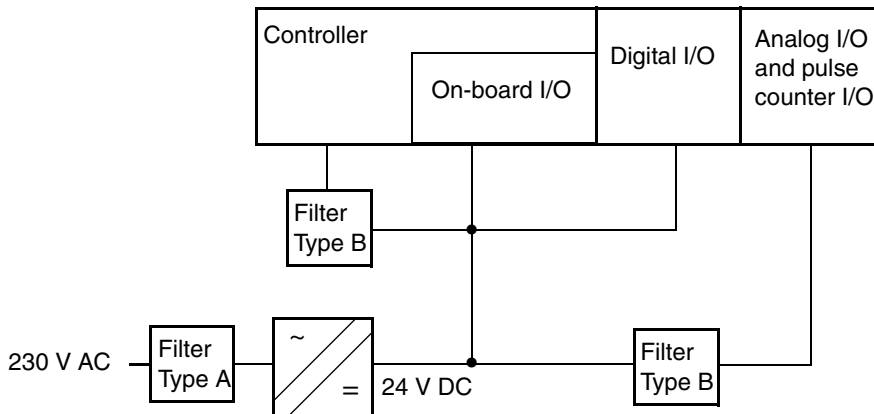


Figure 4. Filtering for a controller with central digital and analog I/O units combined on a common serial bus.

The controller and the I/O system are mounted in the same cabinet, without a fieldbus connection (central I/O units). The common serial bus is supplied with power by the controller.

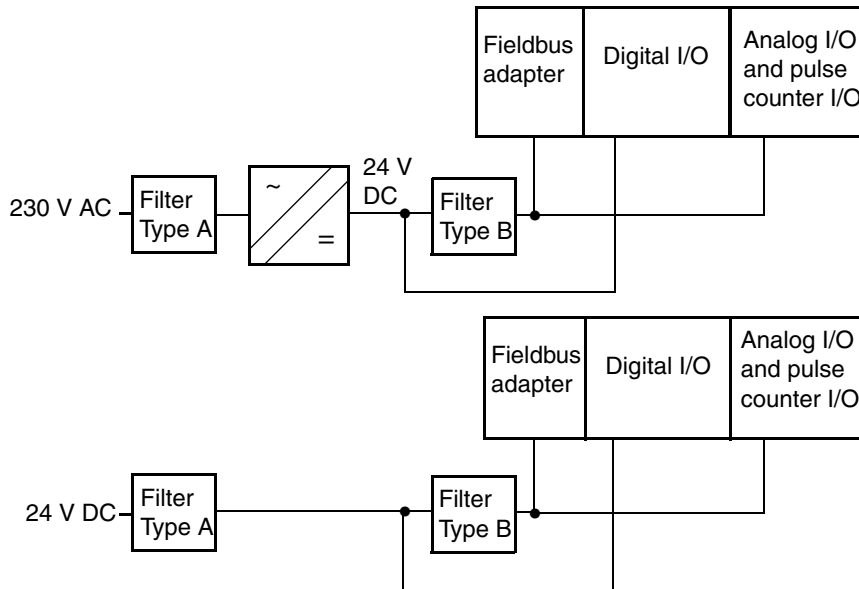


Figure 5. Filtering for remote I/O

The I/O systems are connected to the controller via a fieldbus and fieldbus adapter (for instance PROFIBUS-DP). Digital and analog/pulse counter I/O units are combined on a common serial bus. The power to the serial bus is supplied by the fieldbus adapter. Alternative power supplies, 230 V AC and 24 V DC, are shown.

- M
 If filters and lightning protectors are not connected to ground via the mechanical fastening devices, the ground connection should be made with a ground wire, maximum 100 mm long and minimum 1.5 mm² or AWG 16.

Installation of Power-Line Filter for 24 V DC



Note the following when installing the power-line filter for 24 V DC. If the filter has two ground connections, both must be connected to ground via a ground terminal block, close to the power-line filter, see figure below.

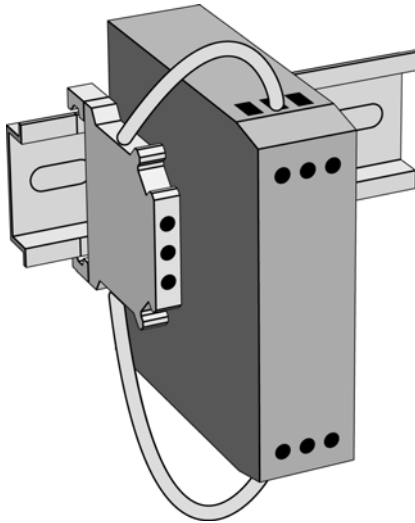


Figure 6. Power-line filter for 24 V DC

For recommended types of filters and overvoltage protectors, see section [Power-Line Filters](#) on page 105.

Installation of External Cables

Recommended Cable Types

ABB Automation Products recommends the cable types specified in section [Cables for Process Signals](#) on page 112.

Cables can be divided into the following classes:

III	Non-sensitive signals (noisy)	Example: 230 V AC mains
II	Moderately sensitive signals (quiet)	Example: 24 V DC, digital I/O signals, RS-485, PROFIBUS-DP, ControlNet and SattBus
I	Sensitive signals (very quiet)	Example: Analog signals, RS-232 and Ethernet (trunk cable and AUI cable)

In order for signals not to interfere with each other, the following minimum distances should be maintained between long, parallel cables outside cabinets.

II – III 0.3 meters

I – II 0.3 meters

I – III 1.0 meter

Connecting Power Supply Cables

- Controller and I/O system should if possible have separate 24 DC power supplies, see section [Power Supply](#) on page 23.
- Always use shielded cables for incoming mains power inside the cabinet unless the power-line filter is mounted directly where the power cable enters the cabinet.
- Connect the mains via a power-line filter to the 24 V supplies.
- Connect the 24 V DC power supply to the I/O units requiring 24 V DC.
 - Ⓜ Digital and analog I/O units should always be separated by a power-line filter. Separate wires can be used for each I/O unit, or the wires can be chained if the total current for all I/O units does not exceed the maximum current for the cables or screw terminals.

For power connection and filtering see also page 24.

Connecting Cables to Screw Terminals

The wire areas for screw terminals are specified in the appendices “Technical Specifications” and “Recommended Components”.

A maximum of 2 wires is allowed in each terminal. However, three wires are allowed if ferrules are used. The wires should be crimped, not soldered.

Recommendations: Tightening torque for the screw terminals: 0.5–0.8 Nm. Use copper wires only, which are UL approved for 60/75 °C.



Figure 7. Two wires are allowed in each terminal, unless ferrules are used.

Unshielded Cables

Unshielded cables can be used in normal industrial environments for digital I/O signals.

M Shielded Cables

Shielded cables must be used for analog I/O and communication (except SattBus and Ethernet twisted pair).

The shields must be clamped to ground (normally the mounting plate) using one of the following alternatives.

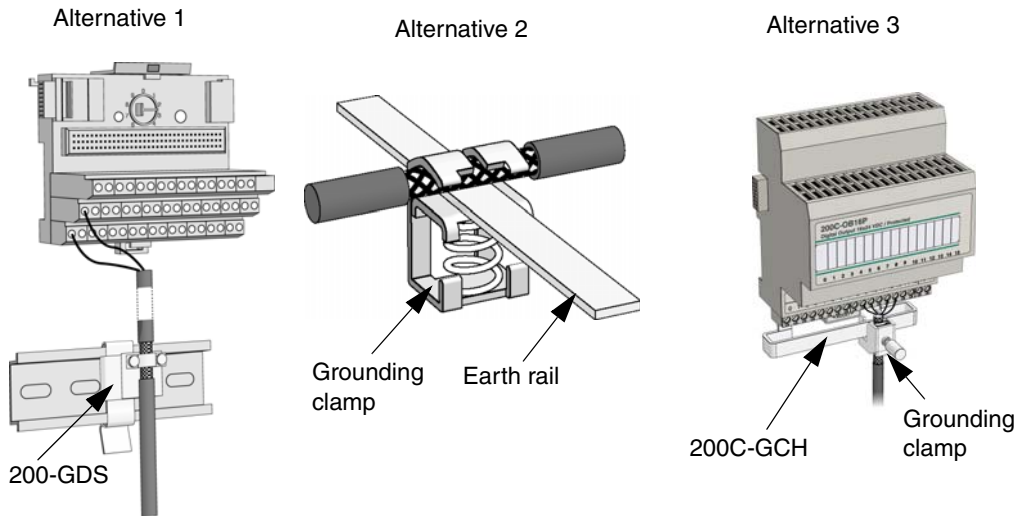


Figure 8. Cable shielding alternatives

Alternative 1: Grounding device 200-GDS

Mount a DIN rail where the cables enter the cabinet, snap a sufficient number of 200-GDS devices onto the DIN rail, remove 10 mm of the sheath and fasten the cables. 200-GDS is designed for cable diameters of 5-8 mm. Let the shield continue as close as possible to the inner conductor connection point.

Alternative 2: Earth rail with grounding clamp

See section [Grounding Devices](#) on page 106 for a recommended grounding clamp to be mounted on an earth rail where the cables enter the cabinet. The distance between the holders must not exceed 100 mm. Use metal holders only.

Alternative 3: Grounding clamp holder 200C-GCH

The clamp holder is screwed onto the back of AC 800C and S200L I/O and I/O 200C units. Mount a suitable grounding clamp on the holder (see section [Grounding Devices](#) on page 106) and tighten it around the exposed braided shield of the cable.

See section [Cables for Process Signals](#) on page 112 for recommended cable types.

Mounting Instructions

This section describes how to mount the Compact I/O units and their accessories. The corresponding information regarding S200 I/O units and bus adapters can be found in the manual *S200 I/O, Hardware and Installation, User's Guide*. Refer to the section [Mounting Dimensions](#) on page 37 for scale drawings and recommended distances between components on a mounting plate. The mounting of I/O units together with controllers is described in the corresponding controller manuals.

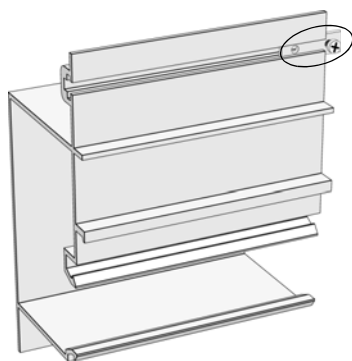
Mandatory installation instructions in this section are marked with the symbol **M**. Such instructions must be followed to fulfil the requirements of the EMC directive.

Rails and Profiles

I/O units are mounted on either DIN rails or mounting profiles. To achieve the best possible corrosion resistance, DIN rails should be chromium plated, for instance yellow chromium treated. Use star washers with each screw used to fasten the DIN rail to the mounting plate. The minimum screw diameter is 5 mm. Recommended DIN rails are specified in section [Miscellaneous](#) on page 109.

Mounting profiles incorporate cable ducts. They can be delivered by ABB Automation Products in different lengths, see page 101.

Note that vertical mounting of I/O rows is possible.



A locking plate and a screw are delivered with the mounting profiles. They are used to fasten 200-CE1/CE3 cables, see page 36.

Figure 9. Mounting profile with locking plate

Mounting S200L I/O and I/O 200C Units

Up to eight S200 and S200L I/O and I/O 200C units can be mounted on the DIN rail or mounting profile and plugged together with the bus adapter.

Because the serial I/O bus is an integral part of the Compact I/O units, the units cannot be replaced without physically breaking the bus.

1. Remove the protective caps from the serial bus connectors to be used. Keep track of the caps and fit them on unused connectors. Note that AC 800C and adapters are delivered with protective caps, but S200L I/O units are delivered without.
2. Check that the locking device of the Compact I/O unit is in the MOUNT/SLIDE position (C). Hook the lip at the rear of the unit onto the top of the DIN rail, and snap the unit into position. Slide the unit sideways to mate with the bus adapter or another I/O unit. Turn the locking screw clockwise to the LOCKED position (A).

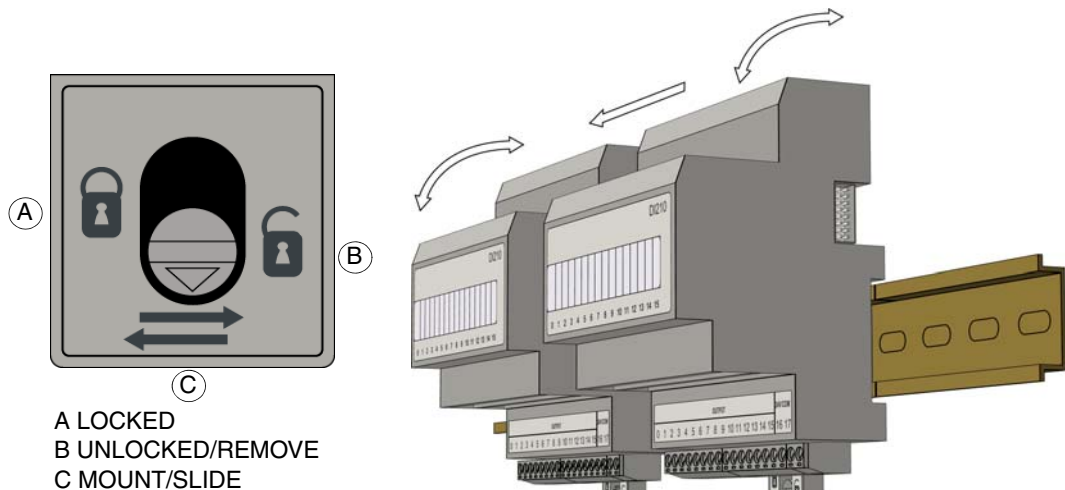


Figure 10. Mounting S200L I/O and I/O 200C units



Make sure that the connector pins and sockets are in line when the units are plugged together, otherwise there is danger of damaging the pins. Do not use excessive force!

Note that it is essential to lock the units in the LOCKED position (A) to avoid problems due to vibration and inadequate grounding.

Do not insert or remove Compact I/O units with the power connected to the unit or to the attached bus adapter.



A controller and an I/O system connected without using a field bus (i.e. a controller and a central I/O system) must be mounted in the same cabinet on the same metal mounting plate.

Removing S200L I/O and I/O 200C Units

1. Disconnect the power supply from the attached bus adapter and remove the detachable screw terminal block from the I/O unit.
2. If units must be moved sideways, turn their locking screws to the MOUNT/SLIDE position (C) and slide them gently to one side.
3. Turn the locking screw of the unit to be removed to the MOUNT/SLIDE position (C). Push it aside just enough to release it from the unit next to it.
4. Turn the locking screw anti-clockwise to the UNLOCKED/REMOVE position (B) and tip the unit outwards to remove it from the DIN rail.

Cables

Cable 200-CE1/CE3 Mounted on a DIN Rail

S200 and S200L I/O and I/O 200C units can be split into two rows by means of the extension cables 200-CE1 or 200-CE3.



Do not use an extension cable to connect an adapter to the first I/O unit in the row.

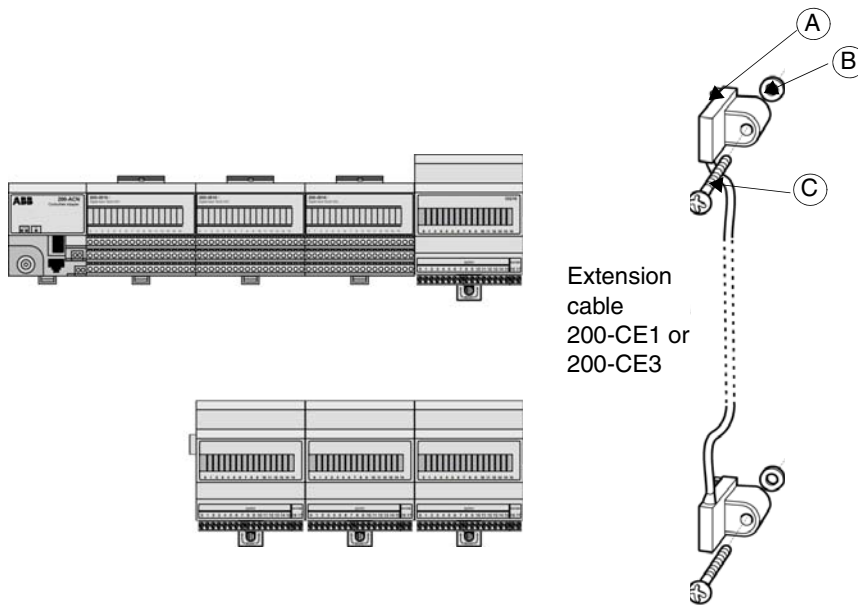


Figure 11. Mounting the extension cable

The cable 200-CE1/CE3 must be mounted before any adapters or I/O units are installed. This is because some drilling is required to attach the screws that come with the cable. Refer also to section [Split Rows](#) on page 38.

Mount an I/O unit temporarily as a template to mark the positions of the cable fixing holes. Make sure you remove the I/O unit before drilling, as metallic particles may otherwise fall into the electronics causing damage or short-circuit. Mounting of I/O units must thus commence from the right hand side of the DIN rail. If mounting is

not carried out in this way, the cable connectors may not be positioned correctly to allow mating to the rightmost I/O unit.

Proceed as follows:

1. Insert the cable connector (A) into the mating connector on right side of the I/O unit. Push in firmly.
2. Mount the I/O unit onto the DIN rail.
3. Use a pointing tool to mark the position of the hole on the mounting plate.
4. Remove the temporarily mounted I/O unit with the connected cable.
5. Using the mark made in step 3, drill a hole with a diameter of 3.2 mm for the 6-32 screw¹ (C) supplied with your kit.
6. Repeat steps 1 to 5 for the row below.
7. After drilling, reinstall both I/O units and secure with the 6-32 screw (C) and the screw washer (B).



Drilling must not take place when units are mounted on the DIN rail. Do not forget the washer (B).

1. This screw has a diameter of 3.7 mm and a length of 25.4 mm. The screw is self-tapping. 6-32 is a screw of type 6, which means a tap diameter of 9/62 inches, i.e. 3.7 mm. The drill-hole diameter of 3.2 mm assumes that the material to be drilled is made of steel with a thickness of 3 mm.

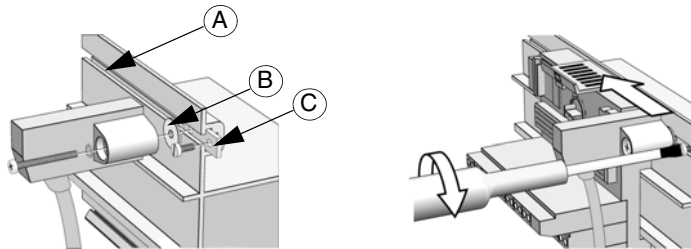
Cable 200-CE1/CE3 Mounted on a Mounting Profile

Figure 12. Cable 200-CE1/CE3 mounted on a mounting profile

Proceed as follows:

1. The mounting profile has a groove (A) where a locking plate (C) is to be inserted.



Make sure that the washer (B) is inserted between the 200-CE1/CE3 cable and the mounting profile.

2. Insert the locking plate into the groove.
3. Attach the 200-CE1/CE3 cable to the locking plate by fastening the screw into the left hole on the locking plate. Make sure that the washer is located between the 200-CE1/CE3 cable and the mounting profile, otherwise the connector will not fit into the I/O unit.
4. Push the 200-CE1/CE3 cable into the I/O unit.
5. Lock the cable by fastening the screw in the right hole of the locking plate.

Mounting Dimensions

This section provides scale drawings of the Compact I/O units and their accessories, and some recommendations for the distances between components on a mounting plate. Mounting I/O units together with controllers is thoroughly dealt with in the corresponding controller manuals.

S200L I/O and I/O 200C Unit

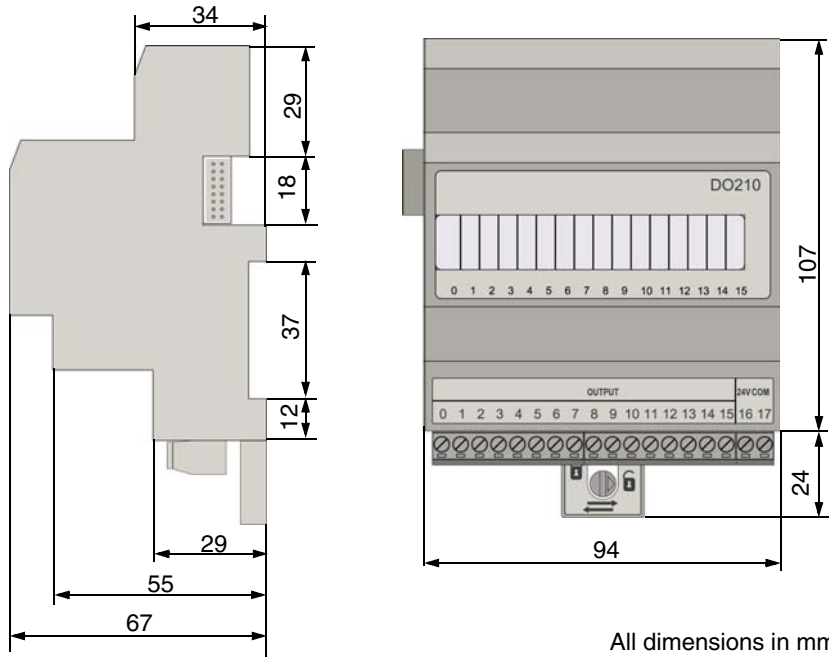


Figure 13. S200L I/O and I/O 200C unit, mounting dimensions

200-AIO Adapter

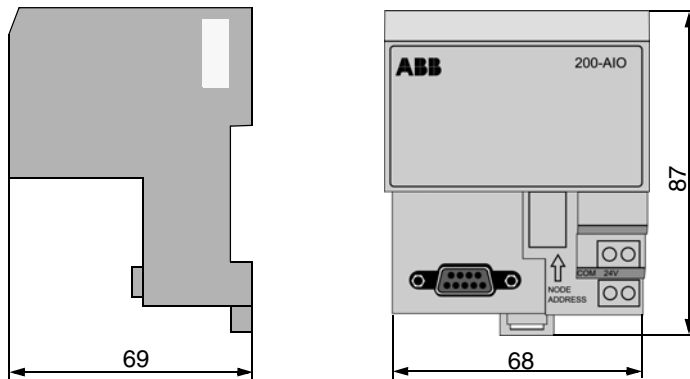
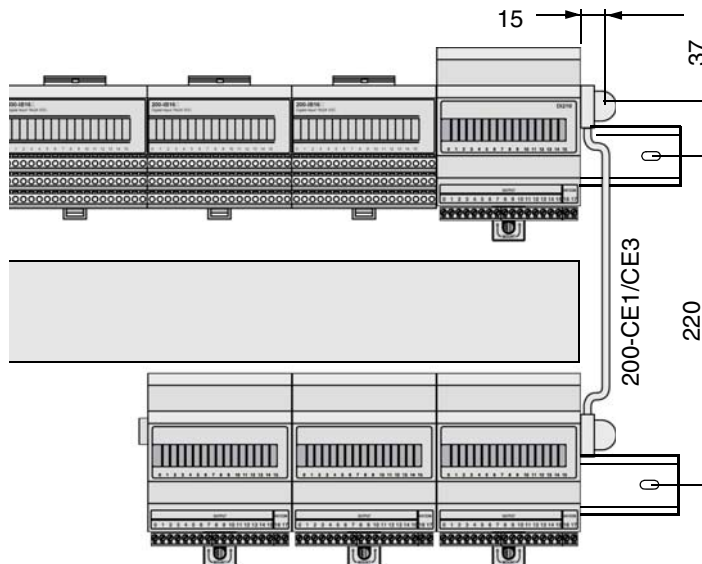


Figure 14. 200-AIO adapter, mounting dimensions

Split Rows

When dividing the I/O units into two rows connected by the 200-CE1/CE3 cable, the recommended minimum distance between the DIN rails is 220 mm. If mounting profiles are used, the corresponding distance can be reduced to 190 mm.



All dimensions in mm

Figure 15. Split rows, mounting dimensions

Various Distances

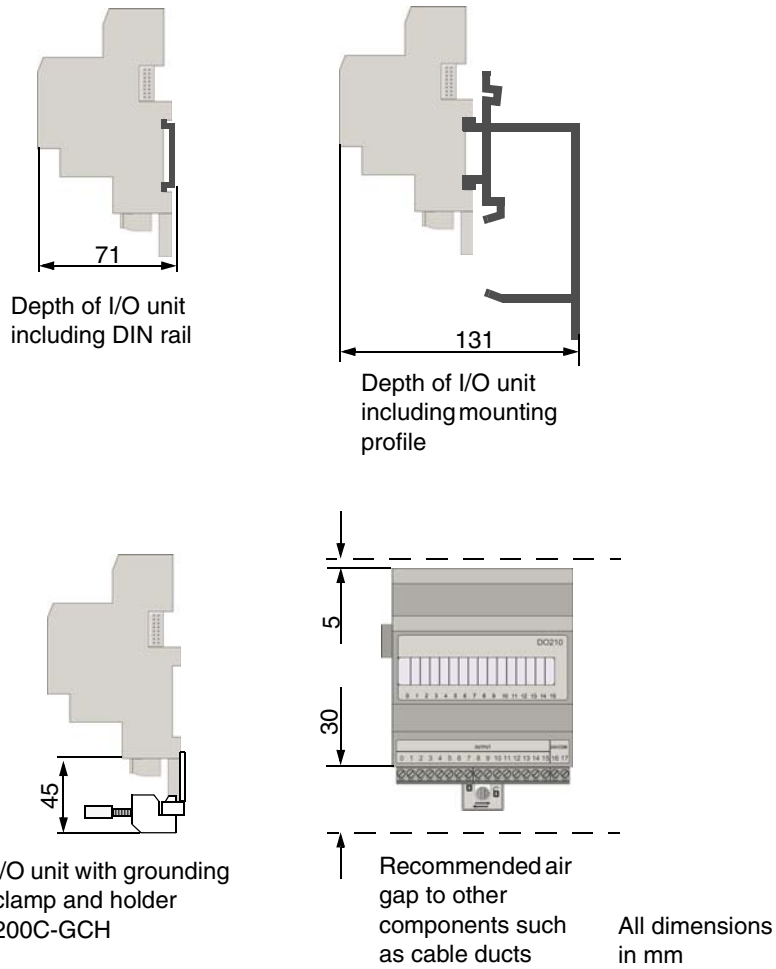
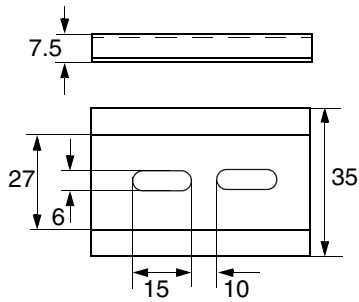


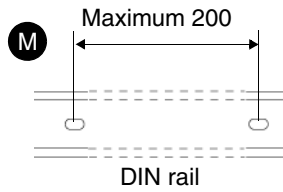
Figure 16. Various distances, mounting dimensions

DIN Rail



Dimensions (in mm) for the DIN rail TS 35/7.5.
Length 2 meters (standard DIN 46 277, EN 50 022).

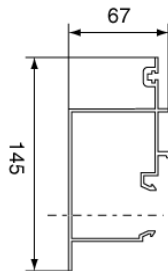
Figure 17. DIN rail, mounting dimensions



The maximum distance between the mounting screws is 200 mm

Figure 18. DIN rail, maximum distance between the mounting screws

Mounting Profile



All dimensions in mm

Figure 19. Mounting profile, mounting dimensions

MP590

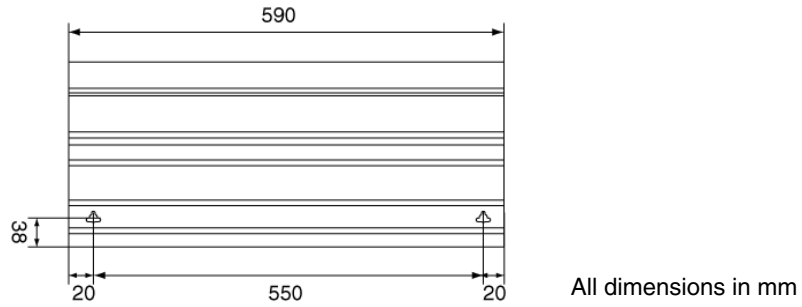


Figure 20. MP590, mounting dimensions

MP890

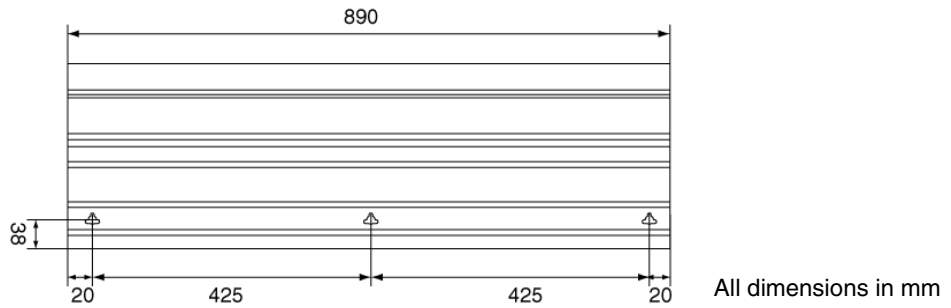


Figure 21. MP890, mounting dimensions

MP990

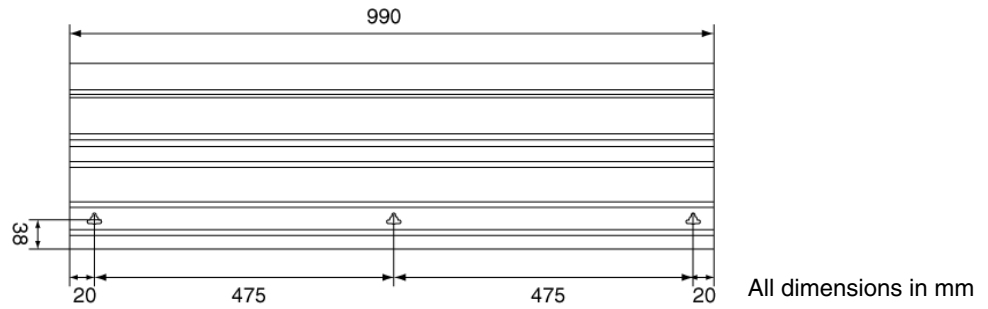


Figure 22. MP990, mounting dimensions

Section 3 Configuration

This section describes how Compact I/O units are incorporated into a control system and how the current consumption can be calculated.

I/O System Connection

Compact I/O units contain an integral serial I/O bus which connects up to eight units to a bus adapter such as 200-AIO (AC 800C or SoftController), 200-APB12 (PROFIBUS-DP), 200-ANN (Advant Controller 250), or 200-ACN (ControlNet). Refer to *S200 I/O Hardware (3BSE021356*) manual* regarding 200-ANN, 200-ACN, and 200-AENTR.

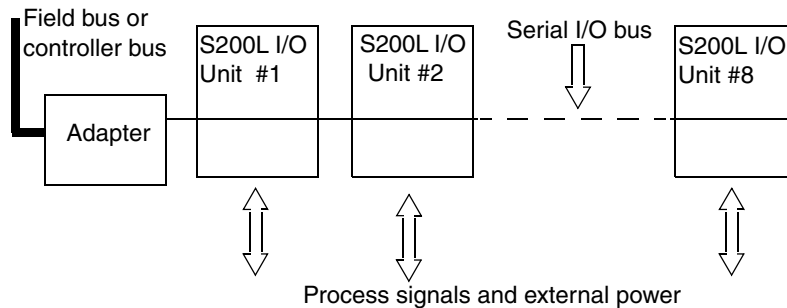


Figure 23. I/O system connection

The serial I/O bus is identical for S200 I/O units, S200L I/O and I/O 200C units. S200 I/O units, S200L I/O and I/O 200C units may be mixed in any order:

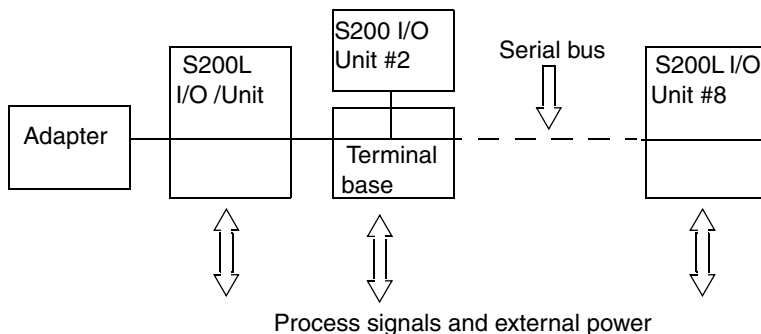


Figure 24. Mixing S200L and S200 I/O units

A maximum of eight I/O units can be plugged together, and they can be split into two rows by means of the extension cables 200-CE1 or 200-CE3:

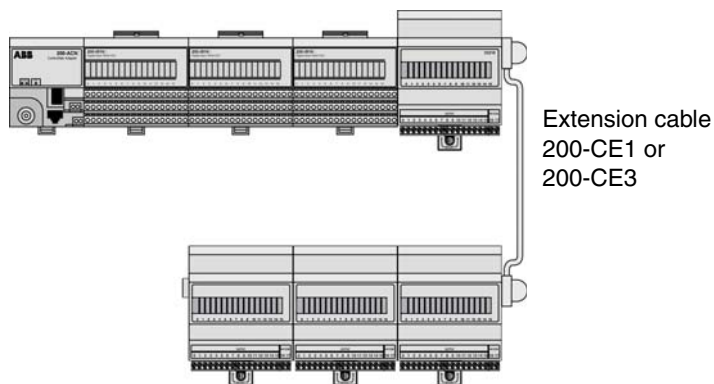


Figure 25. Extension cable

Current Consumption Calculation

To calculate the total current from the external 24 V power supply both the current required by the I/O units themselves and that required by the inputs/outputs must be considered. For digital outputs the total simultaneous output current must be known. Refer to [Appendix B, Technical Specifications](#) on page 89 for the basic data.

Example 1

The current from the external 24 V DC power supply which is required for S200L I/O units can be estimated in the following way.

DI210 and 200C-IB16	With all inputs activated via relay contacts, the current consumption is $16 \times 5.2 \text{ mA} = 0.083 \text{ A}$ per unit at 24 V DC supply voltage. If other types of sensors are used, their internal consumption must be added according to the manufacturer's specifications.
DO210 and 200C-OB16P	The maximal load current is 600 mA per output, 7 A per unit. Other current losses are less significant.
AI210 and 200C-IE8	The current consumption is 40 mA per unit plus the sensor consumption according to the manufacturer's specifications.
AO210	The current consumption is 100 mA per unit plus the output current, which is max. $4 \times 20 \text{ mA} = 80 \text{ mA}$.

Example 2

The current required from the external 24 V DC power supply is estimated for a system which contains the following number of S200L I/O and I/O 200C units: 5 DI210 and 200C-IB16, 3 DO210 and 200C-OB16P, 2 AI210 and 200C-IE8, and 1 AO210.

Assumptions: Max. 32 of the 48 digital outputs can be on simultaneously and the output load is max. 0.1 A per output. The analog sensors are fed from the power supply unit with max. 25 mA per input.

5 DI210 and 200C-IB16 require $5 \times 0.083 \text{ A} = 0.42 \text{ A}$
 32 on-state outputs require $32 \times 0.1 = 3.20 \text{ A}$
 2 AI210 and 200C-IE8 require $2 \times 0.04 + 2 \times 8 \times 0.025 = 0.48 \text{ A}$

$$\begin{array}{rcl} 1 \text{ AO210 requires } 0.1 + 4 \times 0.02 = & & \underline{0.18 \text{ A}} \\ \text{Total max. current} & & 4.28 \text{ A} \end{array}$$

This means that the external 24 V DC power supply should be able to deliver at least 5 A.



It is recommended that a separate power supply be used for analog units to ensure accuracy.

Section 4 Operation

This section describes the design and function of the I/O units. See also [Appendix B, Technical Specifications](#) on page 89. Remember to check that your controller software allows you to use the functions described.

Digital Input Unit DI210 and 200C-IB16

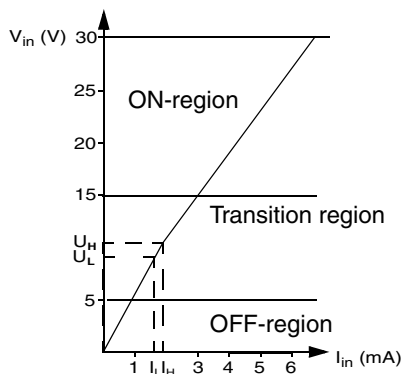
DI210 and 200C-IB16 is an I/O unit for 16 digital input signals, nominally 24 V DC. The unit fulfills the requirements for digital inputs according to IEC 61131-2 type 1.

The inputs are galvanically isolated by optocouplers and share a common ground connection. They have a second-order low-pass hardware filter and a digital low-pass filter with a time constant set in the programming software.

The status of each signal is indicated by a yellow LED on the front of the unit. The LED is lit when the input is TRUE.

Input 15 can also be used as a 16-bit pulse counter.

Power for the internal logic is provided via the serial bus.

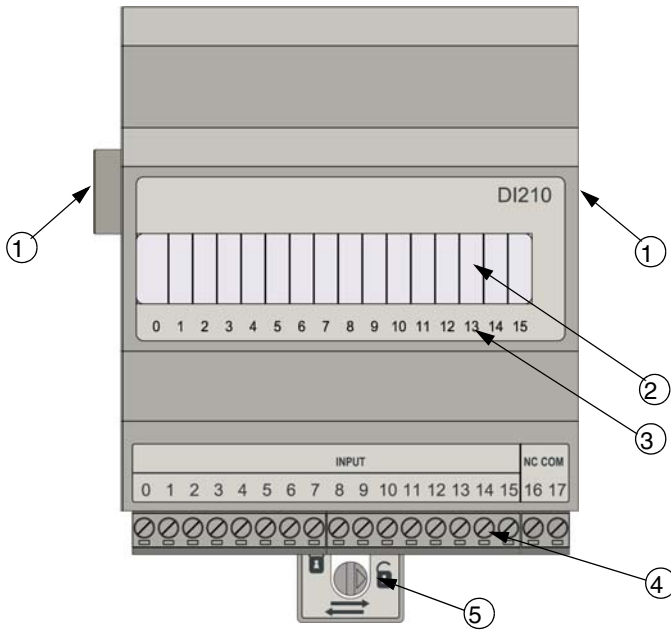


ON, OFF and transition regions for inputs according to the IEC 61131-2 type 1 standard. The transition level and hysteresis of the DX210 inputs are well inside the specified transition region as indicated in the figure:

OFF to ON at U_H, I_H
 ON to OFF at U_L, I_L

Figure 26. Transition regions for digital inputs

The digital filter has one common time constant for inputs 0–11 and another for inputs 12–15. The sum of the hardware and digital filter time constants affects the shortest possible pulse length that can be detected and the highest possible frequency that can be connected to the pulse counter. If the fast pulse counter is selected by software, the maximum pulse frequency is 5 kHz irrespective of the time constant specified for inputs 12–15.



- 1 = Serial bus connectors
- 2 = Label on which input designations can be written
- 3 = Yellow LEDs, 0–15
- 4 = Detachable 18-pole screw terminal block (split into 8+8+2 terminals)
- 5 = Locking device

Figure 27. Digital input unit DI210 and 200C-IB16

The filter time constants and the corresponding maximum pulse frequency are given in the table below.

Filter Time Constant	Max. Pulse Frequency
–	Fast pulse counter 5000 Hz
256 ms	1500 Hz
512 ms	750 Hz
1 ms	375 Hz
2 ms	180 Hz
4 ms	90 Hz
8 ms	45 Hz
16 ms	22 Hz
32 ms	11 Hz

The unit is not damaged if the input signal polarity is reversed.

Functional Block Diagram

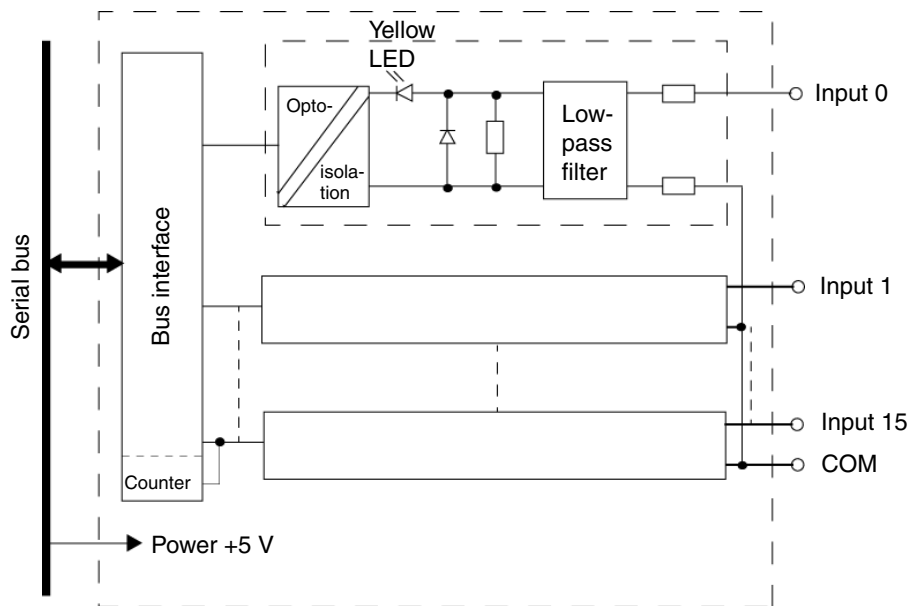


Figure 28. DI210 and 200C-IB16 functional block diagram

DI210 and 200C-IB16 Connections

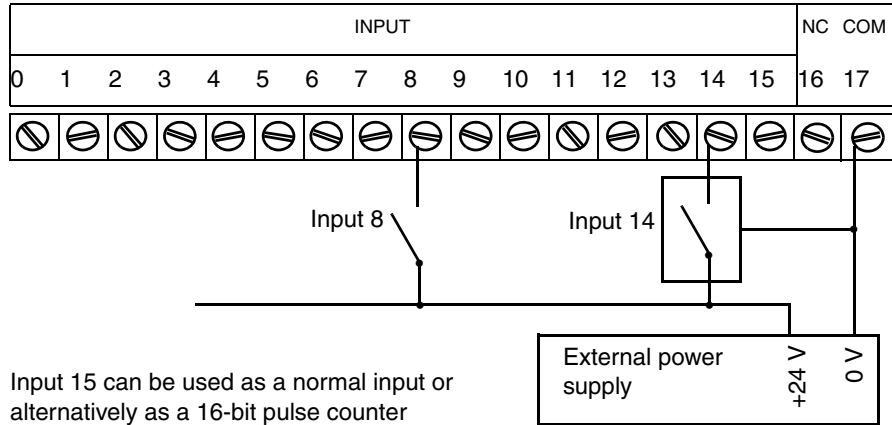


Figure 29. DI 210 - 200C-IB16 connections

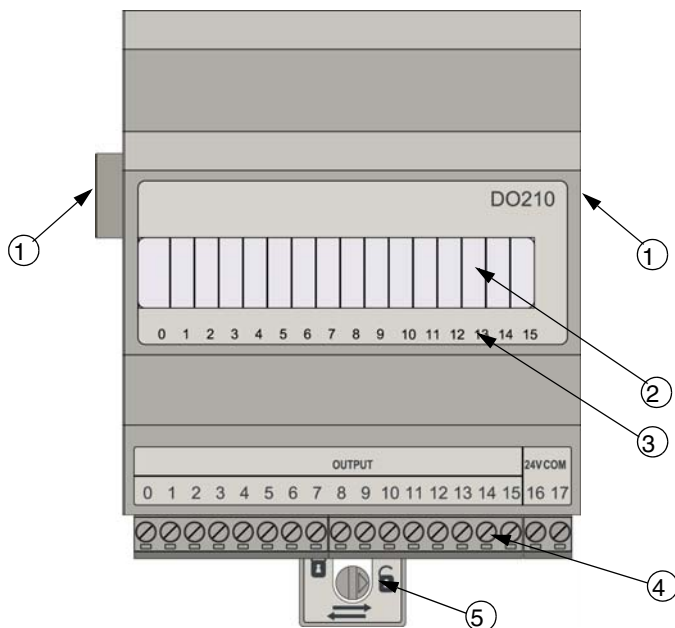
Digital Output Unit DO210 and 200C-OB16P

DO210 and 200C-OB16P is an I/O unit for 16 digital output signals, nominally 24 V DC. The outputs are galvanically isolated by optocouplers, short-circuit proof, and share a common ground connection.

The status of each signal is indicated by a yellow LED on the front of the unit. The LED is lit if the output is activated and the external +24 V DC power supply is present.

Outputs can be connected in parallel to increase output current, restricted only by the maximum total output current of the unit, see Technical Specifications on page 91.

Power for the internal logic is provided via the serial bus.



- 1 = Serial bus connector
- 2 = Label on which output designations can be written
- 3 = Yellow LEDs 0–15
- 4 = Detachable 18-pole screw terminal block (split into 8+8+2 terminals)
- 5 = Locking device

Figure 30. Digital output unit DO210 and 200C-OB16P

In order to quickly demagnetize inductive loads when switched off, a Zener diode limits the negative output voltage.

The output signals are delayed OFF to ON <70 μ s and ON to OFF <350 μ s.

The unit is equipped with a protective control circuit to deal with the following eventualities:

- If an output connects to a short-circuit, it is automatically switched off. The short-circuit is then tested by short pulses at regular intervals, resulting in a mean current of about 200 mA.
- If the chip temperature reaches about 160 °C, the output is switched off in order to protect the driver circuit from overheating.
- If the +24 V supply voltage drops to below about 8 V, the outputs are switched off.

Normal operation of the outputs is automatically resumed when normal external conditions are re-established.



It is recommended that an output not be left permanently short-circuited, as this will cause a local increase in the temperature of the printed circuit board.

The unit is not damaged if the power supply polarity is reversed.

Functional Block Diagram

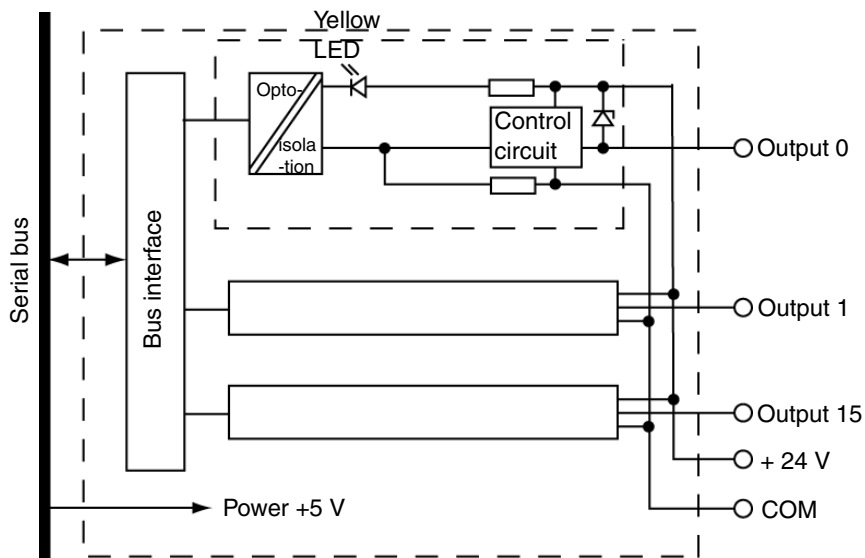


Figure 31. DO210 and 200C-OB16P functional block diagram

DO210 and 200C-OB16P Connections

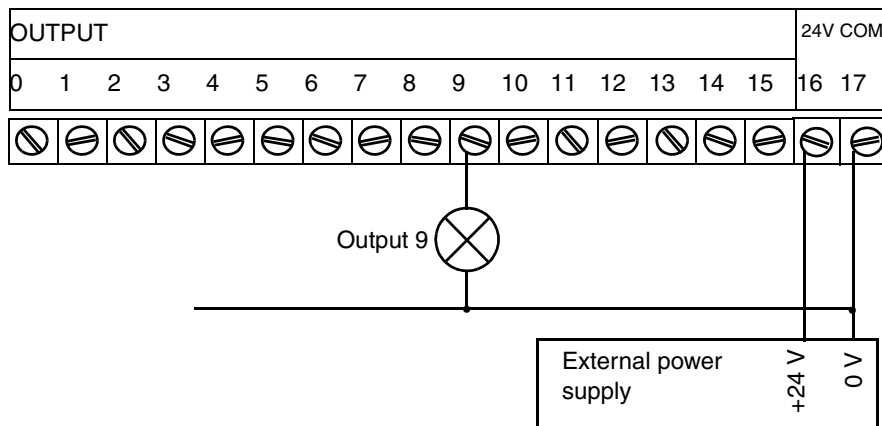


Figure 32. DO 210 - 200C-OB16P connections

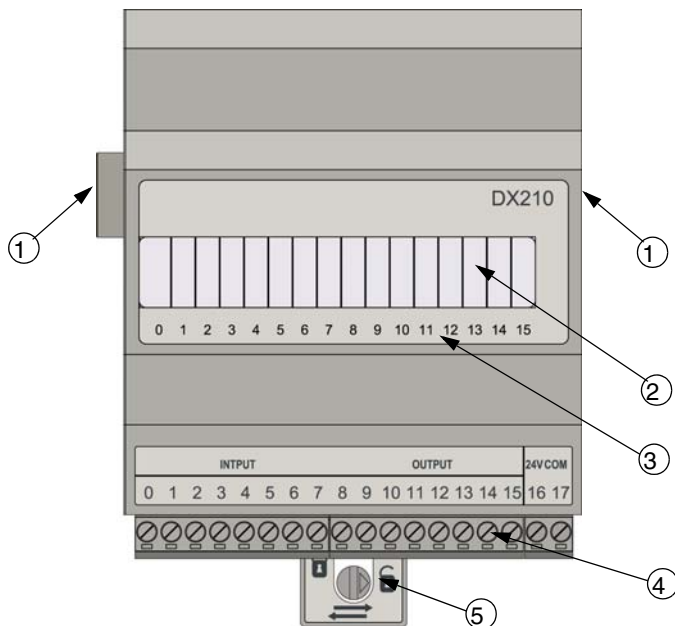
Digital Input/Output Unit DX210 and 200C-IB10xOB6P

DX210 and 200C-IB10xOB6P is an I/O unit for 10 digital input and 6 digital output signals, nominally 24 V DC. All I/O signals are galvanically isolated by optocouplers and share a common ground connection. The outputs are short-circuit proof.

The status of each signal is indicated by a yellow LED on the front of the unit. The output LEDs require the presence of the external +24 V power supply to function.

Outputs can be connected in parallel to increase output current, restricted only by the maximum total output current of the unit, see Technical Specifications on page 92.

Power for the internal logic is provided via the serial bus.



- 1 = Serial bus connector
- 2 = Label on which input/output designations can be written
- 3 = Yellow LEDs, 0–15, lit when the corresponding inputs and outputs are TRUE
- 4 = Detachable 18-pole screw terminal block (split into 10+6+2 terminals)
- 5 = Locking device

Figure 33. Digital input/output unit DX210 and 200C-IB10xOB6P

The inputs have a digital filter with a common time constant which can be selected according to the table on page 50. DX210 and 200C-IB10xOB6P has no pulse counter input. The hardware filter is identical to that of DI210 and 200C-IB16.

The output signal delays and the short-circuit protection for the outputs are identical to those of DO210 and 200C-OB16P.

The unit is not damaged if the power supply polarity is reversed.

Functional Block Diagram

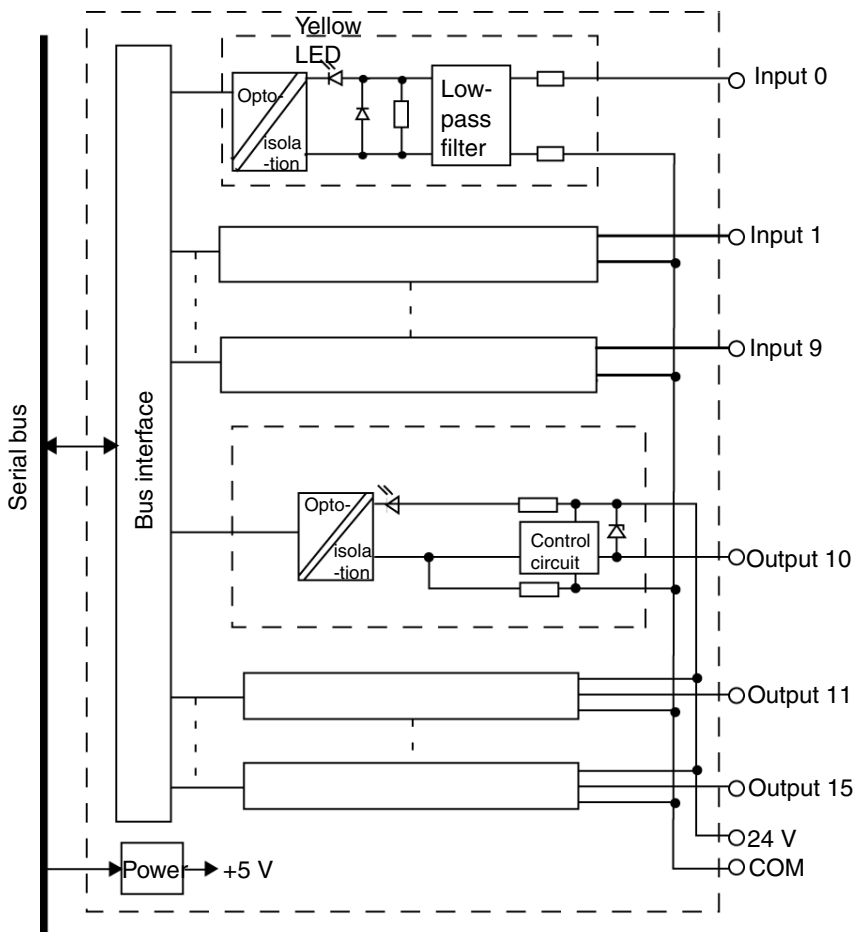


Figure 34. DX210 and 200C-IB10xOB6P functional block diagram

DX210 and 200C-IB10xOB6P Connections

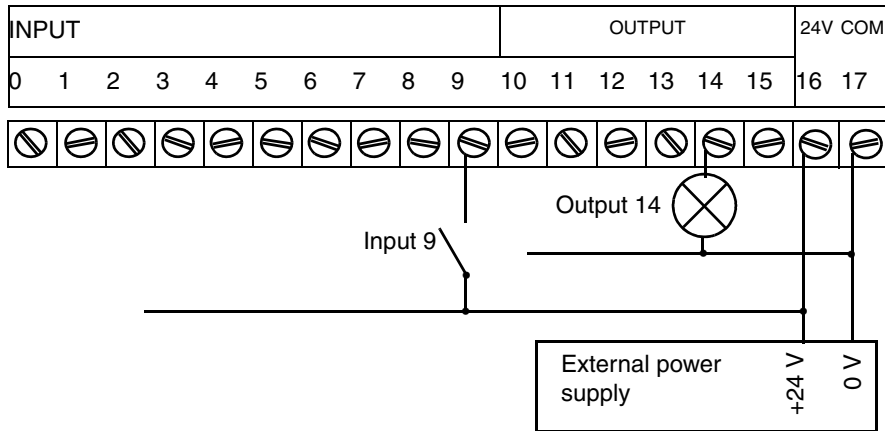


Figure 35. DX210 and 200C-IB10xOB6P connections

Analog Input Unit AI210 and 200C-IE8

AI210 and 200C-IE8 is an I/O unit for 8 analog single-ended input signals. The inputs are low-pass filtered, galvanically isolated from the serial bus by optocouplers and share a common ground connection. The internal logic requires an external +24 V DC power supply.

A common LED indicates correct operation with a green light and failure with red, see page 94.

The input current range 4–20 mA or 0–20 mA is set in the programming software individually for each input.

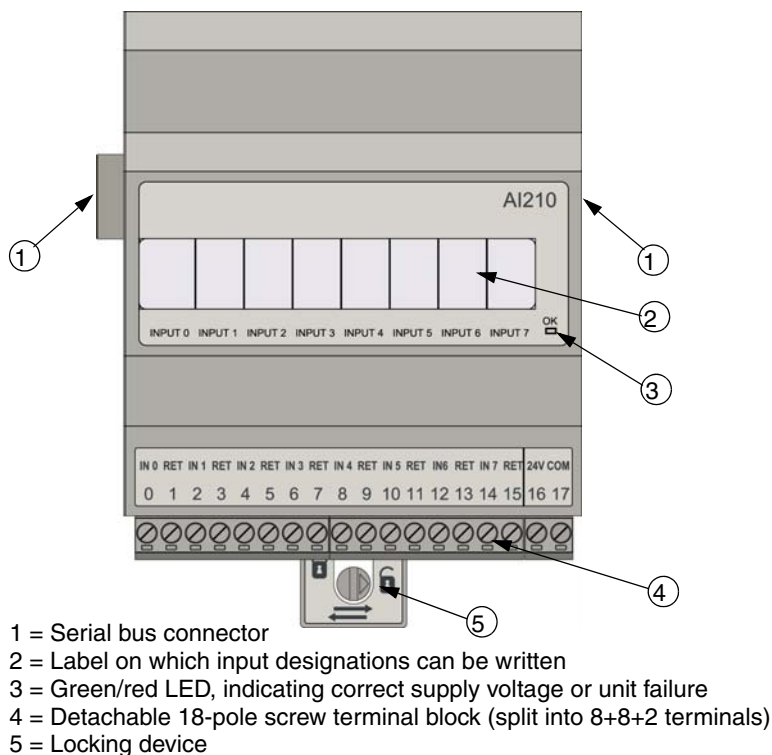


Figure 36. Analog input unit AI210 and 200C-IE8

The AD converter is calibrated on power-up, but calibration can also be initialized by user programming. Accuracy can be improved if the unit is calibrated at normal operating temperature, if this differs considerably from the power-up temperature. The input signals are frozen during calibration, which takes about 250 ms.



Since the internal logic is supplied from an external +24 V power supply, the unit appears non-existent from the adapter or controller if the power is lacking.

The unit is not damaged if the power supply polarity is reversed.

Functional Block Diagram

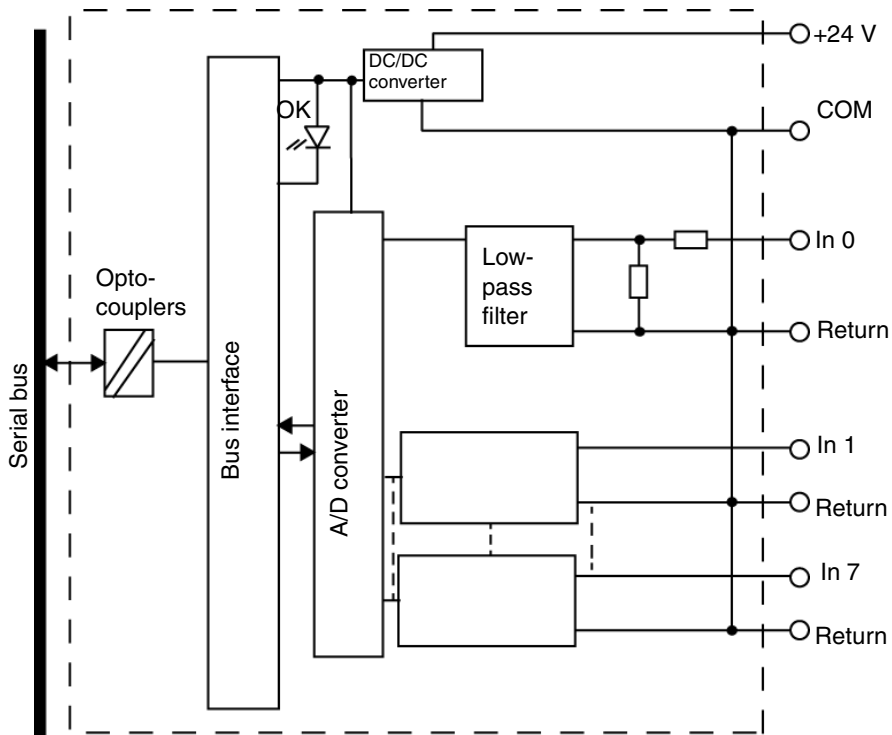


Figure 37. AI210 and 200C-IE8 functional block diagram

AI210 and 200C-IE8 Connections

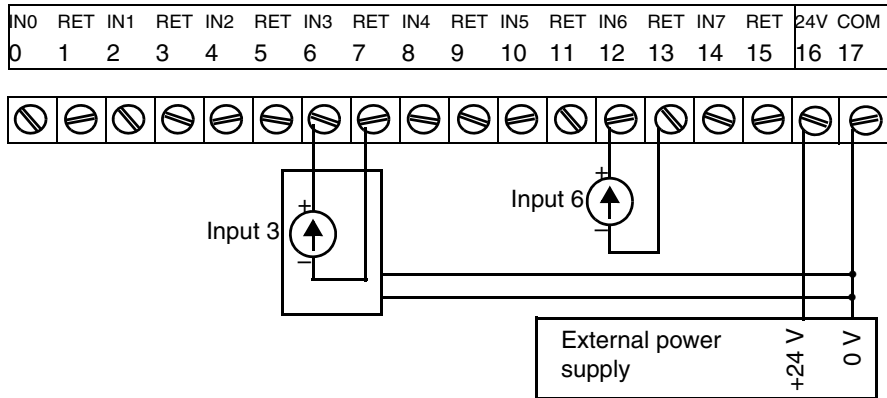


Figure 38. AI210 and 200C-IE8 connections

Analog Output Unit AO210 and 200C-OE4

AO210 and 200C-OE4 is an I/O unit for 4 analog single-ended output signals. The outputs are low-pass filtered, galvanically isolated from the serial bus by optocouplers and share a common ground connection. The internal logic requires an external +24 V DC power supply.

A common LED indicates correct operation with a green light and failures with red, see page 80.

The output current range 4–20 mA or 0–20 mA is set in the programming software individually for each output.

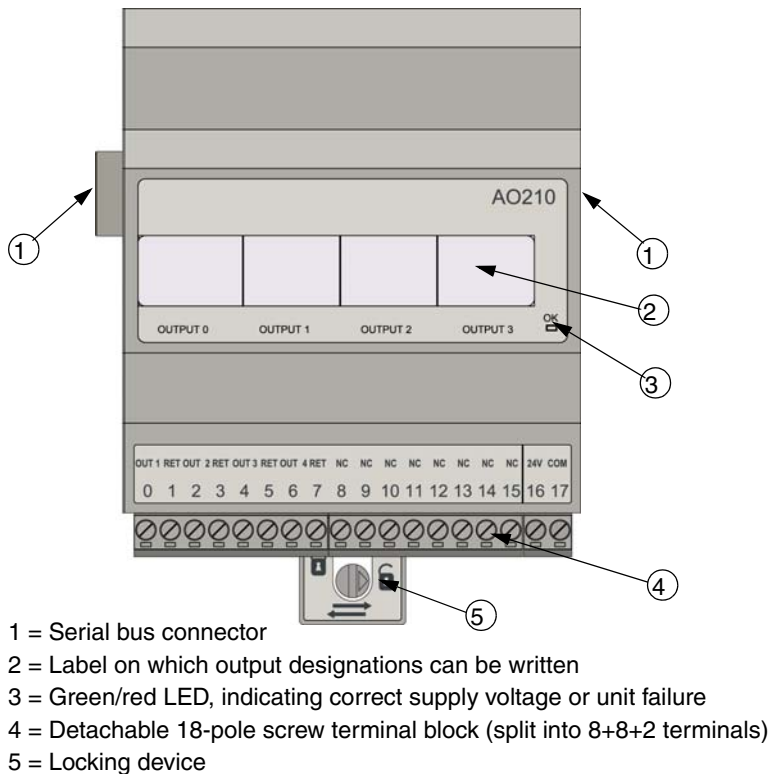


Figure 39. Analog output unit AO210 and 200C-OE4



Since the internal logic is supplied from an external +24 V power supply, the unit appears non-existent from the adapter or controller if the power is lacking. Lacking power also forces the outputs to 0 mA.

The unit is not damaged if the power supply polarity is reversed.

Functional Block Diagram

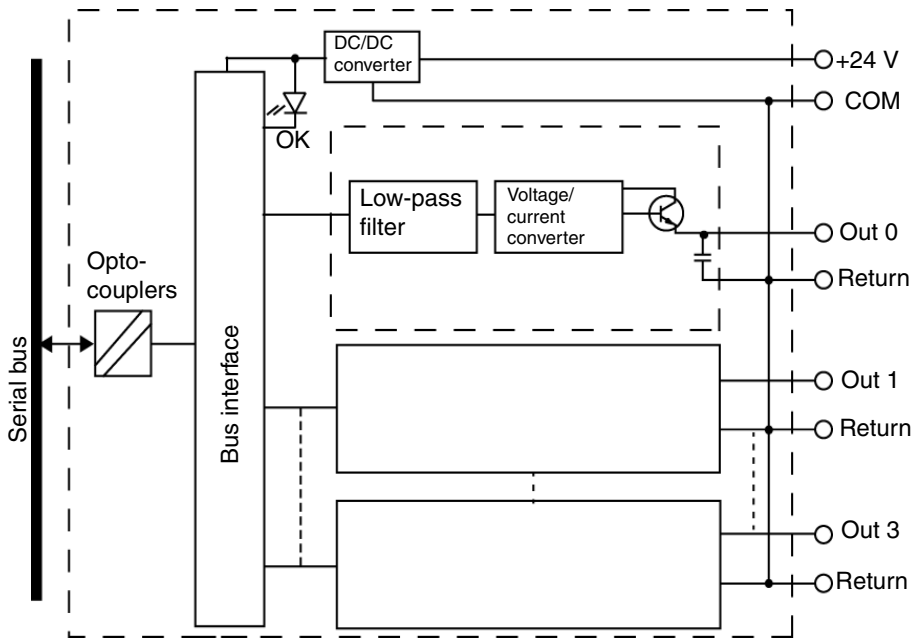


Figure 40. AO210 and 200C-OE4 functional block diagram

AO210 and 200C-OE4 Connections

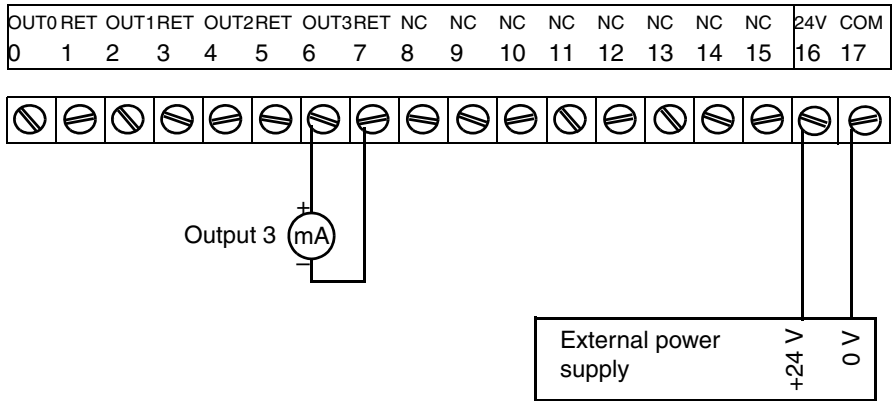


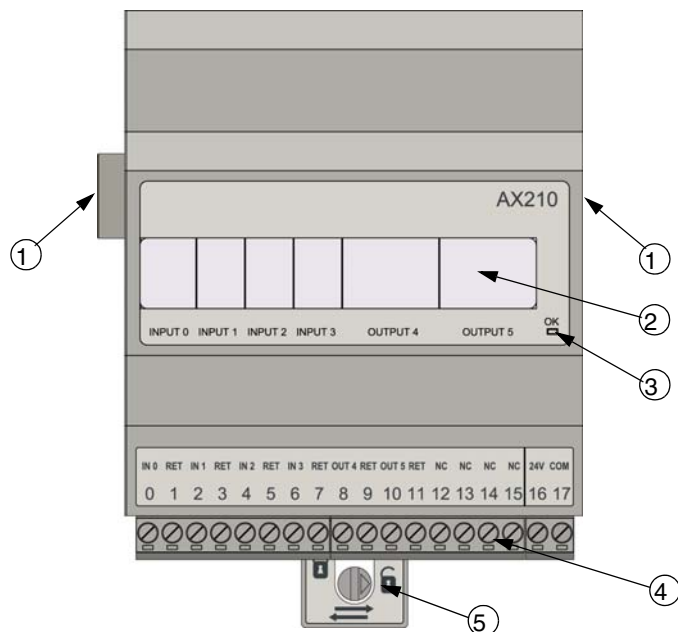
Figure 41. AO210 and 200C-OE4 connections

Analog Input/Output Unit AX210 and 200C-IE4xOE2

AX210 and 200C-IE4xOE2 is an I/O unit for 4 analog single-ended input signals and 2 analog single-ended output signals. All signals are low-pass filtered, galvanically isolated from the serial bus by optocouplers and share a common ground connection. The internal logic requires an external +24 V DC power supply.

A common LED indicates correct operation with a green light and failure with red, see page 81.

The current range 4–20 mA or 0–20 mA is set in the programming software individually for each input/output.



- 1 = Serial bus connector
- 2 = Label on which input/output designations can be written
- 3 = Green/red LED, indicating correct supply voltage or unit failure
- 4 = Detachable 18-pole screw terminal block (split into 8+8+2 terminals)
- 5 = Locking device

Figure 42. Analog input/output unit AX210 and 200C-IE4xOE2

The calibration procedure is identical to that of AI210. The output signals are not affected by the calibration.



Since the internal logic is supplied from an external +24 V power supply, the unit appears non-existent from the adapter or controller if the power is lacking. Lacking power also forces the outputs to 0 mA.

The unit is not damaged if the power supply polarity is reversed.

Functional Block Diagram

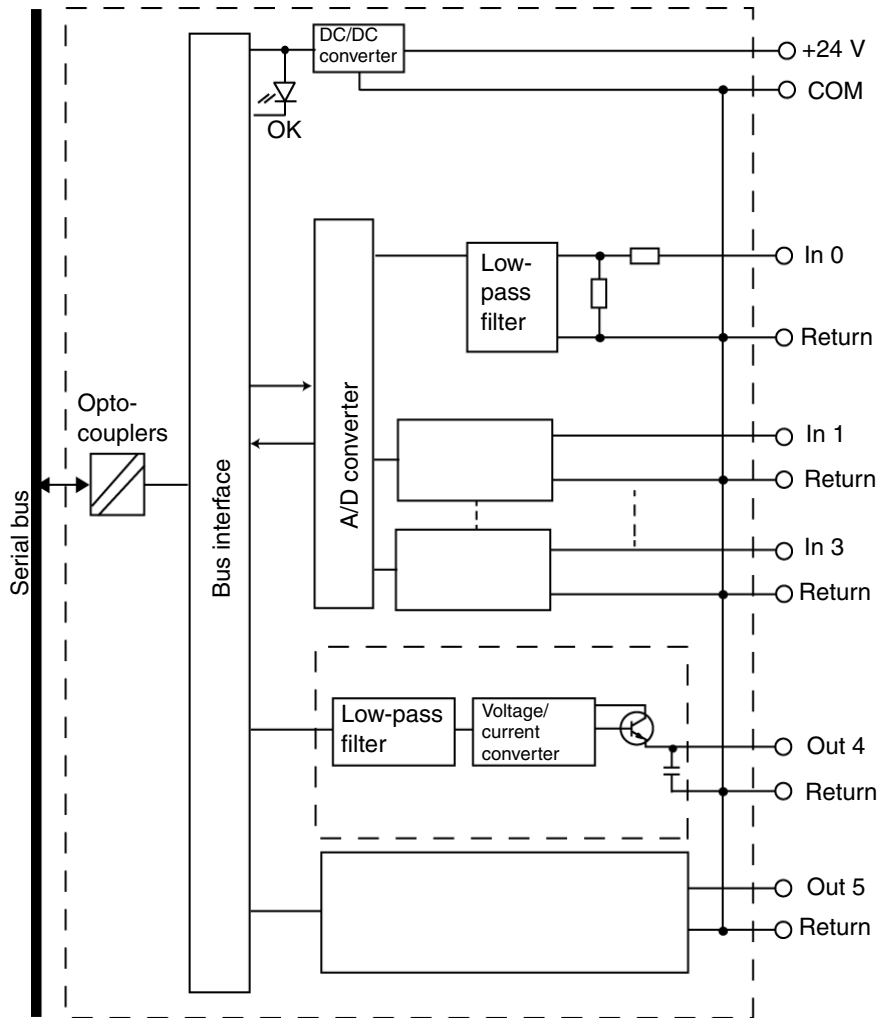


Figure 43. AX210 and 200C-IE4xOE2 functional block diagram

AX210 and 200C-IE4xOE2 Connections

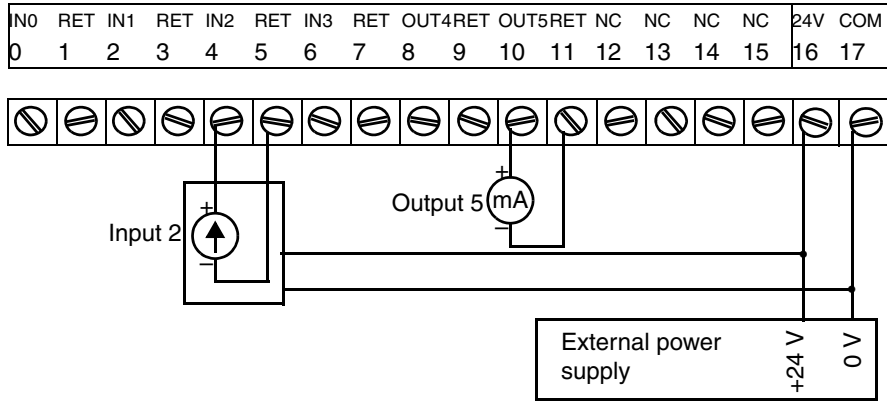


Figure 44. AX210 and 200C-IE4xOE2 connections

Adapter 200-AIO

The adapter 200-AIO is used to connect up to 8 units of type S200 I/O or S200L I/O to AC 800C or SoftController via a TK210 cable. It has a female connector for the cable and a male connector for the serial I/O bus of the attached I/O unit.

The adapter has no indications, and the screw terminals are not connected.

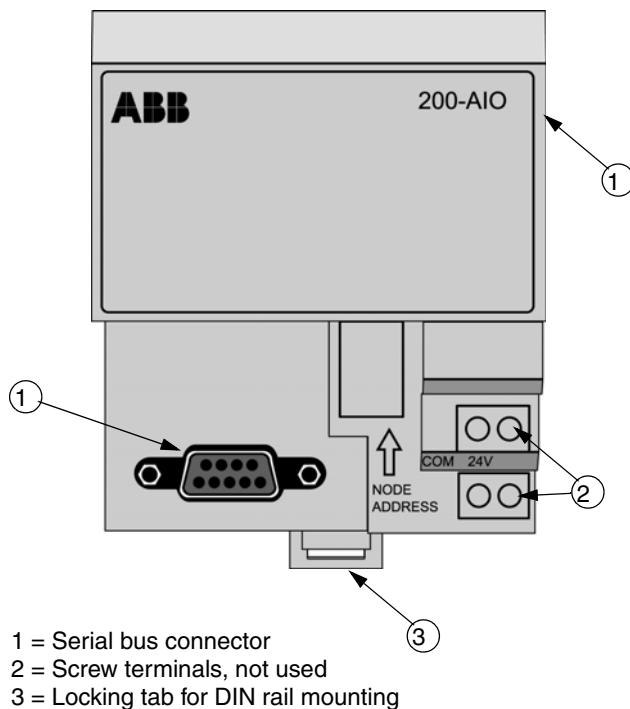


Figure 45. Adapter 200-AIO

Adapter 200-APB12

This unit is intended for connection of up to eight I/O units to a PROFIBUS-DP network.

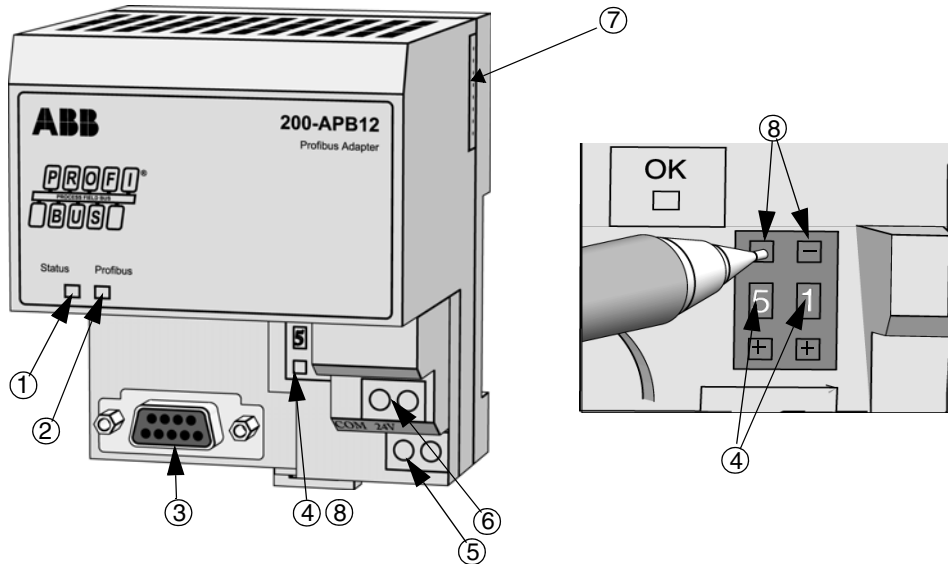


Figure 46. Adapter 200-APB12

Front Panel

1	Red/Green LED, adapter status indicator
2	Red/Green LED, PROFIBUS communication link indicator
3	PROFIBUS-DP network 9-pin D-type female connector
4	Node address indicator
5	+24 V DC connection terminals
6	0 V DC connection terminals
7	Serial I/O bus connector
8	Push-button switches for node address setting

Functional Description

The 200-APB12 adapter acts as a slave device to a DP master controller on the PROFIBUS network and transfers data between the controller and the I/O units. For information on PROFIBUS-DP installation, see “Installation Guidelines for PROFIBUS-DP/FMS” (available from ABB Automation Products).

The power is taken from a 24 V DC supply. The status of the adapter is indicated by the LEDs on the front panel. The unit also supports I/O units with internal current via the serial I/O bus.

Adapter Status Indicator	
Off	No power
Steady green	Normal operation
Flashing red/off	Recoverable fault <ul style="list-style-type: none"> - Faulty I/O unit - Incorrect I/O unit installed - Node address changed since power-up
Steady red	Unrecoverable fault
PROFIBUS Communication Link Indicator	
Off	No power or no communication
Steady green	Data are being transmitted and received
Flashing red/off	Recoverable fault <ul style="list-style-type: none"> - Invalid Send parameter data - Invalid Check configuration data
Steady red	Unrecoverable fault, unable to communicate

Node Address Selection

A node address in the range 1-99 should be selected for the 200-APB12. A GSD file for the configuration can be ordered from ABB Automation.

Screw Terminals

The screw terminals are located on the lower right side of the front of the unit. The two terminals located on the upper row are for 0 V DC and the two on the lower row are for +24 V DC.

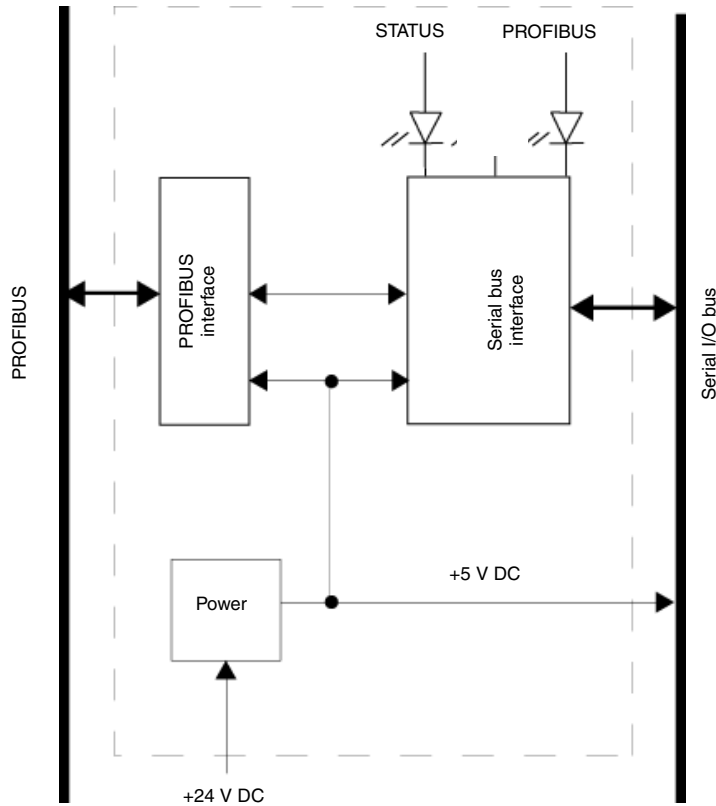


Figure 47. 200-APB12 functional block diagram

Adapters 200-ANN, 200-ACN and 200-AENTR

Refer to *S200 I/O Hardware (3BSE021356*)* manual. For 200-AENTR refer to *AC 800M EtherNet/IP DeviceNet Configuration (9ARD000014*)* manual.

Test Unit 200-PTC

200-PTC is a test unit which simulates 16 digital input signals by means of switches numbered 0–15. A flat cable is supplied with 2 eight-pole terminal blocks which can be directly plugged into the digital input unit DI210 and 200C-IB16 after its detachable terminal blocks have been removed. A two-pole terminal block is provided with extra connection pins to connect the 24 V DC process power supply cable.

The ten inputs of DO210 and 200C-OB16P and the ten inputs on-board the AC 800C can also easily be simulated, if it is observed not to activate signals from the test unit to the outputs.

The signals are activated when the switches are turned upwards.

- 1 = Switches for inputs 0–15
- 2 = Terminal block for inputs 0–7
- 3 = Terminal block for inputs 8–15
- 4 = Terminal block for power supply

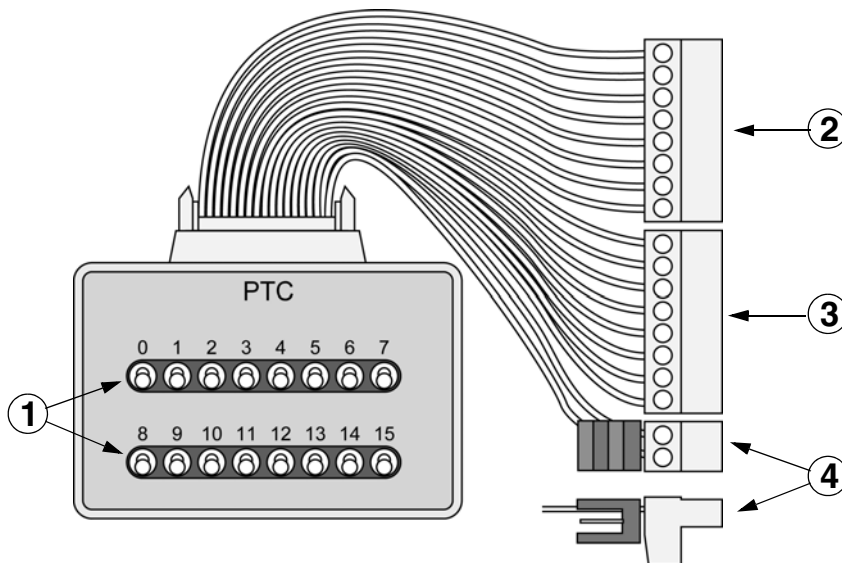


Figure 48. Test unit 200-PTC

Functional Block Diagram and Connections

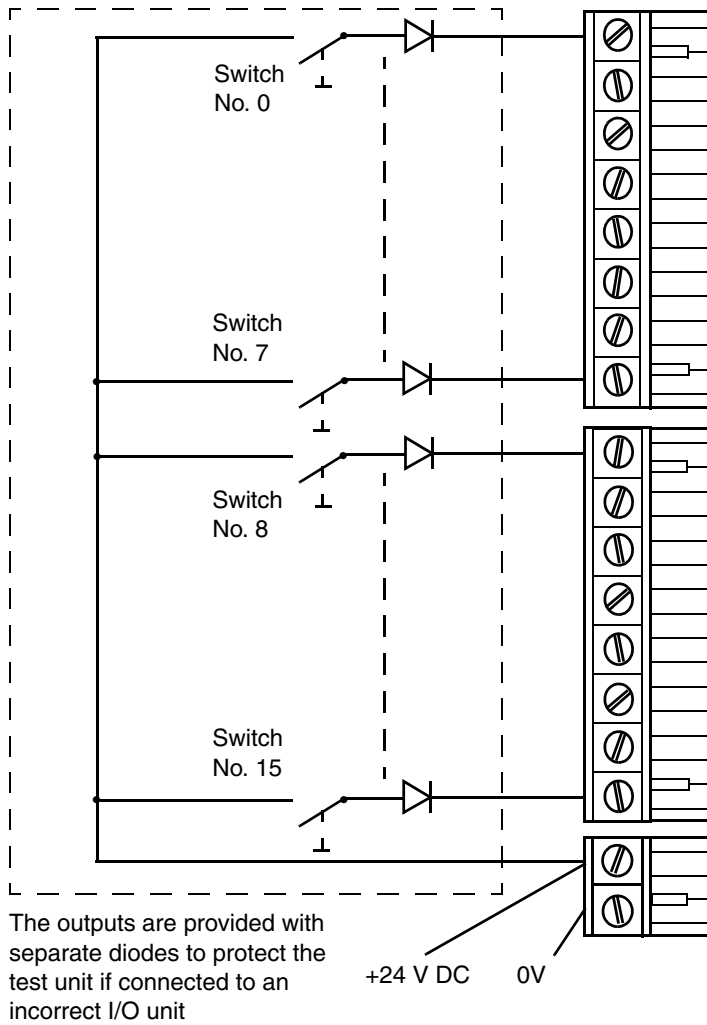


Figure 49. 200-PTC block diagram and connections

Test Unit 200-ATC

200-ATC is a test unit which simulates 8 analog input signals by means of potentiometers numbered 0–7. A flat cable is supplied with 2 eight-pole terminal blocks which can be directly plugged into the analog input unit AI210 and 200C-IE8 after its detachable terminal blocks have been removed. A two-pole terminal block is provided with extra connection pins to connect the 24 V DC process power supply cable.

One of the terminal blocks with its corresponding potentiometers can also be used to simulate the four inputs of the input/output unit AX210 and 200C-IE4xOE2.

The current range is 2.5–21.5 mA, and the signal is increased when the potentiometer is turned clockwise.

- 1 = Potentiometers for inputs 0–7
- 2 = Terminal block for inputs 0–3
- 3 = Terminal block for inputs 4–7
- 4 = Terminal block for power supply

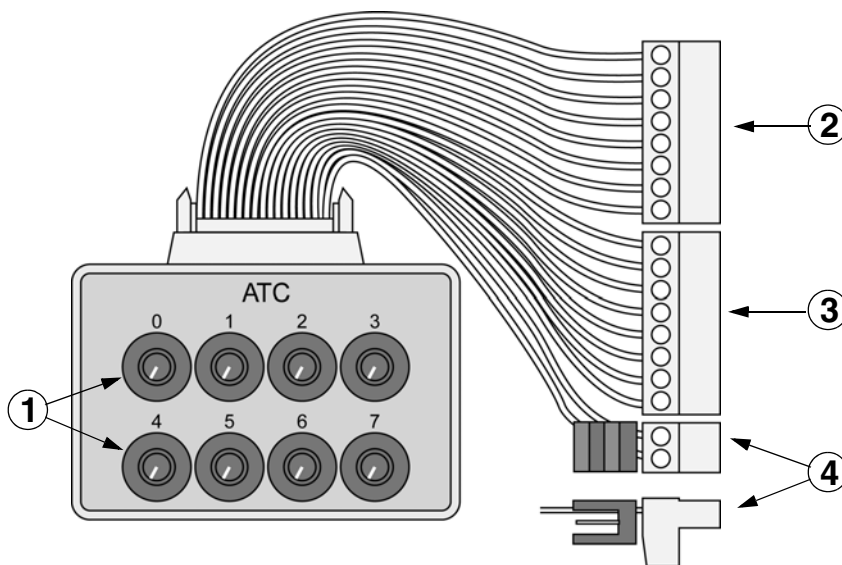
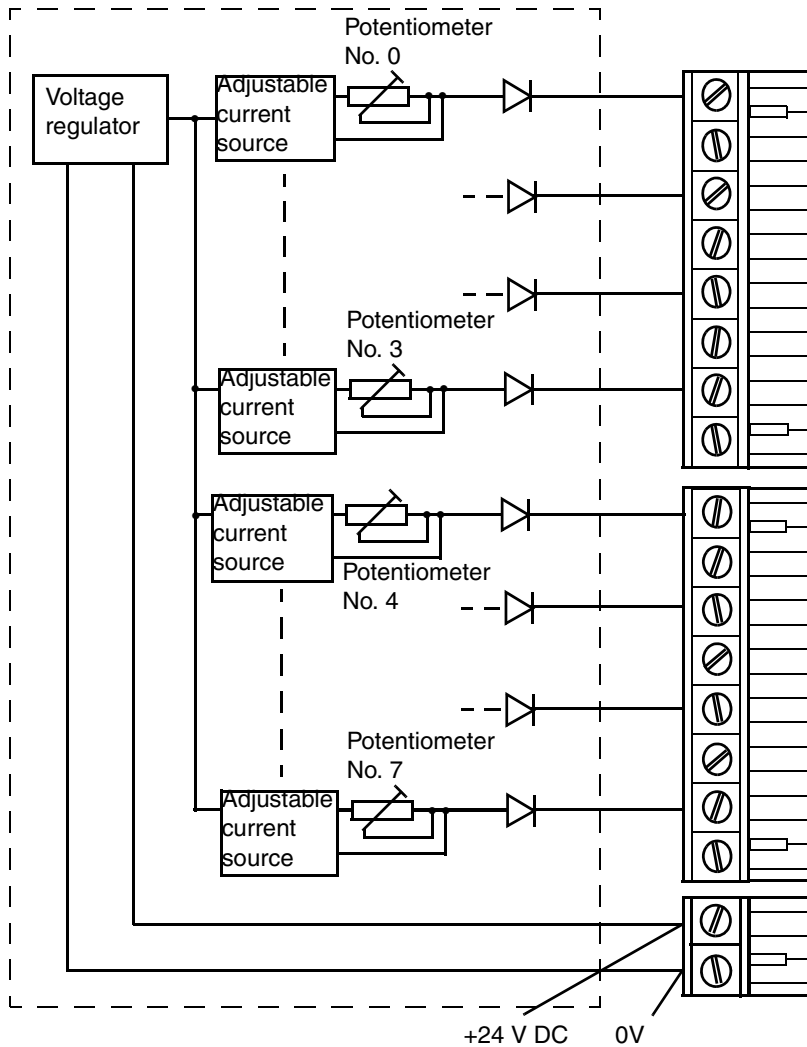


Figure 50. Test unit 200-ATC

Functional Block Diagram and Connections



The common voltage regulator provides an intermediate voltage of about 12 V. The outputs are provided with separate diodes to protect the test unit if connected to an incorrect I/O unit

Figure 51. 200-ATC block diagram and connections

Section 5 Maintenance



This section describes the maintenance required for Compact I/O units and the troubleshooting. Read the “Safety warnings” at the beginning of this manual before performing operations which can be dangerous to personnel or cause damage to equipment.

Before troubleshooting the hardware, consider the possibility that expected signal values may have been overwritten or forced by software.

Replacing I/O Units



Compact I/O units cannot be removed or inserted under system power. Regarding S200 I/O units, refer to the manual “S200 I/O, Hardware and Installation, User’s Guide”.

Troubleshooting DI210 and 200C-IB16

Input levels are in accordance with the EN 61131-2 type 1 standard, see page 48. In the transition region the LED indications and the status read by the system are not predictable. When the system is running and the adapter is active:

Troubleshooting DO210 and 200C-OB16P

When the output is activated:

When the output is not activated:

Symptom	Measure
LED status on an input is ON and the control system status is OFF or LED status on an input is OFF and the control system status is ON	<ol style="list-style-type: none"> 1. Check that the input is not forced. 2. Check that the input voltage is not within the transition region. 3. Replace the DI210 and 200C-IB16 unit.
LED OFF despite 19.2–30 V DC on the power supply screw terminals	Replace the unit.

Symptom	Measure
LED status on the output is ON but there is less than 10 V DC on the output screw terminal	<ol style="list-style-type: none"> 1. Release the cable from the screw terminal and check that the load resistance is minimum 40 Ω. Light bulbs must be rated less than 10 W. Also check the cabling and correct faults. 2. Replace the DO210 and 200C-OB16P unit.
LED status on the output is OFF but there is 10–30 V DC on the output screw terminal	Replace the DO210 and 200C-OB16P unit.
LED status on the output is OFF and there is less than 10 V DC on the output screw terminal	<ol style="list-style-type: none"> 1. Check that the supply voltage to the unit is 19.2–30 V DC. 2. Replace the DO210 and 200C-OB16P unit.

Symptom	Measure
LED status on the output is ON and there is 10–30 V DC on the output screw terminal	<ol style="list-style-type: none"> 1. Check that the output is not forced ON. 2. Loosen the cable attached to the output screw terminal. Connect the screw terminal to 0 V DC via a 1 kΩ resistor and check that the voltage across it is less than 0.5 V. If not, replace the output unit. 3. Else, check the cabling and correct faults. The cable should be voltage-free and the load resistance should be less than 10 kΩ.
LED status on the output is OFF but there is 10–30 V DC on the output screw terminal	

Troubleshooting DO210 and 200C-OB16P

See section [Troubleshooting DI210 and 200C-IB16](#) on page 77 for inputs and section [Troubleshooting DO210 and 200C-OB16P](#) on page 77 for outputs.

Troubleshooting AI210 and 200C-IE8

When the system is running and the adapter is active:

Symptom	Measure
OK LED is not lit	<ol style="list-style-type: none"> 1. Check that the supply voltage to the unit is 19.2–30 V DC. 2. Check wiring to the power supply unit. 3. Replace the unit.
OK LED is steady red	Replace the unit
OK LED is flashing red	Check the serial bus (communication problems)
OK LED is flashing green	Wait until the calibration and the first sampling cycle have been completed after power-up. Ensure that at least one signal is in use by the controller.
A break in a 4–20 mA loop is detected by the system	<ol style="list-style-type: none"> 1. Check cabling and connections. 2. Check the sensor. 3. Measure the voltage across a known high precision resistance or a zener diode, connected in series with the current loop. 4. Check that the correct type of input is selected in the hardware configuration program. 5. Replace the unit.

Symptom	Measure
An erroneous analog value has been detected by the system	<ol style="list-style-type: none"> 1. Is power-line filter for the power supply in use? 2. Are shielded cables used for the I/O signals? 3. Measure the voltage across a known high-precision resistance or a Zener diode, connected in series with the current loop. 4. Check that the correct type of input has been selected in the hardware configuration program. 5. Replace the unit.
There is no signal on the screw terminals	<ol style="list-style-type: none"> 1. Check cabling and connections. 2. Check that input is within range. 3. Check the sensor. 4. Replace the AI210 and 200C-IE8 unit.

Troubleshooting AO210

When the system is running and the adapter is active:

Symptom	Measure
OK LED is not lit	<ol style="list-style-type: none"> 1. Check that the supply voltage to the unit is 19.2–30 V DC. 2. Check the wiring to the power supply unit.
OK LED is flashing red	Check the serial bus (communication problems)
OK LED is flashing green	Wait until the outputs have assumed their programmed values after power-up. Ensure that at least one signal is in use by the controller.

Symptom	Measure
A break in a 4–20 mA loop has been detected by the system	<ol style="list-style-type: none"> 1. Check cabling and connections. 2. Check the actuator. 3. Measure the voltage across a known high-precision resistance or a Zener diode, connected in series with the current loop. 4. Check that the correct type of output has been selected in the hardware configuration program. 5. Replace the unit.
An erroneous analog value has occurred at the actuator	<ol style="list-style-type: none"> 1. Is power-line filter for the power supply in use? 2. Are shielded cables used for the I/O signals? 3. Measure the voltage across a known high-precision resistance or a Zener diode, connected in series with the current loop. 4. Check that the correct type of output has been selected in the hardware configuration program. 5. Replace the unit.
There is no signal on the screw terminals	<ol style="list-style-type: none"> 1. Check cabling and connections. 2. Check the actuator. 3. Replace the AO210 unit.

Troubleshooting AX210 and 200C-IE4xOE2

See section [Troubleshooting AI210 and 200C-IE8](#) on page 79 for inputs and section [Troubleshooting AO210](#) on page 80 for outputs.

Troubleshooting 200-APB12

Status LED, which indicates APB and I/O units status:

Symptom	Measure
Off: No power	<ol style="list-style-type: none"> 1. Check 24 V DC power to APB12 2. Replace APB12
<p>Flashing red/off: Recoverable fault APB12 is active, but there is no exchange of I/O-data between the DP master controller and the APB12</p>	<ol style="list-style-type: none"> 1. Check APB12 node address - has it changed since power-up? 2. Check application program - is the hardware configuration correct (the correct I/O units installed)? 3. Are any of the attached I/O units faulty?
Steady red: Unit failure	Replace APB12.
Steady green: Normal operation	

PROFIBUS LED, which indicates communication link status:

Symptom	Measure
<p>Off: No power or no communication</p>	<ol style="list-style-type: none"> 1. Check 24 V DC power to APB12. 2. Check that APB12 is connected to the network, that there is no broken cable, faulty connectors or taps. 3. Check that there is a DP master controller switched on, connected to the network, and with the control program running. 4. Replace APB12.
<p>Steady green: Data are being transmitted or received</p>	
<p>Flashing red/off: Recoverable fault</p> <ul style="list-style-type: none"> - Invalid Send parameter message received - Invalid Check configuration message received 	<ol style="list-style-type: none"> 1. Check the network for intermittent disturbances. 2. Check node address (the node address must be unique on the network). 3. Check the DP master slave configuration.
<p>Steady red: Unrecoverable fault, unable to communicate</p>	<p>Replace APB12.</p>

Appendix A Safety Instructions

Precautions

This section is mandatory reading for anyone planning to use the control system.

Be Careful – Prevent Accidents and Protect Valuable Equipment

A control system is a general tool which can be used in various processes. Responsibility for attaining and maintaining a reasonable level of safety must therefore rest with the people who engineer, operate and maintain the equipment. They must have intimate knowledge of the functions and inherent safety risks of the processes involved, and the imaginative power to anticipate situations in which accidents may occur.

Special attention should be paid to situations in which the mains supply is switched on or off, units are fitted or removed, cables are connected or disconnected, and units are reset or switched to manual operation. If possible, the process should be shut down before such actions are taken.

The level of safety can be improved considerably by taking steps to bring the process to a safe state when power supplies, communication links or parts of the control system fail. Such steps may, for instance, imply the installation of valves or relays which are spring-returned to a safe position.

Before Replacing I/O Units



Although it is possible to remove and insert I/O system units, except adapters and terminal base units, under system power, it is highly recommended that the process side power be disconnected before removing or inserting an I/O unit to avoid hazardous conditions.

S200L I/O units must not be removed or inserted under system power, as hazardous conditions may occur or units may be damaged.

Maintenance

In order to avoid long shutdowns, it is advisable to keep spares of components in stock.

Always make regular backup copies of the application program.

Operating Environment

Before the system is brought on-line, find out which environmental conditions are applicable. The following points are important.

- The product must not be exposed to conditions exceeding the stated values in the technical specifications.
- The product must not be used in an environment where it is exposed to strong electrical interference. Electrical machines can produce interference which exceeds the permitted levels for the equipment, e.g. during repair work.
- All products must be handled with appropriate precautions with regard to electrostatic damage.

Important: Software

Check:

- Use the system's fault-monitoring facility to prevent mishaps and accidents.
- Check before executing any changes.

Important: Hardware

Do not disconnect the power supply to a system which is in operation.


Signal Noise Due to Cables

Cables which might cause electrical interference (e.g. the power-line cables) must not be installed close to bus cables carrying fast digital signals. Ensure a minimum distance of 100 mm between them inside cabinets.

Hazardous Electrical Supplies

Operations in which personnel may come into contact with high-voltage supplies should only be performed by those trained in the maintenance of electrical equipment and who are fully aware of the risks involved.

Mandatory Installation Instructions

Mandatory installation instructions in this manual are marked with the symbol . Such instructions must be followed to fulfil the authority requirements (EMC directive).

Appendix B Technical Specifications

General Specifications

Technical Data	
Power supply	+24 V DC (19.2–30 V DC) incl. 5% ripple according to IEC 61131-2 type 1 standard i.e. +20%, –15% and max. 5% ripple
Isolation voltage	Type-test voltage 500 V AC (corresponding to 700 V DC) during 1 minute, according to UL 508
Environmental conditions	Industrial
Operating temperature	+5 °C to +55 °C
Storage temperature	–25 °C to +70 °C
Relative humidity	5 to 95%, non-condensing
Protection class	IP 20
Approval (when the product is marked) ⁽¹⁾	CE-marked and meets the EMC directive, EMCD 2004/108/EC according to the standards EN 61000-6-4:2007 + A1:2011 and EN 61000-6-2:2005
Wire area	0.5–2.5 mm ² or AWG 20–AWG 12
Dimensions	W 94 × H 131 × D 67 mm
Weight	240 g excl. package 324 g incl. package

(1) Please note that the 200-APB12 adapter is not UL/CSA approved.

Digital Input Unit DI210 and 200C-IB16

Technical Data	
Number of inputs	16 positive logic
Counter input	16-bit up to 5000 Hz on input 15, reset on power-up
Galvanic isolation	By means of optocouplers
Status indicators	16 yellow LEDs for input indication
ON-state input voltage	15 V DC min. 24 V DC nominal 30 V DC max.
ON-state input current	3.0 mA min. at 15 V DC 5.2 mA nominal at 24V DC 6.8 mA max. at 30 V DC
OFF-state input voltage	< 6.0 V DC
OFF-state input current	< 1.6 mA
Input impedance	6.2 k Ω max.
Digital filter	Time constant set in software, see Functional Description on page 47
Hardware filter	Second-order low-pass filter, time constant 70 μ s, minimum pulse width 90 μ s
Internal current consumption (from serial bus)	<25 mA
Power dissipation	Max. 3.5 W at 30 V DC with all inputs activated
Unit identity	0210H
Order code	DI210 and 200C-IB16

Digital Output Unit DO210 and 200C-OB16P

Technical Data	
Number of outputs	16 positive logic, short-circuit proof
Galvanic isolation	By means of optocouplers
Status indicators	16 yellow LEDs for output indication
ON-state output voltage	19 V DC min. 24 V DC nominal 30 V DC max.
Maximum total output current per unit	7 A
ON-state current per output	1.0 mA min. 600 mA max.
Surge current	Limited to a value between 0.7 A and 1.5 A
OFF-state voltage	5 V DC max. (if load resistance max. 10 k Ω) 30 V DC max. (if no load connected)
OFF-state leakage current	<0.5 mA
ON-state voltage drop	<0.15 V DC at 600 mA load current
Output signal delay	
OFF to ON	<70 μ s
ON to OFF	<350 μ s
External DC power	
Supply voltage	24 V DC nominal (19.2–30 V DC)
Supply current	4 mA +5 mA/activated output + total load current
Protective control circuit	See Functional Description onpage 52
Internal current consumption (from serial bus)	<70 mA
Power dissipation	Max. 5 W at 30 V DC with all outputs activated and 7 A total load current
Unit identity	0115H
Order code	DO210 and 200C-OB16P

Digital Input/Output Unit DO210 and 200C-OB16P

General Technical Data	
Galvanic isolation	By means of optocouplers
Status indicators	16 yellow LEDs for input/output indication
External DC power	
Supply voltage	24 V DC nominal (19.2–30 V DC)
Supply current	2 mA + 5 mA/activated output + total load current
Internal current consumption (from serial bus)	<40 mA
Power dissipation	Max. 3.5 W at 30 V DC with all inputs and outputs activated and total load current 3.6 A
Unit identity	0114H
Order code	DO210 and 200C-OB16P
Technical Data for Inputs	
Number of inputs	10 positive logic
ON-state input voltage	15 V DC min. 24 V DC nominal 30 V DC max.
ON-state input current	3.0 mA min. at 15 V DC 5.2 mA nominal at 24 V DC 6.8 mA max. at 30 V DC
OFF-state input voltage	< 6.0 V DC
OFF-state input current	< 1.6 mA
Input impedance	6.2 k Ω max.
Digital filter	Time constant set in software, see Functional Description on page 55
Hardware filter	Second-order low-pass filter, time constant 70 μ s, minimum pulse width 90 μ s

Technical Data for Outputs	
Number of outputs	6 positive logic, short-circuit proof
ON-state voltage	19 V DC min. 24 V DC nominal 30 V DC max.
Maximum total output current/unit	3.6 A
ON-state current/output	1.0 mA min. 600 mA max.
Surge current	Limited to a value between 0.7 A and 1.5 A
OFF-state voltage	5 V DC max. (if load resistance max. 10 k Ω) 30 V DC max. (if no load connected)
OFF-state leakage current	<0.5 mA
ON-state voltage drop	<0.15 V DC at 600 mA load current
Output signal delay	
OFF to ON	<70 μ s
ON to OFF	<350 μ s
Protective control circuit	See Functional Description on page 55

Analog Input Unit AI210 and 200C-IE8

Technical Data	
Number of inputs	8 single-ended
Galvanic isolation	Serial bus is isolated from inputs by optocouplers
Crosstalk between inputs	-70 dB
Status indicator	One green/red LED for power/fault indication
Input current range	4-20 mA or 0-20 mA
Input resistance	205 $\Omega \pm 0.2\%$
Filter	Third-order low-pass filter with time constant 14 ms
Calibration	See Functional Description on page 59
Resolution	12 bits
Non-linearity	<0.05% according to ISA-RP55.1
Accuracy at 25 °C	$\pm 0.3\%$ of full scale
Drift with temperature	$<\pm 0.005\%$ of full scale per °C
Repeatability	$\pm 0.05\%$ of full scale
Overload without damage	Max. 32 mA continuously, only one input at a time
External DC power	
Supply voltage	24 V DC nominal (19.2-30 V DC)
Supply current	Approx. 40 mA at 24 V DC
Internal current consumption (from serial bus)	Max. 20 mA
Power dissipation	<3 W at 30 V DC
Unit identity	1901H
Order code	AI210 and 200C-IE8

Analog Output Unit AO210 and 200C-OE4

Technical Data	
Number of outputs	4 single-ended
Galvanic isolation	Serial bus is isolated from outputs by optocouplers
Status indicator	One green/red LED for power/fault indication
Output current range	4–20 mA or 0–20 mA
Output load resistance	0–550 Ω at 19.2 V power supply 0–850 Ω at 24 V power supply 0–1100 Ω at 30 V power supply
Filter	Third-order low-pass filter with time constant 14 ms
Resolution	11 bits
Non-linearity	<0.1% according to ISA-RP55.1
Accuracy at 25 °C	$\pm 0.5\%$ of full scale
Drift with temperature	$<\pm 0.005\%$ of full scale per °C
External DC power	
Supply voltage	24 V DC nominal (19.2–30 V DC)
Supply current	Approx. 100 mA at 24V DC (not including outputs)
Internal current consumption (from serial bus)	Max 20 mA
Power dissipation	<3 W at 30 V DC
Unit identity	1100H
Order code	AO210 and 200C-OE4

Analog Input/Output Unit AX210 and 200C-IE4xOE2

General Technical Data	
Galvanic isolation	Serial bus is isolated from inputs/outputs by optocouplers
Crosstalk between inputs	-70 dB
Status indicator	One green/red LED for power/fault indication
External DC power	
Supply voltage	24 V DC nominal (19.2–30 V DC)
Supply current	Approx. 60 mA at 24V DC (not including outputs)
Internal current consumption (from serial bus)	Max. 20 mA
Power dissipation	<3 W at 30 V DC
Unit identity	1500H
Order code	AX210 and 200C-IE4xOE2
Technical Data for Inputs	
Number of inputs	4 single-ended
Input current range	4–20 mA or 0–20 mA
Input resistance	205 Ω \pm 0.2%
Filter	Third-order low-pass filter with time constant 14 ms
Calibration	See Functional Description on page 65
Resolution	12 bits
Non-linearity	<0.05% according to ISA-RP55.1
Accuracy at 25 °C	\pm 0.3% of full scale
Drift with temperature	< \pm 0.005% of full scale per °C
Repeatability	\pm 0.05% of full scale
Overload without damage	Max. 32 mA continuously, only one input at a time

Technical Data for Outputs	
Number of outputs	2 single-ended
Output current range	4–20 mA or 0–20 mA
Output load resistance	0–550 Ω at 19.2 V power supply 0–850 Ω at 24 V power supply 0–1100 Ω at 30 V power supply
Filter	Third-order low-pass filter with time constant 14 ms
Resolution	11 bits
Non-linearity	<0.1% according to ISA-RP55.1
Accuracy at 25 °C	\pm 0.5% of full scale
Drift with temperature	$<\pm$ 0.005% of full scale per °C

Adapter for I/O Units 200-AIO

Technical Data	
I/O capacity	8 S200 I/O or S200L I/O units (can be mixed)
Max. current from internal 5 V DC	0.64 A
Connectors	One 15-pole female high-density D-type connector One male serial I/O bus connector
Weight	
excl. packing	100 g
incl. packing	195 g
Dimensions	W 68 × H 87 × D 69 mm
Order code	200-AIO

Adapter for PROFIBUS 200-APB12

Technical Data	
Input voltage range	+24 V DC nominal, 19.2–31.2 V DC
I/O capacity	8 I/O units
Status indicators	2 red/green LEDs for unit status and communication status
Communication rate	Up to 12 Mbit/s
Current consumption	400 mA max. from external 24 V DC supply (includes internal current to I/O units)
Power dissipation	7.68 W max. at 19.2 V DC
Temperature	Operating: 0 °C to + 55 °C Non-operating: -40 °C to + 85 °C
Humidity	5–95%, non-condensing
Weight	0.18 kg excl. package 0.27 kg incl. package
Dimensions	W 68 x H 88 x D 69 mm
Approval ⁽¹⁾	CE-marked and meets the EMC directive 89/336/EEC according to the standards EN 50081-2 and EN 50082-2
Agency certification	PNO (PROFIBUS Nutzerorganisation, PROFIBUS User Organization)
Order code	200-APB12

(1) Please note that the 200-APB12 adapter is not UL/CSA approved.

I/O Accessories

Cable for I/O Units TK210V005

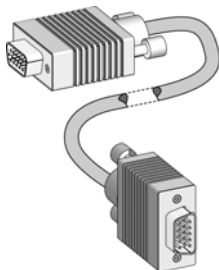


Figure 52. Cable TK210V005

Technical Data	
Connectors	Two 15-pole male high-density D-type connectors
Weight	130 g
Length	0.5 m
Order code	TK210V005

Cable for I/O Units TK210V010

Technical Data	
Connectors	Two 15-pole male high-density D-type connectors
Weight	180 g
Length	1.0 m
Order code	TK210V010

Cable for I/O Units TK210V025

Technical Data	
Connectors	Two 15-pole male high-density D-type connectors
Weight	320 g
Length	2.5 m
Order code	TK210V025

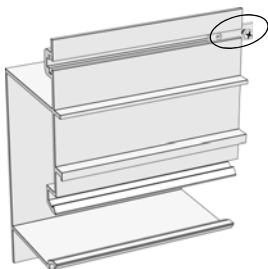
Extension Cable 200-CE1

Figure 53. Extension cable 200-CE1

Technical Data	
Weight	63 g
Length	0.3 m
Order code	200-CE1

Extension Cable 200-CE3

Technical Data	
Weight	93 g
Length	0.9 m
Order code	200-CE3

Mounting Profile MP990

A locking plate and a screw are delivered with the mounting profiles. They are used to fasten 200-CE1/CE3 cables, see page 36

Figure 54. Mounting profile MP990

Technical Data

Weight	1.9 kg
Dimensions	W 990 × H 144.5 × D 67.8 mm
Order code	MP990

Mounting Profile MP890

Technical Data

Weight	1.7 kg
Dimensions	W 890 × H 144.5 × D 67.8 mm
Order code	MP890

Mounting Profile MP590

Technical Data

Weight	1.2 kg
Dimensions	W 590 × H 144.5 × D 67.8 mm
Order code	MP590

Clips

For cables used with mounting profiles.



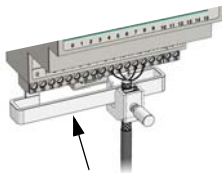
Clips are delivered in a plastic bag containing 10 pcs.

Figure 55. Clips

Technical Data	
Weight	0.01 kg/10pcs
Dimensions	W 375 × H 9 × D 10 mm
Order code	MP-CLIPS

Grounding Clamp Holder

The holder is used to support grounding clamps for shielded process cables to Advant Controller 210 and to S200L I/O units.



Grounding clamp holder

Figure 56. Grounding clamp holder

Technical Data	
Weight	0.03 kg/
Dimensions	W 92 × H 10 × D 13 mm
Order code ⁽¹⁾	200C-GCH

(1) The holder only. See page 106 for a recommended clamp.

Test Unit 200-PTC

Technical Data	
Number of simulated signals	16
Number of switches	16
Terminal blocks	8 + 8 + 2 poles
Cable length	150 mm
Power supply	24 V DC nominal
Output signal voltage	+24 V DC nominal
Weight	180 g incl. cable
Dimensions	W 55 × H 39 × D 58 mm
Order code	200-PTC

Test Unit 200-ATC

Technical Data	
Number of simulated signals	8
Number of switches	8
Terminal blocks	8 + 8 + 2 poles
Cable length	150 mm
Power supply	24 V DC nominal
Output signal range	2.5–21.5 mA
Weight	180 g incl. cable
Dimensions	W 55 × H 39 × D 56 mm
Order code	200-ATC

Appendix C Recommended Components

This appendix lists recommended cables and components available on the market to be used when installing the AC 800C.

Power-Line Filters

Power-line filters for 230 V AC and external 24 V DC (Filter type A)¹

Recommended type: Schaffner: FN 660, Schaffner FN 2060 or a corresponding two-stage filter for mounting plate assembly.

Power-line filters for analog signals and pulse counter signals 24 V DC (Filter type B)¹

Recommended type (1): Schaffner FN 610, Schaffner FN 2010 or a corresponding one-stage filter for mounting plate assembly.

Recommended type (2): Phoenix NEF 1 or a corresponding one-stage filter for DIN rail assembly.

1. See section [Filtering](#) on page 24.

Grounding Devices

Universal ground terminal blocks

Recommended type (1): Phoenix: USLKG4 (green/yellow)

Recommended type (2): Weidmüller: WPE 2,5 (green/yellow)

Earth rail

Recommended type: Weidmüller: Ssch 10x3 Cu

Grounding clamp for shielded cables

Recommended type: Weidmüller: KLBÜ4-13.5

Comments: Earth rail (10x3 mm) mounted. Used to connect a cable shield to ground (0 V).

Grounding clamp for holder 200C-GCH

Recommended type: Phoenix shield connection terminal blocks, type SK

Comments: Used for AC 800C and S200L I/O units

Devices for Extended Noise Suppression

To obtain extra reliability in harsh industrial environments or environments where there is a risk of direct lightning strikes, and in offices where high electrostatic charges occur, etc., the following accessories are suitable. They are to be mounted on a separate DIN rail (unless otherwise stated) and in the same cabinet as the control system.

Surge voltage suppression for 230 V AC input

Recommended type (1): Phoenix: MAINS-MODUTRAB MT 2PE-230 AC

Complement: Phoenix: VAL-BE

Comments: Base element with universal foot for mounting on rails

Recommended type (2): Weidmüller: RSU, 240 V, 6 A

Description: This unit must be grounded to universal ground terminal blocks, listed in section [Grounding Devices](#) on page 106. Ground cable length max. 10 cm.

Comments: Both modules are to be used if the plant is likely to be exposed to direct lightning strikes, if the power supply cables are extremely long or are at risk from other noise sources.

Surge voltage suppression for 24 V DC input

Recommended type (1): Phoenix: TERMITRAB-SLKK 5/24 DC

Description: Built-in earth connector is attached to the DIN rail

Recommended type (2): Weidmüller: EGU 4, 24 V

Description: Max. 1.5 A, to be connected to earth via adjacent ground terminal block

Comments: Used if the plant is likely to be exposed to direct lightning strikes, if the power supply cables are extremely long or are at risk from other noise sources

Coarse surge arrester for main panel 230 V AC

Recommended types POWERTRAB FM (3-phase) or Phoenix: POWERTRAB FM/2 (1-phase)

Comments: The building must always be protected against overvoltage.

Medium surge arrester for sub-panel 230 V AC

Recommended types Phoenix: VALVETRAB VAL-ST 230

Comments: This plug-in medium-surge arrester is to be used as a complement to the surge arresters for main panels described above. Minimum 10 m cable between main and sub-panel

Protection modules for RS 232 data interfaces

Recommended type (1): Phoenix: DATA-MODUTRAB MT V24

Description: Two data line pins and one ground connection

Recommended type (2): Phoenix: DATA-MODUTRAB MT V24/8

Description: Seven data line pins and one ground connection

Recommended type (3): Phoenix: DATATRAB D-UFB-V24/BS-B-U

Description: 25-pin D-SUB with two data lines and one signal ground

Comments: All listed RS232 protection modules are recommended for long cables which are exposed to noise. Also recommended for “service outputs” where the equipment might be electrostatically charged

Protection module for RS 485 data interfaces

Recommended type: Phoenix: MT RS485/S

Description: One 12 V DC line, two data line pairs and one signal ground

Comment: Recommended for long cables which are at risk from noise sources. Must be grounded to universal ground terminal blocks listed among section [Grounding Devices](#) on page 106.

Surge voltage protection for telephone line

Recommended type (1): Phoenix: LINETRAB UFB 2-PE-220 DC

Description: Complete for DIN rail. Is to be connected via adjacent ground terminal block

Recommended type (2): Phoenix: MCR-PLUGTRAB-UFBK 2 PE-220DC-ST

Description: Plug-in module needed together with base element below

Complement: Phoenix: MCR-PLUGTRAB-UFBK 2 PE-220DC-BE

Description: Base element with universal foot for mounting on rails

Comments: Is used for surge voltage protection of telephone lines. It is to be interconnected between the modem and the telephone line if there is a risk of overvoltage caused by direct lightning strikes. Fuse protected from the telephone line

Miscellaneous

DIN rail

Recommended type: Phoenix:
TS 35/7,5. Steel, yellow chromium threaded with holes
DIN 46 277, EN 50 022

DIN rail accessories

Recommended type (1): Phoenix: UK 4-TG + ST-BE

Description: Component adapter

Recommended type (2): Phoenix: E/UK

Description: DIN rail end support device

Recommended type (3): Weidmüller: WEW 35/2

Description: DIN rail end support device

Recommended type (4): Phoenix: EN/MP-45 (width 45 mm)

Description: Mounting plate for Ethernet transceivers and other similar devices

Screw terminal blocks for S200L units

Recommended type: Phoenix MSTB 2,5/x-ST, where x is the number of screw terminals (2, 6, 8 or 10)

Modems

Recommended type: Westermo MA42, MA44
MA42 generates no handshaking signals
MA44 generates DTR, DSR, CTS and RTS

Description: Short haul modem, RS232/RS485, 220 V AC

Modems (fiber)

Recommended type: Hirschmann, OZD 485 G2 BFOC, OZD PROFIBUS

Description: PROFIBUS Modem for fiber optic conductors

Power Supplies

Power supply output 24 V DC

Recommended type (1): ABB SD821

Description: Input: 115/230 V AC
Output: 24 V DC/2.5 A

Recommended type (2): ABB SD822

Description: Input: 115/230 V AC
Output: 24 V DC/5 A

Recommended type (3): ABB SD823

Description: Input: 115/230 V AC
Output: 24 V DC/10 A

Recommended type (4): Phoenix⁽¹⁾: CM90-PS-230 AC/24 DC/2

Description: Input: 230 V AC
Output: 24 V DC/2A

Recommended type (5): Phoenix⁽¹⁾: CM125-PS-230 AC/24 DC/5

Description: Input: 230 V AC
Output: 24 V DC/5A

Recommended type (6): Omron: S82K-05024

Description: 2 A, switchable 115/230 V AC

Recommended type (7): MEAN WELL: S-60-24 DIN

Description: 2.5 A, input range 90-260 V AC

(1) Note manufacturer's derating

Cables for Process Signals

The process cables below are recommended for use with products described in this document. See cable manufacturer's specifications for further information.

Type of signals	Type of cables	Manufacturer
Mains	RKFK 3x1.5 mm ²	Various
Digital I/O signals	Solid or stranded copper wire 0.5–2.5 mm ²	Various
Analog and Pulse/Frequency counter I/O signals	FKAR-PG LiYCY(TP)	Various Unitronic
RS 232	Belden 8723 2 pair (0.34mm ²) Belden 9729 2 pair (0.22 mm ²) Belden 9730 3 pair (0.34 mm ²) Unitronic CY 3x0.25 mm ² , 7x0.25 mm ²	Belden Belden Belden Unitronic
RS485	Belden 8723 2 pair (0.34mm ²) Belden 9729 2 pair (0.22 mm ²) Belden 9730 3 pair (0.34 mm ²)	Belden Belden Belden
PROFIBUS-DP	Twisted pair, 0.34 mm ² Unitronic-Bus L2/F.I.P Twisted pair, 0.34 mm ² Belden 3079A	Unitronic Belden

Appendix D Standards

The information below is applicable to products approved for hazardous locations according to CSA and/or UL standards (UL1604).

Hazardous Location Approval

To comply with CSA and/or UL certification for use at hazardous locations, the following information becomes part of the product literature for CSA and/or UL-certified ABB Automation industrial control products.

- Equipment labeled with reference to Class I, Groups A, B, C and D, Division 2, hazardous locations is suitable for use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only.
- The products having the appropriate CSA and/or UL markings (that is, Class I Division 2, Groups A, B, C, D), are certified for use in other equipment where the suitability of combination (that is, application or use) is determined by the CSA and/or UL or the local inspection office having jurisdiction.
- Cables longer than 0.9 m used for internal power supply must not be installed in Class I, Division 2, groups A, B, C, and D, Division 2 locations.



Explosion hazard – Substitution of components may impair suitability for Class I, Division 2.



Explosion hazard – Do not replace components unless the power has been switched off or the area is known to be non-hazardous.



Explosion hazard – Do not disconnect equipment unless the power has been switched off or the area is known to be non-hazardous.



Explosion hazard – Do not disconnect connectors unless the power has been switched off or the area is known to be non-hazardous. Secure any user-supplied connectors that mate to external circuits on an ABB Automation product using screws, sliding latches, threaded connectors, or other means such that any connection can withstand a 15 Newton (3.4 lb.–1.5 kg) separating force applied for a minimum of one minute.

Approbation D'utilisation Dans des Emplacements Dangereux par la CSA

Les informations ci-dessous s'appliquent aux produits conformes aux normes de la CSA et/ou des UL pour utilisation dans des emplacements dangereux.

Pour satisfaire à la certification de la CSA et/ou des UL dans des endroits dangereux, les informations suivantes font partie intégrante de la documentation des produits industriels de contrôle ABB Automation certifiés par la CSA et/ou des UL.

- Cet équipement convient à l'utilisation dans des emplacements de Classe 1, Division 2, Groupes A, B, C, D, ou ne convient qu'à l'utilisation dans des endroits non dangereux.
- Les produits portant le marquage approprié de la CSA et/ou des UL (c'est à dire, Classe 1, Division 2, Groupes A, B, C, D) sont certifiés à l'utilisation pour d'autres équipements où la convenance de combinaison (application ou utilisation) est déterminée par la CSA et/ou des UL ou le bureau local d'inspection qualifié.
- Les câbles de plus de 0,9 m de long utilisés pour l'alimentation interne ne doivent pas être installés dans les emplacements de Classe 1, Division 2, Groupes A, B, C et D, ni dans les emplacements de Division 2.



Risque d'explosion – La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Classe I, Division 2.



Risque d'explosion – Couper le courant ou s'assurer que l'emplacement est désigné non dangereux avant de remplacer les composants.



Risque d'explosion – Avant de débrancher l'équipement, couper le courant ou s'assurer que l'emplacement est désigné non dangereux.



Risque d'explosion – Avant de débrancher les connecteurs, couper le courant ou s'assurer que l'emplacement est reconnu non dangereux. Attacher tous connecteurs fournis par l'utilisateur et reliés aux circuits externes d'un appareil ABB Automation à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens permettant aux connexions de résister à une force de séparation de 15 newton (3,4 lb.- 1,5 kg) appliquée pendant au moins une minute.

Appendix E Directive Considerations

Electromagnetic Compatibility (EMC)

Units mentioned in this document for which the product is marked with the **CE** logo are tested to meet EMC directive, EMCD 2004/108/EC, Electromagnetic Compatibility (EMC) using a technical construction file, and meet the following EMC standards, applicable in whole or in part:

- EN 61000-6-4:2007 + A1:2011 – Generic Emission Standard, Part 4 – Industrial Environment.
- EN 61000-6-2:2005 – Generic Immunity Standard, Part 2 – Industrial Environment.

Low-Voltage Directive (LVD)

Units mentioned in this document for which the product is marked with the **CE** logo are designed to meet LVD directive 2006/95/EC, Low Voltage, by applying the safety requirements of EN 61131-2, Programmable Controllers, Part 2 - Equipment Requirements and Tests. Units must comply with the LVD if they are connected to 50–1000 V AC and/or 75–1500 V DC.



The units are classed as “open type equipment” and must be mounted in suitable cabinets.



External power supplies used to provide 24 V DC must be CE-marked. The CE low-voltage directive prescribes that a safety extra low voltage (SELV) or a protected extra low voltage (PELV) power supply be used.

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