



WAGO-I/O-SYSTEM 750

2AO 4-20mA Ex i

750-586

2-Channel Analog Output Module 4-20 mA, Ex i

Version 1.0.0

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Every conceivable measure has been taken to ensure the accuracy and completeness of this documentation. However, as errors can never be fully excluded, we always appreciate any information or suggestions for improving the documentation.

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We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally protected by trademark or patent.

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1 Notes about this Documentation

Note



Keep this documentation!

The operating instructions are part of the product and shall be kept for the entire lifetime of the device. They shall be transferred to each subsequent owner or user of the device. Care must also be taken to ensure that any supplement to these instructions are included, if applicable.

1.1 Validity of this Documentation

This documentation is only applicable to the I/O module 750-586 (2AO 4-20mA Ex i) of the WAGO-I/O-SYSTEM 750 series.

The I/O module 750-586 shall only be installed and operated according to the instructions in this manual and in the manual for the used fieldbus coupler/controller.

NOTICE

Consider power layout of the WAGO-I/O-SYSTEM 750!

In addition to these operating instructions, you will also need the manual for the used fieldbus coupler/controller, which can be downloaded at www.wago.com. There, you can obtain important information including information on electrical isolation, system power and supply specifications.

1.2 Copyright

This Manual, including all figures and illustrations, is copyright-protected. Any further use of this Manual by third parties that violate pertinent copyright provisions is prohibited. Reproduction, translation, electronic and phototechnical filing/archiving (e.g., photocopying) as well as any amendments require the written consent of WAGO Kontakttechnik GmbH & Co. KG, Minden, Germany. Non-observance will involve the right to assert damage claims.

1.3 Symbols

 **DANGER****Personal Injury!**

Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **DANGER****Personal Injury Caused by Electric Current!**

Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING****Personal Injury!**

Indicates a moderate-risk, potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **CAUTION****Personal Injury!**

Indicates a low-risk, potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE**Damage to Property!**

Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.

NOTICE**Damage to Property Caused by Electrostatic Discharge (ESD)!**

Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.

Note**Important Note!**

Indicates a potential malfunction which, if not avoided, however, will not result in damage to property.



Information

Additional Information:

Refers to additional information which is not an integral part of this documentation (e.g., the Internet).

1.4 Number Notation

Table 1: Number Notation

Number code	Example	Note
Decimal	100	Normal notation
Hexadecimal	0x64	C notation
Binary	'100' '0110.0100'	In quotation marks, nibble separated with dots (.)

1.5 Font Conventions

Table 2: Font Conventions

Font type	Indicates
<i>italic</i>	Names of paths and data files are marked in italic-type. e.g.: <i>C:\Programme\WAGO-I/O-CHECK</i>
Menu	Menu items are marked in bold letters. e.g.: Save
>	A greater-than sign between two names means the selection of a menu item from a menu. e.g.: File > New
Input	Designation of input or optional fields are marked in bold letters, e.g.: Start of measurement range
“Value”	Input or selective values are marked in inverted commas. e.g.: Enter the value “4 mA” under Start of measurement range .
[Button]	Pushbuttons in dialog boxes are marked with bold letters in square brackets. e.g.: [Input]
[Key]	Keys are marked with bold letters in square brackets. e.g.: [F5]

2 Important Notes

This section includes an overall summary of the most important safety requirements and notes that are mentioned in each individual section. To protect your health and prevent damage to devices as well, it is imperative to read and carefully follow the safety guidelines.

2.1 Legal Bases

2.1.1 Subject to Changes

WAGO Kontakttechnik GmbH & Co. KG reserves the right to provide for any alterations or modifications that serve to increase the efficiency of technical progress. WAGO Kontakttechnik GmbH & Co. KG owns all rights arising from the granting of patents or from the legal protection of utility patents. Third-party products are always mentioned without any reference to patent rights. Thus, the existence of such rights cannot be excluded.

2.1.2 Personnel Qualifications

All sequences implemented on Series 750 devices may only be carried out by electrical specialists with sufficient knowledge in automation. The specialists must be familiar with the current norms and guidelines for the devices and automated environments.

All changes to the coupler or controller should always be carried out by qualified personnel with sufficient skills in PLC programming.

2.1.3 Use of the 750 Series in Compliance with Underlying Provisions

Couplers, controllers and I/O modules found in the modular WAGO-I/O-SYSTEM 750 receive digital and analog signals from sensors and transmit them to the actuators or higher-level control systems. Using programmable controllers, the signals can also be (pre-)processed.

The components have been developed for use in an environment that meets the IP20 protection class criteria. Protection against finger injury and solid impurities up to 12.5 mm diameter is assured; protection against water damage is not ensured. Unless otherwise specified, operation of the components in wet and dusty environments is prohibited.

Operating 750 Series components in home applications without further measures is only permitted if they meet the emission limits (emissions of interference) according to EN 61000-6-3. You will find the relevant information in the section on "WAGO-I/O-SYSTEM 750" → "System Description" → "Technical Data" in the manual for the used fieldbus coupler/controller.

Appropriate housing (per 94/9/EG) is required when operating the WAGO-I/O-SYSTEM 750 in hazardous environments. Please note that a prototype test certificate must be obtained that confirms the correct installation of the system in a housing or switch cabinet.

2.1.4 Technical Condition of Specified Devices

The components to be supplied Ex Works, are equipped with hardware and software configurations, which meet the individual application requirements. WAGO Kontakttechnik GmbH & Co. KG will be exempted from any liability in case of changes in hardware or software as well as to non-compliant usage of components.

Please send your request for modified and new hardware or software configurations directly to WAGO Kontakttechnik GmbH & Co. KG.

2.2 Safety Advice (Precautions)

For installing and operating purposes of the relevant device to your system the following safety precautions shall be observed:



DANGER

Do not work on components while energized!

All power sources to the device shall be switched off prior to performing any installation, repair or maintenance work.

DANGER

Installation only in appropriate housings, cabinets or in electrical operation rooms!

The WAGO-I/O-SYSTEM 750 and its components are an open system. As such, install the system and its components exclusively in appropriate housings, cabinets or in electrical operation rooms. Allow access to such equipment and fixtures to authorized, qualified staff only by means of specific keys or tools.

NOTICE

Replace defective or damaged devices!

Replace defective or damaged device/module (e.g., in the event of deformed contacts), since the long-term functionality of device/module involved can no longer be ensured.

NOTICE

Protect the components against materials having seeping and insulating properties!

The components are not resistant to materials having seeping and insulating properties such as: aerosols, silicones and triglycerides (found in some hand creams). If you cannot exclude that such materials will appear in the component environment, then install the components in an enclosure being resistant to the above-mentioned materials. Clean tools and materials are imperative for handling devices/modules.

NOTICE

Cleaning only with permitted materials!

Clean soiled contacts using oil-free compressed air or with ethyl alcohol and leather cloths.

NOTICE**Do not use any contact spray!**

Do not use any contact spray. The spray may impair contact area functionality in connection with contamination.

NOTICE**Do not reverse the polarity of connection lines!**

Avoid reverse polarity of data and power supply lines, as this may damage the devices involved.

NOTICE**Avoid electrostatic discharge!**

The devices are equipped with electronic components that you may destroy by electrostatic discharge when you touch. Pay attention while handling the devices to good grounding of the environment (persons, job and packing).

3 Device Description

The analog output module 750-586 (2AO 4-20mA Ex i) generates a standardized signal of 4 ... 20 mA for hazardous field area of zone 0 or zone 1.

WARNING

Installation only in zone 2 or in non-hazardous environments!

The installation of the WAGO-I/O-SYSTEM 750 fieldbus couplers/ controllers and I/O modules is only to be done in zone 2 or in non-hazardous environments.

The module has two output channels and enables, for example, the direct wiring of two 2-conductor actuators. The output signals are connected to the CAGE CLAMP[®] connections AO 1 and 0V or AO 2 and 0V.

The output channels of this module have a common shield (screen) connection. The assignment of the connections is described in the "Connections" section. Connection examples are in the "Connecting devices - connection examples" section.

The "ready" state of the respective channel and the internal data communication is indicated by a green function LED.

The meaning of the LEDs is described in the "Display Elements" section.

WARNING

Ex i I/O modules shall only be supplied via Ex i 24VDC power supply module!

Ex i I/O modules shall only be operated with an Ex i 24VDC power supply module (see figure below).

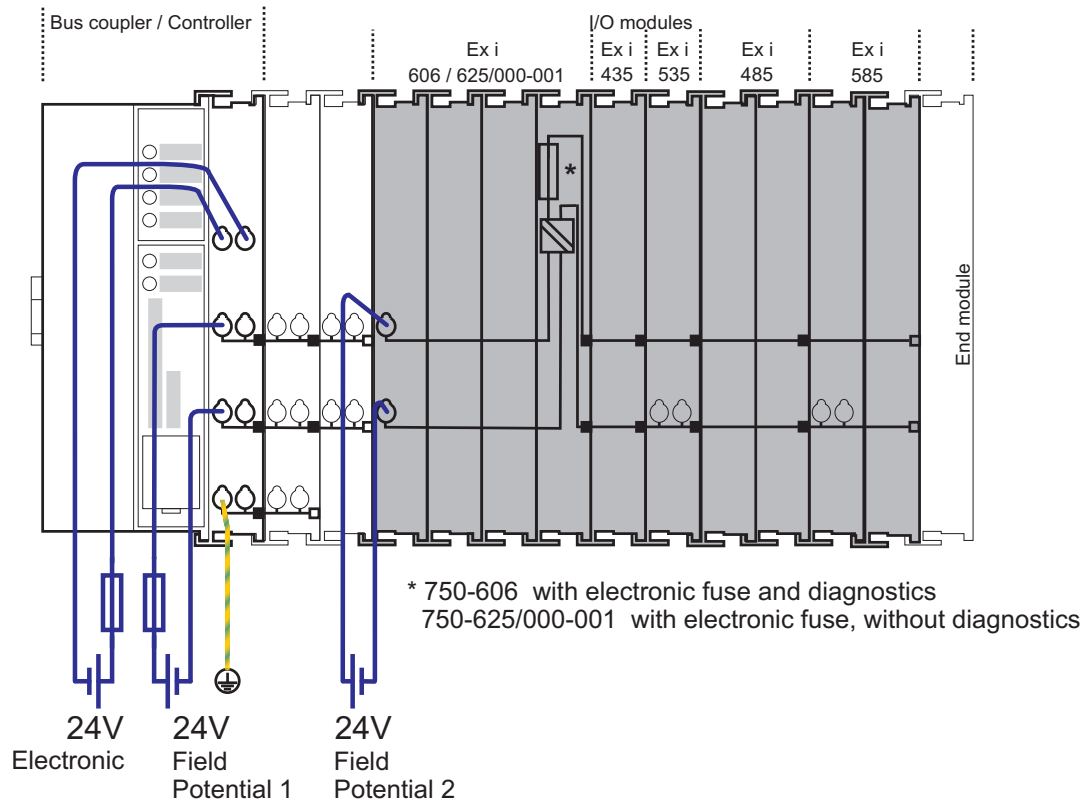


Figure 1: Supply Principle Ex i

The Ex i I/O module receives the 24V voltage supply for the field level from an upstream Ex i I/O module or from an Ex i power supply module via the power contacts used as blade contacts. It then provides this potential to subsequent I/O modules via the power contacts used as spring contacts.

NOTICE

Do not exceed maximum current via power contacts!

The maximum current available from the 750-606 or 750-625/000-001 Ex-i Supply Module is 1000 mA.

Greater currents can damage the power contacts.

When configuring the system, ensure that this current is not exceeded. If exceeded, an additional potential feed module must be used.

⚠ WARNING

Keep the air and creep distances between intrinsically safe segments!

If the employment of further DC 24 V Ex i Supply modules is necessary for reasons of extent of utilization, four Separation modules (750-616) must be used to guarantee the distance between the intrinsically safe segments.

The field voltage and the system voltage are electrically isolated from each other.

Any configuration of the input modules is possible within an intrinsically safe segment when configuring the fieldbus node. An arrangement in groups within the group of potentials is not necessary.

The I/O module 750-586 can be used with all fieldbus couplers/controllers of the WAGO-I/O-SYSTEM 750 (except for the economy types 750-320, -323, -324 and -327).



Information

Further Information about explosion prevention!

General information to the explosion prevention is in the manual chapter "Use in Hazardous Environments" described!

3.1 View

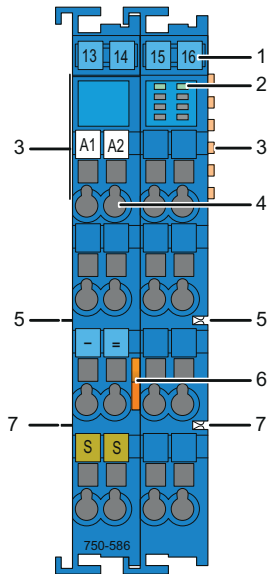


Figure 2: View

Table 3: Caption acc. to figure "View"

No.	Designation	Description	Details see chapter
1	---	Marking possibility with Mini-WSB	---
2	A, E	Status-LEDs	„Device Description“ > „Display elements“
3	---	Data contacts	„Device Description“ > „Connections“
4	1, 3, 4, 5, 7, 8	CAGE CLAMP® - supplies Outputs AO 1, AO 2, Field supply 0 V and Shield	„Technical manual “ > „Connections“
5	---	Power jumper contacts +24 V	„Device Description“ > „Connections“
6	---	Release clip	„Assembly“ > „Insert and delete Device“
7	---	Power jumper contacts 0 V	„Device Description“ > „Connections“

3.2 Connectors

3.2.1 Data Contacts/Internal Bus

Communication between the coupler/controller and the bus modules as well as the system supply of the bus modules is carried out via the internal bus. It is comprised of 6 data contacts, which are available as self-cleaning gold spring contacts.

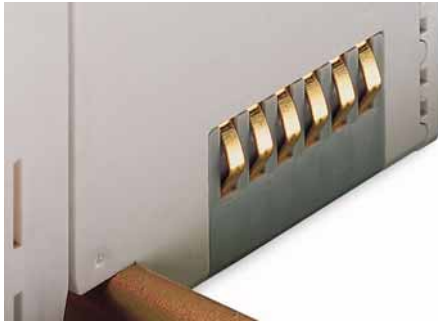


Figure 3: Data contacts

NOTICE

Do not place the I/O modules on the gold spring contacts!

Do not place the I/O modules on the gold spring contacts in order to avoid soiling or scratching!

NOTICE



Ensure that the environment is well grounded!

The modules are equipped with electronic components that may be destroyed by electrostatic discharge. When handling the modules, ensure that the environment (persons, workplace and packing) is well grounded. Avoid touching conductive components, e.g. data contacts.

3.2.2 Power Contacts/Field Supply

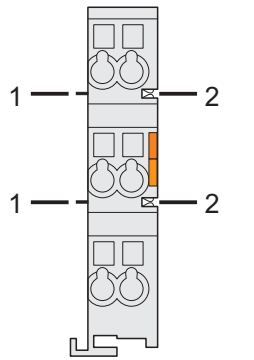
⚠ CAUTION

Risk of injury due to sharp-edged male contacts!

The male contacts are sharp-edged. Handle the module carefully to prevent injury.

The I/O module 750-586 has 2 self-cleaning power jumper contacts that supply and transmit power for the field side. The contacts on the left side of the I/O module are designed as male contacts and the contacts on the right side as spring contacts.

Table 4: Power jumper contacts

	Connection	Type	Number	Function
 <p>Figure 4: Power jumper contacts</p>	1	Blade contact	2	Infeed of the field supply voltage (U_V and 0 V)
	2	Spring contact	2	Forwarding of the field supply voltage (U_V and 0 V)

NOTICE

Do not exceed maximum current via power contacts!

The maximum current available from the 750-606 or 750-625/000-001 Ex-i Supply Module is 1000 mA.

Greater currents can damage the power contacts.

When configuring the system, ensure that this current is not exceeded. If exceeded, an additional potential feed module must be used.

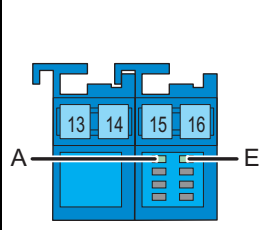
3.2.3 CAGE CLAMP® Connections

Table 5: Connections

	Connection	Channel	Designation	Function
<p>Fig. 5: Connections</p>	1	1	AO 1	Output AO 1: Signal voltage
	3		0 V	Output AO 1: Actuator supply 0 V
	4		S	Output AO 1: Shield connection
	5	2	AO 2	Output AO 2: Signal voltage
	7		0 V	Output AO 2: Actuator supply 0 V
	8		S	Output AO 2: Shield connection
	Power jumper contacts	-	+24 V	Field supply 24 V
	Power jumper contacts	-	0 V	Field supply 0 V

3.3 Display Elements

Table 6: Display elements

 <p>Figure 6: Display elements</p>	LED	Channel	Designation	State	Function
	A	1	State AO 1	off	No operational readiness or the internal data bus communication is interrupted
				green	Operational readiness and trouble-free internal data bus communication
	E	2	State AO 2	off	No operational readiness or the internal data bus communication is interrupted
green				Operational readiness and trouble-free internal data bus communication	

3.4 Operating Elements

The I/O module 750-586 has no operating elements.

3.5 Schematic Diagram

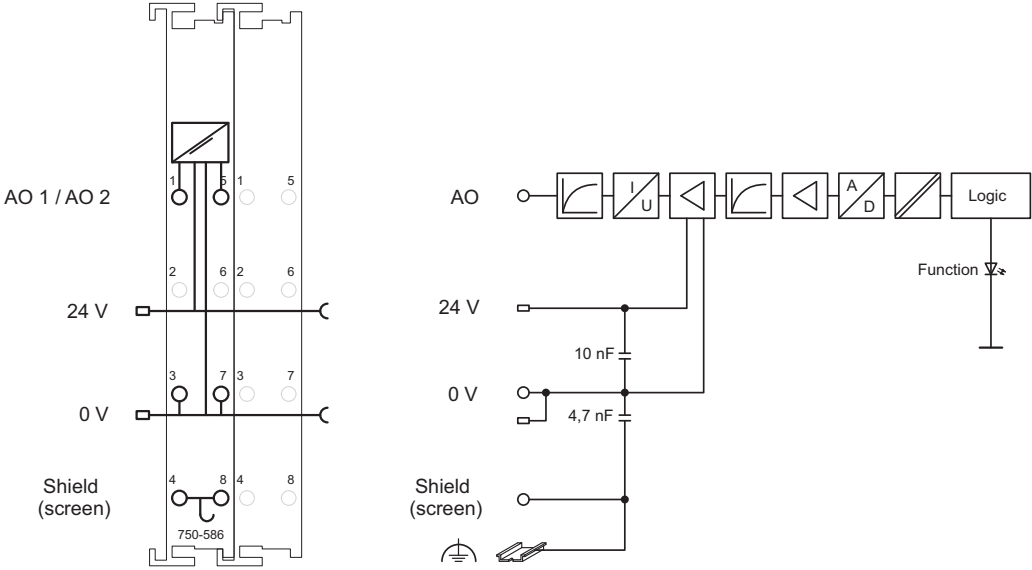


Figure 7: Schematic diagram

3.6 Technical Data

3.6.1 Device data

Table 7: Technical data device

Width	24 mm
Height (from upper edge of 35 DIN rail)	64 mm
Depth	100 mm
Weight	ca. 91,6 g

3.6.2 Supply

Table 8: Technical data supply

Voltage supply	Via system voltage terminal bus (5 V DC) and power contacts (24 V DC)
Current consumption $I_{typ.}$ (internal). (5 V DC)	21 mA
Input current $I_{typ.}$ (Field). (24 V DC)	19 mA / module + load (2 x 20 mA)
Voltage via power jumper contacts	24 V DC (Supply via Ex i supply module)
Current via power contacts $I_{max.}$	1000 mA (Supply via Ex i supply module)
Power loss P_V	0,9 W
Power consumption $P_{max.}$	1,5 W
Isolation (Peak value)	375 V System/Supply

3.6.3 Communication

Table 9: Technical data communication

Internal bit width (Terminal bus)	2 x 16 Bit data, 2 x 8 Bit Control/Status (optional)
-----------------------------------	---

3.6.4 Outputs

Table 10: Technical data outputs

No. of outputs	2
Signal current	4 mA ... 20 mA
Load impedance	< 500 Ω
Linearity	± 2 LSB
Resolution	12 Bit
Conversion time	< 2 ms
Output error 25°C	< $\pm 0,2$ % from full scale range
Temperature coefficient	< $\pm 0,01$ % / K from full scale range

3.6.5 Explosion Protection

Table 11: Technical data Explosion Protection

Ex directive 94/9/EG		EN 60079-0:2006, EN 60079-11:2007, EN 60079-15:2005, EN 61241-0:2006, EN 61241-1:2004, EN 61241-11:2006	
Safety Data electric circuit		U ₀ = 27,3 V I ₀ = 57,5mA P ₀ = 392 mW Line characteristic: linear	
Reactance <u>without</u> consideration of the simultaneousness		L ₀	C ₀
	Ex ia IIC	11 mH	88 nF
	Ex ia IIB	56 mH	680 nF
	Ex ia I	110 mH	3,5 µF
Reactance <u>with</u> consideration of the simultaneousness		L ₀	C ₀
	Ex ia II C	≤ 0,02 mH	87 nF
		0,5 mH	77 nF
		1,0 mH	63 nF
		2,0 mH	51 nF
		7,6 mH	40 nF
	Ex ia II B	≤ 0,1 mH	0,67 µF
		0,5 mH	0,46 µF
		1,0 mH	0,39 µF
		20,0 mH	0,31 µF
		44,0 mH	0,23 µF
	Ex ia I	0,01 mH	1,8 µF
		0,05 mH	1,1 µF
		0,2 mH	0,68 µF
		1,0 mH	0,43 µF
		5,0 mH	0,29 µF

3.7 Approvals

Information



More Information about Approvals

Detailed references to the approvals are listed in the document "Overview Approvals **WAGO-I/O-SYSTEM 750**", which you can find on the DVD "AUTOMATION Tools and Docs" (order no. 0888-0412) or via the internet under: www.wago.com → Documentation → WAGO-I/O-SYSTEM 750 → System Description.


The following approvals have been granted to 750-586 I/O modules:


 Conformity Marking

The following approvals are pending for 750-586 I/O modules:


 cUL_{US} (UL508)


The following Ex approvals have been granted to 750-586 I/O modules:

 TÜV 07 ATEX 554086 X

 I (M2) [Ex ia] I
II 3 (1) G Ex nA [ia] IIC T4
II 3 (1) D Ex tD [iaD] A22 IP6X T135°C

Permissible operation temperature: $0\text{ °C} \leq T_A \leq +60\text{ °C}$

 TÜV TUN 09.0001X

 [Ex ia] I
Ex nA [ia] IIC T4
Ex tD [iaD] A22 IP6X T135°C

Permissible operation temperature: $0\text{ °C} \leq T_A \leq +60\text{ °C}$

The following ship approvals have been granted to 750-586 I/O modules:



Federal Maritime and Hydrographic Agency

3.8 Standards and Guidelines

750-586 I/O modules meet the following requirements on emission and immunity of interference:

EC EMC Directive	2004/108/EC
EMC CE-Emission of interference	acc. to EN 61000-6-4: 2007
EMC CE-Immunity to interference	acc. to EN 61000-6-2: 2005

4 Assembly

4.1 Assembly Sequence

All system components can be snapped directly on a carrier rail in accordance with the European standard EN 50022 (DIN 35).

The reliable positioning and connection is made using a tongue and groove system. Due to the automatic locking, the individual components are securely seated on the rail after installation.

Starting with the coupler/controller, the bus modules are assembled adjacent to each other according to the project design. Errors in the design of the node in terms of the potential groups (connection via the power contacts) are recognized, as the bus modules with power contacts (male contacts) cannot be linked to bus modules with fewer power contacts.

CAUTION

Risk of injury due to sharp-edged male contacts!

The male contacts are sharp-edged. Handle the module carefully to prevent injury.

NOTICE

Connect the I/O modules in the required order!

Never plug bus modules from the direction of the end terminal. A ground wire power contact, which is inserted into a terminal without contacts, e.g. a 4-channel digital input module, has a decreased air and creepage distance to the neighboring contact in the example DI4.

NOTICE

Assemble the I/O modules in rows only if the grooves are open!

Please take into consideration that some bus modules have no or only a few power jumper contacts. The design of some modules does not allow them to be physically assembled in rows, as the grooves for the male contacts are closed at the top.

Note



Don't forget the bus end module!

Always plug a bus end module 750-600 onto the end of the fieldbus node! You must always use a bus end module at all fieldbus nodes with the WAGO I/O System 750 fieldbus couplers/controllers to guarantee proper data transfer.

4.2 Inserting and Removing Devices

DANGER

Use caution when interrupting the PE!

Make sure that people or equipment are not placed at risk when removing an I/O module and the associated PE interruption. To prevent interruptions, provide ring feeding of the ground conductor, see section "Grounding/Ground Conductor" in manual "System Description WAGO-I/O-SYSTEM 750".

NOTICE

Perform work on devices only if the system is de-energized!

Working on devices when the system is energized can damage the devices. Therefore, turn off the power supply before working on the devices.

4.2.1 Inserting I/O Module

1. Position the I/O module so that the tongue and groove joints to the fieldbus coupler/controller or to the previous or possibly subsequent I/O module are engaged.

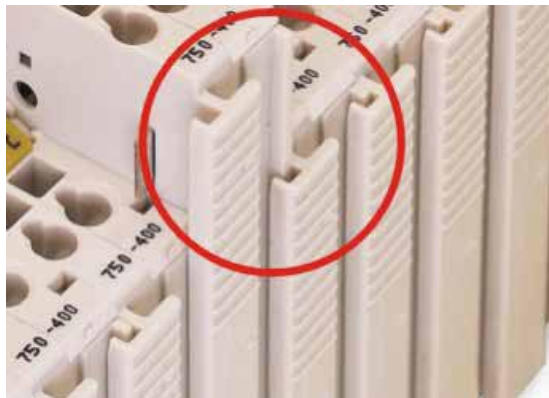


Figure 8: Insert I/O module

2. Press the I/O module into the assembly until the I/O module snaps into the carrier rail.

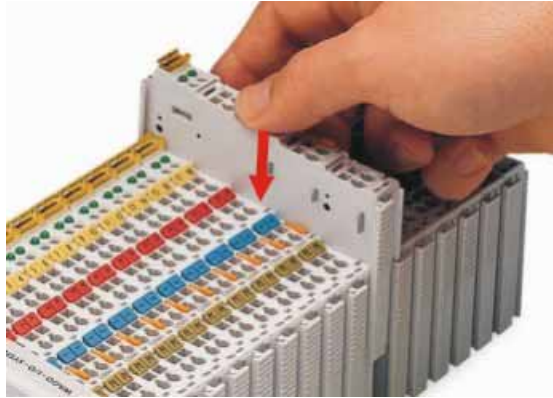


Figure 9: Snap the I/O module into place

With the I/O module snapped in place, the electrical connections for the data contacts and power contacts (if any) to the fieldbus coupler/controller or to the previous or possibly subsequent I/O module are established.

4.2.2 Removing the I/O Module

1. Remove the I/O module from the assembly by pulling the release tab.

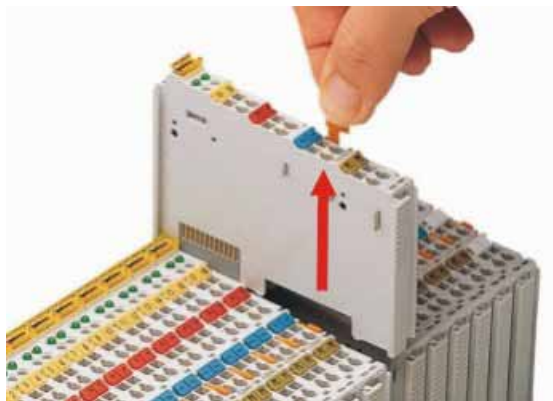


Figure 10: Removing the I/O module

Electrical connections for data or power contacts are disconnected when removing the I/O module.

5 Connect Devices

5.1 Connecting a conductor to the CAGE CLAMP®

The WAGO CAGE CLAMP® connection is appropriate for solid, stranded and finely stranded conductors.

Note



Only connect one conductor to each CAGE CLAMP® connection!

Only one conductor may be connected to each CAGE CLAMP® connection.

Do not connect more than one conductor at one single connection!

If more than one conductor must be routed to one connection, these must be connected in an up-circuit wiring assembly, for example using WAGO feed-through terminals.

Exception:

If it is unavoidable to jointly connect 2 conductors, then you must use a ferrule to join the wires together. The following ferrules can be used:

Length	8 mm
Nominal cross section _{max.}	1 mm ² for 2 conductors with 0.5 mm ² each
WAGO Product	216-103 or products with comparable properties.

1. To open the CAGE CLAMP® insert the actuating tool into the opening above the connection.
2. Insert the conductor into the corresponding connection opening.
3. To close the CAGE CLAMP® simply remove the tool - the conductor is then clamped firmly in place.

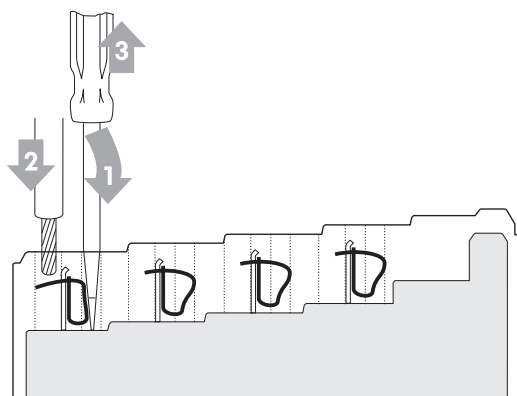


Figure 11: Connecting a conductor to a CAGE CLAMP®

5.2 Connection Example

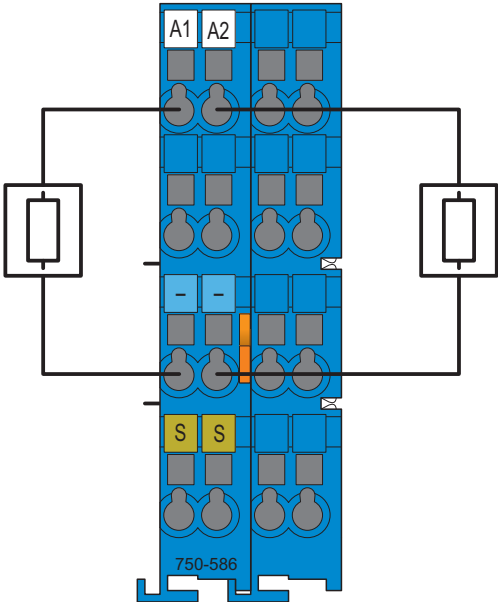


Figure 12: Connecting diagram

6 Process Image

Note



Mapping of process data in the process image of fieldbus systems

The representation of the process data of some I/O modules or their variations in the process image depends on the fieldbus coupler/controller used. Please take this information from the section "Fieldbus Specific Design of the Process Data" included in the description concerning the process image of the corresponding coupler/controller.

Note



No Status Byte to evaluate!

Some fieldbus systems can process the status information of process values using by means of a status byte.

As the returned status byte of this I/O module is always zero, it will not be parsed.

The analog output module 750-586 transmits 16-bit measured values and 8 optional status bits per channel.

The digitalized output value is transmitted in a data word (16 bits) as output byte 0 (low) and output byte 1 (high) via the process image of the fieldbuscoupler/controller.

The output current ranging from 4 mA to 20 mA is scaled on the numerical values ranging from 0x0000 to 0x7FFF.

This value is represented with a 12 bit resolution on bit B3 ... B14. The three least significant bits (B0 ... B2) are not parsed.

Table 12: Process Image

Output current 4 mA ... 20 mA	Numerical value			Status- byte hex.
	Binary Output value	hex.	dec.	
4,0	'0000.0000.0000.0000'	0x0000	0	0x00
6,0	'0001.0000.0000.0000'	0x1000	4096	0x00
8,0	'0010.0000.0000.0000'	0x2000	8192	0x00
10,0	'0011.0000.0000.0000'	0x3000	12288	0x00
12,0	'0100.0000.0000.0000'	0x4000	16384	0x00
14,0	'0101.0000.0000.0000'	0x5000	20480	0x00
16,0	'0110.0000.0000.0000'	0x6000	24576	0x00
18,0	'0111.0000.0000.0000'	0x7000	28672	0x00
20,0	'0111.1111.1111.1111'	0x7FFF	32767	0x00

7 Use in Hazardous Environments

The **WAGO-I/O-SYSTEM 750** (electrical equipment) is designed for use in Zone 2 hazardous areas.

The following sections include both the general identification of components (devices) and the installation regulations to be observed. The individual subsections of the "Installation Regulations" section must be taken into account if the I/O module has the required approval or is subject to the range of application of the ATEX directive.

7.1 Marking Configuration Examples

7.1.1 Marking for Europe according to CENELEC and IEC

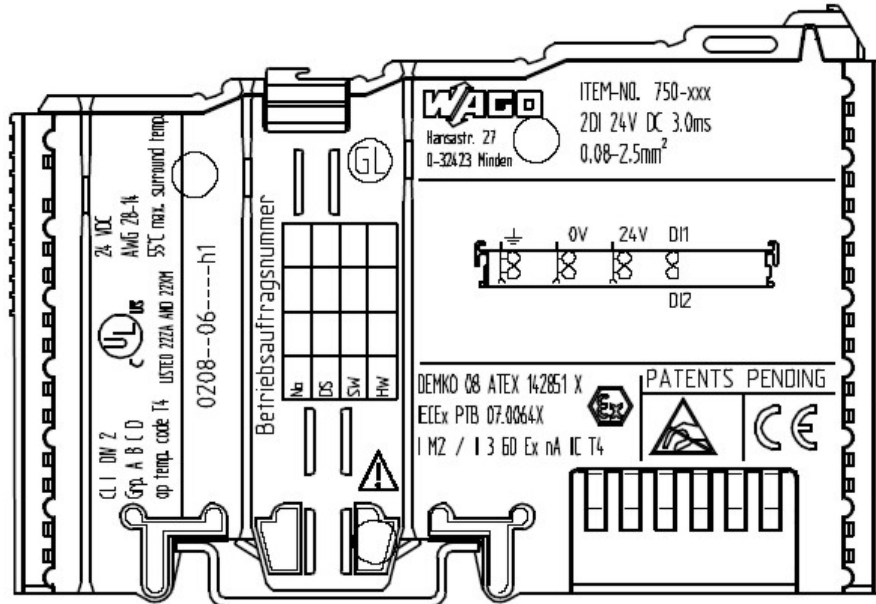


Figure 13: Side marking example for ATEX and IEC Ex approved I/O modules according to CENELEC and IEC

DEMKO 08 ATEX 142851 X
IECEX PTB 07.0064X
I M2 / II 3 GD Ex nA IIC T4



Figure 14: Printing Text detail – Marking example for ATEX and IEC Ex approved I/O modules according to CENELEC and IEC

Table 13: Description of marking example for ATEX and IEC Ex approved I/O modules according to CENELEC and IEC

Printing on Text	Description
DEMKO 08 ATEX 142851 X IECEX PTB 07.0064X	Approval body and/or number of the examination certificate
I M2 / II 3 GD	Explosion protection group and Unit category
Ex nA	Type of ignition and extended identification
IIC	Explosion protection group
T4	Temperature class

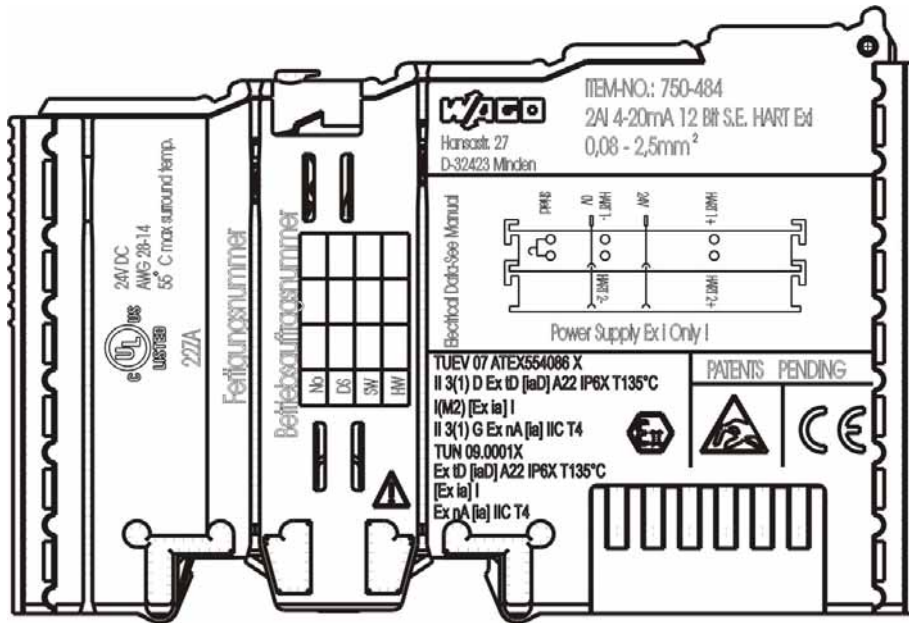


Figure 15: Side marking example for Ex i and IEC Ex i approved I/O modules according to CENELEC and IEC

TUEV 07 ATEX554086 X
II 3(1) D Ex tD [iaD] A22 IP6X T135°C
I(M2) [Ex ia] I
II 3(1) G Ex nA [ia] IIC T4
TUN 09.0001X
Ex tD [iaD] A22 IP6X T135°C
[Ex ia] I
Ex nA [ia] IIC T4



Figure 16: Text detail – Marking example for Ex i and IEC Ex i approved I/O modules according to CENELEC and IEC

Table 14: Description of marking example for Ex i and IEC Ex i approved I/O modules according to CENELEC and IEC

Inscription text	Description
TÜV 07 ATEX 554086 X TUN 09.0001X	Approving authority or certificate numbers
Dust	
II	Device group: All except mining
3(1)D	Device category: Zone 22 device (Zone 20 subunit)
Ex	Explosion protection mark
tD	Protection by enclosure
[iaD]	Approved in accordance with "Dust intrinsic safety" standard
A22	Surface temperature determined according to Procedure A, use in Zone 22
IP6X	Dust-tight (totally protected against dust)
T 135°C	Max. surface temp. of the enclosure (no dust bin)
Mining	
I	Device group: Mining
(M2)	Device category: High degree of safety
[Ex ia]	Explosion protection: Mark with category of type of protection intrinsic safety: Even safe when two errors occur
I	Device group: Mining
Gases	
II	Device group: All except mining
3(1)G	Device category: Zone 2 device (Zone 0 subunit)
Ex	Explosion protection mark
nA	Type of protection: Non-sparking operating equipment
[ia]	Category of type of protection intrinsic safety: Even safe when two errors occur
IIC	Explosion Group
T4	Temperature class: Max. surface temperature 135°C

7.1.2 Marking for America according to NEC 500

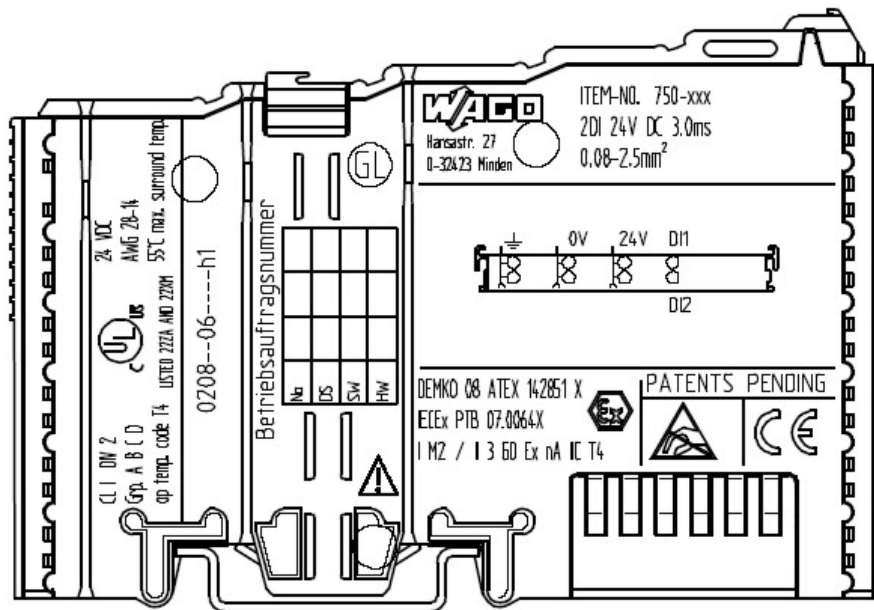


Figure 17: Side marking example for I/O modules according to NEC 500



Figure 18: Text detail – Marking example for I/O modules according to NEC 500

Table 15: Description of marking example for I/O modules according to NEC 500

Printing on Text	Description
CL 1	Explosion protection group (condition of use category)
DIV 2	Area of application (zone)
Grp. ABCD	Explosion group (gas group)
Optemp code T4	Temperature class

7.2 Installation Regulations

In the **Federal Republic of Germany**, various national regulations for the installation in explosive areas must be taken into consideration. The basis for this forms the working reliability regulation, which is the national conversion of the European guideline 99/92/E6. They are complemented by the installation regulation EN 60079-14. The following are excerpts from additional VDE regulations:

Table 16: VDE Installation Regulations in Germany

DIN VDE 0100	Installation in power plants with rated voltages up to 1000 V
DIN VDE 0101	Installation in power plants with rated voltages above 1 kV
DIN VDE 0800	Installation and operation in telecommunication plants including information processing equipment
DIN VDE 0185	lightning protection systems

The **USA** and **Canada** have their own regulations. The following are excerpts from these regulations:

Table 17: Installation Regulations in USA and Canada

NFPA 70	National Electrical Code Art. 500 Hazardous Locations
ANSI/ISA-RP 12.6-1987	Recommended Practice
C22.1	Canadian Electrical Code

NOTICE

Notice the following points

When using the **WAGO-I/O SYSTEM 750** (electrical operation) with Ex approval, the following points are mandatory:

7.2.1 Special Conditions for Safe Operation of the ATEX and IEC Ex (acc. DEMKO 08 ATEX 142851X and IECEx PTB 07.0064)

The fieldbus-independent I/O modules of the WAGO-I/O-SYSTEM 750-.../...-... must be installed in an environment with degree of pollution 2 or better. In the final application, the I/O modules must be mounted in an enclosure with IP 54 degree of protection at a minimum with the following exceptions:

- I/O modules 750-440, 750-609 and 750-611 must be installed in an IP 64 minimum enclosure.
- I/O module 750-540 must be installed in an IP 64 minimum enclosure for 230 V AC applications.
- I/O module 750-440 may be used up to max. 120 V AC.

When used in the presence of combustible dust, all devices and the enclosure shall be fully tested and assessed in compliance with the requirements of IEC 61241-0:2004 and IEC 61241-1:2004.

When used in mining applications the equipment shall be installed in a suitable enclosure according to EN 60079-0:2006 and EN 60079-1:2007.

I/O modules fieldbus plugs or fuses may only be installed, added, removed or replaced when the system and field supply is switched off or the area exhibits no explosive atmosphere.

DIP switches, coding switches and potentiometers that are connected to the I/O module may only be operated if an explosive atmosphere can be ruled out.

I/O module 750-642 may only be used in conjunction with antenna 758-910 with a max. cable length of 2.5 m.

To exceed the rated voltage no more than 40%, the supply connections must have transient protection.

The permissible ambient temperature range is 0 °C to +55 °C.

7.2.2 Special conditions for safe use (ATEX Certificate TÜV 07 ATEX 554086 X)

1. For use as Gc- or Dc-apparatus (in zone 2 or 22) the field bus independent I/O modules WAGO-I/O-SYSTEM 750-*** shall be erected in an enclosure that fulfils the requirements of the applicable standards (see the marking) EN 60079-0, EN 60079-11, EN 60079-15, EN 61241-0 and EN 61241-1. For use as group I, electrical apparatus M2, the apparatus shall be erected in an enclosure that ensures a sufficient protection according to EN 60079-0 and EN 60079-1 and the degree of protection IP64. The compliance of these requirements and the correct installation into an enclosure or a control cabinet of the devices shall be certified by an ExNB.
2. If the interface circuits are operated without the field bus coupler station type 750-3./...-... (DEMKO 08 ATEX 142851 X), measures must be taken outside of the device so that the rating voltage is not being exceeded of more than 40% because of transient disturbances.
3. DIP-switches, binary-switches and potentiometers, connected to the module may only be actuated when explosive atmosphere can be excluded.
4. The connecting and disconnecting of the non-intrinsically safe circuits is only permitted during installation, for maintenance or for repair purposes. The temporal coincidence of explosion hazardous atmosphere and installation, maintenance resp. repair purposes shall be excluded. This is although and in particular valid for the interfaces “CF-Card”, “USB”, “Fieldbus connection“, “Configuration and programming interface“, “antenna socket“, “D-Sub“ and the “Ethernet interface“. These interfaces are not energy limited or intrinsically safe circuits. An operating of those circuits is in the behalf of the operator.
5. For the types 750-606, 750-625/000-001, 750-487/003-000, 750-484 and 750-633 the following shall be considered: The interface circuits shall be limited to overvoltage category I/II/III (non mains/mains circuits) as defined in EN 60664-1.
6. For the type 750-601 the following shall be considered: Do not remove or replace the fuse when the apparatus is energized.
7. The ambient temperature range is: $0^{\circ}\text{C} \leq T_a \leq +55^{\circ}\text{C}$ (for extended details please note certificate).

8. The following warnings shall be placed nearby the unit:

 **WARNING**

Do not remove or replace fuse when energized!

If the module is energized do not remove or replace the fuse.

 **WARNING**

Do not separate when energized!

Do not separate the module when energized!

 **WARNING**

Separate only in a non-hazardous area!

Separate the module only in a non-hazardous area!

7.2.3 Special conditions for safe use (IEC-Ex Certificate TUN 09.0001 X)

1. For use as Dc- or Gc-apparatus (in zone 2 or 22) the fieldbus independent I/O modules WAGO-I/O-SYSTEM 750-*** shall be erected in an enclosure that fulfils the requirements of the applicable standards (see the marking) IEC 60079-0, IEC 60079-11, IEC 60079-15, IEC 61241-0 and IEC 61241-1. For use as group I, electrical apparatus M2, the apparatus shall be erected in an enclosure that ensures a sufficient protection according to IEC 60079-0 and IEC 60079-1 and the degree of protection IP64. The compliance of these requirements and the correct installation into an enclosure or a control cabinet of the devices shall be certified by an ExCB.
2. Measures have to be taken outside of the device that the rating voltage is not being exceeded of more than 40% because of transient disturbances.
3. DIP-switches, binary-switches and potentiometers, connected to the module may only be actuated when explosive atmosphere can be excluded.
4. The connecting and disconnecting of the non-intrinsically safe circuits is only permitted during installation, for maintenance or for repair purposes. The temporal coincidence of explosion hazardous atmosphere and installation, maintenance resp. repair purposes shall be excluded. This is although and in particular valid for the interfaces “CF-Card”, “USB”, “Fieldbus connection“, “Configuration and programming interface“, “antenna socket“, “D-Sub“ and the “Ethernet interface“. These interfaces are not energy limited or intrinsically safe circuits. An operating of those circuits is in the behalf of the operator.
5. For the types 750-606, 750-625/000-001, 750-487/003-000, 750-484 and 750-633 the following shall be considered: The interface circuits shall be limited to overvoltage category I/II/III (non mains/mains circuits) as defined in IEC 60664-1.
6. For the type 750-601 the following shall be considered: Do not remove or replace the fuse when the apparatus is energized.
7. The ambient temperature range is: $0^{\circ}\text{C} \leq T_a \leq +55^{\circ}\text{C}$ (For extensions please see the certificate).

8. The following warnings shall be placed nearby the unit:

 **WARNING**

Do not remove or replace fuse when energized!

If the module is energized do not remove or replace the fuse.

 **WARNING**

Do not separate when energized!

Do not separate the module when energized!

 **WARNING**

Separate only in a non-hazardous area!

Separate the module only in a non-hazardous area!

7.2.4 ANSI/ISA 12.12.01

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only.

This equipment is to be fitted within tool-secured enclosures only.

WARNING

Explosion hazard!

Explosion hazard - substitution of components may impair suitability for Class I, Div. 2.

WARNING

Disconnect device when power is off and only in a non-hazardous area!

Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous near each operator accessible connector and fuse holder." When a fuse is provided, the following information shall be provided: "A switch suitable for the location where the equipment is installed shall be provided to remove the power from the fuse."

For devices with Ethernet connectors:

"Only for use in LAN, not for connection to telecommunication circuits".

WARNING

Use only with antenna module 758-910!

Use Module 750-642 only with antenna module 758-910.

For Couplers/Controllers and Economy bus modules only: "The configuration Interface Service connector is for temporary connection only. Do not connect or disconnect unless the area is known to be nonhazardous. Connection or disconnection in an explosive atmosphere could result in an explosion.

WARNING

Devices containing fuses must not be fitted into circuits subject to over loads!

Devices containing fuses must not be fitted into circuits subject to over loads, e.g. motor circuits!

 **WARNING**

Do not connect or disconnect SD-Card unless the area known to be free of ignitable concentrations of flammable gases or vapors!

Do not connect or disconnect SD-Card while circuit is live unless the area is known to be free of ignitable concentrations of flammable gases or vapors.

 **Information****Additional Information**

Proof of certification is available on request. Also take note of the information given on the module technical information sheet. The Instruction Manual, containing these special conditions for safe use, must be readily available to the user.

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