WAGO-I/O-SYSTEM 750

Manual

750-481/003-000

2AI RTD Ex i

2-Channel Analog Input Module for Resistance Sensors, Ex i

V 1.4.0
HW-Version 07, SW-Version 41

WAGO Kontakttechnik GmbH & Co. KG

Hansastraße 27
D-32423 Minden

Phone: +49 (0) 571/8 87 – 0
Fax: +49 (0) 571/8 87 – 1 69

E-Mail: info@wago.com

Web: http://www.wago.com

Technical Support

Phone: +49 (0) 571/8 87 – 5 55
Fax: +49 (0) 571/8 87 – 85 55

E-Mail: support@wago.com

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.

E-Mail: documentation@wago.com

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.

WAGO is a registered trademark of WAGO Verwaltungsgesellschaft mbH.

Table of Contents

1 Notes about this Documentation

Note

Always retain this documentation!
This documentation is part of the product. Therefore, retain the documentation during the entire service life of the product. Pass on the documentation to any subsequent user. In addition, ensure that any supplement to this documentation is included, if necessary.

1.1 Validity of this Documentation

This documentation is only applicable to the I/O module 750-481/003-000 (2AI RTD Ex i).

The I/O module 750-481/003-000 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

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
italic	Names of paths and data files are marked in italic-type. e.g.: *C:\Program Files\WAGO Software*
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. 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 WAGO-I/O-SYSTEM 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 WAGO-I/O-SYSTEM 750 in Compliance with Underlying Provisions

Fieldbus couplers, fieldbus 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 actuators or higher-level control systems. Using programmable controllers, the signals can also be (pre-) processed.

The devices 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 devices in wet and dusty environments is prohibited.

Operating the WAGO-I/O-SYSTEM 750 devices 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 “Device Description” > “Standards and Guidelines” in the manual for the used fieldbus coupler/controller.

Appropriate housing (per 2014/34/EU) 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 devices 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 devices.

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

DANGER

Install the device 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

Clean 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 may be destroyed by electrostatic discharge when touched. Please observe the safety precautions against electrostatic discharge per DIN EN 61340-5-1/-3. When handling the devices, please ensure that environmental factors (personnel, work space and packaging) are properly grounded.

3 Device Description

The Analog Input Module 750-481/003-000 (2AI RTD Ex i) processes signals from resistance sensors that are operating in hazardous environments of Zones 0 and 1. Resistance thermometers (RTD), as well as resistors and potentiometers can be connected.
Depending on the operating mode, the resistance value is converted to a temperature or directly sent out by the module. A microprocessor within the module is used for converting and linearizing the measured resistance value into a numeric value proportional to the temperature of the selected resistance sensor.

The **WAGO-I/O-*CHECK*** commissioning tool can be used to configure the required operating mode. The I/O module can also be parameterized via PROFIBUS and PROFINET device description (GSD file).
The parameterization description can be found in the appendix in Section "Configuration and Parameterization via GSD File with PROFIBUS DP and PROFINET IO."

The default setting is Pt100.

⚠ 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.

To fulfill Ex i regulations, only passive transducers, that means without their own voltage supply, like adjustable resistances, pressure, flow and level meters, may be connected to the input module.
The transducers are directly supplied from the I/O module.

The module has two input channels allowing the direct connection of two 2- or 3-wire resistance sensors.
For example, two 3-wire sensors can be connected either to +R1, RL1 and −R1 or to +R2, RL2 and −R2.

The assignment of the connections is described in the "Connectors" section.
Connection examples are shown in section "Connect Devices" > … > "Connection Example(s)".

Each input channel of a module has a shield (screen) connection (S).
The shield connection is fed directly to the carrier rail and contact is made automatically by snapping the module onto the rail.

The operating status of the channels is indicated by a green status LED per channel.
A red error LED per channel indicates a wire break, a short circuit or that the signal is outside the measuring range.
The meaning of the LEDs is described in the "Display Elements" section.

Any configuration of the I/O module 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 field voltage and the system voltage are electrically isolated from each other.

The I/O module 750-481/003-000 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).

3.1 View

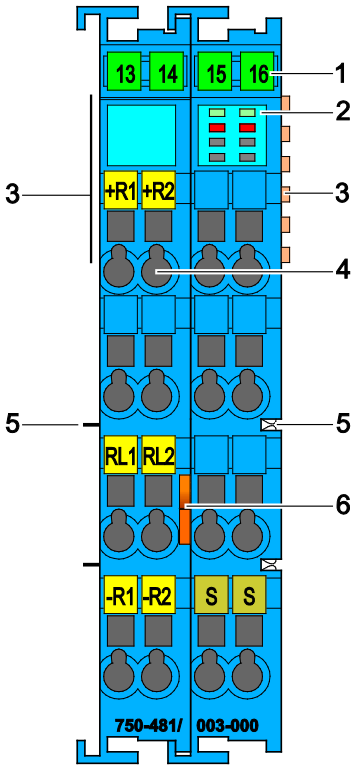

Figure 1: View

Table 3: Legend for Figure “View”

Pos.	Description	Details See Section
1	Marking possibility with Mini-WSB	---
2	Status LEDs	“Device Description” > “Display Elements”
3	Data contacts	“Device Description” > “Connectors”
4	CAGE CLAMP® connectors	“Device Description” > “Connectors”
5	Power jumper contacts	“Device Description” > “Connectors”
6	Release tab	“Mounting” > “Inserting and Removing Devices”

3.2 Connectors

3.2.1 Data Contacts/Internal Bus

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

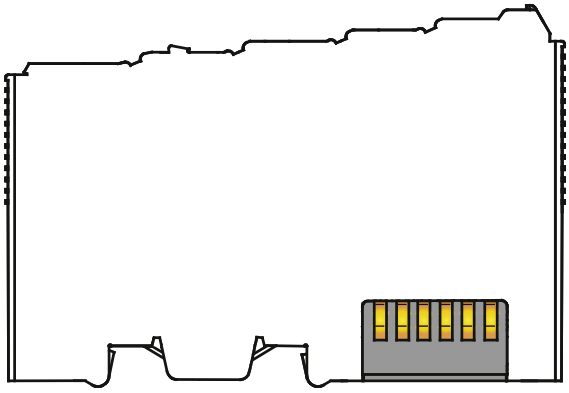

Figure 2: Data Contacts

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

3.2.2 Power Jumper Contacts/Field Supply

⚠ CAUTION

Risk of injury due to sharp-edged blade contacts!
The blade contacts are sharp-edged. Handle the I/O module carefully to prevent injury.

The I/O module 750-481/003-000 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 blade contacts and those on the right side as spring contacts.

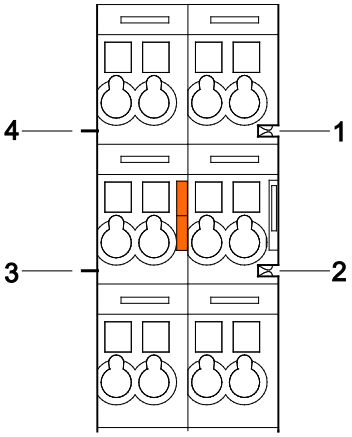

Figure 3: Power Jumper Contacts

Table 4: Legend for Figure “Power Jumper Contacts”

Contact	Type	Function
1	Spring contact	Potential transmission (U_v) for field supply
2	Spring contact	Potential transmission (0 V) for field supply
3	Blade contact	Potential feed-in (0 V) for field supply
4	Blade contact	Potential feed-in (U_v) for field supply

Note

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 1 A.
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® Connectors

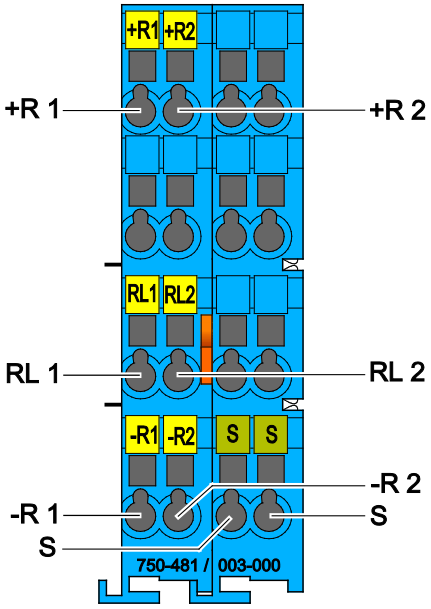

Figure 4: CAGE CLAMP® Connectors

Table 5: Legend for Figure “CAGE CLAMP® Connectors”

Channel	Connector	Designation	Function
1	1 (left)	+R 1	Input AI 1: Sensor +R
	3 (left)	RL 1	Input AI 1: Sensor RL
	4 (left)	-R 1	Input AI 1: Sensor -R
	4 (right)	S	Input AI 1: Shield connection
2	5 (left)	+R 2	Input AI 2: Sensor +R
	7 (left)	RL 2	Input AI 2: Sensor RL
	8 (left)	-R 2	Input AI 2: Sensor -R
	8 (right)	S	Input AI 2: Shield connection

3.3 Display Elements

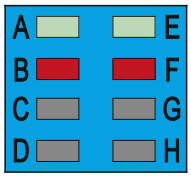

Figure 5: Display Elements

Table 6: Legend for Figure “Display Elements”

Channel	Desig-nation	LED	State	Function
1	Status AI 1	A	off	No operational readiness or the internal data bus communication is interrupted
			green	Operational readiness and trouble-free internal data bus communication
	Error AI 1	B	off	Normal operation
			red	Overrange/underflow of the admissible measuring range, broken wire, short circuit
2	State AI 2	E	off	No operational readiness or the internal data bus communication is interrupted
			green	Operational readiness and trouble-free internal data bus communication
	Error AI 2	F	off	Normal operation
			red	Overrange/underflow of the admissible measuring range, broken wire, short circuit

3.4 Operating Elements

The I/O module 750-481/003-000 has no operating elements.

3.5 Schematic Diagram

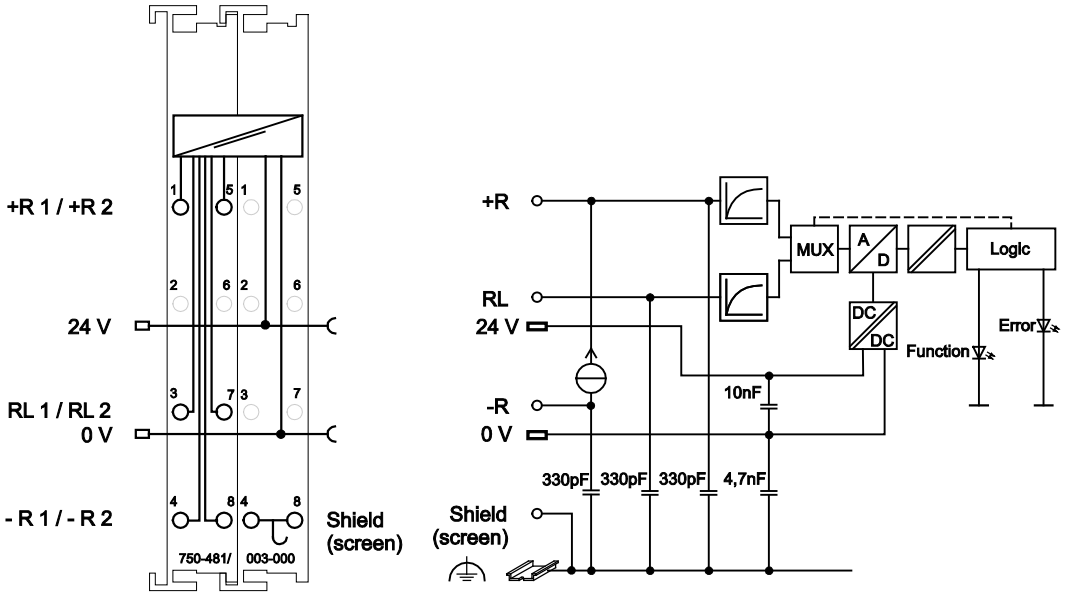

Figure 6: Schematic Diagram

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. 94.2 g

3.6.2 Supply

Table 8: Technical Data – Supply

Voltage supply	Via system voltage terminal bus (5 VDC) and power contacts (24 VDC)
Current consumption $_{typ.}$ (internal) (5 VDC)	25 mA
Input current $_{typ.}$ (Field) (24 VDC)	12 mA
Voltage via power jumper contacts	24 VDC (supply via Ex i-supply module U_o = max. 27.3 V)
Current via power contacts $_{max.}$	1000 mA
Power consumption $P_{max.}$	0.45 W
Power loss P_V	0.45 W
Isolation	300 VAC system/supply

3.6.3 Communication

Table 9: Technical Data – Communication

Bit width	2 x 16 bits data, 2 x 8 bits control/status (option)

3.6.4 Inputs

Table 10: Technical Data – Inputs

Number of inputs	2
Sensor types (setting over software WAGO-I/O-CHECK and GSD-file)	Resistance temperature: Pt100 (factory preset), Pt200, Pt500, Pt1000, Ni100, Ni120, Ni1000, Resistance 1.2 kΩ, 5 kΩ, Potentiometer setting: 0...100 % (1.2 kOhm, 5 kOhm)
Sensor connection	3-wire (factory preset) or 2-wire
Temperature range	-200 °C ... +850 °C (Pt), -60 °C ... + 250 °C (Ni), -80 °C ... +320 °C (Ni120)
Resolution (over whole range)	0.1 °C, 0.1 Ω, 0.0049 %
Resolution	150 ms ... 500 ms per Channel
Measuring current	< 0.5 mA
Measuring error 25 °C	< ±0.2 % of full scale value
Temperature coefficient	< ±0.01 % /K of full scale value

3.6.5 Explosion Protection

Table 11: Technical Data – Explosion Protection

Voltage supply via power jumper contacts (LK1, LK2)		U_i = 27.3 V P_{max} = 0.45 W	
Interface circuit (K-Bus)		U_n = 5 V U_m = 253 V	
Safety data electric circuit (Cage Clamp 1, 3, 4 und 5, 7, 8)		U_o = 7.2 V I_o = 5.8 mA P_o = 10.5 mW Line characteristic: linear	
Reactance without consideration of the simultaneousness		L_o	C_o
	Ex ia IIC	0.9 H	13.5 µF
	Ex ia IIB	1 H	240 µF
	Ex ia IIA	1 H	1000 µF
	Ex ia I	1 H	1000 µF
Reactance with consideration of the simultaneousness		L_o	C_o
	Ex ia II C	0.01 mH	7.40 µF
		0.2 mH	2.60 µF
		1.0 mH	1.80 µF
		10.0 mH	1.20 µF
		100.0 mH	0.97 µF
	Ex ia II B	0.01 mH	60.0 µF
		0.2 mH	15.0 µF
		1.0 mH	9.7 µF
		10.0 mH	6.3 µF
		100.0 mH	4.8 µF
	Ex ia II A	0.1 mH	28 µF
		0.2 mH	22 µF
		2 mH	12 µF
		10 mH	9.4 µF
		100 mH	7.2 µF
	Ex ia I	0.01 mH	120 µF
		0.05 mH	46 µF
		0.2 mH	28 µF
		1.0 mH	18 µF
		5.0 mH	13 µF

3.6.6 Connection Type

Table 12: Technical Data – Field Wiring

Wire connection	CAGE CLAMP®
Cross section	0.08 mm² … 2.5 mm², AWG 28 … 14
Stripped lengths	8 mm … 9 mm / 0.33 in

Table 13: Technical Data – Power Jumper Contacts

Power jumper contacts	Blade/spring contact, self-cleaning

Table 14: Technical Data – Data Contacts

Data contacts	Slide contact, hard gold plated, self-cleaning

3.6.7 Climatic Environmental Conditions

Table 15: Technical Data – Climatic Environmental Conditions

Operating temperature range	0 °C … 55 °C
Storage temperature range	−25 °C … +85 °C
Relative humidity without condensation	Max. 95 %
Resistance to harmful substances	Acc. to IEC 60068-2-42 and IEC 60068-2-43
Maximum pollutant concentration at relative humidity < 75 %	$SO_2 \leq 25$ ppm $H_2S \leq 10$ ppm
Special conditions	Ensure that additional measures for components are taken, which are used in an environment involving: – dust, caustic vapors or gases – ionizing radiation

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 via the internet under: www.wago.com > SERVICES > DOWNLOADS > Additional documentation and information on automation products > WAGO-I/O-SYSTEM 750 > System Description.

The following approvals have been granted to 750-481/003-000 I/O modules:

Conformity Marking

UL E175199 for
use in Ordinary
Location

Korea Certification MSIP-REM-W43-AIM750

The following Ex approvals have been granted to 750-481/003-000 I/O modules:

TÜV 12 ATEX 106032 X

I M2 (M1) Ex d [ia Ma] I Mb
II 3 (1) G Ex ec [ia Ga] IIC T4 Gc
II 3 (1) D Ex tc [ia Da] IIIC T135°C Dc

IECEx TUN 12.0039 X

Ex d [ia Ma] I Mb
Ex ec [ia Ga] IIC T4 Gc
Ex tc [ia Da] IIIC T135°C Dc

TÜV 14.1911 X

Ex d [ia Ma] I Mb
Ex nA [ia Ga] IIC T4 Gc
Ex tc [ia Da] IIIC T135°C Dc

UL E480271 for Use in Zone Classified Hazardous Locations
Cl I Zn 2 AEx nA [ia Ga] IIC T4 Gc
Cl I Zn 2 AEx nA [ia IIIC] IIC T4 Gc
Ex nA [ia Ga] IIC T4 Gc X
Ex nA [ia IIIC] IIC T4 Gc X

UL E198726 for Use in Hazardous Locations
Cl I, Div 2, Group A, B, C, D, T4

The following ship approvals have been granted to 750-481/003-000 I/O modules:

	ABS (American Bureau of Shipping)	
	Federal Maritime and Hydrographic Agency	
	BV (Bureau Veritas)	
	DNV (Det Norske Veritas)	Class B
	GL (Germanischer Lloyd)	Cat. A, B, C, D (EMC 1)
	KR (Korean Register of Shipping)	
	LR (Lloyd's Register)	Env. 1, 2, 3, 4
	NKK (Nippon Kaiji Kyokai)	
	PRS (Polski Rejestr Statków)	
	RINA (Registro Italiano Navale)	

3.8 Standards and Guidelines

750-481/003-000 I/O modules meet the following standards and guidelines:

EU Directive	2014/34/EU
Explosive atmosphere Devices – General requirements	EN 60079-0
Explosive atmosphere Equipment protection by increased safety "e"	IEC 60079-7
Explosive atmosphere Equipment protection by intrinsic safety "I"	EN 60079-11
Explosive atmosphere Equipment with equipment protection level (EPL) Ga	EN 60079-26

Explosive atmosphere EN 60079-31
Equipment dust ignition protection by enclosure “t”

Explosive atmospheres IEC 60079-0
General requirements

Explosive atmosphere IEC 60079-7
Equipment protection by increased safety "e"

Explosive atmospheres IEC 60079-11
Equipment protection by intrinsic safety "i"

Explosive atmospheres IEC 60079-26
Equipment with equipment protection level (EPL) Ga

Explosive atmospheres IEC 60079-31
Equipment dust ignition protection by enclosure “t”

Explosive atmospheres UL 60079-0
General requirements

Explosive atmospheres UL 60079-11
Equipment protection by intrinsic safety "i"

Explosive atmospheres UL 60079-15
Equipment protection by type of protection “n”

Explosive atmospheres CAN/CSA-C22.2 No. 60079-0
Equipment - General requirements

Explosive atmospheres CAN/CSA-C22.2 No. 60079-11
Equipment Protection by Intrinsic Safety "i"

Explosive atmospheres CAN/CSA-C22.2 No. 60079-15
Equipment Protection by Intrinsic Safety "n"

UL Standard for Safety – UL 508
for Industrial Control Equipment

American National Standard – ANSI/ISA 12.12.01
for Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III. Division 1 and 2 Hazardous (Classified) Location

EU EMC Directive	2014/30/EU
EMC CE-Immunity to interference	EN 61000-6-2
	and to EN 61131-2
EMC CE-Emission of interference	EN 61000-6-3 + A1
and	IEC 61131-2
EMC marine applications-Emission of interference	acc. to DNV GL
EMC marine applications-Immunity to interference	acc. to DNV GL

4 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 variants in the process image depends on the fieldbus coupler/controller used. Please take this information from the section “I/O Modules” included in the description concerning the process image of the corresponding coupler/controller.

Note

Evaluation of Status Byte
Some fieldbus systems can process status information of process value by means of a status byte.
This status byte can be displayed via the commissioning tool **WAGO-I/O-*CHECK***.
However, processing via the fieldbus coupler/controller is optional, which means that accessing or parsing the status information depends on the fieldbus system.

The input module 750-481/003-000 transmits 16-bit measured values and 8 optional status bits per channel.

4.1 Configuration for Pt Resistance Sensors

To evaluate the platinum resistance sensors, the measured values of the resistance are converted and sent as temperature values. All temperature values are represented in a standard numeric format. The possible numerical range matches the defined temperature range of the Pt sensors from -200 °C to +850 °C.

In the Pt100, Pt200, Pt500 and Pt1000 settings, the temperature values of the sensors are represented with a resolution of 1 digit per 0.1 °C within a word (16 bits). Thus, 0 °C corresponds to the numeric value 0x0000 and 100 °C to 0x03E8 (dec. 1000). Temperature values below 0 °C are represented in two’s complement binary form.

Table 16: Process Image Configuration for Pt100, Pt200, Pt500 and Pt1000

Temperature °C	Numerical value*)			Status-byte hex.	LED Error AI 1, 2
	binary	hex.	dec.		
<-200.0	'1000.0000.0000.0001'	0x8001	-32767	0x41	on
-200.0	'1111.1000.0011.0000'	0xF830	-2000	0x00	off
-100.0	'1111.1100.0001.1000'	0xFC18	-1000	0x00	off
0.0	'0000.0000.0000.0000'	0x0000	0	0x00	off
100.0	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
200.0	'0000.0111.1101.0000'	0x07D0	2000	0x00	off
500.0	'0001.0011.1000.1000'	0x1388	5000	0x00	off
750.0	'0001.1101.0100.1100'	0x1D4C	7500	0x00	off
800.0	'0001.1111.0100.0000'	0x1F40	8000	0x00	off
850.0	'0010.0001.0011.0100'	0x2134	8500	0x00	off
>850.0	'0010.0001.0011.0100'	0x2134	8500	0x42	on
Broken wire against RL	'0010.0001.0011.0100'	0x2134	8500	0x42	on

*) Temperature values below 0 °C are represented in two's complement binary form.

The measured value can exceed the range from –2000 to 8500 until the limitation applies.

4.2 Configuration for Ni Resistance Sensors

To evaluate the nickel resistance sensors, the measured values of the resistance are converted and sent as temperature values. All temperature values are represented in a standard numeric format. The possible numerical range matches the defined temperature range of the Ni sensors from -60 °C to +250 °C or from -80 °C to +320 °C.

In the Ni100, Ni120 and Ni1000 settings, the temperature values of the sensors are represented with a resolution of 1 digit per 0.1 °C within a word (16 bits). Thus, 0 °C corresponds to the numeric value 0x0000 and 100 °C to 0x03E8 (dec. 1000).

Temperature values below 0 °C are represented in two's complement binary form.

Table 17: Process Image Configuration for Ni100 and Ni1000

Temperature °C	Numerical value*)			Status-byte hex.	LED Error AI 1,2
	binary	hex.	dec.		
<-60.0	'1000.0000.0000.0001'	0x8001	-32767	0x41	on
-60.0	'1111.1101.1010.1000'	0xFDA8	-600	0x00	off
-50.0	'1111.1110.0000.1100'	0xFE0C	-500	0x00	off
0.0	'0000.0000.0000.0000'	0x0000	0	0x00	off
50.0	'0000.0001.1111.0100'	0x01F4	500	0x00	off
100.0	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
150.0	'0000.0101.1101.1100'	0x05DC	1500	0x00	off
200.0	'0000.0111.1101.0000'	0x07D0	2000	0x00	off
250.0	'0000.1001.1100.0100'	0x09C4	2500	0x00	off
>250.0	'0010.0001.0011.0100'	0x2134	8500	0x42	on
Broken wire against RL	'0010.0001.0011.0100'	0x2134	8500	0x42	on

*) Temperature values below 0 °C are represented in two's complement binary form.

The measured value can exceed the range from 8500 until the limitation applies.

Table 18: Process Image Configuration for Ni 120

Temperature °C	Numerical value*)			Status-byte hex.	LED Error AI 1,2
	binary	hex.	dec.		
<-80.0	'1000.0000.0000.0001'	0x8001	-32767	0x41	on
-80.0	'1111.1100.1110.0000'	0xFCE0	-800	0x00	off
-50.0	'1111.1110.0000.1100'	0xFE0C	-500	0x00	off
0.0	'0000.0000.0000.0000'	0x0000	0	0x00	off
50.0	'0000.0001.1111.0100'	0x01F4	500	0x00	off
100.0	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
150.0	'0000.0101.1101.1100'	0x05DC	1500	0x00	off
200.0	'0000.0111.1101.0000'	0x07D0	2000	0x00	off
250.0	'0000.1001.1100.0100'	0x09C4	2500	0x00	off
300.0	'0000.1011.1011.1000'	0x0BB8	3000	0x00	off
320.0	'0000.1100.1000.0000'	0x0C80	3200	0x00	off
>320.0	'0010.0001.0011.0100'	0x2134	8500	0x42	on
Broken wire against RL	'0010.0001.0011.0100'	0x2134	8500	0x42	on

*) Temperature values below 0 °C are represented in two's complement binary form.

The measured value can exceed the range from –800 to 3200 until the limitation applies.

4.3 Configuration for Resistance Measuring

Resistance measuring is only possible using 2-wire devices. The measured values are sent out directly when measuring the resistance.

In the measuring range from 10 Ω to 1.2 kΩ, the resolution is 1 digit per 0.1 Ω.

Table 19: Process Image Configuration for Measuring Range 10 Ω ... 1.2 kΩ

Resistance Ω	Numerical value			Status-byte hex.	LED Error AI 1,2
	binary	hex.	dec.		
0	'1110.1100.0000.0000'	0xEC00	-5120	0x00	off
10	'0000.0000.0110.0100'	0x0064	100	0x00	off
100	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
200	'0000.0111.1101.0000'	0x07D0	2000	0x00	off
300	'0000.1011.1011.1000'	0x0BB8	3000	0x00	off
400	'0000.1111.1010.0000'	0x0FA0	4000	0x00	off
500	'0001.0011.1000.1000'	0x1388	5000	0x00	off
750	'0001.1101.0100.1100'	0x1D4C	7500	0x00	off
1000	'0010.0111.0001.0000'	0x2710	10000	0x00	off
1200	'0010.1110.1110.0000'	0x2EE0	12000	0x00	off
> approx.1200	'0010.0001.0011.0100'	0x2134	8500	0x42	on

Values marked with "approx." are not calibrated.

In the measuring range from 10 Ω to 5.0 kΩ, the resolution is 1 digit per 0.5 Ω.

Table 20: Process Image Configuration for Measuring Range 10 Ω ... 5 kΩ

Resistance Ω	Numerical value			Status-byte hex.	LED Error AI 1,2
	binary	hex.	dec.		
0	'1110.1100.0000.0000'	0xEC00	-5120	0x00	off
10	'0000.0000.0001.0100'	0x0014	20	0x00	off
100	'0000.0000.1100.1000'	0x00C8	200	0x00	off
200	'0000.0001.1001.0000'	0x0190	400	0x00	off
300	'0000.0010.0101.1000'	0x0258	600	0x00	off
1000	'0000.0111.1101.0000'	0x07D0	2000	0x00	off
2000	'0000.1111.1010.0000'	0x0FA0	4000	0x00	off
3000	'0001.0111.0111.0000'	0x1770	6000	0x00	off
4000	'0001.1111.0100.0000'	0x1F40	8000	0x00	off
5000	'0010.0111.0001.0000'	0x2710	10000	0x00	off
> approx. 5000	'0010.0001.0011.0000'	0x2134	8500	0x42	on

Values marked with "approx." are not calibrated.

4.4 Configuration for Potentiometer Measuring

Potentiometer measuring is only possible using 3-wire devices.

When a potentiometer is used for measurement, the relative position of the connected potentiometer is expressed in percent:

$$x = 100\% * \frac{R_{Slider}(R_S)}{R_{Total}(R_G)}.$$

Two settings are available, one for potentiometers with total resistance up to 1.2 kΩ and one for potentiometers up to 5.0 kΩ.

The resolution is 1 digit per 0.0049 %. The increment is determined by the total resistance RG of the potentiometer. If RG is measured with 16 bit resolution, using RG = 200 Ω in the measuring range of 5.0 kΩ, the increment is given by

$$d = \frac{100\% * 5{,}0k\Omega}{65536 * 200\Omega} = 0{,}04\%$$

Table 21: Process Image Configuration for Potentiometer Measuring

Percentage %	Numerical value			Status-byte hex.	LED Error AI 1,2
	binary	hex.	dec.		
0.0	'0000.0000.0000.0000'	0x0000	0	0x00	off
20.0	'0000.0111.1101.0000'	0x1000	4096	0x00	off
40.0	0000.1111.1010.0000'	0x2000	8192	0x00	off
60.0	'0001.0111.0111.0000'	0x3000	12288	0x00	off
80.0	'0001.1111.0100.0000'	0x4000	16384	0x00	off
100.0	'0010.0111.0001.0000'	0x4FFF	20479	0x00	off
> approx.100.0	'0010.0111.0001.0000'	0x4FFF	20479	0x42	on

Values marked with "approx." are not calibrated.

5 Mounting

5.1 Mounting Sequence

Fieldbus couplers/controllers and I/O modules of the WAGO-I/O-SYSTEM 750 are 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 devices are securely seated on the rail after installation.

Starting with the fieldbus coupler/controller, the I/O modules are mounted 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 I/O modules with power contacts (blade contacts) cannot be linked to I/O modules with fewer power contacts.

⚠ CAUTION

Risk of injury due to sharp-edged blade contacts!
The blade contacts are sharp-edged. Handle the I/O module carefully to prevent injury.

NOTICE

Insert I/O modules only from the proper direction!
All I/O modules feature grooves for power jumper contacts on the right side. For some I/O modules, the grooves are closed on the top. Therefore, I/O modules featuring a power jumper contact on the left side cannot be snapped from the top. This mechanical coding helps to avoid configuration errors, which may destroy the I/O modules. Therefore, insert I/O modules only from the right and from 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 WAGO-I/O-SYSTEM 750 fieldbus couplers/controllers to guarantee proper data transfer.

5.2 Inserting and Removing Devices

NOTICE

Perform work on devices only if they are de-energized!
Working on energized devices can damage them. Therefore, turn off the power supply before working on the devices.

5.2.1 Inserting the 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.

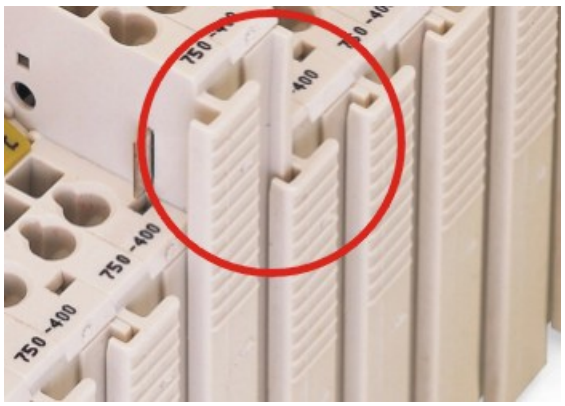

Figure 7: Insert I/O Module (Example)

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

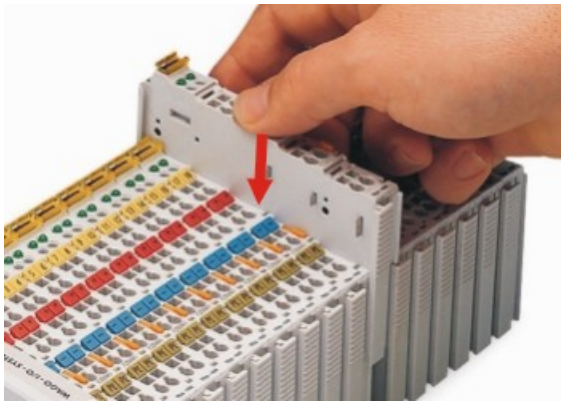

Figure 8: Snap the I/O Module into Place (Example)

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

5.2.2 Removing the I/O Module

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

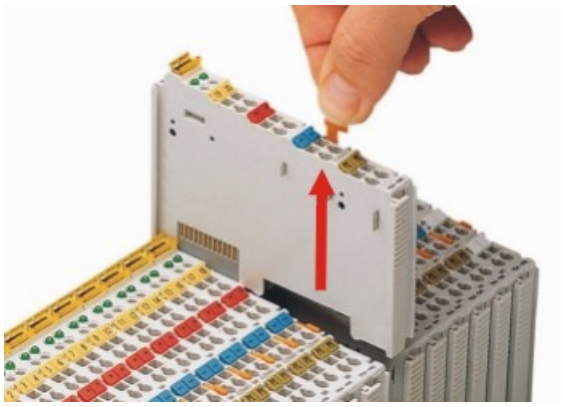

Figure 9: Removing the I/O Module (Example)

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

6 Connect Devices

6.1 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®!
Only one conductor may be connected to each CAGE CLAMP®.
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.

1. For opening the CAGE CLAMP® insert the actuating tool into the opening above the connection.
2. Insert the conductor into the corresponding connection opening.
3. For closing the CAGE CLAMP® simply remove the tool. The conductor is now clamped firmly in place.

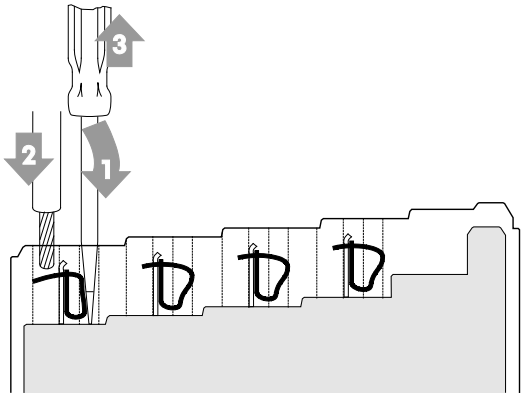

Figure 10: Connecting a Conductor to a CAGE CLAMP®

6.2 Power Supply Concept

⚠ 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.

⚠ WARNING

Keep the air and creep distances between intrinsically safe segments!
The maximum current available from the 750-606 or 750-625/000-001 Ex-i Supply Module is 1 A.
If the use 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.

Note

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

Information

Further information about explosion prevention!
Further information about explosion prevention can be found in section “Use in Hazardous Environments”!

The Ex i I/O module receives the 24 V 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.

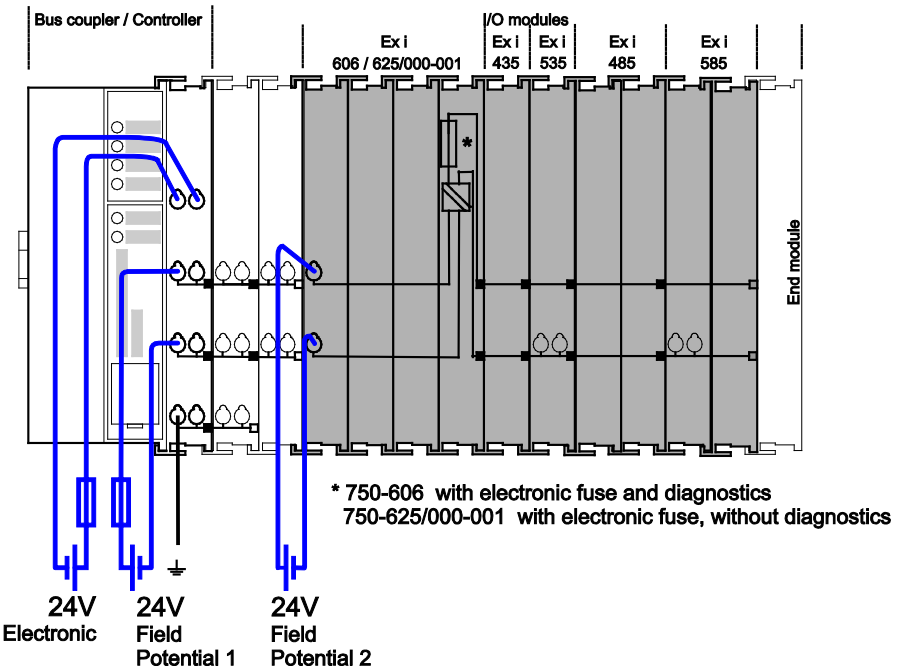

Figure 11: Supply Principle Ex i

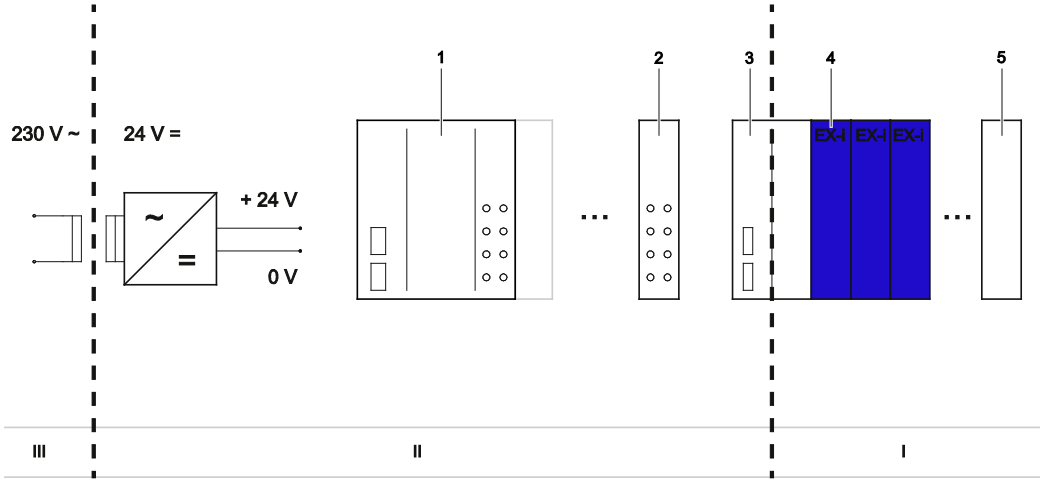

Figure 12: Overvoltage Categories

Table 22: Legend for Figure “Overvoltage Categories”

Pos.	Explanation
1	Fieldbus coupler/controller
2	Filter module
3	Ex i supply module
4	Ex i I/O Modules
5	End module

Both overvoltage categories and rated surge voltage acc. to EN 60664-1:2007 are listed in the appendix.

6.2.1 Power Supply Concept in Marine Applications

⚠ WARNING

The appropriate filter module is required when using Ex i I/O modules in marine applications!

Power supply to the Ex i supply module shall be provided via the appropriate filter module when using Ex i I/O modules in marine applications! Modules approved to category EMC1 (marine applications): 750-626 or 750-626/020-000. Modules approved to category EMC2 (marine applications): 750-626, 750-626/020-000, 750-624 or 750-624/020-000.

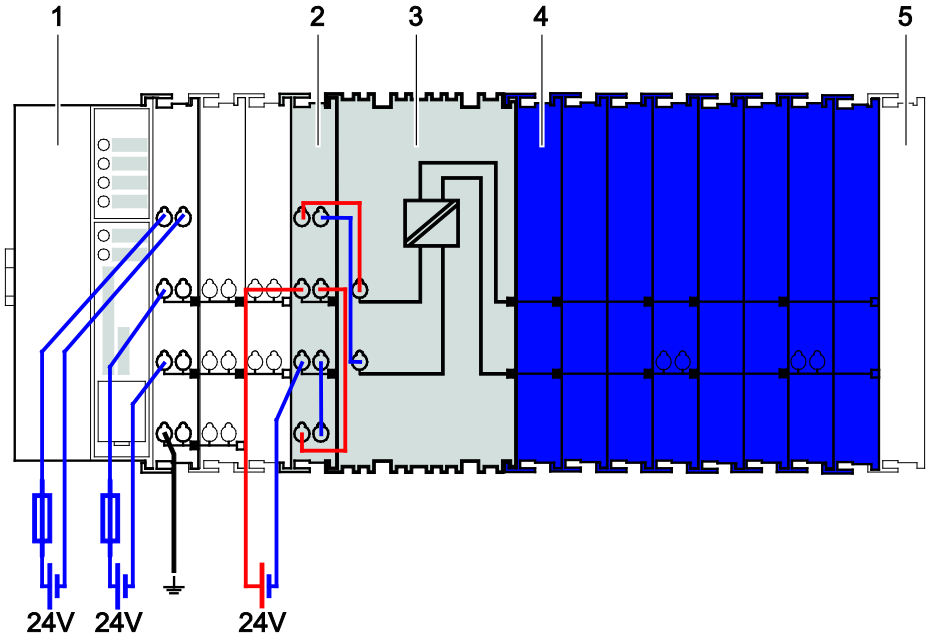

Figure 13: Power Supply Concept, Category EMC1 (Marine Applications)

Table 23: Legend for Figure “Power Supply Concept, Category EMC1 (Marine Applications)”

Pos.	Explanation
1	Fieldbus coupler/controller
2	Filter module (750-626, 750-626/020-000)
3	Ex i supply module (750-606, 750-625/000-001)
4	Ex i I/O Modules
5	End module

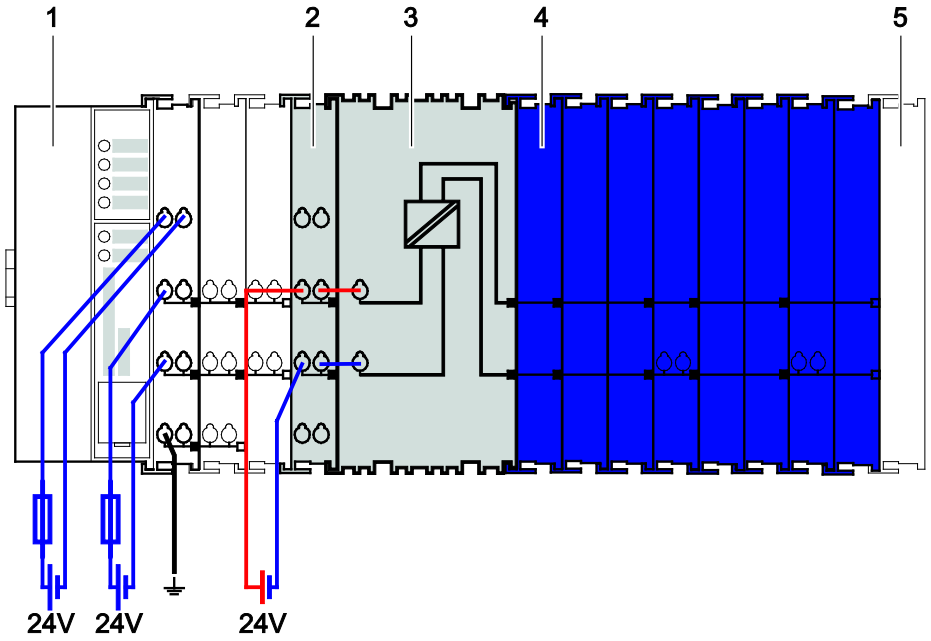

Figure 14: Power Supply Concept, Category EMC2 (Marine Applications)

Table 24: Legend for Figure “Power Supply Concept, Category EMC2 (Marine Applications)”

Pos.	Explanation
1	Fieldbus coupler/controller
2	Filter module (750-626, 750-626/020-000, 750-624, 750-624/020-000)
3	Ex i supply module (750-606, 750-625/000-001)
4	Ex i I/O Modules
5	End module

6.3 Connection Examples

6.3.1 2 x RTD, 2-Conductors

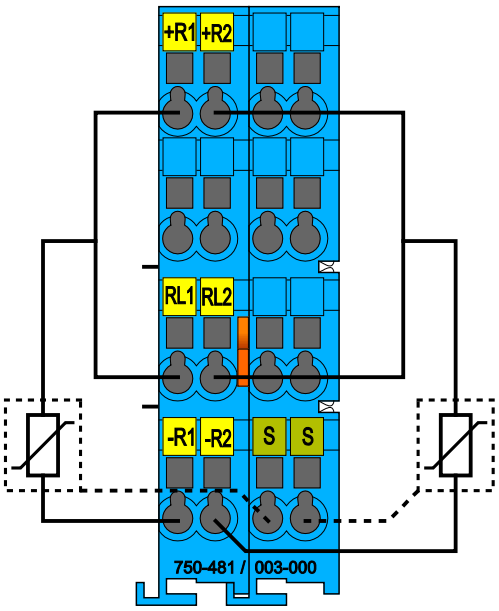

Figure 15: Example Connection 2 x RTD, 2-wire

6.3.2 2 x RTD, 3-Conductors

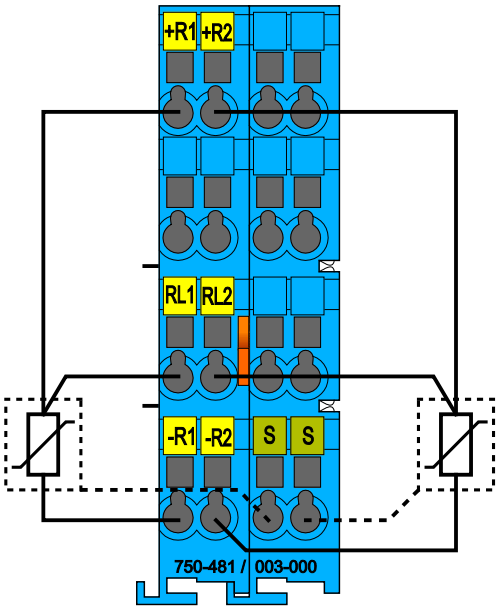

Figure 16: Example Connection 2 x RTD, 3-wire

6.3.3 2 x Resistance

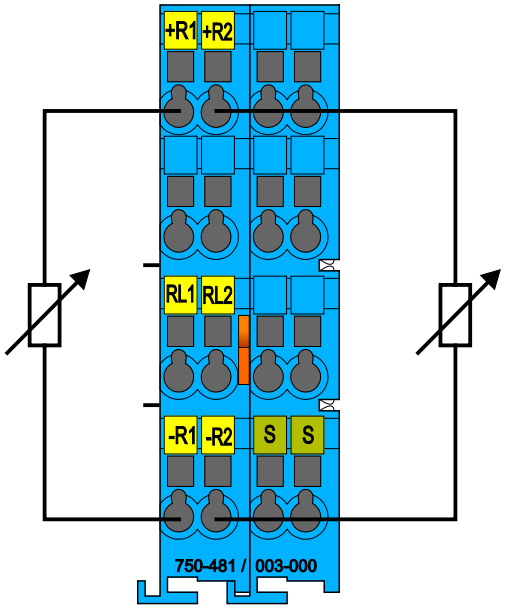

Figure 17: Example Connection 2 x Resistance

6.3.4 2 x Potentiometer

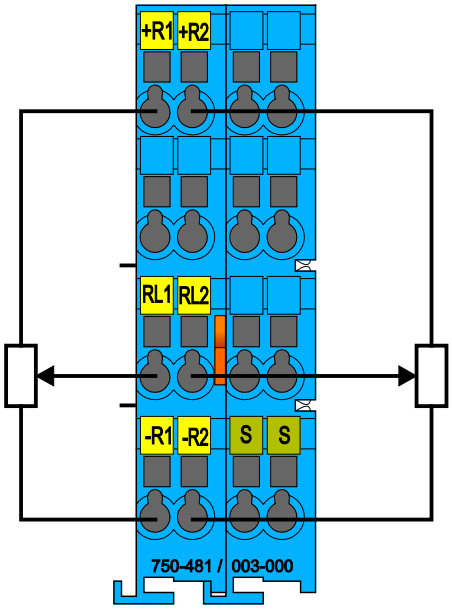

Figure 18: Example Connection 2 x Potentiometer

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 ATEX and IECEx

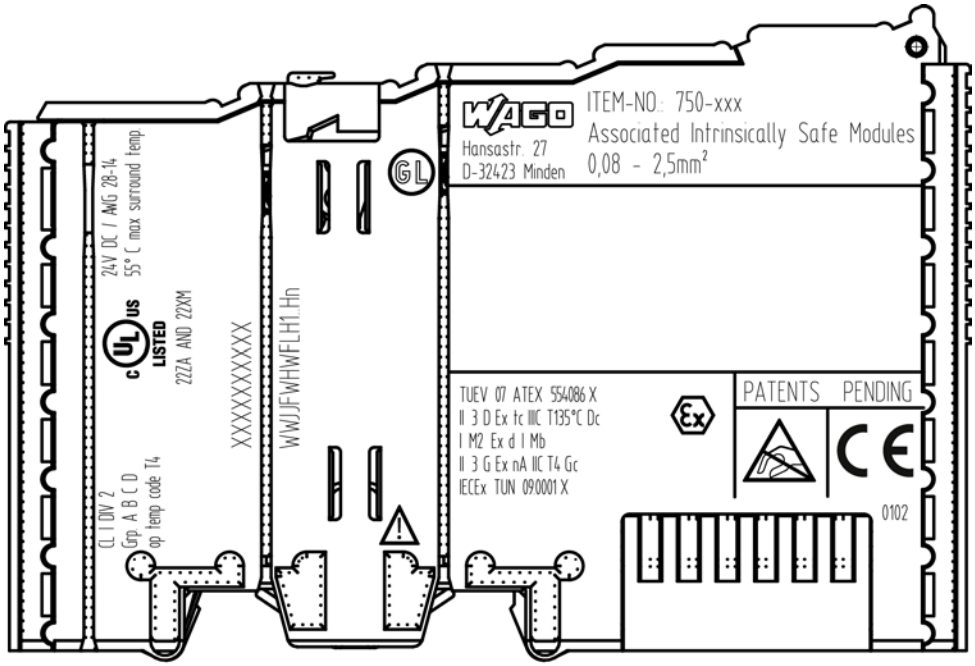

Figure 19: Marking Example According to ATEX and IECEx

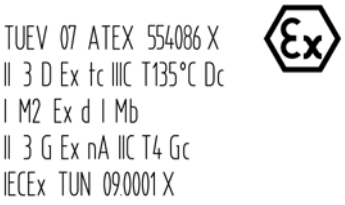

Figure 20: Text Detail – Marking Example According to ATEX and IECEx

Table 25: Description of Marking Example According to ATEX and IECEx

Marking	Description
TUEV 07 ATEX 554086 X IECEx TUN 09.0001 X	Approving authority resp. certificate numbers
Dust	
II	Equipment group: All except mining
3 D	Category 3 (Zone 22)
Ex	Explosion protection mark
tc	Type of protection: Protection by enclosure
IIIC	Explosion group of dust
T135°C	Max. surface temperature of the enclosure (without a dust layer)
Dc	Equipment protection level (EPL)
Mining	
I	Equipment group: Mining
M2	Category: High level of protection
Ex	Explosion protection mark
d	Type of protection: Flameproof enclosure
I	Explosion group for electrical equipment for mines susceptible to firedamp
Mb	Equipment protection level (EPL)
Gases	
II	Equipment group: All except mining
3 G	Category 3 (Zone 2)
Ex	Explosion protection mark
nA	Type of protection: Non-sparking equipment
IIC	Explosion group of gas and vapours
T4	Temperature class: Max. surface temperature 135 °C
Gc	Equipment protection level (EPL)

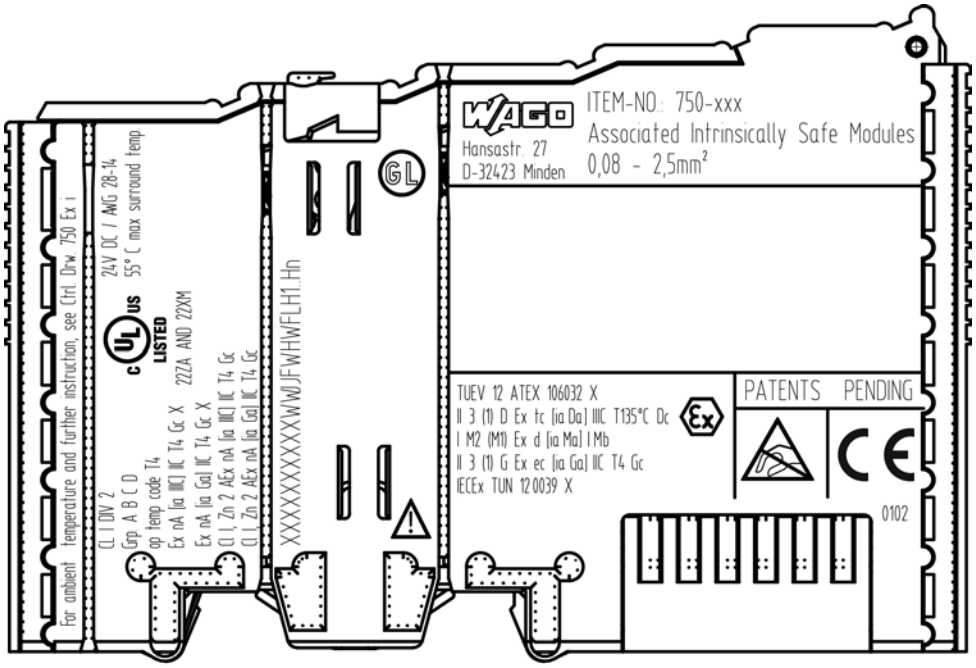

Figure 21: Marking Example for Approved Ex i I/O Module According to ATEX and IECEx

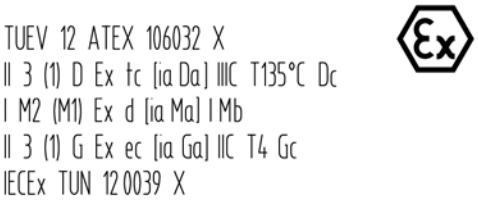

Figure 22: Text Detail – Marking Example for Approved Ex i I/O Module According to ATEX and IECEx

Table 26: Description of Marking Example for Approved Ex i I/O Module According to ATEX and IECEx

Marking	Description
TUEV 12 ATEX 106032 X IECEx TUN 12 0039 X	Approving authority resp. certificate numbers
Dust	
II	Equipment group: All except mining
3 (1) D	Category 3 (Zone 22) equipment containing a safety device for a category 1 (Zone 20) equipment
Ex	Explosion protection mark
tc	Type of protection: Protection by enclosure
[ia Da]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety circuits for use in Zone 20
IIIC	Explosion group of dust
T135°C	Max. surface temperature of the enclosure (without a dust layer)
Dc	Equipment protection level (EPL)
Mining	
I	Equipment Group: Mining
M2 (M1)	Category: High level of protection with electrical circuits which present a very high level of protection
Ex	Explosion protection mark
d	Type of protection: Flameproof enclosure
[ia Ma]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety electrical circuits
I	Explosion group for electrical equipment for mines susceptible to firedamp
Mb	Equipment protection level (EPL)
Gases	
II	Equipment group: All except mining
3 (1) G	Category 3 (Zone 2) equipment containing a safety device for a category 1 (Zone 0) equipment
Ex	Explosion protection mark
ec	Equipment protection by increased safety “e”
[ia Ga]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety circuits for use in Zone 0
IIC	Explosion group of gas and vapours
T4	Temperature class: Max. surface temperature 135 °C
Gc	Equipment protection level (EPL)

7.1.2 Marking for America (NEC) and Canada (CEC)

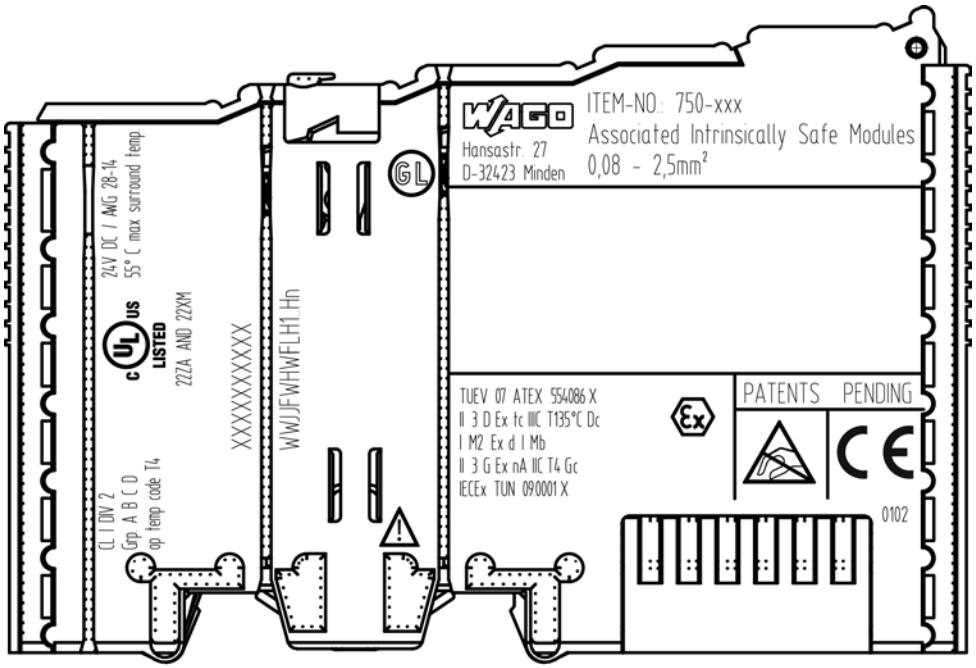

Figure 23: Marking Example According to NEC

CL I DIV 2
Grp. A B C D
op temp code T4

Figure 24: Text Detail – Marking Example According to NEC 500

Table 27: Description of Marking Example According to NEC 500

Marking	Description
CL I	Explosion protection (gas group)
DIV 2	Area of application
Grp. A B C D	Explosion group (gas group)
op temp code T4	Temperature class

Figure 25: Text Detail – Marking Example for Approved Ex i I/O Module According to NEC 505

Table 28: Description of Marking Example for Approved Ex i I/O Module According to NEC 505

Marking	Description
CI I,	Explosion protection group
Zn 2	Area of application
AEx	Explosion protection mark
nA	Type of protection
[ia Ga]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety circuits for use in Zone 20
IIC	Group
T4	Temperature class
Gc	Equipment protection level (EPL)

Figure 26: Text Detail – Marking Example for Approved Ex i I/O Module According to NEC 506

Table 29: Description of Marking Example for Approved Ex i I/O Modules According to NEC 506

Marking	Description
CI I,	Explosion protection group
Zn 2	Area of application
AEx	Explosion protection mark
nA	Type of protection
[ia IIIC]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety circuits for use in Zone 20
IIC	Group
T4	Temperature class
Gc	Equipment protection level (EPL)

Ex nA [ia IIIC] IIC T4 Gc X
Ex nA [ia Ga] IIC T4 Gc X

Figure 27: Text Detail – Marking Example for Approved Ex i I/O Modules According to CEC 18 attachment J

Table 30: Description of Marking Example for Approved Ex i I/O Modules According to CEC 18 attachment J

Marking	Description
Dust	
Ex	Explosion protection mark
nA	Type of protection
[ia IIIC]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety circuits for use in Zone 20
IIC	Group
T4	Temperature class
Gc	Equipment protection level (EPL)
X	Symbol used to denote specific conditions of use
Gases	
Ex	Explosion protection mark
nA	Type of protection
[ia Ga]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety circuits for use in Zone 0
IIC	Group
T4	Temperature class
Gc	Equipment protection level (EPL)
X	Symbol used to denote specific conditions of use

7.2 Installation Regulations

For the installation and operation of electrical equipment in hazardous areas, the valid national and international rules and regulations which are applicable at the installation location must be carefully followed.

7.2.1 Special Notes Regarding Explosion Protection

The following warning notices are to be posted in the immediately proximity of the WAGO-I/O-SYSTEM 750 (hereinafter “product”):

WARNING – DO NOT REMOVE OR REPLACE FUSED WHILE ENERGIZED!

WARNING – DO NOT DISCONNECT WHILE ENERGIZED!

WARNING – ONLY DISCONNECT IN A NON-HAZARDOUS AREA!

Before using the components, check whether the intended application is permitted in accordance with the respective printing. Pay attention to any changes to the printing when replacing components.

The product is an open system. As such, the product must only be installed in appropriate enclosures or electrical operation rooms to which the following applies:

- Can only be opened using a tool or key
- Inside pollution degree 1 or 2
- In operation, internal air temperature within the range of 0 °C ≤ Ta ≤ +55 °C or −20 °C ≤ Ta ≤ +60 °C for components with extension number …/025-xxx or −40 °C ≤ Ta ≤ +70 °C for components with extension number …/040-xxx
- Minimum degree of protection: min. IP54 (acc. to EN/IEC 60529)
- For use in Zone 2 (Gc), compliance with the applicable requirements of the standards EN/IEC/ABNT NBR IEC 60079-0, -7, -11, -15
- For use in Zone 22 (Dc), compliance with the applicable requirements of the standards EN/IEC/ABNT NBR IEC 60079-0, -7, -11, -15 and -31
- For use in mining (Mb), minimum degree of protection IP64 (acc. EN/IEC 60529) and adequate protection acc. EN/IEC/ABNT NBR IEC 60079-0 and -1
- Depending on zoning and device category, correct installation and compliance with requirements must be assessed and certified by a “Notified Body” (ExNB) if necessary!

Explosive atmosphere occurring simultaneously with assembly, installation or repair work must be ruled out. Among other things, these include the following activities

- Insertion and removal of components
- Connecting or disconnecting from fieldbus, antenna, D-Sub, ETHERNET or USB connections, DVI ports, memory cards, configuration and programming interfaces in general and service interface in particular:
  - Operating DIP switches, coding switches or potentiometers
  - Replacing fuses

Wiring (connecting or disconnecting) of non-intrinsically safe circuits is only permitted in the following cases

- The circuit is disconnected from the power supply.
- The area is known to be non-hazardous.

Outside the device, suitable measures must be taken so that the rated voltage is not exceeded by more than 40 % due to transient faults (e.g., when powering the field supply).

Product components intended for intrinsically safe applications may only be powered by 750-606 or 750-625/000-001 bus supply modules.

Only field devices whose power supply corresponds to overvoltage category I or II may be connected to these components.

7.2.2 Special Notes Regarding ANSI/ISA Ex

For ANSI/ISA Ex acc. to UL File E198726, the following additional requirements apply:

- Use in Class I, Division 2, Group A, B, C, D or non-hazardous areas only
- ETHERNET connections are used exclusively for connecting to computer networks (LANs) and may not be connected to telephone networks or telecommunication cables
- **WARNING** – The radio receiver module 750-642 may only be used to connect to external antenna 758-910!
- **WARNING** – Product components with fuses must not be fitted into circuits subject to overloads!
  These include, e.g., motor circuits.
- **WARNING** – When installing I/O module 750-538, “Control Drawing No. 750538” in the manual must be strictly observed!

Information

Additional Information
Proof of certification is available on request.
Also take note of the information given on the operating and assembly instructions.
The manual, containing these special conditions for safe use, must be readily available to the user.

8 Appendix

8.1 Configuration and Parameterization using a GSD File with PROFIBUS DP and PROFINET IO

Note

Requirement

A fieldbus coupler/controller must be used to parameterize the I/O module750-481/003-000 (2AI RTD Ex i) via GSD file:

- PROFIBUS DP 750-333(/0xx-000): ≥ Firmware Version 19
- PROFIBUS DP 750-833(/0xx-000): ≥ Firmware Version 18
- PROFINET IO 750-375(/025-000): ≥ Firmware Version 01
- PROFINET IO 750-377(/025-000): ≥ Firmware Version 01

Note

Behavior after Overwriting with WAGO-I/O-*CHECK*!

If WAGO-I/O-*CHECK* is used to overwrite a parameterization made with the GSD file, the I/O module operates with the WAGO-I/O-*CHECK* settings until the 750-333 and 750-833 Fieldbus Couplers/Controllers are restarted.
After restart, the I/O module is re-parameterized via PROFIBUS using the GSD settings.

8.1.1 2AI RTD Ex i Configuration

8.1.1.1 PROFIBUS DP Fieldbus Couplers/Controllers 750-333(/0xx-000), 750-833(/0xx-000)

When using the aforementioned PROFIBUS DP fieldbus devices, the process image size is configured by selecting the corresponding GSD entry.

Table 31: PROFIBUS DP Configuration

GSD Entry		PI Length/[Byte]		Data Type	Inst.
Module	Sub-Module	I	O		
750-481 2AI/RTD/Ex i	n/a	4	n/a	INT16	2
750-481 2AI/RTD/Ex i, PRM					
750-481 2AI/RTD/Ex i RA, PRM		6	6	{UINT8, INT16}	
750-481 2AI/RTD/Ex i RA					
PFC 750-481 2AI/RTD/Ex i*)		n/a	n/a	n/a	n/a

*) Only available with 750-833(/0xx-000)

8.1.1.2 PROFINET IO Fieldbus Couplers 750-375(/025-000), 750-377(/025-000)

When using the aforementioned PROFINET IO fieldbus couplers, the process image size is configured by selecting the corresponding GSD entry.

Table 32: PROFINET IO Configuration

GSD Entry		PI Length/[Byte]		Data Type	Inst.
Module	**Sub-Module**	**I**	**O**		
750-481(/0..-000) 2AI, RTD	INT16[2] I	4	n/a	INT16	2
	{UINT8, INT16}[2] I/O	6	6	{UINT8, INT16}	

8.1.2 2AI RTD Ex i Parameterization

The I/O module can be supplied with all operating parameters when selecting the module entry in the GSD file on the PROFIBUS DP*) and PROFINET IO fieldbus devices.

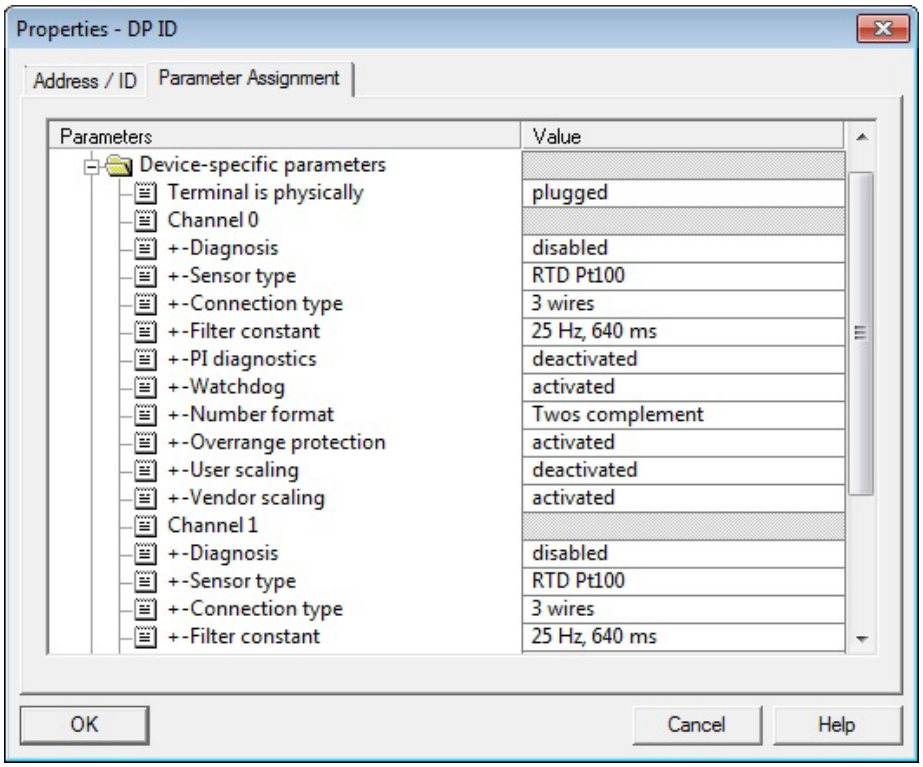

Figure 28: Example of a Parameter Assignment Dialog*) for PROFIBUS DP Fieldbus Couplers/Controllers

*) Only available for “750-481 2AI/RTD/Ex i, PRM” and “750-481 2AI/RTD/Ex i RA, PRM” GSD entries.

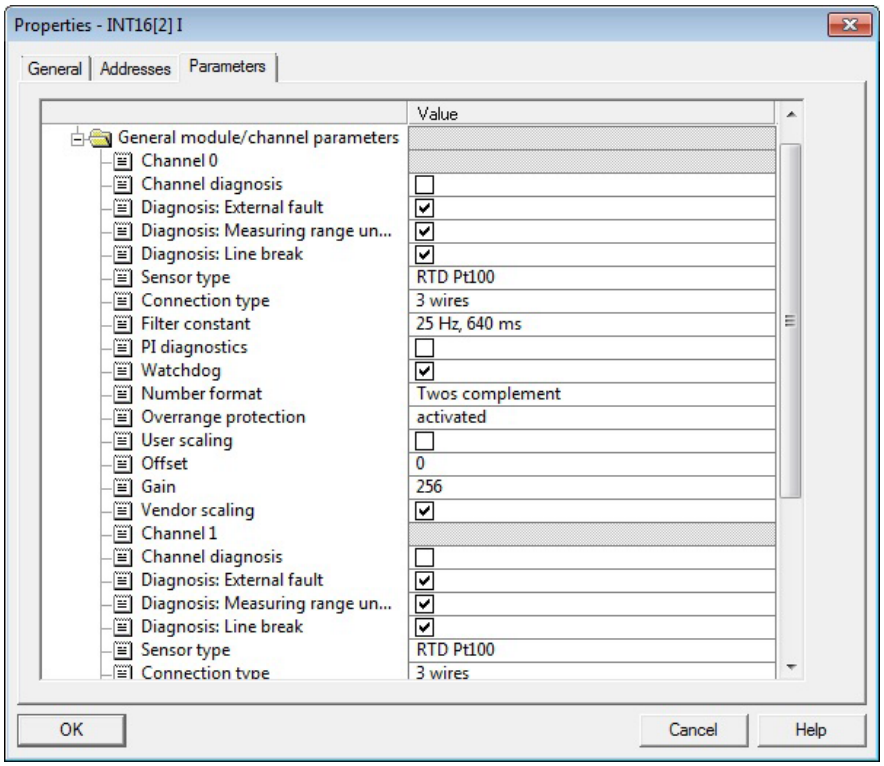

Figure 29: Example of a Parameter Assignment Dialog for PROFINET IO Fieldbus Couplers

8.1.2.1 All PROFIBUS DP and PROFINET IO Fieldbus Couplers/Controllers

The following assignment applies to the parameters of the I/O module when using PROFIBUS DP and PROFINET IO fieldbus devices.

Table 33: Specific Module/Channel Parameters for 750-481/003-000

Parameter	Value	WAGO I/O-*CHECK*	GSD File	
			PB-DP	PN-IO
Sensor type	RTD Pt100*)	✓	✓	✓
	RTD Ni100			
	RTD Pt1000			
	RTD Pt500			
	RTD Pt200			
	RTD Ni1000			
	RTD Ni120			
	POT 5k			
	POT 1k2			
	R 5k			
	R 1k2			
Connection type	3 conductors*)	✓	✓	✓
	2 conductors			
PI diagnostics	enabled	✓	✓	✓
	disabled*)			
Watchdog	enabled*)	✓	✓	✓
	disabled			
Number format	Two's complement*)	✓	✓	✓
	Amount/sign			
Filter constant	25 Hz, 640 ms*)	✓	✓	✓

Table 33: Specific Module/Channel Parameters for 750-481/003-000

Parameter	Value	WAGO I/O-*CHECK*	GSD File	
			PB-DP	PN-IO
	50 Hz, 320 ms			
	60 Hz, 270 ms			
	100 Hz, 160 ms			
	200 Hz, 80 ms			
	400 Hz, 40 ms			
	1000 Hz, 16 ms			
Overflow limit	enabled*)	✓	✓	✓
	disabled			
User scaling	enabled	✓	✓	✓
	disabled*)			
Offset	0x0000 (0)*)	✓	–	✓
Gain	0x0100 (256)*)	✓	–	✓
Manufacturer scaling	enabled*)	✓	✓	✓
	disabled			

*) Default setting

8.1.2.2 PROFIBUS DP Fieldbus Couplers/Controllers 750-333(/0xx-000), 750-833(/0xx-000)

The aforementioned fieldbus couplers/controllers allow channel- and module-specific behavior parameterization during diagnostics.

Table 34: General Module/Channel Parameters

Parameter	Value	Explanation
Diagnostics Channel x (x = 0 … 1)		The fieldbus coupler/controller signals a diagnosis if one of the following events: • External error • Measurement range underflow • Line break are reported by at least one I/O module channel.
	0 (lock)*)	Diagnostics reported by the I/O module do not lead to the signaling of a diagnosis by the fieldbus coupler/controller.
	1 (release)	Diagnostics reported by the I/O module lead to the signaling of a diagnosis by the fieldbus coupler/controller.

*) Default setting

8.1.2.3 PROFINET IO Fieldbus Couplers 750-375(/025-000), 750-377(/025-000)

The aforementioned fieldbus couplers allow channel-specific behavior parameterization during diagnostics.

Table 35: General Module/Channel Parameters

Parameter	Value	Explanation
Channel diagnostics Channel x (x = 0 … 1)	0 (false)*)	An error on the respective signal channel does not lead to transmission of a diagnostic alarm nor entry in the diagnostics database of the station proxy.
	1 (true)	An error on the respective signal channel leads to transmission of a diagnostic alarm. The respective error leads to an entry in the diagnostics database of the station proxy.
Diagnostics: External error Channel x (x = 0 … 1)	0 (false)	An external error on the respective signal channel does not cause transmission of a diagnostic alarm nor entry in the diagnostics database of the station proxy.
	1 (true)*)	Provided that the channel diagnostics of the respective signal channel has been activated, an external error leads to transmission of a diagnostic alarm and entry in the diagnostics database of the station proxy.
Diagnostics: Measurement range underflow Channel x (x = 0 … 1)	0 (false)	An Measurement range underflow on the respective signal channel does not lead to transmission of a diagnostic alarm nor entry in the diagnostics database of the station proxy.
	1 (true)*)	Provided that the channel diagnostics of the respective signal channel has been activated, a measurement range underflow leads to transmission of a diagnostic alarm and entry in the diagnostics database of the station proxy.
Diagnostics: Line break Channel x (x = 0 … 1)	0 (false)	A line break on the respective signal channel does not lead to transmission of a diagnostic alarm nor to entry in the diagnostics database of the station proxy.
	1 (true)*)	Provided that the channel diagnostics of the respective signal channel has been activated, a line break leads to transmission of a diagnostic alarm and entry in the diagnostics database of the station proxy.

*) Default settings

8.2 Rated Surge Voltage

Table 36: Rated Surge Voltage[*)]

Nominal voltage of the power supply system (mains) acc. to IEC 60038 3		Line-to-neutral voltage, derived from the nominal AC or DC voltage up to and including	Rated surge voltage			
Three-phase	Single-phase		Overvoltage category			
			I	II	III	IV
		50 V	330 V	500 V	800 V	1500 V
		100 V	500 V	800 V	1500 V	2500 V
	120 V … 240 V	150 V	800 V	1500 V	2500 V	4000 V
230 V / 400 V 277 V / 480 V		300 V	1500 V	2500 V	4000 V	6000 V
400 V / 690 V		600 V	2500 V	4000 V	6000 V	8000 V
1000 V		1000 V	4000 V	6000 V	8000 V	12000 V

[*)] Source: EN 60664-1:2007, Appendix F.1

List of Figures

List of Tables

WAGO Kontakttechnik GmbH & Co. KG
Postfach 2880 • D-32385 Minden
Hansastraße 27 • D-32423 Minden
Phone: 05 71/8 87 – 0
Fax: 05 71/8 87 – 1 69
E-Mail: info@wago.com
Internet: http://www.wago.com