TECHDOCS

Manual

WAGO-I/O-SYSTEM 750

750-464(/xxx-xxx)

2/4 AI RTD configurable

2-/4-Channel Analog Input Module for RTDs

Version 1.1.0

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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.

WAGO is a registered trademark of WAGO Verwaltungsgesellschaft mbH.

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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 750-464 (2/4 AI RTD configurable) and the variants listed in the table below.

Table 1: Variants

Item Number/Variant	Designation
750-464	2/4AI RTD Adjust
750-464/020-000	4AI NTC Adjust

Note

Documentation Validity for Variants
Unless otherwise indicated, the information given in this documentation applies to listed variants.

The I/O module 750-464 shall only be installed and operated according to the instructions in this manual and in the manual for the used fieldbus coupler or 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 or 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 2: 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 3: 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 750 Series in Compliance with Underlying Provisions

Fieldbus 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 actuators or higher-level control systems. Using 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 or 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.

The implementation of safety functions such as EMERGENCY STOP or safety door monitoring must only be performed by the F I/O modules within the modular WAGO I/O SYSTEM 750. Only these safe F I/O modules ensure functional safety in accordance with the latest international standards. WAGO's interference-free output modules can be controlled by the safety function.

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. These modules contain no parts that can be serviced or repaired by the user. The following actions will result in the exclusion of liability on the part of WAGO Kontakttechnik GmbH & Co. KG:

- Repairs,
- Changes to the hardware or software that are not described in the operating instructions,
- Improper use of the components.

Further details are given in the contractual agreements. Please send your request for modified and new hardware or software configurations directly to WAGO Kontakttechnik GmbH & Co. KG.

2.1.4.1 Disposal

2.1.4.1.1 Electrical and Electronic Equipment

Electrical and electronic equipment may not be disposed of with household waste. This also applies to products without this symbol.

Electrical and electronic equipment contain materials and substances that can be harmful to the environment and health. Electrical and electronic equipment must be disposed of properly after use.
WEEE 2012/19/EU applies throughout Europe. Directives and laws may vary nationally.

Environmentally friendly disposal benefits health and protects the environment from harmful substances in electrical and electronic equipment.

- Observe national and local regulations for the disposal of electrical and electronic equipment.
- Clear any data stored on the electrical and electronic equipment.
- Remove any added battery or memory card in the electrical and electronic equipment.
- Have the electrical and electronic equipment sent to your local collection point.

Improper disposal of electrical and electronic equipment can be harmful to the environment and human health.

2.1.4.1.2 Packaging

Packaging contains materials that can be reused.
PPWD 94/62/EU and 2004/12/EU packaging guidelines apply throughout Europe. Directives and laws may vary nationally.

Environmentally friendly disposal of the packaging protects the environment and allows sustainable and efficient use of resources.

- Observe national and local regulations for the disposal of packaging.
- Dispose of packaging of all types that allows a high level of recovery, reuse and recycling.

Improper disposal of packaging can be harmful to the environment and wastes valuable resources.

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 device in only one suitable enclosure!
The device is an open system. Install the device in a suitable enclosure. This enclosure must:

- Guarantee that the max. permissible degree of pollution is not exceeded.
- Offer adequate protection against contact.
- Prevent fire from spreading outside of the enclosure.
- Offer adequate protection against UV irradiation.
- Guarantee mechanical stability
- Restrict access to authorized personnel and may only be opened with tools

DANGER

Ensure disconnect and overcurrent protection!
The device is intended for installation in automation technology systems. Disconnect protection is not integrated. Connected systems must be protected by a fuse.
Provide suitable disconnect and overcurrent protection on the system side!

DANGER

Ensure a standard connection!
To minimize any hazardous situations resulting in personal injury or to avoid failures in your system, the data and power supply lines shall be installed according to standards, with careful attention given to ensuring the correct terminal assignment. Always adhere to the EMC directives applicable to your application.

NOTICE

Ensure proper contact with the DIN-rail!
Proper electrical contact between the DIN-rail and device is necessary to maintain the EMC characteristics and function of the device.

NOTICE

Replace defective or damaged devices!
Replace defective or damaged device/module (e.g., in the event of deformed contacts).

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 housing and soiled contacts with propanol.

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 I/O module 750-464(2/4 AI RTD configurable) measures resistance at field level or evaluates platinum or nickel resistance sensors.
The resistance values are converted into temperature values. A microprocessor in the I/O module linearizes the measured resistance values and converts them 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 has 2 or 4 input channels (configurable), providing a direct connection to 2- or 3-wire resistance sensors.
The sensors are connected to the CAGE CLAMP® connectors
+AI 1/−AI 1 … +AI 4/−AI 4.

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

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.

The I/O module 750-464 (2/4 AI RTD configurable) receives the 24 V voltage supply for the field level from an upstream I/O module or from the fieldbus coupler/controller via blade-formed power jumper contacts. It then provides these potentials to subsequent I/O modules via spring-formed power jumper contacts.

NOTICE

Do not exceed maximum values via power contacts!
The maximum current that can flow through the power jumper contacts is 10 A.
The power jumper contacts can be damaged and the permissible operating temperature can be exceeded by higher current values.
When configuring the system, do not exceed the permissible maximum current value. If there is a higher power requirement, you must use an additional supply module to provide the field voltage.

Note

Use supply modules for ground (earth)!
The I/O module has no power jumper contacts for receiving and transmitting the earth potential. Use a supply module when an earth potential is needed for the subsequent I/O modules.

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

With consideration of the power jumper contacts, the individual modules can be arranged in any combination when configuring the fieldbus node.
An arrangement in groups within the group of potentials is not necessary.

The I/O module 750-464 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

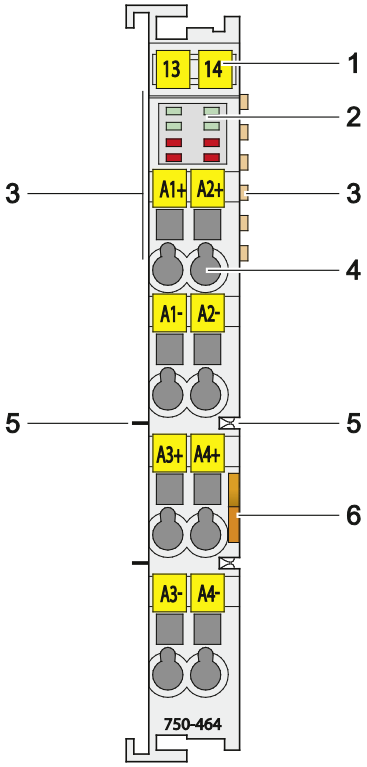


Figure 1: View

Table 4: 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/Local 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 local bus. The contacting for the local bus consists of 6 data contacts, which are available as self-cleaning gold spring contacts.

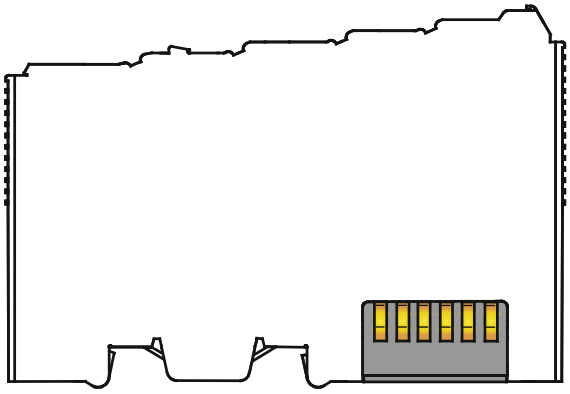


Figure 2: Data Contacts

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

Pay attention to potential equalization from the environment!
The devices are equipped with electronic components that may be destroyed by electrostatic discharge. When handling the devices, please ensure that environmental factors (personnel, work space and packaging) are properly equalized. Do not touch any conducting parts, 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. Do not touch the blade contacts.

The I/O module 750-464 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.

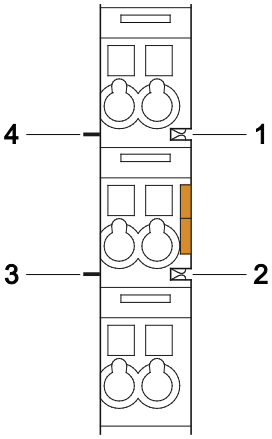


Figure 3: Power Jumper Contacts

Table 5: 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

NOTICE

Do not exceed maximum values via power contacts!
The maximum current that can flow through the power jumper contacts is 10 A. The power jumper contacts can be damaged and the permissible operating temperature can be exceeded by higher current values.
When configuring the system, do not exceed the permissible maximum current value. If there is a higher power requirement, you must use an additional supply module to provide the field voltage.

Note

Use supply modules for ground (earth)!
The I/O module has no power jumper contacts for receiving and transmitting the earth potential. Use a supply module when an earth potential is needed for the subsequent I/O modules.

3.2.3 CAGE CLAMP® Connectors

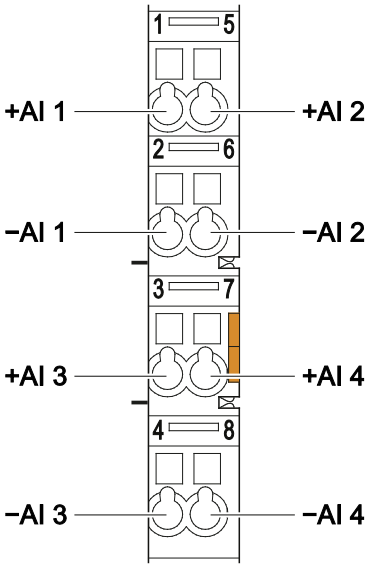


Figure 1: CAGE CLAMP® Connectors

3.2.4 Connections 4-Channel, 2-Wire

Table 6: Legend for Figure “CAGE CLAMP® Connectors” – 4-channel, 2-wire

Channel	Designation	Connector	Function
1	+AI 1	1	Sensor 1: +R
	−AI 1	2	Sensor 1: −R
2	+AI 2	5	Sensor 2: +R
	−AI 2	6	Sensor 2: −R
3	+AI 3	3	Sensor 3: +R
	−AI 3	4	Sensor 3: −R
4	+AI 4	7	Sensor 4: +R
	−AI 4	8	Sensor 4: −R

3.2.5 Connections 2-Channel, 3-Wire

Table 7: Legend for Figure “CAGE CLAMP® Connectors” – 2-channel, 3-wire

Channel	Designation	Connector	Function
1	+AI 1	1	Sensor 1: +R
	−AI 1	2	Sensor 1: RL
	−AI 3	4	Sensor 1: −R
2	+AI 2	5	Sensor 2: +R
	−AI 2	6	Sensor 2: RL
	−AI 4	8	Sensor 2: −R
---	+AI 3	3	Not connected
---	+AI 4	7	Not connected

3.2.6 Connections 2-Channel, 2-Wire

Table 8: Legend for Figure "CAGE CLAMP® Connectors"– 2-channel, 2-wire

Channel	Designation	Connector	Function
1	+AI 1	1	Sensor 1: +R
	−AI 3	4	Sensor 1: −R
2	+AI 2	5	Sensor 2: +R
	−AI 4	8	Sensor 2: −R
---	−AI 1	2	Not connected
---	+AI 3	3	Not connected
---	−AI 2	6	Not connected
---	+AI 4	7	Not connected

Note

Use shielded signal lines!
Only use shielded signal lines for analog signals and I/O modules which are equipped with shield clamps. Only then can you ensure that the accuracy and interference immunity specified for the respective I/O module can be achieved even in the presence of interference acting on the signal cable.

3.3 Display Elements

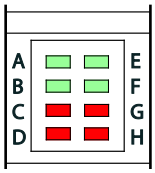


Figure 4: Display Elements

Table 9: Legend for Figure “Display Elements”

Channel	Designation	LED	State	Function
1	Status AI 1	A	Off	Not ready for operation or no or disturbed local bus communication (when watchdog timer enabled only, see section “Parameterization”)
			Green	Operational readiness and trouble-free local bus communication
	Error AI 1	C	Off	Normal operation
			Red	Overrange/underrange of the admissible measuring range *), broken wire, short circuit*)
2	Status AI 2	E	Off	Not ready for operation or no or disturbed local bus communication (when watchdog timer enabled only, see section “Parameterization”)
			Green	Operational readiness and trouble-free local bus communication
	Error AI 2	G	Off	Normal operation
			Red	Overrange/underrange of the admissible measuring range *), broken wire, short circuit*)
3	Status AI 3	B	Off	Not ready for operation or no or disturbed local bus communication (when watchdog timer enabled only, see section “Parameterization”)
			Green	Operational readiness and trouble-free local bus communication
	Error AI 3	D	Off	Normal operation
			Red	Overrange/underrange of the admissible measuring range*), broken wire, short circuit *)

Table 9: Legend for Figure “Display Elements”

Channel	Designation	LED	State	Function
4	Status AI 4	F	Off	Not ready for operation or no or disturbed local bus communication (when watchdog timer enabled only, see section “Parameterization”)
			Green	Operational readiness and trouble-free local bus communication
	Error AI 4	H	Off	Normal operation
			Red	Overrange/underrange of the admissible measuring range *), broken wire, short circuit*)

*) Depending on the hardware, it is not possible to distinguish between a range underrange and a wire break when using NTC version 750-464/020-000. In the case of wire break, a range underrange is always detected and displayed.

3.4 Operating Elements

The I/O module 750-464 has no operating elements.

3.5 Schematic Diagram

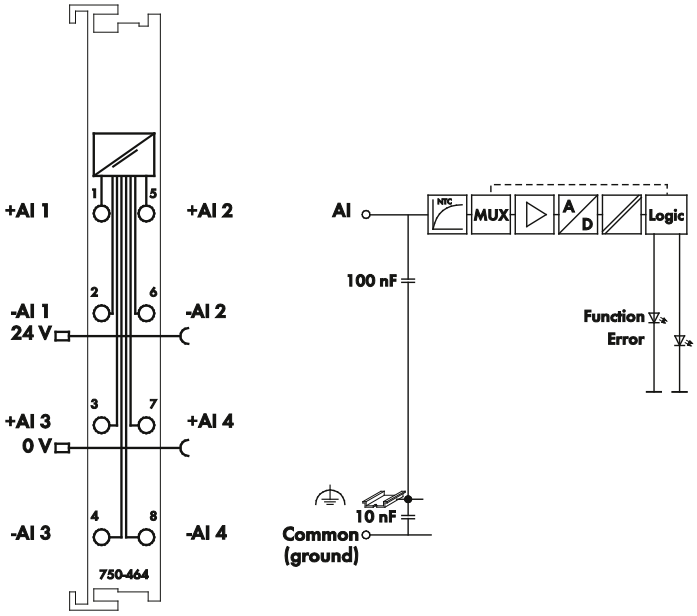


Figure 5: Schematic Diagram

3.6 Technical Data

3.6.1 Device

Table 10: Technical Data – Device

Width	12 mm
Height (from upper edge of 35 DIN rail)	64 mm
Depth	100 mm
Weight	Approx. 50.6 g

3.6.2 Supply

Table 11: Technical Data – Supply

Voltage supply	Via system voltage local bus (5 VDC)
Current consumption $_{typ.}$ (internal) (5 VDC)	50 mA
Input current $_{typ}$ (Field) (24 VDC)	---
Voltage via power jumper contacts	24 VDC
Current via power contacts $_{max.}$	10 A
Isolation (peak value)	500 V system/supply

3.6.3 Communication

Table 12: Technical Data – Communication

Internal bit width (local bus)	
4-Channel operation	4 × 16 bits data
	4 × 8 bits control/status (optional)
2-Channel operation	2 × 16 bits data
	2 × 8 bits control/status (optional)

3.6.4 Inputs (RTD variant 750-464)

Table 13: Technical Data – Inputs (RTD Variant 750-464)

Number of inputs	2 or 4 (parametrizable)
Sensor types	Pt100 (IEC 751, default)
	Ni100 (DIN 43760)
	Pt1000 (IEC 751)
	Pt500 (IEC 751)
	Pt200 (IEC 751)
	Ni1000 (DIN 43760)
	Ni120 (Minco)
	Ni1000 (TK 5000)
	Potentiometer
	Measurement resistance 10 Ω … 5000 Ω
	Measurement resistance 10 Ω … 1200 Ω
Sensor connection	2-wire, 3-wire
Measuring current (typ.)	≤ 350 µA per measuring circuit
Conversion time	≤ 320 ms
Resolution	16 bits
Absolute accuracy at 25 °C	≤ ±0.2 % of the full scale value
typical	≤ ±0.1 % of the full scale value
Temperature coefficient	≤ ±20 ppm/K
typical	≤ ±15 ppm/K

3.6.5 Inputs (NTC variant 750-464/020-000)

Table 14: Technical Data – Inputs (NTC Variant 750-464/020-000)

Number of inputs	4
Sensor types	NTC 10 kΩ, (default)
	NTC 20 kΩ
	NTC-Thermokon 10 kΩ
Sensor connection	2-wire
Measuring current	≤ 350 µA per measuring circuit
Conversion time	≤ 320 ms
Resolution	16 bits
Absolute accuracy at 25 °C	≤ ±0.2 % of the full scale value
typical	≤ ±0.1 % of the full scale value
Temperature coefficient	≤ ±20 ppm/K
typical	≤ ±15 ppm/K

3.6.6 Connection Type

Table 15: 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 16: Technical Data – Power Jumper Contacts

Power jumper contacts	Blade/spring contact, self-cleaning

Table 17: Technical Data – Data Contacts

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

3.6.7 Climatic Environmental Conditions

Table 18: Technical Data – Climatic Environmental Conditions

Surrounding air temperature, operation	0 °C … 55 °C
Surrounding air temperature, storage	−25 °C … +85 °C
Operating altitude	0 … 2000 m; (> 2000 m upon request)
Relative humidity	Max. 5 % … 95 % without condensation
Pollution degree	2
Protection type	IP20
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 → DOWNLOADS → Documentation → System Description.

The following approvals have been granted to the basic version and all variants of 750-464 I/O modules:

CE Conformity Marking

cULus UL508

The following approvals have been granted to the basic version and all variants of 750-464 I/O modules:

Korea Certification MSIP-REM-W43-AIM750

The following Ex approvals have been granted to the basic version and all variants of 750-464 I/O modules:

TÜV 07 ATEX 554086 X

I M2 Ex d I Mb
II 3 G Ex nA IIC T4 Gc
II 3 D Ex tc IIIC T135°C Dc

IECEx TUN 09.0001 X

Ex d I Mb
Ex nA IIC T4 Gc
Ex tc IIIC T135°C Dc

cULus ANSI/ISA 12.12.01

Class I, Div2 ABCD T4

The following Ex approvals have been granted to the basic version and all variants of 750-464 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

All variations of 750-464 I/O modules meet the following requirements on emission and immunity of interference:

EMC CE-Immunity to interference	EN 61131-2
EMC CE-Emission of interference	EN 61131-2
EMC marine applications-Immunity to interference	acc. to DNV GL
EMC marine applications-Emission of interference	acc. to DNV GL

4 Process Image

Note

Mapping of process data in the process image of fieldbus systems
The representation of the I/O modules' process data in the process image depends on the fieldbus coupler/controller used. Please take this information as well as the particular design of the respective control/status bytes from the section "Fieldbus Specific Design of the Process Data" included in the description concerning the process image of the fieldbus coupler/controller used.

4.1 Overview

4.1.1 Process Image for 2-Channel Operation

Table 19: Process image for 2-channel operation

Input		Output	
Byte 0	Status byte S0	Byte 0	Control byte C0
Byte 1	Data byte D0	Byte 1	Data byte D0
Byte 2	Data byte D1	Byte 2	Data byte D1
Byte 3	Status byte S1	Byte 3	Control byte C1
Byte 4	Data byte D2	Byte 4	Data byte D2
Byte 5	Data byte D3	Byte 5	Data byte D3

4.1.2 Process Image for 4-Channel Operation

Table 20: Process image for 4-channel operation

Input		Output	
Byte 0	Status byte S0	Byte 0	Control byte C0
Byte 1	Data byte D0	Byte 1	Data byte D0
Byte 2	Data byte D1	Byte 2	Data byte D1
Byte 3	Status byte S1	Byte 3	Control byte C1
Byte 4	Data byte D2	Byte 4	Data byte D2
Byte 5	Data byte D3	Byte 5	Data byte D3
Byte 6	Status byte S2	Byte 6	Control byte C2
Byte 7	Data byte D4	Byte 7	Data byte D4
Byte 8	Data byte D5	Byte 8	Data byte D5
Byte 9	Status byte S3	Byte 9	Control byte C3
Byte 10	Data byte D6	Byte 10	Data byte D6
Byte 11	Data byte D7	Byte 11	Data byte D7

4.2 Status Bytes

Table 21: Status byte S0

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reg_Com	**General Error**	**Wire Break**	**Short Circuit**	**User Over-range**	**User Under-range**	**Over-range**	**Under-range**

Underrange	Underrange	
	Ptxxx, Nixxx (all versions 750-464/xxx-xxx) NTCxxk (only version 750-464/020-000)	
	0:	The overrange limit (see section "Feature Register) is OFF or the resistance value is above the lower temperature limit in relation to the calculated temperature.
	1:	The overrange limit is ON and the resistance value is below the lower temperature limit in relation to the calculated temperature.
	10R…1k2R, 10R…5kR	
	0:	The overrange limit (see section "Feature Register") is OFF or the resistance value is above the lower resistance limit.
	1:	The overrange limit is ON and the resistance value is below the lower resistance limit.
	Potentiometer	
	0:	This bit is always 0.
Overrange	Range exceeded	
	Ptxxx, Nixxx (all versions 750-464/xxx-xxx) NTCxxk (only version 750-464/020-000)	
	0:	The overrange limit (see section "Feature Register) is OFF or the resistance value is below the upper temperature limit in relation to the calculated temperature.
	1:	The overrange limit is ON and the resistance value is above the upper temperature limit in relation to the calculated temperature.
	10R…1k2R, 10R…5kR	
	0:	The overrange limit (see section "Feature Register") is OFF or the resistance value is below the upper resistance limit.
	1:	The overrange limit is ON and the resistance value is above the upper resistance limit.
	Potentiometer	
	0:	This bit is always 0.

Table 21: Status byte S0

User Underrange	User underrange	
	0:	The process value is greater than specified for the underrange (see section “Feature Register”).
	1:	The process value is less than specified for the underrange. The format of the number notation (see section "Feature Register") is taken into account.
User Overrange	User overrange	
	0:	The process value is less than specified for the overrange (see section “Feature Register”).
	1:	The process value is greater than specified for the overrange. The format of the number notation (see section "Feature Register") is taken into account.
Short Circuit	Short Circuit	
	0:	"Indicate wire break/short circuit" (see section "Feature Register") is OFF or there is no short circuit.
	1:	"Indicate wire break/short circuit" is ON and there is a short circuit.
Wire Break	Wire Break	
	0:	"Indicate wire break/short circuit" (see section "Feature Register") is OFF or there is no wire break.
	1:	"Indicate wire break/short circuit" is ON and there is a wire break.
General Error	Group Error	
	0:	No error, bit 0 (underrange), bit 1 (overrange), bit 4 (short circuit) and bit 5 (wire break) is not set.
	1:	Error, bit 0 (underrange), bit 1 (overrange), bit 4 (short circuit) or bit 5 (wire break) is set.
RegCom	Register Communication	
	0:	Register communication is switched off (normal mode)
	1:	Register communication is switched on (configuration, see section "Setting Parameters via Register Communication")

Table 22: Status byte S1

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reg_Com	**General Error**	**Wire Break**	**Short Circuit**	**User Over-range**	**User Under-range**	**Over-range**	**Under-range**

Underrange	Underrange	
	Ptxxx, Nixxx (all versions 750-464/xxx-xxx) NTCxxk (only version 750-464/020-000)	
	0:	The overrange limit (see section "Feature Register") is OFF or the resistance value is above the lower temperature limit in relation to the calculated temperature.
	1:	The overrange limit is ON and the resistance value is below the lower temperature limit in relation to the calculated temperature.
	10R…1k2R, 10R…5kR	
	0:	The overrange limit (see section "Feature Register") is OFF or the resistance value is above the lower resistance limit.
	1:	The overrange limit is ON and the resistance value is below the lower resistance limit.
	Potentiometer	
	0:	This bit is always 0.
Overrange	Range exceeded	
	Ptxxx, Nixxx (all versions 750-464/xxx-xxx) NTCxxk (only version 750-464/020-000)	
	0:	The overrange limit (see section "Feature Register") is OFF or the resistance value is below the upper temperature limit in relation to the calculated temperature.
	1:	The overrange limit is ON and the resistance value is above the upper temperature limit in relation to the calculated temperature.
	10R…1k2R, 10R…5kR	
	0:	The overrange limit (see section "Feature Register") is OFF or the resistance value is below the upper resistance limit.
	1:	The overrange limit is ON and the resistance value is above the upper resistance limit.
	Potentiometer	
	0:	This bit is always 0.

Table 22: Status byte S1

User Underrange	User underrange	
	0:	The process value is greater than specified for the underrange (see section “Feature Register”).
	1:	The process value is less than specified for the underrange. The format of the number notation (see section "Feature Register") is taken into account.
User Overrange	User overrange	
	0:	The process value is less than specified for the overrange (see section “Feature Register”).
	1:	The process value is greater than specified for the overrange. The format of the number notation (see section "Feature Register") is taken into account.
Short Circuit	Short Circuit	
	0:	"Indicate wire break/short circuit" (see section "Feature Register") is OFF or there is no short circuit.
	1:	"Indicate wire break/short circuit" is ON and there is a short circuit.
Wire Break	Wire Break	
	0:	"Indicate wire break/short circuit" (see section "Feature Register") is OFF or there is no wire break.
	1:	"Indicate wire break/short circuit" is ON and there is a wire break.
General Error	Group Error	
	0:	No error, bit 0 (underrange), bit 1 (overrange), bit 4 (short circuit) and bit 5 (wire break) is not set.
	1:	Error, bit 0 (underrange), bit 1 (overrange), bit 4 (short circuit) or bit 5 (wire break) is set.
RegCom	Register Communication	
	0:	Register communication is switched off (normal mode)
	1:	Register communication is switched on (configuration, see section "Setting Parameters via Register Communication")

Note

Status bytes in 4-channel operation!
Status bytes S2 and S3 are only available in the process image for 4-channel operation!

Table 23: Status byte S2

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reg_Com	**General Error**	**Wire Break**	**Short Circuit**	**User Over-range**	**User Under-range**	**Over-range**	**Under-range**

Underrange	Underrange	
	Ptxxx, Nixxx (all versions 750-464/xxx-xxx) NTCxxk (only version 750-464/020-000)	
	0:	The overrange limit (see section "Feature Register) is OFF or the resistance value is above the lower temperature limit in relation to the calculated temperature.
	1:	The overrange limit is ON and the resistance value is below the lower temperature limit in relation to the calculated temperature.
	10R…1k2R, 10R…5kR	
	0:	The overrange limit (see section "Feature Register") is OFF or the resistance value is above the lower resistance limit.
	1:	The overrange limit is ON and the resistance value is below the lower resistance limit.
	Potentiometer	
	0:	This bit is always 0.
Overrange	Range exceeded	
	Ptxxx, Nixxx (all versions 750-464/xxx-xxx) NTCxxk (only version 750-464/020-000)	
	0:	The overrange limit (see section "Feature Register) is OFF or the resistance value is below the upper temperature limit in relation to the calculated temperature.
	1:	The overrange limit is ON and the resistance value is above the upper temperature limit in relation to the calculated temperature.
	10R…1k2R, 10R…5kR	
	0:	The overrange limit (see section "Feature Register") is OFF or the resistance value is below the upper resistance limit.
	1:	The overrange limit is ON and the resistance value is above the upper resistance limit.
	Potentiometer	
	0:	This bit is always 0.

Table 23: Status byte S2

User Underrange	User underrange	
	0:	The process value is greater than specified for the underrange (see section “Feature Register”).
	1:	The process value is less than specified for the underrange. The format of the number notation (see section "Feature Register") is taken into account.
User Overrange	User overrange	
	0:	The process value is less than specified for the overrange (see section “Feature Register”).
	1:	The process value is greater than specified for the overrange. The format of the number notation (see section "Feature Register") is taken into account.
Short Circuit	Short Circuit	
	0:	"Indicate wire break/short circuit" (see section "Feature Register") is OFF or there is no short circuit.
	1:	"Indicate wire break/short circuit" is ON and there is a short circuit.
Wire Break	Wire Break	
	0:	"Indicate wire break/short circuit" (see section "Feature Register") is OFF or there is no wire break.
	1:	"Indicate wire break/short circuit" is ON and there is a wire break.
General Error	Group Error	
	0:	No error, bit 0 (underrange), bit 1 (overrange), bit 4 (short circuit) and bit 5 (wire break) is not set.
	1:	Error, bit 0 (underrange), bit 1 (overrange), bit 4 (short circuit) or bit 5 (wire break) is set.
RegCom	Register Communication	
	0:	Register communication is switched off (normal mode)
	1:	Register communication is switched on (configuration, see section "Setting Parameters via Register Communication")

Table 24: Status byte S3

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reg_Com	**General Error**	**Wire Break**	**Short Circuit**	**User Over-range**	**User Under-range**	**Over-range**	**Under-range**

Underrange	Underrange	
	Ptxxx, Nixxx (all versions 750-464/xxx-xxx) NTCxxk (only version 750-464/020-000)	
	0:	The overrange limit (see section "Feature Register) is OFF or the resistance value is above the lower temperature limit in relation to the calculated temperature.
	1:	The overrange limit is ON and the resistance value is below the lower temperature limit in relation to the calculated temperature.
	10R…1k2R, 10R…5kR	
	0:	The overrange limit (see section "Feature Register") is OFF or the resistance value is above the lower resistance limit.
	1:	The overrange limit is ON and the resistance value is below the lower resistance limit.
	Potentiometer	
	0:	This bit is always 0.
Overrange	Range exceeded	
	Ptxxx, Nixxx (all versions 750-464/xxx-xxx) NTCxxk (only version 750-464/020-000)	
	0:	The overrange limit (see section "Feature Register) is OFF or the resistance value is below the upper temperature limit in relation to the calculated temperature.
	1:	The overrange limit is ON and the resistance value is above the upper temperature limit in relation to the calculated temperature.
	10R…1k2R, 10R…5kR	
	0:	The overrange limit (see section "Feature Register") is OFF or the resistance value is below the upper resistance limit.
	1:	The overrange limit is ON and the resistance value is above the upper resistance limit.
	Potentiometer	
	0:	This bit is always 0.

Table 24: Status byte S3

User Underrange	User underrange	
	0:	The process value is greater than specified for the underrange (see section “Feature Register”).
	1:	The process value is less than specified for the underrange. The format of the number notation (see section "Feature Register") is taken into account.
User Overrange	User overrange	
	0:	The process value is less than specified for the overrange (see section “Feature Register”).
	1:	The process value is greater than specified for the overrange. The format of the number notation (see section "Feature Register") is taken into account.
Short Circuit	Short Circuit	
	0:	"Indicate wire break/short circuit" (see section "Feature Register") is OFF or there is no short circuit.
	1:	"Indicate wire break/short circuit" is ON and there is a short circuit.
Wire Break	Wire Break	
	0:	"Indicate wire break/short circuit" (see section "Feature Register") is OFF or there is no wire break.
	1:	"Indicate wire break/short circuit" is ON and there is a wire break.
General Error	Group Error	
	0:	No error, bit 0 (underrange), bit 1 (overrange), bit 4 (short circuit) and bit 5 (wire break) is not set.
	1:	Error, bit 0 (underrange), bit 1 (overrange), bit 4 (short circuit) or bit 5 (wire break) is set.
RegCom	Register Communication	
	0:	Register communication is switched off (normal mode)
	1:	Register communication is switched on (configuration, see section "Setting Parameters via Register Communication")

4.3 Process Data of the Standard Version 750-464, (RTD, configurable)

4.3.1 Pt100 (acc. IEC 751)

With the setting "Pt100 (acc. IEC 751)", the I/O module converts the resistance measured values of Pt100 sensors (acc. IEC 751) and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.1 °C in one word (16-bit). Temperature values below 0 °C are represented in two's complement binary. As a result, 0 °C corresponds to the numeric value 0x0000 and 100 °C to the numeric value 0x03E8 (dec. 1000).
The possible numeric range corresponds to the defined temperature range of −200 °C … +850 °C for Pt100 sensors (acc. IEC 751).

Table 25: Process image for 750-464, Pt100 setting (acc. IEC 751)

Temperature °C	Resistance Ω	Numeric value [1]			Status byte hex.	LED error AI 1, 2
		Binary	Hex.	Dec.		
---	< 9.00	'1111.1000.0011.0000'	0xF830	−2000	0x51	on
Short circuit [2]						
< −200.0	< 18.52	'1111.1000.0011.0000'	0xF830	−2000	0x41	on
Underrange [3]						
−200.0	18.52	'1111.1000.0011.0000'	0xF830	−2000	0x00	off
−100.0	60.256	'1111.1100.0001.1000'	0xFC18	−1000	0x00	off
0.0	100.000	'0000.0000.0000.0000'	0x0000	0	0x00	off
100.0	138.506	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
200.0	175.856	'0000.0111.1101.0000'	0x07D0	2000	0x00	off
500.0	280.978	'0001.0011.1000.1000'	0x1388	5000	0x00	off
750.0	360.638	'0001.1101.0100.1100'	0x1D4C	7500	0x00	off
800.0	375.704	'0001.1111.0100.0000'	0x1F40	8000	0x00	off
850.0	390.481	'0010.0001.0011.0100'	0x2134	8500	0x00	off
> 850.0	> 390.481	'0010.0001.0011.0100'	0x2134	8500	0x42	on
Overrange [3]						
---	> 5500.00	'0010.0001.0011.0100'	0x2134	8500	0x62	on
Wire break [2]						

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")

4.3.2 Pt200 (acc. IEC 751)

With the setting "Pt200 (acc. IEC 751)", the I/O module converts the resistance measured values of Pt200 sensors (acc. IEC 751) and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.1 °C in one word (16-bit). Temperature values below 0 °C are represented in two's complement binary. As a result, 0 °C corresponds to the numeric value 0x0000 and 100 °C to the numeric value 0x03E8 (dec. 1000).
The possible numeric range corresponds to the defined temperature range of −200 °C … +850 °C for Pt200 sensors (acc. IEC 751).

Table 26: Process image for 750-464, Pt200 setting (acc. IEC 751)

Temperature °C	Resistance Ω	Numeric value [1]			Status byte hex.	LED error AI 1, 2
		Binary	Hex.	Dec.		
---	< 9.00	'1111.1000.0011.0000'	0xF830	−2000	0x51	on
Short circuit [2]						
< −200.0	< 37.04	'1111.1000.0011.0000'	0xF830	−2000	0x41	on
Underrange [3]						
−200.0	37.04	'1111.1000.0011.0000'	0xF830	−2000	0x00	off
−100.0	120.51	'1111.1100.0001.1000'	0xFC18	−1000	0x00	off
0.0	200.00	'0000.0000.0000.0000'	0x0000	0	0x00	off
100.0	277.01	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
200.0	351.71	'0000.0111.1101.0000'	0x07D0	2000	0x00	off
500.0	561.96	'0001.0011.1000.1000'	0x1388	5000	0x00	off
750.0	721.28	'0001.1101.0100.1100'	0x1D4C	7500	0x00	off
800.0	751.41	'0001.1111.0100.0000'	0x1F40	8000	0x00	off
850.0	780.96	'0010.0001.0011.0100'	0x2134	8500	0x00	off
> 850.0	> 780.96	'0010.0001.0011.0100'	0x2134	8500	0x42	on
Overrange [3]						
---	> 5500.00	'0010.0001.0011.0100'	0x2134	8500	0x62	on
Wire break [2]						

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")

4.3.3 Pt500 (acc. IEC 751)

With the setting "Pt500 (acc. IEC 751)", the I/O module converts the resistance measured values of Pt500 sensors (acc. IEC 751) and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.1 °C in one word (16-bit). Temperature values below 0 °C are represented in two's complement binary. As a result, 0 °C corresponds to the numeric value 0x0000 and 100 °C to the numeric value 0x03E8 (dec. 1000).
The possible numeric range corresponds to the defined temperature range of −200 °C … +850 °C for Pt500 sensors (acc IEC 751).

Table 27: Process image for 750-464, Pt500 setting (acc. IEC 751)

Temperature °C	Resistance Ω	Numeric value [1]			Status byte hex.	LED error AI 1, 2
		Binary	Hex.	Dec.		
---	< 9.00	'1111.1000.0011.0000'	0xF830	−2000	0x51	on
Short circuit [2]						
< −200.0	< 92.60	'1111.1000.0011.0000'	0xF830	−2000	0x41	on
Underrange [3]						
−200.0	92.60	'1111.1000.0011.0000'	0xF830	−2000	0x00	off
−100.0	301.28	'1111.1100.0001.1000'	0xFC18	−1000	0x00	off
0.0	500.00	'0000.0000.0000.0000'	0x0000	0	0x00	off
100.0	692.53	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
200.0	879.28	'0000.0111.1101.0000'	0x07D0	2000	0x00	off
500.0	1404.89	'0001.0011.1000.1000'	0x1388	5000	0x00	off
750.0	1803.19	'0001.1101.0100.1100'	0x1D4C	7500	0x00	off
800.0	1878.52	'0001.1111.0100.0000'	0x1F40	8000	0x00	off
850.0	1952.41	'0010.0001.0011.0100'	0x2134	8500	0x00	off
> 850.0	> 1952.41	'0010.0001.0011.0100'	0x2134	8500	0x42	on
Overrange [3]						
---	> 5500.00	'0010.0001.0011.0100'	0x2134	8500	0x62	on
Wire break [2]						

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")

4.3.4 Pt1000 (acc. IEC 751)

With the setting "Pt1000 (acc. IEC 751)", the I/O module converts the resistance measured values of Pt1000 sensors (acc. IEC 751) and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.1 °C in one word (16-bit). Temperature values below 0 °C are represented in two's complement binary. As a result, 0 °C corresponds to the numeric value 0x0000 and 100 °C to the numeric value 0x03E8 (dec. 1000).
The possible numeric range corresponds to the defined temperature range of −200 °C … +850 °C for Pt1000 sensors (acc. IEC 751).

Table 28: Process image for 750-464, Pt1000 setting (acc. IEC 751)

Temperature °C	Resistance Ω	Numeric value [1]			Status byte hex.	LED error AI 1, 2
		Binary	Hex.	Dec.		
---	< 9.00	'1111.1000.0011.0000'	0xF830	−2000	0x51	on
Short circuit [2]						
< −200.0	< 185.20	'1111.1000.0011.0000'	0xF830	−2000	0x41	on
Underrange [3]						
−200.0	185.20	'1111.1000.0011.0000'	0xF830	−2000	0x00	off
−100.0	602.56	'1111.1100.0001.1000'	0xFC18	−1000	0x00	off
0.0	1000.00	'0000.0000.0000.0000'	0x0000	0	0x00	off
100.0	1385.06	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
200.0	1758.56	'0000.0111.1101.0000'	0x07D0	2000	0x00	off
500.0	2809.78	'0001.0011.1000.1000'	0x1388	5000	0x00	off
750.0	3606.38	'0001.1101.0100.1100'	0x1D4C	7500	0x00	off
800.0	3757.04	'0001.1111.0100.0000'	0x1F40	8000	0x00	off
850.0	3904.81	'0010.0001.0011.0100'	0x2134	8500	0x00	off
> 850.0	> 3904.81	'0010.0001.0011.0100'	0x2134	8500	0x42	on
Overrange [3]						
---	> 5500.00	'0010.0001.0011.0100'	0x2134	8500	0x62	on
Wire break [2]						

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")

4.3.5 Ni100 (acc. DIN 43760)

With the setting "Ni100 (acc. DIN 43760)", the I/O module converts the resistance measured values of Ni100 sensors (acc. DIN 43760) and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.1 °C in one word (16-bit). Temperature values below 0 °C are represented in two's complement binary. As a result, 0 °C corresponds to the numeric value 0x0000 and 100 °C to the numeric value 0x03E8 (dec. 1000).
The possible numeric range corresponds to the defined temperature range of −60 °C … +300 °C for Ni100 sensors (acc. DIN 43760).

Table 29: Process image for 750-464, Ni100 setting (acc. DIN 43760)

Temperature °C	Resistance Ω	Numeric value [1]			Status byte hex.	LED error AI 1, 2
		Binary	Hex.	Dec.		
---	< 9.00	'1111.1101.1010.1000'	0xFDA8	−600	0x51	on
Short circuit [2]						
< −60.0	< 69.52	'1111.1101.1010.1000'	0xFDA8	−600	0x41	on
Underrange [3]						
−60.0	69.52	'1111.1101.1010.1000'	0xFDA8	−600	0x00	off
−50.0	74.26	'1111.1110.0000.1100'	0xFE0C	−500	0x00	off
0.0	100.00	'0000.0000.0000.0000'	0x0000	0	0x00	off
50.0	129.11	'0000.0001.1111.0100'	0x01F4	500	0x00	off
100.0	161.78	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
150.0	198.64	'0000.0101.1101.1100'	0x05DC	1500	0x00	off
200.0	240.66	'0000.0111.1101.0000'	0x07D0	2000	0x00	off
250.0	289.16	'0000.1001.1100.0100'	0x09C4	2500	0x00	off
300.0	345.66	'0000.1011.1011.1000'	0x0BB8	3000	0x00	off
> 300.0	> 345.66	'0000.1011.1011.1000'	0x0BB8	3000	0x42	on
Overrange [3]						
---	> 5500.00	'0000.1011.1011.1000'	0x0BB8	3000	0x62	on
Wire break [2]						

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")

4.3.6 Ni120 (Minco)

With the setting "Ni120 (Minco)", the I/O module converts the resistance measured values of Ni120 sensors (Minco) and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.1 °C in one word (16-bit). Temperature values below 0 °C are represented in two's complement binary. As a result, 0 °C corresponds to the numeric value 0x0000 and 100 °C to the numeric value 0x03E8 (dec. 1000).
The possible numeric range corresponds to the defined temperature range of −80 °C … +260 °C for Ni120 sensors (Minco).

Table 30: Process image for 750-464, Ni120 setting (Minco)

Temperature °C	Resistance Ω	Numeric value [1]			Status byte hex.	LED error AI 1, 2
		Binary	Hex.	Dec.		
---	< 9.00	'1111.1100.1110.0000'	0xFCE0	−800	0x51	on
Short circuit [2]						
< −80.0	66.60	'1111.1100.1110.0000'	0xFCE0	−800	0x41	on
Underrange [3]						
−80.0	66.60	'1111.1100.1110.0000'	0xFCE0	−800	0x00	off
−50.0	86.16	'1111.1110.0000.1100'	0xFE0C	−500	0x00	off
0.0	120.00	'0000.0000.0000.0000'	0x0000	0	0x00	off
50.0	157.75	'0000.0001.1111.0100'	0x01F4	500	0x00	off
100.0	200.64	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
150.0	248.95	'0000.0101.1101.1100'	0x05DC	1500	0x00	off
200.0	303.45	'0000.0111.1101.0000'	0x07D0	2000	0x00	off
250.0	366.53	'0000.1001.1100.0100'	0x09C4	2500	0x00	off
260.0	380.31	'0000.1010.0010.1000'	0x0A28	2600	0x00	off
> 260.0	> 380.31	'0000.1010.0010.1000'	0x0A28	2600	0x42	on
Overrange [3]						
---	> 5500.00	'0000.1010.0010.1000'	0x0A28	2600	0x62	on
Wire break [2]						

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")

4.3.7 Ni1000 (acc. DIN 43760)

With the setting "Ni1000 (acc. DIN 43760)", the I/O module converts the resistance measured values of Ni1000 sensors (acc. DIN 43760) and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.1 °C in one word (16-bit). Temperature values below 0 °C are represented in two's complement binary. As a result, 0 °C corresponds to the numeric value 0x0000 and 100 °C to the numeric value 0x03E8 (dec. 1000).
The possible numeric range corresponds to the defined temperature range of −60 °C … +300 °C for Ni1000 sensors (acc. DIN 43760).

Table 31: Process image for 750-464, Ni1000 setting (acc. DIN 43760)

Temperature °C	Resistance Ω	Numeric value [1]			Status byte hex.	LED error AI 1, 2
		Binary	Hex.	Dec.		
---	< 90.00	'1111.1101.1010.1000'	0xFDA8	−600	0x51	on
Short circuit [2]						
< −60.0	< 695.20	'1111.1101.1010.1000'	0xFDA8	−600	0x41	on
Underrange [3]						
−60.0	695.20	'1111.1101.1010.1000'	0xFDA8	−600	0x00	off
−50.0	742.60	'1111.1110.0000.1100'	0xFE0C	−500	0x00	off
0.0	1000.00	'0000.0000.0000.0000'	0x0000	0	0x00	off
50.0	1291.10	'0000.0001.1111.0100'	0x01F4	500	0x00	off
100.0	1617.80	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
150.0	1986.40	'0000.0101.1101.1100'	0x05DC	1500	0x00	off
200.0	2406.60	'0000.0111.1101.0000'	0x07D0	2000	0x00	off
250.0	2891.60	'0000.1001.1100.0100'	0x09C4	2500	0x00	off
300.0	3456.60	'0000.1011.1011.1000'	0x0BB8	3000	0x00	off
> 300.0	> 3456.60	'0000.1011.1011.1000'	0x0BB8	3000	0x42	on
Overrange [3]						
---	> 5500.00	'0000.1011.1011.1000'	0x0BB8	3000	0x62	on
Wire break [2]						

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")

4.3.8 Ni1000 TK5000

With the setting "Ni1000 TK5000", the I/O module converts the resistance measured values of type Ni1000 TK5000 sensors and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.1 °C in one word (16-bit). Temperature values below 0 °C are represented in two's complement binary. As a result, 0 °C corresponds to the numeric value 0x0000 and 100 °C to the numeric value 0x03E8 (dec. 1000).
The possible numeric range corresponds to the defined temperature range of −60 °C … +250 °C for type Ni1000 TK5000 sensors.

Table 32: Process image for 750-464, type Ni1000 TK5000 sensor setting

Temperature °C	Resistance Ω	Numeric value [1]			Status byte hex.	LED error AI 1, 2
		Binary	Hex.	Dec.		
---	< 9	'1111.1101.1010.1000'	0xFDA8	−600	0x51	on
Short circuit [2]						
< −60.0	< 751.79	'1111.1101.1010.1000'	0xFDA8	−600	0x41	on
Underrange [3]						
−60.0	751.79	'1111.1101.1010.1000'	0xFDA8	−600	0x51	on
−50.0	790.88	'1111.1110.1101.0000'	0xF1F4	−500	0x00	off
0.0	1000.00	'1111.1111.1001.1000'	0xFF9C	0	0x00	off
50.0	1234.98	'0000.0000.0110.0000'	0x01F4	500	0x00	off
100.0	1500.00	'0000.0001.0010.1000'	0x03E8	1000	0x00	off
150.0	1799.27	'0000.0001.1111.0000'	0x05DC	1500	0x00	off
200.0	2136.96	'0000.0010.1011.1000'	0x07D0	2000	0x00	off
250.0	2517.27	'0000.0011.1000.0000'	0x09C4	2500	0x00	off
> 250.0	> 2517.27	'0000.0011.1000.0000'	0x09C4	2500	0x42	on
Overrange [3]						
---	> 5500	'0000.0011.1000.0000'	0x09C4	2500	0x62	on
Wire break [2]						

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")

4.3.9 Resistance Measurement 10 Ohm … 1.2 kOhm

With the setting "Resistance measurement 10 Ohm … 1.2 kOhm", the I/O module outputs the resistance measured values of the sensors directly.
The resistances values are displayed at a resolution of 1 digit per 0.1 Ω in one word (16-bit). The possible numeric range corresponds to the defined measurement range of 10 Ω … 1.2 kΩ.

Table 33: Process image for 750-464, setting 10 Ω … 1.2 kΩ

Resistance Ω	Numeric value [1]			Status byte hex.	LED error AI 1, 2
	Binary	Hex.	Dec.		
< 9 Short circuit [2]	'0000.0000.0110.0100'	0x0064	100	0x51	on
< 10 Underrange [3]	'0000.0000.0110.0100'	0x0064	100	0x41	on
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
> 1200 Overrange [3]	'0010.1110.1110.0000'	0x2EE0	12000	0x42	on
> 5500 Wire break[2]	'0010.1110.1110.0000'	0x2EE0	12000	0x62	on

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")

4.3.10 Resistance Measurement 10 Ohm … 5.0 kOhm

With the setting "Resistance measurement 10 Ohm … 5.0 kOhm", the I/O module outputs the resistance measured values of the sensors directly.
The resistances values are displayed at a resolution of 1 digit per 0.5 Ω in one word (16-bit). The possible numeric range corresponds to the defined measurement range of 10 Ω … 5.0 kΩ.

Table 34: Process image for 750-464, setting 10 Ω … 5 kΩ

Resistance Ω	Numeric value [1]			Status byte hex.	LED error AI 1, 2
	Binary	Hex.	Dec.		
< 9 Short circuit [2]	'0000.0000.0001.0100'	0x0014	20	0x51	on
< 10 Underrange [3]	'0000.0000.0001.0100'	0x0014	20	0x41	on
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
> 5000 Overrange [3]	'0010.0111.0001.0000'	0x2710	10000	0x42	on
> 5500 Wire break[2]	'0010.0111.0001.0000'	0x2710	10000	0x62	on

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")

4.3.11 Potentiometer

With the setting "Potentiometer", the I/O module outputs the resistance ratio between the connections +R1/−R1 and −R1/−R3 or +R2/−R2 und −R2/−R4. Potentiometers of 1 kOhm … 5 kOhm can be used.
The set values are displayed at a resolution of 1 digit per 0.1 % in one word (16-bit). The possible numeric range corresponds to the defined measurement range of 0 % … 100 %.

Table 35: Process image for 750-464, "Potentiometer" setting

Percent %	Numeric value			Status byte hex.	LED error AI 1, 2
	Binary	Hex.	Dec.		
0.0	'0000.0000.0000.0000'	0x0000	0	0x00	off
20.0	'0000.1111.1010.0000'	0x0FA0	4000	0x00	off
40.0	'0001.1111.0100.0000'	0x1F40	8000	0x00	off
60.0	'0010.1110.1110.0000'	0x2EE0	12000	0x00	off
80.0	'0011.1110.1000.0000'	0x3E80	16000	0x00	off
100.0	'0100.1110.0010.0000'	0x4E20	20000	0x00	off

Note

No error detection for the "Potentiometer" setting!
Detection of a wire break or short circuit is not possible depending on the model. An overrange or underrange is also not possible depending on the sensor. Accordingly, the status byte is always 0x00.

4.4.1 Process Data of the Standard Version 750-464 (RTD, configurable) Siemens Format

4.4.2 Pt100 (acc. IEC 751)

With the setting "Pt100 (acc. IEC 751)" and activated Siemens format, the I/O module converts the resistance measured values of Pt100 sensors (acc. IEC 751) and outputs them as temperature values. The temperature values are displayed at a resolution of 1 digit per 0.5 °C).
The status information is depicted in bit 0 … bit 2 and the digitalized measured value in bit 3 … bit 15.

Table 36: Process image for 750-464, Pt100 setting (acc. IEC 751)

Temperature °C	Resistance Ω	Numeric value [2] with status information [4]				Status byte hex.	LED error AI 1, 2
		Binary	XFÜ	Hex.	Dec.		
---	< 9.00	'1111.0011.1000.0	011'	0xF383	−3197	0x51	on
Short circuit [2]							
< −200.0	< 18.52	'1111.0011.1000.0	001'	0xF381	−3199	0x41	on
Underrange [3]							
−200.0	18.52	'1111.0011.1000.0	000'	0xF380	−3200	0x00	off
−100.0	60.256	'1111.1001.1100.0	000'	0xF9C0	−1600	0x00	off
0.0	100.000	'0000.0000.0000.0	000'	0x0000	0	0x00	off
100.0	138.506	'0000.0110.0100.0	000'	0x0640	1600	0x00	off
200.0	175.856	'0000.1100.1000.0	000'	0x0C80	3200	0x00	off
500.0	280.978	'0001.1111.0100.0	000'	0x1F40	8000	0x00	off
750.0	360.638	'0010.1110.1110.0	000'	0x2EE0	12000	0x00	off
800.0	375.704	'0011.0010.0000.0	000'	0x3200	12800	0x00	off
850.0	390.481	'0011.0101.0010.0	000'	0x3520	13600	0x00	off
> 850.0	> 390.481	'0011.0101.0010.0	001'	0x3521	13601	0x42	on
Overrange [3]							
---	> 5500.00	'0011.0101.0010.0	011'	0x3523	13603	0x62	on
Wire break [2]							

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")
4) Status information: X: Not used, F: Short circuit, wire break, Ü: Overrange

4.4.3 Pt200 (acc. IEC 751)

With the setting "Pt200 (acc. IEC 751)" and activated Siemens format, the I/O module converts the resistance measured values of Pt200 sensors (acc. IEC 751) and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.5 °C).
The status information is depicted in bit 0 … bit 2 and the digitalized measured value in bit 3 … bit 15.

Table 37: Process image for 750-464, Pt200 setting (acc. IEC 751)

Temperature °C	Resistance Ω	Numeric value [1] with status information [4]				Status byte hex.	LED error AI 1, 2
		Binary	XFÜ	Hex.	Dec.		
---	< 9.00	'1111.0011.1000.0	011'	0xF383	−3197	0x51	on
Short circuit [2]							
< −200.0	< 37.04	'1111.0011.1000.0	001'	0xF381	−3199	0x41	on
Underrange [3]							
−200.0	37.04	'1111.0011.1000.0	000'	0xF380	−3200	0x00	off
−100.0	120.51	'1111.1001.1100.0	000'	0xF9C0	−1600	0x00	off
0.0	200.00	'0000.0000.0000.0	000'	0x0000	0	0x00	off
100.0	277.01	'0000.0011.1110.1	000'	0x0640	1600	0x00	off
200.0	351.71	'0000.1100.1000.0	000'	0x0C80	3200	0x00	off
500.0	561.96	'0001.1111.0100.0	000'	0x1F40	8000	0x00	off
750.0	721.28	'0010.1110.1110.0	000'	0x2EE0	12000	0x00	off
800.0	751.41	'0011.0010.0000.0	000'	0x3200	12800	0x00	off
850.0	780.96	'0011.0101.0010.0	000'	0x3520	13600	0x00	off
> 850.0	> 780.96	'0011.0101.0010.0	001'	0x3521	13601	0x42	on
Overrange [3]							
---	> 5500.00	'0011.0101.0010.0	011'	0x3523	13603	0x62	on
Wire break [2]							

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")
4) Status information: X: Not used, F: Short circuit, wire break, Ü: Overrange

4.4.4 Pt500 (acc. IEC 751)

With the setting "Pt500 (acc. IEC 751)" and activated Siemens format, the I/O module converts the resistance measured values of Pt500 sensors (acc. IEC 751) and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.5 °C.
The status information is depicted in bit 0 … bit 2 and the digitalized measured value in bit 3 … bit 15.

Table 38: Process image for 750-464, Pt500 setting (acc. IEC 751)

Temperature °C	Resistance Ω	Numeric value [1] with status information [4]				Status byte hex.	LED error AI 1, 2
		Binary	XFÜ	Hex.	Dec.		
---	< 9.00	'1111.0011.1000.0	011'	0xF383	−3197	0x51	on
Short circuit [2]							
< −200.0	< 92.60	'1111.0011.1000.0	001'	0xF381	−3199	0x41	on
Underrange [3]							
−200.0	92.60	'1111.0011.1000.0	000'	0xF380	−3200	0x00	off
−100.0	301.28	'1111.1001.1100.0	000'	0xF9C0	−1600	0x00	off
0.0	500.00	'0000.0000.0000.0	000'	0x0000	0	0x00	off
100.0	692.53	'0000.0011.1110.1	000'	0x0640	1600	0x00	off
200.0	879.28	'0000.1100.1000.0	000'	0x0C80	3200	0x00	off
500.0	1404.89	'0001.1111.0100.0	000'	0x1F40	8000	0x00	off
750.0	1803.19	'0010.1110.1110.0	000'	0x2EE0	12000	0x00	off
800.0	1878.52	'0011.0010.0000.0	000'	0x3200	12800	0x00	off
850.0	1952.41	'0011.0101.0010.0	000'	0x3520	13600	0x00	off
> 850.0	> 1952.41	'0011.0101.0010.0	001'	0x3521	13601	0x42	on
Overrange [3]							
---	> 5500.00	'0011.0101.0010.0	011'	0x3523	13603	0x62	on
Wire break [2]							

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")
4) Status information: X: Not used, F: Short circuit, wire break, Ü: Overrange

4.4.5 Pt1000 (acc. IEC 751)

With the setting "Pt1000 (acc. IEC 751)" and activated Siemens format, the I/O module converts the resistance measured values of Pt1000 sensors (acc. IEC 751) and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.5 °C.
The status information is depicted in bit 0 … bit 2 and the digitalized measured value in bit 3 … bit 15.

Table 39: Process image for 750-464, Pt1000 setting (acc. IEC 751)

Temperature °C	Resistance Ω	Numeric value [1] with status information [4]				Status byte hex.	LED error AI 1, 2
		Binary	XFÜ	Hex.	Dec.		
---	< 9.00	'1111.0011.1000.0	011'	0xF383	−3197	0x51	on
Short circuit [2]							
< −200.0	< 185.20	'1111.0011.1000.0	001'	0xF381	−3199	0x41	on
Underrange [3]							
−200.0	185.20	'1111.0011.1000.0	000'	0xF380	−3200	0x00	off
−100.0	602.56	'1111.1001.1100.0	000'	0xF9C0	−1600	0x00	off
0.0	1000.00	'0000.0000.0000.0	000'	0x0000	0	0x00	off
100.0	1385.06	'0000.0011.1110.1	000'	0x0640	1600	0x00	off
200.0	1758.56	'0000.0111.1101.0	000'	0x0C80	3200	0x00	off
500.0	2809.78	'0001.1111.0100.0	000'	0x1F40	8000	0x00	off
750.0	3606.38	'0010.1110.1110.0	000'	0x2EE0	12000	0x00	off
800.0	3757.04	'0011.0010.0000.0	000'	0x3200	12800	0x00	off
850.0	3904.81	'0011.0101.0010.0	000'	0x3520	13600	0x00	off
> 850.0	> 3904.81	'0011.0101.0010.0	001'	0x3521	13601	0x42	on
Overrange [3]							
---	> 5500.00	'0011.0101.0010.0	011'	0x3523	13603	0x62	on
Wire break [2]							

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")
4) Status information: X: Not used, F: Short circuit, wire break, Ü: Overrange

4.4.6 Ni100 (acc. DIN 43760)

With the setting "Ni100 (acc. DIN 43760)" and activated Siemens format, the I/O module converts the resistance measured values of Ni100 sensors (acc. DIN 43760) and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.5 °C.
The status information is depicted in bit 0 … bit 2 and the digitalized measured value in bit 3 … bit 15.

Table 40: Process image for 750-464, Ni100 setting (acc. DIN 43760)

Temperature °C	Resistance Ω	Numeric value [1] with status information [4]				Status byte hex.	LED error AI 1, 2
		Binary	XFÜ	Hex.	Dec.		
---	< 9.00	'1111.1100.0100.0	011'	0xFC43	−957	0x51	on
Short circuit [2]							
< −60.0	< 69.52	'1111.1100.0100.0	001'	0xFC41	−959	0x41	on
Underrange [3]							
−60.0	69.52	'1111.1100.0100.0	000'	0xFC40	−960	0x00	off
−50.0	74.26	'1111.1100.1110.0	000'	0xFCE0	−800	0x00	off
0.0	100.00	'0000.0000.0000.0	000'	0x0000	0	0x00	off
50.0	129.11	'0000.0011.0010.0	000'	0x0320	800	0x00	off
100.0	161.78	'0000.0110.0100.0	000'	0x0640	1600	0x00	off
150.0	198.64	'0000.1001.0110.0	000'	0x0960	2400	0x00	off
200.0	240.66	'0000.1100.1000.0	000'	0x0C80	3200	0x00	off
250.0	289.16	'0000.1111.1010.0	000'	0x0FA0	4000	0x00	off
300.0	345.66	'0001.0010.1100.0	000'	0x12C0	4800	0x00	off
>300.0	> 345.66	'0001.0010.1100.0	001'	0x12C1	4801	0x42	on
Overrange [3]							
---	> 5500.00	'0001.0010.1100.0	011'	0x12C3	4803	0x62	on
Wire break [2]							

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")
4) Status information: X: Not used, F: Short circuit, wire break, Ü: Overrange

4.4.7 Ni120 (Minco)

With the setting "Ni120 (Minco)" and activated Siemens format, the I/O module converts the resistance measured values of Ni120 sensors (Minco) and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.5 °C.
The status information is depicted in bit 0 … bit 2 and the digitalized measured value in bit 3 … bit 15.

Table 41: Process image for 750-464, Ni120 setting (Minco)

Temperature °C	Resistance Ω	Numeric value [1] with status information [4]				Status byte hex.	LED error AI 1, 2
		Binary	XFÜ	Hex.	Dec.		
---	< 9.00	'1111.1011.0000.0	011'	0xFB03	−1277	0x51	on
Short circuit [2]							
< −80.0	66.60	'1111.1011.0000.0	001'	0xFB01	−1279	0x41	on
Underrange [3]							
−80.0	66.60	'1111.1011.0000.0	000'	0xFB00	−1280	0x00	off
−50.0	86.16	'1111.1100.1110.0	100'	0xFCE0	−800	0x00	off
0.0	120.00	'0000.0000.0000.0	000'	0x0000	0	0x00	off
50.0	157.75	'0000.0011.0010.0	000'	0x0320	800	0x00	off
100.0	200.64	'0000.0110.0100.0	000'	0x0640	1600	0x00	off
150.0	248.95	'0000.1001.0110.0	000'	0x0960	2400	0x00	off
200.0	303.45	'0000.1100.1000.0	000'	0x0C80	3200	0x00	off
250.0	366.53	'0000.1111.1010.0	000'	0x0FA0	4000	0x00	off
260.0	380.31	'0001.0000.0100.0	000'	0x1040	4160	0x00	off
> 260.0	>380.31	'0001.0000.0100.0	001'	0x1041	4161	0x42	on
Overrange [3]							
---	> 5500.00	'0001.0000.0100.0	011'	0x1043	4163	0x62	on
Wire break [2]							

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")
4) Status information: X: Not used, F: Short circuit, wire break, Ü: Overrange

4.4.8 Ni1000 (acc. DIN 43760)

With the setting "Ni1000 (acc. DIN 43760)" and activated Siemens format, the I/O module converts the resistance measured values of Ni1000 sensors (acc. DIN 43760) and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.5 °C.
The status information is depicted in bit 0 to bit 2 and the digitalized measured value in bit 3 … bit 15.

Table 42: Process image for 750-464, Ni1000 setting (acc. DIN 43760)

Temperature °C	Resistance Ω	Numeric value [1] with status information [4]				Status byte hex.	LED error AI 1, 2
		Binary	XFÜ	Hex.	Dec.		
---	< 9.00	'1111.1100.0100.0	011'	0xFC43	−957	0x51	on
Short circuit [2]							
< −60.0	< 695.20	'1111.1100.0100.0	001'	0xFC41	−959	0x41	on
Underrange [3]							
−60.0	695.20	'1111.1100.0100.0	000'	0xFC40	−960	0x00	off
−50.0	742.55	'1111.1100.1110.0	000'	0xFCE0	−800	0x00	off
0.0	1000.00	'0000.0000.0000.0	000'	0x0000	0	0x00	off
50.0	1291.05	'0000.0011.0010.0	000'	0x0320	800	0x00	off
100.0	1617.79	'0000.1110.0100.0	000'	0x0640	1600	0x00	off
150.0	1986.35	'0000.1001.0110.0	000'	0x0960	2400	0x00	off
200.0	2406.60	'0000.1100.1000.0	000'	0x0C80	3200	0x00	off
250.0	2891.56	'0000.1111.1010.0	000'	0x0FA0	4000	0x00	off
300.0	3456.63	'0001.0010.1100.0	000'	0x12C0	4800	0x00	off
> 300.0	>3456.63	'0001.0010.1100.0	001'	0x12C1	4801	0x42	on
Overrange [3]							
---	> 5500.00	'0001.0010.1100.0	011'	0x12C3	4803	0x62	on
Wire break [2]							

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")
4) Status information: X: Not used, F: Short circuit, wire break, Ü: Overrange

4.4.9 Ni1000 TK5000

With the setting "Ni1000 TK5000" and activated Siemens format, the I/O module converts the resistance measured values of Ni1000 TK5000 sensors and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.5 °C.
The status information is depicted in bit 0 … bit 2 and the digitalized measured value in bit 3 … bit 15.

Table 43: Process image for 750-464, type Ni1000 TK5000 sensor setting

Temperature °C	Resistance Ω	Numeric value [1] with status information [4]				Status byte hex.	LED error AI 1, 2
		Binary	XFÜ	Hex.	Dec.		
---	< 9	'1111.1100.0100.0	011'	0x FC43	−957	0x51	on
Short circuit [2]							
< −60.0	< 751.79	'1111.1100.0100.0	001'	0x FC41	−959	0x41	on
Underrange [3]							
−60.0	751.79	'1111.1100.0100.0	000'	0xFC40	−960	0x00	off
−50.0	790.88	'1111.1100.1110.0	000'	0xFCE0	−800	0x00	off
0.0	1000.00	'0000.0000.0000.0	000'	0x0000	0	0x00	off
50.0	1234.98	'0000.0011.0010.0	000'	0x0320	800	0x00	off
100.0	1500.00	'0000.0110.0100.0	000'	0x0640	1600	0x00	off
150.0	1799.27	'0000.1001.0110.0	000'	0x0960	2400	0x00	off
200.0	2136.96	'0000.1100.1000.0	000'	0x0C80	3200	0x00	off
250.0	2517.27	'0000.1111.1010.0	000'	0x0FA0	4000	0x00	off
> 250.0	> 2517.27	'0000.1111.1010.0	001'	0x0FA1	4001	0x00	on
Overrange [3]							
---	> 5500	'0000.1111.1010.0	011'	0x0FA3	4003	0x00	on
Wire break [2]							

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")
4) Status information: X: Not used, F: Short circuit, wire break, Ü: Overrange

4.4.10 Resistance Measurement 10 Ohm … 1.2 kOhm

With the setting "Resistance measurement 10 Ohm … 1.2 kOhm" and activated Siemens format, the I/O module outputs the resistance measured values of the sensors directly.
The resistances values are displayed at a resolution of 1 digit per 0.5 Ω.
The status information is depicted in bit 0 … bit 2 and the digitalized measured value in bit 3 … bit 15.

Table 44: Process image for 750-464, setting 10 Ω ... 1.2 kΩ

Resistance Ω	Numeric value [1] with status information [4]				Status byte hex.	LED error AI 1, 2
	Binary	XFÜ	Hex.	Dec.		
< 9 Short circuit [2]	'0000.0000.1010.0	011'	0x00A3	163	0x51	on
< 10 Underrange [3]	'0000.0000.1010.0	001'	0x00A1	161	0x41	on
10	'0000.0000.1010.0	000'	0x00A0	160	0x00	off
100	'0000.0110.0100.0	000'	0x0640	1600	0x00	off
200	'0000.1100.1000.0	000'	0x0C80	3200	0x00	off
300	'0001.0010.1100.0	000'	0x12C0	4800	0x00	off
400	'0000.1111.1010.0	000'	0x1900	6400	0x00	off
500	'0001.1111.0100.0	000'	0x1F40	8000	0x00	off
750	'0010.1110.1110.0	000'	0x2EE0	12000	0x00	off
1000	'0011.1110.1000.0	000'	0x3E80	16000	0x00	off
1200	'0100.1011.0000.0	000'	0x4B00	19200	0x00	off
> 1200 Overrange [3]	'0100.1011.0000.0	001'	0x4B01	19201	0x42	on
> 5500 Wire break [2]	'0100.1011.0000.0	011'	0x4B03	19203	0x62	on

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")
4) Status information: X: Not used, F: Short circuit, wire break, Ü: Overrange

4.4.11 Resistance Measurement 10 Ohm … 5.0 kOhm

With the setting "Resistance measurement 10 Ohm … 5.0 kOhm" and activated Siemens format, the I/O module outputs the resistance measured values of the sensors directly.
The resistances values are displayed at a resolution of 1 digit per 4 Ω. The status information is depicted in bit 0 to bit 2 and the digitalized measured value in bit 3 … bit 15.

Table 45: Process image for 750-464, setting 10 Ω … 5 kΩ

Resistance Ω	Numeric value [1] with status information [4]				Status byte hex.	LED error AI 1, 2
	Binary	XFÜ	Hex.	Dec.		
< 9 Short circuit [2]	'0000.0000.0001.0	100'	0x0013	19	0x51	on
< 10 Underrange [3]	'0000.0000.0001.0	100'	0x0011	17	0x41	on
10	'0000.0000.0001.0	100'	0x0010	16	0x00	off
100	'0000.0000.1100.1	000'	0x00C8	200	0x00	off
200	'0000.0001.1001.0	000'	0x0190	400	0x00	off
300	'0000.0010.0101.1	000'	0x0258	600	0x00	off
1000	'0000.0111.1101.0	000'	0x07D0	2000	0x00	off
2000	'0000.1111.1010.0	000'	0x0FA0	4000	0x00	off
3000	'0001.0111.0111.0	000'	0x1770	6000	0x00	off
4000	'0001.1111.0100.0	000'	0x1F40	8000	0x00	off
5000	'0010.0111.0001.0	000'	0x2710	10000	0x00	off
> 5000 Overrange [3]	'0010.0111.0001.0	000'	0x2711	10001	0x42	on
> 5500 Wire break[2]	'0010.0111.0001.0	000'	0x2713	10003	0x62	on

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")
4) Status information: X: Not used, F: Short circuit, wire break, Ü: Overrange

4.4.12 Potentiometer

Note

No error detection for the "Potentiometer" setting!
Detection of a wire break or short circuit is not possible depending on the model. An overrange or underrange is also not possible depending on the sensor. Accordingly, the status byte is always 0x00. Therefore, this sensor type is not recommended because the only effect would be a change in the resolution.

4.5 Data of the Version 750-464/020-000 (NTC, configurable)

4.5.1 NTC 10 kOhm

With the setting "NTC 10 kOhm", the I/O module converts the resistance measured values of NTC 10kOhm resistance sensors and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.1 °C in one word (16-bit). Temperature values below 0 °C are represented in two's complement binary. As a result, 0 °C corresponds to the numeric value 0x0000 and 100 °C to the numeric value 0x03E8 (dec. 1000).
The possible numeric range corresponds to the defined temperature range of the sensors from -50 °C to +150 °C.

Table 46: Process image for 750-464/020-000, NTC 10 kOhm setting

Temperature °C	Resistance kΩ	Numeric value [1]			Status byte hex.	LED error AI 1, 2
		Binary	Hex.	Dec.		
< -50.0	>1144.48	'1110.1100.0111.1000'	0xFE0C	-500	0x41	on
Underrange [3]						
-50.0	1144.48	'1110.1100.0111.1000'	0xFE0C	-500	0x00	off
0.0	36.35	'0000.0000.0000.0000'	0x0000	0	0x00	off
25.0	10.00	'0000.0000.1111.1010'	0x00FA	250	0x00	off
50.0	3.36	'0000.0011.0010.0000'	0x01F4	500	0x00	off
100.0	0.59	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
150.0	0.155	'0000.0101.1101.1100'	0x05DC	1500	0x51	off
> 150.0	< 0.155	'0000.0101.1101.1100'	0x05DC	1500	0x42	on
Overrange [3]						
---	< 0.009	'0000.0101.1101.1100'	0x05DC	1500	0x52	on
Short circuit [2]						

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")

4.5.2 NTC 20 kOhm

With the setting "NTC 20 kOhm", the I/O module converts the resistance measured values of NTC 20kOhm resistance sensors and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.1 °C in one word (16-bit). Temperature values below 0 °C are represented in two's complement binary. As a result, 0 °C corresponds to the numeric value 0x0000 and 100 °C to the numeric value 0x03E8 (dec. 1000).
The possible numeric range corresponds to the defined temperature range of -50 °C to +150 °C.

Table 47: Process image for 750-464/020-000, NTC 20 kOhm setting

Temperature °C	Resistance kΩ	Numeric value [1]			Status byte hex.	LED error AI 1, 2
		Binary	Hex.	Dec.		
< -50.0	> 2288.96	'1110.1100.0111.1000'	0xFE0C	-500	0x41	on
Underrange [3]						
-50.0	2288.96	'1110.1100.0111.1000'	0xFE0C	-500	0x00	off
0.0	72.70	'0000.0000.0000.0000'	0x0000	0	0x00	off
25.0	20.00	'0000.0000.1111.1010'	0x00FA	250	0x00	off
50.0	6.72	'0000.0001.1111.0100'	0x01F4	500	0x00	off
100.0	1.18	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
150.0	0.305	'0000.0101.1101.1100'	0x05DC	1500	0x00	off
> 150.0	< 0.305	'0000.0101.1101.1100'	0x05DC	1500	0x42	on
Overrange [3]						
---	<0.009	'0000.0101.1101.1100'	0x05DC	1500	0x52	on
Short circuit [2]						

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")

4.5.3 NTC 10 kOhm Thermokon

With the setting "NTC 10 kOhm Thermokon", the I/O module converts the resistance measured values of NTC 10 kOhm Thermokon resistance sensors and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.1 °C in one word (16-bit). Temperature values below 0 °C are represented in two's complement binary. As a result, 0 °C corresponds to the numeric value 0x0000 and 100 °C to the numeric value 0x03E8 (dec. 1000).
The possible numeric range corresponds to the defined temperature range of -40 °C to +150 °C.

Table 48: Process image for 750-464/020-000, NTC 10 kOhm Thermokon setting

Temperature °C	Resistance kΩ	Numeric value [1]			Status byte hex.	LED error AI 1, 2
		Binary	Hex.	Dec.		
< -40.0	> 335.67	'1111.1110.0111.0000'	0xFE70	-400	0x41	on
Underrange [3]						
-40.0	335.67	'1111.1110.0111.0000'	0xFE70	-400	0x41	on
-30.0	176.68	'1111.1110.1101.0100'	0xFED4	-300	0x00	off
0.0	32.65	'0000.0000.0000.0000'	0x0000	0	0x00	off
25.0	10.00	'0000.0000.1111.1010'	0x00FA	250	0x00	off
50.0	3.60	'0000.0001.1111.0100'	0x01F4	500	0x00	off
100.0	0.68	'0000.0011.1110.1000'	0x03E8	1000	0x00	off
150.0	0.18	'0000.0101.1101.1100'	0x05DC	1500	0x00	off
> 150.0	< 0.18	'0000.0101.1101.1100'	0x05DC	1500	0x42	on
Overrange [3]						
---	<0.009	'0000.0101.1101.1100'	0x05DC	1500	0x52	on
Short circuit [2]						

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")

4.6 Data of the Version 750-464/020-000 (NTC, configurable) Siemens Format

4.6.1 NTC 10 kOhm

With the setting "NTC 10 kOhm" and activated Siemens format, the I/O module converts the resistance measured values of NTC10 kOhm resistance sensors and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.5 °C.
The status information is depicted in bit 0 to bit 2 and the digitalized measured value in bit 3 to bit 15.

Table 49: Process image for 750-464/020-000, NTC 10 kOhm setting

Temperature °C	Resistance kΩ	Numeric value [1] with status information [4]				Status-byte Hex.	LED error AI 1, 2
		Binary	XFÜ	Hex.	Dec.		
< -50.0	>1144.48	'1111.1100.1110.0	001'	0xFCE1	-799	0x41	ein
Underrange[3]							
-50.0	1144.48	'1111.1100.1110.0	000'	0xFCE0	-800	0x00	aus
0.0	36.35	'0000.0000.0000.0	000'	0x0000	0	0x00	aus
25.0	10.00	'0000.0001.1001.0	000'	0x0190	400	0x00	aus
50.0	3.36	'0000.0011.0010.0	000'	0x0320	800	0x00	aus
100.0	0.59	'0000.0110.0100.0	000'	0x0640	1600	0x00	aus
150.0	0.155	'0000.1001.0110.0	000'	0x0960	2400	0x00	aus
> 150.0	< 0.155	'0000.1001.0110.0	001'	0x0961	2401	0x42	ein
Overrange[3]							
---	< 0.009	'0000.1001.0110.0	011'	0x0963	2403	0x52	ein
Short circuit[2]							

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")
4) Status information: X: Not used, F: Short circuit, wire break, Ü: Overrange

4.6.2 NTC 20 kOhm

With the setting "NTC 20 kOhm" and activated Siemens format, the I/O module converts the resistance measured values of NTC20 kOhm resistance sensors and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.5 °C.
The status information is depicted in bit 0 to bit 2 and the digitalized measured value in bit 3 to bit 15.

Table 50: Process image for 750-464/020-000, NTC 20 kOhm setting

Temperature °C	Resistance kΩ	Numeric value [1] with status information [4]				Status-byte Hex.	LED error AI 1, 2
		Binary	XFÜ	Hex.	Dec.		
< -50.0	> 2288.96	'1111.1100.1110.0	001'	0xFCE1	-799	0x41	on
Underrange[3]							
-50.0	2288.96	'1111.1100.1110.0	000'	0xFCE0	-800	0x00	off
0.0	70.20	'0000.0000.0000.0	000'	0x0000	0	0x00	off
25.0	20.00	'0000.0001.1001.0	000'	0x0190	400	0x00	off
50.0	6.72	'0000.0011.0010.0	000'	0x0320	800	0x00	off
100.0	1.18	'0000.0110.0100.0	000'	0x0640	1600	0x00	off
150.0	0.305	'0000.1001.0110.0	000'	0x0960	2400	0x00	off
> 150.0	< 0.305	'0000.1001.0110.0	001'	0x0961	2401	0x42	on
Overrange[3]							
---	<0.009	'0000.1001.0110.0	011'	0x0963	2403	0x52	on
Short circuit[2]							

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")
4) Status information: X: Not used, F: Short circuit, wire break, Ü: Overrange

4.6.3 NTC 10 kOhm Thermokon

With the setting "NTC 10 kOhm Thermokon" and activated Siemens format, the I/O module converts the resistance measured values of NTC 10 kOhm Thermokon resistance sensors and outputs them as temperature values.
The temperature values are displayed at a resolution of 1 digit per 0.5 °C.
The status information is depicted in bit 0 to bit 2 and the digitalized measured value in bit 3 to bit 15.

Table 51: Process image for 750-464/020-000, NTC 10 kOhm Thermokon setting

Temperature °C	Resistance kΩ	Numeric value [1] with status information [4]				Status-byte Hex.	LED error AI 1, 2
		Binary	XFÜ	Hex.	Dec.		
< -40.0	>335.67	'1111.1101.1000.0	001'	0xFD81	-639	0x41	on
Underrange[3]							
-40.0	335.67	'1111.1101.1000.0	000'	0xFD80	-640	0x00	off
-30.0	176.68	'1111 1110 0010 0	000'	0xFE20	-480	0x00	off
0.0	32.65	'0000.0000.0000.0	000'	0x0000	0	0x00	off
25.0	10.00	'0000.0001.1001.0	000'	0x0190	400	0x00	off
50.0	3.60	'0000.0011.0010.0	000'	0x0320	800	0x00	off
100.0	0.68	'0000.0110.0100.0	000'	0x0640	1600	0x00	off
150.0	0.18	'0000.1001.0110.0	000'	0x0960	2400	0x00	off
> 150.0	< 0.18	'0000.1001.0110.0	001'	0x0961	2401	0x42	on
Overrange[3]							
---	< 0.009	'0000.1001.0110.0	011'	0x0963	2403	0x52	on
Short circuit[2]							

1) Temperature values below 0 °C are represented in two's complement binary.
2) When short circuit and wire break monitoring is ON (see section "Behavior in the Event of an Error")
3) When underrange / overrange limit is ON (see section "Behavior in the Event of an Error")
4) Status information: X: Not used, F: Short circuit, wire break, Ü: Overrange

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 60175 (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 or 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. Do not touch the blade contacts.

NOTICE

Follow the installation instructions!
Only install this device in dry, indoor rooms.
Do not install the device on or in the vicinity of easily flammable materials!

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 or controllers to guarantee proper data transfer.

5.2 Inserting and Removing Devices

DANGER

Do not work when devices are energized!
High voltage can cause electric shock or burns.
Switch off all power to the device prior to performing any installation, repair or maintenance work.

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 or controller or to the previous or possibly subsequent I/O module are
engaged.

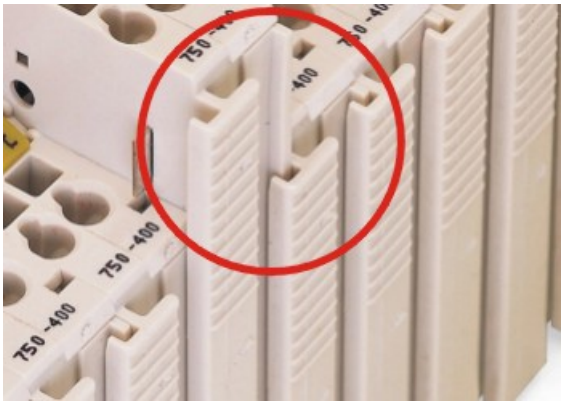


Figure 6: Insert I/O Module (Example)

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

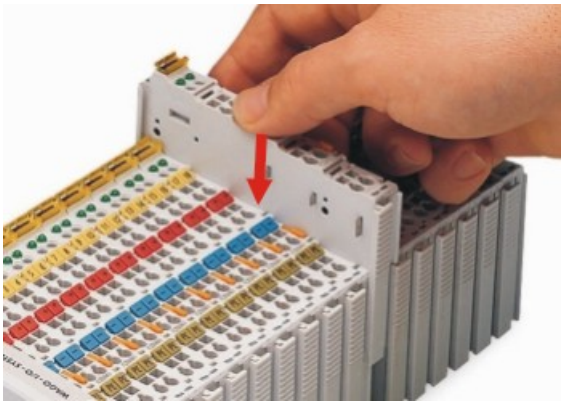


Figure 7: Snap the I/O Module into Place (Example)

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 or 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.

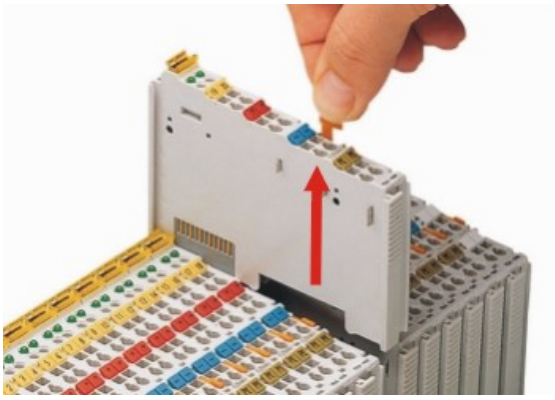


Figure 8: Removing the I/O Module (Example)

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.

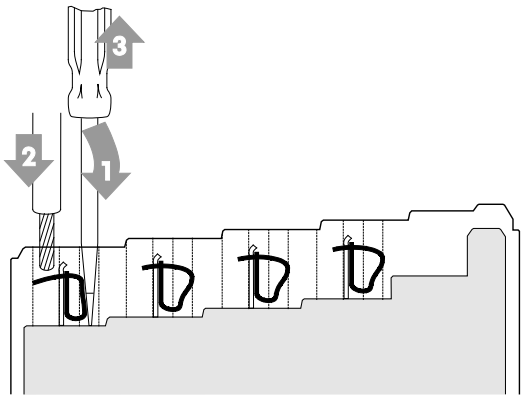


Figure 9: Connecting a Conductor to a CAGE CLAMP®

6.2 Connection Examples

Note

Use shielded signal lines!
Only use shielded signal lines for analog signals and I/O modules which are equipped with shield clamps. Only then can you ensure that the accuracy and interference immunity specified for the respective I/O module can be achieved even in the presence of interference acting on the signal cable.

6.2.1 750-464 (RTD) Version, 4-Channel Operation

6.2.1.1 4 x 2-Wire

Note

Important information for 4-channel operation
Please note the special features of 4-channel operation in the following chapter!

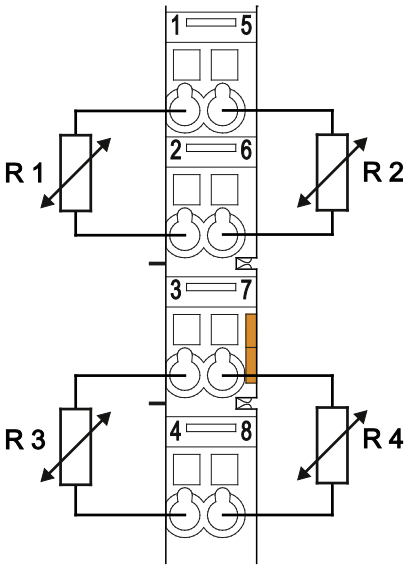


Figure 10: Connection example, version 750-464 (RTD), 4-channel, 4 x 2-wire

6.2.1.2 Special Features in 4-Channel Operation

6.2.1.2.1 Open Input Wiring

The resistors and/or temperature sensors connected to the bus terminal are metered sequentially (channel 1, channel 3, channel 2, channel 4). In so doing, channel 1 and channel 3, or channel 2 and channel 4 form a common measuring circuit in the circuit design. Therefore, in 4-channel operation, either both channels of a measuring circuit have to be connected or unused channels have to be connected at a resistance of 0 Ω ... 5 kΩ.

6.2.1.2.2 Measuring Circuit Line Break Detection

Metering in series results in a special behavior in the case of wire break, such that this is always detected for both sensors connected to a measuring circuit. This applies independently of the selected setting for "indicate wire break/short circuit" (see section "Register assignment", Register 32).

6.2.1.2.3 Influencing a Measuring Circuit Channel through a Quick Change in Temperature

As a rule, temperatures change relatively slowly. If a channel's applied resistance changes over a short period of time by a large resistance value (large in relation to the converted temperature change), then this can influence the other channel within the measuring circuit.

6.2.2 750-464 (RTD) Version, 2-Channel Operation

6.2.2.1 2 x 2-Wire

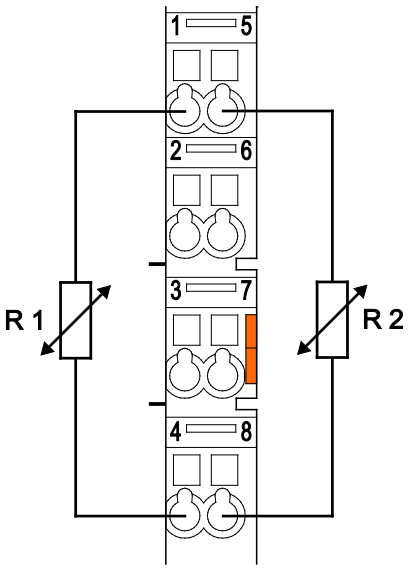


Figure 11: Connection example, version 750-464 (RTD), 2-channel, 2 x 2-wire

6.2.2.2 2 x 3-Wire

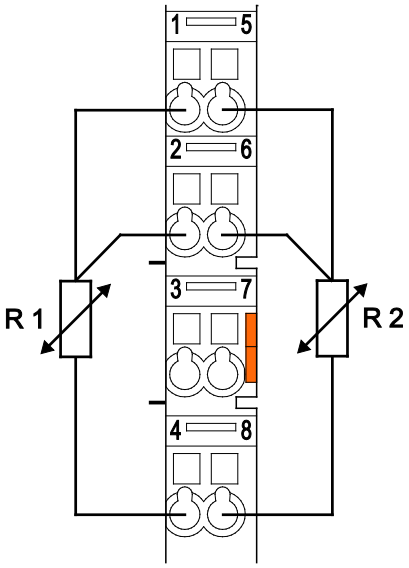


Figure 12: Connection example, version 750-464 (RTD), 2-channel, 2 x 3-Wire

6.2.2.3 1 x 2-Wire + 1 x 3-Wire

Due to the adjustability by channel, all combinations of 2-wire and 3-wire connections are possible.

6.2.3 750-464/020-000 (NTC) Version

6.2.3.1 4 x 2-Wire

Note

Important information for 4-channel operation
Please note the special features in the following chapter

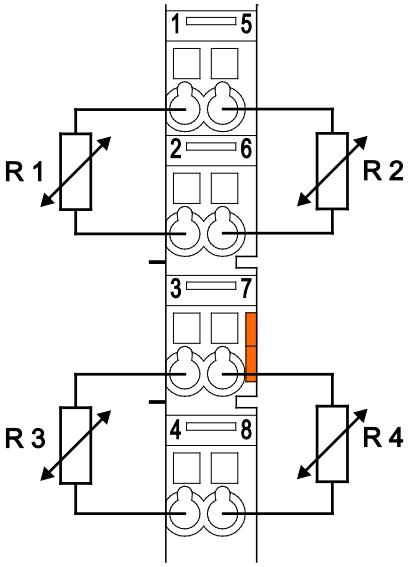


Figure 13: Connection example, version 750-464/020-000 (NTC)

6.2.3.2 Special Features

6.2.3.2.1 Influencing a Measuring Circuit Channel through a Quick Change in Temperature

As a rule, temperatures change relatively slowly. If a channel's applied resistance changes over a short period of time by a large resistance value (large in relation to the converted temperature change), then this can influence the other channel within the measuring circuit.

6.2.3.2.2 Underrange and Wire Break

Depending on the hardware, it is not possible to distinguish between a (temperature) underrange and a wire break when using the NTC version 750-464/020-000. In the case of wire break, an underrange is always detected.

7 Commissioning

7.1 Setting Parameters via Register Communication

The operating mode and the parameters for the 750-464 I/O module can be set directly using the register communication.
The values for channel 1 are set via control byte C0 and status byte S0 for the addressing and via the data bytes D0 and D1 for the transmission of values to be set.

Note

Enter the password!
Before writing to the user register 32 and following, “0x1235” must be written to the password register 31.
The number of user registers depends on the I/O module used.

The bits 0 … 5 of the control byte contain the register number.
Via bit 6 (R/W) the access directions (read or write) are set.
To switch on the register communication, bit 7 (Reg_Com) is set to “1”.

Note

No access to process data during register communication!
During register communication, process data cannot be accessed!
Process data that may be displayed are invalid!

The values to be set are written into the output data bytes D0 and D1.
Via the input data bytes D0 and D1, the set values can be read out of the I/O module.

Note

Check the set values!
After writing to the register, the set values can be checked by reading out the registers.

The corresponding bits of the control byte are mirrored in bits 0 … 5 and 7 of the status byte.

Note

Do not forget: Reset the password!
After writing to the registers, the password register 31 must be reset with “0x0000”. Otherwise write access to these registers remains enabled as long as the supply voltage is switched on.

Set the parameters for channel 2 via control byte C1, status byte S1 and data bytes D2 and D3. Use the same procedure as for channel 1.
Set the parameters for channel 3 via control byte C2, status byte S2 and data bytes D4 and D5.
Set the parameters for channel 4 via control byte C3, status byte S3 and data bytes D6 and D7.

7.1.1 Register Assignment

Table 52: Register 32

Register	Function	Memory	Access	Default settings
32	**Mode setting**	**EEPROM**	**R/W**	**0x0106**
Bit 0: User scaling				
0*)	The user scaling is switched off.			
1	The user scaling is switched on.			
Bit 1: Manufacturer scaling				
0	The manufacturer scaling is switched off.			
1*)	The manufacturer scaling is switched on.			
Bit 2: Watchdog timer (terminal box)				
0	The Watchdog timer is not active.			
1*)	The Watchdog timer is active: The watchdog trips if no process data is received within 100 ms.			
Bit 3: Number notation				
0*)	Numeric values appear in two's complement.			
1	Numeric values appear in amount / sign format.			
Bit 4: S5-FB250 output format				
0*)	Numeric values appear in default format.			
1	Numeric values appear in S5-FB250 format.			
Bit 5: Manufacturer or user calibration				
0*)	The manufacturer calibration (R17, R18) is switched on.			
1	The user calibration (R39, R40) is switched on.			
Bit 6: Wire break / short circuit diagnostics				
0*)	Diagnostics is switched off.			
1	Diagnostics is switched on.			
Bit 7: Mean value filter				
0*)	The mean value filter is switched off.			
1	The mean value filter is switched on.			
Bit 8: Overflow limit				
0	The overflow limit is switched off.			
1*)	The overflow limit is switched on: Numeric values are limited to values in R50, R51.			
Bit 9: Reserved				
0*)	This bit is reserved and may not be changed.			
Bit 10: Number of measuring lines.				
0*)	2-wire			
1	3-wire			
Bit 11: Reserved				
0*)	This bit is reserved and may not be changed.			

Table 52: Register 32

Register	Function	Memory	Access	Default settings
32	**Mode setting**	**EEPROM**	**R/W**	**0x0106**
Bit 12 … 15: Characteristic or sensor types of the 750-464/xxx-xxx (RTD) version				
0*)	Pt100	(IEC 751)		
1	Ni100	(DIN 43760)		
2	Pt1000	(IEC 751)		
3	Pt500	(IEC 751)		
4	Pt200	(IEC 751)		
5	Ni1000	(DIN 43760)		
6	Ni120	(Minco)		
7	Ni1000	(TK 5000)		
8 ... 12	Reserved			
13	Potentiometer			
14	Output in Ohm	(10R … 5000R)		
15	Output in Ohm	(10R … 1200R)		
Bit 12 … 15: Characteristic or sensor types of the 750-464/000-002 (NTC) version				
0*)	NTC (default)	10 kOhm		
1	NTC	20 kOhm		
2	NTC-Thermokon	10 kOhm		
3 ... 15	Reserved			

*) Default settings

Table 53: Register 33

Register	Function	Memory	Access	Default settings
33	**User scaling Offset B_W**	**EEPROM**	**R/W**	**0x0000**
16-bit signed integer User scaling is active if bit 1 is set in register 32. Y5 = R34 * Y4 / 256 + R33				

Table 54: Register 34

Register	Function	Memory	Access	Default settings
34	**User scaling Gain A_W**	**EEPROM**	**R/W**	**0x0100**
16-bit unsigned integer User scaling is active if bit 1 is set in register 32. Y5 = R34 * Y4 / 256 + R33				

Table 55: Register 35

Register	Function	Memory	Access	Default settings
35	**User Underrange**	**EEPROM**	**R/W**	**0x8001**
16-bit signed integer The measured value Y5 is compared to this limit and the comparison result entered in status byte Sx in bit 2, see Status Byte Description. The resolution / LSB is in accordance with the respective process value.				

Table 56: Register 36

Register	Function	Memory	Access	Default settings
36	**User Overrange**	**EEPROM**	**R/W**	**0x7FFF**
The measured value Y5 is compared to this limit and the comparison result entered in status byte Sx in bit 3, see Status Byte Description. The resolution / LSB is in accordance with the respective process value.				

Table 57: Register 37

Register	Function	Memory	Access	Default settings
37	**Coefficients Mean value filter**	**EEPROM**	**R/W**	**0x0003**
16-bit unsigned integer Acceptable value range 2, 3 and 4. Coefficients for the mean value filter before calculation of Y1. Bit 7 of the Feature register can be used to switch ON/OFF mean value filtering. Filtering is enabled immediately after determining the measured resistance value on the sensor input. The number of measured values averaged is indicated in register 37 and can be configured via WAGO-I/O-*CHECK*. Possible values are 2 and 3 (possibly 4). Mean value filtering is switched off by default (i.e. bit 7 = 0). The default value for register 37 is 0x0003, i.e. when filtering is active the mean value from the last 3 measured values is output. The mean value filter is only enabled if the determined resistance value of the sensor does not fall below or exceed the previously determined value by 24 mOhm. Otherwise, it is not averaged and the current measured value is used as the baseline for the next (possible) filtering.				

Table 58: Register 39

Register	Function	Memory	Access	Default settings
39	**User calibration Offset**	**EEPROM**	**R/W**	**0x0000**
16-bit unsigned integer In 2-wire mode, the measured resistance is reduced by the value specified in register 22. The resolution is 1/256. The calibration value is entered to eliminate the internal line or coil resistance.				

Table 59: Register 40

Register	Function	Memory	Access	Default settings
40	**User calibration Gain**	**EEPROM**	**R/W**	**0x4000**
16-bit unsigned integer Gain for calibration of the 1000 Ohm reference resistance at a resolution of 1/16384.				

Table 60: Register 47

Register	Function	Memory	Access	Default settings
47	**Advanced settings**	**EEPROM**	**R/W**	**0x0000**
Bit 0: Number of channels				
0*)	4 channels			
1	2 channels			
Bit 1 … 7: reserved				
0*)	These bits are reserved and may not be changed.			
Bit 8, 9: Interference frequency suppression				
0*)	50 Hz			
1	60 Hz			
2	50/60 Hz			
3	Illegal			
Bit 10 … 15: reserved				
0*)	These bits are reserved and may not be changed.			

*) Default settings

7.1.2 Control and Status Bytes for Register Communication

The following tables show the assignment of the control and status bytes for register communication.

With the bits 0 ... 5 and 7 in the respective status byte, the register communication is acknowledged by the I/O module.

Table 61: Control Byte C0 for Register Communication

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reg_Com	R/W	Register number					

Register number	Register number of the selected function (cf. “Register Assignment” section)	
R/W	0:	Read access
	1:	Write access
Reg_Com	1:	Register Communication

Table 62: Status Byte S0 for Register Communication

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reg_Com	R/W	Register number					

Register number	Register number of the selected function (cf. “Register Assignment” section) mirrored from control byte C0	
R/W	0:	Read access (acknowledgement)
Reg_Com	1:	Register communication, mirrored from control byte C0

Table 63: Control Byte C1 for Register Communication

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reg_Com	R/W	Register number					

Register number	Register number of the selected function (cf. “Register Assignment” section)	
R/W	0:	Read access
	1:	Write access
Reg_Com	1:	Register communication

Table 64: Status Byte S1 for Register Communication

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reg_Com	R/W	Register number					

Register number	Register number of the selected function (cf. “Register Assignment” section), mirrored from control byte C1	
R/W	0:	Read access (acknowledgement)
Reg_Com	1:	Register communication, mirrored from control byte C1

Table 65: Control Byte C2 for Register Communication

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reg_Com	R/W	Register number					

Register number	Register number of the selected function (cf. “Register Assignment” section)	
R/W	0:	Read access
	1:	Write access
Reg_Com	1:	Register communication

Table 66: Status Byte S2 for Register Communication

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reg_Com	R/W	Register number					

Register number	Register number of the selected function (cf. “Register Assignment” section), mirrored from control byte C2	
R/W	0:	Read access (acknowledgement)
Reg_Com	1:	Register communication, mirrored from control byte C2

Table 67: Control Byte C3 for Register Communication

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reg_Com	R/W	Register number					

Register number	Register number of the selected function (cf. “Register Assignment” section)	
R/W	0:	Read access
	1:	Write access
Reg_Com	1:	Register communication

Table 68: Status Byte S3 for Register Communication

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reg_Com	R/W	Register number					

Register number	Register number of the selected function (cf. “Register Assignment” section), mirrored from control byte C3	
R/W	0:	Read access (acknowledgement)
Reg_Com	1:	Register communication, mirrored from control byte C3

7.2 Setting Parameters via Parameter Channel

7.2.1 Introduction

A common data channel between the application and the I/O module is used to exchange parameter sets acyclically and have them checked by the complex I/O module. In order to access the channel via all available interfaces of a fieldbus coupler/controller, the parameter channel is mapped to the existing register model. Currently, the parameter channel can be operated with the following interfaces:

- via the control/status byte during the process data exchange
- via the 2-byte process data interface (SPS interface)
- via the parameter exchange for the corresponding fieldbus systems (e.g. PROFIBUS-DP/DP-V1)
- via the asynchronous serial interface of the fieldbus coupler/controller (e.g., for WAGO-I/O-*CHECK*, WAGO-I/O-*PRO*).

The parameter channel is mapped via registers 56 and 57 of the corresponding table or the corresponding channel. The parameter data is stored word by word in register 56, communication control is done via register 57. The structure for registers 56 and 57 is described in the following sections.

7.2.2 Structure of the Registers

7.2.2.1 Parameter Data (Register 56)

Register 56 contains the parameter data to be read or written. Depending on the access type, either the I/O module (read parameters) or the fieldbus coupler/controller (write parameters) will write data to the register.

Table 69: Parameter Data (Register 56)

Bit	**7**	**6**	**6**	**4**	**3**	**2**	**1**	**0**
Parameter	PRM 7	PRM 6	PRM 5	PRM 4	PRM 3	PRM 2	PRM 1	PRM 0
Bit	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**
Parameter	PRM 15	PRM 14	PRM 13	PRM 12	PRM 11	PRM 10	PRM 9	PRM 8
PRM0 ... PRM15	Parameter data bit 0 to bit 15							

7.2.2.2 Communication Control (Register 57)

Parameter channel control and diagnostics are done via register 57.

Table 70: Communication Control (Register 57)

Bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Request parameter	A7	A6	A5	A4	A3	A2	A1	A0
Response parameter	A7	A6	A5	A4	A3	A2	A1	A0
Bit	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**
Request parameter	TGL_ MS	PRM_ RW	MORE _PRM	RES	RES	RES	RES	RES
Response parameter	TGL_ SM	TIME OUT	BUF_ OVF	PRM_ ERR	PRM_ UPD	SR_ LEN_ UPD	RES	RES
Request parameter	Information is written by the application and read by the I/O module							
Response parameter	Information is written by the I/O module and read by the application							

Table 71: Communication Control Parameters

Parameter	**Value range**	**Meaning**
A0 … A7	0...255	Word address of the parameter to be read / to be written.
TGL_MS	FALSE, TRUE	Toggle bit to release new instructions from the application to the module. If TGL_SM and TGL_MS have the same status, no new instruction has been released yet. If the flags have different statuses, a new instruction has been released and is currently being processed.
PRM_RW	FALSE	Parameter data of A7 ... A0 are read
	TRUE	Parameter data are written to A7 ... A0
MORE_PRM	FALSE	End of parameter transmission
	TRUE	More parameter data to follow
TGL_SM	FALSE, TRUE	Toggle bit indicating that a parameter sent by the module has been transferred. If TGL_SM and TGL_MS have different statuses, the corresponding instruction is processed by the module. If both flags have the same status, the instruction for the parameter that was sent or requested is completed.

Table 71: Communication Control Parameters

Parameter	Value range	Meaning
TIMEOUT	FALSE	The transmission of the parameters has been completed within the stipulated time (parameter address 0).
	TRUE	The maximum time for the transmission of the parameters between I/O module and application was exceeded.
BUF_OVF	FALSE	Access to the write or read buffer of the I/O module was permitted.
	TRUE	Parameters outside of the write or read buffer were accessed.
PRM_ERR	FALSE	The parameter/all parameters previously transmitted are valid.
	TRUE	At least one transmitted parameter was defective. The flag can either be set after each parameter that is received or after the transmission of the parameters is completed.
PRM_UPD	FALSE	No change in module´s individual parameter data set.
	TRUE	Module's individual parameter data set has been changed. A respective iPar-Server request is to be initiated by the PROFIBUS/PROFINET coupler/controller.
SR_LEN_UPD	FALSE	No change in module´s local bus shift register size.
	TRUE	Module´s local bus shift register size will be changed. The initiation of a local bus reset sequence is necessary.
RES	FALSE	Reserved for expansions

7.2.3 Parameter Sets

For use of the parameter channel, parameter sets are defined and indexed using parameter addresses (A7 ... A0). Module-specific parameters (parameters 0 through 249) and general system parameters (parameters 250 through 255) are differentiated.

7.2.3.1 General Parameter Data (System Parameter Range)

The following addresses are defined to access the system parameters of the I/O modules:

Table 72: System Parameters

Address	Mode	Parameter	Description
250 ... 253	R/W	RESERVED	Reserved for expansions
254	R/W	TIMEOUT	This parameter contains the maximum permissible time in milliseconds that can elapse for the transfer of the parameter set. If TIMEOUT = 0, the monitoring time is infinite.
255	R	NO_OF_PRMS	Number of words (parameter data) of the I/O module.
	W	SET_DEFAULT_PRMS	The I/O module is reset to the default setting.

7.2.3.2 I/O Module-Specific Parameter Data

The following addresses are defined for access to the specific parameter data of the I/O module:

Table 73: Parameter Channel Address 0

Parameter channel address	Register	Memory	Access	Default settings
0	**32 (proportionate)**	**EEPROM**	**R/W**	**0x0000**
Bit 0: 2/4-channel switching				
0*)	4-channel operation is switched on.			
1	2-channel operation is switched on.			
Bit 1: 2/3-wire switching channel 1				
0*)	2-wire operation for channel 1 is switched on.			
1	3-wire operation for channel 1 is switched on.			
Bit 2: 2/3-wire switching channel 2				
0*)	2-wire operation for channel 2 is switched on.			
1	3-wire operation for channel 2 is switched on.			
Bit 3: 2/3-wire switching channel 3				
0*)	2-wire operation for channel 3 is switched on.			
1	3-wire operation for channel 3 is switched on.			
Bit 4: 2/3-wire switching channel 4				
0*)	2-wire operation for channel 4 is switched on.			
1	3-wire operation for channel 4 is switched on.			
Bit 5 … 15: reserved				
0*	These bits are reserved and may not be changed.			

*) Default settings

Table 74: Parameter Channel Address 1

Parameter channel address	Register	Memory	Access	Default settings
1	**32 (proportionate)**	**EEPROM**	**R/W**	**0x0000**
Bit 0 … 3: Sensor type channel 1				
0 … 15	See registration assignment, register 32, bit 12 … 15			
Bit 4 … 7: Sensor type channel 2				
0 … 15	See registration assignment, register 32, bit 12 … 15			
Bit 8 … 11: Sensor type channel 3				
0 … 15	See registration assignment, register 32, bit 12 … 15			
Bit 12 … 15: Sensor type channel 4				
0 … 15	See registration assignment, register 32, bit 12 … 15			

Table 75: Parameter Channel Address 16 … 142

	Parameter channel address			
Register	**Channel 1**	**Channel 2**	**Channel 3**	**Channel 4**
32	16	56	96	136
33	17	57	97	137
34	18	58	98	138
35	19	59	99	139
36	20	60	100	140
39	21	61	101	141
40	22	62	102	142

7.2.4 Parameter Transmission Process

Parameter data are exchanged between application and bus modules by means of the Request-Response process. The application initiates an order with the help of the toggle bit (TGL_MS != TGL_SM). The communications control register (R57) then polls the module until the latter acknowledges the execution of the order (TGL_SM == TGL_MS).

The possible orders to the parameterizing interface of the bus module are listed in the following.

7.2.4.1 Determining the Maximum I/O Module Parameter Data (System Parameters)

Request (Application)

Table 76: Determining the Maximum Bus Module Parameter Data (Request)

Parameter	Value	Meaning
TGL_MS	!= TGL_SM	Initiate order
PRM_RW	= FALSE	Read access
A0 ... A7	255	Address of parameter data length

Response (I/O module)

Table 77: Determining the Maximum Bus Module Parameter Data (Response)

Parameter	Value	Meaning
TGL_SM	== TGL_MS	Order executed
A0 ... A7	255	Address of parameter data length mirrored
PRM0 ... PRM15	N	Number of parameters in the address range 0 ... (n-1), n ∈ {N < 250}

7.2.4.2 Restoring Factory Settings (System Parameters)

Request (Application)

Table 78: Restoring Factory Settings (Request)

Parameter	Value	Meaning
TGL_MS	!= TGL_SM	Initiate order
PRM_RW	= TRUE	Write access
A0 ... A7	255	Address of factory settings

Response (I/O module)

Table 79: Restoring Factory Settings (Response)

Parameter	Value	Meaning
TGL_SM	== TGL_MS	Order executed
A0 ... A7	255	Address of factory settings mirrored

7.2.4.3 Reading/Writing Parameters (I/O Module-Specific)

Request (Application)

Table 80: Reading/Writing Parameters (Request)

Parameter	Value	Meaning
TGL_MS	!= TGL_SM	Initiate order
PRM_RW	= FALSE	Read access
	= TRUE	Write access
MORE_PRM	= FALSE	The transmission of the parameter data is terminated with the currently transmitted parameter.
	= TRUE	Further parameter data are to follow.
A0 ... A7	0 ... (n-1)	Address of parameter data
PRM0 ... PRM15	0 ... 65535	Parameter data for write access

Response (I/O module)

Table 81: Reading/Writing Parameters (Response)

Parameter	Value	Meaning
TGL_SM	== TGL_MS	Order executed
A0 ... A7	0 ... (n-1)	Address of parameter data mirrored
TIMEOUT	FALSE, TRUE	Monitoring time expired
BUF_OFL	FALSE, TRUE	Access outside the module parameter range
PRM_ERR	FALSE, TRUE	Parameter/parameter set error
PRM0 ... PRM15	0 ... 65535	Parameter data for read access

Errors when exchanging parameter data are reported by the module in the error flags TIMEOUT, BUF_OV and PRM_ERR.

When the last parameter has been transferred to the module (MORE_PRM = FALSE), the entire parameter set is checked by the module and accepted if correct. Otherwise, the module returns a parameterizing error (PRM_ERR = TRUE).

7.3 Parameterization with WAGO-I/O-*CHECK*

7.3.1 Configuration Dialog for the 2/4-Channel Input Module for Resistance Sensors 750-464(/xxx-xxx)

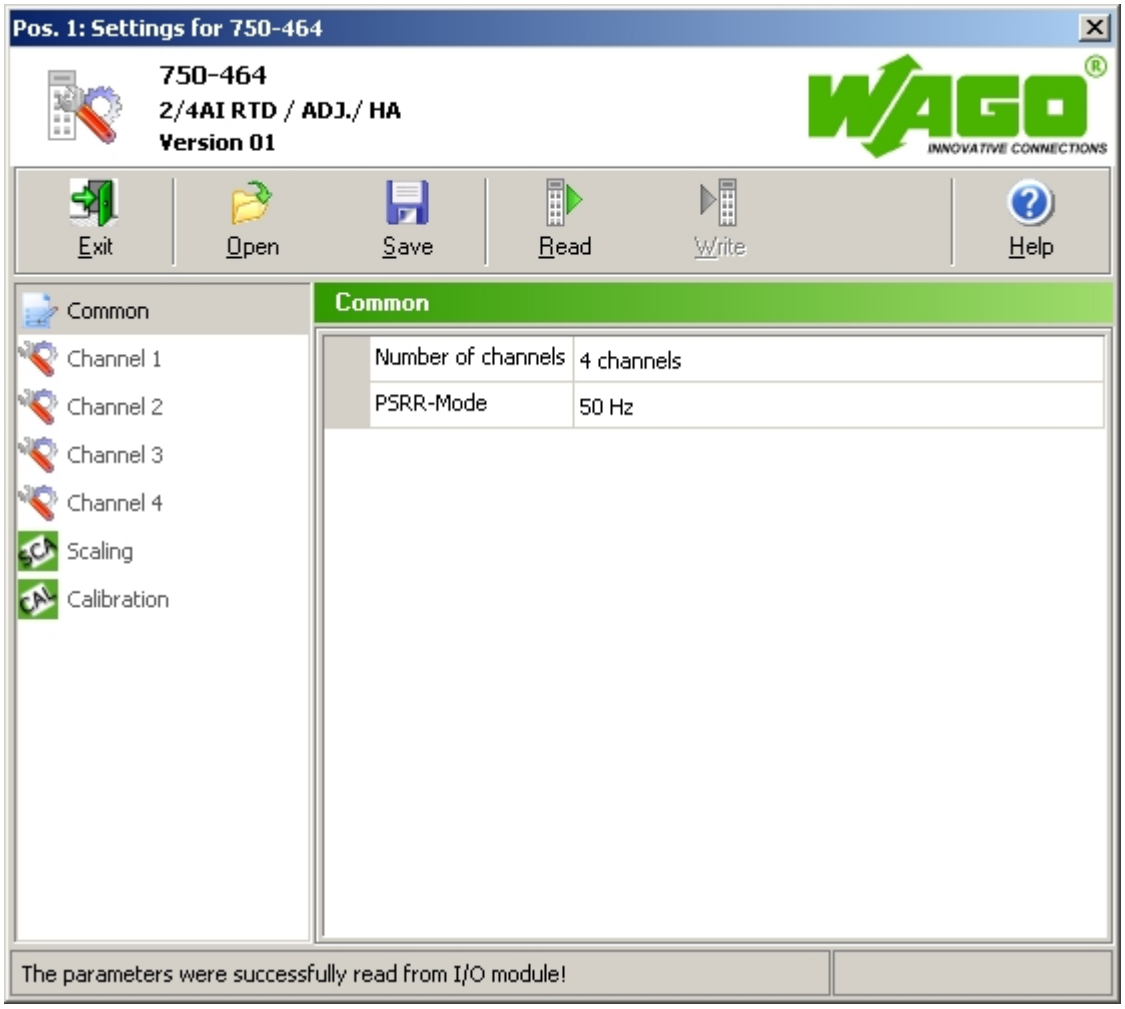


Figure 14: General Dialog

The parameter dialog is divided into the following areas:

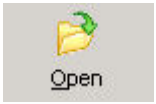
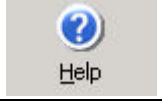
- Title bar with position and item number of the selected I/O module
- Information area including item number, name as well as version number and version date of the I/O module
- Toolbar
- Navigation area
- Parameter range (selectable via navigation between general settings, channel settings, calibration and scaling)
- Status bar

7.3.2 Toolbar on the Configuration Dialog

The toolbar contains the following buttons:

Figure 15: Toolbar

Table 82: Toolbar

Button	Function	Description
	[Exit]	Closes the configuration dialog.
	Open	Opens an existing parameterization file. WAGO-I/O-*CHECK* displays the default dialog for opening files.
	Save	Saves the current parameter in a parameter file. WAGO-I/O-*CHECK* displays the default dialog for saving files.
	Reading	Reads the current parameters of the selected module.
	Write	Writes the current parameters to the selected module.
	Default	Resets the selected module to the WAGO default settings.
	Help	Opens the WAGO-I/O-*CHECK* online help.

7.3.3 Navigation area

The navigation area contains the following buttons:

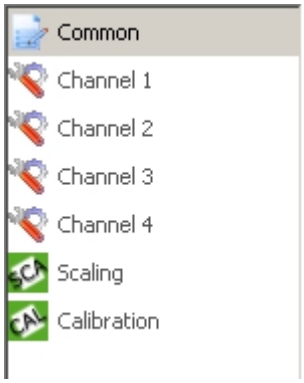


Figure 16: Navigation

Press one of the buttons to display the corresponding parameters:

Table 83: Navigation

Button	Function	Description
Common	General	Opens a page with parameters for general settings
Channel 1	Channel 1	Opens a page with parameters for channel 1 settings
Channel 2	Channel 2	Opens a page with parameters for channel 2 settings
Channel 3	Channel 3	Opens a page with parameters for channel 3 settings. This button is only available if the operating mode of the I/O module is set to "4-channel".
Channel 4	Channel 4	Opens a page with parameters for channel 4 settings. This button is only available if the operating mode of the I/O module is set to "4-channel".
Scaling	Scaling	Opens a page for the scaling settings for channel 1 … 2 (4).
Calibration	Calibration	Opens a page for the calibration settings for channel 1 … 4. This button is only available if the operating mode of the I/O module is set to "4-channel".

7.3.3.1 General

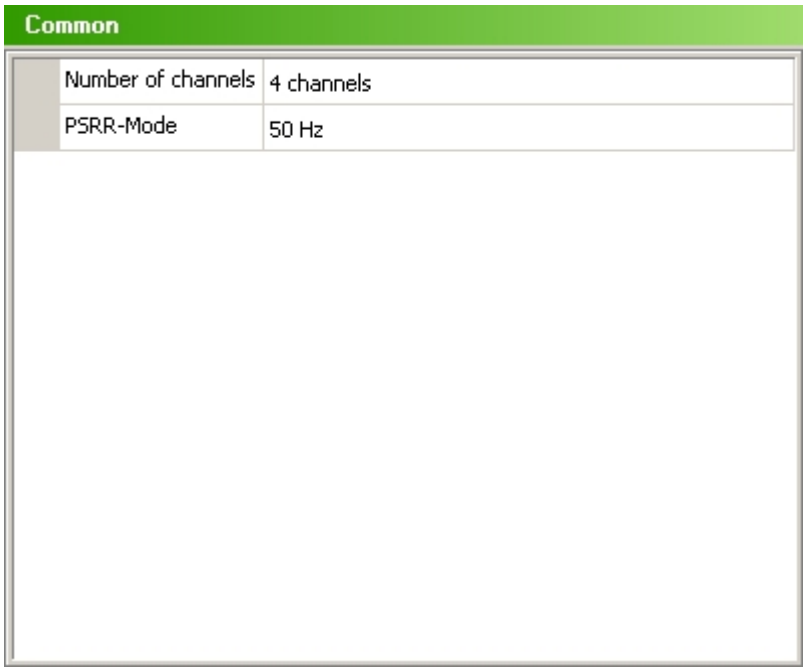


Figure 17: "General" Parameters

The following selection boxes are displayed in tabular form:

Table 84: "General" Parameters

Selection box	Settings
Channel qty	2 channels
	4 channels
PSSR mode	50 Hz
	60 Hz
	50/60 Hz

7.3.3.2 Channels

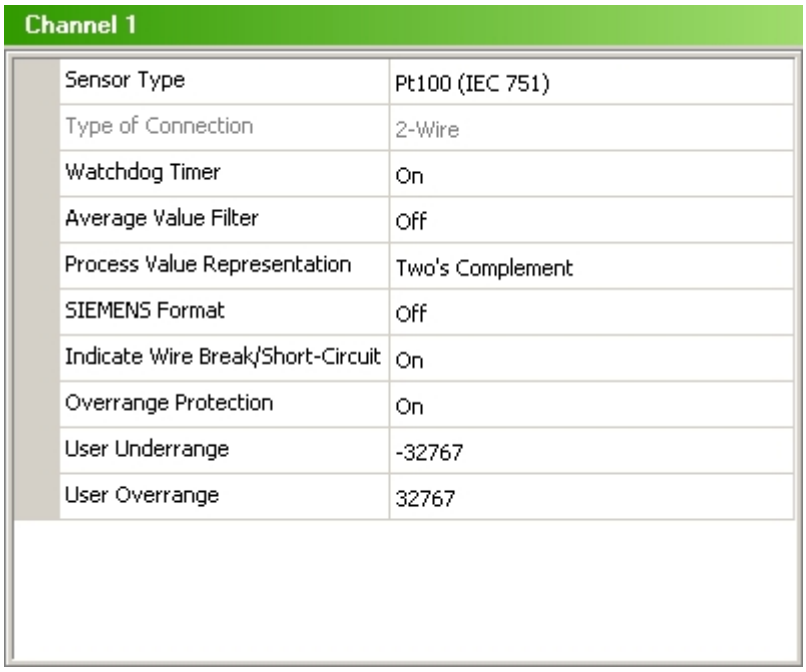


Figure 18: "Channel" Parameters

The following selection boxes are displayed in tabular form:

Table 85: "Channel" Parameters

Selection box	Possible settings	
Sensor type (750-464/xxx-xxx)	Pt100 (IEC 751)*), Ni100 (DIN 43760), Pt1000 (IEC 751), Pt500 (IEC 751), Pt200 (IEC 751), Ni1000 (DIN 43760), Ni120 (Minco), Ni1000 (TK 5000), Potentiometer, Resistance measurement 10 Ω … 5000 Ω, Resistance measurement 10 Ω … 1200 Ω	
Sensor type (750-464/000-020)	NTC 10 kΩ*), NTC 20 kΩ, NTC-Thermokon 10 kΩ	
Connection type	2-wire	2-wire connection technology
	3-wire	3-wire connection technology (not for 750-464/xxx-xxx in operating mode "4-channel" not for 750-464/000-020)
Watchdog Timer	Off	The Watchdog timer is not active. The green LEDs illuminate continuously.
	On*)	The Watchdog timer is active. If no process data is exchange with the bus coupler for 100 ms, the green LEDs go out.
Mean value filter	Off	The mean value filter is switched off.
	On	The mean value filter is switched on. To reduce the digital noise, the I/O module uses a software-based mean value filter (median filter). A resistance value is assumed to be constant if the voltage drop considered for the measurement differs by less than the specific (very small) value by the resistance applied in the circuit. It is recommended to always leave the mean value filter on for each channel.
Process Data Representation	2nd complement	Two's complement representation
	Amount/ leading sign	Representation as an amount with leading sign

Table 85: "Channel" Parameters

Selection box	Possible settings	
SIEMENS Format	Off*)	No display of status indicators
	On	Display of status indicators in the bottom three bits: Bit 0: Overflow. Set for Overrange/Underrange (if "Overflow Limit" is active). Bit 1: Error. Set for wire break/short circuit (if "Indicate wire break/short circuit" is active). Bit 2: Always 0
	 **Note** **Important Note!** If SIEMENS format is ON, the "Manufacturer scaling" setting is not taken into account!	
Indicate wire break/short circuit	Off	A wire break or short circuit is not indicated in the status byte.
	On	A wire break or short circuit is indicated in the status byte. The setting has no impact on the process data representation. The process value is always saturated on the respective resistance limits of the sensor type set.
	 **Note** **Important Note!** The setting has no impact on the process data representation. The process value is always saturated on the respective resistance limits of the sensor type set. (Principle: "Analog measuring instrument").	
Overflow Limit	Off	A measuring range overrange/underrange is not indicated in the status byte.
	On	A measuring range overrange/underrange is indicated in the status byte. The setting has no impact on the process data representation. The process value is always saturated on the respective resistance limits of the sensor type set.

Table 85: "Channel" Parameters

Selection box	Possible settings
	Note **Important Note!** The setting has no impact on the process data representation. The process value is always saturated on the respective resistance limits of the sensor type set. (Principle: "Analog measuring instrument").
Underrange	At these points, the user can define limits, which will result in setting the corresponding bits in the status byte (see section "Control / status byte") in the event of an underrange or overrange. The selected decimal value always refers to the final output process value. As delivered, the limits for the underrange/overrange are selected, so that they cannot be exceeded. The function is thereby virtually deactivated.
Range exceeded	At these points, the user can define limits, which will result in setting the corresponding bits in the status byte (see section "Control / status byte") in the event of an underrange or overrange. The selected decimal value always refers to the final output process value. As delivered, the limits for the underrange/overrange are selected, so that they cannot be exceeded. The function is thereby virtually deactivated.
	*) Default setting

7.3.3.3 Calibration

Note

Calibration in "4-channel mode" only!
The module can only be calibrated depending on the topology in "4-channel mode"!

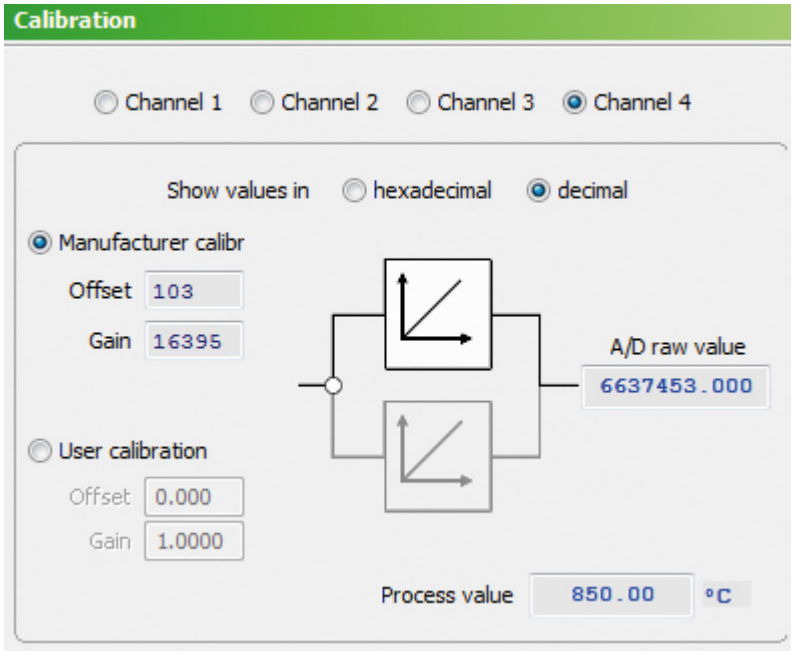


Figure 19: Calibration Dialog

To select the respective channel, select the **[Channel 1]** … **[Channel 4]** radio button.

To enter the value in hexadecimal format, select the **[hexadecimal]** radio button.

To enter the value in decimal format, select the **[decimal]** radio button.

To select the **Offset** and **Gain** factory setting, select the **[Manufacturer Calibration]** radio button.

To enter your settings in the **Offset** and **Gain** fields, select the **[User Calibration]** radio button.

The corresponding value appears in the **A/D raw value** field.

The value appears in °C in the **Process value** field.

The measuring circuits can be calibrated independently in the same way.

Note

Calibration independent of sensor type!
Any sensor type selected can be calibrated independently!

Note

Use resistance decade boxes for calibration!
For best possible calibration of the module, use resistors or resistance decade boxes that are a accurate as possible, i.e. exhibit low tolerance. Otherwise, the measuring accuracy specified in the data sheet may not be achieved!

7.3.3.4 Scaling

The settings in the Scaling dialog have a direct impact on the process value. Scaling is carried out for each channel and is saved permanently, i.e. available after restarting the node.

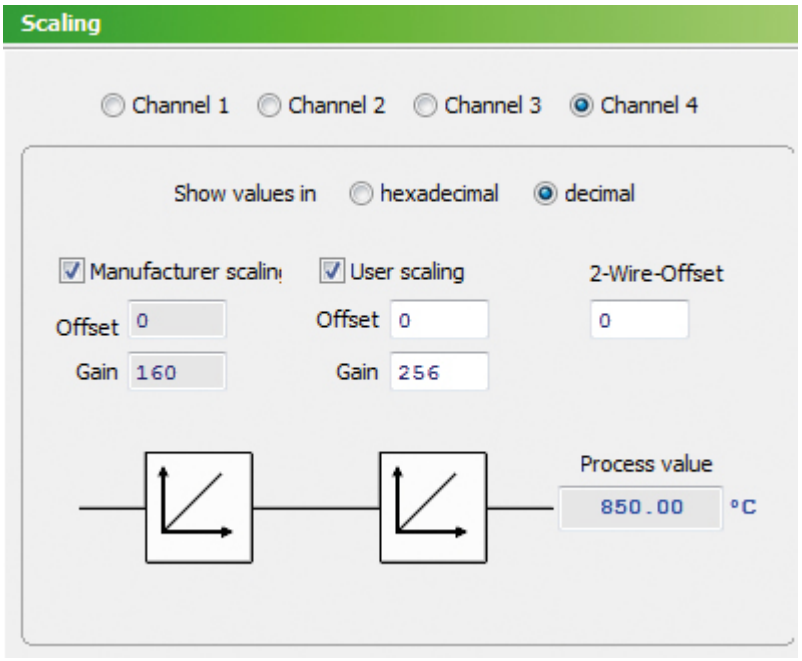


Figure 20: Scaling Parameters

To select the process value for the respective channel, select the **[Channel 1]** … **[Channel (2) 4]** radio button.

To display the value in hexadecimal format, select the **[hexadecimal]** radio button.

To display the value in decimal format, select the **[decimal]** radio button.

To switch on manufacturer scaling, select the **[Manufacturer scaling]** radio button. When manufacturer scaling is ON, the process value appears scaled in 1/10 °C or Ohm per digit. When manufacturer scaling is OFF, the process value appears scaled 1/16 °C or Ohm per digit.
For sensor types with ineffective manufacturer scaling (resistance … 5 kOhm), the process value appears scaled in 0.5 Ohm per digit.

To switch on user scaling, select the **[User scaling]** radio button. When user scaling is ON, the signal charge can be viewed immediately after the manufacturer scaling. The **Offset** and **Gain** fields involve linearization according to the formula of a linear equation:

$$f(x) = mx+b$$

Where:

m = Gain [1/256 per digit, data type: unsigned integer],

x = Resistance or temperature value

b = Offset

If connection type "2-wire" is set in the **2-wire offset** field for a connected resistance/temperature sensor, the line resistance of the sensor has a direct impact on the measurement results and can this distort it. The line resistance can be entered here in 1/256 Ohm resistance per digit. This is then always subtracted from the measurement results.

8 Diagnostics

8.1 Behavior in the Event of an Error

The behavior in the event of an error depends on the configuration of the wire break/short circuit monitoring and the underrange/overrange monitoring.

Table 86: Behavior in the Event of an Error Dependent on the Configuration

Configuration		Behavior for range violation	Behavior for wire break/ short circuit
Wire break/ short circuit monitoring	**Underrange/ overrange monitoring**		
Off	Off	Process value is saturated, no change in statues byte, error LED on	Process value is saturated, no change in statues byte, error LED on
Off	On	Process value is saturated, error bit (bit 0: Underrange or bit 1: Overrange), Gen. error (bit 6) is set, error LED on	Process value is saturated, error bit (bit 0: Underrange for short circuit or bit 1: Overrange for wire break), Gen. error (bit 6) is set, error LED on
On	Off	Process value is saturated, no change in statues byte, error LED on	Process value is saturated, error bit (bit 4 for short circuit or bit 5 for wire break) is set, Gen. error (bit 6) is set, error LED on
On	On	Process value is saturated, error bit (bit 0: Underrange or bit 1: Overrange), Gen. error (bit 6) is set, error LED on	Process value is saturated, error bits (bit 0 and bit 4 for short circuit or bit 1 and bit 5 for wire break) is set, Gen. error (bit 6) is set, error LED on

The limits for detecting an underrange/overrange or a short circuit or wire break and the output process values are specified in the process image tables.

9 Use in Hazardous Environments

The **WAGO I/O SYSTEM 750** (electrical equipment) is designed for use in Zone 2 hazardous areas and shall be used in accordance with the marking and installation regulations.

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.

9.1 Marking Configuration Examples

9.1.1 Marking for Europe According to ATEX and IECEx

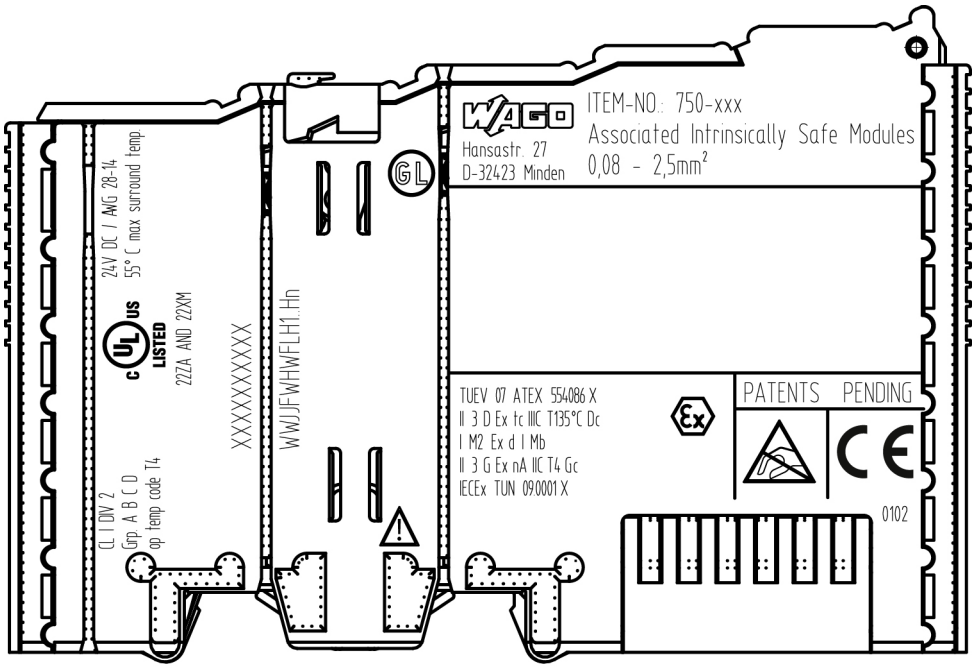


Figure 21: Marking Example According to ATEX and IECEx

TUEV 07 ATEX 554086 X
II 3 D Ex tc IIIC T135°C Dc
I M2 Ex d I Mb
II 3 G Ex nA IIC T4 Gc
IECEx TUN 09.0001 X

Figure 22: Text Detail – Marking Example According to ATEX and IECEx

Table 87: 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)

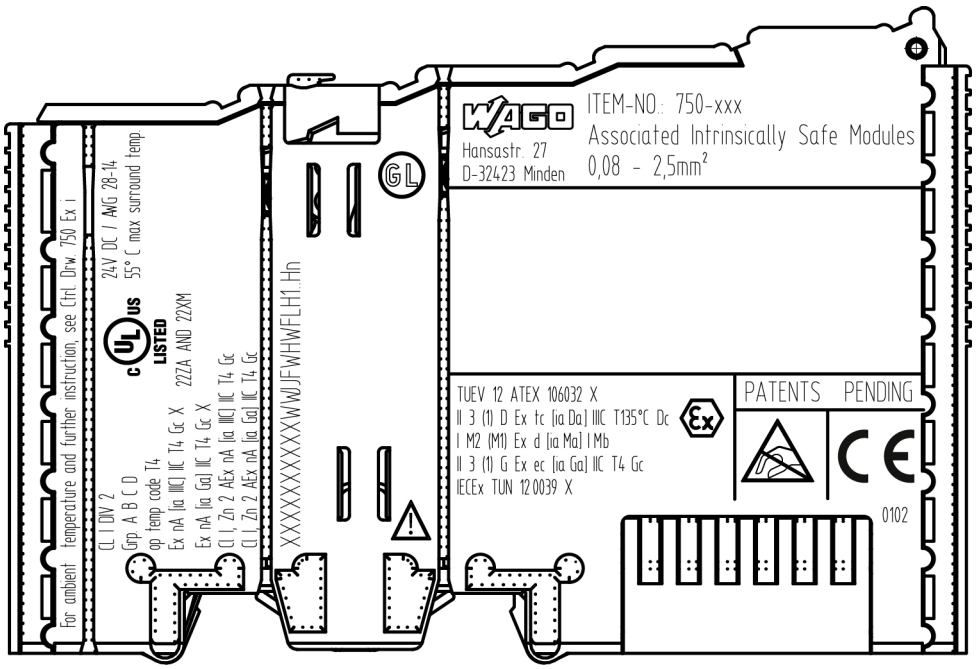


Figure 23: Marking Example for Approved Ex i I/O Module According to ATEX and IECEx

TUEV 12 ATEX 106032 X
II 3 (1) D Ex tc [ia Da] IIIC T135°C Dc
I M2 (M1) Ex d [ia Ma] I Mb
II 3 (1) G Ex ec [ia Ga] IIC T4 Gc
IECEx TUN 12 0039 X

Figure 24: Text Detail – Marking Example for Approved Ex i I/O Module According to ATEX and IECEx

Table 88: 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)

9.1.2 Marking for the United States of America (NEC) and Canada (CEC)

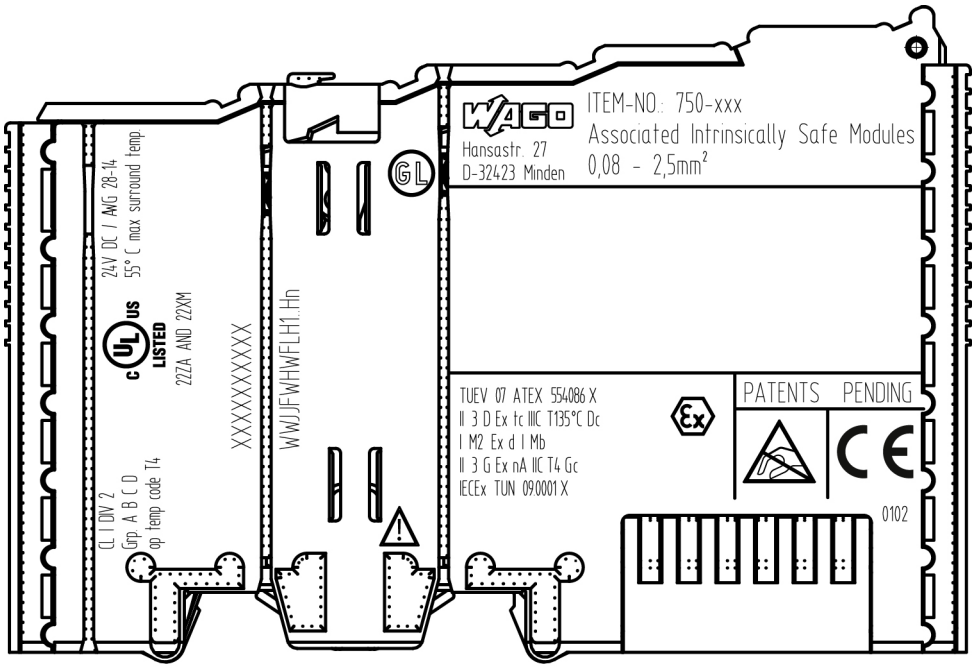


Figure 25: Marking Example According to NEC

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

Figure 26: Text Detail – Marking Example According to NEC 500

Table 89: 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 27: Text Detail – Marking Example for Approved Ex i I/O Module According to NEC 505

Table 90: Description of Marking Example for Approved Ex i I/O Module According to NEC 505

Marking	Description
Cl 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 28: Text Detail – Marking Example for Approved Ex i I/O Module According to NEC 506

Table 91: Description of Marking Example for Approved Ex i I/O Modules According to NEC 506

Marking	Description
Cl 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 29: Text Detail – Marking Example for Approved Ex i I/O Modules According to CEC 18 attachment J

Table 92: 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

9.2 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.

9.2.1 Special Notes including 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.

9.2.2 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.

List of Figures

List of Tables

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