

WAGO SYSTEM 750

Fieldbus Independent I/O Modules

**2 AI DC ± 10 V, Differential Inputs
750-456**



Manual

Version 1.0.2

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Every conceivable measure has been taken to ensure the correctness and completeness of this documentation. However, as errors can never be fully excluded, we would appreciate any information or ideas at any time.

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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 trademark or patent protected.

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1 Important Comments

To ensure fast installation and start-up of the units described in this manual, we strongly recommend that the following information and explanations are carefully read and abided by.

1.1 Legal Principles

1.1.1 Copyright

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1.1.2 Personnel Qualification

The use of the product detailed in this manual is exclusively geared to specialists having qualifications in PLC programming, electrical specialists or persons instructed by electrical specialists who are also familiar with the valid standards. WAGO Kontakttechnik GmbH & Co. KG declines all liability resulting from improper action and damage to WAGO products and third party products due to non-observance of the information contained in this manual.

1.1.3 Intended Use

For each individual application, the components supplied are to work with a dedicated hardware and software configuration. Modifications are only permitted within the framework of the possibilities documented in the manuals. All other changes to the hardware and/or software and the non-conforming use of the components entail the exclusion of liability on part of WAGO Kontakttechnik GmbH & Co. KG.

Please direct any requirements pertaining to a modified and/or new hardware or software configuration directly to WAGO Kontakttechnik GmbH & Co. KG.

1.2 Symbols



Danger

Always abide by this information to protect persons from injury.



Warning

Always abide by this information to prevent damage to the device.



Attention

Marginal conditions must always be observed to ensure smooth operation.



ESD (Electrostatic Discharge)

Warning of damage to the components by electrostatic discharge. Observe the precautionary measure for handling components at risk.



Note

Routines or advice for efficient use of the device and software optimization.



More information

References on additional literature, manuals, data sheets and INTERNET pages

1.3 Number Notation

Number Code	Example	Note
Decimal	100	normal notation
Hexadecimal	0x64	C notation
Binary	'100' '0110.0100'	Within ' Nibble separated with dots

1.4 Safety Notes



Warning

Switch off the system prior to working on bus modules!

In the event of deformed contacts, the module in question is to be replaced, as its functionality can no longer be ensured on a long-term basis.

The components are not resistant against materials having seeping and insulating properties. Belonging to this group of materials is: e.g. aerosols, silicones, triglycerides (found in some hand creams).

If it cannot be ruled out that these materials appear in the component environment, then additional measures are to be taken:

- installation of the components into an appropriate enclosure
 - handling of the components only with clean tools and materials.
-



Attention

Cleaning of soiled contacts may only be done with ethyl alcohol and leather cloths. Thereby, the ESD information is to be regarded.

Do not use any contact spray. The spray may impair the functioning of the contact area.

The WAGO-I/O-SYSTEM 750 and its components are an open system. It must only be assembled in housings, cabinets or in electrical operation rooms. Access must only be given via a key or tool to authorized qualified personnel.

The relevant valid and applicable standards and guidelines concerning the installation of switch boxes are to be observed.



ESD (Electrostatic Discharge)

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

1.5 Scope

This manual describes the Analog Input Module 750-456
2 AI DC ± 10 V, Differential Inputs of the modular WAGO-I/O-SYSTEM 750.

Handling, assembly and start-up are described in the manual of the Fieldbus Coupler. Therefore this documentation is valid only in the connection with the appropriate manual.

2 I/O Modules

2.1 Analog Input Modules

2.1.1 750-456 [2 AI DC ± 10 V, Differential Inputs]

2-Channel Analog Input Module (DC ± 10 V, differential inputs)

2.1.1.1 View

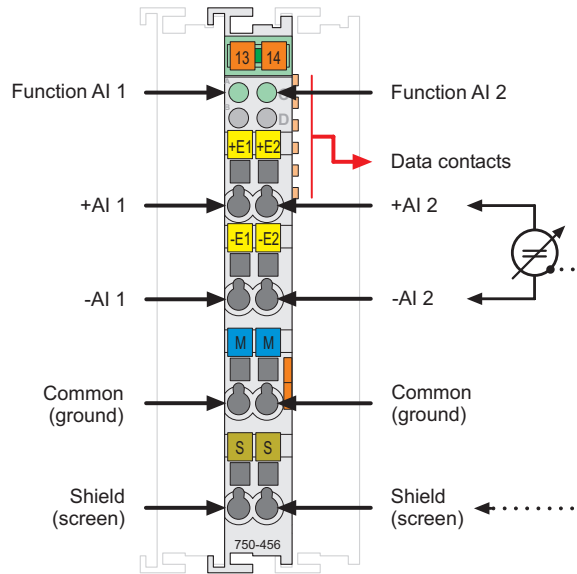


Fig. 2.1.1-1: 2-Channel Analog Input Module 750-456

g045600e

2.1.1.2 Variations

Item-No.	Designation	Description
750-456	2 AI (± 10 V) differential inputs	2-Channel Analog Input Module, ± 10 V, differential inputs
750-456/000-200	2 AI (± 10 V) differential inputs with Siemens (S5-FB 250)	2-Channel Analog Input Module, ± 10 V, differential inputs, adapted data format for S5-control systems with the use of function block FB 250

2.1.1.3 Description

This analog input module and its variations receives signals with standardized values of ± 10 V.

The module has two differential input channels and can receive differential signals via the connections +AI 1 and -AI 1 or +AI 2 and -AI 2. The input channels of a module have a common ground and a shield (screen) connection (S). The Shield (screen) is directly connected to the DIN rail. A capacitive connection is made automatically when snapped onto the DIN rail.

The input signal of each channel is electrically isolated and will be transmitted with a resolution of 12 bits.

The operational readiness and the trouble-free internal data bus communication of the channels are indicated via a green function LED.

Any configuration of the input modules is possible when designing the fieldbus node. Grouping of module types is not necessary

The voltage supply is done via system voltage.



Attention

This module has no power contacts. For field supply to downstream I/O modules, a supply module will be needed.

The analog input module 750-456 and its variations can be used with all couplers/controllers of the WAGO-I/O-SYSTEM 750 (except for the economy types 750-320, -323, -324 and -327).

2.1.1.4 Display Elements

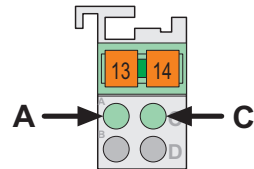


Fig. 2.1.1-2: Display Elements g046702x

LED	Channel	Meaning	State	Function
A green	1	Function AI 1	off	No operational readiness or the internal data bus communication is interrupted
			on	Operational readiness and trouble-free internal data bus communication
C green	2	Function AI 2	off	No operational readiness or the internal data bus communication is interrupted
			on	Operational readiness and trouble-free internal data bus communication

2.1.1.5 Schematic Diagram

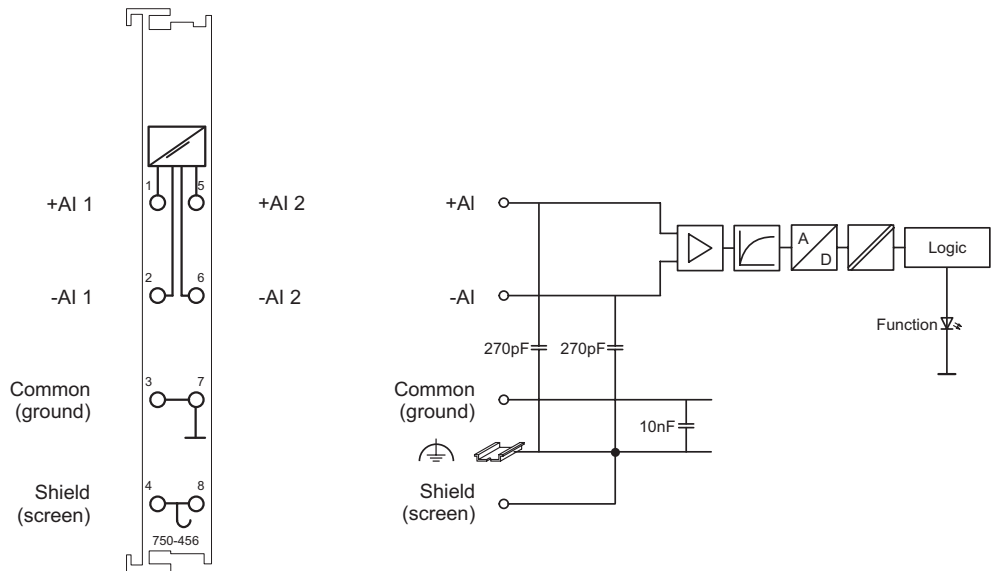


Fig. 2.1.1-3: 2-Channel Analog Input Module 750-456

g045601e

2.1.1.6 Technical Data

Module Specific Data	
Number of inputs	2
Voltage supply	via system voltage DC /DC
Current consumption _{typ.} (internal)	80 mA
Common mode voltage _{max.}	35 V
Signal current	± 10 V
Input resistance _{typ.}	570 k Ω
Resolution	12 bits
Conversion time _{typ.}	2 ms
Measuring error _{25°C}	$<\pm 0.2$ % of full scale value
Temperature coefficient	$<\pm 0.015$ % /K of full scale value
Isolation	500 V (Field/System)
Bit width	4 x 16 bits data 4 x 8 bits control/status (option)
Dimensions (mm) W x H x L	12 x 64* x 100 * from upper edge of 35 DIN rail
Weight	ca. 55 g
Standards and Regulations (cf. Chapter 2.2 of the Coupler/Controller Manual)	
EMC-Immunity to interference (CE)	acc. to EN 50082-2 (96)
EMC-Emission of interference (CE)	acc. to EN 50081-1 (93)
EMC-Immunity to interference (Ship building)	acc. to Germanischer Lloyd (01)
EMC-Emission of interference (Ship building)	acc. to Germanischer Lloyd (01)

Approvals (cf. Chapter 2.2 of the Coupler/Controller Manual)		
	cUL _{US} (UL508)	
	ABS (American Bureau of Shipping)	
	BV (Bureau Veritas) (applied for)	
	DNV (Det Norske Veritas)	Cl. B
	GL (Germanischer Lloyd)	Cat. A, B, C, D
	KR (Korean Register of Shipping)	
	LR (Lloyd's Register) (applied for)	Env. 1, 2, 3, 4
	NKK (Nippon Kaiji Kyokai)	
	cUL _{US} (UL1604)	Class I Div2 ABCD T4A
	KEMA	II 3 G EEx nA II T4
	Conformity Marking	



More Information

Detailed references to the approvals are listed in the document "Overview Approvals WAGO-I/O-SYSTEM 750", which you can find on the CD ROM ELECTRONICC Tools and Docs (Item-No.: 0888-0412)

or in the internet under:

www.wago.com → Documentation → WAGO-I/O-SYSTEM 750 → System Description

2.1.1.7 Process Image

The analog input module 750-456 and its variations transmit 16-bit measured values and 8 status bits per channel.

The digitalized measured value is transmitted in a data word (16 bits) as input byte 0 (low) and input byte 1 (high) into the process image of the coupler / controller.

This value is represented with a 12 bit resolution on bit B3 ... B14.

From the manufacturing number 3202XXXX onwards, the status information included in the three least significant bits (B0 ... B2) can be parsed in the event of an error. Bit B0 = 1 is set when the range of measurement is overranged. For modules having a previous manufacturing number, the last 3 bits are not parsed.

The manufacturing number is part of the lateral marking on the module enclosure.

Some fieldbus systems can process input channel status information by means of a status byte.

This status byte can be displayed using the starting tool WAGO-I/O-CHECK 2. However, the coupler / controller process operation is optional, which means that accessing or parsing the status information depends on the fieldbus system.



Attention

The representation of the process data of some fieldbus modules or their variations 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 of the process image of the corresponding coupler/controller.

2.1.1.7.1 Standard Data Format

For the standard module 750-456, the input voltage ranging from -10 V to +10 V is scaled on the numerical values ranging from 0x8000 to 0x7FF9.

Process values of Module 750-456					
Input voltage ± 10 V	Numerical value			Status- byte hex.	
	binary Measured value	*) X F Ü	hex.	dec.	
<-10.0	'1000.0000.0000.0	001'	0x8001	-32767	0x41
-10.0	'1000.0000.0000.0	000'	0x8000	-32768	0x00
-7.5	'1010.0000.0000.0	000'	0xA000	-24576	0x00
-5.0	'1100.0000.0000.0	000'	0xC000	-16384	0x00
-2.5	'1110.0000.0000.0	000'	0xE000	-8192	0x00
0.0	'0000.0000.0000.0	000'	0x0000	0	0x00
2.5	'0010.0000.0000.0	000'	0x2000	8192	0x00
5.0	'0100.0000.0000.0	000'	0x4000	16384	0x00
7.5	'0110.0000.0000.0	000'	0x6000	24576	0x00
10.0	'0111.1111.1111.1	000'	0x7FF8	32760	0x00
>10.0	'0111.1111.1111.1	001'	0x7FF9	32761	0x42

*) status bits: X = not used, F = short-circuit, Ü = oversize

2.1.1.7.2 Special Data Format

To digitalize the measurement value, the variation 750-456/000-200 uses a format adapted for the S5 control systems using FB 250.

For this variation, the input voltage ranging from -10 V to +10 V is scaled on the numerical values ranging from 0x0000 to 0x7FF9.

Process values of Module 750-456/000-200					
Input voltage ± 10 V	Numerical value				Status- byte hex.
	binary Measured value	*) X F Ü	hex.	dec.	
<-10.0	'0000.0000.0000.0	001'	0x0001	1	0x41
-10.0	'0000.0000.0000.0	000'	0x0000	0	0x00
-7.5	'0001.0000.0000.0	000'	0x1000	4096	0x00
-5.0	'0010.0000.0000.0	000'	0x2000	8192	0x00
-2.5	'0011.0000.0000.0	000'	0x3000	12288	0x00
0.0	'0100.0000.0000.0	000'	0x4000	16384	0x00
2.5	'0101.0000.0000.0	000'	0x5000	20480	0x00
5.0	'0110.0000.0000.0	000'	0x6000	24576	0x00
7.5	'0111.0000.0000.0	000'	0x7000	28672	0x00
10.0	'0111.1111.1111.1	000'	0x7FF8	32760	0x00
>10.0	'0111.1111.1111.1	001'	0x7FF9	32761	0x42

*) status bits: X = not used, F = short-circuit, Ü = oversize



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