

WAGO → I/O → SYSTEM 750

Fieldbus Independent I/O Modules

2 AI AC/DC 0-10 V, Differential
Inputs
750-477



Manual

Version 1.0.5

Copyright © 2009 by WAGO Kontakttechnik GmbH & Co. KG
All rights reserved.

WAGO Kontakttechnik GmbH & Co. KG

Hansastraße 27
D-32423 Minden

Phone: +49 (0) 571/8 87 – 0
Fax: +49 (0) 571/8 87 – 1 69
E-Mail: info@wago.com
Web: <http://www.wago.com>

Technical Support

Phone: +49 (0) 571/8 87 – 5 55
Fax: +49 (0) 571/8 87 – 85 55
E-Mail: support@wago.com

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

E-Mail: documentation@wago.com

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

Content

1 Important Notes	4
1.1 Legal Bases.....	4
1.1.1 Copyright.....	4
1.1.2 Personnel Qualifications.....	4
1.1.3 Use of the 750 Series in Compliance with Underlying Provisions	5
1.1.4 Technical Condition of Specified Devices	5
1.2 Standards and Guidelines for Operating the 750 Series.....	6
1.3 Symbols	7
1.4 Safety Information.....	8
1.5 Font Conventions	9
1.6 Number Notation.....	9
1.7 Scope	9
2 I/O Modules	10
2.1 Analog Input Modules.....	10
2.1.1 750-477 [2 AI AC/DC 0-10 V, Differential Inputs].....	10
2.1.1.1 View.....	10
2.1.1.2 Description.....	10
2.1.1.3 Display Elements	11
2.1.1.4 Schematic Diagram.....	12
2.1.1.5 Technical Data	13
2.1.1.6 Process Image	14

1 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.

1.1 Legal Bases

1.1.1 Copyright

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

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

1.1.2 Personnel Qualifications

The use of the product described in this Manual requires special personnel qualifications, as shown in the following table:

Activity	Electrical specialist	Instructed personnel*)	Specialists**) having qualifications in PLC programming
Assembly	X	X	
Commissioning	X		X
Programming			X
Maintenance	X	X	
Troubleshooting	X		
Disassembly	X	X	

*) Instructed persons have been trained by qualified personnel or electrical specialists.

**) A specialist is a person, who – thanks to technical training – has the qualification, knowledge and expertise to meet the required specifications of this work and to identify any potential hazardous situation in the above listed fields of activity.

All responsible persons have to familiarize themselves with the underlying legal standards to be applied. WAGO Kontakttechnik GmbH & Co. KG does not assume any liability whatsoever resulting from improper handling and damage incurred to both WAGO's own and third-party products by disregarding detailed information in this Manual.

1.1.3 Use of the 750 Series in Compliance with Underlying Provisions

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

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

1.1.4 Technical Condition of Specified Devices

The components to be supplied Ex Works, are equipped with hardware and software configurations, which meet the individual application requirements. Changes in hardware, software and firmware are permitted exclusively within the framework of the various alternatives that are documented in the specific manuals. WAGO Kontakttechnik GmbH & Co. KG will be exempted from any liability in case of changes in hardware or software as well as to non-compliant usage of components.

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

1.2 Standards and Guidelines for Operating the 750 Series

Please adhere to the standards and guidelines required for the use of your system:

- The data and power lines shall be connected and installed in compliance with the standards required to avoid failures on your system and to substantially minimize any imminently hazardous situations resulting in personal injury.
- For assembly, start-up, maintenance and troubleshooting, adhere to the specific accident prevention provisions which apply to your system (e.g. BGV A 3, "Electrical Installations and Equipment").
- Emergency stop functions and equipment shall not be made ineffective. See relevant standards (e.g. DIN EN 418).
- The equipment of your system shall conform to EMC guidelines so that any electromagnetic interferences will be eliminated.
- Operating 750 Series components in home applications without further measures is permitted only if they meet the emission limits (emissions of interference) in compliance with EN 61000-6-3. You will find the detailed information in section "WAGO-I/O-SYSTEM 750" → "System Description" → "Technical Data".
- Please observe the safety precautions against electrostatic discharge in accordance with DIN EN 61340-5-1/-3. When handling the modules, please ensure that environmental factors (persons, working place and packaging) are well grounded.
- The valid standards and guidelines applicable for the installation of switch cabinets shall be adhered to.

1.3 Symbols



Danger

Always observe this information to protect persons from injury.



Warning

Always observe this information to prevent damage to the device.



Attention

Marginal conditions that must always be observed to ensure smooth and efficient operation.



ESD (Electrostatic Discharge)

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



Note

Make important notes that are to be complied with so that a trouble-free and efficient device operation can be guaranteed.



Additional Information

References to additional literature, manuals, data sheets and internet pages.

1.4 Safety Information

When connecting the device to your installation and during operation, the following safety notes must be observed:



Danger

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 is only permitted via a key or tool to authorized qualified personnel.



Danger

All power sources to the device must always be switched off before carrying out any installation, repair or maintenance work.



Warning

Replace defective or damaged device/module (e.g. in the event of deformed contacts), as the functionality of field bus station in question can no longer be ensured on a long-term basis.



Warning

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 the components must be installed in an enclosure that is resistant against the above mentioned materials. Clean tools and materials are generally required to operate the device/module.



Warning

Soiled contacts must be cleaned using oil-free compressed air or with ethyl alcohol and leather cloths.



Warning

Do not use contact sprays, which could possibly impair the functioning of the contact area.



Warning

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



ESD (Electrostatic Discharge)

The devices are equipped with electronic components that may be destroyed by electrostatic discharge when touched.



Warning

For components with ETHERNET/RJ-45 connectors:
Only for use in LAN, not for connection to telecommunication circuits.

1.5 Font Conventions

- italic* Names of paths and data files are marked in italic-type.
e.g.: *C:\Programs\WAGO-IO-CHECK*
- italic*** Menu items are marked in italic-type, bold letters.
e.g.: ***Save***
- \ A backslash between two names characterizes the selection of a menu point from a menu.
e.g.: ***File*** \ ***New***
- END** Pushbuttons are marked as bold with small capitals
e.g.: **ENTER**
- <>** Keys are marked bold within angle brackets
e.g.: **<F5>**
- Courier** The print font for program codes is Courier.
e.g.: **END_VAR**

1.6 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 (.)

1.7 Scope

This manual describes the Analog Input Module 750-477
2 AI AC/DC 0-10 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

2.1.1 750-477 [2 AI AC/DC 0-10 V, Differential Inputs]{ XE "750-477 [2 AI AC/DC 0-10 V, Differential Input]" }

2-Channel Analog Input Module (AC/DC 0-10 V, differential inputs)

2.1.1.1 View

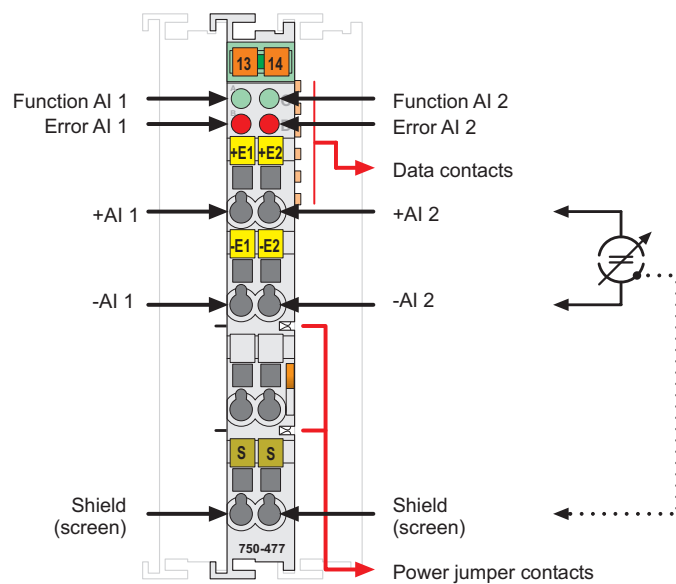


Fig. 2.1.1-1: View

g047700e

2.1.1.2 Description

The analog input module receives AC and DC voltages of values 0-10 V_{rms}.

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 Shield (screen) is directly connected to the DIN rail. A capacitive connection is made automatically when snapped onto the DIN rail.

The input signal is measured for each channel galvanically separated to the system level as rms value of the voltage and displayed with a resolution of 1 mV.

The maximum value of the voltage must not exceed 20 V.

The operational readiness and trouble-free internal data bus communication of the channels are indicated via a green Function LED. Overrange of the measuring range (> 20 V) is indicated via a red error 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.

The field side supply voltage of 24 V and 0 V for the input module is derived from adjacent I/O modules or from a supply module. The field supply voltage is passed on separately galvanically to following modules without own use.

The supply voltage for the field side is made automatically through the individual I/O modules by means of power jumper contacts.



Warning

The maximum current of the internal power jumper contacts is 10 A. When configuring the system it is important not to exceed the maximum/sum current. However, if such a case should occur, another supply module must be added.

The analog input module 750-477 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).

2.1.1.3 Display Elements

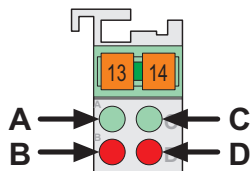


Fig. 2.1.1-2: Display Elements g041802x

LED	Channel	Meaning	State	Function
A	1	Function AI 1	off	No operational readiness or the internal data bus communication is interrupted
			green	Operational readiness and trouble-free internal data bus communication
B		Error AI 1	off	Normal operation
			red	Overrange of the admissible measuring range
C	2	Function AI 2	off	No operational readiness or the internal data bus communication is interrupted
			green	Operational readiness and trouble-free internal data bus communication
D		Error AI 2	off	Normal operation
			red	Overrange of the admissible measuring range

2.1.1.4 Schematic Diagram

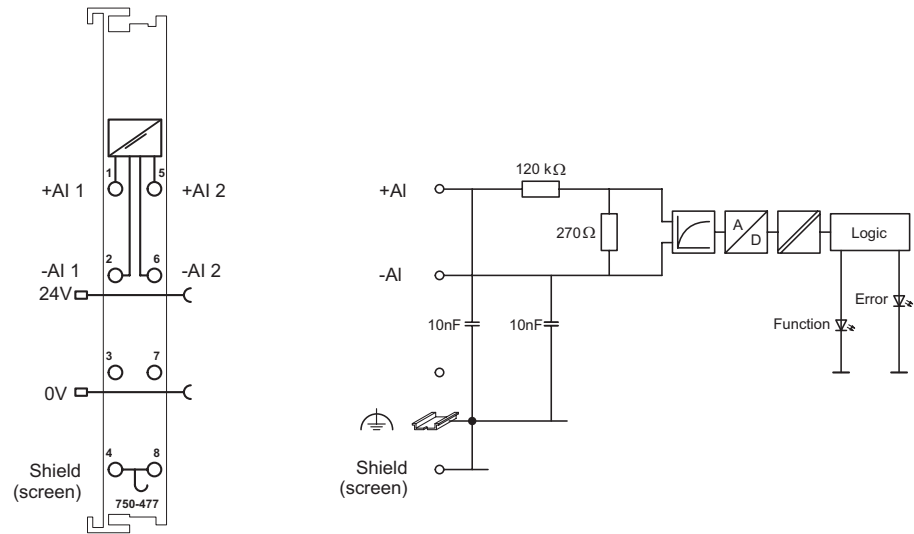






Fig. 2.1.1-3: Schematic diagram

g047701e

2.1.1.5 Technical Data

Module Specific Data		
Number of inputs	2	
Voltage supply	via system voltage DC /DC	
Current consumption _{typ.} (internal)	80 mA	
Signal voltage	0 V... 10 V _{r.m.s.} (peak value 20 V)	
Internal resistance	120 kΩ	
Resolution	16 bits internal (1 LSB = 1mV)	
Conversion time _{typ.}	200 ms	
Measuring error _{25°C}	<± 0.1 % of full scale value	
Temperature coefficient	<± 110 ppm /K of full scale value	
Measuring error over whole temp. range	<± 0.6 % of full scale value	
Voltage resistance	DC 500V (channel/channel or channel/system)	
Voltage via power jumper contacts	DC 24 V	
Bit width	2 x 16 bits data 2 x 8 bits control/status (option)	
Process data	0,0 V corresponds to 0x0000 20 V DC corresponds to 0x4E20	
Dimensions W x H* x L * from upper edge of 35 DIN rail	12 mm x 64 mm x 100 mm	
Weight	ca. 80 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)	
Approvals (cf. Chapter 2.2 of the Coupler/Controller Manual)		
	cUL _{US} (UL508)	
	cUL _{US} (ANSI/ISA 12.12.01)	Class I Div2 ABCD T4
	DEMKO / IEC	I M2 / II 3 G/D Ex nA IIC 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: <http://www.wago.com> → Documentation → WAGO-I/O-SYSTEM 750 → System Description

2.1.1.6 Process Image

The analog input module 750-477 transmits 16-bit measured values and 8 optional 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 16 bit (1 LSB = 1 mV) resolution on bit B0 ... B14.

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

This status byte can be displayed via the starting tool WAGO-I/O-CHECK 2. However, processing via the coupler/controller 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 I/O 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 concerning the process image of the corresponding coupler/controller.

For the standard module 750-477, the input voltage ranging from 0 V to 20 V is scaled on the numerical values ranging from 0x0000 to 0x4E20.

Process values of module 750-477					
Input voltage $U_{r.m.s.}$ 0 V – 10 V	numerical value			Status- byte hex.	LED Error AI 1, 2
	binary Measured value	hex.	dec.		
0.0	'0000.0000.0000.0000'	0x0000	0	0x00	off
2.5	'0000.1001.1100.0100'	0x09C4	2500	0x00	off
5.0	'0001.0011.1000.1000'	0x1388	5000	0x00	off
7.5	'0001.1101.0100.1100'	0x1D4C	7500	0x00	off
10.0	'0010.0111.0001.0000'	0x2710	10000	0x00	off
12.5	'0011.0000.1101.0100'	0x30D4	12500	0x00	off
15.0	'0011.1010.1001.1000'	0x3A98	15000	0x00	off
17.5	'0100.0100.0101.1100'	0x445C	17500	0x00	off
20.0	'0100.1110.0010.0000'	0x4E20	20000	0x00	off
>20.0	'0100.1110.0010.0000'	0x4E20	20000	0x42	on



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

Internet: <http://www.wago.com>
