WAGO I/O SYSTEM 750

Fieldbus Independent I/O Modules

1 AI DMS 750-491

Manual

Version 1.1.6

WAGO® INNOVATIVE CONNECTIONS

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 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

This manual is copyrighted, together with all figures and illustrations contained therein. Any use of this manual which infringes the copyright provisions stipulated herein, is not permitted. Reproduction, translation and electronic and photo-technical archiving and amendments require the written consent of WAGO Kontakttechnik GmbH & Co. KG. Non-observance will entail the right of claims for damages.

WAGO Kontakttechnik GmbH & Co. KG reserves the right to perform modifications allowed by technical progress. In case of grant of a patent or legal protection of utility patents all rights are reserved by WAGO Kontakttechnik GmbH & Co. KG. Products of other manufacturers are always named without referring to patent rights. The existence of such rights can therefore not be ruled out.

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 inverted commas, 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 750-491
1 AI DMS 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 Digital Output Modules

2.1.1 750-491 [1 AI DMS]

1-Channel Analog Input Module for Resistor Bridges (DMS)

2.1.1.1 Variations

Item-No.	Designation	Description
750-491	1 AI DMS	1-Channel Analog Input Module for Resistor Bridges (DMS), Conversion time 500 ms
750-491/000-001	1 AI DMS/125 ms	1-Channel Analog Input Module for Resistor Bridges (DMS), Conversion time 125 ms

2.1.1.2 View

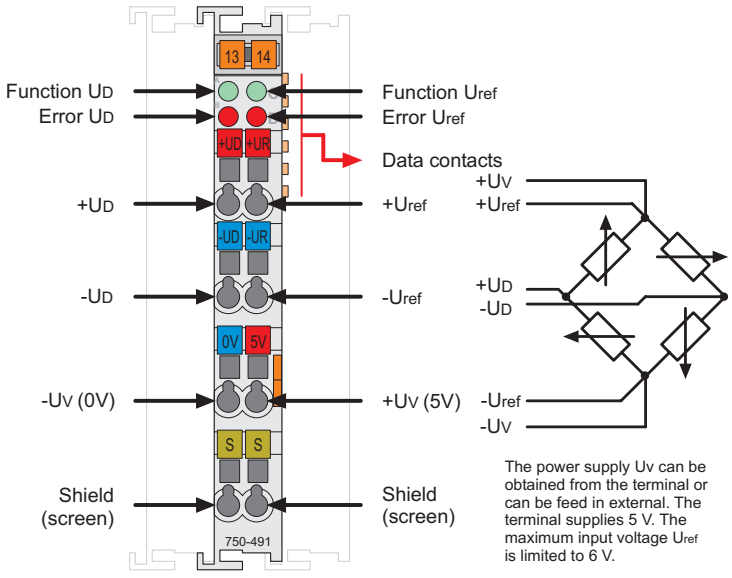

Fig. 1: 1-Channel Analog Input Module 750-491 g049100e

2.1.1.3 Description

The analog input module enables the direct connection of a resistor measurement bridge. The brigde voltage U_D and supply voltage U_{ref} of the brigde are digitised with a resolution of 16 bits.

The input channels for the resistor bridge are available as two 16 bit values for further processing. The result of measurment can be calculated by the formula:

$$\textit{Measuring value} = U_D / U_{ref}$$

Due to the accurate measurement of supply voltage as well as bridge voltage in one measurement transformer, long-term and temperature drift are compensated.

If the internal voltage supply (U_V) is overloaded ($I_{load} > 20$ mA), an external power supply is necessary. (cf. chapter 2.1.1.9, “Connection examples”).

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 750-491 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

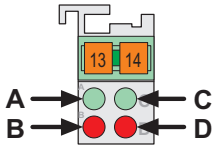

Fig. 2.1.1-1: Display Elements g045202x

LED	Channel	Meaning	State	Function
A green	U_D	Function	off	No operational readiness or the internal data bus communication is interrupted
			on	Operational readiness and trouble-free internal data bus communication
B red		Error	off	Normal operation
			on	Brigde voltage U_D outside of the valid range or broken wire
C green	U_{ref}	Function	off	No operational readiness or the internal data bus communication is interrupted
			on	Operational readiness and trouble-free internal data bus communication
D red		Error	off	Normal operation
			on	Voltage supply U_{ref} outside of the valid range

2.1.1.5 Schematic Diagram

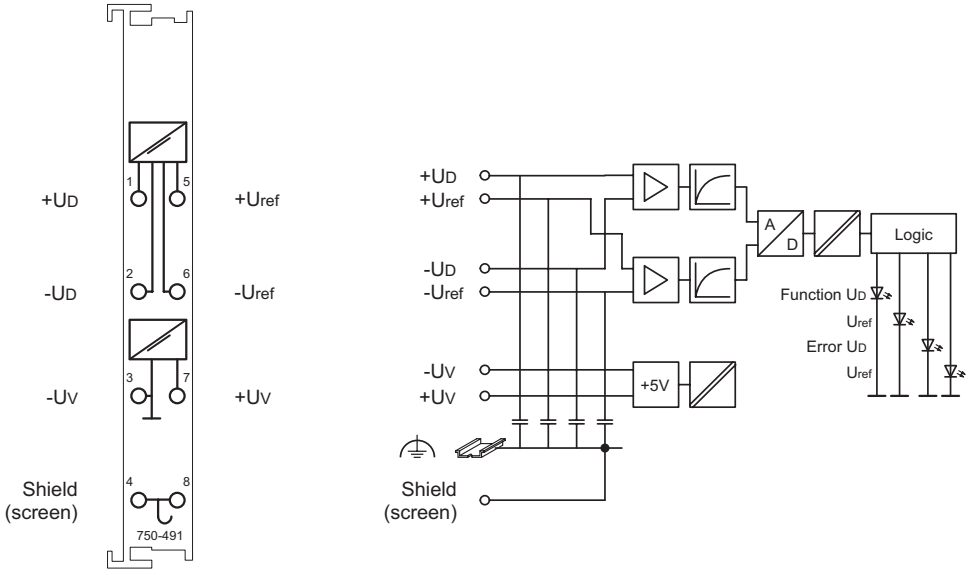

Fig. 2.1.1-2: 2-Channel Analog Input Module 750-491 g049101e

2.1.1.6 Technical data

Module Specific Data		
Number of inputs	2, for one resistor bridge	
Voltage supply	Via system voltage DC /DC	
Current consumption $_{typ.}$(internal)	65 mA	
Voltage supply U_v	DC 5 V, 20 mA	
Signal voltage U_D	-15 mV ... +15 mV	
Internal resistance U_D	> 1 MΩ	
Common-mode voltage U_D/U_{V-}	±35 V	
Signal voltage U_{ref}	+2 V ... +6 V	
Internal resistance U_{ref}	> 200 kΩ	
Common-mode voltage U_{ref}/U_{V-}	±35 V	
Resolution	16 bits	
Conversion time	500 ms (750-491) 125 ms (750-491/000-001)	
Measuring error	<± 0.1 % (of the upper range value)	
Filter	50 Hz (750-491) 200 Hz (750-491/000-001)	
Isolation	500 V (System/Supply)	
Bit width	2 x 16 bits data 2 x 8 bits control/status (option)	
Dimensions W x H* x L * from upper edge of 35 DIN rail	12 mm x 64 mm x 100 mm	
Weight	ca. 60 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 (97)	
EMC-Emission of interference (Ship building)	acc. to Germanischer Lloyd (97)	
Approvals (cf. Chapter 2.2 of the Coupler/Controller Manual)		
CE	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 bridge voltage between $+U_D$ and $-U_D$ is output with a resolution of 500 nV/digit, so that 10 mV corresponds to an output value of 20000 in the data bytes D0 and D1 of channel 1.

The supply voltage for the bridge is output with a resolution of 500 µV/digit, so that 10 V corresponds to the output value 20000 in the data bytes D0 and D1 of channel 2.

Process values of module 750-491					
Signal voltage U_D ±15 mV	Numerical value			Status-byte hex.	LED
	binary Output value	hex.	dec.		
<ca.-15.5000	'0111.1111.1111.1111'	0x7FFF	32767	0x41	on
ca.-15.5000	'0000.0000.0000.0000'	0x0000	0	0x00	off
-15.0000	'1000.1010.1101.0000'	0x8AD0	-30000	0x00	off
-10.0000	'1011.0001.1110.0000'	0xB1E0	-20000	0x00	off
-5.0000	'1101.1000.1111.0000'	0xD8F0	-10000	0x00	off
-0.0005	'1111.1111.1111.1111'	0xFFFF	-1	0x00	off
0.0000	'0000.0000.0000.0000'	0x0000	0	0x00	off
0.0005	'0000.0000.0000.0001'	0x0001	1	0x00	off
5.0000	'0010.0111.0001.0000'	0x2710	10000	0x00	off
10.0000	'0100.1110.0010.0000'	0x4E20	20000	0x00	off
15.0000	'0111.0101.0011.0000'	0x7530	30000	0x00	off
>ca.15.5000	'0111.1111.1111.1111'	0x7FFF	32767	0x41	on
Broken wire	'0111.1111.1111.1111'	0x7FFF	32767	0x41	on

Process values of module 750-491					
Signal voltage U_{ref} ±10 V	Numerical value			Status-byte hex.	LED
	binary Output value	hex.	dec.		

<ca.–13.0000	'0111.1111.1111.1111'	0x7FFF	32767	0x41	on
-10.0000	'1011.0001.1110.0000'	0xB1E0	-20000	0x00	off
-5.0000	'1101.1000.1111.0000'	0xD8F0	-10000	0x00	off
-1.0000	'1111.1000.0011.0000'	0xF830	-2000	0x00	off
-0.0003	'1111.1111.1111.1111'	0xFFFF	-1	0x00	off
0.0000	'0000.0000.0000.0000'	0x0000	0	0x00	off
0.0003	'0000.0000.0000.0001'	0x0001	1	0x00	off
1.0000	'0000.0111.1101.0000'	0x07D0	2000	0x00	off
5.0000	'0010.0111.0001.0000'	0x2710	10000	0x00	off
10.0000	'0100.1110.0010.0000'	0x4E20	20000	0x00	off
>ca.13.0000	'0111.1111.1111.1111'	0x7FFF	32767	0x41	on

2.1.1.8 Applicaton examples

A load cell was connected to the module in an experimental test bed.

The load cell was fed with the terminal's 5 V supply voltage (U_V), while the reference voltage (U_{ref}) and the bridge voltage were captured with the U_{ref} and U_D channels respectively.

Technical data for the load cell: 5 kg = 2 mV/V

The weight is calculated as follows: Weight = (U_D / 2 mV) / (U_{ref} / 1 V) * 5kg

2.1.1.9 Connection examples

The connected resistor measurement bridge can be supplied by the module via the connections $+U_V$ and $-U_V$ (see following illustration) or by an external voltage supply.

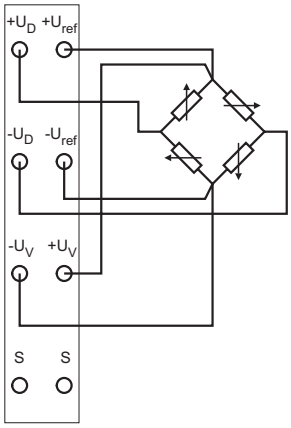

Fig. 2.1.1-3: Connection of a Resistor Measurement Bridge with internal Supply g049105x

If the resistor measurement bridge is supplied by an external voltage supply, a common ground (earth) potential must be made by bridging the $-U_V$ connection of the module to the externally $-U_{V\ extern}$ (see illustration down).

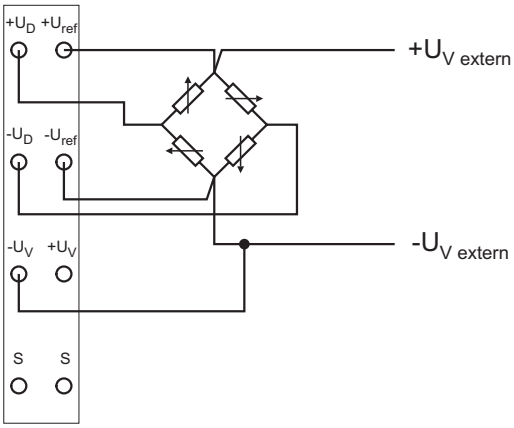

Fig. 2.1.1-4: Connection of a Resistor Measurement Bridge with external Supply g049105x

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