

# WAGO I/O System 750/753

4-channel analog input; 0 ... 10 VDC; single-ended

750-459



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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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# 1 Provisions

## 1.1 Scope of Applicability

This document applies to the following product:

🔗 **750-459** (4AI 0-10V DC S.E.) 4-channel analog input; 0 ... 10 VDC; single-ended.

|                       |                                                                   |
|-----------------------|-------------------------------------------------------------------|
| From hardware version | 07                                                                |
| From firmware version | 04                                                                |
| Product detail page   | 🔗 <a href="https://www.wago.com/750-459">www.wago.com/750-459</a> |

### Note

#### Note applicable documents!

The complete operating instructions for the product consists of several, applicable documents. The product must only be installed and operated in accordance with the complete operating instructions. Knowledge of all applicable documents is required for proper use. You can find all documents and information on the product detail page.

#### Applicable document

##### 📖 System Manual I/O System 750/753

- Provisions
- Safety
- Planning
- Transport and Storage
- Assembly and Disassembly
- Conductor Termination
- Decommissioning

## 2 Overview

This I/O module processes standard 0 ... 10 V signals from the field range.

The I/O module has four input channels for field signals. The ground connections are available for all four channels on a common 0 V ground potential. This potential is not the 0 V field power of the power jumper contacts.

One red error LED per channel indicates whether there is a measurement overrange or underrange for the respective channel.

The input signal is electrically isolated and transmitted with a resolution of 12 bits.

The internal power supply powers the module.

The potentials for the field level received via the power jumper contacts are electrically isolated and passed on to subsequent I/O modules, without being used themselves.

# 3 Properties

## 3.1 View

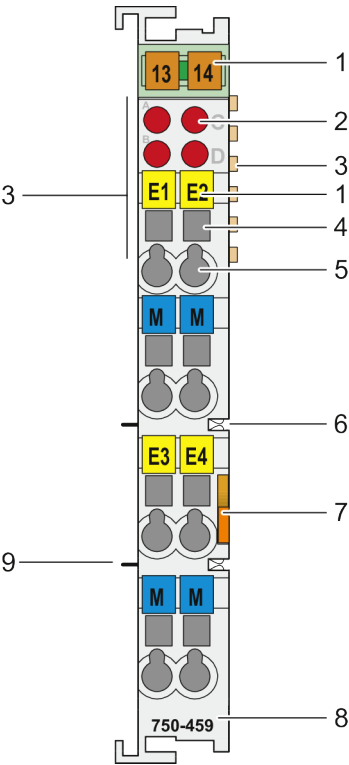


Figure 1: View

|   |                                                      |                                                                                                         |
|---|------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| 1 | Slot for Mini-WSB (optional)                         | ☐ <a href="#">System Manual I/O System 750/753</a>                                                      |
| 2 | Status LEDs                                          | 🔗 <a href="#">Indicators [► 7]</a>                                                                      |
| 3 | Data contacts                                        | ☐ <a href="#">System Manual I/O System 750/753</a>                                                      |
| 4 | Access to open the associated CAGE CLAMP® connection | ☐ <a href="#">System Manual I/O System 750/753</a>                                                      |
| 5 | CAGE CLAMP® connections                              | 🔗 <a href="#">Wiring Interface [► 8]</a> and<br>☐ <a href="#">System Manual I/O System 750/753</a>      |
| 6 | Power jumper contacts (spring)                       | 🔗 <a href="#">Power Jumper Contacts [► 9]</a> and<br>☐ <a href="#">System Manual I/O System 750/753</a> |
| 7 | Release tab                                          | ☐ <a href="#">System Manual I/O System 750/753</a>                                                      |
| 8 | Item number                                          | 🔗 <a href="#">Scope of Applicability [► 4]</a>                                                          |
| 9 | Power jumper contacts (blade)                        | 🔗 <a href="#">Power Jumper Contacts [► 9]</a> and<br>☐ <a href="#">System Manual I/O System 750/753</a> |

### 3.2 Indicators

One red error LED per channel indicates whether there is a measurement overrange or underrange for the respective channel.

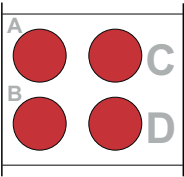


Figure 2: Indicators

| Channel | Designation | LED | State | Function                                     |
|---------|-------------|-----|-------|----------------------------------------------|
| 1       | Error AI 1  | A   | Off   | Normal operation                             |
|         |             |     | Red   | Measurement below or above permissible range |
| 2       | Error AI 2  | C   | Off   | Normal operation                             |
|         |             |     | Red   | Measurement below or above permissible range |
| 3       | Error AI 3  | B   | Off   | Normal operation                             |
|         |             |     | Red   | Measurement below or above permissible range |
| 4       | Error AI 4  | D   | Off   | Normal operation                             |
|         |             |     | Red   | Measurement below or above permissible range |

3.3 Wiring Interface

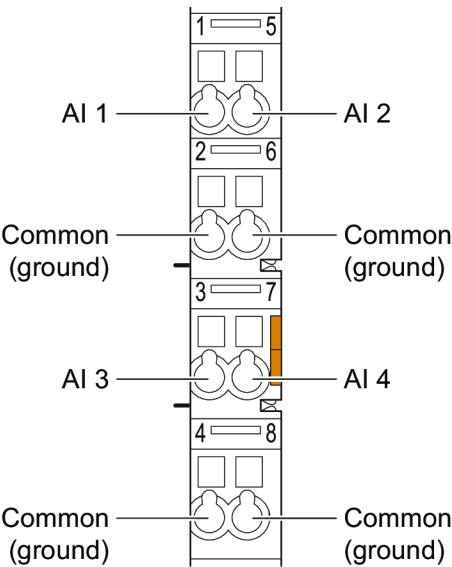


Figure 3: CAGE CLAMP® Connections

| Channel | Designation | Connection | Function               |
|---------|-------------|------------|------------------------|
| 1       | AI 1        | 1          | Analog input 1: signal |
|         | Ground      | 2          | Analog input: ground   |
| 2       | AI 2        | 5          | Analog input 2: signal |
|         | Ground      | 6          | Analog input: ground   |
| 3       | AI 3        | 3          | Analog input 3: signal |
|         | Ground      | 4          | Analog input: ground   |
| 4       | AI 4        | 7          | Analog input 4: signal |
|         | Ground      | 8          | Analog input: ground   |

### 3.4 Power Jumper Contacts

The potential for the field supply is fed in via the blade contacts and passed on via the spring contacts.

For additional information on the Power Jumper Contacts, please see [System Manual I/O System 750/753](#).

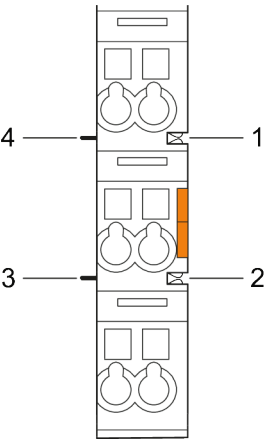


Figure 4: Power Jumper Contacts

| No. | Type                       |
|-----|----------------------------|
| 1   | Groove with spring contact |
| 2   |                            |
| 3   | Blade contact              |
| 4   |                            |

#### Arrangement in the Bus Node

For mechanical arrangement of the I/O module, the previous component must have at least 2 open grooves for accommodating the blade contacts.

For electrical compatibility requirements see Section [Circuit Diagram \[► 10\]](#).

3.5 Circuit Diagram

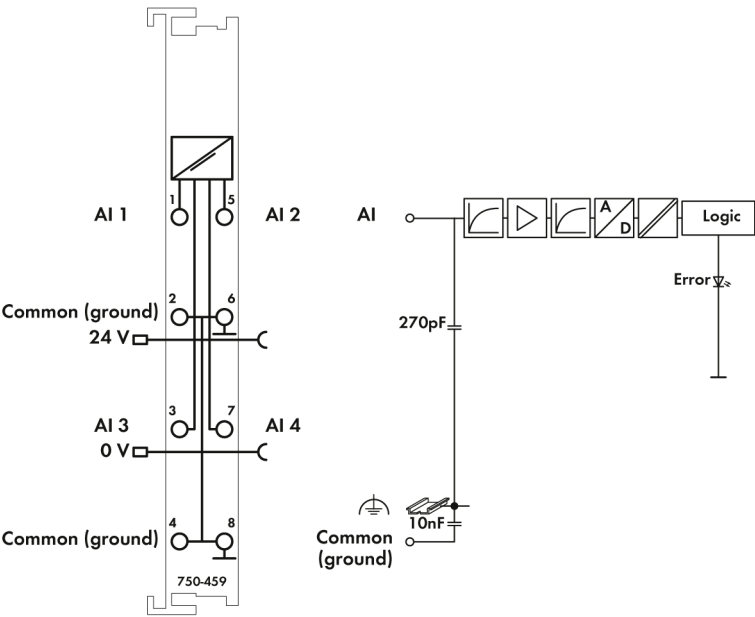


Figure 5: Circuit Diagram

For information on the system power supply, please see [System Manual I/O System 750/753](#).

## 4 Functions

### 4.1 Signal Processing

The I/O module provides one status byte (8 bits) and one data word (16 bits) per channel.

Whether the status byte can be read out via the fieldbus depends on how diagnostic information is transmitted by the corresponding fieldbus or the head station used. In any case, the status byte can be read out via the service interface of the head station using the WAGO-I/O-CHECK commissioning tool.

The I/O module captures the input voltage range 0 ... 10 V with a resolution of 12 bits plus the sign.

The measured value is given in two's complement representation, and the numerical value is mapped to bits B15 ... B4 of the data word (bit 15 is the sign bit). Bits B3 and B2 are reserved and can take a value of 0 or 1. Bits B1 and B0 contain diagnostic information.

In the event of measurement overrange or underrange, the I/O module transmits the next displayable measured value and sets B0 and B1 to a value of 1.

#### **Simplified Interpretation of the Measured Value**

A simpler way to obtain the measured value is to interpret the entire data word as a 16-bit integer value. The measurement range is then scaled to the numerical value range from 0x0000 to 0x7FFF. The decimal places of the resulting analog value corresponding to the lower four bits, however, must be ignored.

## 4.2 Process Image

Table 1: Process Image of the I/O Module – Examples of Process Values

| Input Voltage<br>0 ... 10 V | Numerical Value              |                                  |                                    |                    |                    | Status<br>Byte<br>Hex. | LED<br>Error<br>AI 1 ... 4 |
|-----------------------------|------------------------------|----------------------------------|------------------------------------|--------------------|--------------------|------------------------|----------------------------|
|                             | Binary                       |                                  |                                    | Hex. <sup>3)</sup> | Dec. <sup>3)</sup> |                        |                            |
|                             | Measured Value<br>B15 ... B4 | Reserved <sup>1)</sup><br>B3, B2 | Diagnostic <sup>2)</sup><br>B1, B0 |                    |                    |                        |                            |
| <~-1,0                      | '0000.0000.0000.             | 00                               | 11'                                | 0x0003             | 3                  | 0x41                   | On                         |
| 0.0                         | '0000.0000.0000.             | XX                               | 00'                                | 0x0000             | 0                  | 0x00                   | Off                        |
| 1.0                         | '0000.1100.1101.             | XX                               | 00'                                | 0x0CD0             | 3,280              | 0x00                   | Off                        |
| 2.0                         | '0001.1001.1001.             | XX                               | 00'                                | 0x1990             | 6,544              | 0x00                   | Off                        |
| 3.0                         | '0010.0110.0110.             | XX                               | 00'                                | 0x2660             | 9,824              | 0x00                   | Off                        |
| 4.0                         | '0011.0011.0011.             | XX                               | 00'                                | 0x3330             | 13,104             | 0x00                   | Off                        |
| 5.0                         | '0100.0000.0000.             | XX                               | 00'                                | 0x4000             | 16,384             | 0x00                   | Off                        |
| 6.0                         | '0100.1100.1100.             | XX                               | 00'                                | 0x4CC0             | 19,648             | 0x00                   | Off                        |
| 7.0                         | '0101.1001.1001.             | XX                               | 00'                                | 0x5990             | 22,928             | 0x00                   | Off                        |
| 8.0                         | '0110.0110.0110.             | XX                               | 00'                                | 0x6660             | 26,208             | 0x00                   | Off                        |
| 9.0                         | '0111.0011.0011.             | XX                               | 00'                                | 0x7330             | 29,488             | 0x00                   | Off                        |
| 10.0                        | '0111.1111.1111.             | XX                               | 00'                                | 0x7FF0             | 32,752             | 0x00                   | Off                        |
| >~11.0                      | '0111.1111.1111.             | 11                               | 11'                                | 0x7FFF             | 32,767             | 0x42                   | On                         |

<sup>1)</sup> Bits B3 and B2 are reserved and can each take a value of 0 or 1.

Exception: Diagnostics are pending; in that case, their value is fixed.

<sup>2)</sup> Indicates whether a measurement overflow/underflow exists.

<sup>3)</sup> The measured value depends on the reserved bits B3 and B2. In this example, X = 0 was assumed.

## 5 Planning

This section provides helpful information for planning the use of the product in a node.

### 5.1 Compatibility

The I/O module can be operated on all head stations of the WAGO I/O System 750/753 with the exception of the economy variants 750-320, 750-323, 750-324 and 750-327.

### 5.2 Aids

The status byte can be read out via the service interface of the head station using the WAGO-I/O-CHECK commissioning tool.

You can obtain the WAGO-I/O-CHECK under Item No. [759-302](#). The description is available on the website at [www.wago.com](http://www.wago.com).

### 5.3 Connection Example

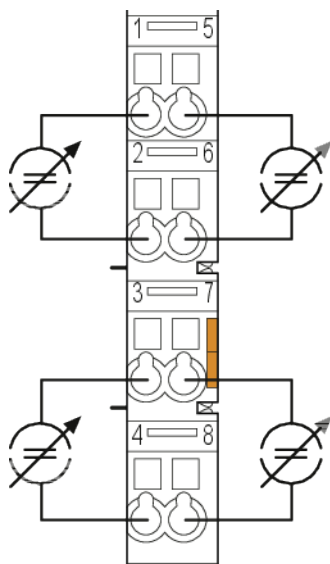


Figure 6: Connection Example

# 6 Appendix

## 6.1 Technical Data, Approvals, Guidelines and Standards

### Note

#### Subject to changes!

Please also observe the further product documentation! You can generate the current datasheet at any time at: [> www.wago.com](https://www.wago.com) /<item number>.

#### See also

 Data sheet 750-459 [► 15]

This analog input module processes standard 0–10 V signals.  
 The input signal is electrically isolated and is transmitted with a resolution of 12 bits.  
 The internal system supply powers the module.  
 The input channels of the module have a common ground potential.

#### Technical data

|                                                                |                                                                                                                                                      |
|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Number of analog inputs                                        | 4                                                                                                                                                    |
| Total number of channels (module)                              | 4                                                                                                                                                    |
| Signal type                                                    | Voltage                                                                                                                                              |
| Signal type (voltage)                                          | 0 ... 10 VDC                                                                                                                                         |
| Sensor connection                                              | 4 x (2-wire)                                                                                                                                         |
| Input voltage (max.)                                           | ±40 V                                                                                                                                                |
| Signal characteristics                                         | Single-ended                                                                                                                                         |
| Resolution [bit]                                               | 12 bits                                                                                                                                              |
| Data width                                                     | 4 x 16-bit data; 4 x 8-bit control/status (optional)                                                                                                 |
| Internal resistance                                            | 100 kΩ                                                                                                                                               |
| Conversion time (typ.)                                         | 10 ms                                                                                                                                                |
| Measurement error (reference temperature)                      | 25 °C                                                                                                                                                |
| Measurement error, deviation (max.) from the upper-range value | 0.1 %                                                                                                                                                |
| Temperature error (max.) of the upper-range value              | 0.01 %/K                                                                                                                                             |
| Supply voltage (system)                                        | 5 VDC; via data contacts                                                                                                                             |
| Current consumption (5 V system supply)                        | 65 mA                                                                                                                                                |
| Supply voltage (field)                                         | 24 VDC (-25 ... +30 %); via power jumper contacts (power supply via blade contact; transmission (field side supply voltage only) via spring contact) |
| Isolation                                                      | 500 V system/field                                                                                                                                   |
| Indicators                                                     | LED (A-D) red: Error AI 1 ... AI 4                                                                                                                   |
| Number of incoming power jumper contacts                       | 2                                                                                                                                                    |
| Number of outgoing power jumper contacts                       | 2                                                                                                                                                    |

#### Connection data

|                                       |                                   |
|---------------------------------------|-----------------------------------|
| Connection technology: inputs/outputs | 8 x CAGE CLAMP®                   |
| Connectable conductor materials       | Copper                            |
| Connection type 1                     | Inputs/outputs                    |
| Solid conductor                       | 0.08 ... 2.5 mm² / 28 ... 14 AWG  |
| Fine-stranded conductor               | 0.08 ... 2.5 mm² / 28 ... 14 AWG  |
| Strip length                          | 8 ... 9 mm / 0.31 ... 0.35 inches |

#### Physical data

|                                   |                        |
|-----------------------------------|------------------------|
| Width                             | 12 mm / 0.472 inches   |
| Height                            | 100 mm / 3.937 inches  |
| Depth                             | 69.8 mm / 2.748 inches |
| Depth from upper-edge of DIN-rail | 62.6 mm / 2.465 inches |



| Mechanical data     |             |
|---------------------|-------------|
| Mounting type       | DIN-35 rail |
| Pluggable connector | fixed       |

| Material data      |                              |
|--------------------|------------------------------|
| Color              | light gray                   |
| Housing material   | Polycarbonate; polyamide 6.6 |
| Fire load          | 1.556 MJ                     |
| Weight             | 50.8 g                       |
| Conformity marking | CE                           |

| Environmental requirements                                                         |                                                                                                        |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Ambient temperature (operation)                                                    | 0 ... +55 °C                                                                                           |
| Ambient temperature (storage)                                                      | -40 ... +85 °C                                                                                         |
| Protection type                                                                    | IP20                                                                                                   |
| Pollution degree                                                                   | 2 per IEC 61131-2                                                                                      |
| Operating altitude                                                                 | 0 ... 2000 m / 0 ... 6562 ft                                                                           |
| Mounting position                                                                  | Horizontal left, horizontal right, horizontal top, horizontal bottom, vertical top and vertical bottom |
| Relative humidity (without condensation)                                           | 95 %                                                                                                   |
| Vibration resistance                                                               | 4g per IEC 60068-2-6                                                                                   |
| Shock resistance                                                                   | 15g per IEC 60068-2-27                                                                                 |
| EMC immunity to interference                                                       | per EN 61000-6-2, marine applications                                                                  |
| EMC emission of interference                                                       | per EN 61000-6-4, marine applications                                                                  |
| Exposure to pollutants                                                             | per IEC 60068-2-42 and IEC 60068-2-43                                                                  |
| Permissible H <sub>2</sub> S contaminant concentration at a relative humidity 75 % | 10 ppm                                                                                                 |
| Permissible SO <sub>2</sub> contaminant concentration at a relative humidity 75 %  | 25 ppm                                                                                                 |

| Product classification |          |
|------------------------|----------|
| UNSPSC                 | 32101505 |

| Environmental Product Compliance          |                                           |
|-------------------------------------------|-------------------------------------------|
| CAS-No.                                   | 1303-86-2<br>1317-36-8<br>7439-92-1       |
| REACH Candidate List Substance            | Diboron trioxide<br>Lead<br>Lead monoxide |
| RoHS Compliance Status                    | Compliant,With Exemption                  |
| RoHS Exemption                            | 6(c)<br>7(a)<br>7(c)-I<br>7(c)-II         |
| SCIP notification number (Austria)        | adfe4707-0107-4983-bbc9-28ab5d13e18b      |
| SCIP notification number (Belgium)        | 11c8e0b7-24a5-4749-a453-08727d634444      |
| SCIP notification number (Bulgaria)       | fc6837a0-866f-43ac-810c-840777f19ae4      |
| SCIP notification number (Czech Republic) | e17af7b8-e3b3-49e2-8aee-fc79edfa2a25      |
| SCIP notification number (Denmark)        | a22bd038-07ec-417a-b6e3-9f8c661889eb      |
| SCIP notification number (Finland)        | 9eca2b0c-8482-480d-921c-cd410cdef293      |
| SCIP notification number (France)         | 8ccc1fcd-baec-426d-92dd-887388d15578      |
| SCIP notification number (Germany)        | a938dcef-87ea-463d-b8e8-9ac50285cc17      |
| SCIP notification number (Hungary)        | eba7dc1b-e207-4669-a757-8e077d0aa315      |
| SCIP notification number (Italy)          | e3389f06-9ed2-4966-a095-50f13099db5e      |
| SCIP notification number (Netherlands)    | 50d831c2-d787-4637-bffd-76c302fb2a81      |
| SCIP notification number (Poland)         | 7aba1503-157a-4041-ac2b-4e6927f8385d      |
| SCIP notification number (Romania)        | 85034795-5f2f-433f-80ad-38506e2cfefe      |



Environmental Product Compliance

SCIP notification number (Sweden) 1b9d1f8f-ebd6-4ad4-8d2a-fa8f2125796a

Approvals / Certificates

| General approvals                       |                        |                     | Declarations of conformity and manufacturer's declarations |          |                  |
|-----------------------------------------|------------------------|---------------------|------------------------------------------------------------|----------|------------------|
|                                         |                        |                     |                                                            |          |                  |
| Approval                                | Standard               | Certificate Name    | Approval                                                   | Standard | Certificate Name |
| EAC<br>GZO Almaty Standart              | TP TC 020/2011         | EAC CoC 03083       | EU-Declaration of Confor-<br>mity<br>WAGO GmbH & Co. KG    | -        | -                |
| KC<br>National Radio Research<br>Agency | Article 58-2, Clause 3 | MSIP-REM-W43-AIM750 | UK-Declaration of Confor-<br>mity<br>WAGO GmbH & Co. KG    | -        | -                |

Approvals for marine applications

| Approval                                                        | Standard             | Certificate Name  |
|-----------------------------------------------------------------|----------------------|-------------------|
| ABS<br>American Bureau of Ship-<br>ping                         | -                    | 22-2219060        |
| BSH<br>Bundesamt fuer See-<br>schifffahrt und Hydrogra-<br>phie | -                    | 1104              |
| BV<br>Bureau Veritas S.A.                                       | -                    | 13453/E0 BV       |
| DNV<br>DNV GL SE                                                | DNV-CG-0339,Aug.2021 | TAA0000194        |
| KR<br>Korean Register of Ship-<br>ping                          | -                    | KR HMB05880-AC001 |
| LR<br>Lloyds Register EMEA                                      | -                    | LR22180952TA      |
| PRS<br>Polski Rejestr Statków                                   | -                    | TE/1101/880590/23 |
| RINA<br>RINA Germany GmbH                                       | -                    | ELE343521XG001    |

Approvals for hazardous areas

| Approval                                    | Standard    | Certificate Name                              |
|---------------------------------------------|-------------|-----------------------------------------------|
| ATEX<br>TUEV Nord Cert GmbH                 | EN 60079-0  | TUEV14ATEX148929X (II<br>3 G Ex ec IIC T4 Gc) |
| CCCEX<br>CQST/CNEx                          | CNCA-C23-01 | 2020312310000213 (Ex<br>ec IIC T4 Gc)         |
| IECEX<br>TUEV Nord Cert GmbH                | IEC 60079-0 | IECEX TUN 14.0035 X (Ex<br>ec IIC T4 Gc)      |
| INMETRO<br>TÜV Rheinland do Brasil<br>Ltda. | IEC 60079-0 | TÜV 12.1297 X                                 |
| UKEx<br>WAGO GmbH & Co. KG                  | EN 60079-0  | UKCA_WA<br>GO22UKEX003X_ec                    |

Subject to changes. Please also observe the further product documentation!

Current addresses can be found at: [www.wago.com](https://www.wago.com)

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