

WAGO-I/O-SYSTEM 750
16DO 24V DC 0.5A, ribbon cable

750-1500

**16-Channel Digital Output Module 24 VDC, Ribbon
Cable, High-side Switching**

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.

Table of Contents

1	Notes about this Documentation.....	5
1.1	Validity of this Documentation.....	5
1.2	Copyright.....	5
1.3	Symbols.....	6
1.4	Number Notation.....	8
1.5	Font Conventions.....	8
2	Important Notes	9
2.1	Legal Bases	9
2.1.1	Subject to Changes	9
2.1.2	Personnel Qualifications.....	9
2.1.3	Use of the WAGO-I/O-SYSTEM 750 in Compliance with Underlying Provisions	9
2.1.4	Technical Condition of Specified Devices.....	10
2.2	Safety Advice (Precautions).....	11
3	Device Description	13
3.1	View	15
3.2	Connectors.....	16
3.2.1	Data Contacts/Internal Bus.....	16
3.2.2	Ribbon Cable and CAGE CLAMP® Connectors	17
3.3	Display Elements	18
3.4	Operating Elements	18
3.5	Schematic Diagram	19
3.6	Technical Data	20
3.6.1	Device.....	20
3.6.2	Communication	20
3.6.3	Supply.....	20
3.6.4	Outputs	20
3.6.5	Connection Type	21
3.6.6	Climatic Environmental Conditions.....	21
3.7	Approvals	22
3.8	Standards and Guidelines	23
4	Mounting.....	24
4.1	Mounting Sequence.....	24
4.2	Inserting and Removing Devices	25
4.2.1	Inserting the I/O Module	25
4.2.2	Removing the I/O Module.....	26
5	Connect Devices	27
5.1	Connecting a Conductor to the CAGE CLAMP®	27
6	Process Image	28
7	Accessories	29
8	Using Interference-Free I/O Modules in Safety Related Applications .	32
8.1	Important Notes.....	33

8.2	Connecting the I/O Module to Safety Switching Devices or Safety Modules.....	34
8.2.1	General Structure of a Potential Group	34
8.2.2	Examples of Connection.....	35
9	Use in Hazardous Environments	36
9.1	Marking Configuration Examples.....	37
9.1.1	Marking for Europe According to ATEX and IEC-Ex	37
9.1.2	Marking for America According to NEC 500	42
9.2	Installation Regulations.....	43
9.2.1	Special Conditions for Safe Use (ATEX Certificate TÜV 07 ATEX 554086 X).....	44
9.2.2	Special Conditions for Safe Use (ATEX Certificate TÜV 12 ATEX 106032 X).....	45
9.2.3	Special Conditions for Safe Use (IEC-Ex Certificate TUN 09.0001 X).....	46
9.2.4	Special Conditions for Safe Use (IEC-Ex Certificate IECEX TUN 12.0039 X).....	47
9.2.5	Special Conditions for Safe Use According to ANSI/ISA 12.12.01 ..	48
	List of Figures	49
	List of Tables.....	50

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 750-1500 (16DO 24V DC 0.5A, ribbon cable).

The I/O module 750-1500 shall only be installed and operated according to the instructions in this manual and in the manual for the used fieldbus coupler/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/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

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.

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 1: 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 2: Font Conventions

Font Type	Indicates
<i>italic</i>	Names of paths and data files are marked in italic-type. e.g.: <i>C:\Program Files\WAGO Software</i>
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 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.

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 WAGO-I/O-SYSTEM 750 in Compliance with Underlying Provisions

Fieldbus couplers, fieldbus 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 programmable 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/controller.

Appropriate housing (per 94/9/EG) 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.

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. 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 devices.

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

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 the device only in appropriate housings, cabinets or in electrical operation rooms!

The WAGO-I/O-SYSTEM 750 and its components are an open system. As such, install the system and its components exclusively in appropriate housings, cabinets or in electrical operation rooms. Allow access to such equipment and fixtures to authorized, qualified staff only by means of specific keys or tools.

NOTICE

Replace defective or damaged devices!

Replace defective or damaged device/module (e.g., in the event of deformed contacts), since the long-term functionality of device/module involved can no longer be ensured.

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 soiled contacts using oil-free compressed air or with ethyl alcohol and leather cloths.

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 750-1500 (16DO 24V DC 0.5A, ribbon cable) Digital Output Module transmits binary control signals from the automation device to the connected actuators (e.g., solenoid valves, contactors, transmitters, relays or other electrical loads).

The I/O module has 16 output channels and connects to electronic modules via 20-pin ribbon cable.

The assignment of the connections is described in the “Connectors” section. Suitable electronic modules are available as accessories from WAGO.

NOTICE

Limit all induced voltage!

The electronic components of the I/O module can be damaged by the induced voltage produced when inductive loads are de-activated.

An appropriate protection circuit, e.g., a recovery diode, must be installed in parallel to the load to limit this induced voltage.

NOTICE

Provide for overload protection!

Overloading can damage the electronic components of the I/O module.

Install an appropriate fuse to protect the I/O module against overloading!

The I/O module outputs provide high-side switching. If the signal status of an output channel is at “high” the 24 V potential for field power will be switched to the appropriate output connection.

A green LED indicates the switched status of each channel.

The meaning of the LEDs is described in the “Display Elements” section.

The 24 V power supply can be fed in via the 24 V and 0 V CAGE CLAMP[®] connectors, or as an alternative, via the electronic module's ribbon cable.

Note



Use a supply module!

Use a supply module for field-side power supply of downstream 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 750-1500 can be used with all fieldbus couplers/controllers of the WAGO-I/O-SYSTEM 750.

3.1 View

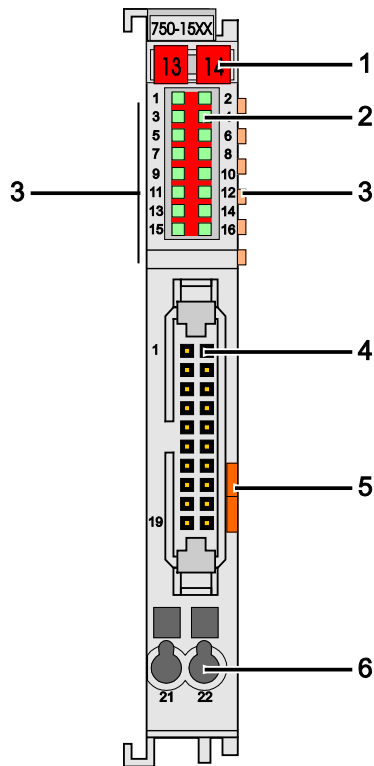


Figure 1: View

Table 3: 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	Connector	“Device Description” > “Connectors”
5	Release tab	“Mounting” > “Inserting and Removing Devices”
6	CAGE CLAMP® connectors	“Device Description” > “Connectors”

3.2 Connectors

3.2.1 Data Contacts/Internal 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 internal bus. It is comprised of 6 data contacts, which are available as self-cleaning gold spring contacts.

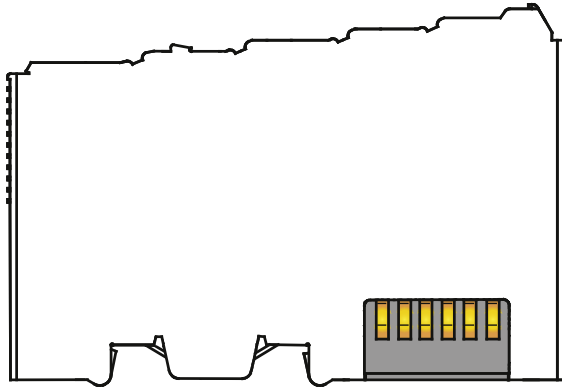


Figure 2: Data Contacts

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



Ensure that the environment is well grounded!

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

3.2.2 Ribbon Cable and CAGE CLAMP® Connectors

A 20-pole male connector is used to connect the field devices.
Via two CAGE CLAMP® connectors the field supply voltage is fed in.

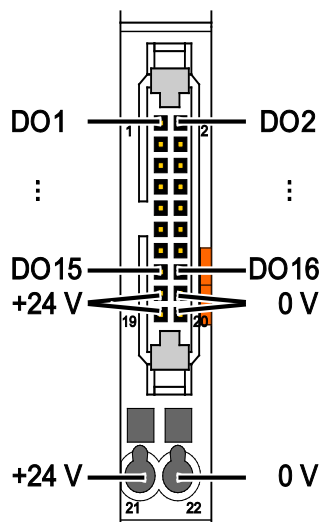


Figure 3: Connectors

Table 4: Legend for Figure “Connectors”

Channel	Designation	Connector	Function
1	Output DO 1	1	Output DO 1: Signal voltage
2	Output DO 2	2	Output DO 2: Signal voltage
			· · ·
15	Output DO 15	15	Output DO 15: Signal voltage
16	Output DO 16	16	Output DO 16: Signal voltage
-	+24 V	17, 19	Field supply voltage +24 V (transmission)
-	0 V	18, 20	Field supply voltage 0 V (transmission)
-	+24 V	21	Field supply voltage +24 V (feed-in)
-	0 V	22	Field supply voltage 0 V (feed-in)

3.3 Display Elements

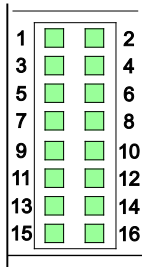


Figure 4: Display Elements

Table 5: Legend for Figure “Display Elements”

Channel	Designation	LED	State	Function
1	State DO1	1	Off	Output DO 1: Signal voltage (0)
			Green	Output DO 1: Signal voltage (1)
2	State DO 2	2	Off	Output DO 2: Signal voltage (0)
			Green	Output DO 2: Signal voltage (1)
⋮				
15	State DO 15	15	Off	Output DO 15: Signal voltage (0)
			Green	Output DO 15: Signal voltage (1)
16	State DO 16	16	Off	Output DO 16: Signal voltage (0)
			Green	Output DO 16: Signal voltage (1)

3.4 Operating Elements

The I/O module 750-1500 has no operating elements.

3.5 Schematic Diagram

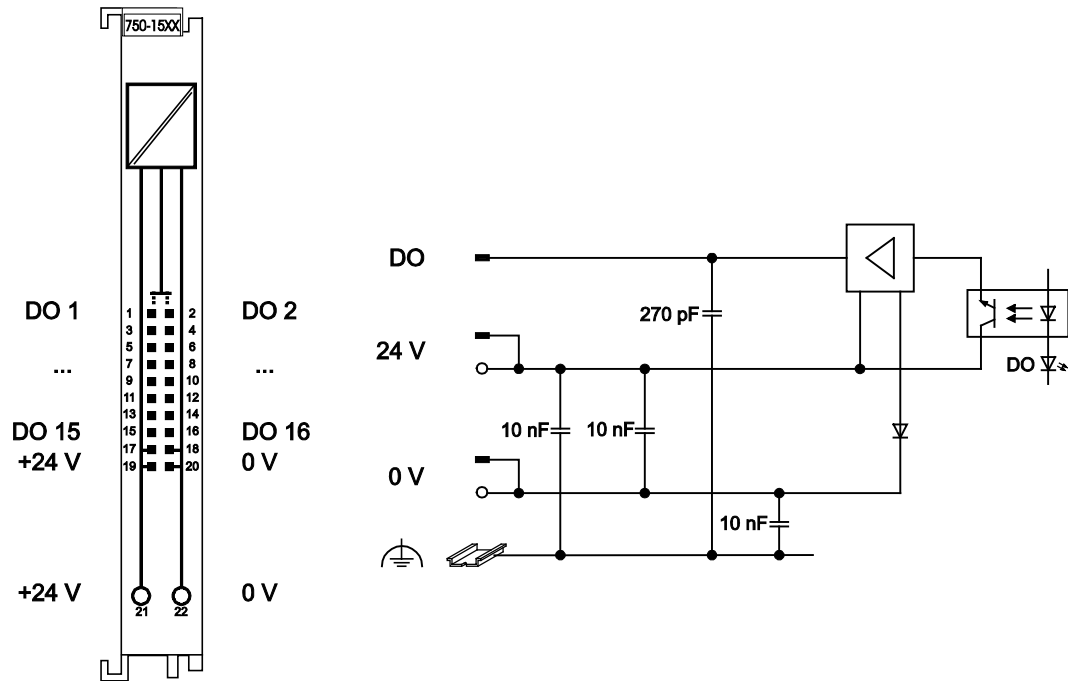


Figure 5: Schematic Diagram

3.6 Technical Data

3.6.1 Device

Table 6: Technical Data – Device

Width	12 mm
Height (from upper edge of 35 DIN rail)	73 mm
Depth	100 mm
Weight	50 g

3.6.2 Communication

Table 7: Technical Data – Communication

Bit width	16 bits
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3.6.3 Supply

Table 8: Technical Data – Supply

Voltage supply	Via system supply (internal bus) and CAGE CLAMP® connectors
Supply voltage (U _v) field supply	24 VDC (-25 % ... +30 %)
Current consumption field supply	approx. 29 mA
Current consumption system supply	approx. 40 mA
Isolation system/supply	500 V

3.6.4 Outputs

Table 9: Technical Data – Outputs

No. of outputs	16
Output type	High-side switching
Type of load	Lamps, resistive and inductive load
Switching frequency _{max.}	1 kHz
Output current _{max.} , 1 Output	0.5 A, short-circuit protected
L _{max.} (V _{cc} = 24 V, R _{Load} = 48 Ohm)	2 H
Voltage quenching circuit _{max.}	V _{cc} - 47 V

3.6.5 Connection Type

Table 10: Technical Data – Field Wiring

Wire connection	CAGE CLAMP®
Cross section	0.08 mm ² ... 2.5 mm ² , AWG 28 ... 14
Stripped lengths	8 mm ... 9 mm / 0.33 in

Table 11: Technical Data – Connection of Ribbon Cable

Connection of ribbon cable	20-pole male connector
----------------------------	------------------------

Table 12: Technical Data – Data Contacts

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

3.6.6 Climatic Environmental Conditions

Table 13: Technical Data – Climatic Environmental Conditions

Operating temperature range	0 °C ... 55 °C
Storage temperature range	-25 °C ... +85 °C
Relative humidity without condensation	Max. 95 %
Resistance to harmful substances	Acc. to IEC 60068-2-42 and IEC 60068-2-43
Maximum pollutant concentration at relative humidity < 75 %	SO ₂ ≤ 25 ppm H ₂ S ≤ 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 > SERVICES > DOWNLOADS > Additional documentation and information on automation products > WAGO-I/O-SYSTEM 750 > System Description.

The following approvals have been granted to 750-1500 I/O modules:



Conformity Marking



cUL_{US} UL508



Korea Certification

MSIP-REM-W43-DOM750

The following Ex approvals have been granted to 750-1500 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

Ambient temperature range: $0\text{ °C} \leq T_a \leq +60\text{ °C}$

IECE_x TUN 09.0001 X

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

Ambient temperature range: $0\text{ °C} \leq T_a \leq +60\text{ °C}$



cUL_{US} ANSI/ISA 12.12.01
Class I, Div2 ABCD T4

The following ship approvals have been granted to 750-1500 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

750-1500 I/O modules meet the following requirements on emission and immunity of interference:

EMC CE-Emission of interference acc. to EN 61000-6-3

EMC CE-Immunity to interference acc. to EN 61000-6-2

EMC marine applications-Emission of interference acc. to Germanischer Lloyd

EMC marine applications-Immunity to interference acc. to Germanischer Lloyd

4 Mounting

4.1 Mounting Sequence

Fieldbus couplers/controllers and I/O modules of the WAGO-I/O-SYSTEM 750/753 are snapped directly on a carrier rail in accordance with the European standard EN 50022 (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/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.

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/controllers to guarantee proper data transfer.

4.2 Inserting and Removing Devices

NOTICE

Perform work on devices only if they are de-energized!

Working on energized devices can damage them. Therefore, turn off the power supply before working on the devices.

4.2.1 Inserting the I/O Module

1. Position the I/O module so that the tongue and groove joints to the fieldbus coupler/controller or to the previous or possibly subsequent I/O module are engaged.

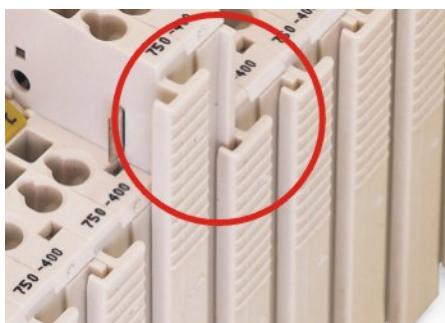


Figure 6: Insert I/O Module (Example)

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

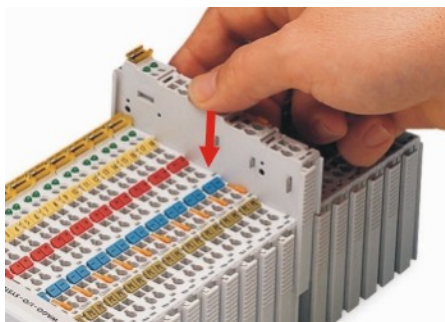


Figure 7: Snap the I/O Module into Place (Example)

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

4.2.2 Removing the I/O Module

1. Remove the I/O module from the assembly by pulling the release tab.

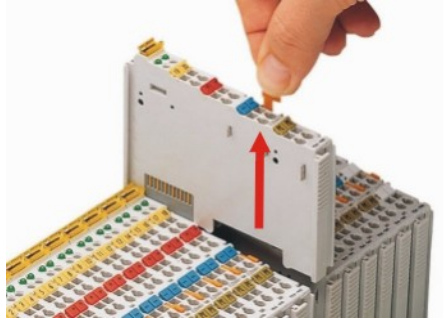


Figure 8: Removing the I/O Module (Example)

Electrical connections for data or power jumper contacts are disconnected when removing the I/O module.

5 Connect Devices

5.1 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.

Exception:

If it is unavoidable to jointly connect 2 conductors, then you must use a ferrule to join the wires together. The following ferrules can be used:

Length:	8 mm
Nominal cross section _{max.} :	1 mm ² for 2 conductors with 0.5 mm ² each
WAGO product:	216-103 or products with comparable properties

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.

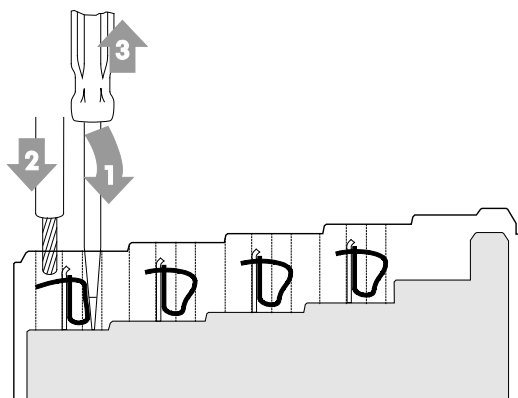


Figure 9: Connecting a Conductor to a CAGE CLAMP®

6 Process Image

Table 14: Output Bits 0 ... 7

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DO 8	DO 7	DO 6	DO 5	DO 4	DO 3	DO 2	DO 1
DO 1	Signal state DO 1 – Digital output channel 1						
DO 2	Signal state DO 2 – Digital output channel 2						
DO 3	Signal state DO 3 – Digital output channel 3						
DO 4	Signal state DO 4 – Digital output channel 4						
DO 5	Signal state DO 5 – Digital output channel 5						
DO 6	Signal state DO 6 – Digital output channel 6						
DO 7	Signal state DO 7 – Digital output channel 7						
DO 8	Signal state DO 8 – Digital output channel 8						

Table 15: Output Bits 8 ... 15

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
DO 16	DO 15	DO 14	DO 13	DO 12	DO 11	DO 10	DO 9
DO 9	Signal state DO 9 – Digital output channel 9						
DO 10	Signal state DO 10 – Digital output channel 10						
DO 11	Signal state DO 11 – Digital output channel 11						
DO 12	Signal state DO 12 – Digital output channel 12						
DO 13	Signal state DO 13 – Digital output channel 13						
DO 14	Signal state DO 14 – Digital output channel 14						
DO 15	Signal state DO 15 – Digital output channel 15						
DO 16	Signal state DO 16 – Digital output channel 16						

7 Accessories

The following electronic modules are available from WAGO as accessories for the 750-1500 I/O Module:

Table 16: Series 289 (Interface Modules)

Item-number	Description	Suitable WAGO-ribbon cable
289-611	Interface modules for ribbon cable acc. to IEC 603-1 / DIN 41651 IEC, 10 poles	706-7753/302-xxx
289-614	Interface modules for ribbon cable acc. to IEC 603-1 / DIN 41651 IEC, 20 poles	706-3057/300-xxx

Table 17: Series 704 (Interface Modules for System Wiring, 8 Channels)

Item-number	Description	Suitable WAGO-ribbon cable
704-5003	Relay output module with miniature switching relay, for DIN 35 rail, 8 channels, 1 changeover contact each (1 u) with integrated status indication, 10-pole ribbon cable connector acc. to DIN 41651	706-7753/302-xxx
704-5013	Relay output module with miniature switching relay, for DIN 35 rail, 8 channels, 1 changeover contact each (1 u) with integrated status indication and manual operation, 10-pole ribbon cable connector acc. to DIN 41651	706-7753/302-xxx

Table 18: Series 704 (Interface Modules for System Wiring, 16 Channels)

Item-number	Description	Suitable WAGO-ribbon cable
704-5004	Relay output module with miniature switching relay, for DIN 35 rail, 16 channels, 1 changeover contact each (1 u) with integrated status indication, 20-pole ribbon cable connector acc. to DIN 41651	706-3057/300-xxx
704-5014	Relay output module without miniature switching relay, for DIN 35 rail, 16 channels, 1 changeover contact each (1 u) with integrated status indication, 20-pole ribbon cable connector acc. to DIN 41651	706-3057/300-xxx
704-5024	Relay output module with miniature switching relay, for DIN 35 rail, 16 channels, 1 changeover contact each (1 u) with integrated status indication, 20-pole ribbon cable connector acc. to DIN 41651	706-3057/300-xxx
704-5034	Relay output module with miniature switching relay, for DIN 35 rail, 16 channels, 1 changeover contact each (1 u) with integrated status indication and output fuse, 20-pole ribbon cable connector acc. to DIN 41651	706-3057/300-xxx
704-5044	Relay output module with miniature switching relay, for DIN 35 rail, 16 channels, 1 changeover contact each (1 u) with integrated status indication and manual operation, 20-pole ribbon cable connector acc. to DIN 41651	706-3057/300-xxx
704-5054	Relay output module with miniature switching relay, for DIN 35 rail, 16 channels, 1 make contact each (1 a) with integrated status indication, disconnect terminal block and output fuse, 20-pole ribbon cable connector acc. to DIN 41651	706-3057/300-xxx
704-5064	Relay output module with miniature switching relay, for DIN 35 rail, 16 channels, 2 changeover contacts each (2 u) with integrated status indication, 20-pole ribbon cable connector acc. to DIN 41651	706-3057/300-xxx
704-5074	Relay output module with miniature switching relay, for DIN 35 rail, 16 channels, 1 make contact each (1 a) with integrated status indication, double disconnect terminal block and output fuse, 20-pole ribbon cable connector acc. to DIN 41651	706-3057/300-xxx

Table 19: Series 857 (JUMPFLEX® Adapter for System Cables, Input)

Item-number	Description	Suitable WAGO-ribbon cable
857-981	JUMPFLEX® 8-Way Adapter for System Cables, with 14-pin flat cable connector, Input, positive switching	706-7753/301-xxx

The following WAGO ribbon cables are available for connecting the interface or relay modules to the 750-1500 I/O Module:

Table 20: Series 706 (WAGO Ribbon Cable)

Item-number	Description	Length
706-3057/300-100	WAGO ribbon cable 20/20, one 20-pole female connector at both ends	1 m
706-3057/300-200	WAGO ribbon cable 20/20, one 20-pole female connector at both ends	2 m
706-3057/300-300	WAGO ribbon cable 20/20, one 20-pole female connector at both ends	3 m
706-7753/302-100	WAGO ribbon cable 20/2x10, one 20-pole and two 10-pole female connectors at the ends	1 m
706-7753/302-200	WAGO ribbon cable 20/2x10, one 20-pole and two 10-pole female connectors at the ends	2 m

8 Using Interference-Free I/O Modules in Safety Related Applications

The 750-1500 I/O module is suited for use in interference-free safety circuits.

If the field side supply is shut down via a safety switching device, the safety function of the module is not active.

When the interference-free I/O module is used correctly in a safety related application, neither the SIL nor Performance Level achieved by the circuit nor the category will be influenced.

This requires that you adhere to the following notes and connection diagrams!

8.1 Important Notes

WARNING

Use PELV supply only!

Only a power supply unit with protective extra-low voltage (PELV) shall be used for the 24 V power supply.

WARNING

Note maximum voltage!

Please note that a maximum voltage U_{\max} only can act on the reaction-free I/O module in the event of a failure because irreparable damage could occur to the module otherwise.

For the reaction-free I/O module, the field supply voltage is:

$$U_{\max} < 32 \text{ V}$$

NOTICE

Note IP54 protection class!

IP54 protection class is absolutely mandatory. This means that the interference-free digital output module shall only be integrated and operated in switch boxes or switch cabinets complying with IP54 or higher.

NOTICE

Avoid reverse supply of output!

The 24 V power supply shall never be applied to the output of an interference-free digital output module. This wiring failure will not be detected by the system.

NOTICE

Avoid reverse supply of module!

A group of interference-free digital output modules shall only be supplied using a safety switching device. Reverse supply must absolutely be avoided.

NOTICE

Avoid short circuits between outputs!

Short circuits between outputs of different interference-free digital output modules must absolutely be avoided as they are not detected by the system.

According to EN ISO 13849-2, the following measures are required for an “external voltage” fault exclusion:

- Use of cables routed separately and
- Protection from external damage (e.g., caused by cable duct).

8.2 Connecting the I/O Module to Safety Switching Devices or Safety Modules

8.2.1 General Structure of a Potential Group

When using the interference-free I/O module 750-1500 in safety related applications, the modules belonging to a safety switching device shall be combined to form a potential group. Power to the potential group shall be supplied via a power supply module 750-601 or 750-602 or via filter module 750-626. Either a power supply module or a separation module without power jumper contacts (750-616) must be connected at the end of the potential group.

Safety switch module/
Safety module

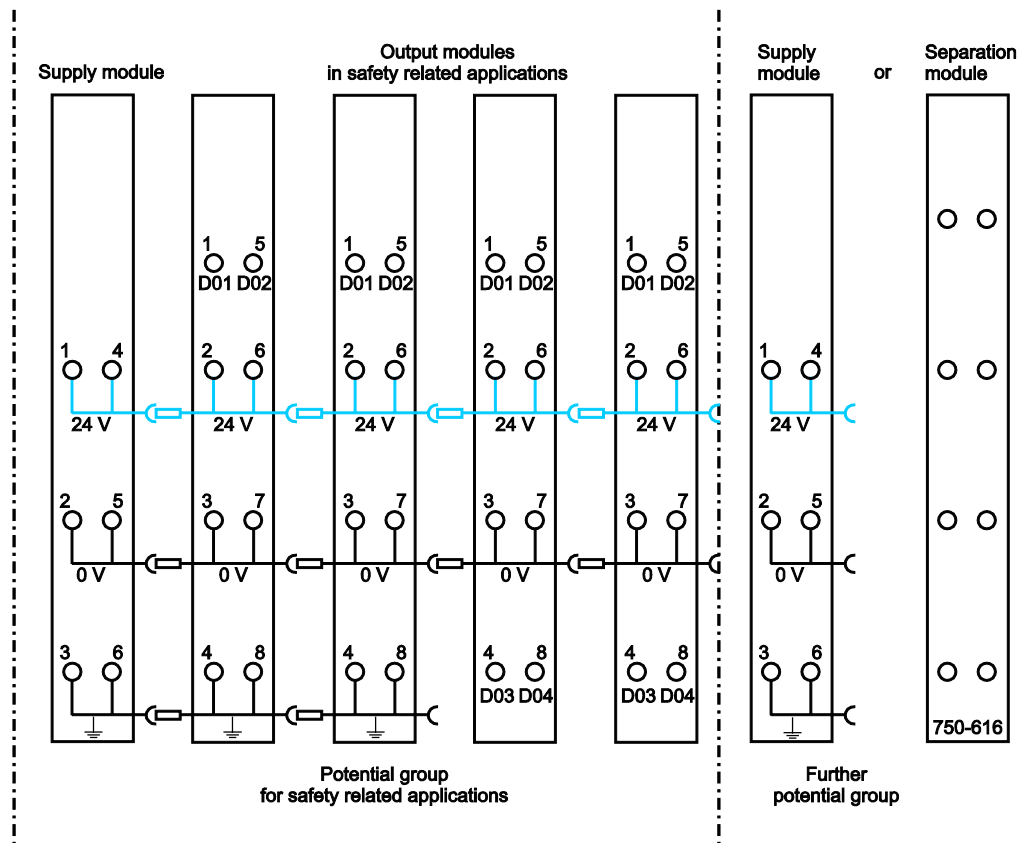


Figure 10: Potential Group for Safety Related Applications

8.2.2 Examples of Connection

Two-Channel Single-Pole Power Supply Disconnection

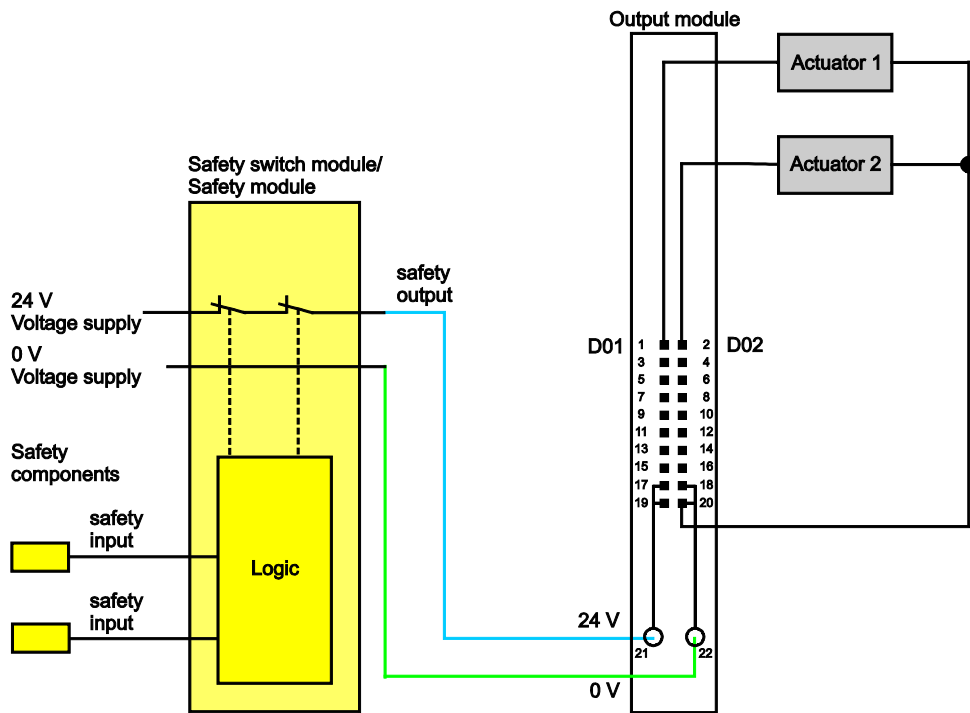


Figure 11: Two-Channel Single-Pole Disconnection

Two-Channel Double-Pole Power Supply Disconnection

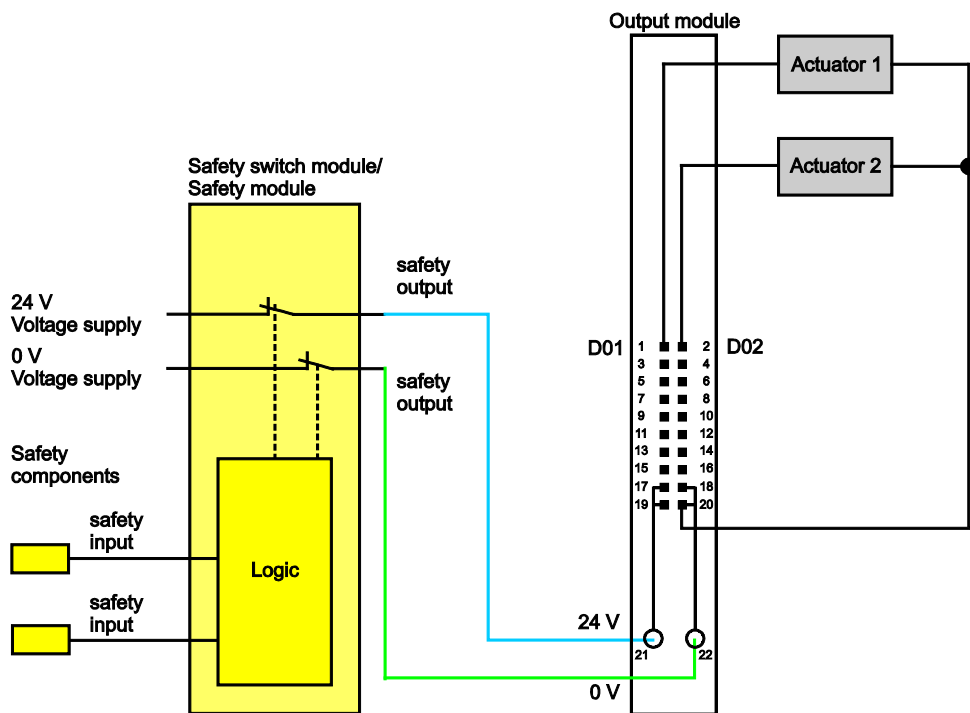


Figure 12: Two-Channel Double-Pole Disconnection

9 Use in Hazardous Environments

The **WAGO-I/O-SYSTEM 750** (electrical equipment) is designed for use in Zone 2 hazardous areas.

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 IEC-Ex

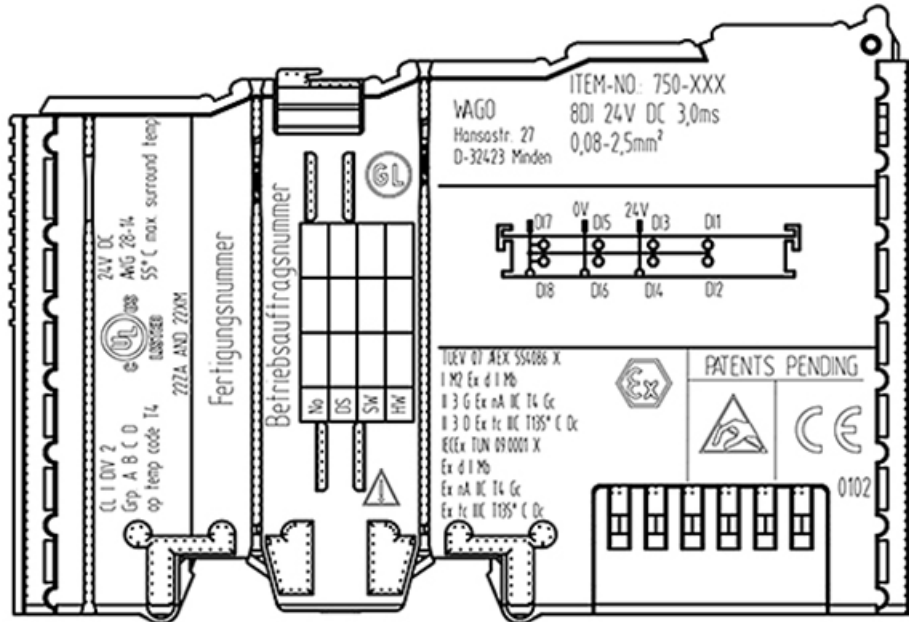


Figure 13: Side Marking Example for Approved I/O Modules According to ATEX and IECEx

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




Figure 14: Text Detail – Marking Example for Approved I/O Modules According to ATEX and IECEx.

Table 21: Description of Marking Example for Approved I/O Modules According to ATEX and IECEx

Printing on Text	Description
TÜV 07 ATEX 554086 X IECEx TUN 09.0001 X	Approving authority and certificate numbers
Dust	
II	Equipment group: All except mining
3D	Category 3 (Zone 22)
Ex	Explosion protection mark
tc Dc	Type of protection and equipment protection level (EPL): protection by enclosure
IIIC	Explosion group of dust
T 135°C	Max. surface temperature of the enclosure (without a dust layer)
Mining	
I	Equipment group: Mining
M2	Category: High level of protection
Ex	Explosion protection mark
d Mb	Type of protection and equipment protection level (EPL): Flameproof enclosure
I	Explosion group for electrical equipment for mines susceptible to firedamp
Gases	
II	Equipment group: All except mining
3G	Category 3 (Zone 2)
Ex	Explosion protection mark
nA Gc	Type of protection and equipment protection level (EPL): Non-sparking equipment
nC Gc	Type of protection and equipment protection level (EPL): Sparking apparatus with protected contacts. A device which is so constructed that the external atmosphere cannot gain access to the interior
IIIC	Explosion group of gas and vapours
T4	Temperature class: Max. surface temperature 135°C

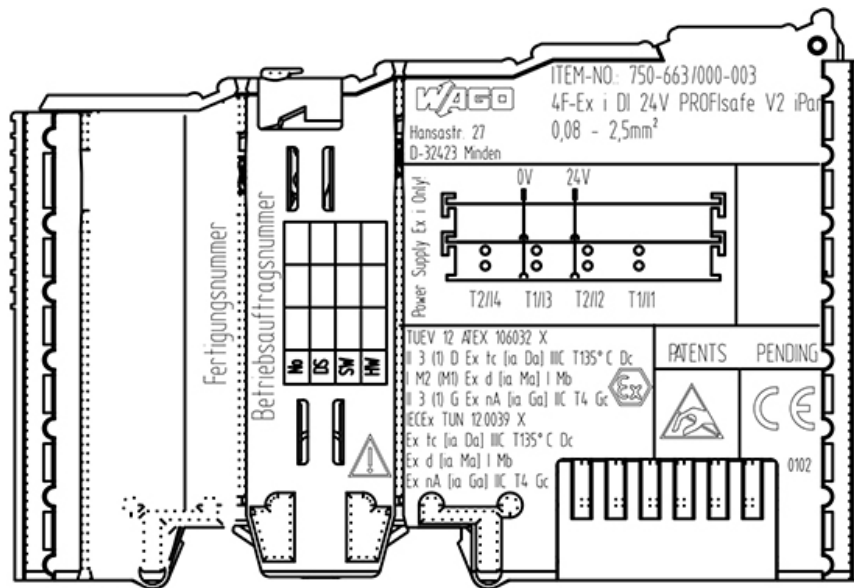


Figure 15: Side Marking Example for Approved Ex i I/O Modules According to ATEX and IECEX.


TUEV 12 ATEX 106032 X
 II 3 (1) D Ex tc [ia Da] IIC T135° C Dc
 I M2 (M1) Ex d [ia Ma] I Mb
 II 3 (1) G Ex nA [ia Ga] IIC T4 Gc 
 IECEX TUN 12.0039 X
 Ex tc [ia Da] IIC T135° C Dc
 Ex d [ia Ma] I Mb
 Ex nA [ia Ga] IIC T4 Gc

Figure 16: Text Detail – Marking Example for Approved Ex i I/O Modules According to ATEX and IECEX.

Table 22: Description of Marking Example for Approved Ex i I/O Modules According to ATEX and IECEx

Inscription Text	Description
TÜV 07 ATEX 554086 X IECEx TUN 09.0001X	Approving authority and certificate numbers
TÜV 12 ATEX 106032 X IECEx TUN 12.0039 X	
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
3(2)D	Category 3 (Zone 22) equipment containing a safety device for a category 2 (Zone 21) equipment
Ex	Explosion protection mark
tc Dc	Type of protection and equipment protection level (EPL): protection by enclosure
[ia Da]	Type of protection and equipment protection level (EPL): associated apparatus with intrinsic safety circuits for use in Zone 20
[ib Db]	Type of protection and equipment protection level (EPL): associated apparatus with intrinsic safety circuits for use in Zone 21
IIIC	Explosion group of dust
T 135°C	Max. surface temperature of the enclosure (without a dust layer)
Mining	
I	Equipment Group: Mining
M2 (M1)	Category: High level of protection with electrical circuits which present a very high level of protection
Ex d Mb	Explosion protection mark with Type of protection and equipment protection level (EPL): 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

Table 22: Description of Marking Example for Approved Ex i I/O Modules According to ATEX and IECEx

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
3(2)G	Category 3 (Zone 2) equipment containing a safety device for a category 2 (Zone 1) equipment
Ex	Explosion protection mark
nA Gc	Type of protection and equipment protection level (EPL): Non-sparking equipment
[ia Ga]	Type of protection and equipment protection level (EPL): associated apparatus with intrinsic safety circuits for use in Zone 0
[ia Gb]	Type of protection and equipment protection level (EPL): associated apparatus with intrinsic safety circuits for use in Zone 1
IIC	Explosion group of gas and vapours
T4	Temperature class: Max. surface temperature 135°C

9.1.2 Marking for America According to NEC 500

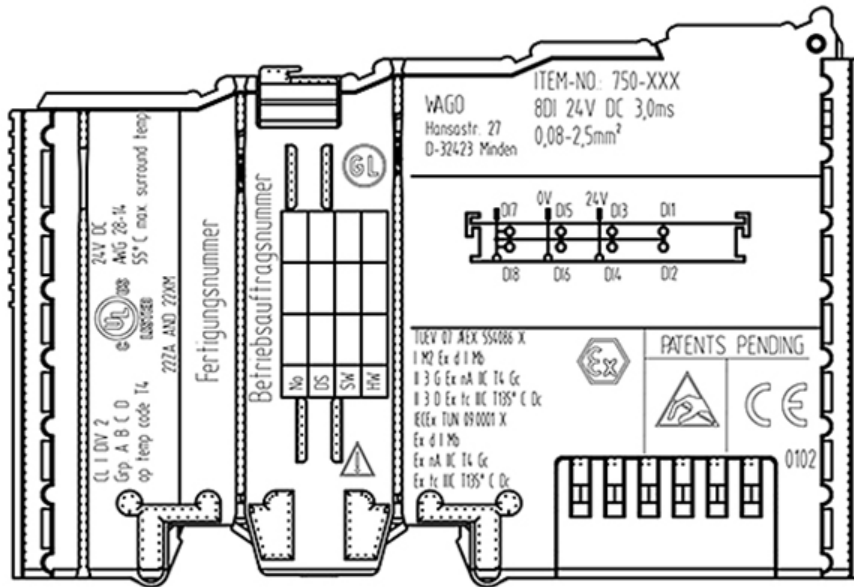


Figure 17: Side Marking Example for I/O Modules According to NEC 500

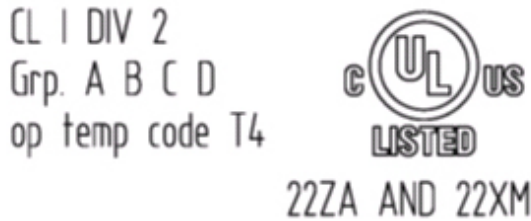


Figure 18: Text Detail – Marking Example for Approved I/O Modules According to NEC 500

Table 23: Description of Marking Example for Approved I/O Modules According to NEC 500

Printing on Text	Description
CL I	Explosion protection group (condition of use category)
DIV 2	Area of application
Grp. ABCD	Explosion group (gas group)
Op temp code T4	Temperature class

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 Conditions for Safe Use (ATEX Certificate TÜV 07 ATEX 554086 X)

1. For use as Gc- or Dc-apparatus (in zone 2 or 22) the Field bus Independent I/O Modules WAGO-I/O-SYSTEM 750-*** shall be erected in an enclosure that fulfils the requirements of the applicable standards (see the marking) EN 60079-0, EN 60079-11, EN 60079-15 and EN 60079-31. For use as group I electrical apparatus M2 the apparatus shall be erected in an enclosure that ensures a sufficient protection according to EN 60079-0 and EN 60079-1 and the degree of protection IP64. The compliance of these requirements and the correct installation into an enclosure or a control cabinet of the devices shall be certified by an ExNB.
2. Measures have to be taken outside of the device that the rating voltage is not being exceeded of more than 40 % because of transient disturbances.
3. Dip-switches, binary-switches and potentiometers, connected to the module may only be actuated when explosive atmosphere can be excluded.
4. The connecting and disconnecting of the non-intrinsically safe circuits is only permitted during installation, for maintenance or for repair purposes. The temporal coincidence of explosion hazardous atmosphere and installation, maintenance resp. repair purposes shall be excluded. This is although and in particular valid for the interfaces “Memory-Card”, “USB”, “Fieldbus connection”, “Configuration and programming interface”, “antenna socket”, “D-Sub”, “DVI-port” and the “Ethernet interface”. These interfaces are not energy limited or intrinsically safe circuits. An operating of those circuits is in the behalf of the operator.
5. For the types 750-606, 750-625/000-001, 750-487/003-000, 750-484 and 750-633 the following shall be considered: The Interface circuits shall be limited to overvoltage category I/II/III (non mains/mains circuits) as defined in EN 60664-1.
6. For replaceable fuses the following shall be considered: Do not remove or replace the fuse when the apparatus is energized.
7. The following warnings shall be placed nearby the unit:
WARNING – DO NOT REMOVE OR REPLACE FUSE WHEN ENERGIZED
WARNING – DO NOT SEPARATE WHEN ENERGIZED
WARNING – SEPARATE ONLY IN A NON-HAZARDOUS AREA

9.2.2 Special Conditions for Safe Use (ATEX Certificate TÜV 12 ATEX 106032 X)

1. For use as Gc- or Dc-apparatus (in zone 2 or 22) the Field bus Independent I/O Modules WAGO-I/O-SYSTEM 750-*** Ex i shall be erected in an enclosure that fulfils the requirements of the applicable standards (see the marking) EN 60079-0, EN 60079-11, EN 60079-15 and EN 60079-31. For use as group I electrical apparatus M2 the apparatus shall be erected in an enclosure that ensures a sufficient protection according to EN 60079-0 and EN 60079-1 and the degree of protection IP64. The compliance of these requirements and the correct installation into an enclosure or a control cabinet of the devices shall be certified by an ExNB.
2. Measures have to be taken outside of the device that the rating voltage is not being exceeded of more than 40 % because of transient disturbances.
3. The connecting and disconnecting of the non-intrinsically safe circuits is only permitted during installation, for maintenance or for repair purposes. The temporal coincidence of explosion hazardous atmosphere and installation, maintenance resp. repair purposes shall be excluded.
4. For the type the following shall be considered: The Interface circuits shall be limited to overvoltage category I/II/III (non mains/mains circuits) as defined in EN 60664-1.

9.2.3 Special Conditions for Safe Use (IEC-Ex Certificate TUN 09.0001 X)

1. For use as Gc- or Dc-apparatus (in zone 2 or 22) the Field bus Independent I/O Modules WAGO-I/O-SYSTEM 750-*** shall be erected in an enclosure that fulfils the requirements of the applicable standards (see the marking) IEC 60079-0, IEC 60079-11, IEC 60079-15 and IEC 60079-31. For use as group I electrical apparatus M2 the apparatus shall be erected in an enclosure that ensures a sufficient protection according to IEC 60079-0 and IEC 60079-1 and the degree of protection IP64.
The compliance of these requirements and the correct installation into an enclosure or a control cabinet of the devices shall be certified by an ExCB.
2. Measures have to be taken outside of the device that the rating voltage is not being exceeded of more than 40 % because of transient disturbances.
3. DIP-switches, binary-switches and potentiometers, connected to the module may only be actuated when explosive atmosphere can be excluded.
4. The connecting and disconnecting of the non-intrinsically safe circuits is only permitted during installation, for maintenance or for repair purposes. The temporal coincidence of explosion hazardous atmosphere and installation, maintenance resp. repair purposes shall be excluded.
This is although and in particular valid for the interfaces “Memory-Card”, “USB”, “Fieldbus connection”, “Configuration and programming interface”, “antenna socket”, “D-Sub”, “DVI-port” and the “Ethernet interface”. These interfaces are not energy limited or intrinsically safe circuits. An operating of those circuits is in the behalf of the operator.
5. For the types 750-606, 750-625/000-001, 750-487/003-000, 750-484 and 750-633 the following shall be considered: The Interface circuits shall be limited to overvoltage category I/II/III (non mains/mains circuits) as defined in IEC 60664-1.
6. For replaceable fuses the following shall be considered: Do not remove or replace the fuse when the apparatus is energized.
7. The following warnings shall be placed nearby the unit:
WARNING – DO NOT REMOVE OR REPLACE FUSE WHEN ENERGIZED
WARNING – DO NOT SEPARATE WHEN ENERGIZED
WARNING – SEPARATE ONLY IN A NON-HAZARDOUS AREA

9.2.4 Special Conditions for Safe Use (IEC-Ex Certificate IECEx TUN 12.0039 X)

1. For use as Gc- or Dc-apparatus (in zone 2 or 22) the Field bus independent I/O Modules WAGO-I/O-SYSTEM 750-*** Ex i shall be erected in an enclosure that fulfils the requirements of the applicable standards (see the marking) IEC 60079-0, IEC 60079-11, IEC 60079-15, IEC 60079-31.
For use as group I electrical apparatus M2 the apparatus shall be erected in an enclosure that ensures a sufficient protection according to IEC 60079-0 and IEC 60079-1 and the degree of protection IP64.
The compliance of these requirements and the correct installation into an enclosure or a control cabinet of the devices shall be certified by an ExCB.
2. Measures have to be taken outside of the device that the rating voltage is not being exceeded of more than 40 % because of transient disturbances.
3. The connecting and disconnecting of the non-intrinsically safe circuits is only permitted during installation, for maintenance or for repair purposes. The temporal coincidence of explosion hazardous atmosphere and installation, maintenance resp. repair purposes shall be excluded.
4. For the type the following shall be considered: The Interface circuits shall be limited to overvoltage category I/II/III (non mains/mains circuits) as defined in IEC 60664-1.

9.2.5 Special Conditions for Safe Use According to ANSI/ISA 12.12.01

- A. “This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only.”
- B. “This equipment is to be fitted within tool-secured enclosures only.”
- C. “WARNING Explosion hazard - substitution of components may impair suitability for Class I, Div. 2.”
- D. “WARNING – Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous” has to be placed near each operator accessible connector and fuse holder.
- E. When a fuse is provided, the following information shall be provided: “A switch suitable for the location where the equipment is installed shall be provided to remove the power from the fuse.”
- F. For devices with EtherCAT/Ethernet connectors “Only for use in LAN, not for connection to telecommunication circuits.”
- G. “WARNING - Use Module 750-642 only with antenna module 758-910.”
- H. For Couplers/Controllers and Economy bus modules only: The instructions shall contain the following: “The configuration interface Service connector is for temporary connection only. Do not connect or disconnect unless the area is known to be non-hazardous. Connection or disconnection in an explosive atmosphere could result in an explosion.”
- I. Modules containing fuses only: “WARNING - Devices containing fuses must not be fitted into circuits subject to over loads, e.g. motor circuits.”
- J. Modules containing SD card reader sockets only: “WARNING - Do not connect or disconnect SD-Card while circuit is live unless the area is known to be free of ignitable concentrations of flammable gases or vapors.”

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

Figure 1: View	15
Figure 2: Data Contacts	16
Figure 3: Connectors	17
Figure 4: Display Elements	18
Figure 5: Schematic Diagram	19
Figure 6: Insert I/O Module (Example)	25
Figure 7: Snap the I/O Module into Place (Example)	25
Figure 8: Removing the I/O Module (Example)	26
Figure 9: Connecting a Conductor to a CAGE CLAMP®	27
Figure 10: Potential Group for Safety Related Applications	34
Figure 11: Two-Channel Single-Pole Disconnection	35
Figure 12: Two-Channel Double-Pole Disconnection	35
Figure 13: Side Marking Example for Approved I/O Modules According to ATEX and IECEX	37
Figure 14: Text Detail – Marking Example for Approved I/O Modules According to ATEX and IECEX	37
Figure 15: Side Marking Example for Approved Ex i I/O Modules According to ATEX and IECEX	39
Figure 16: Text Detail – Marking Example for Approved Ex i I/O Modules According to ATEX and IECEX	39
Figure 17: Side Marking Example for I/O Modules According to NEC 500	42
Figure 18: Text Detail – Marking Example for Approved I/O Modules According to NEC 500	42

List of Tables

Table 1: Number Notation.....	8
Table 2: Font Conventions	8
Table 3: Legend for Figure “View”	15
Table 4: Legend for Figure “Connectors”	17
Table 5: Legend for Figure “Display Elements”	18
Table 6: Technical Data – Device	20
Table 7: Technical Data – Communication.....	20
Table 8: Technical Data – Supply	20
Table 9: Technical Data – Outputs.....	20
Table 10: Technical Data – Field Wiring.....	21
Table 11: Technical Data – Connection of Ribbon Cable.....	21
Table 12: Technical Data – Data Contacts	21
Table 13: Technical Data – Climatic Environmental Conditions	21
Table 14: Output Bits 0 ... 7	28
Table 15: Output Bits 8 ... 15	28
Table 16: Series 289 (Interface Modules)	29
Table 17: Series 704 (Interface Modules for System Wiring, 8 Channels)	29
Table 18: Series 704 (Interface Modules for System Wiring, 16 Channels)	30
Table 19: Series 857 (JUMPFLEX® Adapter for System Cables, Input)	30
Table 20: Series 706 (WAGO Ribbon Cable).....	31
Table 21: Description of Marking Example for Approved I/O Modules According to ATEX and IECEx	38
Table 22: Description of Marking Example for Approved Ex i I/O Modules According to ATEX and IECEx	40
Table 23: Description of Marking Example for Approved I/O Modules According to NEC 500	42

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