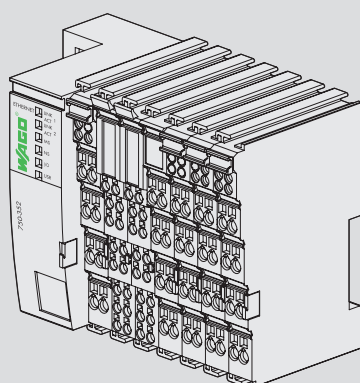


Installation Manual

WAGO-I/O-SYSTEM 750 with SMA DATA MANAGER M



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1 Information on this Document

1.1 Validity

This document is valid for:

- EDMM-10 (SMA Data Manager M)
- WAGO-I/O-SYSTEM 750 configured for EDMM-10 (SMA order number: 115214-00.01)

1.2 Target Group

The tasks described in this document must only be performed by qualified persons. Qualified persons must have the following skills:

- Training in the installation and configuration of IT systems
- Training in how to deal with the dangers and risks associated with installing, repairing and using electrical devices and installations
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of all applicable laws, standards and directives
- Knowledge of and compliance with this document and all safety information

1.3 Content and Structure of this Document

This document supplements the documents that are enclosed with each product and does not replace any locally applicable codes or standards. Read and observe all documents supplied with the product.

Illustrations in this document are reduced to the essential information and may deviate from the real product.

1.4 Levels of Warning Messages

The following levels of warning messages may occur when handling the product.

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.




CAUTION


Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates a situation which, if not avoided, can result in property damage.

1.5 Symbols in the Document

Symbol	Explanation
	Information that is important for a specific topic or goal, but is not safety-relevant
	Indicates a requirement for meeting a specific goal
	Desired result

Symbol	Explanation
✘	A problem that might occur
	Example

1.6 Typographies in the Document

Typography	Use	Example
bold	<ul style="list-style-type: none"> • Messages • Terminals • Elements on a user interface • Elements to be selected • Elements to be entered 	<ul style="list-style-type: none"> • Connect the insulated conductors to the terminals X703:1 to X703:6. • Enter 10 in the field Minutes.
>	<ul style="list-style-type: none"> • Connects several elements to be selected 	<ul style="list-style-type: none"> • Select Settings > Date.
[Button] [Key]	<ul style="list-style-type: none"> • Button or key to be selected or pressed 	<ul style="list-style-type: none"> • Select [Enter].
#	<ul style="list-style-type: none"> • Placeholder for variable components (e.g., parameter names) 	<ul style="list-style-type: none"> • Parameter WCtHz.Hz#

2 Safety

2.1 Intended Use

The WAGO-I/O-SYSTEM 750 is used to receive digital and analog signals from sensors and output them to actuators. The WAGO-I/O-SYSTEM 750 and the assembled I/O modules were developed for a working environment that complies with the IP20 degree of protection. It is equipped with a finger guard and protection against solid foreign objects ≥ 12.5 mm; however it is not protected against water.

In order to operate the product in potentially explosive atmospheres, corresponding enclosure protection is required in accordance with the Directive 2014/34/EU. Furthermore, please note that a type examination certificate must be obtained that confirms the correct installation of the system in the enclosure or switch cabinet.

The product is designed for indoor use only.

Use SMA products only in accordance with the information provided in the enclosed documentation and with the locally applicable laws, regulations, standards and directives. Any other application may cause personal injury or property damage.

Alterations to the SMA products, e.g., changes or modifications, are only permitted with the express written permission of SMA Solar Technology AG. Unauthorized alterations will void guarantee and warranty claims and in most cases terminate the operating license. SMA Solar Technology AG shall not be held liable for any damage caused by such changes.

Any use of the product other than that described in the Intended Use section does not qualify as the intended use.

The enclosed documentation is an integral part of this product. Keep the documentation in a convenient, dry place for future reference and observe all instructions contained therein.

This document does not replace and is not intended to replace any local, state, provincial, federal or national laws, regulations or codes applicable to the installation, electrical safety and use of the product. SMA Solar Technology AG assumes no responsibility for the compliance or non-compliance with such laws or codes in connection with the installation of the product.

The type label must remain permanently attached to the product.

2.2 IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This section contains safety information that must be observed at all times when working.

The product has been designed and tested in accordance with international safety requirements. As with all electrical or electronical devices, there are residual risks despite careful construction. To prevent personal injury and property damage and to ensure long-term operation of the product, read this section carefully and observe all safety information at all times.

DANGER

Danger to life due to electric shock when live components or cables are touched

High voltages are present in the conductive components or cables of the product. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Do not touch non-insulated parts or cables.
- Disconnect the product from voltage sources and make sure it cannot be reconnected before working on the device.
- Observe the prescribed minimum clearance between the network cable and live installation components, or use suitable insulation.
- Observe all safety information on components associated with the product.
- Wear suitable personal protective equipment for all work on the product.
- Always perform all work in accordance with the locally applicable standards, directives and laws.

NOTICE**Damage to the product due to condensation**

If the product is moved from a cold environment to a warm environment, condensation may form in the product. This can damage the product or impair its functionality.

- When there are large temperature differences, wait until the product has reached room temperature to connect the voltage supply.
- Make sure the product is dry.

NOTICE**Damage to electronic components due to electrostatic discharge**

Electrostatic discharge can damage or destroy electronic components.

- Observe the ESD safety regulations when working on the product.
- Wear suitable personal protective equipment for all work on the product.
- Discharge electrostatic charge by touching grounded elements. Only then is it safe to touch electronic components.

NOTICE**Damage to the product due to cleaning agents**

The use of cleaning agents may cause damage to the product and its components.

- Clean the product and any dirty contacts on the product with Propanol.
- Do not treat dirty contacts on the product with contact cleaners.

i DHCP Server is recommended.

The DHCP server automatically assigns the appropriate network settings to your nodes in the local network. A manual network configuration is therefore not necessary. In a local network, the Internet router is usually the DHCP server. If the IP addresses in the local network are to be assigned dynamically, DHCP must be activated in the Internet router (see the Internet router manual). In order to receive the same IP address by the internet router after a restart, set the MAC address binding.

In networks where no DHCP server is active, proper IP addresses must be assigned from the free address pool of the network segment to all network participants to be integrated during commissioning.

i Use of Ethernet devices

Please observe the following information if you use Ethernet devices in your system:

- Do not connect the control components and control networks with an open network such as the Internet. Always install control components and control networks behind a firewall.
- Restrict physical and electronic access to all automation components to a group of authorized persons.
- Be sure to change any automatically generated passwords before initial commissioning. This will reduce the risk of unauthorized persons gaining access to your system.
- Regularly change your passwords. This will reduce the risk of unauthorized persons gaining access to your system.
- If remote access to control components and control networks is required, use a virtual private network (VPN) whenever possible.
- Carry out regular threat assessments. This will allow you to make sure that the measures in place match your protection needs.
- When it comes to the safety-oriented design of your system, use defense in depth mechanisms to restrict access to and control of individual products and networks.

3 Scope of Delivery

Check the scope of delivery for completeness and any externally visible damage. Contact your distributor if the scope of delivery is incomplete or damaged.

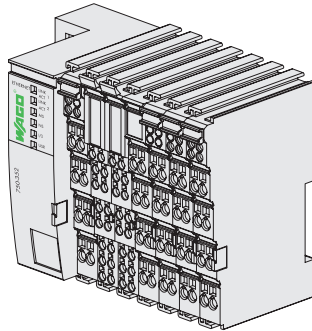


Figure 1: Components included in the scope of delivery

Quantity	Designation
1	WAGO-I/O-SYSTEM 750

4 Product Overview

4.1 WAGO-I/O-SYSTEM 750

The WAGO-I/O-SYSTEM 750 is a modular, fieldbus-independent input/output system (I/O system). The configuration consists of a fieldbus coupler, supply module, and the assembled I/O modules for any signal type. These I/O modules together make up the fieldbus node. The bus end terminal completes the fieldbus node and is required for correct operation.

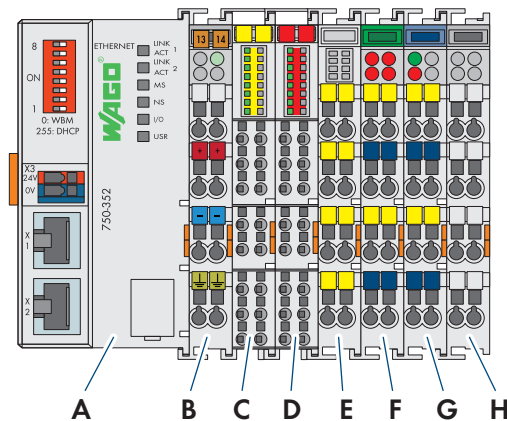


Figure 2: WAGO-I/O-SYSTEM 750 configuration

Position	Designation	Type
A	Ethernet fieldbus coupler	750-352 / 750-362
B	DC 24 V supply module	750-602
C	8-channel DC 24 V digital input terminal	750-1415
D	8-channel DC 24 V digital output terminal	750-1515
E	2/4-channel analog input terminal 2 TempIN (PT100)	750-464
F	4-channel analog input terminal 4 mA to 20 mA	750-455
G	4-channel analog output terminal 0 mA to 20 mA	750-553
H	Bus end terminal	750-600

4.2 Fieldbus coupler

The fieldbus coupler 750-352 or 750-362 combines the modular WAGO-I/O-SYSTEM with Ethernet.

The fieldbus coupler detects which I/O modules are plugged in and uses them to generate a local process image, which corresponds to the Modbus profile in Data Manager M. The two RJ45 ports, which both function as 2-channel network switches, make it easy to wire the fieldbus in a line topology. This eliminates the need for additional components such as network switches or Ethernet hubs.

The interfaces can be connected to any Ethernet system. The data transfer rate and pin assignment are determined automatically. The IP address is assigned via DHCP by default. Alternatively, the address selection can be used to assign the last byte of the IP address as well as the use of a fixed IP address. The fieldbus coupler is suitable for fieldbus communication with Modbus TCP.

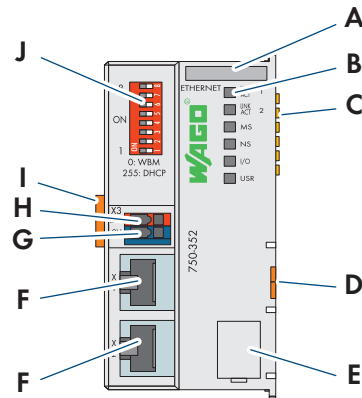


Figure 3: Fieldbus coupler configuration

Position	Designation
A	Labeling option with Mini WSB
B	Status LEDs
C	Data contacts
D	Release tab
E	Service interface (flap)
F	Fieldbus connection 2 x RJ-45 as a 2-port Ethernet switch
G	CAGE CLAMP® connections, system supply, 0 V
H	CAGE CLAMP® connections, system supply, DC 24 V
I	Locking disc
J	Address selection switch

LEDs

The operating state of the fieldbus coupler and the entire node is indicated using LEDs. In some cases, the LEDs are multi-colored (red, green, or red/green/orange).

For the diagnostics of the different areas for the fieldbus coupler and fieldbus nodes, the LEDs can be divided into corresponding groups.

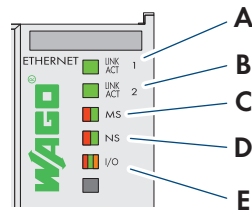


Figure 4: Fieldbus coupler LEDs

Position	LED group	Color	Explanation
Fieldbus status			
A	LINK ACT 1	green	Indicates a connection to the physical network at Port 1.
B	LINK ACT 2	green	Indicates a connection to the physical network at Port 2.
C	MS	Red/green	Indicates the node status.
D	NS	Red/green	Indicates the network status.
Node status			
E	OK	Red/green/orange	Displays the local bus operation and indicates errors with a blink code.

For detailed information on evaluation of the LED statuses (see Section 4.8 "LED Signals", page 16).

4.3 DC 24 V supply module

The supply module provides the bus terminals with the corresponding supply potential.

- Max. current via supply module: 10 A
- Max. voltage via power contacts: DC 24 V
- Max. current via power contacts: DC 10 A

The supply module provides the 24 V supply potential via the power contacts, the 0 V supply potential, and the ground potential for the field level and for subsequent bus terminals. A green status LED indicates the 24 V operating voltage at the power contacts.

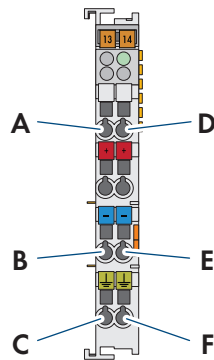


Figure 5: Supply module connections

Position	Connection	Designation	Designation
A	2	24 V	Feed-in: 24 V field supply
D	6		Feed-in: 24 V field supply
B	3	0 V	Feed-in: 0 V field supply
E	7		Feed-in: 0 V field supply
C	4	Ground	Feed-in: Ground field supply
F	8		Feed-in: Ground field supply

For detailed information on evaluation of the LED statuses (see Section 4.8 "LED Signals", page 16).

4.4 I/O modules

Different sensors and actuators are connected to the WAGO-I/O-SYSTEM 750 via the I/O modules. Single-, multiple-, or fine-wire conductors can be connected via the CAGE CLAMP® connections. The terminal bus is responsible for communication between the fieldbus coupler/controller and the individual I/O modules. The terminal bus is comprised of 6 self-cleaning gold-spring contacts. Field supply voltage is used for the voltage supply.

The I/O modules receive the 24 V supply potential and the 0 V potential for the field level via the power contacts of the respective upstream I/O module or the supply module and also conduct this potential to the downstream I/O module.

Status LEDs on the I/O modules indicate the operating state and error-free terminal bus communication via red/green signals.

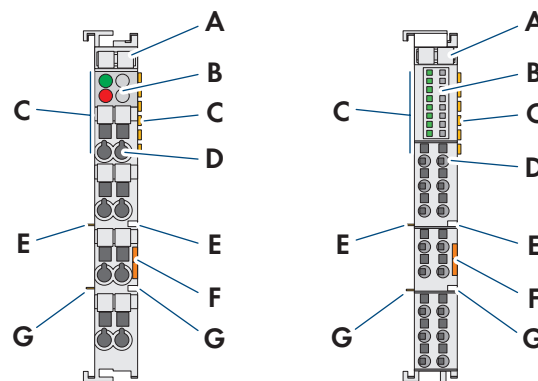


Figure 6: I/O module configuration (example)

Position	Designation
A	Labeling option with Mini WSB
B	Status LEDs
C	Data contacts
D	CAGE CLAMP® connections
E	Power contacts +24 V
F	Release tab
G	Power contacts 0 V

For detailed information on evaluation of the LED statuses (see Section 4.8 "LED Signals", page 16).

4.5 Bus end terminal 750-600

The bus end terminal 750-600 is used to terminate the internal terminal bus of a fieldbus node. This bus termination ensures correct data transmission via terminal bus.

The bus end terminal 750-600 is not equipped with any power contacts, CAGE CLAMP® connections or LED signaling.

4.6 Hardware address (MAC ID)

The WAGO-I/O-SYSTEM 750 has an internationally unique physical address: the MAC ID (Media Access Control Identity).

The MAC ID is printed on a paper strip with two self-adhesive tear-off labels on the left side of the field bus coupler/controller. The MAC ID has a fixed length of 6 bytes (48 bits) in hexadecimal notation. The first 3 bytes provide information about the manufacturer (e.g. 00:30:DE for WAGO). The other 3 bytes contain the consecutive serial number of the device hardware.

4.7 Design guidelines and standards

DIN 60204	Electrical equipment of machines
DIN EN 50178	Electronic equipment for use in power installations (replacement for VDE 0160)
EN 60439	Low-voltage switch gear and controlgear assemblies

4.8 LED Signals

LED signals of the fieldbus coupler

The LEDs indicate the operating state of the fieldbus coupler or the entire fieldbus node. The LEDs are assigned to various diagnostic areas in groups.

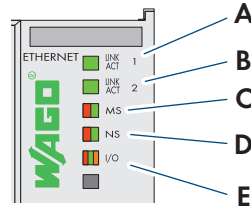


Figure 7: Fieldbus coupler LEDs

Position	LED group	Diagnostic area
A	LINK ACT Port 1	Fieldbus status
B	LINK ACT Port 2	
C	MS (module status)	
D	NS (network status)	
E	OK	Node status

Evaluating the fieldbus status

The operating state of the communication via fieldbus is indicated via the upper LED group: **LINK ACT 1**, **LINK ACT 2**, **MS**, and **NS**.

The two-color LEDs **MS** (module status) and **NS** (network status) are only used by the Ethernet/IP protocol. The indications of these two LEDs comply with the Ethernet/IP specification.

LED status	Description	Corrective measures
LINK ACT 1, LINK ACT 2		
Green	The fieldbus node is connected to the physical network.	-
Flashing green	The fieldbus node is sending or receiving Ethernet telegrams.	-
Off	The fieldbus is not connected to the physical network.	1. Check the fieldbus cable.
MS (module status)		
Green	The system is working properly.	-
Flashing green	The system is not yet configured.	-
Red	The system indicates an error that cannot be corrected.	1. Switch the supply voltage off and on again to restart the system. 2. If the error is not resolved, please contact WAGO I/O support.

LED status	Description	Corrective measures
Flashing red/green	Self-test	-
Off	There is no operating voltage for the system.	1. Check the power supply.
NS (network status)		
Green	The fieldbus node is connected to the physical network.	-
Flashing green	The fieldbus node is sending or receiving Ethernet telegrams.	-
Red	The system has detected a double IP address.	1. Use an IP address that is not already in use.
Flashing red	At least one connection (Modbus TCP or Ethernet/IP) has indicated a timeout where the device functions as the target.	1. Switch the supply voltage off and on again to restart the system. 2. Re-establish the connection.
Flashing red/green	Self-test	-
Off	No IP address is assigned to the system.	1. Assign the system a valid IP address (DHCP recommended).

LED signals of the supply module

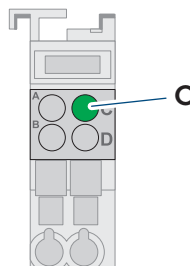


Figure 8: LEDs of the supply module

LED	Designation	LED status	Description
C	Status of the operating voltage, power contacts	Off	There is no 24 V operating voltage at the power contacts
		Green	There is 24 V operating voltage at the power contacts.

LED signals of the 4-channel analog input terminal

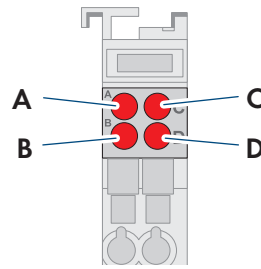


Figure 9: LEDs of the 4-channel analog input terminal

LED	Channel	Designation	LED status	Description
A	1	Error AI 1	Off	Normal operation
			Red	Wire break, values outside of the permitted measurement range
B	2	Error AI 2	Off	Normal operation
			Red	Wire break, values outside of the permitted measurement range
C	3	Error AI 3	Off	Normal operation
			Red	Wire break, values outside of the permitted measurement range
D	4	Error AI 4	Off	Normal operation
			Red	Wire break, values outside of the permitted measurement range

LED signals of the 4-channel analog output terminal

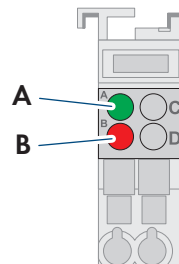


Figure 10: LEDs of the 4-channel analog output terminal

LED	Designation	LED status	Description
A	Function	Off	System is not available, lack of or disturbed terminal bus communication
		Green	System is available and terminal bus communication is not disturbed
B	Error	Off	No error
		Red	Wire break or inadmissible load combination

LED signals of the 8-channel DC 24 V analog input terminal

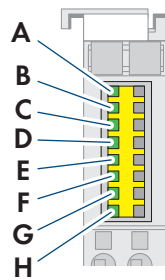


Figure 11: LEDs of the 8-channel DC 24 V digital input terminal

LED	Channel	Designation	LED status	Description
A - H	1 - 8	Status DI 1 - 8	Off	Input DI 1: signal voltage (0)
			Green	Input DI 1: signal voltage (1)

LED signals of the 8-channel DC 24 V digital output terminal

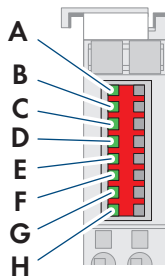


Figure 12: LEDs of the 8-channel DC 24 V digital output terminal

LED	Channel	Designation	LED status	Description
A - H	1 - 8	Status DO 1 - 8	Off	Output DO 1: signal voltage (0)
			Green	Output DO 1: signal voltage (1)

LED signals of the 2/4-channel analog input terminal TempIN

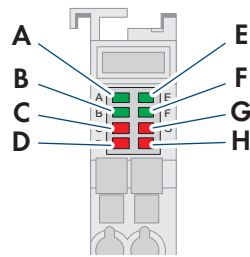


Figure 13: LEDs of the 2/4-channel analog input terminal TempIN

LED	Channel	LED status	Description
A	1	Off	System is not available, lack of or disturbed terminal bus communication (only when the watchdog timer is enabled)
		Green	System is available and terminal bus communication is not disturbed
B	2	Off	System is not available, lack of or disturbed terminal bus communication (only when the watchdog timer is enabled)
		Green	System is available and terminal bus communication is not disturbed
C	1	Off	No error
		Red	Range violated (values too high or too low), short circuit or wire break
D	2	Off	No error
		Red	Range violated (values too high or too low), short circuit or wire break
E	3	Off	System is not available, lack of or disturbed terminal bus communication (only when the watchdog timer is enabled)
		Green	System is available and terminal bus communication is not disturbed
F	4	Off	System is not available, lack of or disturbed terminal bus communication (only when the watchdog timer is enabled)
		Green	System is available and terminal bus communication is not disturbed
G	3	Off	No error
		Red	Range violated (values too high or too low), short circuit or wire break

LED	Channel	LED status	Description
H	4	Off	No error
		Red	Range violated (values too high or too low), short circuit or wire break

5 Mounting

5.1 Requirements for Mounting

NOTICE

Errors due to changed installation sequence

The sequence of the I/O modules is fixed. Changing the sequence can impact the function of the product and cause errors.

- Do not change the sequence of the I/O modules.

Permitted and prohibited mounting positions:

In addition to horizontal and vertical mounting, all other mounting positions are allowed.

Recommended clearances:

Observe the clearances of the entire fieldbus node to neighboring components, cable channels and enclosure/frame walls. The clearances provide space for heat dissipation and assembly or wiring. The clearances to cable channels also prevent conducted electromagnetic interference from impacting operation.

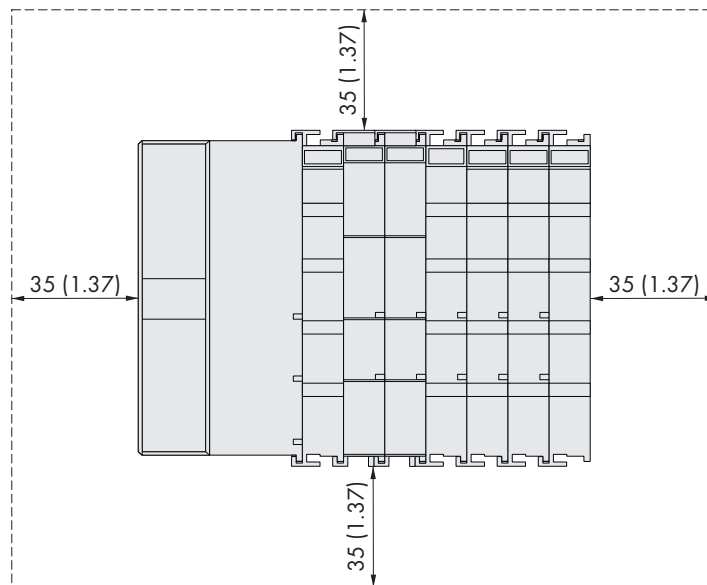


Figure 14: Recommended clearances (Dimensions in mm (in))

i Use end clamps for vertical installation

For vertical installation, mount an additional end clamp under the fieldbus node to secure the fieldbus node against sliding down.

Properties of the mounting rail

The WAGO-I/O-SYSTEM 750 can be directly snapped onto a mounting rail in accordance with EN 60175 (TS 35, DIN Rail 35). Please note that mounting rails can have different mechanical and electrical characteristics. To ensure optimal functioning, the following conditions must be observed: The material must be corrosion-resistant. Most components have a discharge contact to the mounting rail to ground electromagnetic interference. To avoid any corrosive effects, this tin-plated mounting rail contact may not form a galvanic element with the material of the mounting rail that generates a differential voltage greater than 0.5 V (saline solution of 0.3% at 20 °C). The mounting rail must optimally support the electromagnetic compatibility measures integrated into the system and the shielding of the I/O module connections. The geometry of the mounting rail may not be altered to ensure that the WAGO-I/O-SYSTEM 750 is held in place securely. In particular, when shortening or mounting the carrier rail, it may not be crushed.

or bent. The base of the components extends into the profile of the mounting rail. For mounting rails with a height of 7.5 mm, mounting points (screw connections) must be countersunk under the node in the mounting rail (countersunk screw or blind rivet). The metal springs on the bottom of the enclosure must have a low-impedance contact with the mounting rail (widest possible contact surface).

Grounding the mounting rail

⚠ WARNING

Beware of electrical voltage

Ensure a proper electrical connection between the mounting rail and the frame or enclosure in order to guarantee sufficient grounding and to avoid electric shock in the event of an error.

When assembling the frame, the mounting rail must be screwed onto the electrically conductive cabinet frame or enclosure. The frame or enclosure must be grounded. The screw connection also establishes the electrical connection. This grounds the mounting rail.

Insulated assembly

An assembly is insulated when it is designed so that there is no direct, conductive connection between the cabinet frame or the machine parts and the mounting rail. In this case, the grounding must be established with an electrical conductor in accordance with the valid national safety regulations.

i Recommendation for optimal assembly

The optimal assembly involves a metallic mounting plate with a ground connection that has an electrically conductive connection to the mounting rail.

5.2 Mounting the product on the mounting rail

The WAGO-I/O-SYSTEM 750 comes pre-configured and is directly snapped onto the mounting rail as a complete unit. A tongue and groove system is used for secure positioning and connection. Automatic locking guarantees secure hold on the mounting rail.

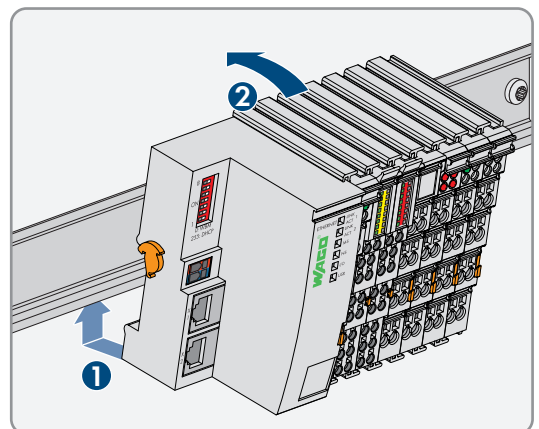
⚠ WARNING

Beware of electrical voltage

Ensure a proper electrical connection between the mounting rail contact and the mounting rail in order to guarantee sufficient grounding and to avoid electric shock in the event of an error. Observe the properties of the mounting rail.

Procedure:

1. Attach the product to the mounting rail.
 - Place the lower edge of the product onto the mounting rail.



- Press the product down onto the mounting rail from the top.
 - The product snaps audibly into place.
2. Ensure that the product is securely in place.

6 Connection

6.1 Overview of the Connection Area

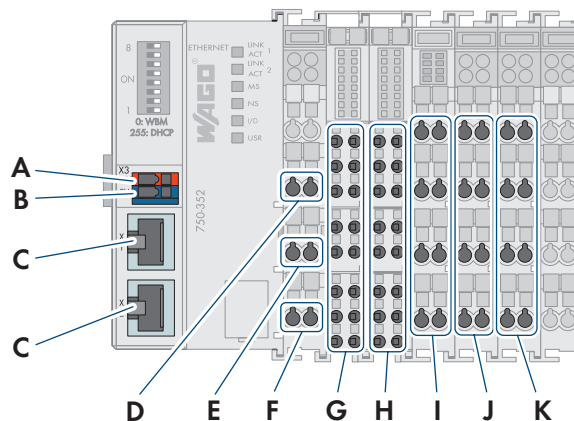


Figure 15: Overview of the connection area

Position	Designation
A	DC 24 V system supply
B	DC 0 V system supply
C	Fieldbus connection 2 x RJ-45 as a 2-port Ethernet switch
D	Feed-in: DC 24 V field supply
E	Feed-in: DC 0 V field supply
F	Feed-in: Ground field supply
G	8x digital input
H	8x digital output
I	2x analog input for PT100 sensors
J	4x analog input 4 mA to 20 mA
K	4x analog output 0 mA to 20 mA

6.2 Connecting the conductor the CAGE CLAMP®

The CAGE CLAMP® connection is used to connect the conductor for system supply and supply of the various components of the I/O modules. The CAGE CLAMP® connections are designed for single-, multiple- or fine-wire conductors.

i Only connect one conductor per CAGE CLAMP®

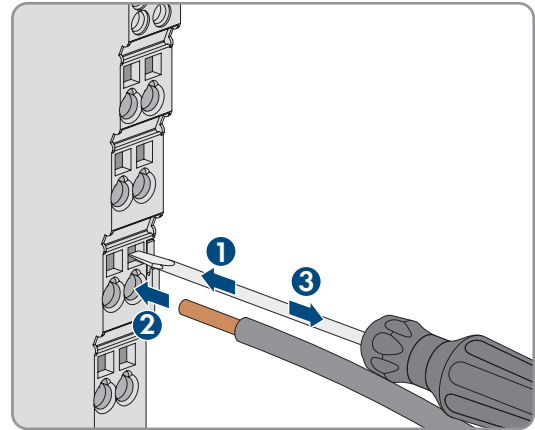
You may only connect one conductor to each CAGE CLAMP® connection. Multiple individual conductors may not be connected to one connection. If multiple conductors need to be placed on one connection, connect them using upstream wiring.

Requirements:

- Conductor cross-section, single-wire: 0.08 mm² to 2.5 mm² (AWG 28 to AWG 14)
- Conductor cross-section, fine-wire: 0.25 mm² to 2.5 mm² (AWG 24 to AWG 14)
- Insulation stripping length: 8 mm to 9 mm (0.315 in to 0.354 in)

Procedure:

1. Use a suitable tool to unlock the CAGE CLAMP® in the opening above the connection.



2. Insert the conductor into the corresponding connection opening.
3. To lock the CAGE CLAMP®, remove the tool from the opening.
4. Ensure that the conductor is securely in place.

6.3 Information on shielding

The use of a shielded cable reduces the electromagnetic influences and therefore increases the signal quality. This makes it possible to avoid measurement errors, data transmission errors, and disturbances due to overvoltage.

Observe the following information:

Connect the cable shield with ground potential

Comprehensive shielding is mandatory in order to guarantee the technical specifications in terms of measurement precision. Establish the connection between the cable shield and ground potential at the opening of the cabinet or enclosure. This diverts any disturbances and keeps them far away from the devices within the cabinet or enclosure.

Use shielded signal cables

Use only shielded cables for analog signals and with devices that are equipped with terminals for the shield. This is the only way to guarantee that the precision and interference immunity for the respective device can be achieved in the event of disturbances that affect the signal cable. You can directly connect the shielded cable to some of the I/O modules. Use the WAGO shield connection system for all others.

Improve the shielding with a large contact area

Shielding is improved when the connection between the shield and the ground potential is a low-impedance connection. For this purpose, apply the shield over a large area. This is recommended in particular for larger systems in which equalizing currents run or high pulsed currents (e.g. triggered by atmospheric discharge) could occur.

Keep data and signal cables away from disturbance sources

Lay data and signal cables separate from all cables that carry three-phase current and other sources of high electromagnetic emissions (e.g. frequency inverters or drives).

6.4 Functional grounding

Functional grounding increases the interference immunity against electromagnetic influences. The I/O modules are equipped with a mounting rail contact that diverts electromagnetic disturbances away from the mounting rail.

The bottom CAGE CLAMP® connections of the supply modules allow for the option to connect a field-side functional grounding. The bottom spring contact of the three power contacts makes this potential available to the I/O module installed to the right. The I/O modules are equipped with a measuring contact that picks up this potential. In terms of the functional grounding, this forms a potential group together with the I/O module installed on the left.

6.5 Voltage supply terminal

6.5.1 Overcurrent protection

⚠ WARNING

Risk of fire due to insufficient overcurrent protection

In the event of an error, insufficient overcurrent protection may present a fire risk. If the current flow is too high in the components, in the event of an error this could result in excessive overheating.

- Always design the overcurrent protection based on the anticipated power usage.

The fieldbus coupler and supply module are responsible for feeding-in the system and field voltage supply of the WAGO-I/O-SYSTEM 750. For components that work with low voltages, only SELV/PELV voltage sources can be used. To supply multiple components from a single voltage source, this voltage source must be designed in accordance with the strictest electrical safety requirements based on these components. For components that may only be supplied with voltage from SELV voltage sources, these requirements are listed in the technical data. Most of the components in the WAGO-I/O-SYSTEM 750 do not have any internal overcurrent protection. For this reason, a suitable overcurrent protection must be installed externally for every feed-in, for example using fuses. The maximum permitted current is listed in the technical data of the installed components.

6.5.2 Potential isolation

There are three galvanically isolated potential groups in the WAGO-I/O-SYSTEM 750:

- Galvanically isolated fieldbus interface
- Electronics of the fieldbus coupler and the I/O modules (local bus)
- All I/O modules are equipped with galvanic isolation between the system electronics (local bus, logic) and the field-side electronics. This isolation is installed per channel for some digital input modules and analog input modules. For further information, see the product specifications of the individual I/O modules.

6.5.3 System supply

NOTICE

Damage to the electronics

Without overvoltage protection, the electronics can be damaged.

- Ensure that the power supply is adequately protected. If you use a fuse for overcurrent protection of the system supply, use a fuse with a maximum of 2 A for this purpose.

NOTICE

Damage due to exceeding the maximum current at the power contacts.

- Please ensure that the maximum current that can run through the power contacts does not exceed 10 A.

The WAGO-I/O-SYSTEM 750 requires a 24 V direct voltage for the system supply. The voltage is fed in via the supply module and is protected against reverse polarity.

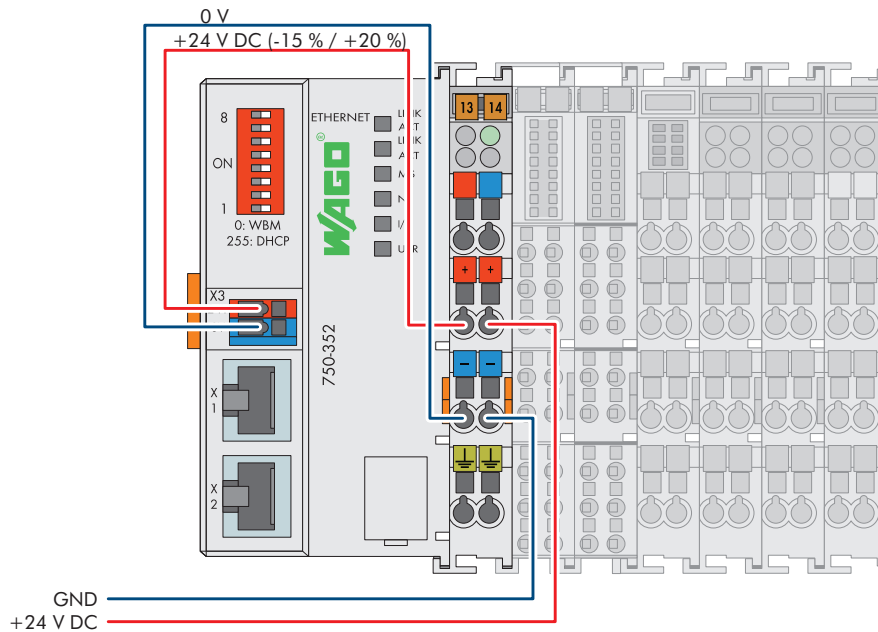


Figure 16: System supply overview

The fed in 24 V direct voltage supplies all internal system components, e.g. the electronics of the fieldbus coupler/controller, the fieldbus interface and the I/O modules, via the local bus (5 V system voltage). The 5 V system voltage is galvanically connected to the 24 V system supply.

6.5.4 Power supply design

i Regulated power supply units

Stable grid supply cannot always be guaranteed anywhere all the time. For this reason, regulated power supply units must be used in order to guarantee the quality of the supply voltage.

Calculation of the power supply unit output (at DC 24 V):

The internal current consumption for each I/O module is specified in the technical data of the I/O module. To determine overall consumption, the values of all of the modules in the node are added up.

Example:

Fieldbus coupler:	280 mA
DI:	37 mA
DO:	10 mA + output load of all channels (max. 500 mA/channel)
TempIN (PT100):	10 mA
AI:	15 mA
AO:	120 mA (80 mA for 4 x 20 mA outputs + efficiency + internal power supply)
Total	Approx. 1.5 A at 24 V (with a maximum load of 120 mA per digital output channel)

With higher loads at the digital outputs, it is correspondingly greater.

6.5.5 Connecting different components at the I/O modules

Five I/O modules are available for connecting different components:

- 8-channel DC 24 V digital input terminal
- 8-channel DC 24 V digital output terminal
- 2/4-channel analog input terminal 2 TempIN (PT100)
- 4-channel analog input terminal 4 mA to 20 mA
- 4-channel analog output terminal 0 mA to 20 mA

6.5.5.1 8-channel DC 24 V digital input terminal

The 8-channel DC 24 V digital input terminal is comprised of binary control signals from the field area (e.g. from sensors, transmitters, switches or proximity switches).

The bus terminal has 8 input channels and allows for direct connection of sensors with 2-conductor technology (potential-free contact). The sensors are connected to the CAGE CLAMP® connections DI 1 and 24 V to DI8 and 24 V.

For interference suppression, each input channel is equipped with an RC filter with a time constant of 3.0 ms. The inputs of the bus terminal are positive switching. If the 24 V potential for the field supply is switched on an input connection, the signal state of the corresponding input channel is "high". Green status LEDs indicate the respective signal state per channel.

For detailed information on evaluation of the LED statuses (see Section 4.8 "LED Signals", page 16).

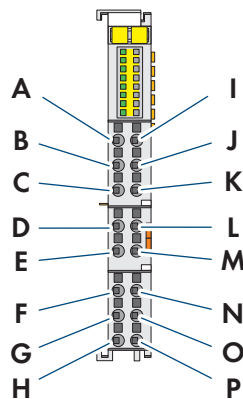


Figure 17: Connections of the 8-channel DC 24 V digital input terminal

Position	Channel	Con- nection	Designation	Designation
A - H	1 - 8	1 - 8	DI 1- 8	Digital input 1 - 8: signal voltage
I - P		9 - 16	24 V	Digital input 1 - 8: sensor supply +24 V

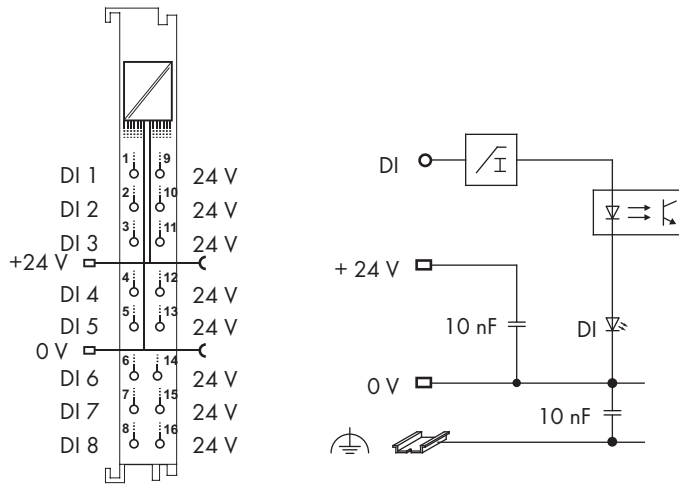


Figure 18: Circuitry of the 8-channel DC 24 V digital input terminal

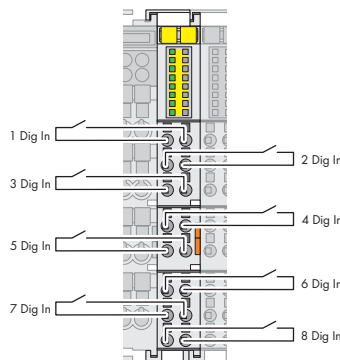


Figure 19: Example connection of the 8-channel DC 24 V digital input terminal

6.5.5.2 8-channel DC 24 V digital output terminal

The 8-channel DC 24 V digital output terminal transmits binary control signals from the automation device to the connected actuators (e.g. magnet valves, contactors, transmitters, relays or other electrical appliances).

The bus terminal has 8 output channels and allows for direct connection of actuators with 2-conductor technology. These are not outputs in the form of potential-free contacts, but rather actively switched 24 V signals.

For detailed information on evaluation of the LED statuses (see Section 4.8 "LED Signals", page 16).

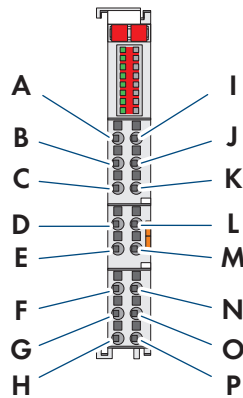


Figure 20: Connections of the 8-channel DC 24 V digital output terminal

Position	Channel	Connection	Designation	Designation
A - H	1 - 8	1 - 8	DO 1- 8	Digital output 1 - 8: signal voltage
I - P		9 - 16	0 V	Digital output 1 - 8: field supply 0 V

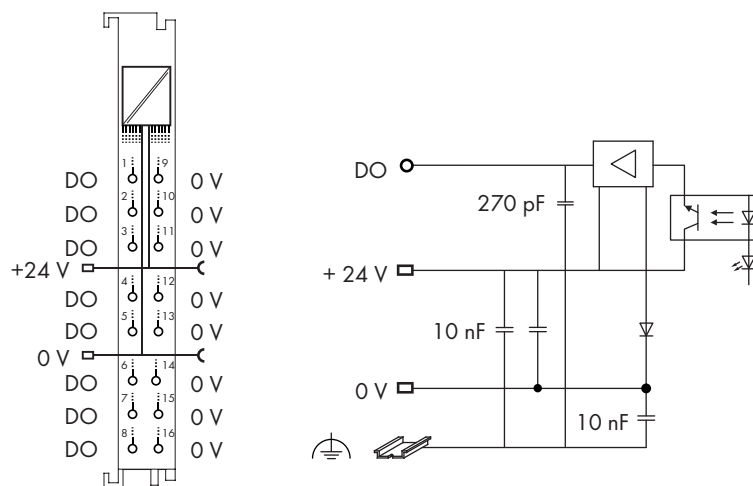


Figure 21: Circuitry of the 8-channel DC 24 V digital output terminal

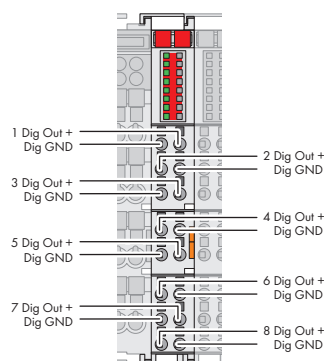


Figure 22: Example connection of the 8-channel DC 24 V digital output terminal

6.5.5.3 2/4-channel analog input terminal (TempIN)

The 2/4-channel analog input terminal (TempIN) evaluates two PT100 sensors. The resistance values are converted to temperature values. A microprocessor in the bus terminal linearizes the measured resistance values and converts them into a numerical value that is proportional to the temperature of the selected resistance sensor.

A green status LED and a red error LED for each channel indicate either the operating state, a short circuit, a wire break, or values outside the range of measurement. PT100 sensors are connected to the CAGE CLAMP® connections +R1/-R1 to +R4/-R4.

For detailed information on evaluation of the LED statuses (see Section 4.8 "LED Signals", page 16).

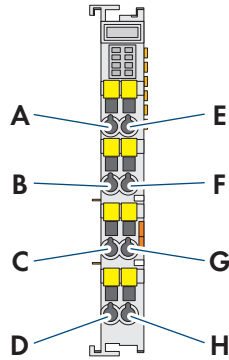


Figure 23: Connections of the 2/4-channel analog input terminal (TempIN)

Position	Connection	Designation	Designation
A	1	+R1	
B	2	-R1	
C	3	+R3	
D	4	-R3	
E	5	+R2	
F	6	-R2	
G	7	+R4	
H	8	-R4	

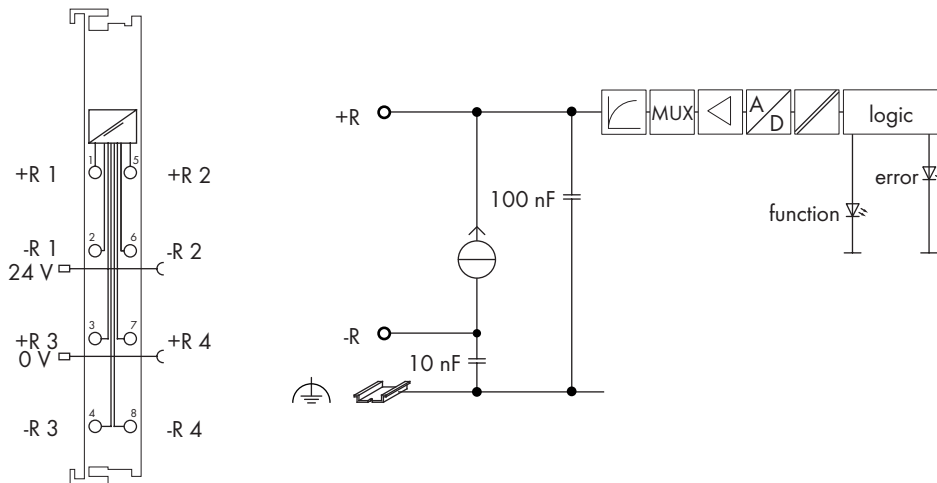


Figure 24: Circuitry of the 2/4-channel analog input terminal (TempIN)

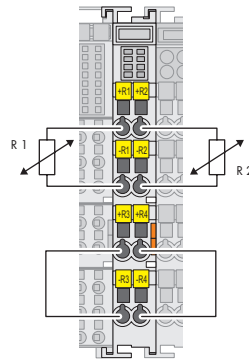


Figure 25: Example connection of the 2/4-channel analog input terminal (TempIN)

6.5.5.4 4-channel analog input terminal 4 mA to 20 mA

The 4-channel analog input terminal 4 mA to 20 mA has four input channels for field signals and processes signals of standard size from 4 mA to 20 mA. The input signal is galvanically isolated from the system level with a 12-bit resolution. The sensors are connected to the CAGE CLAMP® connections AI 1 and ground or AI 2, AI 3, AI 4 and ground. The ground connections for all 4 channels are connected to one shared 0 V ground potential.

A red LED indicates a wire break or a value outside of the measurement range for each channel. The internal system voltage is used for voltage supply.

For detailed information on evaluation of the LED statuses (see Section 4.8 "LED Signals", page 16).

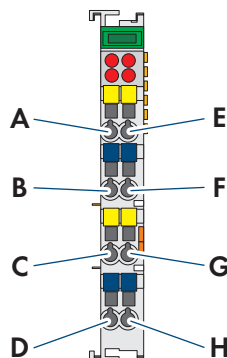


Figure 26: Connections of the 4-channel analog input terminal 4 mA to 20 mA

Position	Channel	Conne- ction	Designation	Designation
A	1	1	AI 1	Analog input 1: signal voltage
B		2	Ground	Analog input 1: ground
C	2	3	AI 3	Analog input 3: signal voltage
D		4	Ground	Analog input 3: ground
E	3	5	AI 2	Analog input 2: signal voltage
F		6	Ground	Analog input 2: ground
G	4	7	AI 4	Analog input 4: signal voltage
H		8	Ground	Analog input 4: ground

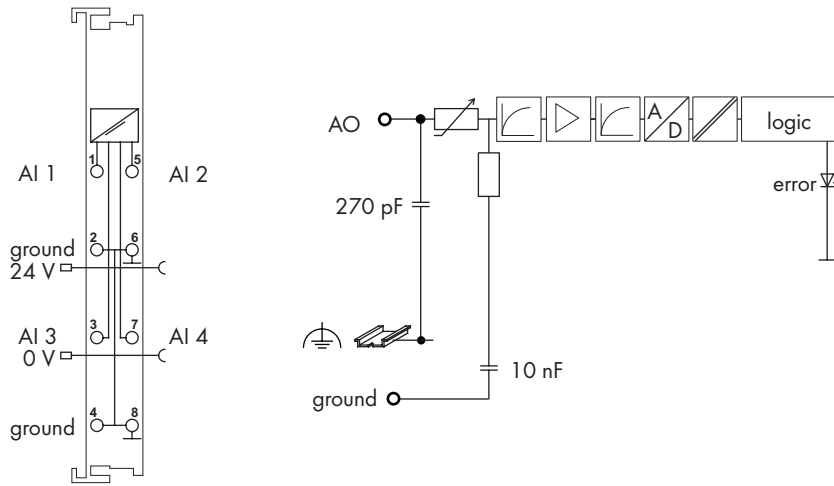


Figure 27: Circuitry of the 4-channel analog input terminal 4 mA to 20 mA

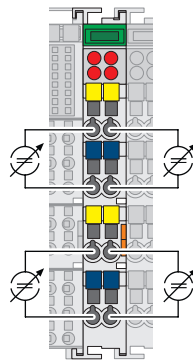


Figure 28: Example connection of the 4-channel analog input terminal 4 mA to 20 mA

6.5.5.5 4-channel analog output terminal 0 mA to 20 mA

The 4-channel analog output terminal 0 mA to 20 mA has four output channels and generates signals that must be strictly restricted to 4 mA to 20 mA by an internal scaling installed in Data Manager M. This allows for direct wiring of four 2-conductor actuators on the bus terminal. The actuators are connected to the CAGE CLAMP® connections AO 1 and ground or AO 2, AO 3, AO 4 and ground. The channels have one shared ground potential.

A green LED indicates the operating state and error-free terminal bus communication. A red error LED indicates a short circuit or an overload.

For detailed information on evaluation of the LED statuses (see Section 4.8 "LED Signals", page 16).

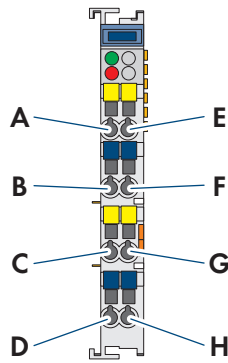


Figure 29: Connections of the 4-channel analog output terminal 0 mA to 20 mA

Position	Channel	Connection	Designation	Designation
A	1	1	AO 1	Analog output 1: signal voltage
B		2	Ground	Analog output 1: ground
C	2	3	AO 3	Analog output 3: signal voltage
D		4	Ground	Analog output 3: ground
E	3	5	AO 2	Analog output 2: signal voltage
F		6	Ground	Analog output 2: ground
G	4	7	AO 4	Analog output 4: signal voltage
H		8	Ground	Analog output 4: ground

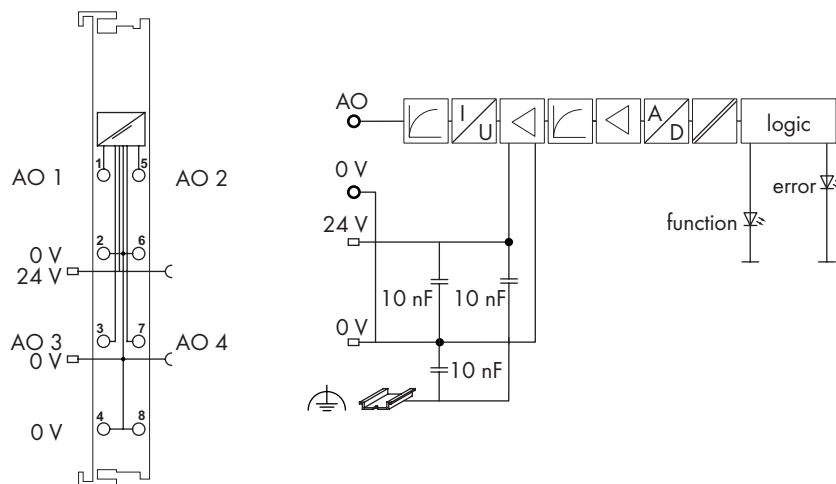


Figure 30: Circuitry of the 4-channel analog output terminal 0 mA to 20 mA

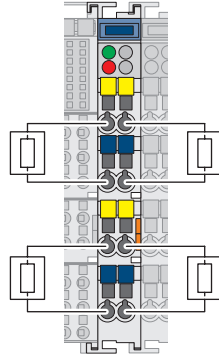


Figure 31: Example connection of the 4-channel analog output terminal 0 mA to 20 mA

6.5.6 Connection to Data Manager M

NOTICE

Damage to the product due to incorrect connection

- Only use devices with an Ethernet/RJ-45 connection in LANs.
- Never connect these devices with telecommunications networks such as with analog or ISDN telephone networks.

Two RJ-45 connectors are used to establish the connection to Data Manager M. The RJ-45 connectors are connected to the fieldbus coupler via an integrated network switch. The integrated network switch works in store-and-forward mode and supports a data transfer rate of 10/100 Mbit for every port as well as the full duplex, half duplex, and auto negotiation transfer modes.

The RJ-45 jacks are wired in accordance with the requirements for 100BASE-TX. In accordance with the Ethernet standard, a Cat 5e twisted-pair cable must be used as the connecting cable. S-UTP (screened unshielded twisted pair) and STP (shielded twisted pair) cables with a maximum segment length of 100 m can be used. The connection point is designed so that the system can be installed in an 80 mm-high switch cabinet is possible after the connector is plugged in.

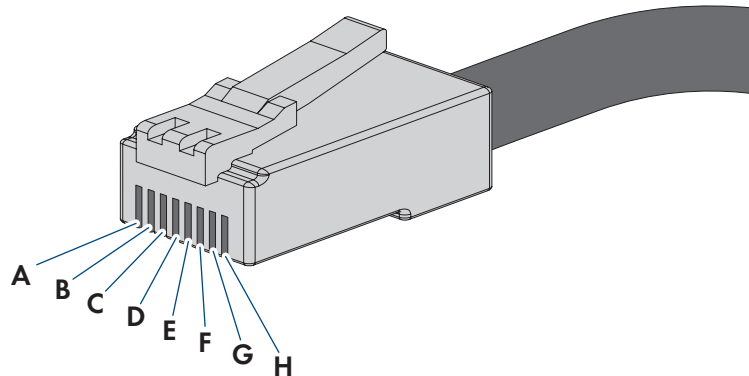


Figure 32: Pin assignment of the fieldbus connection

Position	Signal	Designation
A	TD +	Transmit data +
B	TD -	Transmit data -
C	RD +	Receive data +

Position	Signal	Designation
D		Not assigned
E		Not assigned
F	RD -	Receive data -
G		Not assigned
H		Not assigned

7 Commissioning

For commissioning, you must establish a connection between the WAGO-I/O-SYSTEM 750 and Data Manager M.

7.1 Connecting the WAGO-I/O-SYSTEM 750 with Data Manager M

i Reserving the IP address

If the communication between the WAGO-I/O-SYSTEM 750 and Data Manager M works properly, the IP address must be permanently reserved for the WAGO-I/O-SYSTEM 750 in DHCP. If you have any questions, contact your administrator.

Requirements:

- The fieldbus node is mounted on the TS 35 mounting rail.
- A 24 V supply voltage is connected to the supply module.
- A router is connected to the system and, ideally, has Internet access.
- There is a DHCP server in your network. If you have any questions, contact your administrator.
- The WAGO-I/O-SYSTEM 750 is connected with Data Manager M via the Ethernet interface (RJ-45). Both Ethernet ports on the WAGO-I/O-SYSTEM 750 and on Data Manager M can be used for this purpose.

Procedure:

1. Check whether the address selection switch is set to the value 255 (position of the address switch: 1 1 1 1 1 1 1 1). The address selection switch is inactive in this position and the setting configured in the fieldbus coupler is used. This means that the DHCP server is responsible for assigning the IP address.
2. Switch the operating voltage on.

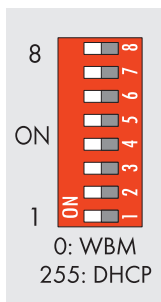


Figure 33: Address selection switch

After you have switched on the operating voltage, initialization of the fieldbus coupler begins. The fieldbus coupler determines the I/O module constellation and generates the corresponding process image. While it is booting up, the I/O LED flashes red. If the I/O LED lights up green after a short time, the fieldbus coupler is ready for operation.

If an error occurs while the fieldbus coupler is booting up, the I/O LED will flash red and communicate an error code by blinking. After the fieldbus coupler boots up, if the I/O LED flashes red 6 times, signaling error code 6, and then flashes red 4 times, signaling error argument 4, this indicates that no IP address has been assigned yet.

7.2 Assigning the IP address

You have 4 options for assigning the IP address:

- Permanently assigning the IP address with the option “use IP from EEPROM”
- Assigning the IP address with the address selection switch
- Assigning the IP address with the “WAGO Ethernet Settings” (static IP address via the serial communication interface)
- Dynamically assigning the IP address with DHCP

Permanently assigning the IP address with the option “use IP from EEPROM”

i The IP saved in EEPROM must be used for permanent address assignment.

In order for the IP address received via DHCP to be stored permanently in the fieldbus coupler, you must select the option “use IP from EEPROM”. When you select this option, the static address in EEPROM is automatically used as the IP address. You can switch to the option “use IP from EEPROM” in the web-based management system.

Assigning the IP address with the address selection switch

Using the address selection switch, you can set the Host ID, e.g. the last byte of the IP address, which is entered in the web-based management system on the TCP/IP page under the entry “Switch IP address”, to a binary coded value between 1 and 254.

Assigning the IP address with the “WAGO Ethernet Settings” (static IP address via the serial communication interface)

Use the address selection switch to set the value 0 (position of the address switch: 0000 0000). The address selection switch is inactive in this position and the settings of the web-based management system or the “WAGO Ethernet Settings” will be applied.

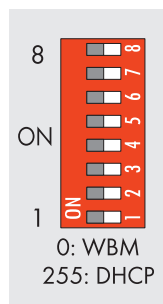


Figure 34: Address selection switch

7.3 Configuring the WAGO-I/O-SYSTEM 750 via Data Manager M user interface

7.3.1 Device registration

Requirements:

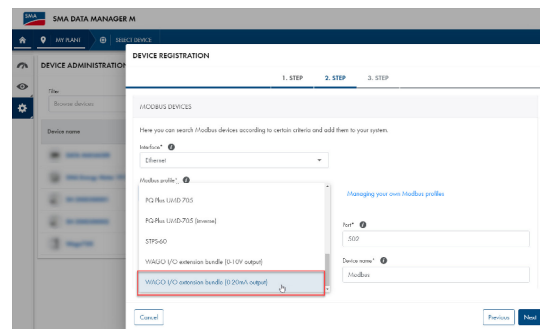
- The fieldbus node is mounted on the TS 35 mounting rail.
- A 24 V supply voltage is connected to the supply module.
- A router is connected to the system and, ideally, has Internet access.
- The WAGO-I/O-SYSTEM 750 is connected with Data Manager M via the Ethernet interface (RJ-45). Both Ethernet ports on the WAGO-I/O-SYSTEM 750 and on Data Manager M can be used for this purpose.

Procedure:

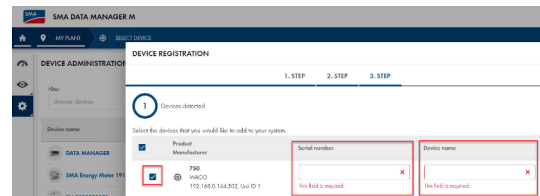
1. Log in to the user interface of Data Manager M.
2. Select the menu item **Device administration** in the menu **Configuration**.
3. Select the button **+** to register a new Modbus device.
4. Select **Modbus devices** and confirm with **[Next]**.



5. Under **Modbus profile**, select the profile **WAGO I/O extension bundle (0-20 mA output)** and confirm with **[Next]**.

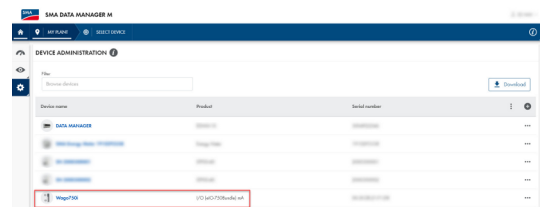


6. Select the device, enter the **Device name** and **Serial number**.



7. Click on **[Save]**.

8. Check that the newly registered WAGO-I/O-SYSTEM 750 is included in the device overview.



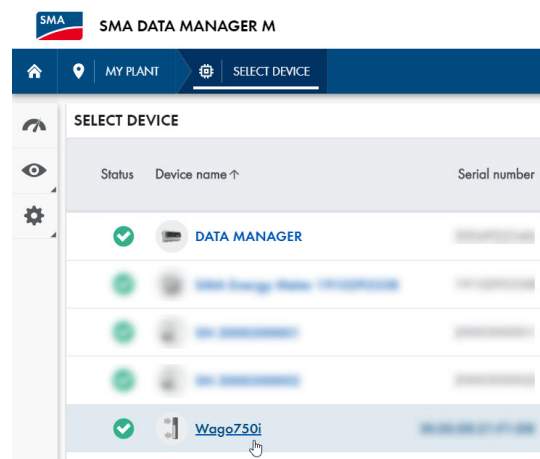
7.3.2 Selecting the device for configuring sensors

Requirements:

- The WAGO-I/O-SYSTEM 750 is in operation and registered as a new Modbus device in Data Manager M.
- During configuration, a signal from 4 mA to 20 mA must be present at the analog inputs.

Procedure:

1. Log in to the user interface of Data Manager M.
2. Select the WAGO-I/O-SYSTEM 750 in the list view in the **SELECT DEVICE** menu under the name that was assigned during device configuration.



7.3.3 Defining the input and function for configuring sensors

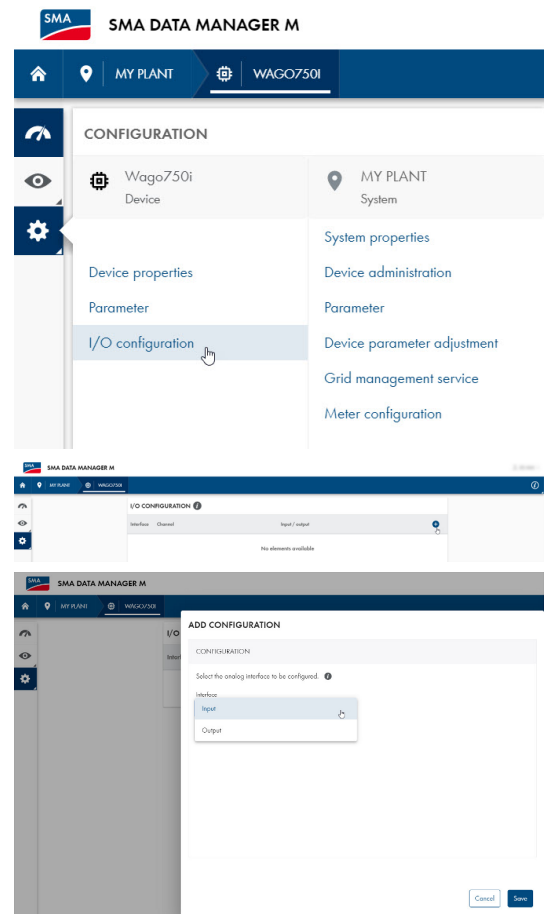
The **I/O configuration** menu item allows you to add and configure I/O channel inputs and I/O channel outputs.

Requirements:

- The WAGO-I/O-SYSTEM 750 is in operation and registered as a new Modbus device in Data Manager M.
- The WAGO-I/O-SYSTEM 750 is selected.

Procedure:

1. Log in to the user interface of Data Manager M.
2. Select the **I/O configuration** menu item in the **Configuration** menu.
3. Click the **+** button to configure a new channel.
4. Determine whether the channel is an input or output channel.
5. Select the function of the channel.



The screenshot shows the 'SMA DATA MANAGER M' interface. The main menu includes 'HOME', 'MY PLANT', and 'WAGO750I'. A sidebar on the left contains icons for a home, eye, and gear. The 'ADD CONFIGURATION' dialog is open, with the following fields and values:

- Interface:** Input
- Input:** Current input [1]
- Channel:** Insolation
- LINEAR CHARACTERISTIC CURVE:**
 - Minimum current value:** 4 mA
 - Minimum value:** 0 W/m²
 - Maximum current value:** 20 mA
 - Maximum value:** 1000 W/m²

Buttons for 'Cancel' and 'Save' are located at the bottom right of the dialog.

Figure 35: Example configuration: solar irradiation

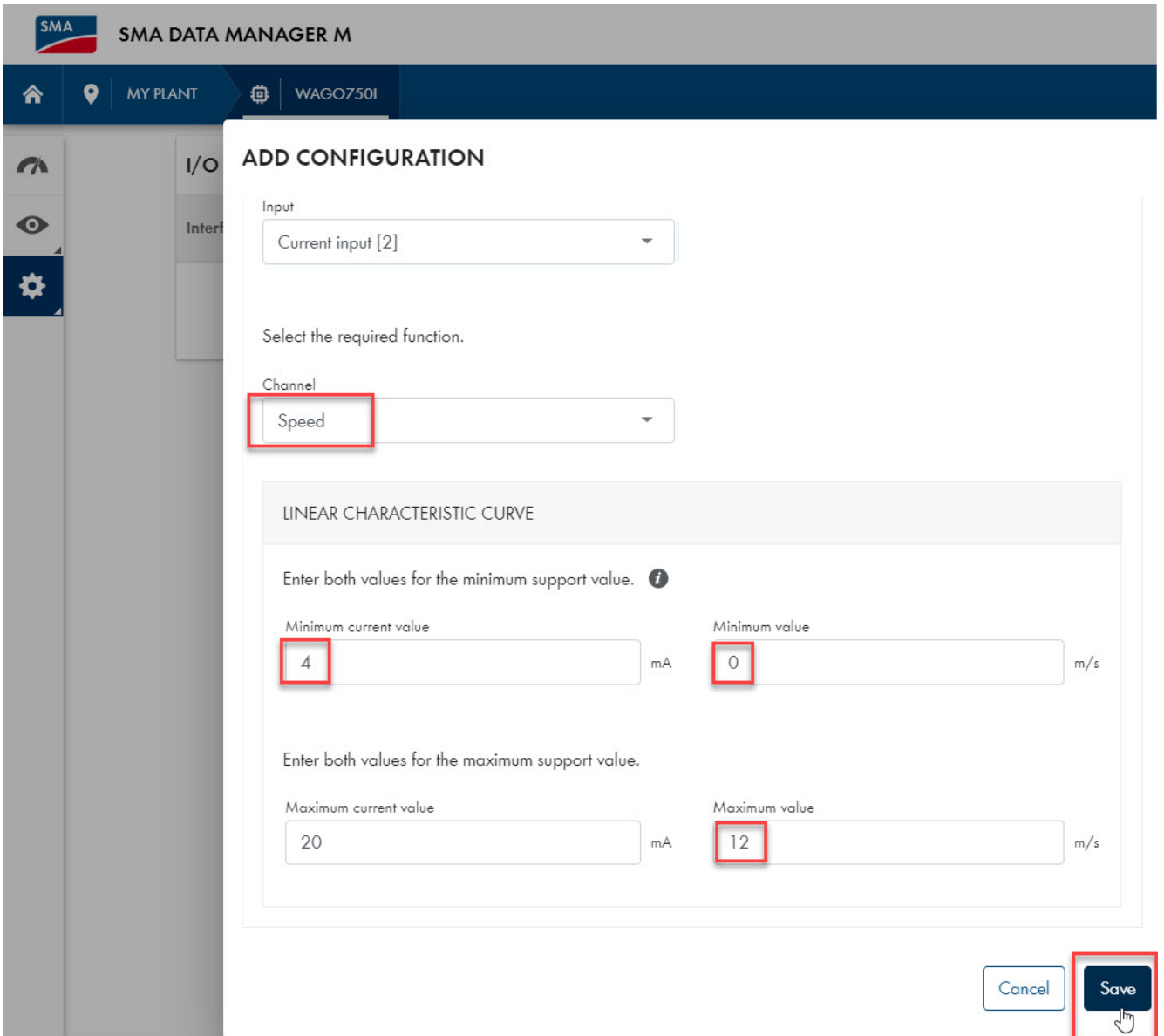


Figure 36: Example configuration: wind speed

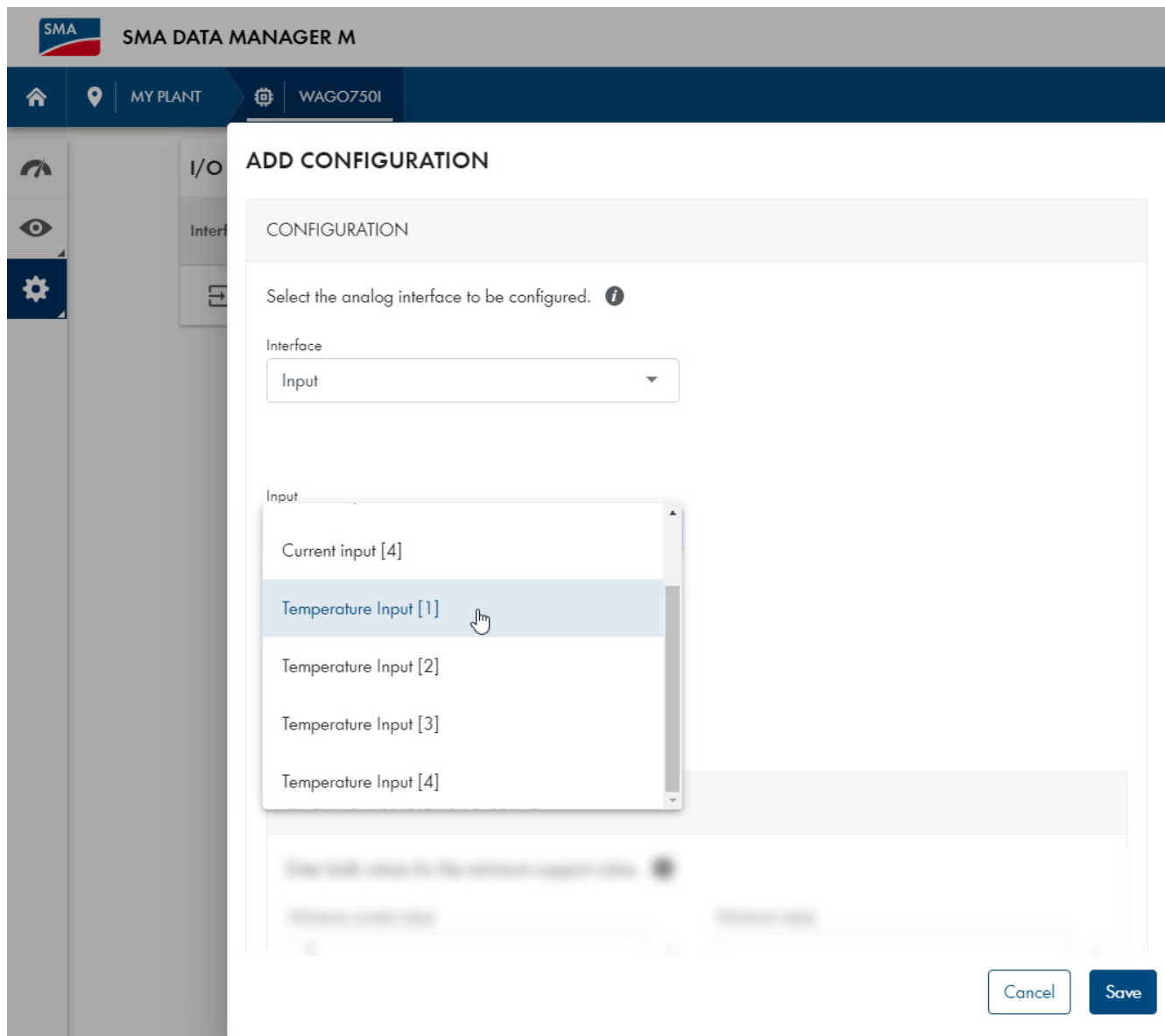


Figure 37: Example configuration: temperature input

6. Fill out the input fields and confirm with **[Save]**.
7. Select the **Instantaneous values** menu item in the **Monitoring** menu and check the information entered. The newly added channel should now appear in the list and display the current values.

Group	Name	Value	Channel
Further Applications	Current Input 1	-	MeasurementInOutAnCur[0]
Further Applications	Current Input 2	-	MeasurementInOutAnCur[1]
Further Applications	Current Input 3	-	MeasurementInOutAnCur[2]
Further Applications	Current Input 4	-	MeasurementInOutAnCur[3]
IO system	Digital Input group 1	0	MeasurementInOutDig[0]
Further Applications	Speed 1	-	MeasurementInOutSpd[0]
Further Applications	Speed 2	-	MeasurementInOutSpd[1]
Further Applications	Temperature 1	-	MeasurementInOutTemp[0]
Further Applications	Temperature Input 1	-	MeasurementInOutTemp[0]

7.3.4 Defining the channel and scaling for grid management services

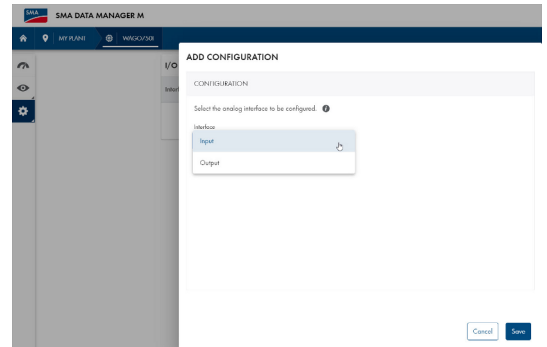
One analog input channel should be created as the setpoint for the active power limit [% of the nominal PV system power] and one analog output channel should be created as the actual value of the power at the point of interconnection [W].

Requirements:

- The WAGO-I/O-SYSTEM 750 is in operation and registered as a new Modbus device in Data Manager M.

Procedure:

1. Log in to the user interface of Data Manager M.
2. Select the WAGO-I/O-SYSTEM 750 in the list view in the **SELECT DEVICE** menu under the name that was assigned during device configuration.
3. Select the **I/O configuration** menu item in the **Configuration** menu.
4. Click the **+** button to configure a new channel.
5. Select **Input**.



SMA DATA MANAGER M

MY PLANT WAGO750I

ADD CONFIGURATION

Interface
Input

Input
Current input [1]

Select the required function.

Channel
Percent

LINEAR CHARACTERISTIC CURVE

Enter both values for the minimum support value. ⓘ

Minimum current value: 4 mA Minimum value: 0 %

Enter both values for the maximum support value.

Maximum current value: 20 mA Maximum value: 100 %

Cancel Save

Figure 38: Example configuration

6. To create the channel as a setpoint source and as a percentage, select the **Current input** input and the **Percent** channel.
7. Fill out the input fields and confirm with [**Save**].
8. Select the **I/O configuration** menu item in the **Configuration** menu.
9. Select **Output**.

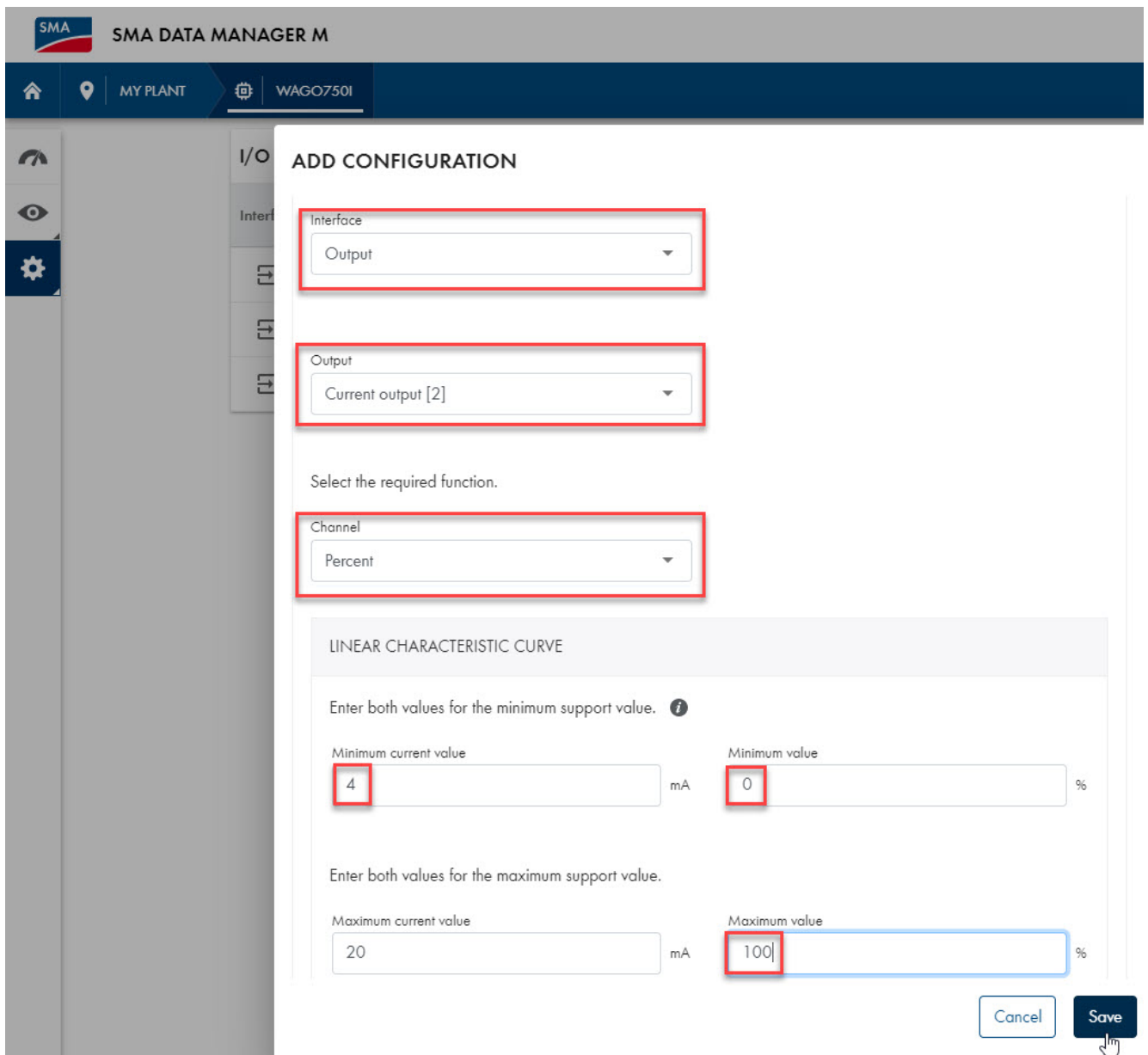
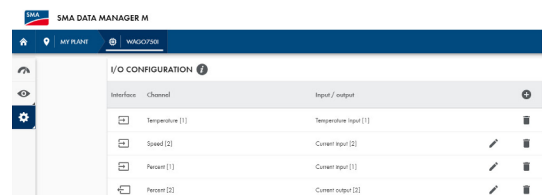


Figure 39: Example configuration

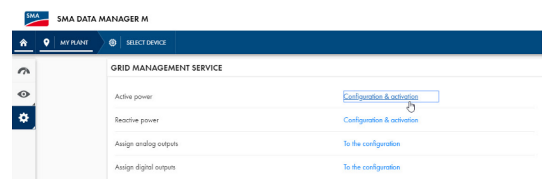
10. To create the current output as a power actual value, fill out the input fields and confirm with [**Save**].

11. Review the added channels in the **I/O configuration** menu.



12. To assign the setpoint input to the previously configured input channel, select the **Grid management service** menu item in the **Configuration** menu.

13. Select the button **Configuration and activation** in the **Active power** row.



SMA DATA MANAGER M

MY PLANT SELECT DEVICE

GRID MANAGEMENT SERVICE

1. STEP 2. STEP 3. STEP 4. STEP 5. STEP

SELECTING THE OPERATING MODE

Operating Mode*

Open loop control

Closed loop control

SELECTING THE SETPOINT

Signal sources*

Analogue inputs

Manual control

Digital inputs

Modbus

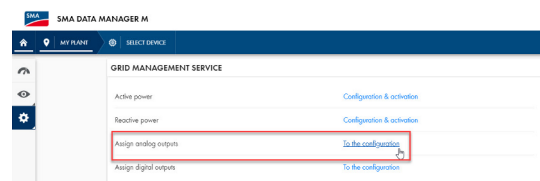
If your system participates in the direct marketing, you can activate the necessary interface here in the communication device.

Direct Marketing Interface:

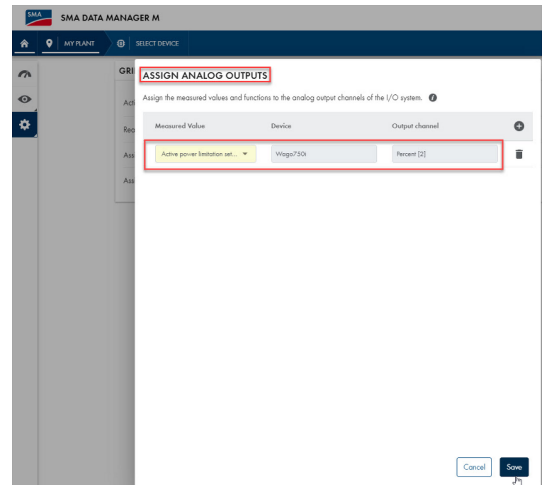
Cancel Previous Next

Figure 40: Example configuration

14. Fill out the input fields and click **[Next]**.
15. Follow the installation assistant steps and make the settings according to the specifications required by the grid operator and laid down in the standards.
16. Click on **[Save]**.
17. To assign the actual value output at the previously configured output channel, select the **Grid management service** menu item in the **Configuration** menu.
18. Click the button **Go to configuration** in the **Assigning analog outputs** row.
19. Click the **+** button to create a new output channel.



20. Select the **Output channel** that was previously configured in the **I/O configuration** and confirm with **[Save]**.



21. To assign additional actual values to the corresponding output channels, click the **+** button.

7.3.5 Displaying measured values locally on the Data Manager M Modbus server

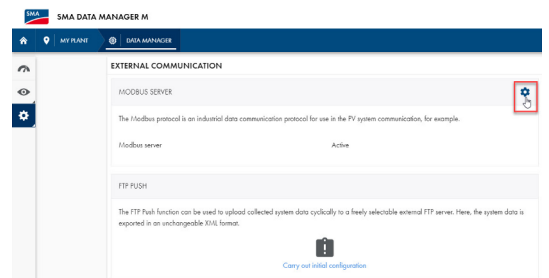
One analog input channel should be created as the setpoint for the active power limit [% of the nominal PV system power] and one analog output channel should be created as the actual value of the power at the point of interconnection [W].

Requirements:

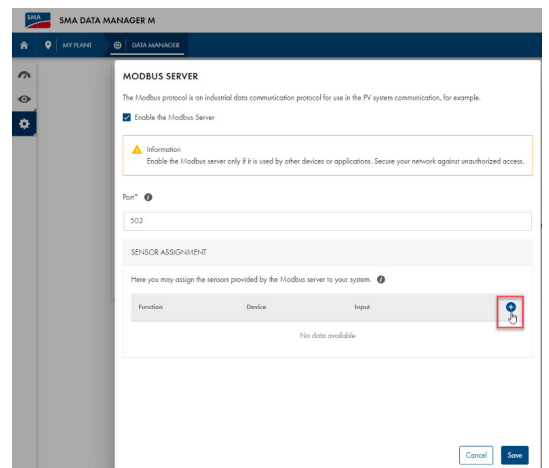
- The Modbus server is enabled.
- The I/O channel inputs and I/O channel outputs are configured and assigned to the corresponding sensors.

Procedure:

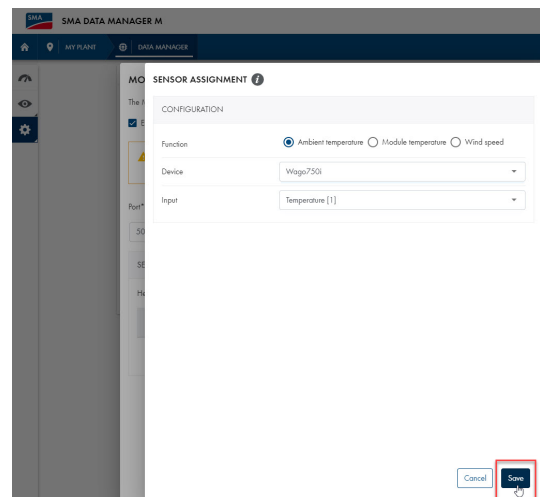
1. Log in to the user interface of Data Manager M.
2. Select Data Manager M in the list view in the **SELECT DEVICE** menu.
3. Select the **External communication** menu item in the **Configuration** menu.
4. Click the **⚙** button to configure the Modbus server.



5. Click the **+** button to add a sensor.

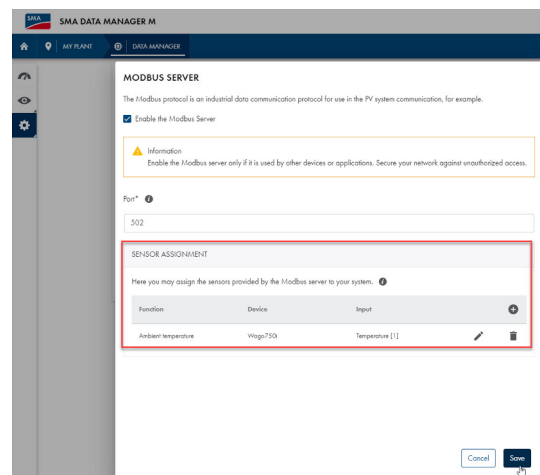


6. Select the settings for the device and confirm with **[Save]**.



7. Repeat the process to add additional sensors such as, for example, for cell temperature.

8. Check the added sensors in the **SENSOR ASSIGNMENT** menu.



9. Click on **[Save]**.

8 Troubleshooting

Fieldbus failure

A fieldbus failure occurs if, for example, the master is switched off or the bus cable is interrupted. An error in the master can also result in a fieldbus failure.

Local bus error

A local bus error is displayed via the I/O LED.

The I/O LED flashes red: In the event of a local bus error, the fieldbus coupler generates an error message (error code and error argument). A local bus error occurs, for example, when an I/O module is unplugged. If this error occurs during operation, the output modules act like a local bus stop. Once the local bus error has been remedied, switch the fieldbus node off and on again to restart the transmission of process data.

For detailed information on evaluation of the LED statuses (see Section 4.8 "LED Signals", page 16).

9 Contact

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