

JUMO diraTRON 104/108/116/132

Compact controller



Brief Instructions

70211000T97Z001K000
V6.00/EN/00688809/2022-03-15

1 Introduction

1.1 Safety information

General
This manual contains information that must be observed in the interest of your own safety and to avoid material damage. This information is supported by symbols which are used in this manual as indicated. Please read this manual before starting up the device. Store this manual in a place that is accessible to all users at all times.
If difficulties occur during startup, please do not intervene in any way that could jeopardize your warranty right!

Warning symbols

WARNING!
This symbol in connection with the signal word indicates that **personal injury** may occur if the respective precautionary measures are not carried out.

CAUTION!
This symbol in connection with the signal word indicates that **material damage or data loss** will occur if the respective precautionary measures are not taken.

CAUTION!
This symbol indicates that **components could be destroyed** by electrostatic discharge (ESD = Electro Static Discharge) if the respective cautionary measures are not taken.
Only use the ESD packages intended for this purpose to return device inserts, assembly groups, or assembly components.

READ THE DOCUMENTATION!
This symbol, which is attached to the device, indicates that the associated **documentation for the device** must be observed. This is necessary to identify the nature of the potential hazard, and to take measures to prevent it.

Note symbols
NOTE!
This symbol refers to **important information** about the product, its handling, or additional benefits.
REFERENCE!
This symbol refers to **additional information** in other sections, chapters, or other manuals.

FURTHER INFORMATION!
This symbol is used in tables and indicates that **further information** is provided after the table.

DISPOSAL!
At the end of its service life, the device and any batteries present do not belong in the trash! Please ensure that they are **disposed of properly** and in an **environmentally friendly manner**.

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1 Introduction

1.2 Intended use

The device is designed for use in an industrial environment as specified in the technical data. Other uses beyond those defined are not viewed as intended uses.
The device has been manufactured in compliance with applicable standards and directives as well as the applicable safety regulations. Nevertheless, improper use may lead to personal injury or material damage.
To avoid danger, only use the device:
• For the intended use
• When in good order and condition
• When taking the technical documentation provided into account
Risks resulting from the application may arise, e.g. as the result of missing safety provisions or wrong settings, even when the device is used properly and as intended.

1.3 Qualification of personnel

This document contains the necessary information for the intended use of the device to which it relates. It is intended for staff with technical qualifications who have been specially trained and have the appropriate knowledge in the field of automation technology.
The appropriate level of knowledge and the technically fault-free implementation of the safety information and warnings contained in the technical documentation provided are prerequisites for risk-free mounting, installation, and startup as well as for ensuring safety when operating the described modules. Only qualified personnel have the required specialist knowledge to correctly interpret and implement the safety information and warnings contained in this document in specific situations.

1.4 Acceptance of goods, storage, and transport

1.4.1 Checking the delivery
• Ensure that the packaging and its contents are undamaged.
• Check the delivery for completeness against the packing slip and order details.
• Inform the supplier immediately if there is any damage.
• Store damaged parts until clarification is received from the supplier.

1.4.2 Important information about storage and transport
• Store the device in a dry, clean environment. Observe the admissible ambient conditions (see "Technical data").
• Protect the device from shock during transport
• The original packaging provides optimum protection for storage and transport

1.4.3 Returning goods
If repairs are needed, return the complete device in clean condition.
Use the original packaging to return goods.

Accompanying letter for repair
Please include the completed accompanying letter for repair when returning goods.
Do not forget to state the following:
• Description of the application and
• Description of the error that has occurred

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1 Introduction

The accompanying letter for repair (supplementary sheet for product returns) can be downloaded online from the manufacturer's website:
<http://productreturn.jumo.info>

Protection against electrostatic discharge (ESD)
(ESD = electrostatic discharge)
To prevent damage due to ESD, electronic modules or components must be handled, packaged, and stored in an ESD-protected environment. Measures that protect against electrostatic discharge and electric fields are described in DIN EN 61340-5-1 and DIN EN 61340-5-2 "Protection of electronic devices from electrostatic phenomena".
When sending back electronic modules or components, please note the following:
• Pack sensitive components only in an environment providing protection against ESD. Workspaces such as this divert electrostatic charges to ground in a controlled manner and prevent static charges due to friction.
• Use only packaging intended specifically for ESD-sensitive modules/components. These must consist of conductive plastics.
No liability can be assumed for damage caused by ESD.

CAUTION!
Electrostatic charges occur in non-ESD-protected environments.
Electrostatic discharges can damage modules or components.
► For transport purposes, use only the ESD packaging provided.

1.4.4 Disposal

Disposing of the device
DISPOSAL!
Devices and/or replaced parts should not be placed in the refuse bin at the end of their service life as they consist of materials that can be recycled by specialist recycling plants.
Dispose of the device and the packaging material in a proper and environmentally friendly manner.
For this purpose, observe the country-specific laws and regulations for waste treatment and disposal.

Disposing of the packaging material
The entire packaging material (cardboard packaging, inserts, plastic film, and plastic bags) is fully recyclable.

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1 Introduction

1.5 Identifying the device version

1.5.1 Nameplate
The nameplate is affixed to the housing.

Contents
The nameplate contains important information. This includes:

Description	Designation on the nameplate	Example
Device type	Typ	7021148-14356-25/214
Part no.	TN	00123456
Serial number	F-Nr.	007033801217480006
Voltage supply	-	AC/DC 20 to 30 V, 48 to 63 Hz

Device type (Typ)
Compare the specifications on the nameplate with the order.
Identify the supplied device version using the order details (order code).

Part no. (TN)
The part no. uniquely identifies an article in the catalog. It is important for communication between the customer and the sales department.

Serial number (F-Nr.)
The serial number indicates, among other things, the date of manufacture (year/week).
Example: F-no. = 007033801217480006
The characters in question are digits 12, 13, 14, and 15 (from the left).
Thus the device was produced in calendar week 48 of 2017.

MAC address
For a device with Ethernet interface, the MAC address is indicated on the nameplate.

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1.5.2 Order details

(1) Basic type
702110 Type 702110 (format 132: 48 x 24 mm) 1 analog input, 2 digital inputs (digital input 1, alternative to logic output), 1 relay (N/O contact), 1 logic output 0/14 V (alternative to digital input 1) incl. timer, ramp function, and program function
702111 Type 702111 (format 116: 48 x 48 mm) 1 analog input, 2 digital inputs (digital input 1, alternative to logic output), 2 relays (N/O contact), 1 logic output 0/14 V (alternative to digital input 1) incl. timer, ramp function, and program function
702112 Type 702112 (format 108H: 48 x 96 mm) 1 analog input, 2 digital inputs (digital input 1, alternative to logic output), 2 relays (N/O contact), 1 logic output 0/14 V (alternative to digital input 1) incl. timer, ramp function, and program function
702113 Type 702113 (format 108Q: 96 x 48 mm) 1 analog input, 2 digital inputs (digital input 1, alternative to logic output), 2 relays (N/O contact), 1 logic output 0/14 V (alternative to digital input 1) incl. timer, ramp function, and program function
702114 Type 702114 (format 104: 96 x 96 mm) 1 analog input, 2 digital inputs (digital input 1, alternative to logic output), 2 relays (N/O contact), 1 logic output 0/14 V (alternative to digital input 1) incl. timer, ramp function, and program function
(2) Version
8 Standard with default settings ^a
9 Customer-specific configuration (specifications in plain text)
(3) Option 1 ^b
0 Not used
1 1 relay (N/O contact) (only for type 702111)
2 1 logic output 0/14 V (only for types 702111, 702112, 702113, 702114)
4 1 RS485 interface (Modbus-RTU)
(4) Option 2 ^c
0 Not used
1 1 relay (N/O contact)
2 1 logic output 0/14 V
3 1 analog output
7 1 Ethernet interface (Modbus-TCP, Modbus-RTU/ASCII via TCP/IP, only for types 702112, 702113, 702114); option 1 does not apply
(5) Option 3 ^d (only for types 702112, 702113, 702114)
0 Not used
1 1 relay (N/O contact)
2 1 logic output 0/14 V
5 1 PhotoMOS [®] relay ^e

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(6) Option 4 ^f (only for types 702112, 702113, 702114)
0 Not used
1 1 relay (N/O contact)
2 1 logic output 0/14 V
5 1 PhotoMOS [®] relay ^e
6 1 relay (N/O contact) with longer contact life
(7) Voltage supply
23 AC 110 to 240 V / 10/-15 %; 48 to 63 Hz
25 AC/DC 20 to 30 V, 48 to 63 Hz
(8) Extra codes
000 Without extra code
062 With DNV GL approval ^g
049 With DV approval ^h
214 Math and logic module
221 Structured text

^a The language of the device texts can be adjusted (German, English, French, Spanish).
^b The options cannot be retrofitted! Please consider options when ordering.
^c PhotoMOS is a registered trademark of Panasonic Corporation.
^d Can only be ordered for type 702111 with power supply AC/DC 20 to 30 V (approval only applies for operation with DC 20 to 30 V) and type 702114 with power supply AC 110 to 240 V; not in combination with Ethernet interface. The approval only applies to panel mounting.
^e Last extra codes in sequence, separated by commas.
^f Last extra codes in sequence, separated by commas.

1.5.3 Scope of delivery
1 device in the ordered version
1 quick start guide
1 mounting frame (only for types 702110 and 702111)
2 mounting elements (only for types 702112, 702113, and 702114)

Description	Part no.
Setup program	00678822
USB cable, A connector to Micro-B connector, length 3 m	00616250
Activation for math and logic module (setup program required)	00689708
Activation for structured text (setup program required)	00689709
Mounting for DIN rail, for type 702110	00688236
Mounting for DIN rail, for type 702111	00688237

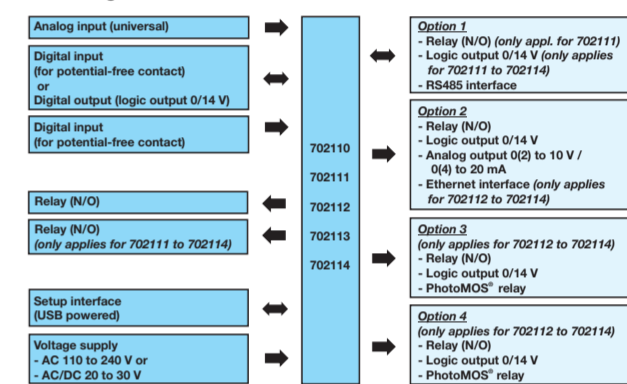
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1 Introduction

1.6 Brief description

The controller series comprises five freely configurable, universally usable compact controllers in various DIN formats to control temperature, pressure, and other process variables.
The devices are characterized by a simple, clearly structured operation supported with texts. Process values and parameters are represented by two 16-segment LCD displays. The types 702112, 702113 and 702114 are additionally equipped with a pixel matrix LCD display for displaying text. In addition, all devices have individual display elements for the switch positions of the outputs as well as for manual mode, ramp function, and timer. The devices are operated using a membrane keyboard with four buttons and can be used under harsh environmental influences thanks to the high IP65 protection type.
Depending on the hardware design, the devices can be used as two-state controllers, three-state controllers, three-step controllers, or continuous controllers. The basic type includes autotuning, a ramp function, a program controller, manual mode, limit value monitoring functions, digital control signals, extensive timer functions, and a service counter. A math and logic function is also available as an option. Furthermore, the user has the option to create his/her own application using structured text (ST code).
The devices can be conveniently configured using a PC with the help of the setup program (incl. program editor and ST editor). No separate voltage supply is required when configuring via the USB interface (USB-powered).

1.7 Block diagram



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1 Introduction

1.8 Device types



1.9 Available technical documentation

NOTE!
In addition to this quick start guide, the following documents are available as PDF files and can be downloaded from the manufacturer's website:
Operating manual
Interface description (Modbus)
ST editor manual

2 Mounting

2.1 Installation instructions

WARNING!
The device is not designed for use in potentially explosive areas.
Explosion hazard.
► Only deploy the device outside of potentially explosive areas.

Mounting site
The device is designed for installation in a panel cut-out within a closed switch cabinet. The front of the device and housing have different protection types (see technical data).

Climatic conditions
The ambient temperature and the relative humidity at the mounting site must correspond to the technical data. Aggressive gases and vapors have a negative effect on the operating life of the device. The mounting site must be free from dust, powder, and other suspended solids.

Installation position
The device can be installed in any position.
The maximum admissible ambient temperature only applies for the installation with the display in a vertical position.

Technical data
⇒ chapter 5 "Technical data", Page 25

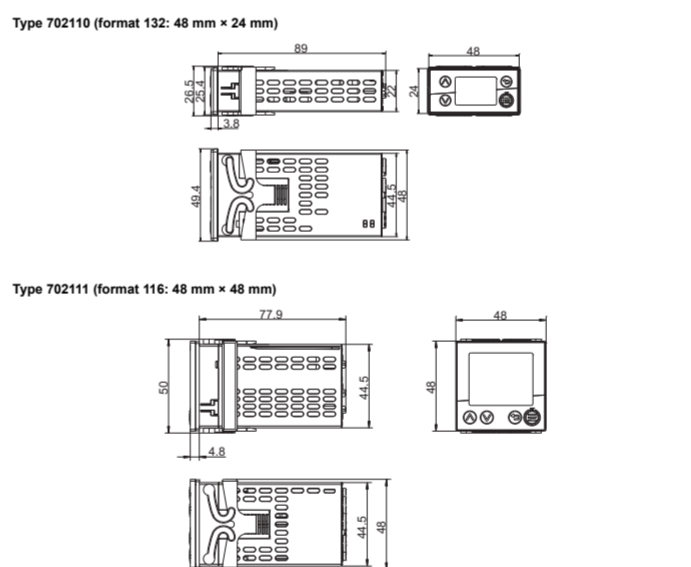
2.2 Cleaning

The front of the device (front foil) can be cleaned with standard detergents, rinsing and cleaning agents.
CAUTION!
The front of the device is not resistant to aggressive acids and lyes, scouring agents, and cleaning with a pressure cleaner.
Use of these media can cause damage.
► Only clean the front of the device with suitable agents.

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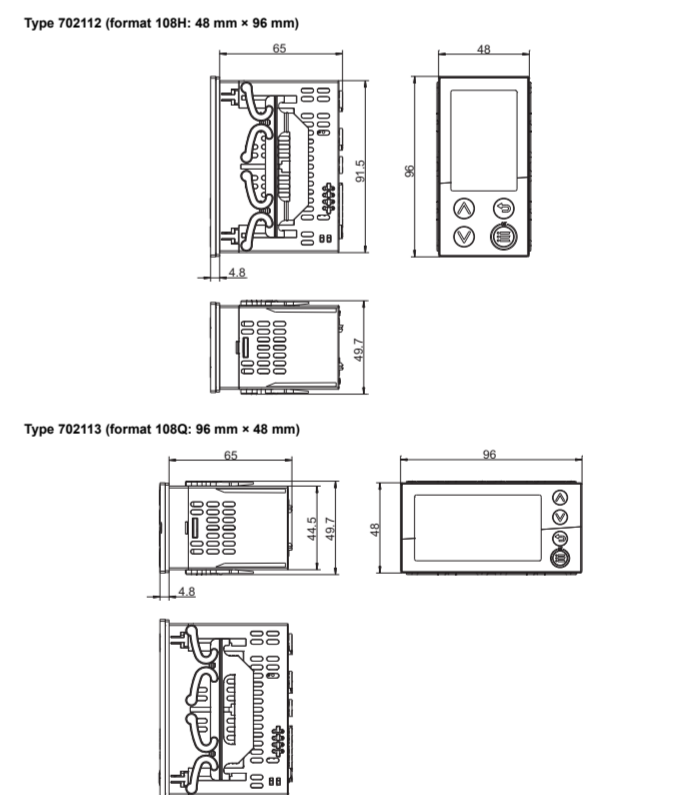
2 Mounting

2.3 Dimensions



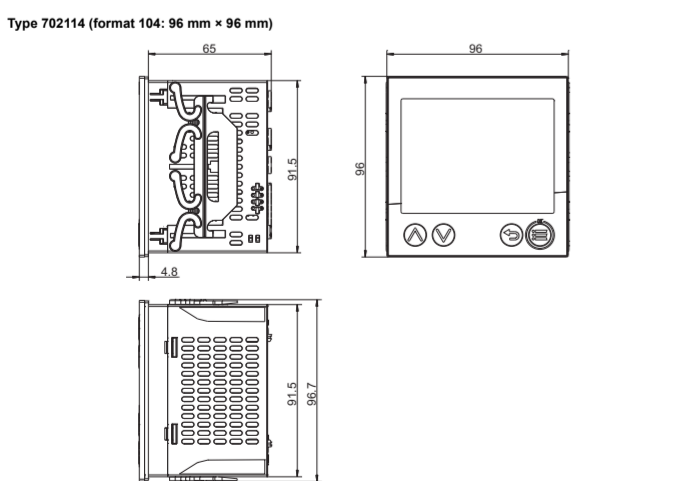
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2 Mounting



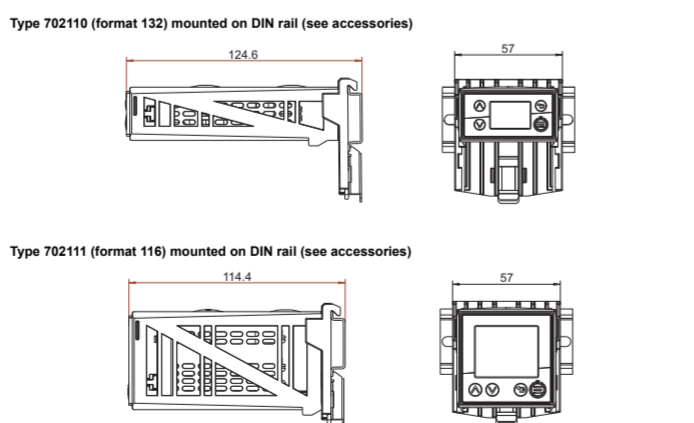
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2 Mounting



Type (format; front frame dimensions)	Panel cut-out (width x height)	Minimum spacing of panel cut-outs (for tightly packed installations)
702110 (132: 48 mm x 24 mm)	45 ^{+0.8} mm x 22 ^{+0.3} mm	Horizontal: 15 mm Vertical: 30 mm
702111 (116: 48 mm x 48 mm)	45 ^{+0.8} mm x 45 ^{+0.8} mm	Horizontal: 15 mm Vertical: 30 mm
702112 (108H: 48 mm x 96 mm)	45 ^{+0.8} mm x 92 ^{+0.8} mm	Horizontal: 20 mm Vertical: 30 mm
702113 (108Q: 96 mm x 48 mm)	92 ^{+0.8} mm x 45 ^{+0.8} mm	Horizontal: 20 mm Vertical: 30 mm
702114 (104: 96 mm x 96 mm)	92 ^{+0.8} mm x 92 ^{+0.8} mm	Horizontal: 20 mm Vertical: 30 mm

2 Mounting



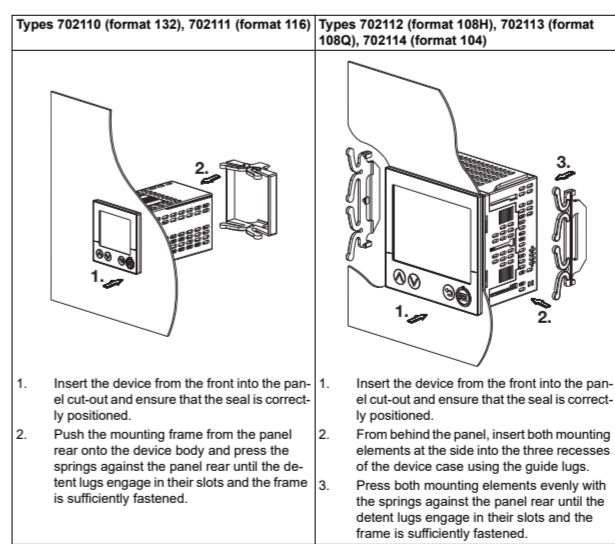
2.4 DIN rail installation

For devices in the formats 132 and 116, special mounting elements for mounting on a DIN rail (35 mm, according to DIN EN 60715) are available as accessories. This involves a base plate attached to the DIN rail and a device holder (see depictions in the section "Dimensions").
Process:
1) Mount the base plate on the DIN rail from above and press down until it engages.
2) Insert the mounting frame (included in the scope of delivery of the device, see Panel mounting) into the device holder from above (front).
3) Insert the device (without panel seal) into the device holder from the front and secure using the mounting frame. In doing so, ensure sufficient attachment (see Panel mounting).
4) Carry out electrical connection.
To facilitate the connection, the device holder can be mounted in the base plate from above with its underside positioned vertically (top connection terminals). It is also possible to mount the device holder with its front positioned horizontally so that the connection terminals can be accessed from the front. After connection, the device holder must be removed from the position!
5) Insert the device holder into the side recesses of the base plate with its rear detent lugs (format 132: top and center recesses) and press down until it engages.

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2 Mounting

2.5 Panel mounting



CAUTION!
The front of the device and housing have different protection types!
The protection type IP65 (front-side) is only guaranteed if the seal is flush and even.
► Use the mounting frame (and both mounting elements as shown in the figure and ensure an even attachment!

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3 Electrical connection

3.1 Installation notes

Requirements for personnel
• Work on the device must only be carried out to the extent described and, like the electrical connection, only by qualified personnel.
• Before plugging and unplugging connecting cables, it must be ensured that the acting person is electrostatically discharged (by touching grounded metallic parts, for example).
Cables, shielding, and grounding
• When selecting the electrical wiring material as well as when installing and connecting the device electrically, comply with the requirements of DIN VDE 0100 "Low-voltage electrical installations" and the applicable country-specific regulations (for example, based on IEC 60364).
• It may be necessary to adhere to special notes relating to the heat resistance of cables (see connection diagram).
• Route input, output, and supply lines separately and not parallel to one another.
• Only use shielded and twisted probe and interface cables. Do not route the lines close to current-carrying components or cables.
• For temperature probes, ground the shielding on one side in the control cabinet.
• Do not perform loopthroughs on the grounding cables, but instead route the cables individually to a shared grounding point in the control cabinet; in doing so, ensure that the cables are as short as possible. Ensure that the potential equalization is correct.

Electrical safety
• The device is intended to be installed in control cabinets or plants. Ensure that the customer's fuse protection does not exceed 20 A. Disconnect the device from the mains voltage on all poles prior to starting service or repair work.
• The relay's load circuit can be operated with a hazardous electrical voltage (e.g. 230 V). De-energize the load circuit during mounting/unmounting and electrical connection.
• To prevent the relay contacts being destroyed in the case of an external short-circuit in the load circuit, the latter must be fuse-protected as per the maximum admissible relay current (see technical data).
• The device is not suitable for installation in potentially explosive areas.
• In addition to a faulty installation, incorrectly set values on the device can also impair the correct function of the downstream process. Therefore, ensure that safety devices independent of the device, e.g. overpressure valves or temperature limiters/monitors, are present and that it is only possible for qualified personnel to define settings. Please observe the corresponding safety regulations in this context.

References to other information
• The electromagnetic compatibility conforms to the standards and regulations cited in the technical data.
• In general, please observe the specifications regarding electrical isolation.

Setup interface
• The setup interface (USB) is not intended for a permanent connection. Always disconnect the USB cable from the device as soon as you have finished working with the setup program.

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3 Electrical connection

3.2 Connection elements

Type 70210 (format 132)
Type 70210 (48 mm x 24 mm)

Terminals	Connection	Terminals	Connection	Terminals	Connection
1, 2	Output 1 (relay)	8, 10	Input 2 (for potential-free contact)	13, 14	(2) = option 2: output 5 (relay, logic or analog output)
3, 4	(2) = option 2: output 2 (relay, logic or analog output)	9, 10	Input 1 (for potential-free contact) or output 3 (logic output)	17, 18	Voltage supply
5-8	Analog input	11, 12	(1) = option 1: output 4 (relay, logic output) or RS485 interface		Setup (USB)

Type 70211 (format 116)
Type 70211 (48 mm x 48 mm)

Terminals	Connection	Terminals	Connection	Terminals	Connection
1, 2	Output 1 (relay)	8, 10	Input 2 (for potential-free contact)	13, 14	(2) = option 2: output 5 (relay, logic or analog output)
3, 4	Output 2 (relay)	9, 10	Input 1 (for potential-free contact) or output 3 (logic output)	17, 18	Voltage supply
5-8	Analog input	11, 12	(1) = option 1: output 4 (relay, logic output) or RS485 interface		Setup (USB)

Types 70212 (format 108H), 70213 (format 108Q), 70214 (format 104)
If the device is equipped with the Ethernet interface (option 2: RJ45 socket), terminals 11 to 14 are not available.

3 Electrical connection

Terminals	Connection	Terminals	Connection	Terminals	Connection
1, 2	Output 1 (relay)	9, 10	Input 1 (for potential-free contact) or output 3 (logic output)	17, 18	(4) = option 4: output 7 (relay, logic output or PhotoMOS [®] relay)
3, 4	Output 2 (relay)	11, 12	(1) = option 1: output 4 (logic output) or RS485 interface		Voltage supply
5-8	Analog input	13, 14	(2) = option 2: output 5 (relay, logic or analog output)		Setup (USB)
8, 10	Input 2 (for potential-free contact)	15, 16	(3) = option 3: output 6 (relay, logic output or PhotoMOS [®] relay)		PC (setup program)

3.3 Connection diagram

CAUTION!
In unfavorable conditions, the temperature may exceed 60 °C at the terminals. As a result, the insulation of the cables connected at the terminals may be damaged. The affected cables must be heat-resistant at least 80 °C.

NOTE!
There is an individual connection diagram on the housing that corresponds to the ordered device version.

3.3.1 Analog input
The analog input version is identical for all types.

Measuring probe/standard signal/Thermocouple	Symbol and terminal designation	Measuring probe/standard signal/Current DC 0/4 ... 20 mA	Symbol and terminal designation
RTD temperature probe two-wire circuit		Resistance/potentiometer two-wire circuit	
RTD temperature probe three-wire circuit		Resistance/potentiometer three-wire circuit	
Voltage DC 0/2 ... 10 V (usable as alternative to digital input 2)		Resistance transmitter	

3.3.2 Digital inputs

The digital input version is identical for all types.

Input	Version	Symbol and terminal designation	Input	Version	Symbol and terminal designation
1	Digital input for potential-free contact (usable as alternative to digital output 3)		2	Digital input for potential-free contact (only usable if the analog input is not configured as DC 0/2 ... 10 V)	

3 Electrical connection

3.3.5 RS485 interface

Version for type 70210 (format 132)	Symbol and terminal designation	Version for types 70211 to 70214	Symbol and terminal designation
Option 1: RS485 interface		Option 1 (alternative to digital output 4): RS485 interface	

3.3.6 Voltage supply

Version (see nameplate)	Symbol and terminal designation	Version (see nameplate)	Symbol and terminal designation
AC 110 to 240 V		AC/DC 20 to 30 V	

NOTE!
No separate voltage supply is required for configuring using the setup program as the device is supplied via the USB interface (USB-powered). For a device in format 108H, 108Q, or 104, in this case the standard digital outputs are activated and the digital outputs of the options are deactivated.

3.4 Galvanic isolation

4 Operation

The device is configured, parameterized, and operated using the four buttons on the front. A setup program is also available for convenient configuration of the device using a PC. Some functions can only be configured with the setup program. The individual parameters for device settings are organized in different levels that can be inhibited. The level inhibit helps to prevent accidental or unauthorized operation.

4.1 Display and control elements

- 18-segment LCD display (e.g. actual value), 4-digit, white; for types 70210 (132) and 70211 (116) also for displaying menu items, parameters and text
- 18-segment LCD display (e.g. setpoint value), 4-digit (70210 (132); 5-digit (70211 (116); 8-digit, green; for types 70210 (132) and 70211 (116) also for displaying menu items, parameters, values and text); display "OK" when exiting editing mode (with change)
- Activity display for ramp function/program, timer, manual mode
- For types 70212 (108H), 70213 (108Q) and 70214 (104), pixel matrix LCD display for displaying menu items, parameters and values as well as customer-specific text
- Switching of the digital outputs (yellow = active)
- Up (in the menu: increase value, select previous menu item or parameter; in basic status: increase setpoint value)
- Down (in menu: reduce value, select next menu item or parameter; in basic status: reduce setpoint value)
- Back (in menu: back to previous menu level, exit editing mode without change; in basic status: configurable function)
- Menu/OK (call up main menu, switch to submenu/level, switch to editing mode, exit editing mode with change)

Symbols (activity displays)

Symbol	Off	Lights up	Flashes
	Ramp function or program controller is not active and also not configured	Ramp function or program controller is active	Ramp function or program controller is active but not active
	Timer is not active and also not configured	Timer is configured but not active	Timer is active (running)

3 Electrical connection

3 Electrical connection

3.3.3 Analog output

Version for type 70210 (format 132)	Symbol and terminal designation	Version for types 70211 to 70214	Symbol and terminal designation
Option 2 (alternative to digital output 2): DC 0/2 ... 10 V or DC 0/4 ... 20 mA (configurable)		Option 2 (alternative to digital output 5): DC 0/2 ... 10 V or DC 0/4 ... 20 mA (configurable)	

3.3.4 Digital outputs

Output	Version	Symbol and terminal designation	Output	Version	Symbol and terminal designation
1	Relay (N/O contact)		5	Option 2 for types 70211 (116), 70212 (108H), 70213 (108Q) and 70214 (104) (alternative to analog output); Relay (N/O contact) or logic output 0/14 V	
2	Relay (N/O contact), (for type 70210 as option 2, see below)		6	Option 3 for types 70212 (108H), 70213 (108Q) and 70214 (104); Relay (N/O contact) or logic output 0/14 V or PhotoMOS [®] relay	
3	Option 2 for type 70210 (132) (alternative to analog output); Relay (N/O contact) or logic output 0/14 V (usable as alternative to digital input 1)		7	Option 4 for types 70211 (116), 70212 (108H), 70213 (108Q) and 70214 (104); Relay (N/O contact; only with longer contact) or logic output 0/14 V or PhotoMOS [®] relay	
4	Option 1 for types 70211 (116), 70212 (108H), and 70214 (104) (alternative to RS485 interface); Relay (N/O contact); only for type 70211 (116) or logic output 0/14 V				

3 Electrical connection

3.3.5 RS485 interface

Version for type 70210 (format 132)	Symbol and terminal designation	Version for types 70211 to 70214	Symbol and terminal designation
Option 1: RS485 interface		Option 1 (alternative to digital output 4): RS485 interface	

3.3.6 Voltage supply

Version (see nameplate)	Symbol and terminal designation	Version (see nameplate)	Symbol and terminal designation
AC 110 to 240 V		AC/DC 20 to 30 V	

NOTE!
No separate voltage supply is required for configuring using the setup program as the device is supplied via the USB interface (USB-powered). For a device in format 108H, 108Q, or 104, in this case the standard digital outputs are activated and the digital outputs of the options are deactivated.

3.4 Galvanic isolation

4 Operation

The device is configured, parameterized, and operated using the four buttons on the front. A setup program is also available for convenient configuration of the device using a PC. Some functions can only be configured with the setup program. The individual parameters for device settings are organized in different levels that can be inhibited. The level inhibit helps to prevent accidental or unauthorized operation.

4.1 Display and control elements

- 18-segment LCD display (e.g. actual value), 4-digit, white; for types 70210 (132) and 70211 (116) also for displaying menu items, parameters and text
- 18-segment LCD display (e.g. setpoint value), 4-digit (70210 (132); 5-digit (70211 (116); 8-digit, green; for types 70210 (132) and 70211 (116) also for displaying menu items, parameters, values and text); display "OK" when exiting editing mode (with change)
- Activity display for ramp function/program, timer, manual mode
- For types 70212 (108H), 70213 (108Q) and 70214 (104), pixel matrix LCD display for displaying menu items, parameters and values as well as customer-specific text
- Switching of the digital outputs (yellow = active)
- Up (in the menu: increase value, select previous menu item or parameter; in basic status: increase setpoint value)
- Down (in menu: reduce value, select next menu item or parameter; in basic status: reduce setpoint value)
- Back (in menu: back to previous menu level, exit editing mode without change; in basic status: configurable function)
- Menu/OK (call up main menu, switch to submenu/level, switch to editing mode, exit editing mode with change)

Symbols (activity displays)

Symbol	Off	Lights up	Flashes
	Ramp function or program controller is not active and also not configured	Ramp function or program controller is active	Ramp function or program controller is active but not active
	Timer is not active and also not configured	Timer is configured but not active	Timer is active (running)

3 Electrical connection

3.3.3 Analog output

Version for type 70210 (format 132)	Symbol and terminal designation	Version for types 70211 to 70214	Symbol and terminal designation
Option 2 (alternative to digital output 2): DC 0/2 ... 10 V or DC 0/4 ... 20 mA (configurable)		Option 2 (alternative to digital output 5): DC 0/2 ... 10 V or DC 0/4 ... 20 mA (configurable)	

3.3.4 Digital outputs

Output	Version	Symbol and terminal designation	Output	Version	Symbol and terminal designation
1	Relay (N/O contact)		5	Option 2 for types 70211 (116), 70212 (108H), 70213 (108Q) and 70214 (104) (alternative to analog output); Relay (N/O contact) or logic output 0/14 V	
2	Relay (N/O contact), (for type 70210 as option 2, see below)		6	Option 3 for types 70212 (108H), 70213 (108Q) and 70214 (104); Relay (N/O contact) or logic output 0/14 V or PhotoMOS [®] relay	
3	Option 2 for type 70210 (132) (alternative to analog output); Relay (N/O contact) or logic output 0/14 V (usable as alternative to digital input 1)		7	Option 4 for types 70211 (116), 70212 (108H), 70213 (108Q) and 70214 (104); Relay (N/O contact; only with longer contact) or logic output 0/14 V or PhotoMOS [®] relay	
4	Option 1 for types 70211 (116), 70212 (108H), and 70214 (104) (alternative to RS485 interface); Relay (N/O contact); only for type 70211 (116) or logic output 0/14 V				

3 Electrical connection

3.3.5 RS485 interface

Version for type 70210 (format 132)	Symbol and terminal designation	Version for types 70211 to 70214	Symbol and terminal designation
Option 1: RS485 interface		Option 1 (alternative to digital output 4): RS485 interface	

3.3.6 Voltage supply

Version (see nameplate)	Symbol and terminal designation	Version (see nameplate)	Symbol and terminal designation
AC 110 to 240 V		AC/DC 20 to 30 V	

NOTE!
No separate voltage supply is required for configuring using the setup program as the device is supplied via the USB interface (USB-powered). For a device in format 108H, 108Q, or 104, in this case the standard digital outputs are activated and the digital outputs of the options are deactivated.

3.4 Galvanic isolation

5 Technical data

5.1 Analog input

Designation	Type	Standard	ITS	Measuring range	Accuracy ^a
Fe-CuNi	"L"	DIN 43710 (1985)	IFTS-68	-200 to +900 °C	± 0.25 %
Fe-CuNi	"J"	DIN EN 60584-1:2014 IEC 60584-1:2013	IFTS-90	-210 to +1200 °C	± 0.25 % from -100 °C
Cu-CuNi	"U"	DIN 43710 (1985)	IFTS-68	-200 to +600 °C	± 0.25 % from -100 °C
Cu-CuNi	"T"	DIN EN 60584-1:2014 IEC 60584-1:2013	IFTS-90	-270 to +400 °C	± 0.25 % from -150 °C
Ni-Cr-Ni	"K"	DIN EN 60584-1:2014 IEC 60584-1:2013	IFTS-90	-270 to +1300 °C	± 0.25 % from -80 °C
Ni-Cr-CuNi	"E"	DIN EN 60584-1:2014 IEC 60584-1:2013	IFTS-90	-270 to +1000 °C	± 0.25 % from -80 °C
Ni-Cr-NiSi	"N"	DIN EN 60584-1:2014 IEC 60584-1:2013	IFTS-90	-270 to +1300 °C	± 0.25 % from -80 °C
Pl10Rh-Pt	"S"	DIN EN 60584-1:2014 IEC 60584-1:2013	IFTS-90	-50 to +1768 °C	± 0.25 % from 20 °C
Pl13Rh-Pt	"R"	DIN EN 60584-1:2014 IEC 60584-1:2013	IFTS-90	-50 to +1768 °C	± 0.25 % from 50 °C
Pl30Rh-PtRh	"B"	DIN EN 60584-1:2014 IEC 60584-1:2013	IFTS-90	-50 to +1820 °C	± 0.25 % from 400 °C
WSRe-W26Re	"C"	DIN EN 60584-1:2014 IEC 60584-1:2013	IFTS-90	0 to 2315 °C	± 0.25 % from 500 °C
WSRe-W26Re	"D"	ASTM E175184-15	IFTS-90	0 to 2315 °C	± 0.25 % from 500 °C
WSRe-W26Re	"A1"	GOST R 8.585-2001	IFTS-90	0 to 2500 °C	± 0.25 % from 500 °C
Chromel-Copel	"L"	GOST R 8.585-2001	IFTS-90	-200 to +800 °C	± 0.25 % from -80 °C
Chromel- Alumel	"K"	GOST R 8.585-2001	IFTS-90	-270 to +1300 °C	± 0.25 % from -80 °C

^a The accuracy value refers to the measuring range.

Ambient temperature influence: ≤ 100 ppm/K

Cold junction: Internal or external (constant)

Reference point temperature (external): 0 to 100 °C (adjustable)

Sampling rate: 150 ms

Input filter: Digital filter, 2nd order; filter constant can be set from 0 to 100.0 s

RTD temperature probe

Designation	Standard	ITS	Connection type	Measuring range	Accuracy ^a	Measuring current
PH100	DIN EN 60751-2009 IEC 60751-2:2008	IFTS-90	Two-wire	-200 to +850 °C	± 0.2 %	500 µA
PH1000	DIN EN 60751-2009 IEC 60751-2:2008	IFTS-90	Three-wire	-200 to +850 °C	± 0.1 %	500 µA
PH100	GOST 6651-2009 A.2	IFTS-90	Two-wire	-200 to +850 °C	± 0.2 %	500 µA
KTY			Two-wire	-53 to +153 °C	± 2.0 %	50 µA

5 Technical data

^a The accuracy value refers to the measuring range.

Ambient temperature influence	Sensor line resistance	Sampling rate	Input filter
≤ 50 ppm/K	Max. 30 Ω per line	150 ms	Digital filter, 2nd order; filter constant can be set from 0 to 100.0 s

Resistance transmitter and resistor/potentiometer

Designation	Measuring range	Accuracy ^a	Measuring current
Resistance transmitter	0 to 4000 Ω	± 0.1 %	50 µA
Resistance/potentiometer	0 to 400 Ω	± 0.1 %	500 µA
	0 to 4000 Ω	± 0.1 %	50 µA

^a The accuracy value refers to the maximum measuring range. Small measuring spans lead to reduced linearity accuracy.

Ambient temperature influence	Connection type	Resistance transmitter	Resistor/potentiometer
≤ 100 ppm/K	Three-wire circuit	Max. 30 Ω per line	

Voltage, current (standard signals)

Designation	Measuring range	Accuracy ^a	Input resistance or burden voltage
Voltage	0 to 10 V	± 0.1 %	> 500 kΩ
	2 to 10 V	± 0.1 %	> 500 kΩ
Current	4 to 20 mA	± 0.1 %	< 2.5 V
	0 to 20 mA	± 0.1 %	< 2.5 V

^a The accuracy value refers to the maximum measuring range. Small measuring spans lead to reduced linearity accuracy.

Ambient temperature influence	Deviation below/above the measuring range	Sampling rate	Input filter
≤ 100 ppm/K	According to NAMUR recommendation NE 43 (only current input 4 to 20 mA)	150 ms	Digital filter, 2nd order; filter constant can be set from 0 to 100.0 s

Measuring circuit monitoring
The device behavior in the event of a fault is configurable.

Measuring probe	Measuring range underflow	Measuring range overflow	Short-circuit (probe/line)	Break (probe/line)	Polarity
RTD temperature probe	++	++	++	++	---
Resistance/potentiometer	---	---	---	---	---
Resistance transmitter	---	++	(+) ^b	(+) ^b	---
Thermocouple	++	++	---	++	(+) ^c

5 Technical data

5.4 Digital outputs

Relay (N/O contact)	Switching capacity	Contact life	Relay (N/O contact) with longer contact life	Switching capacity	Contact life	Logic output	Output signal	Current	Switching time when used as a controller output	PhotoMOS [®] relay ^a	Switching capacity
	Max. 3 A at AC 230 V or DC 30 V, resistive load	150,000 operations at rated load	Max. 3 A at AC 230 V, resistive load	300,000 operations at rated load	1,500,000 operations at 1 A	DC 0/14 V ± 15 %	Max. 20 mA per output (at nominal voltage 14 V)		Min. 10 ms	Max. 200 mA at AC 30 V or DC 45 V, not short-circuit proof	

^a PhotoMOS is a registered trademark of Panasonic Corporation.

5.5 Interfaces

USB device	Connector type	Standard	Max. cable length
	Micro-B (socket)	Low-Speed, Full-Speed	5 m

RS485	Baud rate	Data format	Protocol
	9600, 19200, 38400, 115200	8/1n, 8/1e, 8/1o, 8/2n	Modbus-RTU as slave

Ethernet	Connector type	Transfer rate	Protocol
	RJ45 (socket)	10 Mbit/s, 100 Mbit/s	TCP/IP, DHCP; Modbus-TCP, Modbus-RTU/ASCII via TCP, as slave

5.6 Display

18-segment LCD displays	Digit height	Upper display:	Lower display:
Type 70210 (format 132)	7.2 mm	3.8 mm	