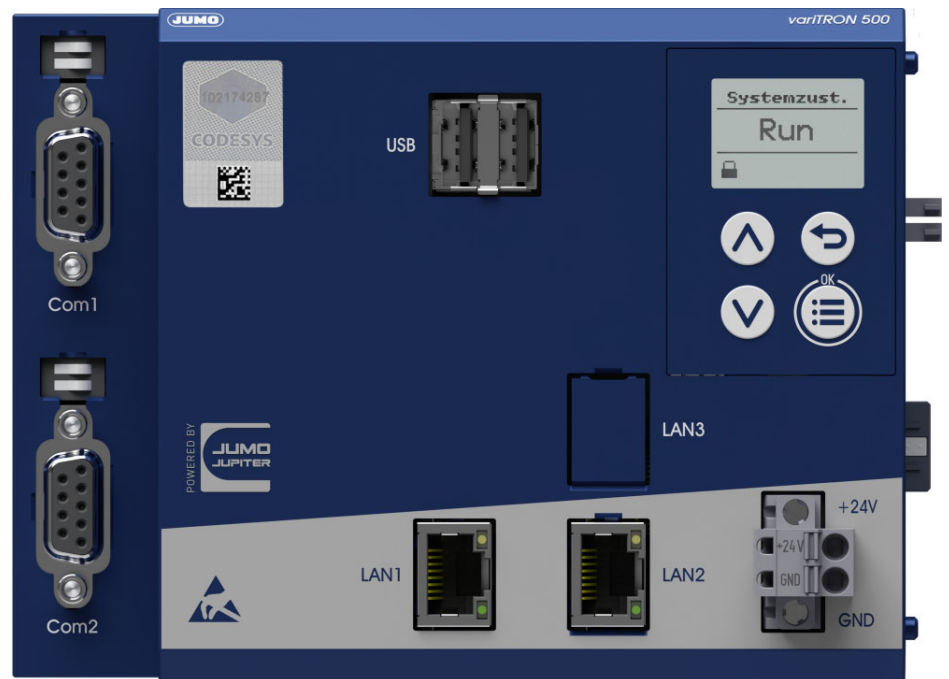


JUMO variTRON 500

Automation System

Central Processing Unit 705002



Operating Manual



70500200T90Z001K000

V8.00/EN/00703039/2023-04-06

Further information and downloads



qr-705002-en.jumo.info

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Contents

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 rights!

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.

1 Introduction

1.2 Trademark information

All trademarks and trade and company names used are the property of their rightful owners or authors.

1.3 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.

1.4 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.

1.5 Acceptance of goods, storage, and transport

1.5.1 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.

1.5.2 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

1.5.3 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

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 Introduction

1.5.4 Disposal

Disposing of the packaging material

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

The country-specific laws and regulations for waste treatment and disposal must be observed.

Disposing of the device



DISPOSAL!

Devices and/or replaced parts (including batteries) should not be placed in the refuse bin at the end of their service life, but must be disposed of properly and in an environmentally friendly manner.

The device consists of materials that can be recycled by specialist recycling plants.

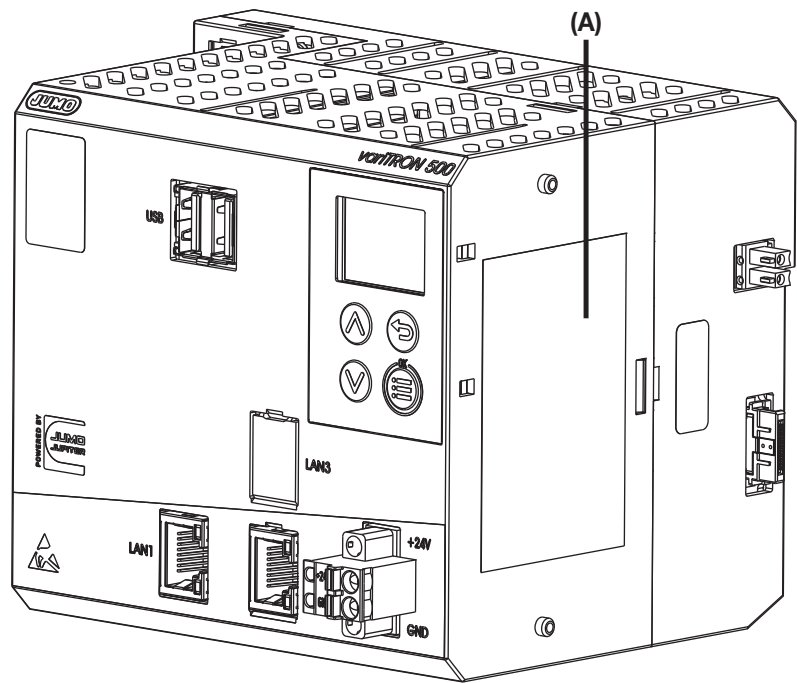
The country-specific laws and regulations for waste treatment and disposal must be observed.

1.6 Identifying the device version

1.6.1 Nameplate

Position

The nameplate (A) is affixed to the module case.



Contents

The nameplate contains important information. This includes:

Description	Designation on the nameplate	Example
Device type	Typ	705002/22108-00-00-00-36/000,224
Part no.	TN	00123456
Fabrication number	F-Nr.	0070033801219200006
Voltage supply	-	DC 24 V, +25/-20 %

Device type (Typ)

Compare the specifications on the nameplate with the order.
Identify the supplied device version using the order details.

Part no. (TN)

The part no. clearly identifies an article in the catalog. It is important for communication between the customer and the sales department.

Fabrication no. (F-Nr)

Among other things, the fabrication number contains the date of manufacture (year/week).
Example: F-Nr = 00700338012**1920**0006
The figures concerned are in positions 12, 13, 14, and 15 (from the left).
The device was therefore produced in the 20th calendar week of 2019.

1 Introduction

1.6.2 Order details

(1) Basic type	
705002	Central processing unit, type 705002 (program generator, 1 × Ethernet (RJ45), 1 × system bus (side), 2 × USB host), Node-RED
(2) Basic type extension 1	
2	Quad core CPU
(3) Basic type extension 2	
2	RAM 1024 MB
(4) Basic type extension 3	
1	eMMC 8 GB ^a
(5) Basic type extension 4	
0	Without software control loops
(6) Version	
8	Standard with default settings
(7) Com1 interface	
00	Not used
51	RS232 Modbus-RTU ^b (as of system version 3)
55	RS485 Modbus-RTU ^b (as of system version 3)
(8) Interface Com2	
00	Not used
51	RS232 Modbus-RTU ^b (as of system version 3)
55	RS485 Modbus-RTU ^b (as of system version 3)
(9) Interface LAN2	
00	Not used
08	Ethernet (RJ45)
(10) Voltage supply	
36	DC 24 V +25/-20 %, SELV
(11) Extra codes	
001	Program generator incl. JUMO smartWARE Program (701850; as of system version 7) ^{c, d}
224	PLC according to IEC 61131-3 (CODESYS V3.5; necessary to operate the device as a PLC) ^e
280	Remote TargetVisu ^{c, e}
281	WebVisu ^{c, e}
282	PROFINET IO controller ^{c, e}
283	OPC UA server ^{c, e}
284	Modbus-TCP master ^{c, e}
285	Modbus-TCP slave ^{c, e}
286	EtherCAT master ^{c, e}
288	PROFINET Device 1-port (as of system version 7) ^{c, e}
289	BACnet/IP (as of system version 4) ^{c, e}

^a Flexible allocation between system data and application data.

^b The PLC (extra code 224) enables additional interface protocols to be implemented (extra cost).

^c Only in conjunction with extra code 224.

^d Only in conjunction with extra code 281.

^e This function can be used in demo mode free of charge for 30 minutes.

Order code (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11)
 705002 / 2 2 1 0 - 8 - - - - 36 / 224 , ...^a
 Order example 705002 / 2 2 1 0 - 8 - 00 - 00 - 00 - 36 / 224

^a List further extra codes in sequence, separated by commas.

1.6.3 Scope of delivery

1 central processing unit, type 705002, in the ordered version
1 cover for system bus
2 screw-on end clamps for DIN rail
1 installation instructions

1.6.4 Accessories

Description	Part no.
USB to Ethernet converter:	
TP-Link UE300 USB to Gigabit LAN converter ^a (as of system version 8)	30047695
Interface modules (expansion boards):	
RS232 Modbus-RTU (as of system version 3)	00745041
RS485 Modbus-RTU (as of system version 3)	00745042
Ethernet (RJ45)	00745043
Extra codes (activations):	
Program generator incl. JUMO smartWARE Program (701850; as of system version 7)	00771090
PLC according to IEC 61131-3 (CODESYS V3.5; necessary to operate the device as a PLC)	00724988
Remote TargetVisu	00724990
WebVisu	00724991
PROFINET IO controller	00724992
OPC UA server	00724993
Modbus-TCP master	00724994
Modbus-TCP slave	00724996
EtherCAT master	00724997
PROFINET Device 1-port (as of system version 7)	30049493
BACnet/IP (as of system version 4)	30049494

^a This USB to Ethernet converter with RTL8153 chipset has been tested by the manufacturer. Other USB to Ethernet converters with the same chipset should also be usable, as well as converters with the following chipsets: Realtek RTL8150, RTL8152, RTL8153ASIX AX88xxx based, AX88179, AX-88178ASMSC LAN95XX based.

1 Introduction

1.7 Module overview

1.7.1 Central processing unit

The central processing unit JUMO variTRON 500 along with the proven input and output modules (incl. controller module) form a complete system.

The central processing unit manages all configuration and parameter data of the complete system and provides a PLC acc. to IEC 61131-3 (CODESYS V3.5; as extra code). The PLC can be activated in different versions:

- CODESYS runtime system
- CODESYS runtime system incl. Remote TargetVisu
- CODESYS runtime system incl. WebVisu
- CODESYS runtime system incl. Remote TargetVisu and WebVisu

For visualization, commercially available panels are used which support CODESYS Remote TargetVisu or WebVisu functionality. The visualization is also possible via web browser. Visualizations have to be implemented with CODESYS resources.

A convenient setup program is used for configuration. JUMO standard functions for CODESYS are provided in libraries (as of system version 6) and can be individually integrated into the customer application.

Module designation	Data sheet	Features
JUMO variTRON 500 Central processing unit	705002	• Process mapping for all connected input/output modules (incl. controller modules) • Display and keys to display the system status • 2 USB host interfaces • OPC UA server (in conjunction with PLC) • Program generator incl. JUMO smartWARE Program (as of system version 7) • 2 field bus interfaces (as of system version 3) • PROFINET IO controller/device (in conjunction with PLC, device as of system version 7) • Plug and Play for input/output module replacement • Battery-buffered SRAM (retain data) • Battery-buffered real-time clock • Data evaluation with JUMO smartWARE Evaluation (as of system version 6)

1.7.2 Modules

The proven controller as well as input and output modules are available as module variants. For example: the analog input module with universal inputs for thermocouples, RTD temperature probes, and voltage or current standard signals. As a result the same hardware can be used to precisely record and digitize a highly diverse range of process variables.

JUMO variTRON 500 enables simultaneous operation of more than 120 control loops so that it can also be used for sophisticated processes. Through expansion slots the inputs and outputs of each controller module can be individually expanded and adapted. The control loops here operate fully independently, which means they do not require resources from the central processing unit.

Thyristor power controllers can also be connected via EtherCAT or PROFINET.

In addition, JUMO digiLine sensors for liquid analysis can be connected to the central processing unit.

Input/output modules

Module designation	Data sheet	Features
Multichannel controller module	705010	- Up to 4 independently configurable PID control loops with a fast cycle time and proven control algorithms - Independent operation - Math and logic functions - Counter input up to 10 kHz
Relay module 4-channel	705015	4 relay outputs controlled via the system bus by digital signals - Changeover contact in each case (230 V / 3 A) - Switching statuses are displayed with LEDs
Analog input module 4-channel	705020	4 high-quality, configurable analog inputs for RTD temperature probes, resistance transmitters, thermocouples, current 0(4) to 20 mA, voltage 0(2) to 10 V - All inputs are galvanically isolated from each other - Customer-specific linearization possible - Limit value monitoring - Additional digital input
Analog input module 8-channel	705021	8 high-quality analog inputs for RTD temperature probes Pt100, Pt500, Pt1000 in two-wire circuit - Limit value monitoring - Additional digital input
Analog output module 4-channel	705025	4 configurable analog outputs 0(4) to 20 mA or 0(2) to 10 V - Adjustable output behavior in case of malfunction
Digital input/output module 12-channel	705030	12 digital inputs or outputs - Each channel can be individually configured as an input DC 0/24 V or output DC 24 V - Load capacity per output: 500 mA - Switching states are visualized by LED
Digital input/output module 32-channel (as of system version 3)	705031	17 digital outputs - up to 15 additional digital inputs or outputs - Load capacity per output: 500 mA - Switching states are visualized by LED
Thyristor power controller Type 70906x (as of system version 3)	709061, 709062, 709063	- For one-phase and three-phase operation - Continuous load current up to 250 A, load voltage up to 500 V - Different circuit variants, load types and operating modes can be realized

1 Introduction

Special modules

Module designation	Data sheet	Features
Router module 2-port (as of system version 3)	705041	• Mounting behind another module (or the CPU) on DIN rail (side system bus input and output) • Is used exclusively for system bus expansion via RJ45 sockets on the front (2 x Bus Out)
Router module 3-port (as of system version 3)	705042	• Use as first module on an additional DIN rail to connect further modules (system bus input via RJ45 socket; system bus output on the side) • Is used additionally for system bus expansion or increasing the system bus range, via RJ45 sockets on the front (1 x Bus In, 2 x Bus Out)
Router module 1-port (as of system version 4)	705043	• Use together with a central processing unit variTRON 300 or variTRON 500 touch to connect the modules (system bus input via RJ45 socket; system bus output on the side) • Is used additionally for system bus expansion

Panels

Module designation	Data sheet	Features
JUMO variTRON Web panels	705070	• Versions for different requirements (e.g. standard, Foot & Beverage) • Screen diagonals from 10.9 cm (4.3") to 54.6 cm (21.5") • TFT- touchscreen, capacitive or resistive

Power supply units

Module designation	Data sheet	Features
Power supply unit 705090/03-33	705090	• AC 100 to 240 V wide-range input • Output: DC 24 V / 3.4 A
Power supply unit 705090/05-33	705090	• AC 100 to 240 V wide-range input • Output: DC 24 V / 5 A
Power supply unit 705090/10-33	705090	• AC 100 to 240 V wide-range input • Output: DC 24 V / 10 A

1.8 Available technical documentation

The documentation for the automation system is addressed to plant manufacturers and users with specialist training and consists of the following documents (previous document number in brackets).

1.8.1 Central processing unit

Product	Document	No.	Printed	PDF file
variTRON 500	Data sheet	70500200T10...	-	X
Central processing unit	Operating manual	70500200T90...	-	X
	Installation instructions	70500200T94...	X	X
Process Technology	Operating manual	70185000T90...	-	X

1.8.2 Input/output modules

Product	Document	No.	Printed	PDF file
Multichannel controller module	Data sheet	70501000T10...	-	X
	Operating manual	70501000T90... (B 705010.0)	-	X
	Installation instructions	70501000T94... (B 705010.4)	X	X
Relay module 4-channel	Data sheet	70501500T10...	-	X
	Operating manual	70501500T90... (B 705015.0)	-	X
	Installation instructions	70501500T94... (B 705015.4)	X	X
Analog input module 4-channel	Data sheet	70502000T10...	-	X
	Operating manual	70502000T90... (B 705020.0)	-	X
	Installation instructions	70502000T94... (B 705020.4)	X	X
Analog input module 8-channel	Data sheet	70502100T10...	-	X
	Operating manual	70502100T90... (B 705021.0)	-	X
	Installation instructions	70502100T94... (B 705021.4)	X	X
Analog output module 4-channel	Data sheet	70502500T10...	-	X
	Operating manual	70502500T90...	-	X
	Installation instructions	70502500T94...	X	X
Digital input/output module 12-channel	Data sheet	70503000T10...	-	X
	Operating manual	70503000T90... (B 705030.0)	-	X
	Installation instructions	70503000T94... (B 705030.4)	X	X
Digital input/output module 32-channel (as of system version 3)	Data sheet	70503100T10...	-	X
	Operating manual	70503100T90...	-	X
	Installation instructions	70503100T94...	X	X

1 Introduction

Thyristor power controller type 70906x (as of system version 3)	Operating manual (integration in the automation system)	70500153T90...	-	X
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1.8.3 Special modules

Product	Document	No.	Printed	PDF file
Router module 2-port (as of system version 3)	Data sheet	70504100T10...	-	X
	Installation instructions	70504100T94...	X	X
Router module 3-port (as of system version 3)	Data sheet	70504200T10...	-	X
	Installation instructions	70504200T94...	X	X
Router module 1-port (as of system version 4)	Data sheet	70504300T10...	-	X
	Installation instructions	70504300T94...	X	X

1.8.4 Panels

Product	Document	No.	Printed	PDF file
JUMO variTRON Web panels	Data sheet	70507000T10...	-	X

1.8.5 Power supply units

Product	Document	No.	Printed	PDF file
24 V power supply units	Data sheet	70509000T10...	-	X
	Operating instructions QS3.241		X	-
	Operating instructions QS5.241		X	-
	Operating instructions QS10.241		X	-

1.9 System version

The system version of the automation system is determined by the software version of the central processing unit.

Example composition of a version number for the central processing unit 705002: 388.x.y.z.b

388 = basic number

x = major version (= system version)

y = minor version

z = patch version

b = build number

In this document, functions which depend on the system version are marked accordingly (e.g. "as of system version x").

2.1 General information on installation/dismounting



DANGER!

With multichannel controller module 705010 and relay module 705015, the load circuits from relay or solid state relay outputs can be operated with a dangerous electrical voltage (e.g. 230 V).

There is a risk of electric shock.

- Prior to the installation/dismounting of these modules or the removal of the module insert, the load circuits are to be disconnected from the voltage and the terminal strips are to be removed from the module. This work must only be performed by qualified personnel.



WARNING!

The modules must never be installed in areas with an explosion hazard.

Explosion hazard.

- The entire system must only be used outside of areas with an explosion hazard.

Mounting site

All modules have protection type IP20 and are only intended for use in fireproof control cabinets or switch boxes. The mounting site should be virtually vibration-free. Electromagnetic fields caused by equipment such as motors or transformers should be avoided.

Type 705070 panels are designed for installation in a panel cut-out. Information on the protection type and other technical data can be found in data sheet 705070.

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 modules. The mounting site must be free from dust, powder, and other suspended matter so that the cooling slots do not become blocked.

DIN rail

All modules are mounted on a DIN rail according to DIN EN 60715 (35 mm × 7.5 mm × 1 mm). For reasons of stability, the spacing of the fastening screws for the DIN rail should not exceed 200 mm. The minimum distances for the modules that are specified in the module-specific installation or operating instructions must be observed.

Installation position

The DIN rail should be mounted horizontally so that all modules are arranged vertically. Otherwise the admissible ambient temperature range will be restricted.

Space requirement

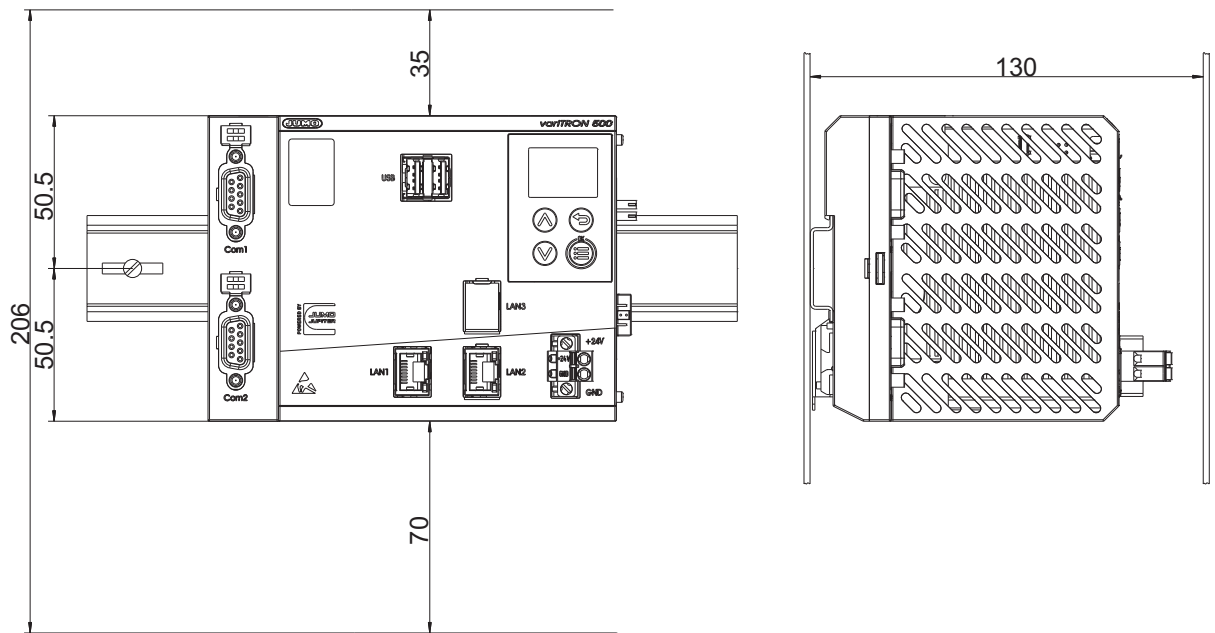
The modules require the minimum distances shown in the following figure for the purpose of installation/dismounting and for future maintenance or replacement. In the event of shorter distances the minimum bending radius of the cables, the performance of the electrical installation, and the clear arrangement of the plant are no longer guaranteed.

Cleaning

Only use a dry cloth for cleaning the modules (protection type IP20).

2 Mounting

Minimum distances



2.2 Installation/dismounting on DIN rail

All modules in the system are intended for installation on a DIN rail according to DIN EN 60715 (35 mm × 7.5 mm × 1 mm).

The following must always be installed on the left side at the start of the DIN rail:

- A central processing unit or
- A router module 705042 (or 705043)

These connect the input/output modules to the voltage supply and the system bus.



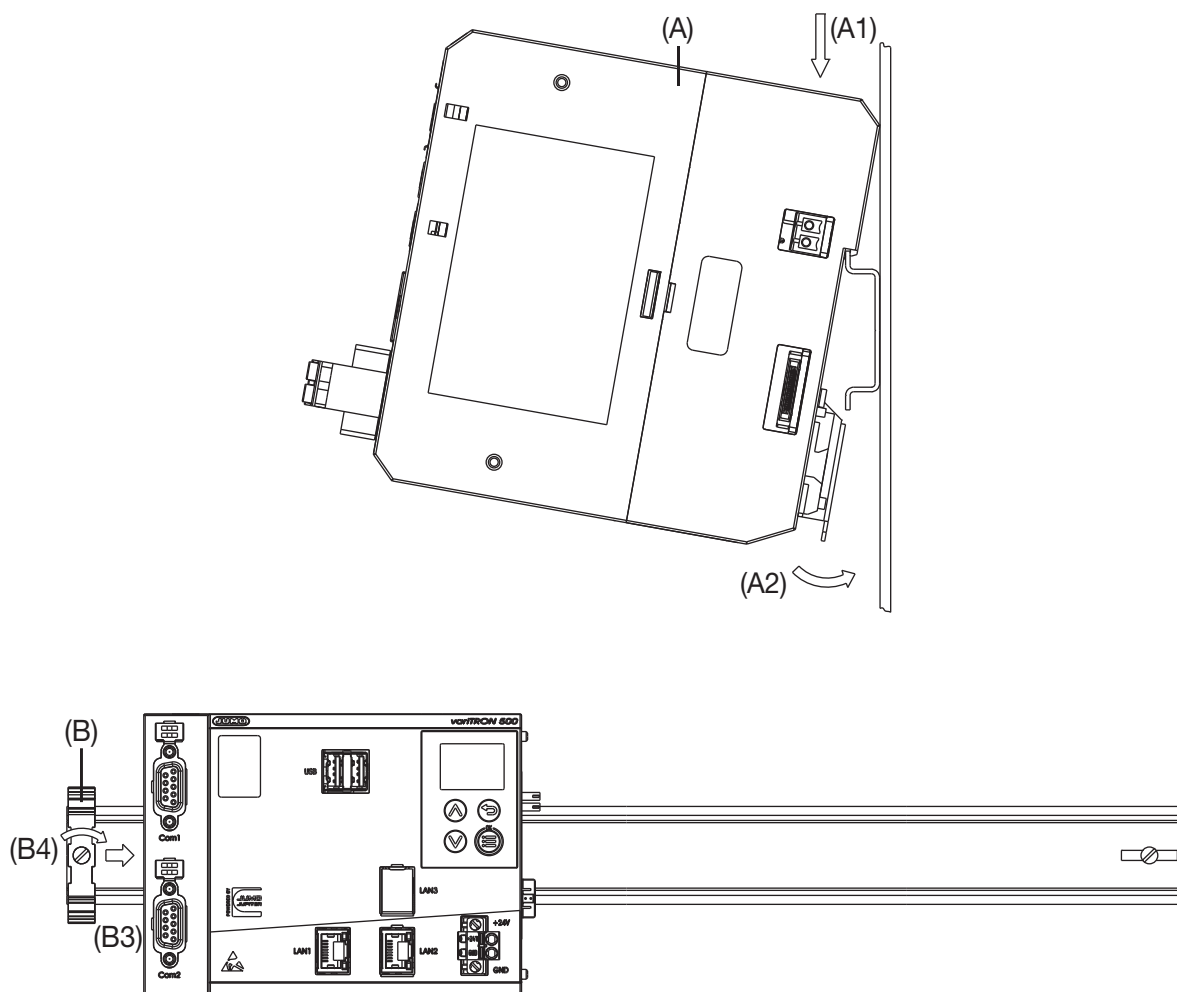
NOTE!

To determine the required minimum width of the DIN rail, the widths of the individual modules are to be added (see technical data of the modules in the respective data sheet or the module-specific installation instructions).

The widths of the cover (17.5 mm) and both end brackets (each 9.5 mm) should also be taken into consideration: $17.5 \text{ mm} + 2 \times 9.5 \text{ mm} = 36.5 \text{ mm}$.

2.2.1 Central processing unit

Installation of the central processing unit 705002

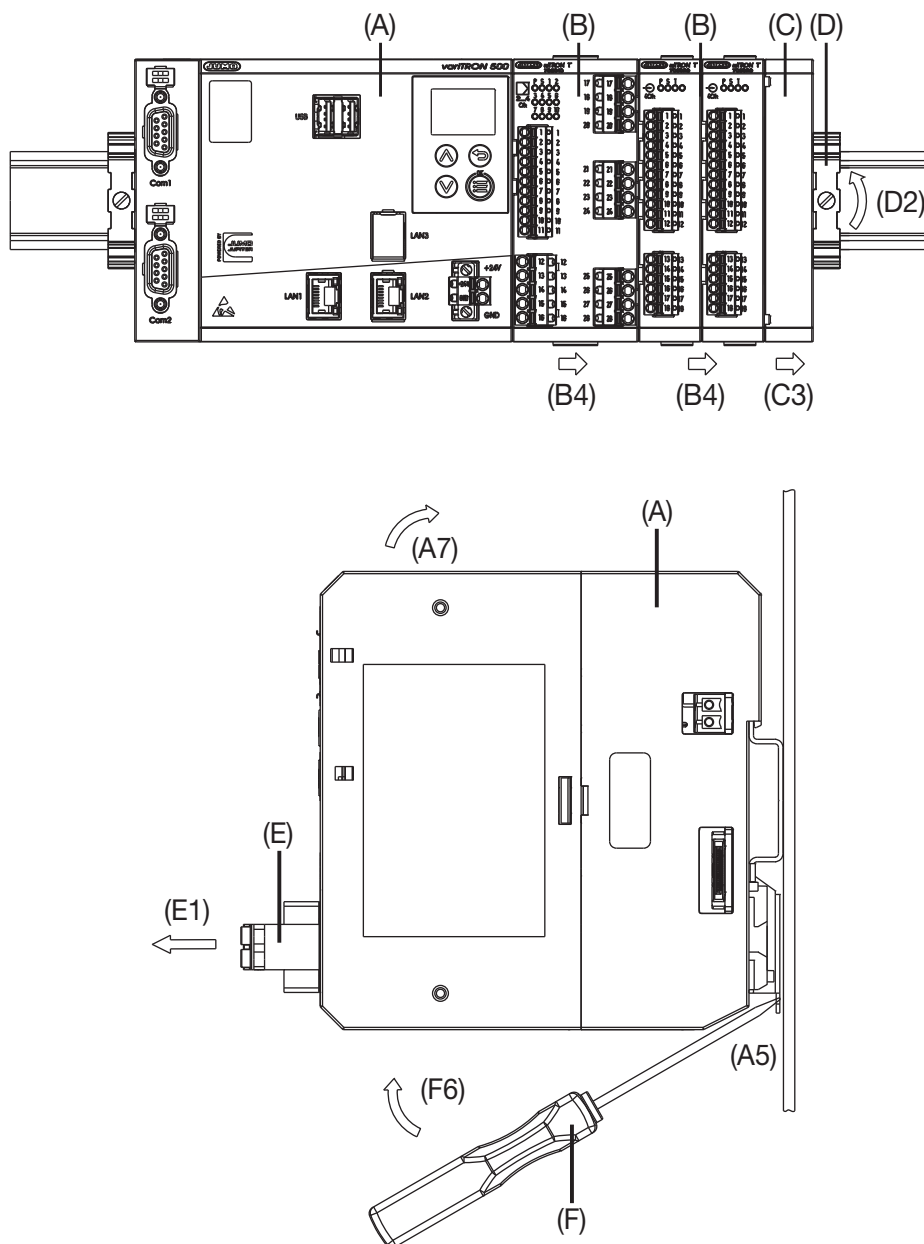


Process:

1. Mount the central processing unit (A) on the DIN rail from above (A1).
2. Pivot the central processing unit (A) downwards until it snaps into place (A2).
3. Position the end bracket (B) on the DIN rail and move to the right against the central processing unit (B3).
4. Fasten the end bracket using a screwdriver (B4).

2 Mounting

Dismounting of the central processing unit 705002



Process:

1. Remove the connecting cables if required (interfaces).
2. If required, use a screwdriver to release the wired terminal (E) of the central processing unit (A) and pull off toward the front (E1).
3. Fully release the end bracket (D) using a screwdriver (D2), press upward from below, pivot toward the front, and remove from the DIN rail.

Note: The end bracket does not need to be removed from the DIN rail if there is sufficient space to the side to move it at least 10 mm to the right.

4. Move the cover (C) to the right (C3) until the side contacts of the neighboring module are exposed. Then release the cover at the bottom using a screwdriver, press upward, and remove from the DIN rail.

Note: The cover does not need to be removed from the DIN rail if there is sufficient space to the side to move it at least 10 mm to the right.

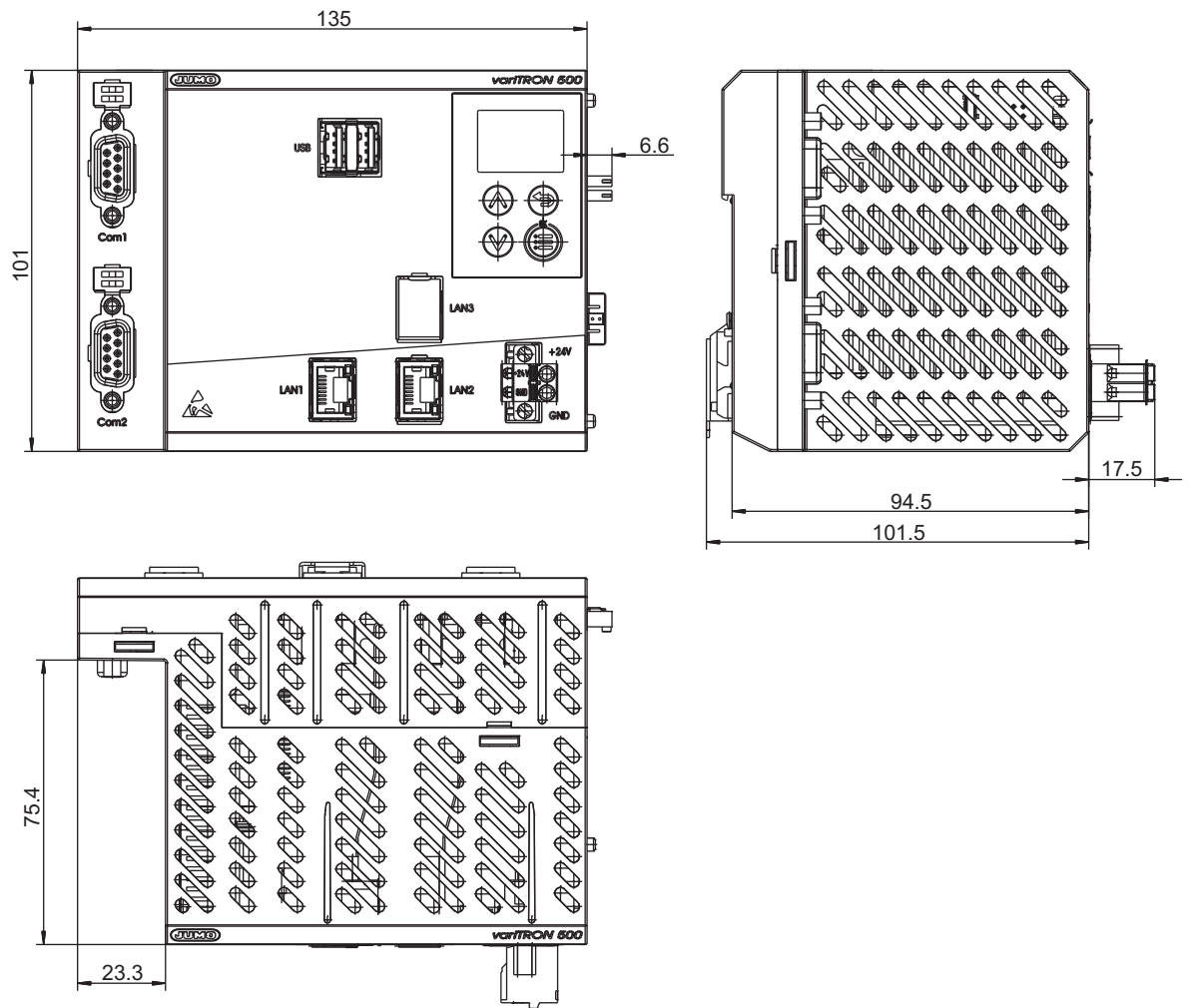
5. Move the modules (B) on the right next to the central processing unit (A) to the right (B4) until the side contacts of the central processing unit are exposed.

These modules are now isolated from the voltage supply and the system bus.

6. Insert a suitable screwdriver (F) into the unlocking slot of the central processing unit (A5) and press upward (F6).
7. Pivot the central processing unit (A) upward off the DIN rail (A7) and remove it.

2 Mounting

2.3 Dimensions



3.1 Installation notes



NOTE!

These installation notes apply for the entire automation system and, on some occasions, are only applicable for a specific module. The respective connection diagram shows the context.

Requirements for personnel

- Work on the modules 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 (e.g. by touching grounded metallic parts).

Cables, shielding, and grounding

- When selecting the cable material, when installing, and when performing the electrical connection of the module, the regulations of DIN VDE 0100 "Erection of low voltage installations" or the respective national regulations (e.g. on the basis of IEC 60364) are to be observed.
- At maximum load, certain cables must be heat resistant up to at least 80 °C. The corresponding notes in the connection diagram of the affected modules must be observed.
- 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 loophroughs 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

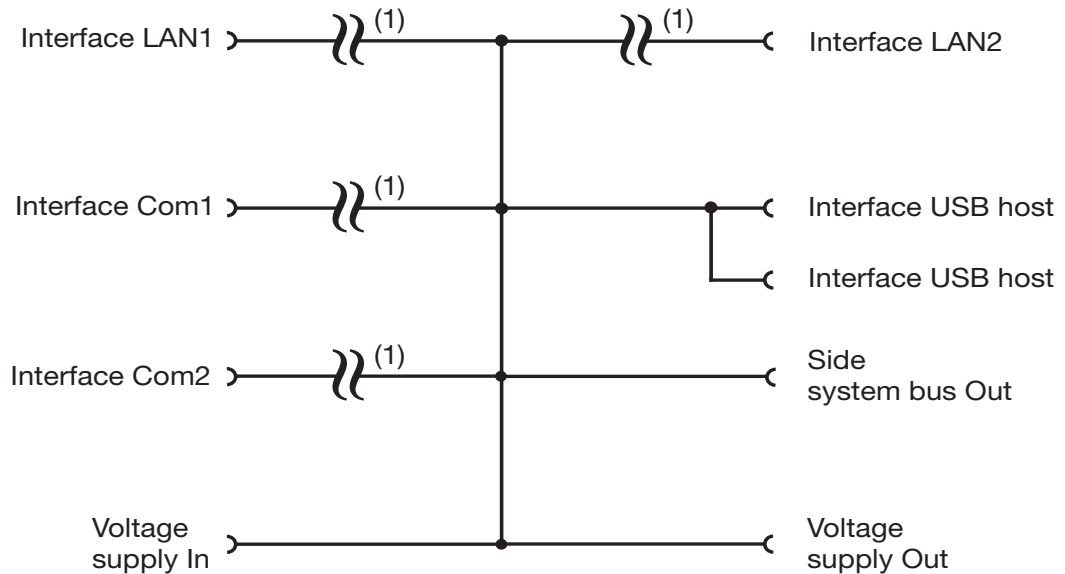
- Isolate power supply units from the voltage supply on the primary side if there is a risk of touching parts with dangerous electrical voltage (e.g. 230 V) during active use.
- The fuse rating of the power supply units on the primary side should not exceed a value of 10 A (inert).
- With modules that have relay or solid state relay outputs, the load circuits can be operated with a dangerous electrical voltage (e.g. 230 V). Disconnect load circuits from the voltage supply during installation/dismounting and electrical connection.
- In order to prevent the destruction of the relay or solid state relay outputs in the event of an external short circuit in the load circuit, the load circuit should be fuse-protected to the maximum admissible output current.
- The modules are not suitable for installation in potentially explosive areas.
- In addition to a faulty installation, incorrectly set values on the module could also impair the correct function of the following process. Therefore, ensure that safety devices independent of the module (e.g. overpressure valves or temperature limiters/monitors) are available 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 meets the standards and regulations cited in the technical data.
- Sometimes USB interface and power supply are not electrically isolated. In general, please observe the device-specific information on galvanic isolation.

3 Electrical connection

3.2 Galvanic isolation



(1) Functional galvanic isolation for connection of SELV or PELV electrical circuits.

3.3 Connection diagram



CAUTION!

At maximum load, the temperature may exceed 60 °C at the terminals "+24 V" and "GND" (voltage supply In).

As a result the insulation of the cable may be damaged.

- The cable must be heat resistant up to at least 80 °C.



CAUTION!

The maximum current carrying capacity of the side connector (DC Out) for the voltage supply of the connected modules is 8 A.

If this current is exceeded, the entire system may be damaged.

- Add up the current consumption of all connected modules (see their technical data). If necessary, distribute modules on several DIN rails and, if necessary, also power supply units.

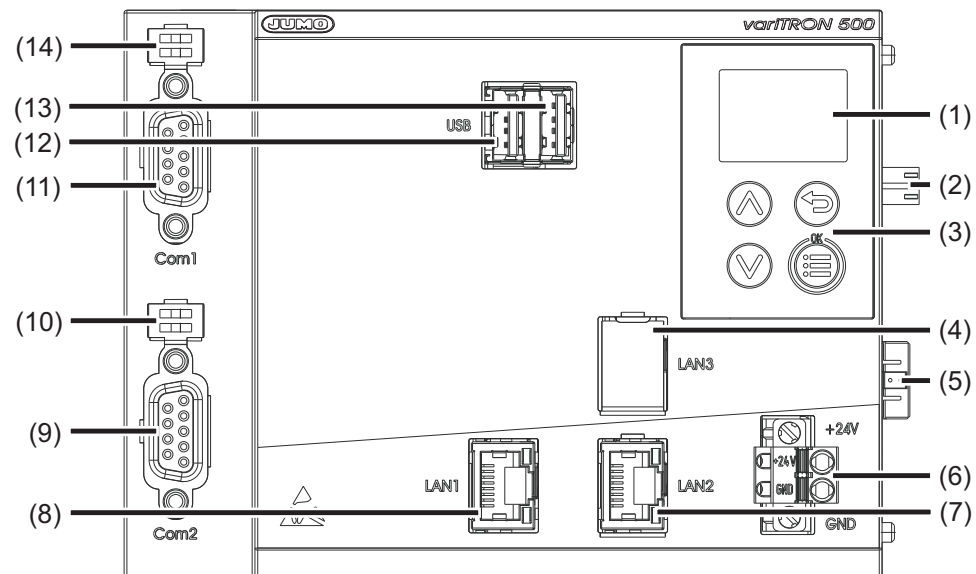


NOTE!

Only copper conductors are allowed to be connected to the terminals.

3.3.1 Display, operating, and connection elements

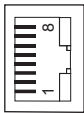
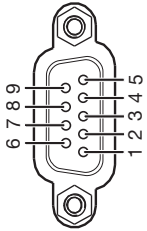
This overview shows the position of the display, operating, and connection elements. The assignment to individual functions is illustrated in the following sections.



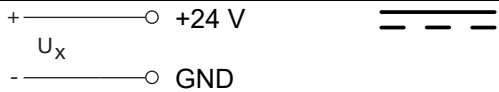
- (1) Display
- (2) Voltage supply Out, DC 24 V
- (3) Control elements
- (4) Interface LAN3 (for future use)
- (5) Side system bus Out
- (6) External voltage supply DC 24 V (voltage supply In)
- (7) Interface LAN2
- (8) Interface LAN1
- (9) Interface Com2
- (10) Com2 terminating resistors
- (11) Interface Com1
- (12) USB host interface 1
- (13) USB host interface 2
- (14) Com1 terminating resistors

3 Electrical connection

3.3.2 Interfaces

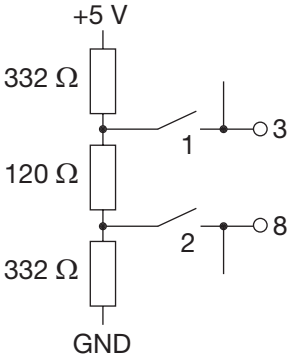
Connection	Designation	Number	Connection element	Assignment
USB host (2 ×)	USB	(12), (13)		
Ethernet (LAN2 optional)	LAN1, LAN2	(8), (7)		1 TX+ Transmission data + 2 TX- Transmission data - 3 RX+ Received data + 6 RX- Received data -
Serial interface RS232 (optional)	Com1, Com2	(11), (9)		2 RxD Received data 3 TxD Transmission data 5 GND Ground
Serial interface RS485 (optional)	Com1, Com2	(11), (9)		3 TxD+/RxD+ Transmission/received data + 5 GND Ground 8 TxD-/RxD- Transmission/received data -

3.3.3 Voltage supply

Connection	Designation	Number	Symbol and terminal designation
Voltage supply In	+24 V and GND	(6)	

3.3.4 Terminating resistors

The internal terminating resistors for the Com1 and Com2 interfaces are only available for RS485.
The terminating resistors are deactivated per default. To activate them, switches 1 and 2 for the relevant interface must be closed.



NOTE!
To ensure fault-free operation, terminating resistors are required at the beginning and end of an RS485 transmission path.

4.1 General information

The following options are available to operate the device:

- Operation on the device
- Use of the setup program
- Use of the "JUMO Web Cockpit" web application using a web browser

The various options for operating the device differ in terms of the scope of the functions they support.

IP address

In order to access the device using the setup program or a web browser, the IP address of the device is required. The IP address of the Ethernet interface concerned can be found using the **device menu** (Device info > Ethernet > LANx). A user does not need to be logged on to do this (dependent on rights).

The Ethernet settings may need to be changed beforehand using the device menu (Configuration > Ethernet > LANx). A user does not need to be logged on to do this (as of system version 8; dependent on rights).

The default setting is that DHCP is active.

User log-on

Please use the following details to log on for startup purposes:

- User name: Master
- Password: 9200

The password should be changed by the end of startup at the latest.

The password must be entered again each time the user logs on.

Hardware configuration

In order to start up a system (which comprises the device (CPU) and other system components (modules)), the system's hardware configuration needs to be created using the **setup program**. This cannot be done using the device menu or the web application.

If the hardware is incorrectly configured, a bus error will be displayed.

Startup

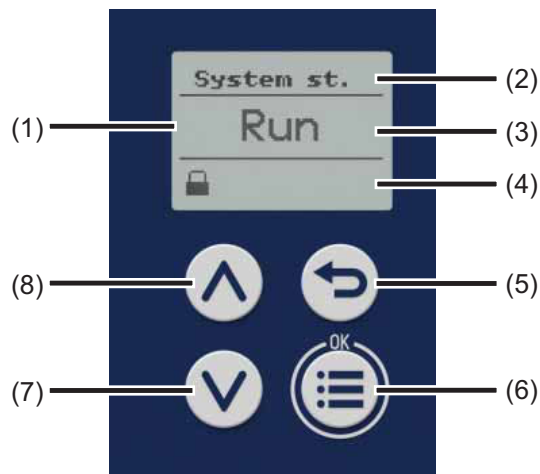
Procedure during startup:

⇒ chapter 6 "Startup", Page 91

4 Operation

4.2 Device

4.2.1 Display and control elements



- (1) Display in basic status
- (2) Title of display
- (3) Display of system status or system bus status
- (4) Display of log-on status or event, e.g. using icons (see table)
- (5) "Back" key (in menu: back to previous menu level, exit editing mode without making a change)
- (6) "Menu/OK" key (call up main menu, switch to submenu/level, switch to editing mode, exit editing mode with a change made, confirm entry or change)
- (7) "Down" key (in menu: reduce value, select next menu item, parameter, or value; in basic status: switch between displaying the system status and the system bus status)
- (8) "Up" key (in menu: increase value, select previous menu item, parameter, or value; in basic status: switch between displaying the system status and the system bus status)

Icons (display in basic status)

Icon designation	Depicted as	Meaning
Logon status (position 1 = left)		User is not logged on.
		User is logged on.
Alarm status (position 2)		There is at least one malfunction (but no alarm).
		There is at least one alarm.
External medium (position 3)		An external medium has been connected (USB port).
Transfer of configuration (position 4)		Configuration is being transferred (setup program).
CODESYS online status (position 5)		The CODESYS programming system has been connected to the device.

4.2.2 Device menu

To access the device menu from the start screen, press the "Menu/OK" key.

The following overview shows the menu levels where individual functions can be configured (by selecting or entering data) or information is shown. The information that is shown on the device display depends on the user's rights.

Beyond this, there are functions that can only be configured with the setup program or the web application; these functions are not listed here.

If you need further information on the individual functions, please see the subsequent chapters in this manual (see cross-references).

User management

Sub-menu 1	Sub-menu 2	Sub-menu 3
Logon (log in)	User (to be selected), password (to be entered)	---
Logoff (log out)	---	---

⇒ chapter 4.2.3 "User log-on", Page 34

System status

Sub-menu 1	Sub-menu 2	Sub-menu 3
Change the system status Selection options: Run, Stop, Reset, Reset (Cold), Reset (Origin), Reboot system	---	---

⇒ chapter 4.4.1 "Device information", Page 59

Configuration

Sub-menu 1	Sub-menu 2	Sub-menu 3
Device manager	Device settings	Device language (selection)
		Start-up behavior (selection options: Run, Stop, Last status)
		Partition change after [x] start-up errors (to be entered)
	Device designations	Device name (display)
		DNS name (display)
	Time zone/NTP	Time zone (selection)
		NTP active (selection)
		Max. round-trip time (to be entered)

4 Operation

Sub-menu 1	Sub-menu 2	Sub-menu 3
Ethernet	LAN1	Method (selection options: Manual, Automatic)
		IP address (to be entered)
		Subnet mask (to be entered)
		Standard gateway (to be entered)
		DNS server IP (obtain automatically; selection options: False, True)
		DNS server (entry of IP address)
Web server	LANx	see LAN1
	HTTP (selection options: Active, Inactive, Redirect to HTTPS)	---
	HTTP port number (to be entered)	---
	HTTPs port number (to be entered)	---
System status UI	Screensaver	Function (selection options: Off, On)
		Waiting period (idle time) (to be entered, in milliseconds)

⇒ chapter 4.4.4 "Configuration", Page 61

Device info

Sub-menu 1	Sub-menu 2	Sub-menu 3
Device information	Device	Device name (display)
		Date and time (display)
		Total root volume memory (display)
		Product group (display)
		Recorder service ID (display)
		Certification number (inspection number) (display)
		Fabrication number (production number) (display)
	Hardware versions	(dependent on what hardware is fitted to the device) Submenu 4 displays: – Hardware type – Comment – LP ID – Compatibility index – Hardware version
	Software versions	Bootloader version (display)
		Version type (display)
		Operating system version (display)
		Application building version (display)
		Software version (display)
System status	System status (display)	---
Ethernet	LAN1	IP address (display)
		Transfer rate (display)
		MAC address (display)
		DNS server (display)
		Standard gateway (display)
		Subnet mask (display)
	LANx	see LAN1

⇒ chapter 4.4.1 "Device information", Page 59

Service

Sub-menu 1	Sub-menu 2	Sub-menu 3
Device manager	Activate debug interface (selection)	---
	As of system version 6: An automatically generated SSH password is stored in the event list (valid until power off).	
Certificate administration	Remove certificates (selection)	---
Email	Send email (selection)	---

4 Operation



CAUTION!

The SSH password gives the user unrestricted access to the operating system (root privileges).

Changes at the operating system level can result in the device functions developed and tested by JUMO being inadmissibly changed. JUMO accepts no liability for this.

► The user is responsible for all changes he makes at the operating system level.

Removable media

This menu item is provided if a USB flash drive has been connected.

Sub-menu 1	Sub-menu 2	Sub-menu 3
Remove hardware Must be run before the USB flash drive is removed!	---	---
Import configuration	---	---
Export configuration	---	---
Firmware update	---	---
Export debug data	---	---
Export license request (as of system version 4)	Functions (extra codes) that can be enabled. A separate request file (license request) must be exported for each function.	---
Import license file (as of system version 4)	If several functions are available, they must be enabled one after the other. A separate response file (license file) is required for each function.	---

4.2.3 User log-on

Logon

- 1) Press the "Menu/OK" key to open the device menu.
- 2) Switch to the submenu "User administration > Logon".
- 3) Select the user from the list and press the "Menu/OK" key to confirm.
- 4) Enter the password: Select the 1st digit by pressing the "Up" or "Down" key and press the "Menu/OK" key to confirm.
- 5) Enter the subsequent digits of the password one after the other.
- 6) Once you have entered the last digit, press the "Menu/OK" key again.

Logoff

- 1) Press the "Menu/OK" key to open the device menu.
- 2) Switch to the submenu "User administration > Logoff".
- 3) Press the "Menu/OK" key.

4.2.4 Reset to factory settings

To perform a reset to default settings, first switch off the device (device disconnected from the voltage supply), then simultaneously press the "Menu/OK" (6) and "Down" (7) keys, and then switch the device back on (restore the voltage supply). When doing so, press and hold the keys until the display's backlight has been activated.



CAUTION!

Reset to default settings

All data will be deleted. All settings will be reset to the default settings (JUMO), including the user administration settings (user "Master", password "9200").

- Back up the hardware configuration and settings beforehand using the setup program.
-



NOTE!

Resetting to factory settings also removes the extra codes (chargeable functions). For this reason, the files for enabling the extra codes (also referred to as license files or FeatureResponse files) should be stored after initial receipt in such a way that they are available again for transfer to the device after a factory reset (see JUMO Web Cockpit > Service).

4 Operation

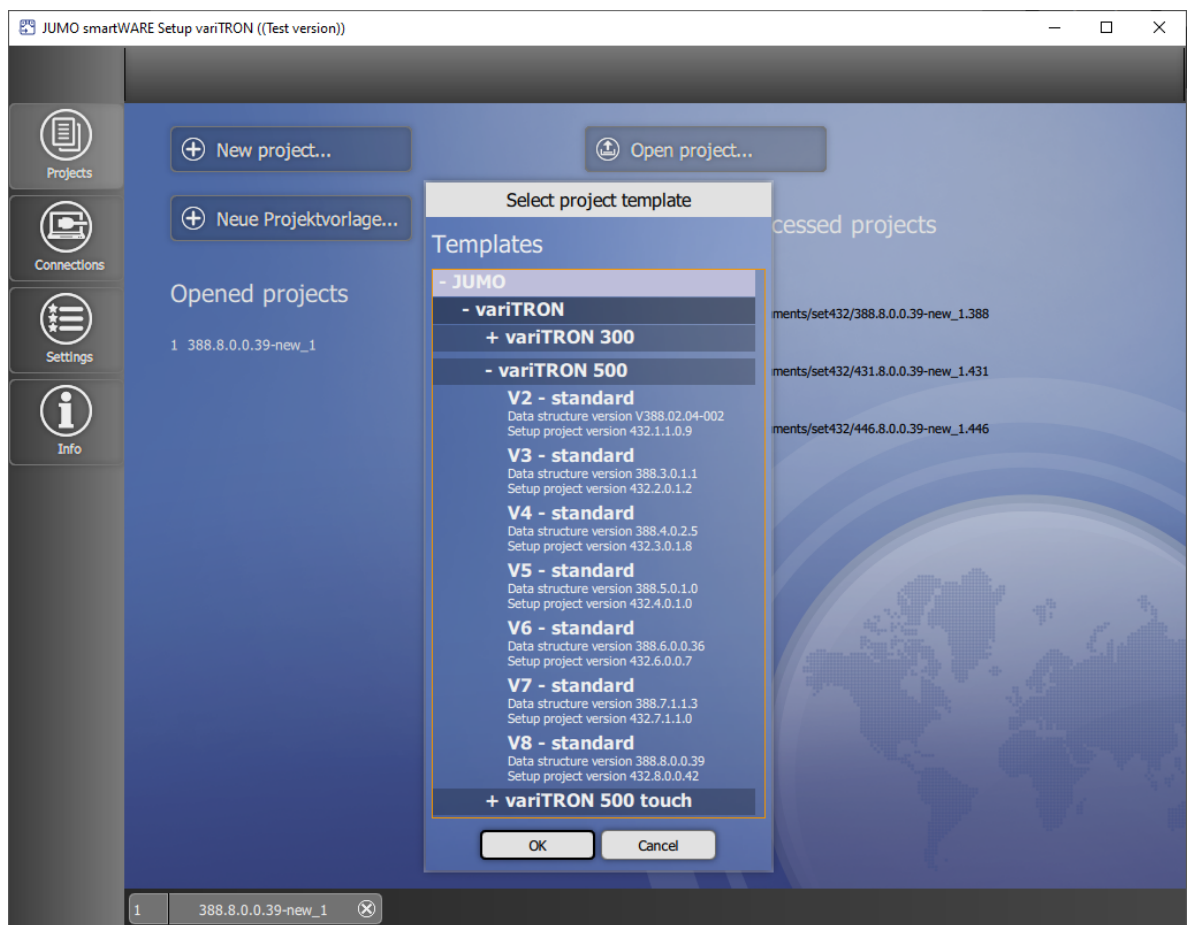
4.3 Setup program

4.3.1 Start page

The setup program is used to create new projects and edit existing projects.

The "Projects" window contains corresponding buttons. If applicable, the most recently edited and opened projects are also shown. These are likewise provided in the form of buttons for opening the respective project or switching to a project that is already open.

When creating a new project, a project template must be selected that depends on the device type and version of the device software. If necessary, the version of the setup program must also be taken into account.



Functions provided in the left-hand bar (also known as the "application bar"):

- Projects: Create new project, import new project template (as of system version 8), open existing project
- Connections: Configure and manage connections to devices
- Settings: Select the language of the setup program
- Info: Display information about the setup program

The bar at the bottom also displays opened projects (in the form of "project maps").

**NOTE!**

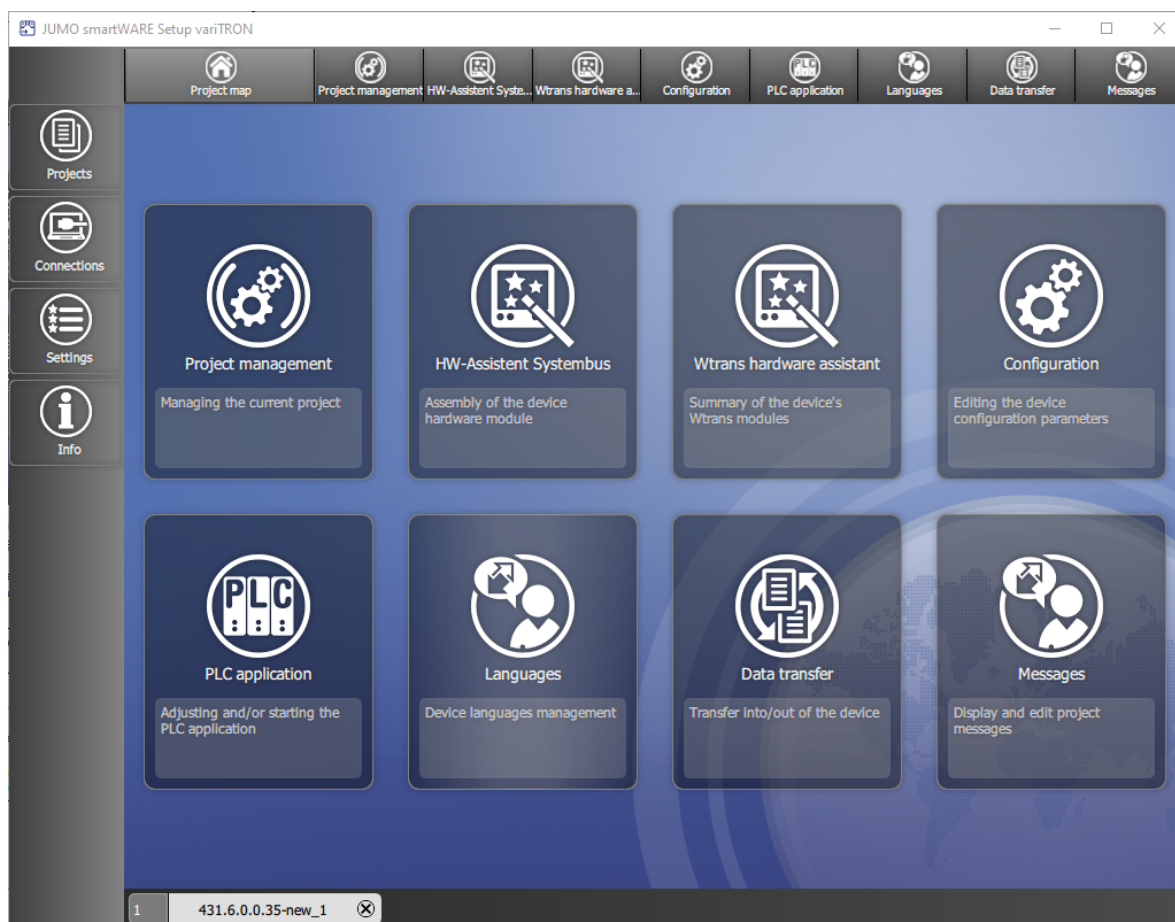
Before a device (or system) can be put into operation, the setup program must be used to create a project and transfer it to the device. The first step is to define the hardware configuration for the device (type and arrangement of hardware modules). The connection to the device must also first be configured before the project can be transferred.

4 Operation

4.3.2 Project map

Create project using individual functions

The functions are combined in a project folder known as a project map.



The following functions are available within a project:

- Project management: Display the name and path of the project file, enter the designation and description of the project
- Hardware assistant for system bus: Define the hardware configuration for the entire system
- Wtrans hardware assistant (only for variTRON 300 and variTRON 500 touch): Select Wtrans transmitters (wireless transmission of measured values)
- Configuration: Configure the device (CPU) and modules and determine their parameters
- PLC application: Determine the start parameters for the CODESYS PLC programming system, start the PLC configuration process (CODESYS)
- PLC parameter definition (function is provided if the CPVE is installed): Determine the start parameters for the CPV Editor (CPVE), start the CPVE
- Languages: Select the project language and device languages, export and import languages (texts)
- Data transfer: Establish a connection to a device, data transfer to/from the device, import and export the configuration
- Messages (as of system version 6): Display and act on project messages (acknowledge; further actions may be required)

You can access these functions using the tiles in the window and using the functions in the bar at the top (also known as the "project bar"). Selecting the "Project map" function takes the user back to the overview of functions.

4.3.3 Project management

Display project information, enter the designation and description of the project, convert the project



Parameters/functions:

- Filename (non-editable): Project file name, which was automatically assigned when creating the project.
- Path (non-editable): Path under which the project file has been saved.
- Project version (non-editable): Version of the setup project
- Device version (non-editable): Version of the device software
- Project name (button): Opens a window for entering a designation for the project (in several languages).
- Description: Input field for providing a more detailed description of the project (in one language)
- Convert project (button): Convert project to the same or to a higher system version (select project template); pay attention to messages!
- Validate project (button): Pay attention to messages!

To change the file name and, if applicable, the file path, select the "Save as..." button.

4 Operation

4.3.4 System bus HW assistant

Define the hardware configuration for the entire system



The window is separated into three areas:

- Hardware configuration
- System components
- Settings

To increase the size of the "Hardware configuration" area, the "System components" and "Settings" areas can be hidden by clicking the relevant button (right arrow/downward arrow).

Hardware configuration

The "Hardware configuration" area shows the device (in this case the variTRON 500 CPU) and, if applicable, all previously added system components (modules). The view can be enlarged or reduced using the zoom function ("+" and "-" magnifying glass icons).

The position of a module on the DIN rail can be changed by dragging and dropping the module accordingly.

Once selected, a module can be removed using the "Recycle bin" button or by pressing the Delete key on the keyboard (you can select the module by clicking on it; you can also navigate using the left/right arrow keys on the keyboard).

As from system version 3: You can use the "+" button to add additional DIN rails. You can switch between the DIN rails using the Up/Down arrow keys on the keyboard. Empty DIN rails can be removed again using the "X" button.

As from system version 3: With the "Bus Scan" button, the system bus of the connected device is scanned and the hardware configuration is read into the setup project.

System components

The "System components" area lists all available system components (open the drop-down menu by clicking on it). A distinction is made here between the CPU and the modules (controller, relay, analog IO units, digital IO units, router units¹). A module can be added to the hardware configuration by dragging and dropping it or by double-clicking on the module (the CPU is specified by the setup program when creating a new project).



NOTE!

A maximum of 30 modules can be connected (router modules do not count).

Settings

The "Settings" area displays information on the system component that is currently selected and enables certain settings to be configured:

- Product group number (non-editable)
- Designation (button): Opens a window for entering a designation for the system component (in several languages)
- Module label: Tag name for the system component (editable; can no longer be changed once the hardware configuration has been applied)
- Expansion slot (dependent on the module): For selecting the option (open the drop-down menu by clicking on it)
- Optional module (alias device address): ⇒ chapter 4.3.5 "Optional module (alias device address)", Page 42



NOTE!

If the hardware configuration is created with the "Bus scan" function, the setting of the rotary coding switches in the setup project must be checked in the case of a router module 3-port (705042). If necessary, the setting must be changed before the configuration is sent to the device.

Router units

If the hardware configuration contains router units¹ (router modules), these units must be connected with one another. To do so, proceed as follows:

1. Click on a router module.
The free RJ45 sockets are depicted by a green border.
2. Double-click on a free socket (or on the "Start connection" connector icon on the right next to the socket).
On the router module on the other DIN rail, suitable free sockets are depicted by a flashing green border. A distinction is automatically made here between inputs (Bus In) and outputs (Bus Out). Please note: To cancel, click on the "Delete connection" x icon on the right next to the socket.
3. Click on a free socket on the other router module (or on the "Close connection" connector icon on the right next to the socket).
The connection between the two sockets is established (color change). Please note: To delete the connection, click on the "Delete connection" x icon on the right next to one of the two sockets (or remove a router module)
4. If necessary, establish connections to other router modules (connections are depicted by different colors for the relevant RJ45 sockets).

¹ Router units available as of system version 3

4 Operation

4.3.5 Optional module (alias device address)

Basic differences between the mandatory module and optional module

Mandatory module:

- The module must be available.
- The position of the module must correspond to the hardware arrangement in the setup program.

Optional module:

- Only router modules can be configured as the head module of an HC group (hot connect group or optional module group) (assignment of an alias device address).
- The router module and the components of its HC group (optional modules) need not be available.
- All input/output modules connected to it are also optional modules.
- Router modules connected to it are optional modules.
- Due to the alias device address, a router module is always uniquely identifiable within the system.
- The router module can be defined in the setup program with a fixed or a variable position on the system bus.

Differences at system start and during operation

System start:

- If a mandatory module causes a problem (module defective or not available, wrong position), the system will not start.
- The HC group must be completely available or completely missing. If only part of the HC group is available, the system will not start.

During operation:

- If a mandatory module fails or is removed, the entire system goes into the "Stop" state.
- If an optional module is used, the system continues to run.
- The HC group can be removed from the system and also connected again (hot connect functionality). If a part of the HC group is removed, the remaining modules of this HC group continue to run.

Configuration of optional modules

When creating a project with the setup program (hardware arrangement), all modules are initially mandatory modules. To form a line with optional modules (HC group), the relevant (upstream) router module must be configured as an optional module:

- Router module 2-port (705041)

The "Optional" parameter must be set to TRUE (red) in the setup program.

The alias device address is fixed (0x200). Within a system, only a single router module 2-port can be configured as an optional module.

Connected router modules are then also automatically optional modules (they do not have to be configured as optional modules themselves).

- Router module 3-port (705042)

The rotary coding switches on the module must be used to set an alias device address (address not equal to 0). The same address must be set in the setup program using the parameters with the same name (rotary coding switch 10x, rotary coding switch 1x). If the settings do not match, the router module is not recognized on the system bus.

Note: if the alias device address 0 is set in the setup program, the address set on the router module is irrelevant (the addresses are not compared). The router module is then a mandatory module.

The alias device address is freely selectable, but must be unique within the system.

All input/output modules connected to the router module and any additional router modules are then also optional modules.

The router module as an optional module can also be operated at a system bus output that is not defined in the hardware arrangement. To prevent this possibility, the parameter "Fixed position" must be set to TRUE (red). Then the connection is only possible at the specific RJ45 socket of the specific router module as it corresponds to the hardware arrangement.

- Router module 1-port (705043)

The "Optional" parameter must be set to TRUE (red) in the setup program.

The alias device address is fixed (0x100). Within a system, only a single router module 1-port can be configured as an optional module.

All input/output modules connected to the router module are then also optional modules.

The router module as an optional module can also be operated at a system bus output that is not defined in the hardware arrangement. To prevent this possibility, the parameter "Fixed position" must be set to TRUE (red). Then the connection is only possible at the specific RJ45 socket of the specific router module as it corresponds to the hardware arrangement.

4 Operation

4.3.6 Configuration

Configure the device (CPU) and modules and determine their parameters



The "Configuration" area comprises the following areas (device-specific example shown):

- Device manager: Device settings (device language, start-up behavior, partition change), device designations, time zone/NTP, date and time, customer-specific linearization (as of system version 5)
- System bus: Master (settings relating to the system bus; see below), module... (module-specific configuration parameters; see below)
- Data carrier management (as of system version 7): Use of network drives
- Ethernet: Configuration of the LAN interface concerned (e.g., IP address, DNS server)
- Web server: Activation, HTTP or HTTPS, port numbers
- Email: Settings for sending emails
- PLC configuration: Units for absolute and relative temperature values (for the PLC application), configuration of program generators, analog and digital variables (as of system version 5)
- PLC parameters: Display of the configuration structures that were created using the CPV Editor (CPVE)
- Programs: Creation of programs using the program editor (setpoint values, operating contacts)
- System status UI: screensaver (activation and waiting period)
- Real-time processing (as of system version 6): Configuration of data recording
- Datastore gateway (as of system version 6): Configuration of the connection to the database
- Cloud gateway: Configuration of the connection to JUMO Cloud (as of system version 4)
- Wtrans gateway (only for variTRON 300 and variTRON 500 touch): Settings for using the JUMO Wtrans transmitters (as of system version 5)
- Node-RED (as of system version 4): Activation of programming tool Node-RED
- Batches (as of system version 6): Configuration of batch reporting

Details can be found in the "Configuration" chapter.

⇒ chapter 5 "Configuration", Page 65



NOTE!

The settings configured under "Bus > Master" influence the transfer of data via the system bus. Sub-optimal settings here will disrupt or even interrupt the communication within the system. For this reason, these parameters are only permitted to be modified by a service engineer from the device manufacturer (or by someone acting on their instructions).

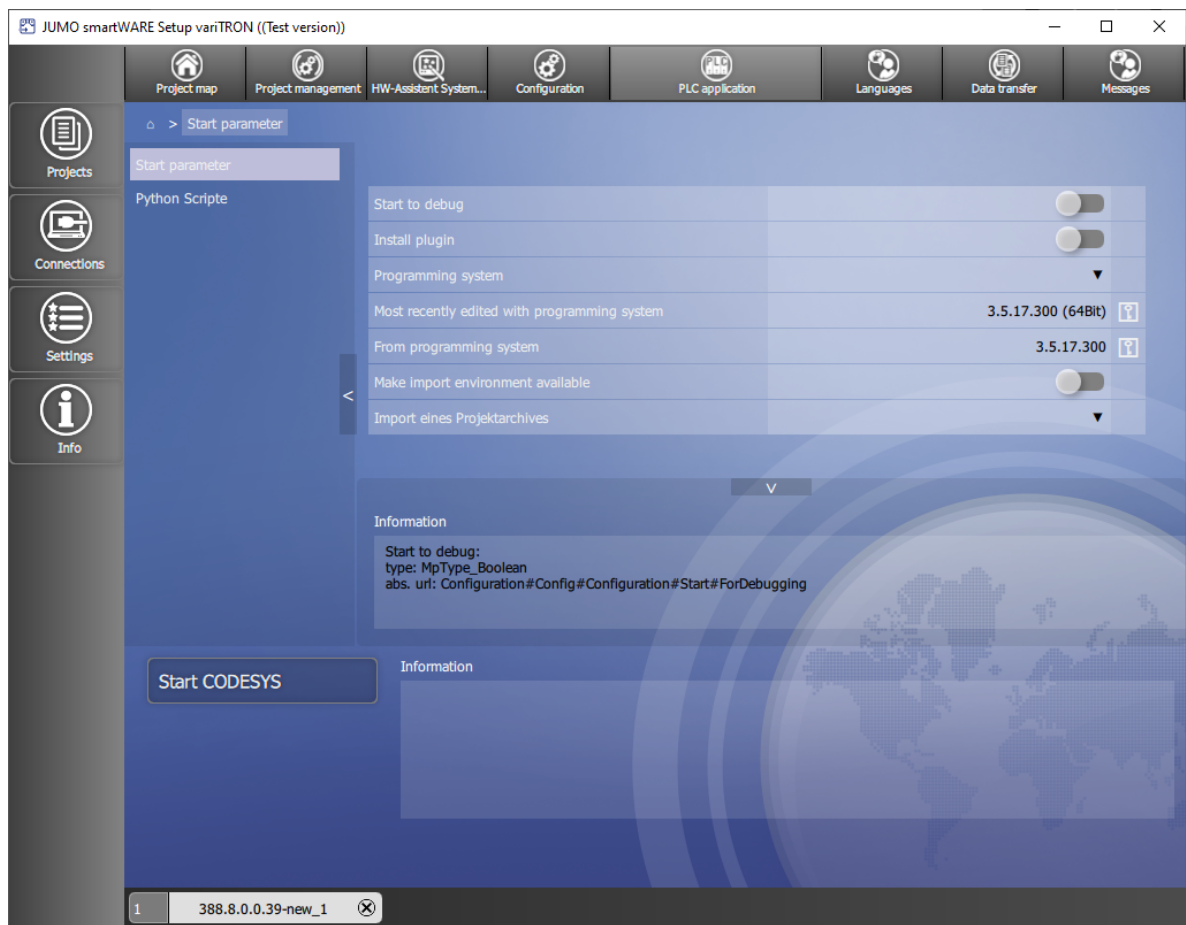
The process of configuring the modules (controller, relay, analog IO units, digital IO units) is described in the operating manual for the respective module.

⇒ chapter 1.8 "Available technical documentation", Page 17

4 Operation

4.3.7 PLC application

Determine the start parameters for the CODESYS PLC programming system, start CODESYS



Parameters/functions:

- Start to debug: Start CODESYS without a newly created device description (the compilation process is not run again before logon, the program is not stopped when logging on to the target system)
- Install plugin: Newly initialize the CODESYS plug-in (e.g., after uninstalling and reinstalling CODESYS)
- Programming system: Select the CODESYS version (drop-down menu)
- Most recently edited with programming system (display only): Most recently used CODESYS version
- As of programming system (display only): Version of the CODESYS runtime system in the device during the last execution
- Provide import environment: Provide texts from the "PLC Parameter" configuration area for import (after starting the PLC configuration)
- Import of a project archive (as of system version 8): Select CODESYS file of type ".projectarchive" for import.

To start the programming system, click the "Start CODESYS" button.

4.3.8 PLC parameter definition

Determine the start parameters for the CPV Editor (CPVE), start the CPVE

This function is only available if the CPV Editor has been installed.



NOTE!

The CPV Editor is used to create customer-specific configuration and process data.

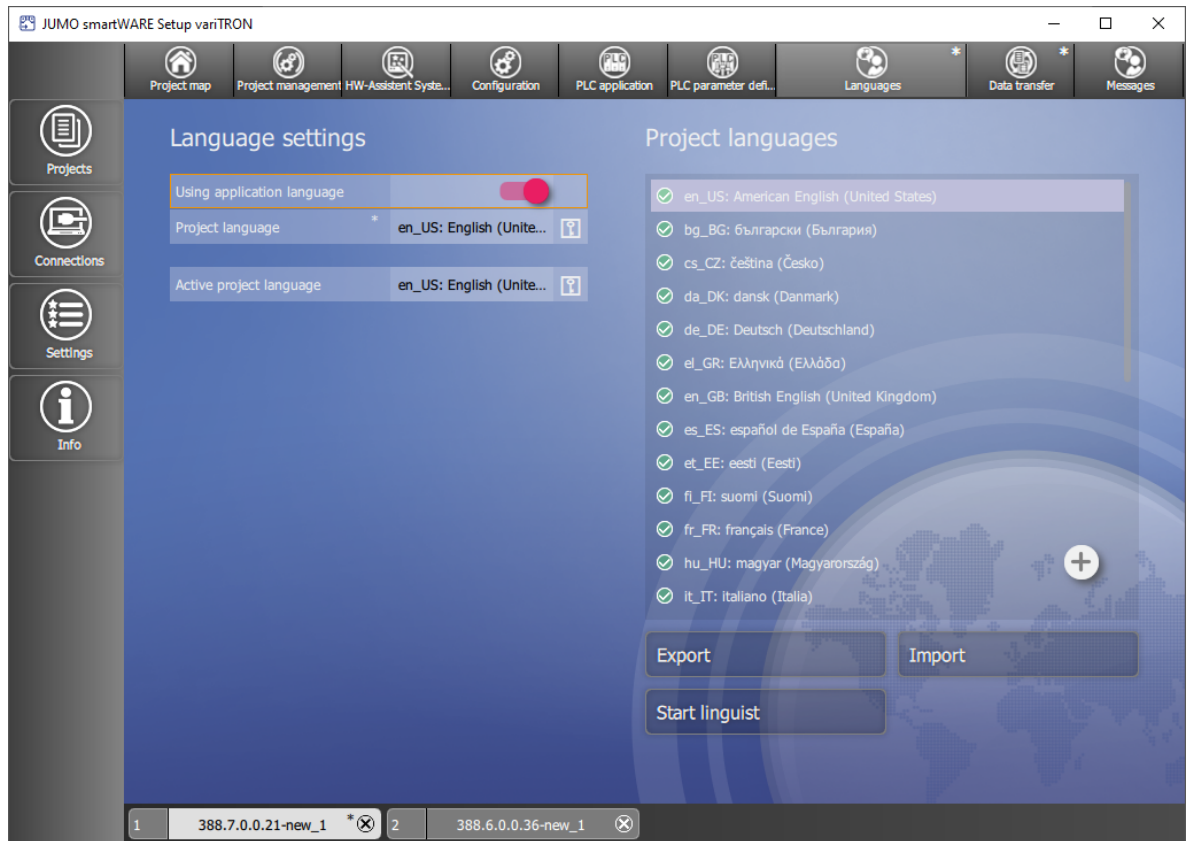
The CPV Editor requires specific knowledge and is intended for use by the manufacturer only (service that is subject to a fee).

A description of the CPV Editor is not included in this operating manual.

4 Operation

4.3.9 Languages

Select the project language and device languages, export and import languages (texts), edit languages



Language settings

Parameters/functions:

- Use application language: Use the language of the setup program as the project language
- Project language (button; not active if the application language is being used): Select the project language from the list (drop-down menu)
- Active project language (cannot be set here): Displays the current project language

Project languages

Parameters/functions:

- List: Project languages which are available for selection as the device language
 - Language selected (ticked): Language can be selected in the device
 - "+" button: Add another language to the list of project languages
 - Delete a project language: Click on the "x" icon after the highlighted language
- Export: Export texts from a language to a language file (*.ts) for translation
 - Select the source language for the translation (the language "Standard" exports all default texts of the so-called development language)
 - Select the target language (if necessary, add your desired target language to the list of project languages beforehand)
- Import: Import translated texts (source language > target language) from a language file (*.ts)
 - Open a language file: Select the language file from the file directory (the source language, target language, and number of texts are displayed)
 - Load a language file: Import texts (the number of texts before and after the import is displayed)
- Start linguist: Edit language files with the Qt Linguist editor
 - File > Open: Select, open and edit language file from file directory

4 Operation

4.3.10 Data transfer

Establish a connection to a device, data transfer to/from the device, import and export the configuration



Connection

Parameters/functions:

- Current connection (button): Displays the current connection; if necessary, select a different connection from the list
- Description (cannot be edited here): Description of the current connection
- Host (cannot be edited here): IP address of the device
- User (cannot be edited here): User name for logging on to the device
- Version (cannot be edited here): Device software version of the connected device
- Connect...: Establish a connection to the device
- Disconnect: Break the connection
- Load from device: Load a configuration from the device into the setup program
- Send to device: Send a configuration from the setup program to the device
- Import: Select a configuration file (.jcf) from the file directory on the PC and import it into the setup program
- Export: Save a configuration as a file (.jcf) in the file directory on the PC

In order for a connection to be available for selection here, it must first be configured using the "Connections" function (application bar).

Transfer settings

Parameters/functions:

- System state after configuration transfer (as of system version 5):
 - Unchanged: After the transfer, the device returns to the system state it had before the transfer.
 - STOP: The device remains in the "Stop" system state after transmission.
- Complete configuration: All data packets are transferred.
- Selective configuration: Only the selected data packets (or parts thereof) are transferred.
 In order to send a data packet (send it to the device) or export it (to a file), select the data packet concerned using the button (= red).
 In order to extract a data packet (load it from the device) or import it (from a file), select the relevant option from the drop-down menu:
 - Do not transfer: The data packet concerned is not transferred.
 - Only visible values of known parameters: Only the values of existing parameters are applied in the setup project. The structure is not modified.
 - Structure and values (only for "Bus" and "PLC Parameter"): In the case of the PLC parameters, by selecting this option you can apply a PLC parameter structure that is already in the device in the setup project.
Caution! The PLC parameter structure that is already in the project will therefore be lost.
 - Only values of known parameters (only for "PLC Parameter"): The structure of the PLC parameters is not modified in the setup project. However, known parameters in the project structure are applied from the device structure.
 - Only modify structure (only for "PLC Parameter"): The structure in the setup project is adjusted to the structure of the device. However, existing parameters are not modified.
- Complete configuration including device-specific data (as of system version 3): In addition, device-specific data is transmitted, for example device ID, IP address, password, activation of options.
- Selective configuration including device-specific data (as of system version 3): In addition, device-specific data is transmitted (see above).



NOTE!

The default settings are suitable for most application scenarios and should only be modified by experienced users.



CAUTION!

While the configuration is being sent to the device, it goes into the "Stop" system state.

This interrupts the processing of the PLC application.

- The user must ensure that this does not have any negative effects on the ongoing operation of the plant.

Default settings (as of system version 7):

Transfer type for sending or export: Selective configuration

Transfer type for extraction or import: Selective configuration

Data packet	Send/Export	Extract/import
User management (AccessControlManager)	No (= gray)	Do not transfer
Device manager	Yes (= red)	Only values of known parameters
System bus	Yes (= red)	Only values of known parameters
Data carrier management (as of system version 7)	No (= gray)	Do not transfer

4 Operation

Data packet	Send/Export	Extract/import
Port configuration (as of system version 8)	Yes (= red)	Only values of known parameters
Ethernet	Yes (= red)	Only values of known parameters
System user interface (only for variTRON 500 touch)	Yes (= red)	Only values of known parameters
Web server	Yes (= red)	Do not transfer
Email	Yes (= red)	Only values of known parameters
PLC configuration	Yes (= red)	Only values of known parameters
CODESYS Configura- tion	Yes (= red)	Do not transfer
PLC parameters	Yes (= red)	Only values of known parameters
PLC parameters 2 to PLC parameters 4 (as of system version 7)	Yes (= red)	Only values of known parameters
Programs	Yes (= red)	Only values of known parameters
System status UI (only for variTRON 300, variTRON 500)	Yes (= red)	Only values of known parameters
Real-time processing (as of system version 6)	Yes (= red)	Only values of known parameters
Datastore gateway (as of system version 6)	Yes (= red)	Only values of known parameters
Cloud Gateway (as of system version 4)	Yes (= red)	Only values of known parameters
Wtrans Gateway (only for variTRON 300, variTRON 500 touch)	Yes (= red)	Only values of known parameters
Node-RED (as of system version 3)	No (= gray)	Do not transfer
Batches (as of system version 6)	Yes (= red)	Only values of known parameters

4.3.11 Messages

Display and act on project messages



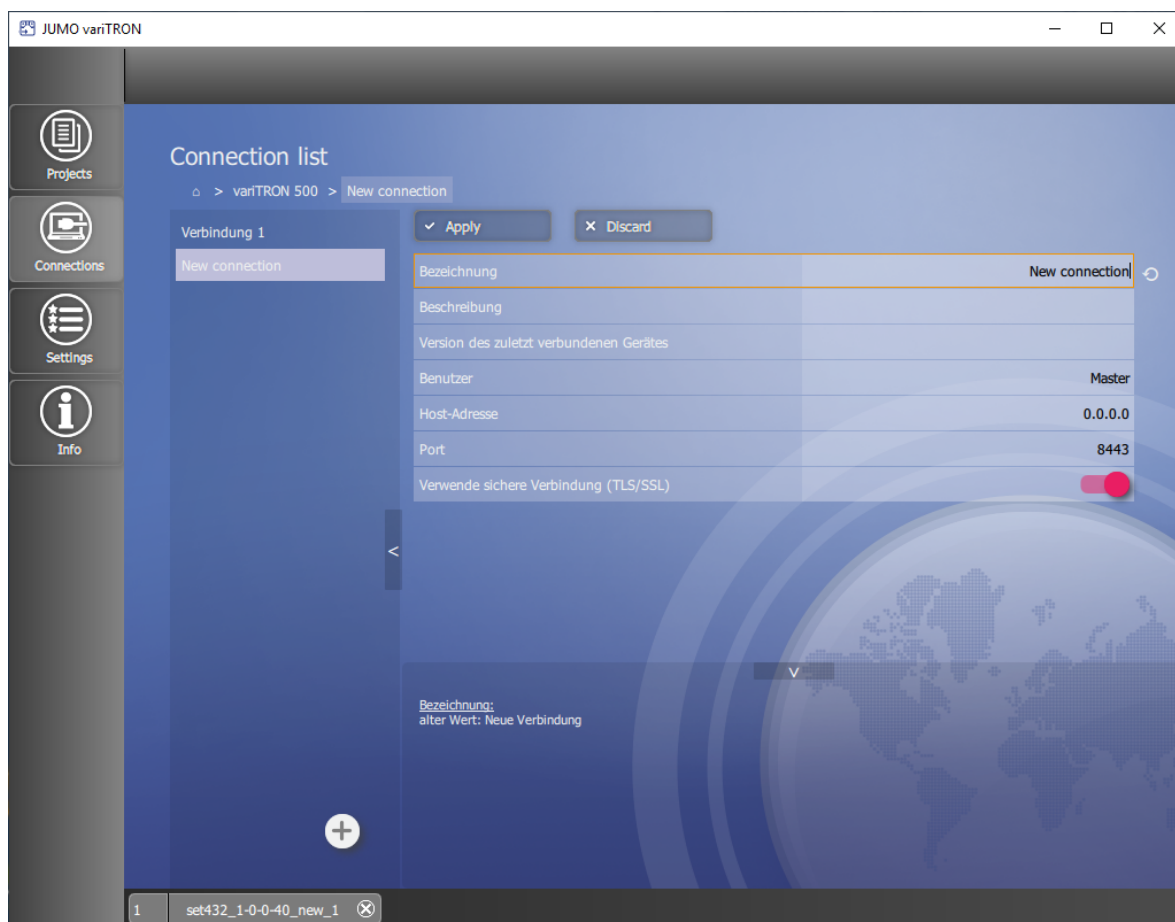
Project messages that require user action (acknowledge message, perform further actions if necessary) are displayed here.

4 Operation

4.3.12 Connections

Connection list

Configure a connection to a device; overview of all configured connections



Parameters/functions:

- Designation (editable): Freely selectable designation for the connection
- Description (editable): Text for a more detailed description of the connection
- Version of most recently connected device: Version number of the device software
- User (editable): User name for logging on to the device
- Host address (editable): IP address of the device
- Port (editable; default setting is 8443): Port number for the connection using the setup program
- Use secure connection (TLS/SSL): FALSE (gray = no), TRUE (red = yes, default setting)
This setting affects the port numbers for the connection (see above). The following port numbers have been assigned per default: 8090 for FALSE (HTTP), 8443 for TRUE (HTTPS).
⇒ chapter 5.7 "Web server", Page 73
If a port number is changed in the configuration, it must also be changed here under "Port".
- Discard: Discard all data entries made
- Apply: Save all values

The left-hand side of this window lists all configured connections along with their designation. You can add another connection using the "+" button. To remove a connection, click the "x" in the area with the designation (this is activated when the cursor is on the area).

If applicable, the old value of the parameter that has just been changed is shown at the bottom of this window. Clicking the "Back" button (circular arrow) after the line containing the changed parameter (above) discards your data entry.

Both areas can be hidden by clicking the relevant button (arrow).

4 Operation

4.4 JUMO Web Cockpit

JUMO Web Cockpit is a web application that enables you to access the device using a web browser. The following web browsers are supported: Mozilla Firefox, Google Chrome, Microsoft Edge, Opera

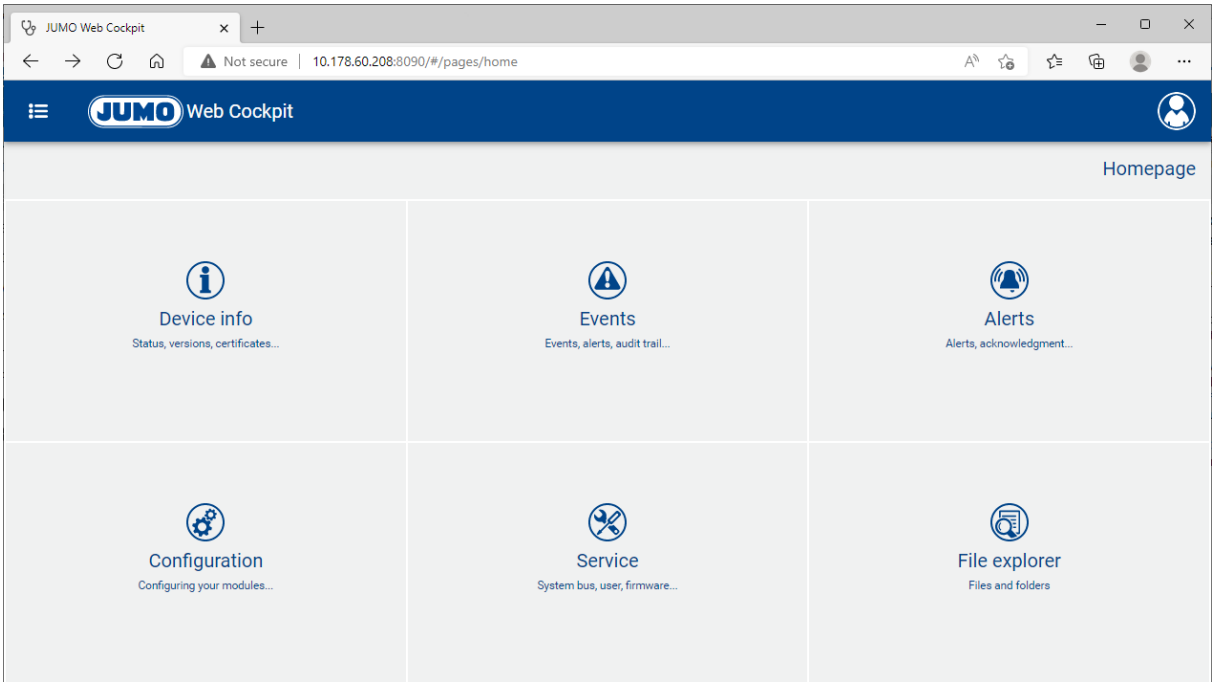


NOTE!

JUMO has successfully tested the aforementioned web browsers using Microsoft Windows 10. If you use a different web browser or another operating system, JUMO cannot guarantee that the application will work correctly.

To start the web application, enter the IP address of the device and the port number 8443 for HTTPS or 8090 for HTTP (default settings) into the address bar of your web browser (for example: 10.178.59.209:8090). You will need your user name and password to log on to the device. Once you have successfully logged on, the homepage of the web application is shown.

Homepage



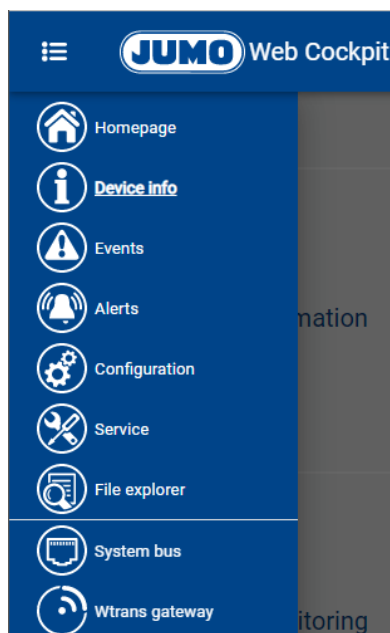
Designation	Description
Device info	Status, versions, certificates, etc. • Display device information • Display and change the system status (Run, Stop, etc.) • Display Ethernet parameters • System monitoring (battery, memory, temperatures, voltage values) • Certificate management (display certificates) • PLC runtime environment (display information) • PLC application (display information) • License management (display extra codes) • Real-time processing (display information on data recording) • Datastore gateway (export status, version) • Cloud gateway (status, version) • Only for variTRON 300 and variTRON 500 touch: Wtrans gateway (version, radio frequency, Wtrans transmitters)

Designation	Description
Events	Events, alarms, audit trail, etc. • Messages shown in a list • Filter by message type • Filter by keyword • Plain-text search • Delete messages
Alerts	Alarms, acknowledgement, etc. • Messages shown in a list • Filter by message type • Filter by keyword • Full-text search • Acknowledge alarms
Configuration	Configure modules, etc. • Configure device • Configure connected modules (system bus)
Service	System bus, users, firmware • EtherCAT (system bus): Display information on the master and slaves (modules); perform actions • Only for variTRON 300 and variTRON 500 touch: Wtrans gateway (status of transmitters) • User management: Create users, assign roles • Import configuration: Transfer configuration file (.jcf) to the device • Extract configuration: Extract configuration from the device and save it as a file (.jcf) • Function activation: Activate extra codes • Firmware: Update the device firmware • Log list: Extract log entries from the device • Debug: Extract debug data from the device and create a debug file (.jdf)
File explorer (as of system version 7)	Files and folders • Files in the "Shared Folder"

"Menu" button

The functions on the homepage can also be accessed using the "Menu" button:

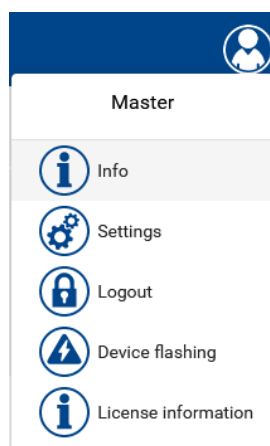
4 Operation



Selecting the menu item "System bus" accesses the function "Service > System bus" directly.

Only for variTRON 300 and variTRON 500 touch: Selecting the menu item "Wtrans gateway" accesses the function "Service > Wtrans gateway" directly.

"User" button



Designation	Description
Master	The user name of the logged-on user is displayed here.
Info	Displays information about the web application
Settings	Change the password
Logout	Log off user
Device flashing	The display of the device flashes (for identification).
License information	Display license information

4.4.1 Device information

The individual items of information displayed under the tiles "Device information", "System status", and "Ethernet" are identical to those in the device menu.

⇒ chapter 4.2.2 "Device menu", Page 31

Device information

Device-specific numbers and version numbers for hardware and software components in the device are displayed here.

Information on the connected modules is not displayed here. This information can be accessed using the function "Service > System bus".

System status

The current system status is displayed here.

Corresponding functions are available to change the system status:

- REBOOT SYSTEM (as of system version 5)
 - Restart of the central processing unit.
- RESET ORIGIN
 - An "Origin" reset resets the system bus (master restarts, data of the modules on the bus is loaded again) and deletes the bus configuration.
 - The PLC performs a full reset, which means that the PLC program and the retain area¹ are deleted (see CODESYS documentation on origin (full) reset of PLC).
 - An event message is issued (origin reset).
- RESET COLD
 - The PLC performs a cold start, which means that the retain area¹ is deleted (see CODESYS documentation on cold start of PLC).
 - An event message is issued (cold start reset).
- RESET
 - The PLC performs a warm start, which means that the retain area¹ is retained (see CODESYS documentation on warm start of PLC).
 - An event message is issued (warm start reset).
- STOP
- RUN

Ethernet

Information on the Ethernet interface LAN1 and, if applicable, other Ethernet interfaces (LANx) is displayed here.

System monitoring

Information on the system battery status, memory usage, CPU temperature, and system voltages (...) is displayed here.

System voltages: The "Reset drag indicator" function can be used to reset the resettable minimum and maximum values.

Certificate management

If applicable, information on certificates is displayed here.

PLC runtime environment

Information about the PLC runtime system is displayed here.

¹ variTRON 300 and variTRON 500 touch: Retain handling only possible via sync in CODESYS (JUMO library available as of system version 6).

4 Operation

PLC application

If applicable, information from the PLC application is displayed here (PLC library "CmpDeviceInfo").

License management

Extra codes and their status are displayed here (active = extra code is active and can be used).

Real-time processing

Information on the relevant function (e.g. data recording) is displayed here (thread runtime, cycle counter, time-out counter, wakeup deviation).

Datastore gateway

Information about data recording is displayed here (version, export status of recorded data, database fill level).

New function as of system version 8: Manual export of the recorded data (for example for backup before a firmware update). The date of the last export is displayed.

Cloud gateway

Information about the cloud gateway is displayed here (status, version).

Wtrans gateway (only for variTRON 300 and variTRON 500 touch)

Information about the Wtrans gateway is displayed here (version, radio frequency; Wtrans transmitters: e.g. transmitter ID, battery status, RSSI value; measured value, transmission interval).

4.4.2 Events

Event messages are extracted from the device and listed in chronological order here.

The information shown can be filtered by message type (alarm, audit trail, malfunction, event). It is also possible to search for specific keywords and run a full-text search.

The "Refresh" function (button) refreshes the list.

The "Delete" function (button) deletes all entries from the list in the device.



NOTE!

The different types of event messages are organized in a common ring buffer. In the event that old entries are overwritten, it is usually ensured that audit trail messages remain stored for at least 14 days.

4.4.3 Alarms

Alarm messages are extracted from the device and listed in chronological order here.

The information shown can be filtered by message type (alarm, malfunction). It is also possible to search for specific keywords and run a full-text search.

The "Refresh" function (button) refreshes the list.

The "Confirm" function (button) acknowledges an alarm. For this purpose, the relevant alarm must be selected (ticked) beforehand.

4.4.4 Configuration

The following sections are merely intended to provide an overview of the functions which are configured under the respective tile.

The process of configuring the individual functions in the CPU (master) is described in detail in the "Configuration" chapter in this document.

⇒ chapter 5 "Configuration", Page 65

The process of configuring the modules (controller, relay, analog IO units, digital IO units) is described in the operating manual for the respective module.

⇒ chapter 1.8 "Available technical documentation", Page 17

Device manager

Here, device settings are configured (device language, start-up behavior, partition change), device designations are assigned, the time zone and time server are selected, and the date and time are manually set. In addition, the customer-specific linearization is configured here (as of system version 5).

Unit settings (only for variTRON 500 touch)

The function is not yet supported (intended for future use).

System bus

The "Master" tile is where settings relating to the transfer of data via the system bus are configured.



NOTE!

The settings configured under "Master" influence the transfer of data via the system bus. Sub-optimal settings here will disrupt or even interrupt the communication within the system. For this reason, these parameters are only permitted to be modified by a service engineer from the device manufacturer (or by someone acting on their instructions).

The modules connected via the system bus are each depicted by a separate tile, which takes the user to the module configuration.

Data carrier management

Settings for the use of network drives are made here (available as of system version 7).

Ethernet

The Ethernet interface LAN1 and, if applicable, other Ethernet interfaces (LANx) are configured here.

Port configuration

Here an Ethernet port (LANx) is selected which is to be used as a PROFINET port (available as of system version 8).

System user interface (only for variTRON 500 touch)

The integrated TFT screen (touch panel) is configured here. Furthermore the graphic file of the boot logo is displayed here (configuration only in the setup program).

Web server

The web server function is configured here.

Email

The settings for sending emails are configured here.

4 Operation

PLC configuration

Here, the units for absolute and relative temperature values are determined (for the PLC application), the program generators are configured, and settings for the analog and digital variables (as of system version 5) are made.

PLC parameters

If applicable, PLC parameters are defined here.

Programs

Programs (setpoint values, operating contacts) are created here using the program editor.

System status UI (only for variTRON 300 and variTRON 500)

The screensaver is configured here.

Real-time processing

Here the process values to be recorded are selected and the data recording is configured (available as of system version 6).

Datastore gateway

Here the connection to the database (datastore) is configured and activated (available as of system version 6).

Cloud gateway

The connection to the JUMO Cloud (available as of system version 4) is configured here.

Wtrans gateway (only for variTRON 300 and variTRON 500 touch)

Settings for using the JUMO Wtrans transmitters are made here (available as of system version 5).

Node-RED

Here, the use of the programming tool Node-RED is activated.

Batches

Batch reporting is configured here (available as of system version 6).

4.4.5 Service

EtherCAT (system bus)

Information on the system bus master and the slaves is displayed here, for example:

- Actual and target status (system bus status)
- Device address and alias address
- Available ports (system bus interfaces)
- Hardware and software version
- Assignment of expansion slots

The following functions are available:

- Bus topology mode active (as of system version 5): Only for servicing purposes; shows the actual hardware configuration.
- Debug output active: Only for servicing purposes
- Reset: System bus restart
- Stop/Run: Switchover of the system bus status (Safe-Operational/Operational; independent of system status)
- Reset statistics



CAUTION!

If the bus topology mode is activated in the system bus state "Operational", the system bus goes into the state "Initialization".

This interrupts the cyclic transmission of values.

- Use this function for servicing purposes only!

Wtrans gateway (only for variTRON 300 and variTRON 500 touch)

Information about the Wtrans transmitters is displayed here (e.g. status, transmitter ID, battery status, RSSI value).

User management

Users are created and assigned user rights here.

The user rights are defined in what are known as roles, which represent typical remits such as administrator or operator. Users are assigned rights by assigning them the relevant role. Users can also be assigned more than one role.

⇒ chapter 8.1 "User rights", Page 99

Import configuration

A configuration file (.jcf) is selected and transferred to the device here.

Once the configuration has been successfully transferred, the device restarts.

Extract configuration

The configuration is extracted from the device and saved as a configuration file (.jcf) here.

Function activation

Extra codes are activated here.

Extra codes are additional functions which are usually subject to a fee.

4 Operation



NOTE!

The files for enabling the extra codes (also referred to as license files or FeatureResponse files) should be stored after initial receipt in such a way that they are available again for transfer to the device after a factory reset.

Firmware

The device's firmware is updated here.

For this purpose, switch the device to the status "Stop". Then select a firmware file (.raucb) and transfer it to the device. Afterward, create a new hardware configuration for the system (connected modules) using the setup program and transfer it to the device.

As an option, a configuration file (.jcf) can also be selected and transferred to the device here.

Log list

Log entries are extracted from the device and listed here.

The information shown can be filtered by entry type (information, warning, error, event, audit trail message, alarm, malfunction). It is also possible to run a full-text search.

Debug

Debug data is extracted from the device here.

The file containing the debug data (.jdf) can be saved locally on the PC and sent to the manufacturer for analysis purposes.

Use of a USB flash drive



NOTE!

It is also possible to update the firmware, import and extract the configuration (import, export), and extract the debug data using a USB flash drive.

⇒ chapter 4.2.2 "Device menu", Page 31

4.4.6 File explorer

Files and subfolders located in the Shared Folder are displayed here.

The files are available for download in the web browser (click on the file).

As of system version 8, the following functions are available (as buttons or in the context menu):

- Create new folder, rename, open, delete
- Download folder (as ZIP file)
- Upload, download, delete file(s)

In a CODESYS application, the shared folder can be accessed via the relative path ../ShareJumo.

5.1 General information

As a basic principle, the device can be configured on the device itself, as well as using the setup program or the "JUMO Web Cockpit" web application. However, these configuration options differ in terms of the function areas that can be configured.

The following table provides an overview of which function areas are configurable by which means (= X).

Function area	Device with LCD display	Device with TFT screen	Setup program	Web application
Device manager	X ^a	X ^a	X	X
System bus			X	X
Data carrier management			X	X
Ethernet	X	X	X	X
Port configuration	X	X	X	X
System user interface (TFT screen, only for variTRON 500 touch)		X	X	X
Web server	X	X	X	X
Email			X	X
PLC configuration			X	X
PLC parameters			X	X
Programs			X	X
System status UI (LCD display, only for variTRON 300 and 500)	X		X	X
Real-time processing			X	X
Datastore gateway			X	X
Cloud gateway			X	X
Wtrans gateway (only for variTRON 300 and 500 touch)			X	X
Node-RED			X	X
Batches			X	X

^a Some functions are not available.



NOTE!

The functions "Hardware assistant" (for defining the hardware configuration for the system), "PLC application" (for defining the start parameters and starting the programming system), and "Languages" (for defining the project language, and exporting and importing languages) are only available in the setup program.

Device with LCD display (variTRON 300, variTRON 500): If the configuration has been changed on the device, this change will not take effect until you confirm the query "Save settings" using the "Menu/OK" key.

Device with TFT display (variTRON 500 touch):

 = Save settings and exit menu level

 = Exit menu level without change

In the web application, selecting "Save" ensures the device applies a change that was made to the configuration. The change is not applied if you select "Exit".

5 Configuration

In the setup program, the changed configuration must be transferred to the device in order for the change to take effect.

If applicable, the default settings are shown in **bold** in the following tables.

5.2 Device manager

Device settings

Parameter	Selection/data input	Description
Device language	Select language	Language in which the texts are shown on the device display. Texts that do not have a translation in the selected language are displayed in English or German (or, if applicable, in the so-called developer language).
Start-up behavior		System status that is adopted by the device once it switches on:
	Run	"Run" system status
	Stop	"Stop" system status
	Last status	Last system status before the switch-off
Partition change after [x] start-up errors	5 to 50	After [x] errors during the boot process, the device boots from the secondary partition (backup partition). Afterwards there is a one-time possibility to boot from the primary partition again with REBOOT SYSTEM. If this fails, a software update is required. Possible errors during the boot process: • Error in the device software • Interruption of the voltage supply

Device designations

Parameter	Selection/data input	Description
Device name	Enter text (or use existing text)	Designation of the device The device name is used in the web application, in the setup program, and, if applicable, in other PC programs. It can also be used by DeviceScan and the CODESYS application, for example for identification purposes.
DNS name	Enter text (or use existing text) The DNS name must not be used more than once in the network.	Name by which the device can be identified and addressed in the network. The name set per default is unique as it comprises the product group number and the MAC address.

Time zone/NTP

Parameter	Selection/data input	Description
Time zone	Select time zone	Time zone in which the device is operated.
NTP active		The device's time settings can be synchronized with a time server using the Network Time Protocol (NTP).
	Yes	Synchronization is active.
	No	Synchronization is not active.

5 Configuration

Parameter	Selection/data input	Description
Server 1 Server 2 Server 3	Enter the address of the time server (or use an existing address) Example: de.pool.ntp.org	Up to three time servers can be entered. The server list is processed top down, in other words, the next time server on the list is only queried if the previous server is unreachable. It must be ensured that the server name is resolved to an IP address via a DNS server (see Configuration > Ethernet).
Maximum round-trip time	0 bis 99999 (5)	Maximum time in seconds between the client's request and the server's response (for local time server).

Date and time

Parameter	Selection/data input	Description
Time	Enter the date and time	Device's time settings (NTP must be inactive) In the web application, the PC's time settings are applied (the current time in the device is not shown). These settings can be changed individually.

5.2.1 Customer-specific linearization

You can use the customer-specific linearization to create a customized linearization characteristic line for analog values. Two procedures are available for this: formulas or grid values (value pairs).

Temperature values must always be specified in °C. In general, use the measuring units without prefixes (e.g. A instead of mA).

Formula

Customer-specific linearization is specified using a polynomial. The polynomial is calculated for the entire linearization range.

Example (4th order polynomial): $y = X4 \cdot x^4 + X3 \cdot x^3 + X2 \cdot x^2 + X1 \cdot x + X0$

Parameter	Selection/data input	Description
Name	Enter text (or use existing text)	Designation of linearization
Measuring range start (Ymin)	-99999 to 99999 (0)	Start value of the y axis
Measuring range end (Ymax)	-99999 to 99999 (100)	End value of the y axis
Decimal places	0 to 6 (4)	Number of decimal places
Polynomial:		
X0	-99999 to 99999 (0)	Absolute component of the polynomial (point of intersection with the y axis)
X1	-99999 to 99999 (1)	Coefficient of the linear component (x)
X2	-99999 to 99999 (0)	Coefficient of the quadratic component (x ²)
X3	-99999 to 99999 (0)	Coefficient of the cubic component (x ³)
X4	-99999 to 99999 (0)	Coefficient of the quartic component (x ⁴)

5 Configuration

Parameter	Selection/data input	Description
...	-99999 to 99999 (0)	(max. up to 20th order)

Grid values

Customer-specific linearization is specified by entering up to 200 grid points (pairs of values X/Y). The value of X stands for the physical measured value (e.g., voltage in V, current in A, or resistance in ohm; depending on the sensor type) and the value of Y stands for the linearized value (e.g., temperature in °C).

Parameter	Selection/data input	Description
Name	Enter text (or use existing text)	Designation of linearization
Decimal places	0 to 6 (4)	Number of decimal places
Grid values:		
Measured value (X)	-99999 to 99999 (0)	Value of the relevant grid point on the x axis
Linearized value (Y)	-99999 to 99999 (0)	Value of the relevant grid point on the y axis

5 Configuration

5.3 System bus

Master

Parameter	Selection/data input	Description
Max. repetitions (max. no. of re-tries)	5 to 10	Maximum number of times a faulty frame is repeated before the system bus switches to the status "Stop".
Continuation after system bus error (run after s. bus err.)		The device can continue automatically as soon as a system bus error that previously occurred is no longer present.
	Inactive	No continuation The device or the system bus must be manually switched back to the status "Run". For example, the system bus can be separately switched to the status "Stop" (Safe-Operational) or "Run" (Operational) in the web application using the function "Service > System bus".
	Active	Continuation The device automatically switches back to the status "Run".
Ignore system start		The system bus status can be independent of the current system status (device status). This may be required if a CODESYS application first needs to perform extensive initialization before the system bus is permitted to switch to the status "Run".
	Inactive	The system bus status follows the system status.
	Active	When the system starts, the system bus remains in the status "Stop", regardless of the system status. The system bus must be separately switched to the status "Run". This can be done in the CODESYS application (CmpSystembus), or performed manually in the web application (Service > System bus).



NOTE!

The settings configured under "Master" influence the transfer of data via the system bus. Sub-optimal settings here will disrupt or even interrupt the communication within the system. For this reason, these parameters are only permitted to be modified by a service engineer from the device manufacturer (or by someone acting on their instructions).

Modules

The process of configuring the modules (controller, relay, analog IO units, digital IO units) is described in the operating manual for the respective module.

⇒ chapter 1.8 "Available technical documentation", Page 17

If used together with a type JUMO variTRON CPU, the description of the NV connecting list provided in the manual does not apply. In this case, all external connections (connections running via the system bus) must be realized in the PLC application.

5.4 Data carrier management

Network drives

Here up to 5 network drives are mounted under Linux (available as of system version 7).

Parameter	Selection/data input	Description
Name	Enter text (only ASCII characters)	Designation for the network drive Examples: Drive1, Drive2
Network path	Enter text (only ASCII characters)	Network path of the drive Examples: //Server/NetDrive, //Server/NetDrive2
File system	SMB/CIFS	Network file system SMB/CIFS is supported up to and including version 3.1.1. To use a specific version, it must be specified as an additional mount option (vers=x.x).
Log on as guest	Off (FALSE)	Username and password are required for logon.
(as of system version 8)	On (TRUE)	Logon without user name and password
User name (as of system version 8)	Enter text	User name for access to the network drive
Password (as of system version 8)	Enter text	Password for access to the network drive
Additional mount options	Enter text	Additional options for mounting the drive under Linux The options are to be entered separated by commas. Example (public drive, SMB/CIFS in version 1.0): guest,user=,vers=1.0



NOTE!

As of system version 7, access to the file system on USB storage media via CODESYS is also supported.

5 Configuration

5.5 Ethernet

LAN1

Parameter	Selection/data input	Description
Method		Method for assigning the IP address
	Manual	The IP address must be assigned manually.
	Automatic	The IP address is obtained from a DHCP server.
IP address	0.0.0.0 to 255.255.255.255	Manually assigned IP address The IP address may need to be requested from the administrator in question.
Subnet mask	0.0.0.0 to 255.255.255.255 (255.255.0.0)	Subnet mask if the IP address is manually assigned The structure of the subnet mask may need to be requested from the responsible administrator.
Standard gateway	0.0.0.0 to 255.255.255.255	IP address of the standard gateway (router) if the IP address is manually assigned The IP address of the standard gateway may need to be requested from the administrator in question.
DNS server IP		Obtain DNS server IP automatically
	Off (FALSE)	The IP address must be assigned manually (see below).
	On (TRUE)	The IP address is obtained automatically.
DNS server	0.0.0.0 to 255.255.255.255	Manually assigned IP address of the DNS server The IP address may need to be requested from the administrator in question.

LANx

Additional (optional) LAN interfaces may be provided depending on the device. The setting options are identical to those for LAN1.

5.6 Port configuration

Parameter	Selection/data input	Description
PROFINET port		Select which Ethernet interface (LANx, device dependent) is to be used as PROFINET port.
	No port	None of the existing Ethernet interfaces is used as PROFINET port.
	LANx	The respective Ethernet interface is used as PROFINET port

5.7 Web server

Parameter	Selection/data input	Description
HTTP		The web server can always be reached via HTTPS; HTTP can be activated in addition.
	Active	HTTP is active in addition to HTTPS.
	Inactive	HTTP is not active.
	Redirect to HTTPS	HTTP is active, but there is an immediate redirect to HTTPS.
HTTP port number	0 to 65535 (8090)	Port number for HTTP
HTTPS port number	0 to 65535 (8443)	Port number for HTTPS

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5.8 Email

Parameter	Selection/data input	Description
SMTP server	Enter address (smtp.example.de)	Address (URL) of the email server for SMTP
Port	0 to 65535 (25)	Port number of the email server for SMTP The port number is dependent on the email provider and the type of encryption (usually: TLS = 465, StartTLS = 587).
User account	Enter designation (user@example.de)	Designation of the user account (user name) for logging on to the email server
Authentication		Authentication at logon to email server
	None	No authentication
	Password	Authentication using password
Password	Enter password	Password for authentication
Encryption		Type of encryption between email client and email server (depending on the email provider)
	None	Unencrypted transfer
	StartTLS	TLS where the connection is unencrypted to begin with (encryption takes place while the connection is being established)
	SSL/TLS	Transport Layer Security
Check certificates		Check SSL/TLS certificates
	No	No check
	Yes	Certificates are checked.
Sender	Enter designation (device@example.de)	Email address as sender address

5.9 PLC configuration

5.9.1 Units

These settings are relevant for the automatic conversion performed when the temperature unit is changed (°C/°F) (relates only to the PLC application).

Parameter	Selection/data input	Description
Setting for absolute temperature		Unit for temperature value
	°C	Deg. Celsius
	°F	Deg. Fahrenheit
	K	Kelvin
Setting for relative temperature		Unit for temperature difference
	°C	Deg. Celsius
	°F	Deg. Fahrenheit
	K	Kelvin

5.9.2 Program generator

Nine independent program generators are available as an optional extra (extra code 225 required), meaning that nine independent programs can run asynchronously at the same time.

General

Parameter	Selection/data input	Description
Name of program generator	Enter text (or use existing text)	Designation of program generator
Function	Inactive	The program generator is switched off.
	Program generator	The program generator is controlled by a program.
	Fixed-setpoint generator	The program generator operates as a fixed-setpoint generator. In this case, the setpoint values for the basic status or manual mode are used.
Program start	Program start	The program starts at the first programmed setpoint value.
	Actual value	The program starts at the point at which the setpoint value corresponds to the current actual value.
	Time	A start time specified for program start is adopted as the start time in a 24 h program. Example: Start time: 06:00:00; 24 h program from 00:00 to 24:00: The program starts at 6 a.m. and runs until midnight.
Response by out of range (O-o-R) (behavior at O-o-R)		Behavior of the program generator if measuring range is exceeded or if there is measuring range underflow (Out-of-Range)
	Continuation	Program continues to run.
	Program stop	The program is stopped.

5 Configuration

Parameter	Selection/data input	Description
Power off		Behavior of the program generator when the power failure is over.
	Abort	The program is aborted; the program generator enters basic status.
	Continuation	The program continues running from the point that it was at when the power failed.
	Standstill	The program is stopped (program generator stays in automatic mode). The program can be continued or aborted by means of operation.
	Continuation at x %	If the difference in the actual value (before and after the power failure) is less than or equal to x %, the program continues running from the point that it was at when the power failed. If this is not the case, the program generator enters standstill.
	Continuation at actual value	The program continues running at the actual value; consideration is given to whether the program profile had a positive or negative slope at the time of the power failure.
Start with time		The program can be started at a specific time (entry of date and time by means of operation).
	No	Immediate program start (e.g., by means of operation or digital signal)
	Yes	Program start at a specific time
Actual-value difference	0 to 100	The maximum admissible difference between the actual value before and after the power failure for the program to continue running.
End signal (s)	0 to 32767	Length of the program end signal
Events		Activate the event message for the relevant event.
(Program start, ...)	Off (FALSE)	No event message
	On (TRUE)	The event is entered in the event list.
Event text	Enter text (or use existing text)	This text is entered into the event list in case of the event.

Names of operating contacts

Parameter	Selection/data input	Description
Name of contact 01 to Name of contact 32	Enter text (or use existing text)	Designation of the operating contact concerned

Tolerance band monitoring

Parameter	Selection/data input	Description
Alarm type	Inactive	The tolerance band monitoring is not active.
	Event	The tolerance band violation is entered as an event in the event list.
	Alarm	The tolerance band violation is entered as an alarm in the event list and the alarm list.
Alarm at level	High	Alarm at high level (1 = actual value outside the tolerance band)
	Low	Alarm at low level (0 = actual value within the tolerance band)
Event text	Enter text (or use existing text)	This text is entered in the relevant list in the event of a violation of the tolerance band.
Hold when tolerance band is exceeded		If the tolerance band is violated, the program can be stopped until the condition is over.
	Yes	The program is stopped.
	No	The program is not stopped.

Setting of setpoint values: setpoint specification

Parameter	Selection/data input	Description
Setpoint value 01 to Setpoint value 30		Specification of whether a change made to the setpoint value should take the form of a step or a ramp.
	Setpoint step	Setpoint value change as step
	Setpoint ramp	Setpoint value change as ramp
	End value for setp. ramp 1 to End value for setp. ramp 10	The relevant setpoint value acts as the end value for the ramp function of the setpoint value (1 to 10) which is selected here.
		If there is no end value specified in a program section, then the program generator works in accordance with its configuration (setpoint step or setpoint ramp).

Setting of setpoint values: setpoint limits

Parameter	Selection/data input	Description
Decimal places	Auto	The number of decimal places is selected automatically.
	XXXXXp	No decimal place
	XXXXpX	One decimal place
	XXXpXX	Two decimal places
	XXpXXX	Three decimal places
	XpXXXX	Four decimal places
Lower tolerance band limit (tol. band lower limit)		
Minimum	-99999 to 99999	Admissible minimum value for the lower tolerance band limit
Maximum	-99999 to 99999	Admissible maximum value for the lower tolerance band limit

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Parameter	Selection/data input	Description
Upper tolerance band limit (tol. band upper limit)		
Minimum	- 99999 to 99999	Admissible minimum value for the upper tolerance band limit
Maximum	-99999 to 99999	Admissible maximum value for the upper tolerance band limit
Setpoint value 01 to Setpoint value 30		
Designation (name)	Enter text (or use existing text)	Designation of the setpoint value
Minimum	- 99999 to 99999	Admissible minimum setpoint value
Maximum	-99999 to 99999	Admissible maximum setpoint value

Setting of setpoint values: setpoint values for manual mode

Parameter	Selection/data input	Description
Lower tolerance value (tol. min)	- 99999 to 99999	Lower value of the tolerance band
Upper tolerance value (tol. max)	-99999 to 99999	Upper value of the tolerance band
Setpoint value 01 to Setpoint value 30	-99999 to 99999 (0)	Value of the setpoint value concerned
Contact 01 to Contact 32		Position of the operating contact concerned
	Off (FALSE)	Contact not active
	On (TRUE)	Contact active

Setting of setpoint values: setpoint values for basic status

Parameter	Selection/data input	Description
Lower tolerance value (tol. min)	- 99999 to 99999	Lower value of the tolerance band
Upper tolerance value (tol. max)	-99999 to 99999	Upper value of the tolerance band
Setpoint value 01 to Setpoint value 30	-99999 to 99999 (0)	Value of the setpoint value concerned
Contact 01 to Contact 32		Position of the operating contact concerned
	Off (FALSE)	Contact not active
	On (TRUE)	Contact active

Setting of setpoint values: setpoint value units

Parameter	Selection/data input	Description
Setpoint value 01 unit to		Unit of the setpoint value concerned
Setpoint value 30 unit	No unit	
	Absolute temperature	Temperature value
	Relative temperature	Temperature difference
	Relative humidity	Relative humidity
	Ratio	Ratio of two values A and B (A / B) in percent
	Hours	Hours
	Minutes	Minutes
	Seconds	Seconds

5.9.3 Analog variables

These settings affect the use of the analog variables (analog PLC outputs) for functions that have been implemented in the device firmware (e.g. data recording).

Parameter	Selection/data input	Description
Name	Enter text (or use existing text)	Name of the variable concerned
Unit	Select signal type and unit from the list (drop-down menu)	Signal type and unit of the variable concerned
Display start	-99999 to 99999 (0)	Lower limit of display range
Display end	-99999 to 99999 (100)	Upper limit of display range

5.9.4 Digital variables

These settings affect the use of the digital variables (digital PLC outputs) for functions that have been implemented in the device firmware (e.g. data recording).

Parameter	Selection/data input	Description
Name	Enter text (or use existing text)	Name of the variable concerned

5.10 PLC parameters

The configuration structures that were individually created using the CPV Editor (CPVE) are displayed here.

This configuration data can be used in the setup program, in the web application, and in the CODESYS application.



NOTE!

The CPV Editor requires specific knowledge and is intended for use by the manufacturer only (service that is subject to a fee).

5 Configuration

5.11 Programs

Each program (each program plan) can consist of a maximum of 200 program sections. Up to 30 setpoint values and up to 32 operating contacts can be used in each program section.

Tolerance band monitoring can be set up for the first setpoint value. This means that the relevant actual value is monitored; if it leaves the tolerance band, the program is stopped until it returns to a value that is within the tolerance band (depending on configuration).

A total of up to 300 programs can be managed in a program pool.

A program generator is required to execute a program. A program can also be assigned multiple program generators.

Program header

Parameter	Selection/data input	Description
Program GUID	Enter ID (0)	ID for uniquely identifying the program (length: 64 bits)
Program name	Enter text (or use existing text)	Designation of the program
Program information	Enter text (or use existing text)	Description of the program
Pictogram name	Select pictogram	Pictogram (icon) for graphical identification marking of the program
Favorite		Programs marked as favorites are placed at the start of the program start menu. If there is more than one favorite, the program number is the decisive criterion (in ascending order).
	No	Program is not a favorite
	Yes	Program is a favorite
Repetitions		Cyclic program repetition
	Inactive	The program is not repeated (only one program run).
	Endless	The program is repeated endlessly.
	Number	The program is repeated as many times as is specified by the parameter "Number of repetitions".
Program assignment (allocation)	-9223372036854775808 to 9223372036854775807 (0)	Number (length: 64 bits) for assigning a program to a plant or a group. This number can be used in the customer-specific application to group similar programs.
Number of repetitions	0 to 99999	Number of program repetitions
Assignment (allocation)		Selection of program generators to be used to execute the program.
	Off (FALSE)	Program generator not selected
	On (TRUE)	Program generator selected

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Program channel

Parameter	Selection/data input	Description
Number of sections	0 to 200	Number of program sections that the program generator is to process.
Program section 1 to Program section 200		
Process step (procedural step) (available as of system version x)	0 to 200	The process step specifies the limits of the section time and defines which setpoint values are available.
Section time (hh:mm:ss)	00:00:00 to 99:59:59	Duration of program section As from system version x: The section time must be within the limits specified by the process step.
RS (Repeat section) Start section	1 to 200	Number of the program section that is to be repeated together with the following sections.
NoC (Number of cycles) Number of cycles	0 to 999	Number of repetitions of a program section (or multiple linked program sections)
Setpoint value 01 to Setpoint value 30	-1000000 to 1000000 The limits depend on the admissible minimum and maximum setpoint values of the program generator.	Setpoint values in the program section As from system version x: Only the setpoint values approved in the process step can be used.
Tol high	-1000000 to 1000000 (0) The limits depend on the admissible minimum and maximum upper limit of the tolerance band for the program generator.	Upper limit value for tolerance band monitoring of setpoint value 01
Tol low	-1000000 to 1000000 (0) The limits depend on the admissible minimum and maximum lower limit of the tolerance band for the program generator.	Lower limit value for tolerance band monitoring of setpoint value 01
Operating contact 01 to Operating contact 32		Operating contacts in the program section
	Off (FALSE)	Operating contact is not active.
	On (TRUE)	Operating contact is active.

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5.12 System status UI

This function area relates to the configuration of the device display.

Screensaver

Parameter	Selection/data input	Description
Function		Activate screen switch-off
	Off	The function is inactive.
	On	The screen is switched off once the waiting period has elapsed.
Waiting period (s) (idle time)	10 to 3600 (900)	Waiting period in seconds

5.13 Real-time processing

5.13.1 Data recording

The process values (analog and digital signals) to be recorded are selected here (available as of system version 6). The process values are organized in groups as analog or digital channels. The input signals of the channels are selected from a selector.

Grouping of signals (channels) allows the user, for example, to create a separate group for each plant or to record signals with different memory cycle.

The maximum number of channels (analog and digital) that can be recorded depends on the device (variTRON 300: 60 channels; variTRON 500 and variTRON 500 touch: 240 channels). However, the number of licensed channels is decisive for the evaluation of the recorded data (fee-based licenses for JUMO smartWARE Evaluation).



NOTE!

The user must ensure that the maximum number channels is not exceeded (60 or 240). The sum of analog and digital channels of all groups is decisive for this.

If the maximum number of channels is exceeded during the configuration of a group, this results in the complete group not being recorded. In case of configuration with the Web Cockpit, a fault message is immediately entered into the event list.



NOTE!

The process values are only temporarily stored in the central processing unit to bridge network failures before these values are transferred to the Datastore for storage. The Datastore is part of the JUMO smartWARE Evaluation software. A visualization using only the central processing unit is not possible.

Parameter

Parameter	Selection/data input	Description
Name	Enter text (or use existing text)	Designation of the group The designation is displayed in the visualization (JUMO smartWARE Evaluation).
Recording (as of system version 8)	Normal	Amount of data stored in one memory cycle Additional data is stored for the current measured value (minimum value, maximum value, average value).
	Compact	Only the current measured value is stored.

Analog channels

Parameter	Selection/data input	Description
Input signal	Select signal from selector	Analog signal System version 5: Analog PLC outputs (analog values 001 to 120) As of system version 6: Additional analog signals available (values of the system monitoring, process values of the modules).
As of system version 6:		
Designation	Enter text (or use existing text)	Designation of the signal

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Parameter	Selection/data input	Description
Replace designation	Inactive Active	If active: Data evaluation: The original designation is replaced by the designation used here.
Start of display range	-99999 to 99999 (0) As of system version 7: -1.7e+307 to 1.7e+307	Lower limit of display range
End of display range	-99999 to 99999 (100) As of system version 7: -1.7e+307 to 1.7e+307	Upper limit of display range
Unit (only with system version 6)	Select unit (No unit)	Value unit As of system version 7, the unit of the input signal is used.
Replace display parameters	Inactive Active	If active: Data evaluation: The original display parameters are replaced by the display parameters used here.
As of system version 7:		
Scaling type		Scaling of the y-axis
	Linear	Linear
	Logarithmic	Logarithmic

Digital channels

Parameter	Selection/data input	Description
Input signal	Select signal from selector	Digital signal (binary signal) System version 5: Digital PLC outputs (binary values 001 to 120) or signal from the event list (central detector: active after each new alarm, inactive after acknowledgement). As of system version 6: Additional digital signals available (process values of the modules).
As of system version 6:		
Designation	Enter text (or use existing text)	Designation of the signal
Replace designation	Inactive Active	If active: Data evaluation: The original designation is replaced by the designation used here.

Standard operation

Parameter	Selection/data input	Description
Memory status		Activation of data recording
	On	The data is recorded at the configured interval
	Off	Data recording is not active.
Memory rate [hh:mm:ss]	00:00:01 to 24:00:00 (00:00:05)	Recording interval Time interval at which the values of the analog and digital signals of the group are stored for evaluation.

Event operation

This function is available as of system version 7.

Event operation has the highest priority of all three operating modes.

Parameter	Selection/data input	Description
Control signal	Select signal from selector	Digital signal (binary signal) that starts (high active) and stops event operation.
Post-trigger time [s]	0 to 10 (0)	Extends event operation after the control signal has been deactivated.
Memory rate [hh:mm:ss]	00:00:01 to 24:00:00 (00:00:01)	Recording interval Time interval at which the values of the analog and digital signals of the group are stored for evaluation.

Time operation

This function is available as of system version 7.

Time operation has higher priority compared with standard operation, but lower priority than event operation.

Parameter	Selection/data input	Description
Start [hh:mm:ss]	00:00:00 to 23:59:59 (00:00:00)	Time at which the time operation is started. Start = End: Time operation is not active.
End [hh:mm:ss]	00:00:00 to 23:59:59 (00:00:00)	Time at which the time operation ends.
Memory rate [hh:mm:ss]	00:00:01 to 24:00:00 (00:00:01)	Recording interval Time interval at which the values of the analog and digital signals of the group are stored for evaluation.

Recorded values

The following values are determined within a recording interval:

- Current value (current value at the end of the interval)
- Measured value status (status of the current value according to NAMUR NE107)
- Minimum value (for digital signal: number of low values (logical 0))
- Maximum value (for digital signal: number of high values (logical 1))
- Average value (for digital signal: number of high values in relation to the number of low values)
- Number of values with measuring range underflow
- Number of values with measuring range overflow
- Number of valid value
- Number of invalid values

5 Configuration

5.14 Datastore gateway

Here the connection to the database (Datastore) is configured and activated (available as of system version 6). In the Datastore, the recorded process data is stored. The data is then available for evaluation with JUMO smartWARE Evaluation (as of system version 6).

Parameter	Selection/data input	Description
Data export		Export of the recorded process data
	Inactive	The function is switched off.
	Active	The function is active. The data is transferred to the datastore at the set time interval (period).
Datastore URL	Enter URL (<host>/store)	URL of the Datastore The URL is usually entered as follows (without "http://"): <Host name>/store <IP address>/store In special cases, the complete path can also be used. Example: http://<Host name>/store/v1/rawdata/store
Period [hh:mm:ss]	00:01:00 to 24:00:00 (00:15:00)	Interval at which the recorded data is transferred to the Datastore.

5.15 Cloud gateway

Here the connection to the JUMO Cloud is configured (available as of system version 4). Before this, the device must be configured as a data source in the JUMO Cloud.

Parameter	Selection/data input	Description
Connection to the cloud		Connection to the cloud server
	Inactive	No connection
	Active	The connection is active.
Cloud server		Selection of the cloud server
	JUMO Cloud	The JUMO Cloud is used. Individual settings are ignored.
	Individual	The cloud server is determined by an individual URL.
Individual URL for configuration (as of system version 05)	Enter URL	URL of the cloud server If the JUMO Cloud is not used, a different URL can be entered here.
Individual URL for MQTT (as of system version 05)	Enter URL	URL of the cloud server (MQTT protocol) If the JUMO Cloud is not used, a different URL can be entered here.
Device ID	Enter device ID	ID used by the device (data source) to authenticate itself to the cloud. The device ID is automatically assigned during configuration in the cloud.
Password	Enter password	Password used by the device (data source) to authenticate itself to the cloud. The password is automatically assigned during configuration in the cloud.
Permanent live mode		In permanent live mode, the live data is permanently sent to the cloud (see cycle time), regardless of the configuration in the cloud.
	Inactive	No permanent live mode The transfer of live data depends on the configuration in the cloud
	Active	The permanent live mode is active.
Cycle time for live data [ms]	250 to 25000	Interval at which live data is sent to the cloud when permanent live mode is active.



NOTE!

The permanent live mode is usually used during startup; it should be deactivated after startup. This avoids costs that may be incurred for the transmission of the data (e.g. in the mobile network).

5 Configuration

5.16 Node-RED

The Node-RED graphical programming tool is present by default, but must be activated before use.

Parameter	Selection/data input	Description
Graphical programming tool Node-RED		Activation of Node-RED in the central processing unit
	Inactive	Node-RED is not active.
	Active	Node-RED is active and can be used with a web browser. To start Node-RED, the IP address of the central processing unit and the port number 1880 must be entered: http://<IP address>:1880

5.17 Batches

Batch logging is configured here (available as of system version 6).

The batch data is displayed together with the channels of the assigned groups and the event messages in the batch visualizations (evaluation with JUMO smartWARE Evaluation).

The maximum number of batches that can be recorded depends on the device (variTRON 300: 10 batches; variTRON 500 and variTRON 500 touch: 20 batches). However, the number of licensed batches is decisive for the evaluation of the recorded batches (fee-based licenses for JUMO smartWARE Evaluation).



NOTE!

If no group has been assigned to the batch (or none of the assigned groups is active), only event messages are recorded.



NOTE!

With the variTRON 300, the user must ensure that the maximum number of 10 batches is not exceeded. If the maximum number of batches is exceeded during configuration, this will result in the batch in question not being recorded. In case of configuration with the Web Cockpit, a fault message is immediately entered into the event list.



NOTE!

The configuration must not be changed during an ongoing batch reporting process. Otherwise, there is a risk that the batch documentation will become unusable.

General information

Parameter	Selection/data input	Description
Batch active	Off (FALSE)	Batch reporting is not active.
	On (TRUE)	Batch reporting is active and can be started.
Batch application (batch name)	Enter text (or use existing text)	Assignment or designation of the batch
Control signal	Select signal from selector	Signal that is used to start (high active) and stop batch reporting.
Response to power interruption (behavior after power interruption)	Continuation	Batch reporting is continued.
	Abort	Batch reporting is stopped. The batch is completed with the last recorded data (before the power failure).
Group allocation	Select group from selector	Group that is assigned to the batch. All groups can be assigned to one batch.

Batch lines

For each batch, up to 10 lines can be defined for the batch report.

Parameter	Selection/data input	Description
ID	Enter text (or use existing text)	Designation (ID) of the relevant line of the batch report (e.g. for use in the PLC application) The identifier must be unique within a batch.

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Parameter	Selection/data input	Description
Text left column	Enter text (or use existing text)	Text in the left column of the batch report. The left column contains the designation for the content of the right column.
Contents of right column		Text or text source for the right line of the batch report
	Empty	No text
	Default text	Text from the "Default text" parameter
	Batch name	The batch name is used (see "General" section).
	Batch number	The batch number is used together with the text from "Default text". The batch number is incremented at the end of batch reporting.
	Batch start	Start (date and time) of batch reporting
	Batch end	End (date and time) of batch reporting
	Batch duration	Duration of batch reporting (time difference between batch start and batch end)
Delete line		Only for "Default text": The parameter decides whether a text edited during batch reporting is replaced again by the text specified in the configuration after the batch has been completed.
	Off (FALSE)	Text changes are retained.
	On (TRUE)	The original text (default text) is used for the next batch reporting.
Default text	Enter text (or use existing text)	The text is used in the batch report if the text in the right column is composed of "Default text" or "Batch number".
Editable		This parameter enables editing of the text within the current batch report.
	Off (FALSE)	The text in the right column can only be edited by changing the "Default text".
	On (TRUE)	The text in the right column can be changed - for the current batch report. Depending on the "Delete line" parameter, the configured text can be automatically reactivated after the batch is completed.

Batch number

Parameter	Selection/data input	Description
Batch number offset	0 to 2147483647	The automatic batch numbering starts with the offset value.

By means of a summary list, this chapter describes the basic procedure to be followed when initially starting up the automation system. This list is intended to enable experienced users to get started quickly.

Requirements

- The work required to mount the entire system – comprising the CPU (also referred to as the "device" here) and the connected modules – and establish its electrical connections is complete (incl. establishing the network connection via the Ethernet interface).
- The network includes a DHCP server from which the CPU obtains its IP address (otherwise this address must be assigned manually; see "Configuration > Ethernet").
- The setup program has been installed and started on a PC that is also connected to the network.

Procedure

1. Switch on the voltage supply.
 - a) Check the system status in the display of the CPU.
Once the system has started up, "Run" is displayed.
 - b) Open the device menu and identify the IP address of the interface concerned.
2. Create a new project: Setup program > Projects
 - a) Select project template (central processing unit and version)
 - b) Project management: Assign a project designation and, if necessary, create a description.
 - c) Save the project file, under a different name if necessary.
3. Create the hardware configuration: Setup program > Project > System bus hardware assistant
 - a) Add the modules to the CPU in the correct order (change the module designation if necessary).
 - b) If necessary, select the hardware for the module's expansion slots.
 - c) If necessary, add another DIN rail and place router module 1-port (705043) or router module 3-port (705042) as the first module on the DIN rail (router module 2-port (705041) must be on the first DIN rail).
 - d) If necessary, establish the connection between the router modules.
4. Configure the connection to the CPU: Setup program > Connections
 - a) Enter the CPU's IP address under "Host address".
 - b) If necessary, enter the designation and description.
 - c) Use the user "Master" available per default.
 - d) Use port 8443 (if the connection is secure).
5. Transfer the project (hardware configuration only) to the CPU: Setup program > Project > Data transfer
 - a) Select the connection that was previously configured.
 - b) Establish the connection ("Connect..."), and enter the default password 9200 when doing so.
 - c) Send the configuration to the CPU ("Send to device").
 - d) Check the status LED of all modules.
The LED will light up steady green as soon as the system bus has the status "Operational".
6. Configure the modules: Setup program > Project > Configuration > Bus
 - a) Configure the digital and analog inputs and outputs.
 - b) If necessary, configure the controller function of the controller module (incl. controller parameters).
 - c) If necessary, configure other functions (e.g., limit value monitoring function, setpoint values).
 - d) If necessary, configure the CPU (e.g. if setpoint value programs are being used):
 - Configure the program generator (Configuration > PLC configuration)
 - Create the program (Configuration > Programs)

6 Startup

7. Optional: Create the CODESYS application: Setup program > Configuration > PLC application
 - a) Select and apply the appropriate CODESYS version.
 - b) Start CODESYS.
 - c) Create the CODESYS application.
8. Optional: Use an existing CODESYS application
Download at: qr-705002-en.jumo.info
 - a) Either: Download Visu Template
 - b) Or: Download Process Technology Template
9. Optional: Setting up data recording without using CODESYS (as of system version 6)
 - a) Setup program > System bus hardware assistant
 - Change module designation if necessary.
 - b) Setup program > Configuration > Real time processing > Data recording > Modules > Groups > Group x
 - Assign a meaningful designation for the group.
 - Assign input signals (process values) to the analog and digital channels.
 - Set memory status and memory rate (memory cycle).
 - c) Setup program > Configuration > Datastore gateway > Datastore interface
 - Configure and activate connection to the database (datastore) (condition for data recording).
10. Optional: Setting up data recording using CODESYS (as of system version 6)
 - a) Setup program > System bus hardware assistant
 - Note the module label.
 - b) Setup program > Configuration > Real time processing > Data recording > Modules > Groups > Group x
 - Assign a meaningful designation for the group.
 - Assign input signals (process values; in system version 5 only PLC outputs) to the analog and digital channels.
 - Set memory status and memory rate (memory cycle).
 - c) CODESYS application: Connecting (mapping) input signals of the modules with PLC outputs
 - I/O image of the module: Assign the input signal (channel) to a self-created variable.
 - I/O image of the PLC manager: Assign the PLC output (channel) to another self-created variable.
 - Link both variables together in the PLC program (PLC_PRG).
 - If necessary, create a table for documentation, which contains the linked signals (input signal > PLC output).
 - d) Setup program > Configuration > Datastore gateway > Datastore interface
 - Configure and activate connection to the database (datastore) (condition for data recording).
11. After creating the CODESYS application, transfer it to the setup project and close CODESYS if applicable.
12. Transfer the project to the CPU: Setup program > Project > Data transfer
 - a) Send the configuration (incl. CODESYS application) to the CPU ("Send to device").



NOTE!

For debugging in the CODESYS application, it is possible to connect "online" to the PLC. In this way, for example, the states of variables can be checked or values can be changed without stopping the application. Before CODESYS is started from the setup program, the option "Start to debug" must be activated. After that, the connection with the PLC can be established in the CODESYS programming environment.

If the CODESYS application is changed while the PLC is running, the "Login with online change" option must be selected in the CODESYS programming environment during transfer. If the change is to be retained in the CPU during power off, the "Update boot application" option must also be activated.

**NOTE!**

Certain changes made to the configuration (e.g., changes to the hardware configuration) will cause the CPU to restart.

Further information

The JUMO Help Center provides further information, especially on the following topics:

- JUMO Cloud
- JUMO smartWARE SCADA
- JUMO smartWARE Evaluation (as of system version 6)
- JUMO smartWARE Program (JUMO variTRON 500 as of system version 7, JUMO variTRON 500 touch as of system version x)

<https://www.helpcenter-jumo.net>

7 Retrofitting interfaces

This section describes how to retrofit the modules for optional interfaces of central processing unit 705002.



CAUTION!

Incorrect handling may result in damage or malfunctions.

This compromises the function of the central processing unit or the system as a whole.

- ▶ Only qualified personnel are permitted to carry out module retrofits. The country-specific requirements regarding changes to an electrical device must be observed. Before a retrofit, the system must be shut down and isolated from the power supply.



CAUTION!

Modules may be damaged by electrostatic discharge.

This compromises the function of the central processing unit or the system as a whole.

- ▶ Modules may only be retrofitted at a grounded workstation and in compliance with the relevant safety measures.

Identifying the module

The module can be identified using the part no. on the packaging.

Assembly	Code (order code)	Part no.	Compatible with interface
RS232 Modbus-RTU (as of system version 3)	51	00745041	Com1, Com2
RS485 Modbus-RTU (as of system version 3)	55	00745042	Com1, Com2
Ethernet (RJ45)	08	00745043	LAN2



NOTE!

For modules that have already been fitted **at the factory**, the type designation on the nameplate of the central processing unit indicates the module type and interface.

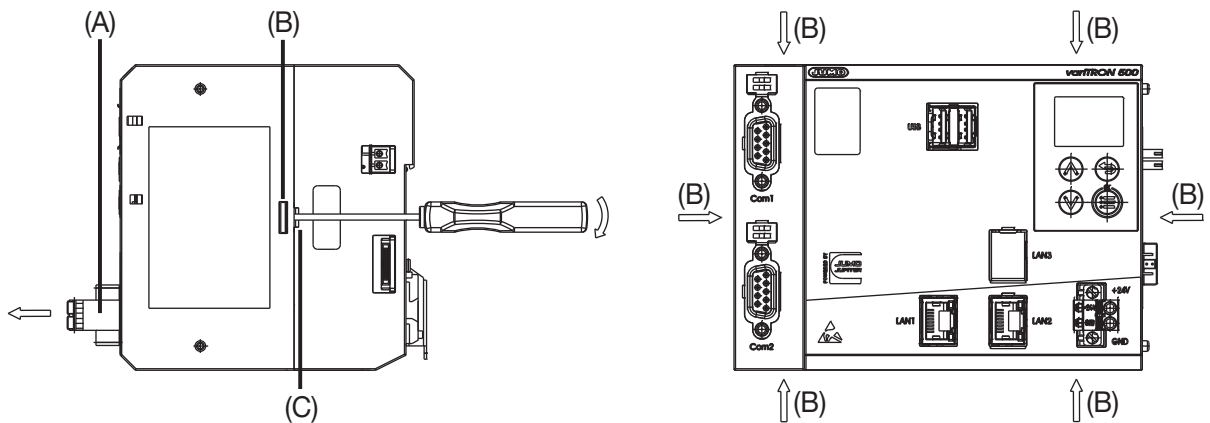
If required, information regarding this can be found in the "Identifying the device version" chapter in operating manual 70500200T90 or installation instructions 70500200T94 (the installation instructions are included in the scope of delivery of the device).

Shutting down the system and removing the central processing unit from the DIN rail

1. Shut down the system and disconnect it from the voltage supply. To do this, loosen the 2 screws of the wired terminal strip +24V/GND and pull the terminal strip forward.
2. If necessary, remove other connecting cables (USB, LAN).
3. Disconnect the central processing unit from the modules and remove from the DIN rail. To do this, please follow the instructions on dismounting previously provided in this document.

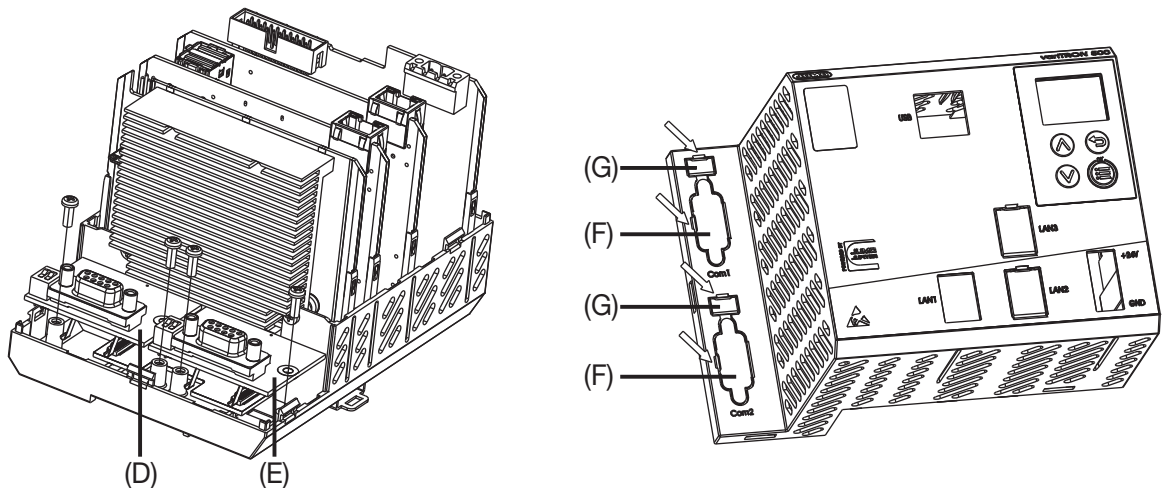
7 Retrofitting interfaces

Opening the housing



1. Loosen and remove terminal strip (A), if not already done during shutting-down.
2. Loosen all locking hooks (B) one after the other using a screwdriver. To do this, insert the screwdriver into the small slot (C) below the locking hook and turn carefully (maximum 90°). When doing so, pull the housing parts slightly apart so that the locking connections can be released.
3. Remove the upper part of the housing.

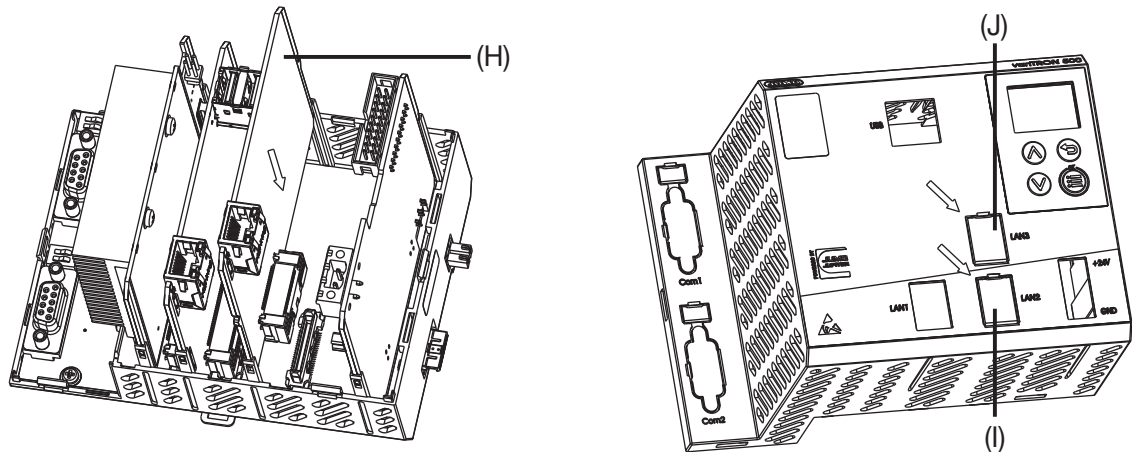
Retrofitting an RS232 or RS485 interface



1. Carefully move module for Com1 (D) or Com2 (E) into position until the plug-in connection is connected.
2. Fasten the module with the enclosed screws (tightening torque 0.7 Nm).
3. Use a screwdriver to remove the blind cover (F) of the relevant interface in the upper part of the housing. In case of an RS485 interface, also remove the blind cover (G) for the switches of the terminating resistors.

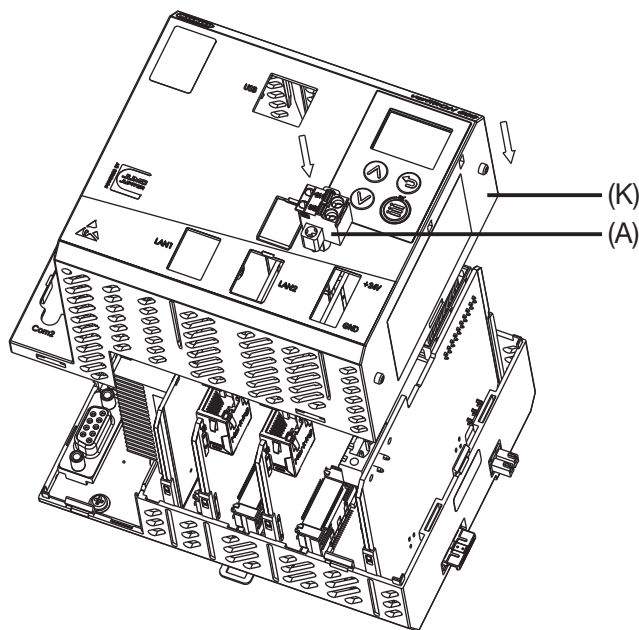
7 Retrofitting interfaces

Retrofitting an Ethernet interface



1. Carefully move module (H) into position until the plug-in connection is connected.
2. Use a screwdriver to remove the blind cover for LAN2 (I) in the upper part of the housing. (Do not remove the blind cover for LAN3 (J).)

Closing the case



1. Place the upper housing part (K) on the lower part and make sure that all locking hooks engage.
2. Attach terminal strip (A) and fasten with the 2 screws (if necessary only during startup).

Positioning the central processing unit on the DIN rail and starting up the system

1. Position the central processing unit on the DIN rail and connect the other modules to the central processing unit. To do this, please follow the instructions on installation/dismounting previously provided in this document.
2. If necessary, reconnect the connecting cables (USB, LAN).
3. Attach wired terminal strip +24V/GND and fasten. Restart the system.

7 Retrofitting interfaces

8.1 User rights

8.1.1 System version 7

The information in this chapter applies to system version 7.

User

The following users are created per default:

User name	Password	Assigned role
Master	9200	- Administrator - BatchAdmin - ConfigurationRead - ConfigurationWrite - Controller - SystemStatusUi - SystemUi - VisuTemplateAdmin - WebUi
UnregisteredUser This user must not be deleted!		ReadOnly

A user can be edited, and it can also be removed. Likewise, the user's password can also be changed. The function  is used to create a new user.



NOTE!

Due to the restricted possibilities for displaying and entering data on the device display, users with the right "SystemStatusUi" can only be assigned simple passwords. To prevent these passwords from being cracked via the web application, these users must not also be given the right "WebUi".

Roles

The following roles are defined per default:

- Administrator
- ReadOnly (do not delete this role)
- SystemStatusUi (do not delete this role)
- WebUi (do not delete this role)
- SystemUi (do not delete this role)
- ConfigurationRead
- ConfigurationWrite

The following table shows the roles defined per default and the rights they confer (= X).

Administrator	ReadOnly	SystemStatusUi	WebUi	SystemUi	ConfigurationRead	ConfigurationWrite	Right	Description
X							AdvancedSettings	(for future use)
X	X						DeviceInformationRead	Read device information

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Administrator	ReadOnly	SystemStatusUi	WebUi	SystemUi	ConfigurationRead	ConfigurationWrite	Right	Description
X							EventlistRead	Read event list
					X		x.Configuration.Read	Read configuration (several single rights)
						X	x.Configuration.Write	Write configuration (several single rights)
X							FirmwareUpdate	Perform a firmware update
X							SystemStateControl	Change the system status
X							BusControl	Change the system bus status (Stop, Start, Reset statistics)
X							CertificateAdministration	Manage certificate
X	X						DebugDataRead	Read debug data
X							DebugInterfaceActivation	Activate SSH interface (only possible on the device)
X							RecorderAdministration	Delete data base
X							AlarmAcknowledgement	Acknowledge alarm
X							DebugDataDelete	Delete debug data
X							EventlistDelete	Delete event list
X							UserManagement	Manage users
X	X						CodesysUi	Visibility of the user in the CODESYS UI
		X					SystemStatusUi	Visibility of the user in the device display (only for variTRON 300 and 500) When assigning this right, take into account the restricted possibilities for displaying and entering data on the device display (user name, password).
				X			SystemUi	Visibility of the user in the device display (only for variTRON 500 touch)
			X				WebUi	Logon in the "JUMO Web Cockpit" web application

A role can be edited, and it can also be removed.

The function  is used to define a new role

When editing a role, it is also possible to add your own rights (using the "add" function), which can be used in the CODESYS application by means of the "CmpAccessControlManager" library.

8.1.2 System version 8

The information in this chapter applies to system version 8 and higher.

User

The following users are created per default:

User name	Password	Assigned role
Master	9200	- AdministratorRole - CodesysUiRole - LcdUiRole - TftUiRole - WebUiRole
User1	1	- UserRole - CodesysUiRole - LcdUiRole - TftUiRole - WebUiRole
Service	9200	- ServiceDisplayRole - CodesysUiRole - LcdUiRole - TftUiRole - WebUiRole
UnregisteredUser This user must not be deleted!		ReadOnlyRole

A user can be edited, and it can also be removed. Likewise, the user's password can also be changed. The function  is used to create a new user.



NOTE!

Due to the restricted possibilities for displaying and entering data on the device display, users with the right "SystemStatusUi" can only be assigned simple passwords. To prevent these passwords from being cracked via the web application, these users must not also be given the right "WebUi".

Roles

The following roles are defined per default:

- AdministratorRole
- UserRole
- ReadOnlyRole (do not delete this role)
- ServiceDisplayRole
- LcdUiRole (formerly: SystemStatusUi; do not delete this role)
- TftUiRole (formerly: SystemUi); do not delete this role)
- WebUiRole (do not delete this role)
- CodesysUiRole (do not delete this role)

The following tables show the roles defined per default and the rights they confer (= X):

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AdministratorRole	UserRole	ReadOnlyRole	ServiceDisplayRole	LcdUiRole	TftUiRole	WebUiRole	CodesysUiRole	Right	Description
X	X							AlarmAcknowledgement	Acknowledge alarm
X			X					BusControl	Change the system bus status (Stop, Start, Reset statistics)
X								CertificateAdministration	Manage certificate
X	X	X	X					ConfigurationRead	Read configuration This right is a prerequisite for the assignment of a special configuration right.
X	X	X	X					ConfigurationWrite	Write configuration This right is a prerequisite for the assignment of a special configuration right.
X	(X)	(X)	(X)					x.Configuration.Read	Read special configuration The special configuration rights are listed in the table below.
X	(X)	(X)	(X)					x.Configuration.Write	Write special configuration The special configuration rights are listed in the table below.
X								DebugDataDelete	Delete debug data
X	X	X	X					DebugDataRead	Read debug data
X			X					DebugInterfaceActivation	Activate SSH interface (only possible on the device)
X	X	X	X					DeviceInformationRead	Read device information
X								EventlistDelete	Delete event list
X	X							EventlistRead	Read event list
X			X					FirmwareUpdate	Perform a firmware update
X								RecorderAdministration	Delete data base
X			X					SystemStateControl	Change the system status
X								UserManagement	Manage users
				X				SystemStatusUi	Visibility of the user in the device display (only for variTRON 300 and 500) When assigning this right, take into account the restricted possibilities for displaying and entering data on the device display (user name, password).
					X			SystemUi	Visibility of the user in the device display (only for variTRON 500 touch)
						X		WebUi	Logon in the "JUMO Web Cockpit" web application
							X	CodesysUi	Visibility of the user in the CODESYS UI

Special configuration rights:

AdministratorRole	UserRole	ReadOnlyRole	ServiceDisplayRole	Right	Description
X				AccessControlManager.Configuration.Read	Read settings for users, roles and rights
X				AccessControlManager.Configuration.Write	Write settings for users, roles and rights
X	X	X		BatchManager.Configuration.Read	Read settings for batch control
X	X	X		BatchManager.Configuration.Write	Write settings for batch control
X				CertificateHandler.Configuration.Read	Read settings for certificate management (e.g., for Node-RED, HTTPS)
X			X	CertificateHandler.Configuration.Write	Write settings for certificate management (e.g., for Node-RED, HTTPS)
X				CloudGatewayBackend.Configuration.Read	Read settings for connection to JUMO Cloud
X				CloudGatewayBackend.Configuration.Write	Write settings for connection to JUMO Cloud
X	X		X	ConfigurationDataManager.Configuration.Read	Export configuration (e.g. to USB flash drive) or read out in Web Cockpit
X			X	ConfigurationDataManager.Configuration.Write	Import configuration (e.g. from USB flash drive) or import in Web Cockpit
X				DataBaseManagement.Configuration.Read	Read settings for datastore gateway
X				DataBaseManagement.Configuration.Write	Write settings for datastore gateway
X			X	DebugDataManager.Configuration.Read	Read settings for debug data (texts only)
X			X	DebugDataManager.Configuration.Write	Write settings for debug data (texts only)
X	X	X	X	DeviceManager.Configuration.Read	Read settings for device manager
X	X		X	DeviceManager.Configuration.Write	Write settings for device manager
X	X	X	X	DeviceManager.UnitManagerConfiguration.Read	Read settings for units
X	X		X	DeviceManager.UnitManagerConfiguration.Write	Write settings for units
X				EmailManager.Configuration.Read	Read settings for email sending
X				EmailManager.Configuration.Write	Write settings for email sending
X				EtherCatGateway.Configuration.Read	Read settings for system bus
X				EtherCatGateway.Configuration.Write	Write settings for system bus
X				EventlistHandler.Configuration.Read	Read settings for events (texts only)
X				EventlistHandler.Configuration.Write	Write settings for events (texts only)
X				LicenceManager.Configuration.Read	Read settings for licenses (texts only)
X				LicenceManager.Configuration.Write	Write settings for licenses (texts only)
X				NodeRedBackend.Configuration.Read	Read settings for Node-RED
X				NodeRedBackend.Configuration.Write	Write settings for Node-RED
X	X	X	X	PeripheryManager.Configuration.Read	Read settings for Ethernet
X			X	PeripheryManager.Configuration.Write	Write settings for Ethernet
X	X	X	X	PeripheryManager.PortManagement.Read	Read settings for Ethernet port management
X			X	PeripheryManager.PortManagement.Write	Write settings for Ethernet port management

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AdministratorRole	UserRole	ReadOnlyRole	ServiceDisplayRole	Right	Description
X				RealTimeScheduler.Configuration.Read	Read settings for real-time processing (e.g. groups)
X				RealTimeScheduler.Configuration.Write	Write settings for real-time processing (e.g. groups)
X				SpsConfigurationManager.Codesys.Read	Read CODESYS application
X				SpsConfigurationManager.Codesys.Write	Write CODESYS application
X				SpsConfigurationManager.Configuration.Read	Read settings for PLC configuration
X				SpsConfigurationManager.Configuration.Write	Write settings for PLC configuration
X				SpsConfigurationManager.Parameter.Read	Read application-specific PLC settings 1 (PLC parameters)
X				SpsConfigurationManager.Parameter.Write	Write application-specific PLC settings 1 (PLC parameters)
X				SpsConfigurationManager.Parameter2.Read	Read application-specific PLC settings 2 (PLC parameters 2)
X				SpsConfigurationManager.Parameter2.Write	Write application-specific PLC settings 2 (PLC parameters 2)
X				SpsConfigurationManager.Parameter3.Read	Read application-specific PLC settings 3 (PLC parameters 3)
X				SpsConfigurationManager.Parameter3.Write	Write application-specific PLC settings 3 (PLC parameters 3)
X				SpsConfigurationManager.Parameter4.Read	Read application-specific PLC settings 4 (PLC parameters 4)
X				SpsConfigurationManager.Parameter4.Write	Write application-specific PLC settings 4 (PLC parameters 4)
X	X			SpsConfigurationManager.Programs.Read	Read settings for programs
X	X			SpsConfigurationManager.Programs.Write	Write settings for programs
X				StorageManager.Configuration.Read	Read data carrier management settings (network drives)
X				StorageManager.Configuration.Write	Write data carrier management settings (network drives)
X			X	SystemLogger.Configuration.Read	Read settings for system logger (texts only)
X			X	SystemLogger.Configuration.Write	Write settings for system logger (texts only)
X				SystemObserver.Configuration.Read	Read settings for system monitoring (texts only)
X				SystemObserver.Configuration.Write	Write settings for system monitoring (texts only)
X				SystemStatusManager.Configuration.Read	Read settings for system status manager (texts only)
X				SystemStatusManager.Configuration.Write	Write settings for system status manager (texts only)

AdministratorRole	UserRole	ReadOnlyRole	ServiceDisplayRole	Right	Description
X	X		X	SystemStatusUi.Configuration.Read	Read settings for system state UI (device display); only for devices with LCD display, such as variTRON 300 and 500
X	X		X	SystemStatusUi.Configuration.Write	Write settings for system state UI (device display) (see above)
X		X		SystemUi.Configuration.Read	Read settings for system UI (device screen); only for devices with TFT display, such as variTRON 500 touch
X		X		SystemUi.Configuration.Write	Write settings for system UI (device screen) (see above)
X				SystemUpdateManager.Configuration.Read	Read settings for firmware update (texts only)
X				SystemUpdateManager.Configuration.Write	Write settings for firmware update (texts only)
X				WTransGateway.Configuration.Read	Read settings for Wtrans gateway
X				WTransGateway.Configuration.Write	Write settings for Wtrans gateway
X			X	WebGatewayBackend.Configuration.Read	Read settings for web server
X			X	WebGatewayBackend.Configuration.Write	Write settings for web server

A role can be edited, and it can also be removed.

The function  is used to define a new role

When editing a role, it is also possible to add your own rights (using the "add" function), which can be used in the CODESYS application by means of the "CmpAccessControlManager" library.

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8.2 Technical data

8.2.1 Interfaces

USB host	
Description	USB
Type	A (socket)
Number	2
Device category	Mass storage class, communications device class – Ethernet control module (as of system version 8)
Application	Connecting a USB flash drive or a USB to Ethernet converter (as of system version 8)
Data rate	Low Speed, Full Speed, Hi-Speed
Max. current	500 mA per interface
Ethernet	
Description	LAN1, LAN2 (optional)
Type	RJ45
Number	1 (optional: 2)
Protocol	TCP, IPv4, HTTP(S)
	Via CODESYS as an option: Modbus-TCP, PROFINET IO controller/device (device as of system version 7), EtherCAT master, OPC UA server, BACnet/IP (as of system version 4)
Application	Communication with: - PC (setup program, web browser) - Email server - Modbus-TCP master/slave - PROFINET IO device/controller - EtherCAT slave - OPC UA client - BACnet/IP server/client
Transfer rate	10 Mbit/s, 100 Mbit/s
Connection cable	Network cable, at least CAT5 (S/FTP)
Cable length	Up to 100 m
RS232 or RS485 (serial interface)	
Description	Depending on the device version
Type	Com1, Com2
Type	D-Sub 9-pole
Number	2
Application	Fieldbus applications, communication via modem with a PC or with an email server
Protocol	Via CODESYS: Modbus-RTU master/slave
Data format	8/1/n, 8/1/e, 8/1/o
Transfer rate	9600 Bd, 19200 Bd, 38400 Bd
System bus	
Description	None (side connector)
Type	System specific
Number	1
Application	Connection of a router module 705041 or an input/output module

8.2.2 Display

Type	LCD, monochrome
Resolution	96 × 64 pixels (8 rows)

8.2.3 Electrical data

Voltage supply Symbol (see nameplate) Connection Voltage Residual ripple	 At the front (removable terminal strip, 2-pole with Push-In technology) DC 24 V +25/-20 % SELV 5 %
Current consumption	Max. 1.16 A (at DC 19.2 V) Current consumption of lined-up modules also has to be considered (see "Hardware configuration" in the setup program)!
Power consumption	Max. 25 W
Conductor cross section (voltage supply) Wire or stranded wire without ferrule Stranded wire with ferrule 2 × stranded wire with twin core-end ferrule with plastic collar	Min. 1.5 mm ² , max. 2.5 mm ² Min. 1.5 mm ² , max. 2.5 mm ² 1.5 mm ²
Stripping length	10 mm
Electrical safety	According to DIN EN 61010-1:2020 Overvoltage category III, pollution degree 2
Protection rating	III
Electromagnetic compatibility Interference emission Interference immunity	Acc. to DIN EN 61326-1:2022 Class A - only for industrial use - Industrial requirement
Data backup	Buffered RAM
Buffer battery service life	Typ. 6 years (lithium battery) Observe fault messages on battery status in the event list (battery almost empty, battery empty)!

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8.2.4 Housing and environmental conditions

Case type	Plastic case for DIN rail mounting in the control cabinet (indoor use); DIN rail acc. to DIN EN 60715, 35 mm x 7.5 mm x 1 mm
Dimensions (W × H × D)	135 mm × 101 mm × 101.5 mm (without connection elements)
Weight (fully fitted)	Approx. 590 g
Protection type	IP 20, according to DIN EN 60529
Ambient temperature range	-20 to +55 °C
Storage temperature range	-40 to +70 °C
Resistance to climatic conditions	Relative humidity ≤ 90 % annual average without condensation (climate class 3K3 acc. to DIN EN 60721-3-3 with extended temperature and humidity range)
Site altitude	Up to 2000 m above sea level
Vibration	Acc. to DIN EN 60068-2-6, table C.2
Amplitude	0.15 mm from 10 to 58.1 Hz
Acceleration	20 m/s ² from 58.1 to 150 Hz
Shock	Acc. to DIN EN 60068-2-27, table A.1
Peak acceleration	150 m/s ²
Shock duration	11 ms

8.2.5 Approvals and approval marks

c UL us	
Test facility	Underwriters Laboratories
Certificate/certification number	E201387
Inspection basis	UL 61010-1 (3. Ed.), CAN/CSA-22.2 No. 61010-1 (3. Ed.)
Valid for	All types

8.3 PLC data

System times

	Typical
Adjustable PLC cycle time (Task) ^a Adjustable task cycles are not limited on the device side. If and where necessary, CODESYS restrictions in this regard must be observed (see documentation for CODESYS).	125 ms (factory setting when creating an IEC task)
System bus cycle time for - Multichannel controller module - Analog input module 4-channel - Analog input module 8-channel - Analog output module 4-channel	30 ms
System bus cycle time ^b for - Relay module 4-channel - Digital input/output module 12-channel - Digital input/output module 32-channel	10 ms
Sampling rate	
- Multichannel controller module ^a	50 ms
- Analog input module 4-channel ^a	50 ms
- Analog input module 8-channel ^a	375 ms
- Analog output module 4-channel ^a	20 ms
- Relay module 4-channel ^b	0 ms
- Digital input/output module 12-channel ^b	0 ms
- Digital input/output module 32-channel ^b	0 ms
Detection of a module failure for - Multichannel controller module - Analog input module 4-channel - Analog input module 8-channel - Analog output module 4-channel	100 to 750 ms
Detection of a module failure for - Relay module 4-channel - Digital input/output module 12-channel - Digital input/output module 32-channel	25 ms

^a Asynchronous with system bus

^b Synchronous with system bus

IEC tasks

Assignment of IEC tasks:

- 0 to 15: RT task
- 6 to 32: Normal priority
- Factory setting: Priority 31

Details are to be found in the CODESYS documentation.



NOTE!

The device is equipped with an integrated UPS which guarantees a backup time of 1 second. A time span of 150 ms is available to terminate all IEC tasks in a defined manner. Afterwards they are terminated hard. Subsequently, the retain data is saved.

8 Annex

Memory for customer-specific PLC programs

The available memory space for customer-specific PLC programs (program code, data, retain data) is dynamic and depends on how much free memory is available in the device.

The free memory is displayed in the system monitoring (Device info > System monitoring > Memory). However, this memory must not be used completely, as the system will then no longer run stably.

8.4 Buffer battery replacement



CAUTION!

The device contains a buffer battery that is used for data buffering when the device is in switched off mode or if the power fails. The operating life of the battery is typically 6 years. If the battery is low, this is indicated by a fault message in the event list ("Battery almost empty").

Danger of data loss!

- Replace battery in time.



NOTE!

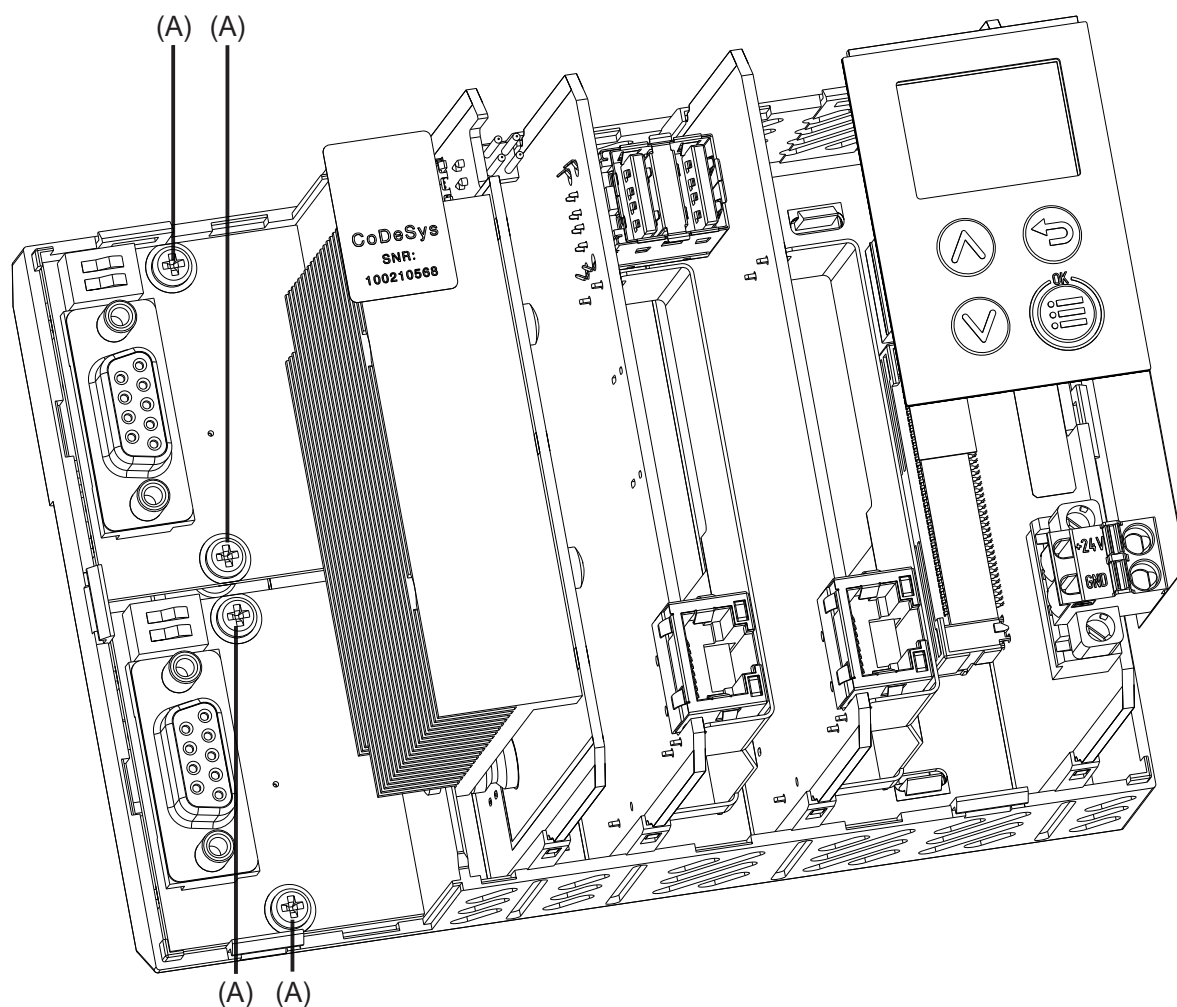
Observe the safety information in the chapter "Retrofitting interfaces"!

In addition, follow the instructions there:

- Shutting down the system and and starting up the system later on
- Opening and closing the housing

Remove the interface modules

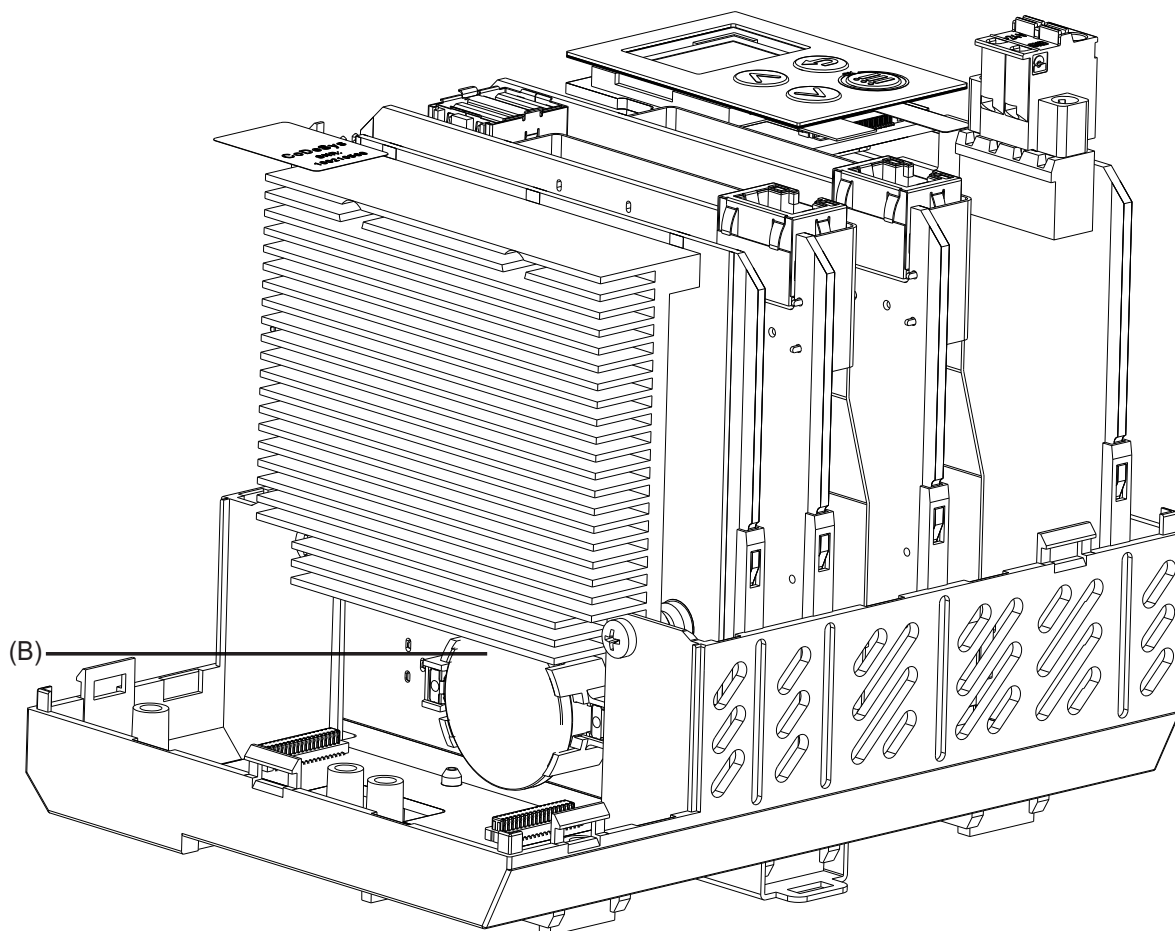
This step is omitted if no interface module is equipped.



1. Loosen and remove the screws (A) of the interface modules (Com1, Com2).
2. Carefully pull off the interface modules upwards (disconnect the plug connection).
3. Ensure that the interface modules are later remounted in their original slot (prevent mix-up).

8 Annex

Replace the battery



1. Remove the old battery (B) from the holder and replace it with a new one of the same type (button cell CR2477).

Mount the interface modules

This step is omitted if no interface module has been removed.

1. Carefully insert each interface module in its original slot until the plug connection is established.
2. Fasten the interface modules with the screws (tightening torque 0.7 Nm).

8.5 LED displays

The "S" LED (Status) indicates the status of the relevant module (prerequisite: "P" LED lights up).

Display modes

The following table lists all possible states of the "S" LED (module-dependent).

Display mode	Description	Green symbol	Red symbol
---	LED state not relevant	---	---
Off	LED off	○	○
On	LED on (permanently lit)	■	●
Flickering	LED flickers (50 ms on, 50 ms off)	■ ■ ■ ■	● ● ● ●
Single flickering	LED flashes briefly (50 ms on, 200 ms off)	■ □ □ □ □	● ○ ○ ○ ○
Blinking	LED flashes (200 ms on, 200 ms off)	■ □ ■ □ ■	● ○ ● ○ ●
Single flash	LED flashes once (200 ms on, 1000 ms off)	■ □ □	● ○ ○
Double flash	LED flashes twice (on/off/on for 200 ms each time, 1000 ms off)	■ ■ □ □	● ● ○ ○
Triple flash	LED flashes three times (on/off/on/off/on for 200 ms each time, 1000 ms off)	■ ■ ■ □ □	● ● ● ○ ○
Quadruple flash	LED flashes four times (on/off/on/off/on/off/on for 200 ms each time, 1000 ms off)	■ ■ ■ ■ □ □	● ● ● ● ○ ○
Blinking red/green	LED flashes red and green (200 ms red, 200 ms green)	● ■ ● ■	
On green/ Single flickering red	LED lights up green, flashes red (50 ms red)	■ ●	

8 Annex

System states and errors

The following table lists all the system states and errors that are indicated by the "S" LED (module-dependent).

Category	"S" LED (Status)	Meaning	Diagnostics with	Recommended action
Start error		Module error (hardware does not start up)	LED	Replace module
Start error		Internal error (bootloader) Various errors during startup (e.g. no memory, initialization error)	LED	Replace module
Start error		No firmware	LED	Replace module
Start error		Incorrect optional board 1, 2, 3 (actual/target)	LED	Check optional board and replace, load, or remove as required; replace module if necessary
Bus status		No connection to central processing unit	LED	Check whether the central processing unit is running; check cabling and topology
Bus status		System in "Stop" (INIT) state – no error, only in start phase	LED	
Bus status		System in "Stop" (PREOP) state – no error, only in start phase	LED	
Operation	 (Priority 1)	Module not calibrated (LED flashes red-green) or module in calibration mode (calibrate/test; LED flickers red-green)	LED/setup program	
Operation	 (Priority 2)	Collective alarm (incl. out of range)	LED/setup program	
Operation	 (Priority 3)	System in "Stop" (SAFEOP) state – no error	LED	
Operation	 (Priority 3)	System in "Run" (OP) state – no error	LED	

The web application (service) and the setup program (hardware configuration) must be used for further diagnosis and, if necessary, measures.

8.6 Open-source software

The software of device and/or components of the device was developed using open-source software.

Insofar as the respective applicable license conditions justify a claim to the provision of the source code or other information, JUMO GmbH & Co. KG will provide the source code and the license texts on a conventional data carrier at the costs incurred for the provision of the data carrier.

This offer is valid for three years after the software is made available. If provided for in the license terms, this offer is valid beyond that.

For questions regarding open source software, please contact:

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8.7 China RoHS

	产品中有害物质的名称及含量 China EEP Hazardous Substances Information							
	产品组别 Product group: 705002							
	部件名称 Component Name							
		铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)	
	外壳 Housing (Gehäuse)	○	○	○	○	○	○	
	过程连接 Process connection (Prozessanschluss)	○	○	○	○	○	○	
本表格依据SJ/T 11364的规定编制。 This table is prepared in accordance with the provisions SJ/T 11364. ○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。 Indicate the hazardous substances in all homogeneous materials' for the part is below the limit of the GB/T 26572.								
x：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。 Indicate the hazardous substances in at least one homogeneous materials' of the part is exceeded the limit of the GB/T 26572.								
	螺母 Nuts (Mutter)	○	○	○	○	○	○	
	螺栓 Screw (Schraube)	○	○	○	○	○	○	



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