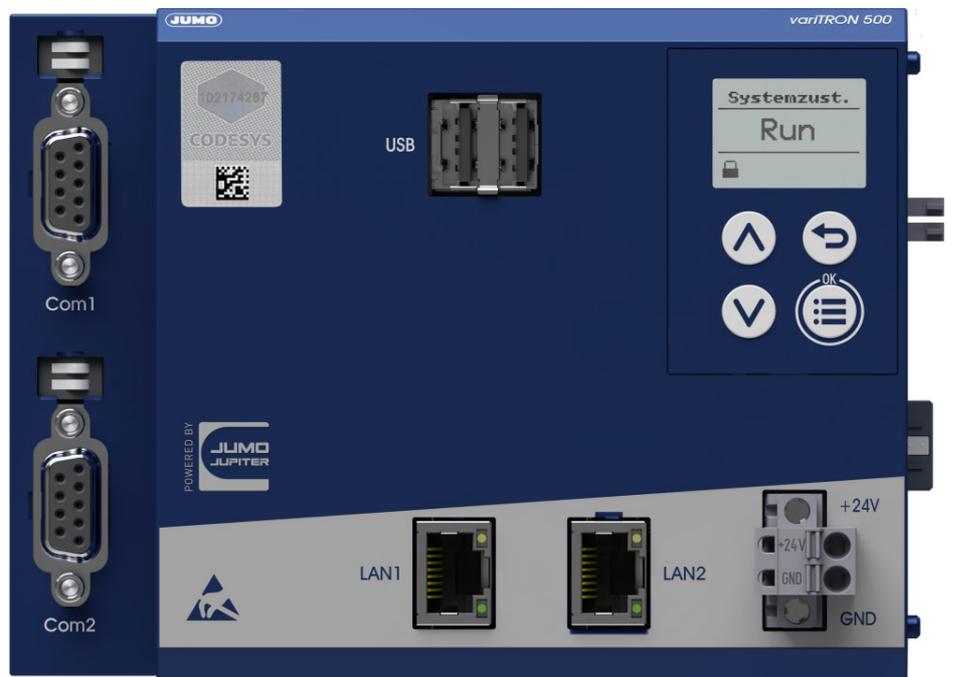


JUMO variTRON 500

Automation System

Central Processing Unit 705002



Operating Manual



70500200T90Z001K000

V11.00/EN/00703039/2025-08-29

Further information and downloads



qr-705002-en.jumo.info

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1 Introduction

1.1 Safety information

General

This manual contains information that must be observed in the interest of your own safety and to avoid material damage. This information is supported by symbols which are used in this manual as indicated.

Please read this manual before starting up the device. Store this manual in a place that is accessible to all users at all times.

If difficulties occur during startup, please do not intervene in any way that could jeopardize your warranty 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.

1.2 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

The personnel deployed must meet the following requirements in all phases of the product lifecycle:

- Trained electrical, mechanical, and plant engineering personnel.
- Members of personnel are familiar with this documentation and the safety information and warnings it contains.

1.5 Security

The manufacturer only provides a warranty if the device is installed and used as described in this documentation. This device is equipped with security mechanisms that protect it against accidental changes to the device settings. Security measures that meet the operator's security standards and offer additional protection for the device and device data transmission must be applied by the operator themselves.

Reference is made to the Security Manual here, which regulates the following points:

- Intended use with regards to security
- Organizational measures regarding the handling of security measures by the operator
- Organizational measures by the manufacturer

⇒ JUMO variTRON 500 Security Manual – 70500000T95Z001K000

1 Introduction

1.6 Acceptance of goods, storage, and transport

1.6.1 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.

1.6.2 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

1.6.3 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.
-

1.6.4 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 Introduction

1.7 Module overview

1.7.1 Central processing unit

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

The central processing unit manages all configuration and parameter data in the overall system and makes a PLC acc. to IEC 61131-3 (CODESYS V3.5) available (extra code 224).

The PLC can be activated in different versions:

- CODESYS runtime system incl. CODESYS Remote TargetVisu and/or
- CODESYS Remote TargetVisu and/or (extra code 280)
- CODESYS WebVisu (extra code 281)

Commercially available panels that support the CODESYS Remote TargetVisu or CODESYS WebVisu functionality can be used for visualization. "Remote Target Visu" is required so that the central processing unit can provide the screen for the panel with "Remote Target Visu". Visualization is also possible via web browser. Visualizations have to be implemented with CODESYS resources.

An easy-to-use 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	<ul style="list-style-type: none">• Process map for all connected input and output modules (including controller modules)• Display and keys to indicate the system status• Two USB host interfaces• OPC UA Server (in conjunction with PLC)• Program generator incl. JUMO variTRON Program Editor (as of system version 7)• Two fieldbus interfaces (as of system version 3)• PROFINET IO-Controller/Device (in conjunction with PLC, Device as of system version 7)• Plug and Play when replacing input and output modules• Battery-buffered SRAM (retain data)• Battery-buffered real-time clock• Data evaluation with JUMO smartWARE Evaluation (as of system version 6)• Recorder app for recording and visualizing process data

1.7.2 Modules

The proven controller, input and output modules from the article group 7050xx, and the new generation of the JUMO I/O system 7051xx are available as module variants. These include 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 acquire 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. On JUMO variTRON controller modules (7050xx), the inputs and outputs of each controller module can be individually expanded and modified using the expansion slots. The control loops here operate fully independently, which means they do not require resources from the central processing unit. The JUMO I/O system (7051xx) controller modules do not have expansion slots.

As of system version 9, thyristor power controllers can be integrated with JUMO system bus and in the PLC (CODESYS) via EtherCAT or PROFINET.

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

Input and output modules - 7050xx JUMO variTRON

Module designation	Data sheet	Features
Multichannel controller module	705010	<ul style="list-style-type: none"> Up to 4 independently configurable PID control loops with a fast cycle time and proven control algorithms Independent operation Math and logic functions Counting input up to 10 kHz
Relay module 4-channel	705015	<ul style="list-style-type: none"> 4 relay outputs controlled via the system bus by digital signals Changeover contact in each case (230 V/3 A) Switching statuses are visualized with LEDs
Analog input module 4-channel	705020	<ul style="list-style-type: none"> 4 high-quality, user 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 function Additional digital input
Analog input module 8-channel	705021	<ul style="list-style-type: none"> 8 high-quality analog inputs for RTD temperature probes Pt100, Pt500, Pt1000 in two-wire circuit Limit value monitoring function Additional digital input
Analog output module 4-channel	705025	<ul style="list-style-type: none"> 4 user configurable analog outputs 0(4) to 20 mA or 0(2) to 10 V Adjustable output behavior in case a malfunction occurs
Digital input and output module 12-channel	705030	<ul style="list-style-type: none"> 12 digital inputs or outputs Each channel can be user configured as an input DC 0/24 V or output DC 24 V Capacity per output: 500 mA Switching statuses are visualized with LEDs

1 Introduction

Module designation	Data sheet	Features
Digital input and output module 32-channel (as of system version 3)	705031	<ul style="list-style-type: none"> • 17 digital outputs • Up to 15 additional digital inputs or outputs • Capacity per output: 500 mA • Switching statuses are visualized with LEDs
Thyristor power controller type 70906x (as of system version 3)	709061, 709062, 709063	<ul style="list-style-type: none"> • 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 implemented

I/O modules - 7051xx JUMO I/O system

Module designation	Data sheet	Features
Digital input module 16-channel	705135	<ul style="list-style-type: none"> • Digital signal DC 0/24 V • External voltage DC 24 V via potential-free contact • Max. 5 mA per input • Reference potential L- (GND) required
Digital output module 4-channel	705143	<ul style="list-style-type: none"> • External voltage supply DC 24 V SELV • Lateral supply via router module • 4 relay outputs (changeover contact) • Switching capacity <ul style="list-style-type: none"> - 3 A at AC 230 V - 3 A at DC 30 V
Digital output module 16-channel	705145	<ul style="list-style-type: none"> • External voltage supply DC 24 V SELV • Lateral supply via router module • Output signal DC 0/24 V • Max. 500 mA per output

Special modules - 7050xx JUMO variTRON

Module designation	Data sheet	Features
Router module 2-port (as of system version 3)	705041	<ul style="list-style-type: none"> • Arrangement on DIN rail (lateral system bus input and output) • Is only intended for system bus expansion via RJ45 sockets on the front (2 × Bus Out)
Router module 3-port (as of system version 3)	705042	<ul style="list-style-type: none"> • Use as first module on an additional DIN rail for connecting further modules (system bus input via RJ45 socket; system bus output on the side) • Is also intended for expanding the system bus or increasing the system bus range via RJ45 sockets on the front (1 x Bus In, 2 × Bus Out)
Router module 1-port (as of system version 4)	705043	<ul style="list-style-type: none"> • Use together with a JUMO variTRON 300 or JUMO variTRON 500 touch central processing unit for connecting the modules (system bus input via RJ45 socket; system bus output on the side) • Is also intended for system bus expansion

1 Introduction

Special modules - 7051xx JUMO I/O system

Module designation	Data sheet	Features
Communication module 2-channel	705162	<ul style="list-style-type: none"> • Use together with a system module on a JUMO variTRON 300, JUMO variTRON 500, or JUMO variTRON 500 touch central processing unit • External voltage supply DC 24 V SELV und EtherCAT In via side plug connector • Side socket for voltage supply^a and EtherCAT Out • Interface 2 x RJ45 EtherCAT Out • Alias device address can be set via DIP switch
Communication module 3-channel	705163	<ul style="list-style-type: none"> • Use together with a system module on a JUMO variTRON 300, JUMO variTRON 500, or JUMO variTRON 500 touch central processing unit • External voltage supply DC 24 V SELV und EtherCAT In via side plug connector • Side socket for voltage supply^a and EtherCAT Out • Interface 1 x RJ45 EtherCAT In • Interface 2 x RJ45 EtherCAT Out • Alias device address can be set via DIP switch
System module	705171	<ul style="list-style-type: none"> • Connection of the I/O modules or communication modules 7051xx (voltage supply and system bus) to a central processing unit JUMO variTRON 500^b • External voltage supply DC 24 V SELV und EtherCAT In

^a The 3-port module takes over the voltage supply at the start of a strand. In order to break the 8 A limit, a 2-port router can be used for supply again.

^b With the system module, mixed operation of JUMO variTRON modules (7050xx) and I/O modules (7051xx) is possible by placing the system module on the last 7050xx module and then adding on the 7051xx modules. The setup program displays where which modules can be arranged in the HW wizard. Mixed operation can also be carried out via the relevant router modules.

Panels

Module designation	Data sheet	Features
JUMO variTRON web panels	705070	<ul style="list-style-type: none"> • Versions for different requirements (e.g. Standard, Food & Beverage) • Screen sizes (diagonal) 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	<ul style="list-style-type: none"> • AC 100 to 240 V wide-range input • Output: DC 24 V / 3.4 A
Power supply unit 705090/05-33	705090	<ul style="list-style-type: none"> • AC 100 to 240 V wide-range input • Output: DC 24 V / 5 A

1 Introduction

Module designation	Data sheet	Features
Power supply unit 705090/10-33	705090	<ul style="list-style-type: none">• 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
JUMO variTRON 500 central pro- cessing unit	Data sheet	70500200T10...	-	X
	Operating manual	70500200T90...	-	X
	Installation instructions	70500200T94...	X	X
	Security Manual	70500000T95...	-	X
Process Technology	Operating manual	70185000T90...	-	X

1.8.2 Input/output modules

7050xx JUMO variTRON

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 and output module 12-channel	Data sheet	70503000T10...	-	X
	Operating manual	70503000T90... (B 705030.0)	-	X
	Installation instructions	70503000T94... (B 705030.4)	X	X

1 Introduction

Digital input and output module 32-channel (as of system version 3)	Data sheet	70503100T10...	-	X
	Operating manual	70503100T90...	-	X
	Installation instructions	70503100T94...	X	X
Thyristor power controller type 70906x (as of system version 3)	Operating manual (integration into the automation system)	70500153T90...	-	X

7051xx JUMO I/O system

Product	Document	No.	Printed	PDF file
Digital input module 16-channel	Data sheet	70513500T10...	-	X
	Operating manual	70513500T90...	-	X
	Installation instructions	70513500T94...	X	X
Digital output module 4-channel	Data sheet	70514300T10...	-	X
	Operating manual	70514300T90...	-	X
	Installation instructions	70514300T94...	X	X
Digital output module 16-channel	Data sheet	70545000T10...	-	X
	Operating manual	70545000T90...	-	X
	Installation instructions	70545000T94...	X	X

1.8.3 Special modules

7050xx JUMO variTRON

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

7051xx JUMO I/O system

Product	Document	No.	Printed	PDF file
Communication module 2-channel	Data sheet	70516200T10...	-	X
	Operating manual	70516200T90...	-	X
	Installation instructions	70516200T94...	X	X
Communication module 3-channel	Data sheet	70516300T10...	-	X
	Operating manual	70516300T90...	-	X
	Installation instructions	70516300T94...	X	X

System module	Data sheet	70517100T10...	-	X
	Operating manual	70517100T90...	-	X
	Installation instructions	70517100T94...	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 Description

JUMO variTRON 500

The central processing unit JUMO variTRON 500 is based on a new hardware platform with an 800 MHz processor, which is used as a quad-core variant.

Due to the scalability of hardware and software, a modular, flexible, and above all sustainable hardware platform is available that is combined with a modern software architecture. Based on this new platform, innovative operating concepts can now be implemented using state-of-the-art display technologies.

The advantages at a glance:

- High speed performance
- Flexible operating philosophy
- Modern communication interfaces (e.g. OPC UA, MQTT)
- Integration of different fieldbus protocols such as PROFINET IO, EtherCAT, and Modbus-TCP/-RTU
- Easy integration of new software functions via PLC (CODESYS V3.5)
- Availability of function and visualization libraries (as of system version 6)
- Easy adaptation of hardware inputs and outputs
- Customer-specific operation and visualization with several operator stations via CODESYS remote target visualization or via web visualization (mixed operation is possible)
- Panels in various formats (portrait or landscape, 4:3 or 16:9)
- JUMO Web Cockpit
- Recorder app for recording and visualizing process data

Input/output modules

Both the JUMO variTRON input and output modules (7050xx series) and the JUMO I/O system modules (7051xx series) 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 acquire 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.

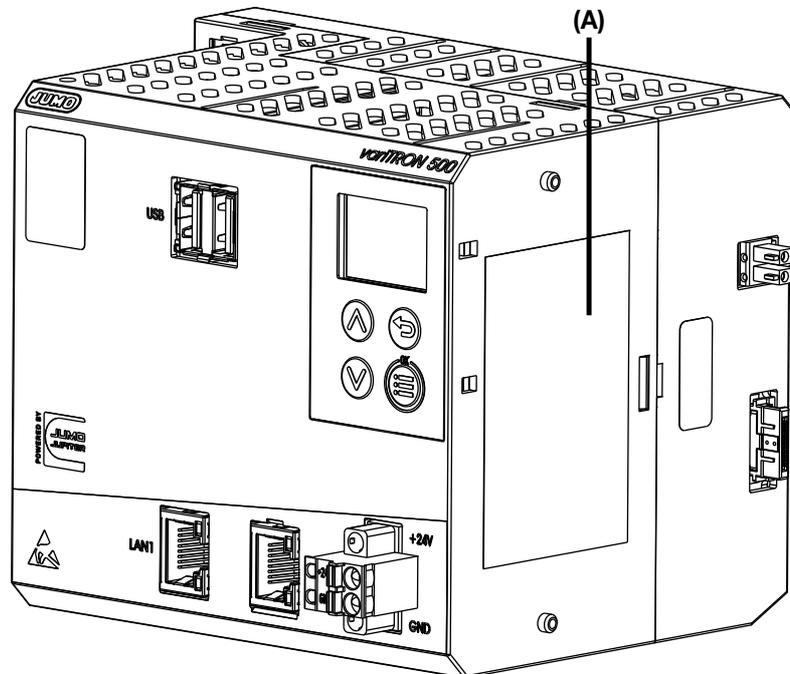
Thyristor power controllers can also be connected via EtherCAT or PROFINET. In addition, JUMO dig-iLine sensors for liquid analysis can be connected to the central processing unit.

2.1 Identifying the device version

2.1.1 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.

2 Description

2.1.2 Order details

(1) Basic type	
705002	Central processing unit, type 705002 (1 × Ethernet (RJ45), 1 × system bus (side), 2 × USB host), program generator, Node-RED, math and logic module ^a , communication protocols (PROFINET IO-Controller/Device 1-Port, Modbus RTU / TCP Master/Slave, OPC UA Server, EtherCAT Master, BACnet/IP) ^c
(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 ^b
(5) Version	
8	Standard with default settings
(6) COM1 interface	
00	Not used
51	RS232
55	RS-485
(7) COM2 interface	
00	Not used
51	RS232
55	RS-485
(8) Interface LAN2	
00	Not used
08	Ethernet (RJ45)
(9) Voltage supply	
36	DC 24 V +25/-20 %, SELV
(10) Extra codes	
001	Program app (incl. JUMO variTRON Template, 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
276	Recorder app (as of system version 9)
280	CODESYS Remote TargetVisu ^{c, e}
281	CODESYS WebVisu ^{c, e}

^a Activation for all connected controller modules.

^b Flexible allocation between system data and application data.

^c Only in conjunction with extra code 224.

^d Only in conjunction with extra code 281.

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

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

Order example 705002 / 2 2 1 - 8 - 00 - 00 - 00 - 36 / 224

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

2.1.3 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

2.1.4 Accessories

Designation	Part no.
Extra codes (activations):	
Recorder app (as of system version 9)	30071661
Program app (incl. JUMO variTRON Template, 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
CODESYS WebVisu	00724991
USB to Ethernet converter ^a :	
TP-Link UE300 USB to Gigabit LAN Converter ^b (as of system version 8)	30047695
Network cable ^a :	
RJ45 patch cable SF/UTP, length 0.3 m	00747472
RJ45 patch cable S/FTP, Cat. 6A, length 1.5 m	00666324
RJ45 patch cable S/FTP, Cat. 6A, length 3 m	00666326
RJ45 patch cable S/FTP, Cat. 6A, length 5 m	00665966
RJ45 patch cable S/FTP, Cat. 6A, length 10 m	00666327
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
Starter kits ^c :	
JUMO variTRON 500 starter kit	

^a The accessories are not part of the device approvals.

^b 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.

^c Ordering is only possible via the contact person at the manufacturer.

2 Description

2.2 Device functions

Recorder – recording of process data

As of system version 6, the JUMO variTRON 500 central processing unit has a function for acquiring process data as a standard feature. This allows up to 240 analog or digital channels (signals) to be logged. The channels are combined into groups for this purpose.

By grouping the channels, the user can, for example, create a separate group for each plant or log signals with a different memory cycle. The grouping of channels is also the basis for acquiring batches.

The process data is stored in the central processing unit before this data is transferred to the Datastore for storage. The Datastore is part of the JUMO smartWARE Evaluation software, which is used to visualize and evaluate the data. A fee-based license is required for this purpose. Visualization using only the central processing unit is not possible.

Recorder app – recording and visualization of process data (extra code 276)

As of system version 9, the JUMO variTRON 500 central processing unit has the recorder app when extra code 276 is activated. This enables visualization of process data as a live trend in the curve diagram (Recorder View).

The recorder app is available on the web.

Acquisition of batches

As of system version 6, the scope of the JUMO variTRON 500 central processing unit also includes the acquisition of batches. As a result, up to 20 batches can be logged simultaneously.

The batch data is acquired together with the channels (signals) of the assigned groups and the event messages.

The batches are also only temporarily stored in the central processing unit. Storage, visualization, and evaluation are then carried out with the JUMO smartWARE Evaluation software. A fee-based license is also required for this purpose (number of batches).

Program App

The browser-based software solution Program App enables intuitive creation and editing of process technology programs and recipes on the JUMO variTRON 500 and the JUMO variTRON 500 touch via web access. As a result, plant manufacturers can define process steps and then link them into a program using the graphical editor. The plant user can control the program sequence via a connected web interface.

Further information about the Program App software:

qr-en-program.jumo.info

2.3 Software

JUMO Cloud

The IoT platform for process visualization as well as data acquisition, evaluation, and archiving enables worldwide access to measurement data using common web browsers. The JUMO Cloud is characterized by a high degree of security as well as valuable visualization, alarm, and planning functions.

Further information on the JUMO Cloud:

qr-en-cloud.jumo.info

JUMO smartWARE SCADA

The JUMO smartWARE SCADA software provides easy access to measurement data using conventional web browsers. It offers functions for process visualization as well as for evaluation of the acquired data. The software also supports manufacturing and work processes with valuable visualization, alarm, and planning functions.

Further information on the JUMO smartWARE SCADA software:

qr-en-scada.jumo.info

JUMO smartWARE Evaluation

JUMO smartWARE Evaluation is intended for evaluating and visualizing process data from the JUMO variTRON system. The process data can be evaluated in customizable dashboards based on time or batch and transferred into reports (e.g. PDF, Excel®, CSV).

Further information on the JUMO smartWARE Evaluation software:

qr-en-evaluation.jumo.info

3 Mounting

3.1 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.

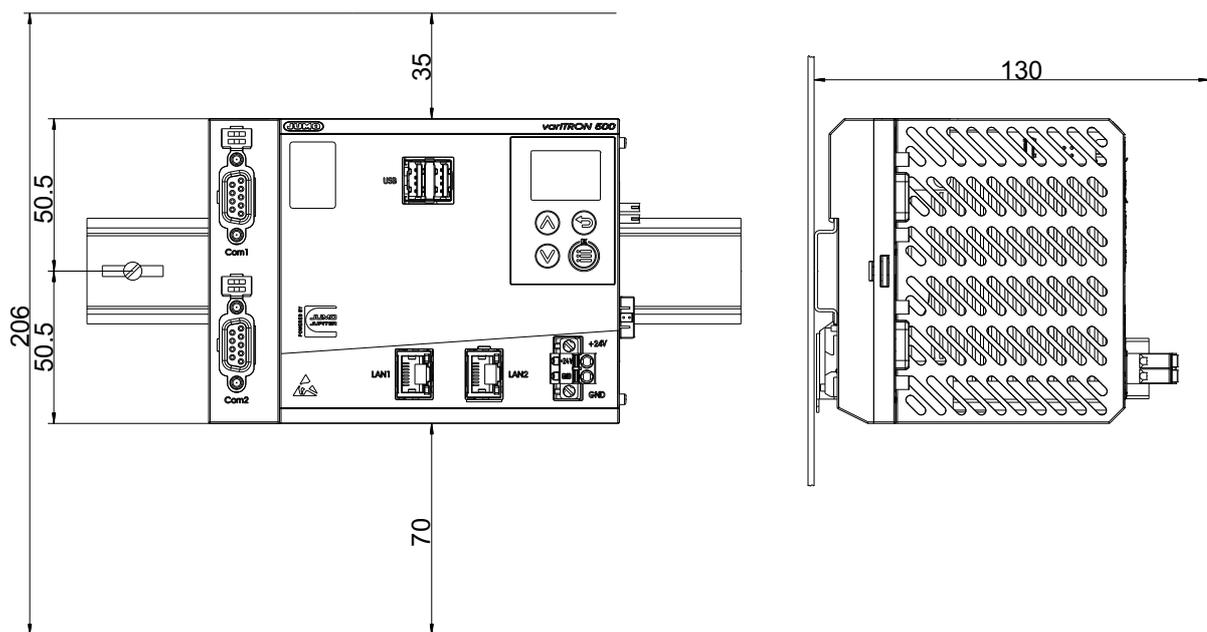
Space requirement

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).

Minimum distances



3.2 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!

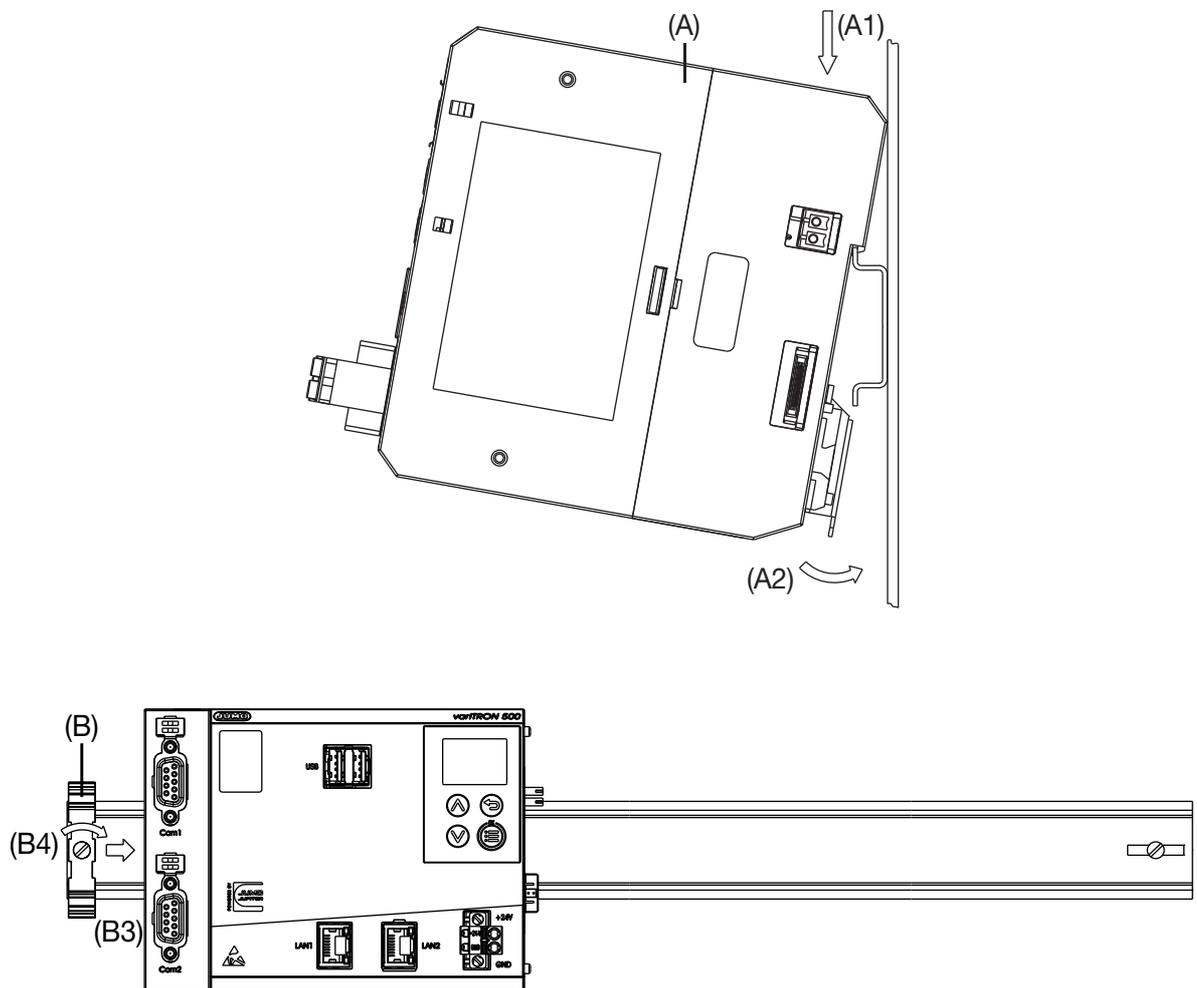
To determine the required minimum width of the DIN rail, the widths of the individual modules are to be added (see technical data of the modules in the respective data sheet or the module-specific installation instructions).

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

3 Mounting

3.2.1 Central processing unit

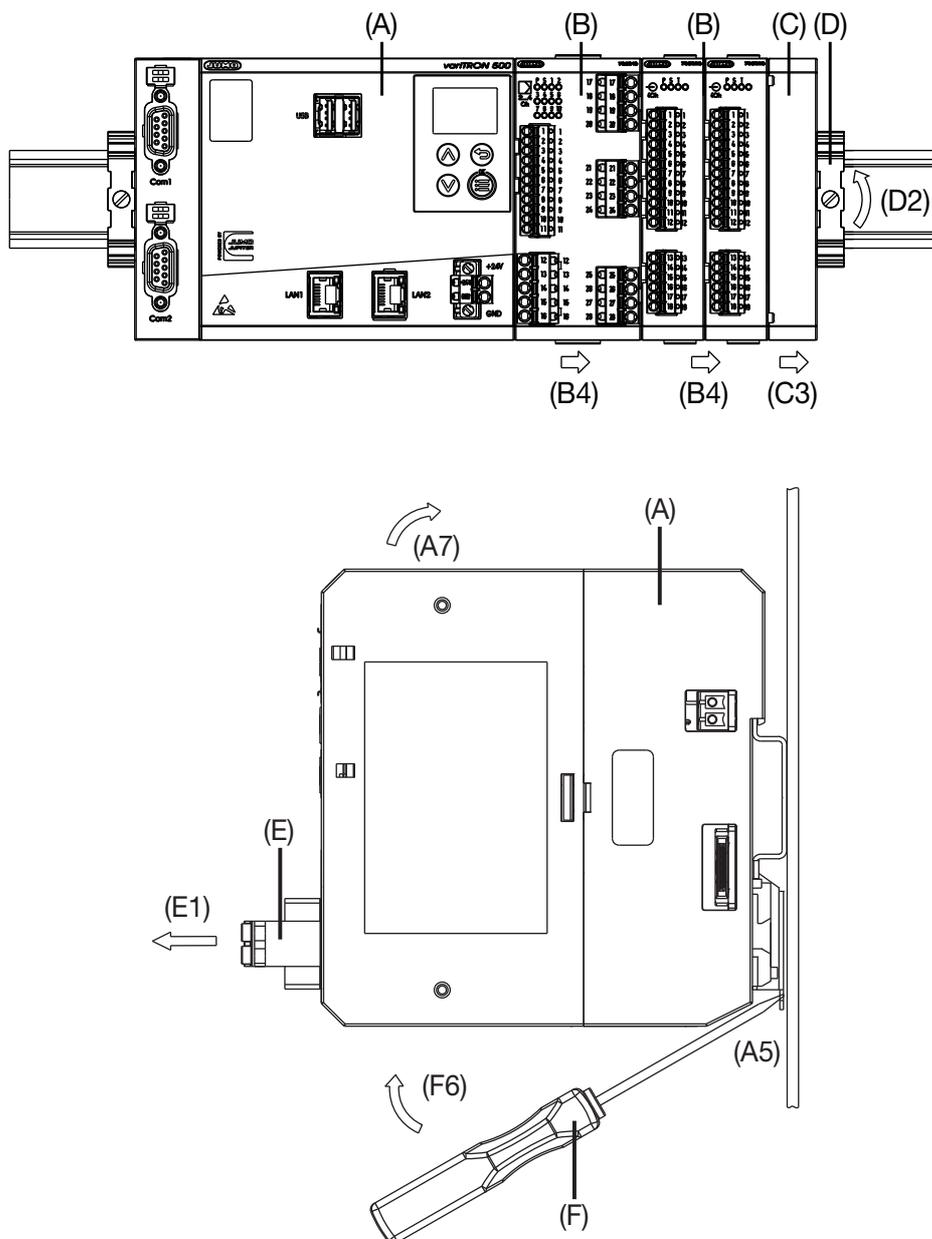
Installation of the central processing unit 705002



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).

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.

3 Mounting

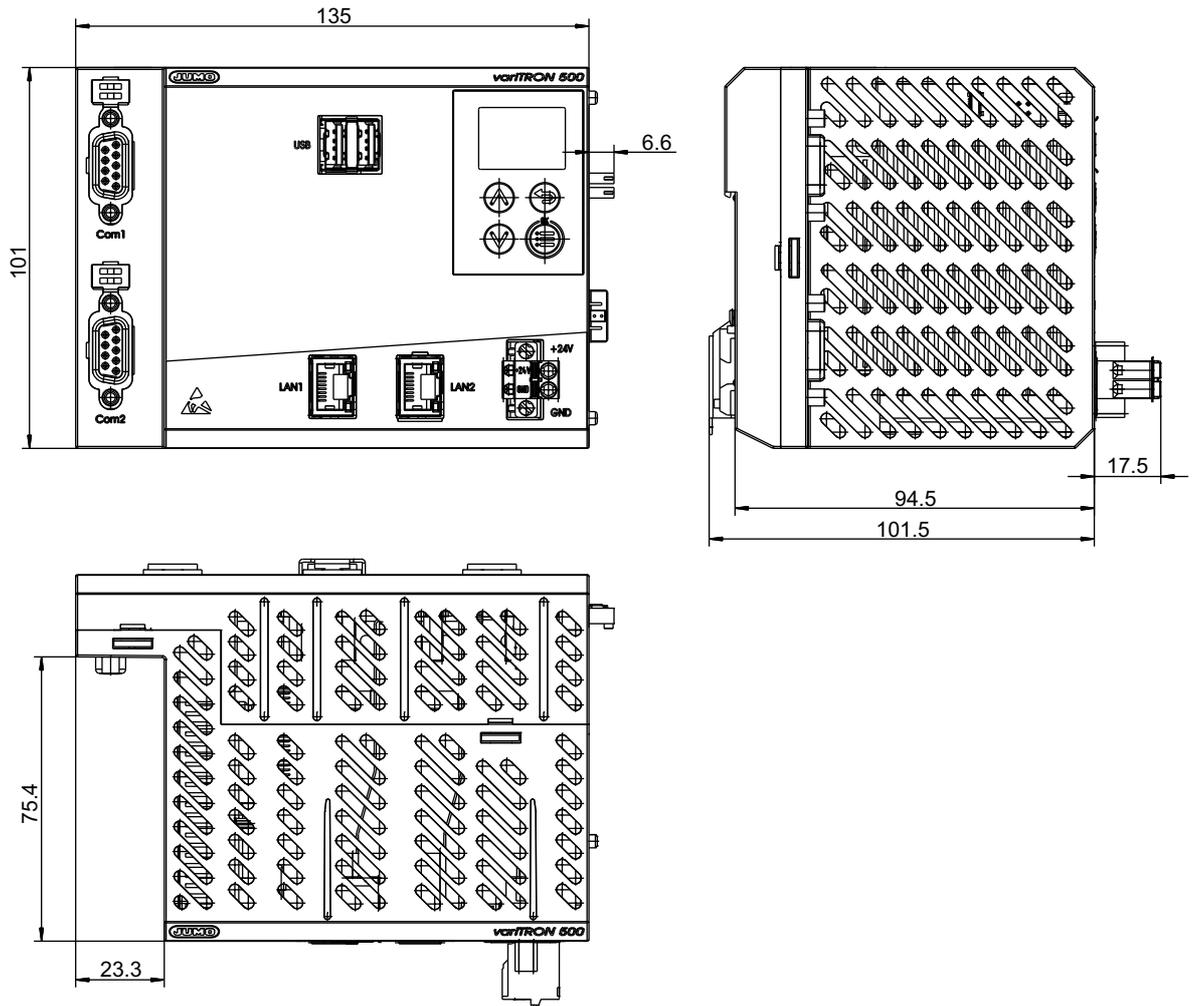
Note: The cover does not need to be removed from the DIN rail if there is sufficient space to the side to move it at least 10 mm to the right.

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.

3.3 Dimensions



4 Electrical connection

4.1 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.

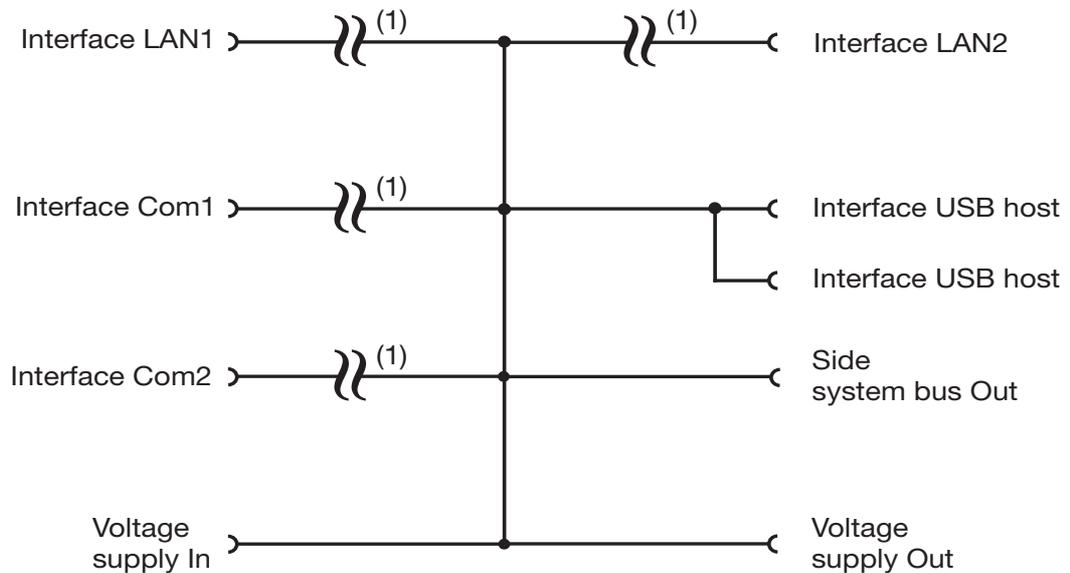
Electrical safety

- 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.

4.2 Electrical isolation



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

4.3 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.



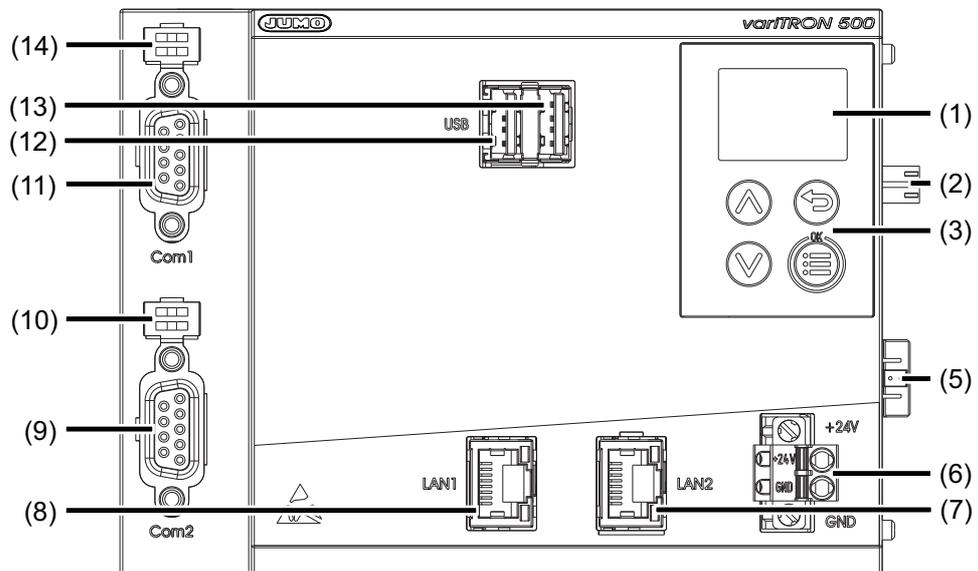
NOTE!

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

4 Electrical connection

4.3.1 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
- (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

4 Electrical connection

4.3.2 Voltage supply

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

4.3.3 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 -



NOTE!

Only SELV or PELV circuits may be connected to the interfaces.

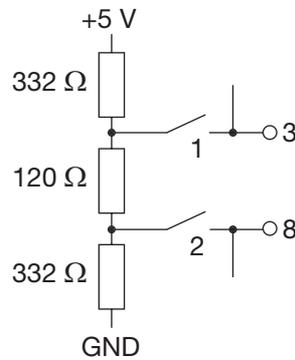
The connection cables of the Ethernet interfaces may only run inside the building.

4 Electrical connection

4.3.4 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.

5.1 General information

The following options are available to operate the device:

- Configuration of the device with the setup program
- Operation on the device
- Use of the JUMO Web Services with the "JUMO Web Cockpit", the "Recorder App", "WebVisu", and "Other apps" in a web browser. The "Other apps" tile takes you directly to the JUMO Help Center.
- Use of the "JUMO smartWARE Evaluation" 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**:

Applications > Main 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:

Applications > Main menu > Configuration > Ethernet > LANx

Network

- Method: Automatic
- Check Obtain DNS server IP automatically

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 that comprises the device (central processing unit) 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

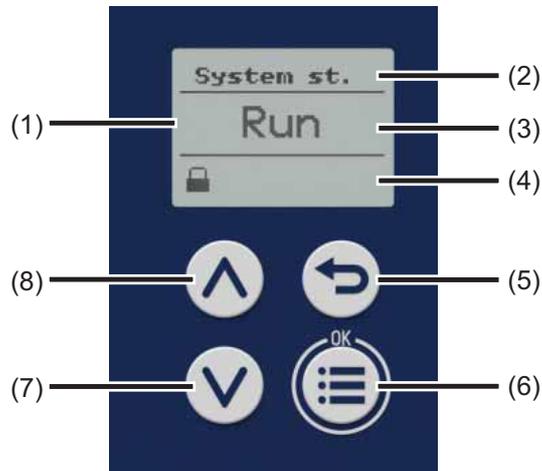
Procedure during startup:

⇒ chapter 7 "Startup", Page 112

5 Operation

5.2 Device

5.2.1 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.

5.2.2 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 5.2.3 "User log-on", Page 40

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 "Device information", Page 68

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)		

5 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)	
	LANx	see LAN1
Web server	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 "Configuration", Page 72

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
	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 "Device information", Page 68

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)	---

5 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.	---

5.2.3 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.

5.2.4 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).

5 Operation

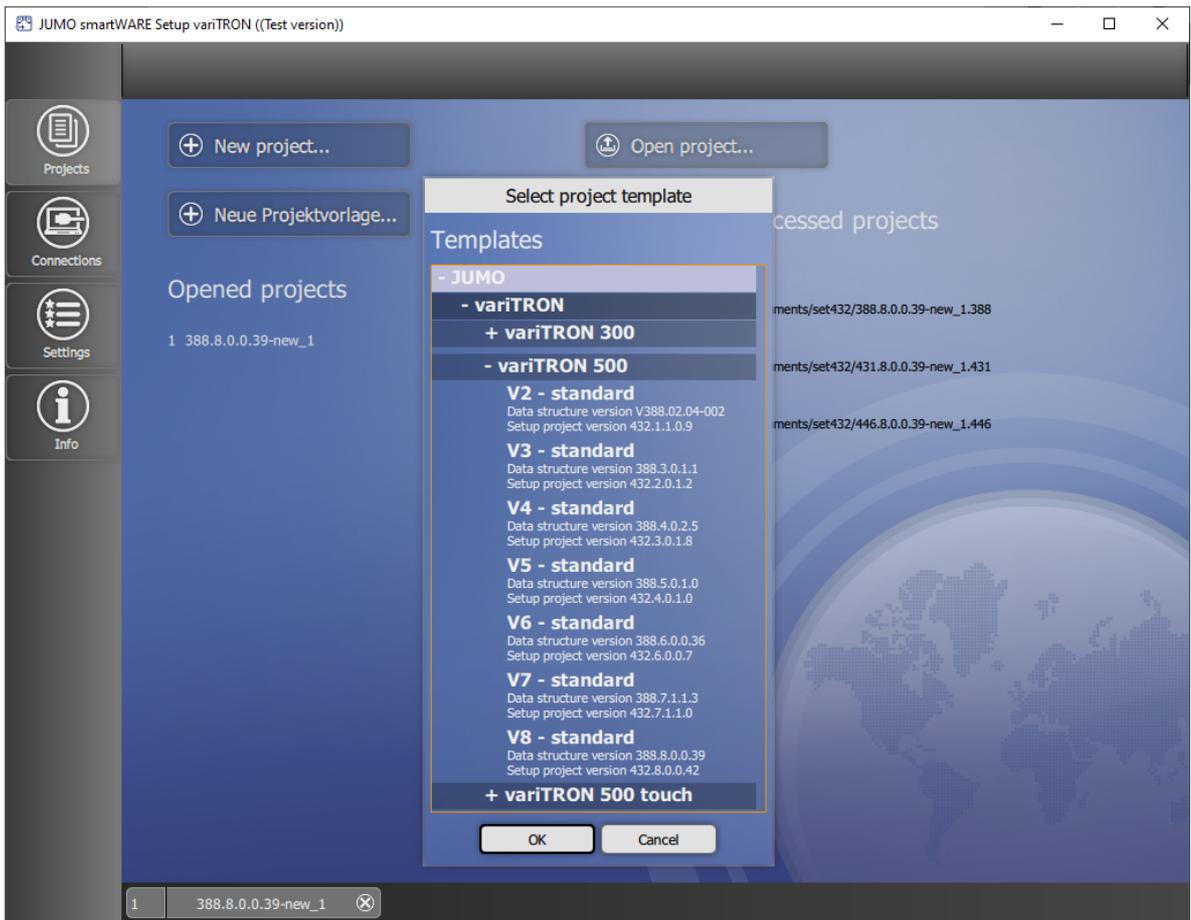
5.3 Setup program

5.3.1 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.

5 Operation

5.3.2 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
- **HW-Assistent Systembus:** Define the hardware configuration for the entire system
- **Wtrans hardware assistant** (only for JUMO variTRON 300 and JUMO variTRON 500 touch): Define the hardware configuration for the entire system
- **Configuration:** Configure the device (central processing unit) 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:** The function is only available if the Configuration and Process Value Editor (CPVE) is installed
Determine the start parameters for the 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 edit project messages (acknowledge; other 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.

5 Operation

5.3.3 Project management

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



Parameters/functions:

- File name (non-editable): Project file name that 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 designation (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 into the same or a higher system version (select project template); note messages!
- Validate project (button): Note messages!
- HTML export – export project into html format.

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

5.3.4 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 JUMO variTRON 500 central processing unit) 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 of 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 of system version 3: The "Bus scan" button is used to scan the connected device's system bus and load the hardware configuration into the setup project.

5 Operation

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 central processing unit 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 central processing unit 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 5.3.5 "Optional module (alias device address)", Page 49



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

5.3.5 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.

5 Operation

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.

5.3.6 Configuration

Configure the device (central processing unit) and modules and determine their parameters



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

- Network: Ethernet and port configuration
- 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)
- Unit settings: Definition of the SI units used in the application
- 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
- Web server: Activation, HTTP or HTTPS, port numbers
- CODESYS 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)
- Email: Settings for sending emails
- PLC Parameter: Display of the configuration structures created using the Configuration and Process Value Editor (CPVE)
- Programs: Creation of programs using the program editor (setpoint values, operating contacts)
- System status UI (only with JUMO variTRON 300 and JUMO variTRON 500): Screensaver (activation and waiting period)
- Recorder app: Definition of groups and customization of the group-specific display modes
- 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)
- Signal generator: Setting of the signal parameters for analog and digital signals
- Node-RED (as of system version 4): Activation of the development tool Node-RED
- Batches (as of system version 6): Configuration of batch reporting

5 Operation

Details can be found in the "Configuration" chapter.

⇒ chapter 6 "Configuration", Page 84



NOTE!

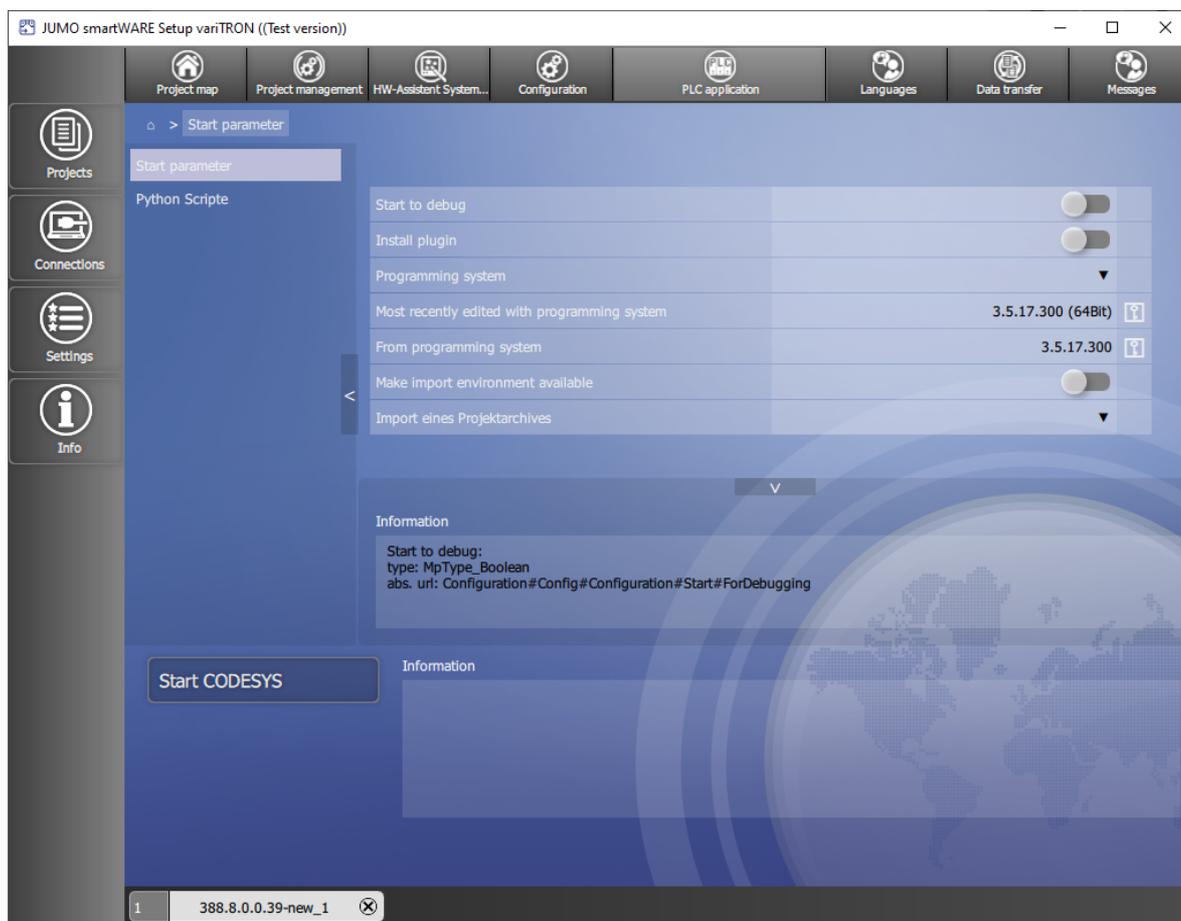
The settings configured under "System bus > Master" influence the transfer of data via the system bus. Sub-optimal settings here will disrupt or even interrupt communication within the system. For this reason, these parameters are only permitted to be modified by a service engineer from the device manufacturer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

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

⇒ chapter 1.8 "Available technical documentation", Page 15

5.3.7 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.

5 Operation

5.3.8 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!

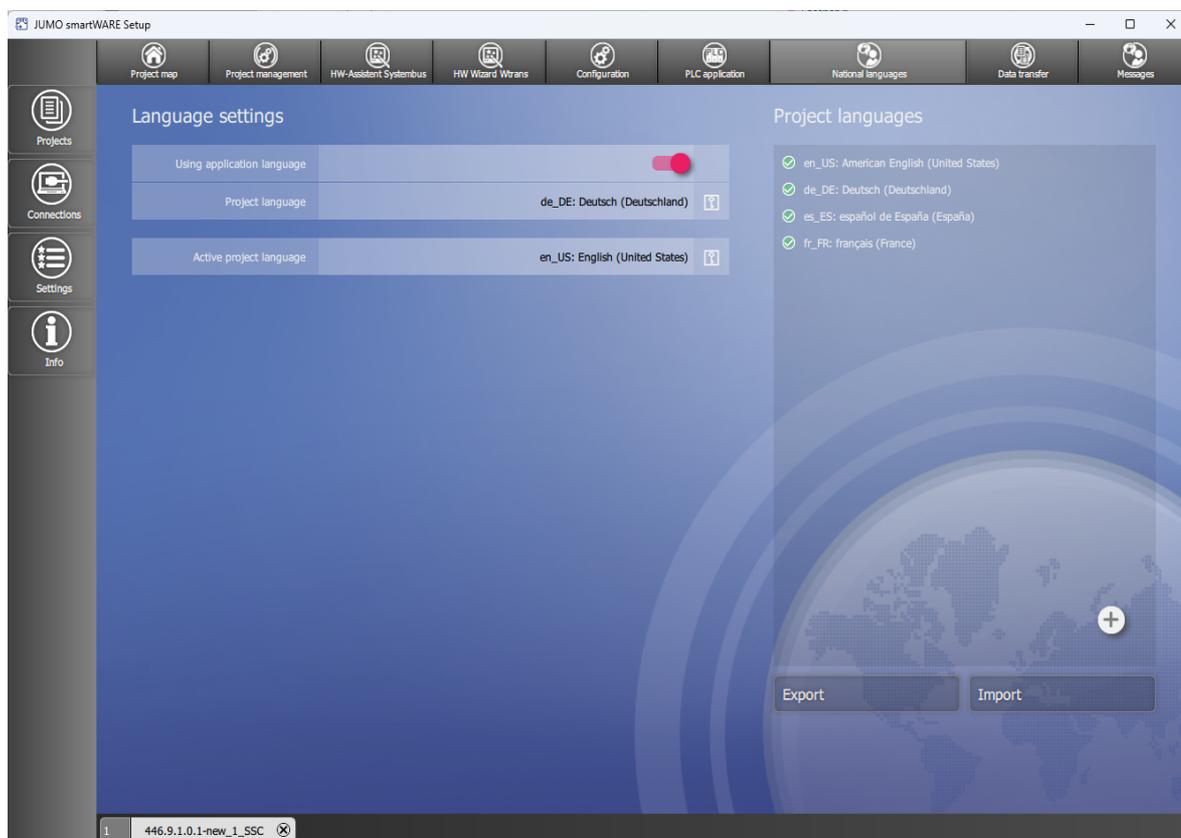
The CPV Editor is used to create customer-specific configuration and process data.

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.

5.3.9 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

5 Operation

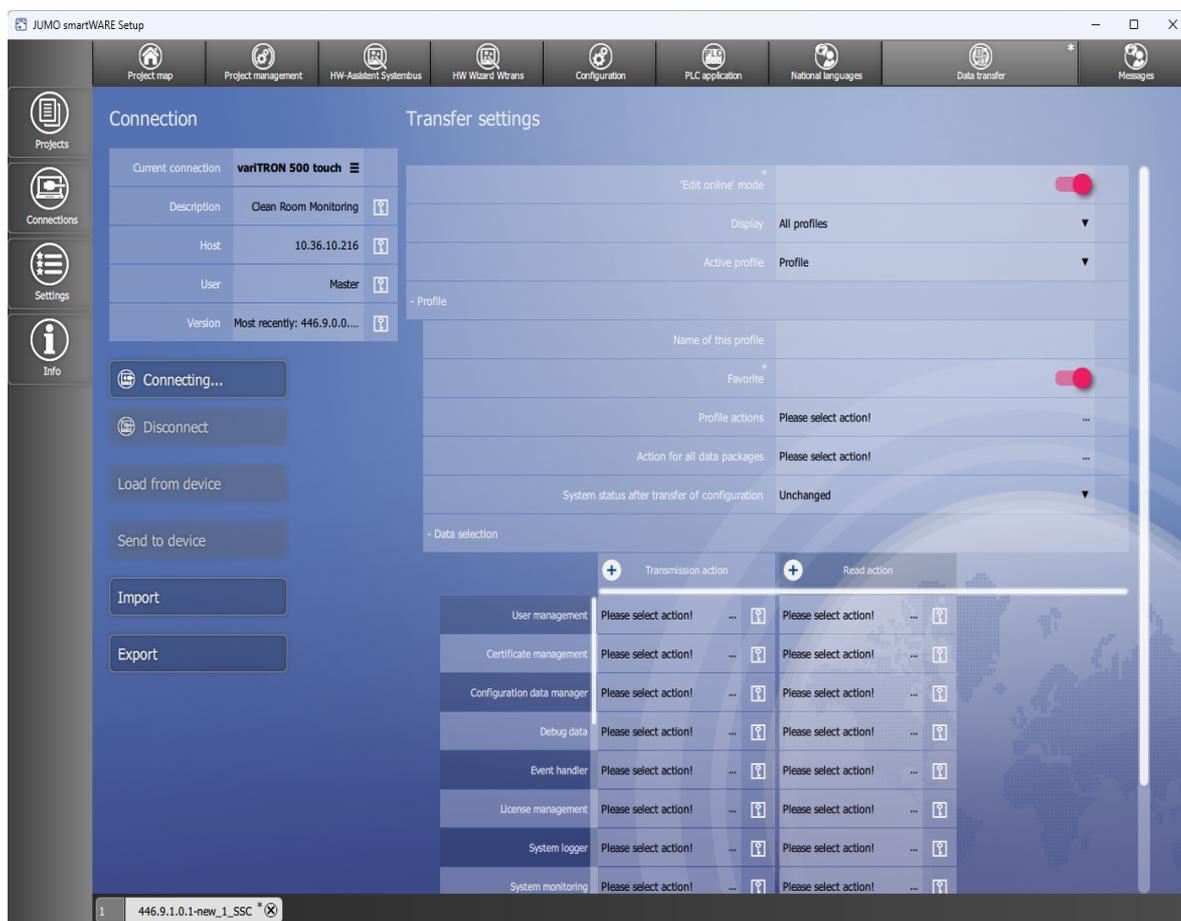
Project languages

Parameters/functions:

- List: Project languages which are available for selection as the device language
 - Language selected (checked): 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 (only if the Configuration and Process Value Editor – CPVE is installed):
Edit language files with the "Qt Linguist" editor
 - File > Open: Select, open, and edit language file from the file directory

5.3.10 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 of the connected device
- Connecting...: 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).

5 Operation

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

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 JUMO 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 JUMO variTRON 300, JUMO 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 JUMO variTRON 300, JUMO 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

5 Operation

5.3.11 Messages

Display and act on project messages

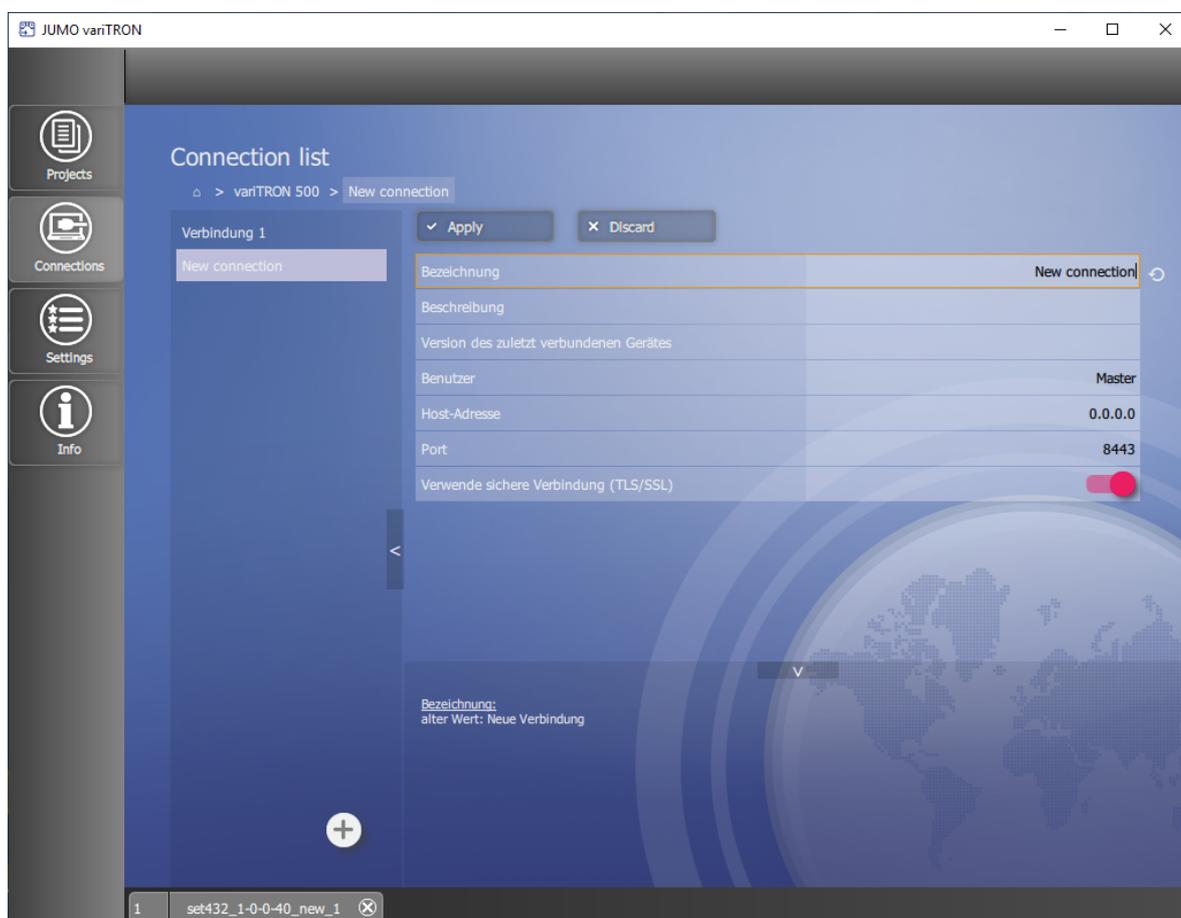


Project messages that require user action (acknowledge message, perform further actions if necessary) are displayed here.

5.3.12 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 6.7 "Web server", Page 94
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).

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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).

5.4 Web Services

JUMO Web Services enables the device to be accessed using a web browser. The landing page provides system information and multiple web applications such as JUMO Web Cockpit and JUMO Recorder with its tiles.

The following web browsers are supported: Mozilla Firefox, Google Chrome, Microsoft Edge, Opera

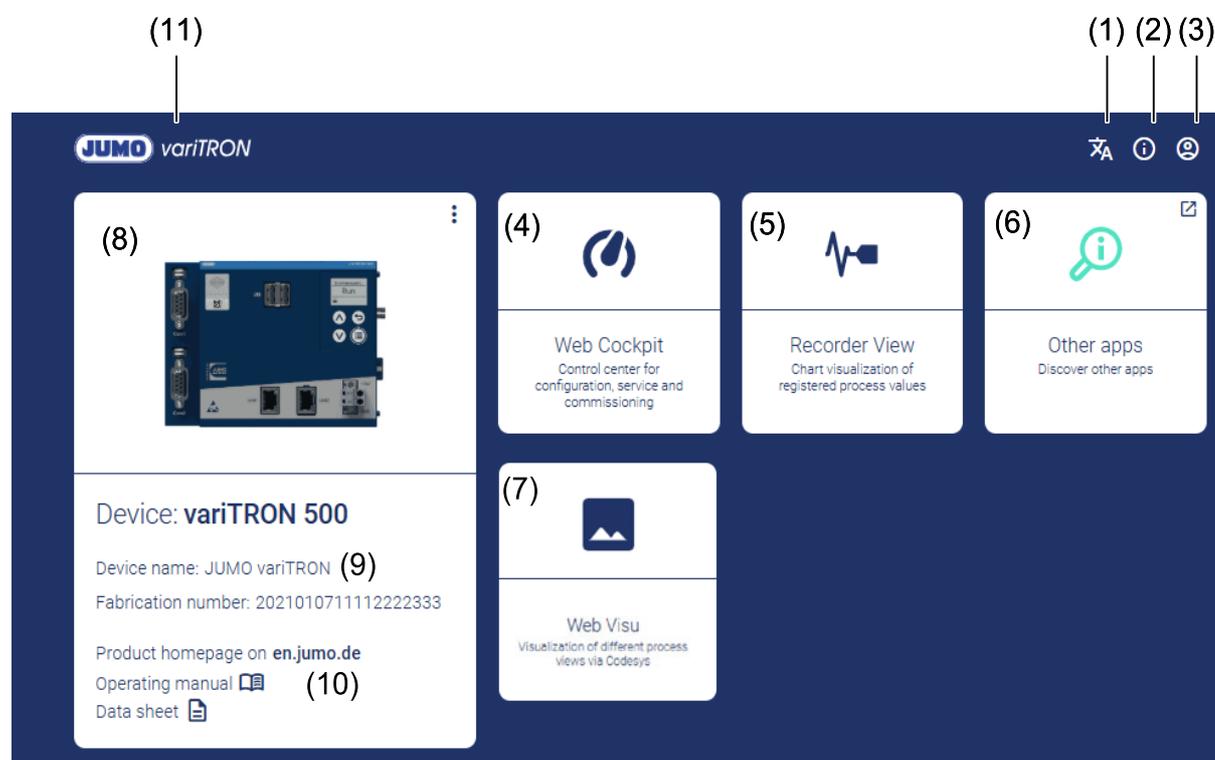


NOTE!

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 function will work correctly.

To start the web application, you need to enter the device's IP address in the address line of the web browser (example: 10.178.59.209). The IP address is displayed on the device connected by LAN under "/Applications/System management/Device info/Ethernet/LAN1 or LAN2".

The web browser accesses the device with HTTPS (Hypertext Transfer Protocol Secure) via an encrypted connection. You will need your user name and password to log on to the device. Once you have successfully logged on, the JUMO Web Services landing page is shown.



1	National language selection	7	Only for devices with CODESYS WebVisu: Opens the CODESYS WebVisu of the device in the browser
2	Links to various information <ul style="list-style-type: none"> • Web application version info • License information • Link to JUMO Help Center 	8	Info tile
3	<ul style="list-style-type: none"> • Info about the logged-in user • Logout • Flash display 	9	Device name and fabrication number display

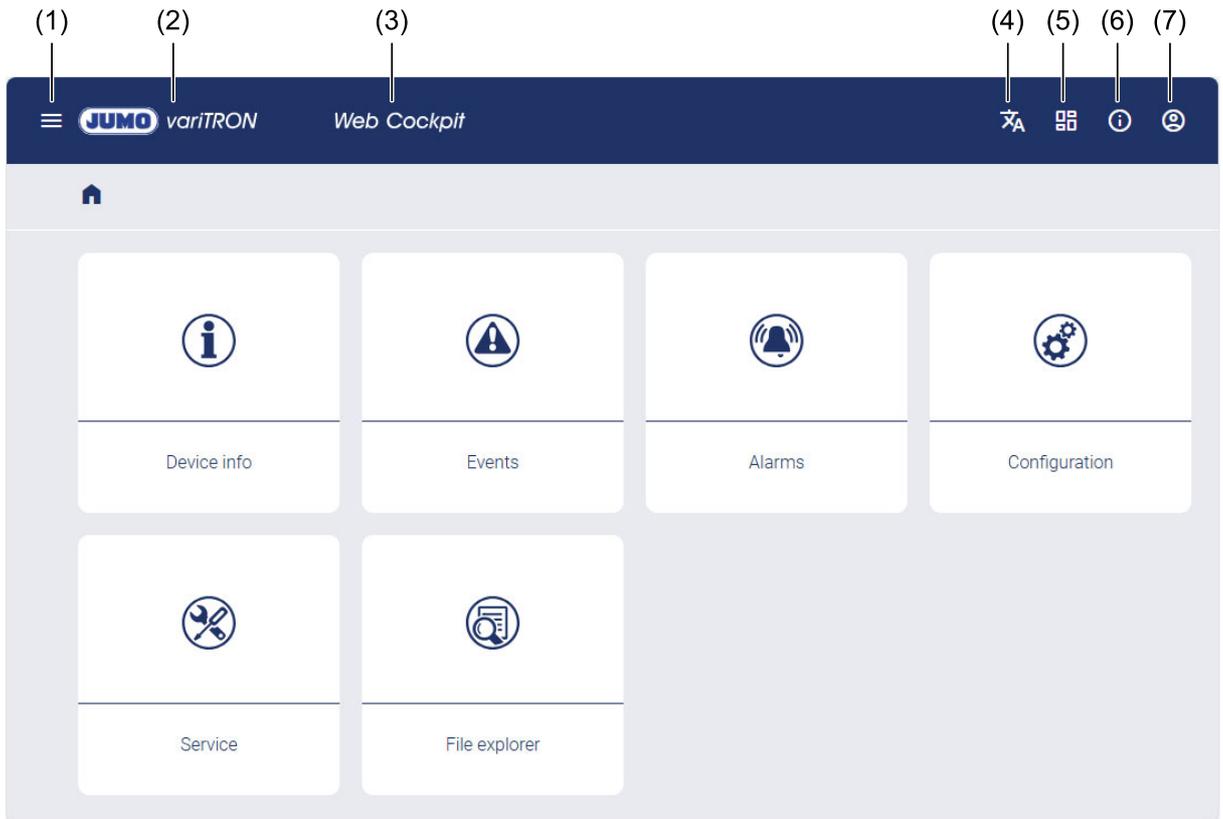
5 Operation

4	Opens the Web Cockpit	10	Links to <ul style="list-style-type: none"> • JUMO product homepage • Operating manual and data sheet
5	Opens the recorder view	11	Return to landing page
6	Link to JUMO Help Center		

5.4.1 Web Cockpit

The JUMO Web Cockpit is a web application that enables operation similar to operation on the device. Operation in the Web Cockpit is higher performance and expanded to include several extra functions.

Homepage



The functions in the landing page header have been expanded to include three functions on the Web Cockpit homepage. The Web Cockpit functions can be called up using both the tiles on the homepage and via the Web Cockpit menu.

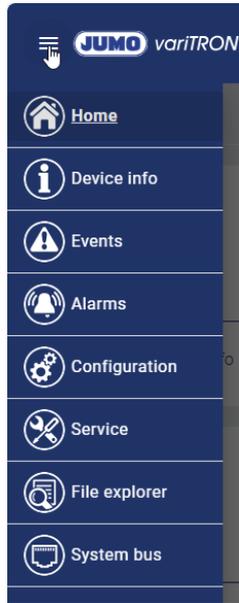
1	Opens the Web Cockpit menu – see below	2	Return to landing page
3	Return to the Web Cockpit homepage	4	Language selection
5	Direct access to the landing page functions	6	Version information for Web Cockpit and license information
7	User – see details below		

Designation	Description
Device info	<p>Status, versions, certificates...</p> <ul style="list-style-type: none"> • Certificate management (display certificates) • Cloud gateway (status, version) • Datastore gateway (export status, version) • Display device information • License management (display extra codes) • Display Ethernet parameters • Real-time processing (display information on data recording) • PLC application (display information) • PLC runtime environment (display information) • System monitoring (battery, memory, temperatures, voltage values) • Display and change the system status (Run, Stop, etc.) • Only with JUMO variTRON 300 and JUMO variTRON 500 touch: Wtrans gateway (version, radio frequency, Wtrans transmitter)
Events	<p>Events, alarms, audit trail, etc.</p> <ul style="list-style-type: none"> • Messages (events) shown in a list • Plain-text search • Filter by message type (type) • Filter by keywords • Delete messages/update list
Alarms	<p>Alarms, acknowledgment, etc.</p> <ul style="list-style-type: none"> • Messages shown in a list • Filter by message type • Filter by alarm or fault • Plain-text search • Acknowledge alarms/update list
Configuration	<p>Configure modules, etc.</p> <ul style="list-style-type: none"> • Configure device • Configure connected modules (system bus)
Service	<p>System bus, users, firmware</p> <ul style="list-style-type: none"> • EtherCAT (system bus): Display information on the master and slaves (modules); perform actions • Only with JUMO variTRON 300 and JUMO variTRON 500 touch: Wtrans gateway (status of the 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) • Import or replace certificates • Screenshot, create device screenshot
File explorer (as of system version 7)	<p>Files and folders</p> <ul style="list-style-type: none"> • Files in "Shared Folder" • Create folder, upload files, update view

5 Operation

"Menu" button

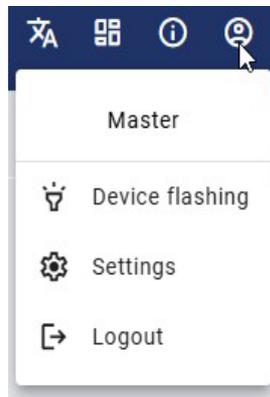
The functions on the homepage can also be accessed using the "Menu" button:



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

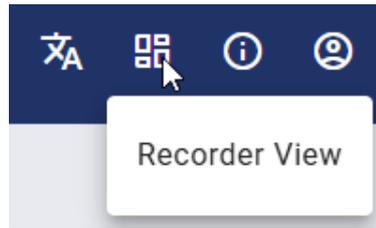
"User" button

The previous functions (except information and license information) are available under the "User" (right) button.



Designation	Description
Master	The user name of the logged-on user is displayed here.
Device flashing	The device display flashes (in particular if multiple JUMO variTRONs are used for identification).
Settings	Change password
Logout	Log off user

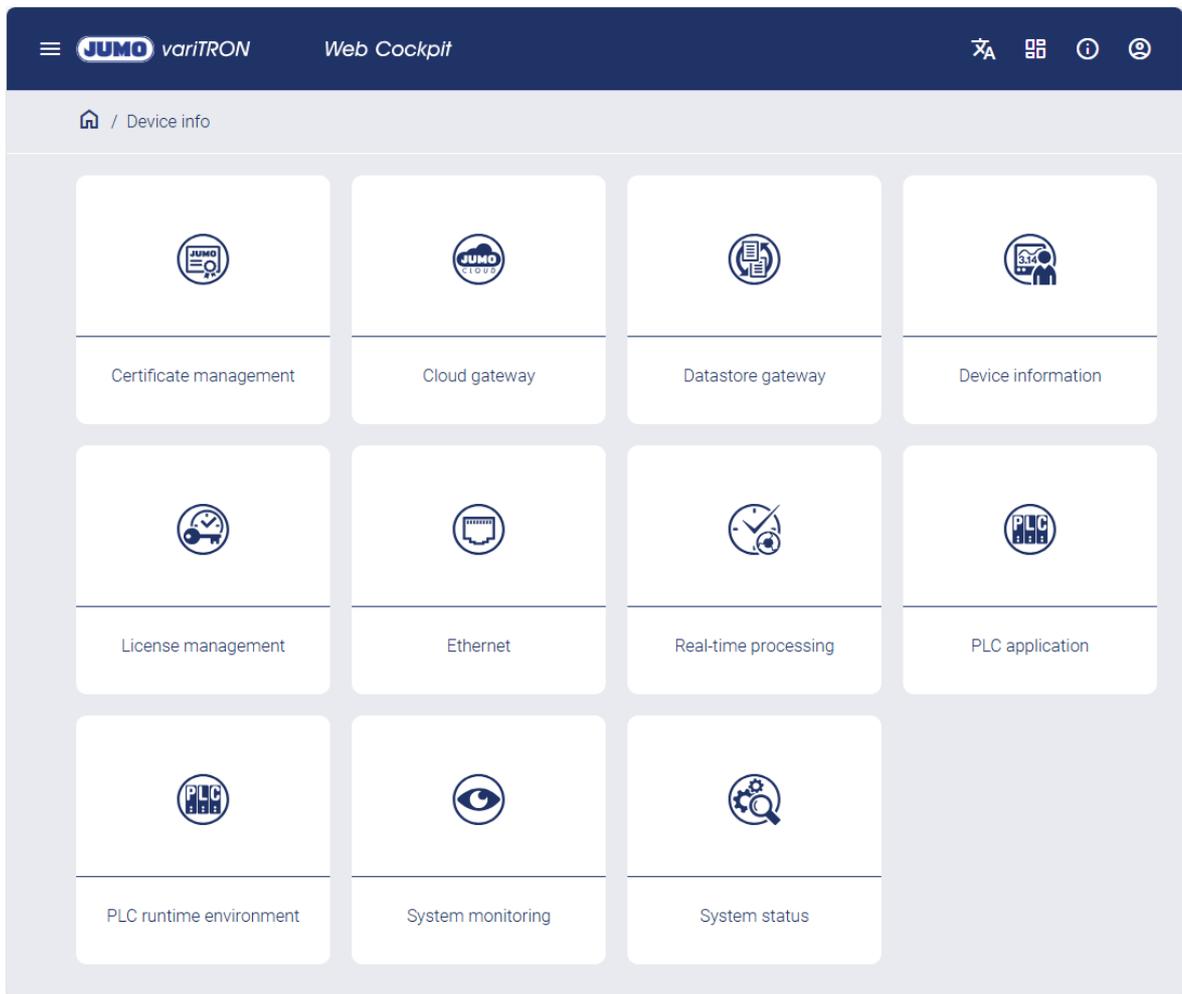
"Web applications" button



Using the new "Web applications" button (left), the user can start the recorder app if it is available as an extra code in the device.

5 Operation

Device information



Certificate management

The following certificates are displayed here:

- Data recording
- Web gateway

Cloud gateway

There are the two tiles "State" and "Version". The status and memory usage of cloud gateway are displayed under "State". "Version" displays the cloud gateway version.

The following functions are displayed under the "State" tile:

- DELETE CONFIG. (as of system version 8.1)
 - Deletes the configuration received from the server (signals and data connections).
- CLEAR BUFFER (as of system version 8.1)
 - Deletes the buffered data.
- DELETE ALL (CLEAR)
 - Deletes the buffered data and the configuration received from the server.
- REBOOT
 - Restarts the cloud gateway.

Datastore gateway

There are the "Export Status", "Export information", and "Version" tiles. Configuration is carried out in the setup program.

The following information is available under "**Export Status**":

- Memory usage / data export active or inactive
- Storage location on the web / date of the last export
- Recording: Status of the data recording and date and time of the last recording.

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

The "Delete data record" function can be used to delete the recorded data.

The following information is available under "**Export information**":

- Export status: Memory usage / data export active or inactive
- Database information also under "Database"
 - Level
 - Number of channel entries
 - Number of process data entries
 - Number of group configurations
 - Number of DeviceDescription entries
 - Max. ID for cyclical data
 - Current export ID (cyclical)

The database version is displayed under the "**Version**" tile.

Device information

There are the "Device", "Hardware versions", and "Software versions" tiles.

The device name, 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".

License management

The CODESYS extra codes and their statuses are displayed under the "Extra code" tile (active = extra code is active and can be used).

Ethernet

Information on the Ethernet interfaces LAN1, LAN2 and, if necessary, LAN3 is displayed here. The LAN1 and LAN2 tiles are available as standard. Values are only displayed for active LAN connections.

Real-time processing

Information on the data recording (thread runtime, cycle counter, timeout counter, wakeup deviation) is displayed under the "Data recording" tile.

The "Reset time measurement" function can be used to reset and restart the time measurement.

PLC application

The versions of the PLC applications are displayed under the "Versions" tile.

PLC runtime environment

Version information on the PLC runtime environment and the status of the exception handler are displayed here.

System monitoring

There are the "Battery status", "Memory", "Performance", and "Temperature" tiles here.

5 Operation

Information on the system battery status, memory usage, CPU and RAM utilization, and CPU temperature is displayed here.

Memory and temperature tiles: The "Reset drag indicator" function can be used to reset the resettable minimum and maximum values.

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.
- ORIGIN RESET
 - 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).
- COLD RESET
 - 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

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

JUMO variTRON 500 touch: Retain handling only possible via sync in CODESYS (JUMO Library available as of system version 6) and with basic type extension 5 = "without UPS".

Events

The screenshot displays the 'Events' section of the JUMO variTRON Web Cockpit. At the top, there is a navigation bar with the JUMO logo and 'Web Cockpit' text. Below this, a search bar and two dropdown menus for 'Type' and 'Keywords' are visible. The main content area shows a list of event entries, each with a timestamp, a title, a type icon, and detailed information including the user, type, module name, and keywords. On the right side of the list, there are two circular buttons: a blue 'Refresh' button and a red 'Delete' button.

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.

Alarms

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

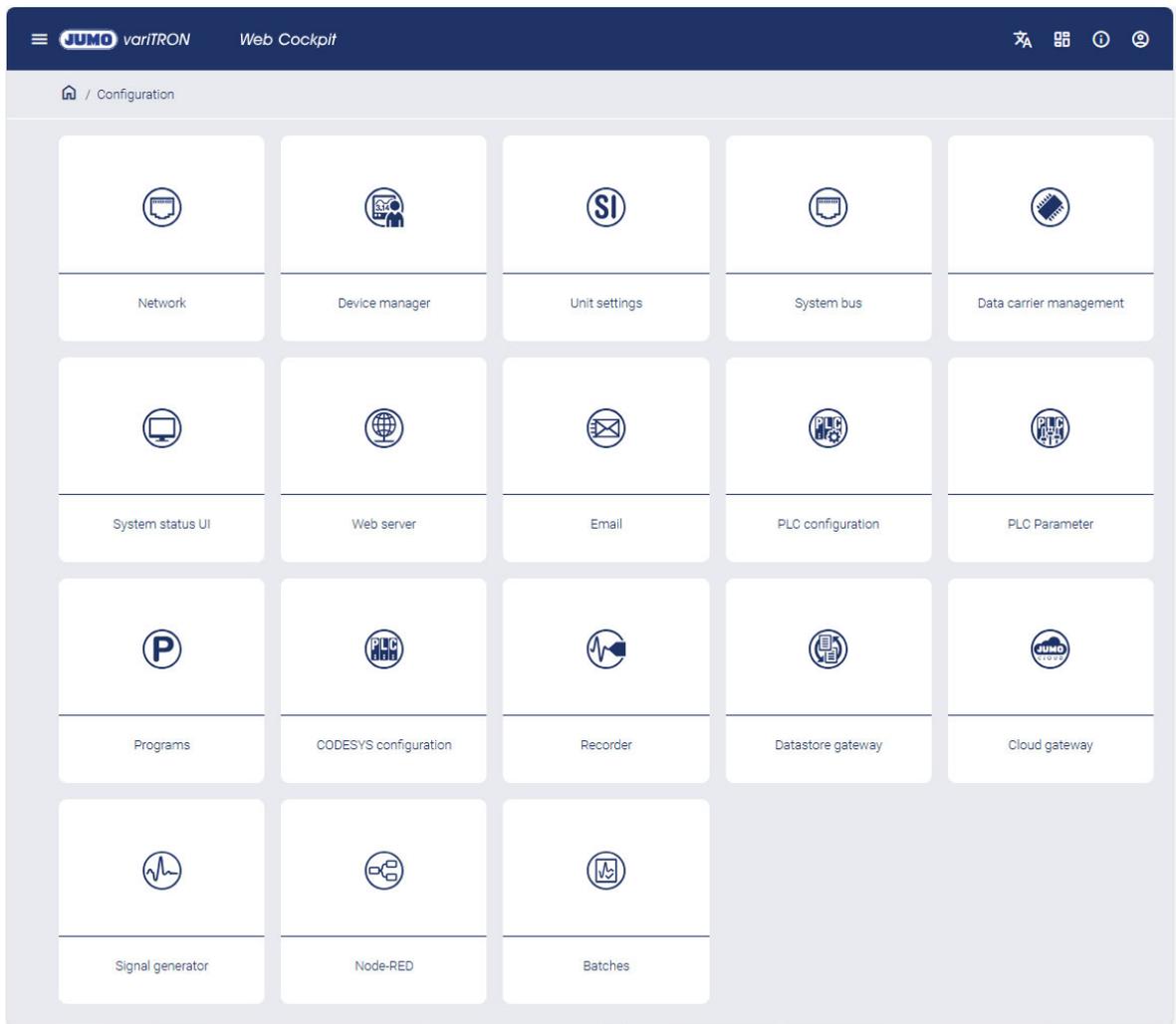
The information shown can be filtered by message type (alarm, malfunction). It is also possible to search for specific keywords and run a full-text search.

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.

5 Operation

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 central processing unit (master) is described in detail in the "Configuration" chapter in this document.

⇒ chapter 6 "Configuration", Page 84

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

⇒ chapter 1.8 "Available technical documentation", Page 15

Network

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

The Ethernet interface (LANx) to be used as the PROFINET port (available as of system version 8) is selected under "Port configuration".

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. The customer-specific linearization is also configured here (as of system version 5). The colors for displaying alarms can be defined under "Display".

Unit settings

The SI units used in the system can be defined and set here.

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 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 configured here (available as of system version 7).

Web server

The web server function is configured here.

Email

The settings for sending emails are configured here.

PLC Parameter

If applicable, PLC parameters are defined here.

CODESYS configuration

The storage interval for CODESYS data can be activated here and the time interval set.

PLC configuration

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

Programs

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

System status UI

The screensaver is configured here.

Recorder app

The process values to be recorded are selected here and the data recording configured. The signals of the connected sensors can be organized into groups. 10 groups are created as standard.

A maximum of 8 analog and 8 digital signals can be visualized per group. Additional signals can be saved in the group, but cannot be visualized as a live trend.

5 Operation

There are the following setting options for each group:

- Parameters
- Diagram view
- Analog channels
- Digital channels
- Standard operation
- Event operation
- Time operation

Recording data export

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

Cloud gateway

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

Signal generator

The parameters for 10 analog signals and 10 digital signals each can be configured here.

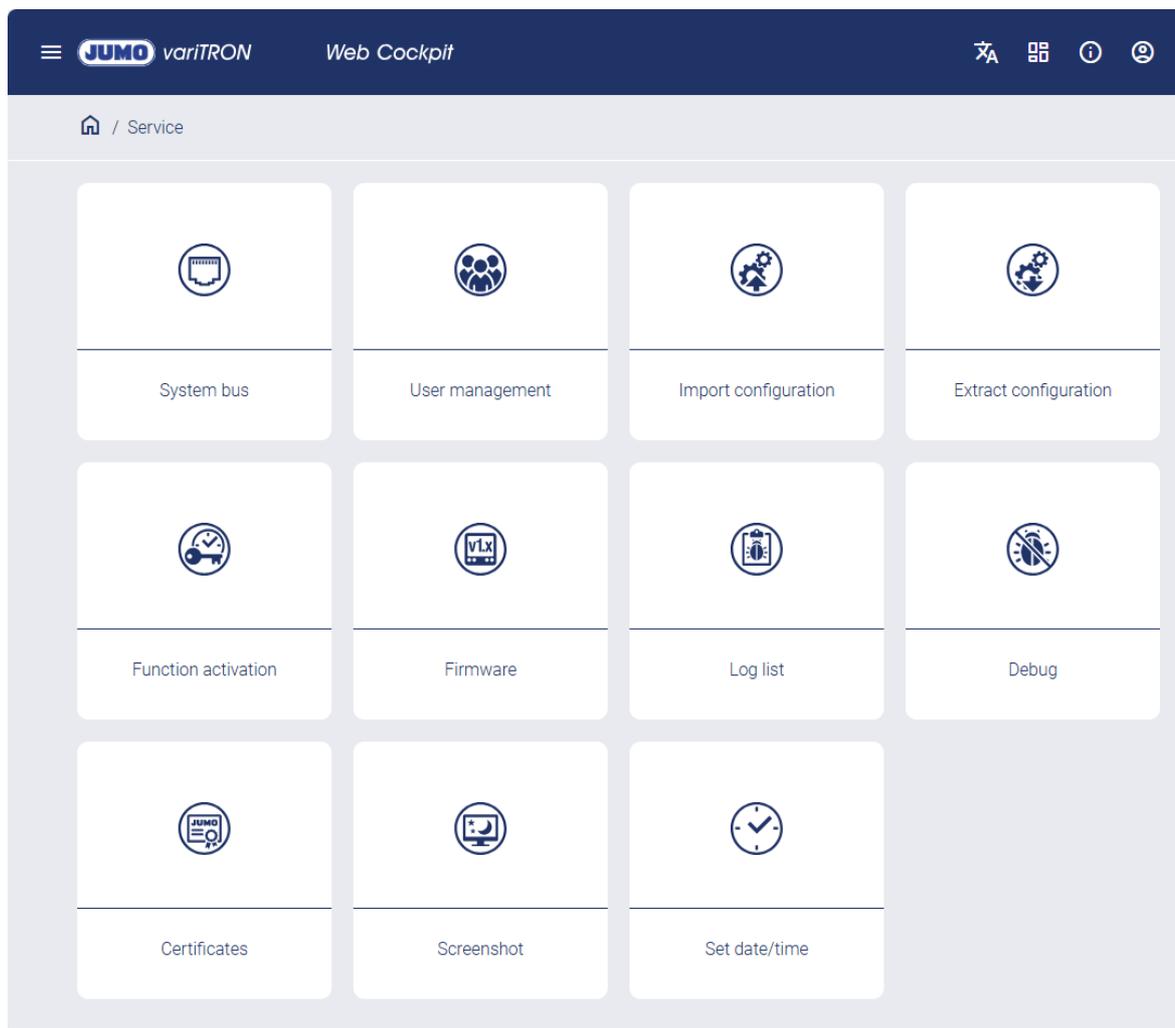
Node-RED

Use of the Node-RED development tool is activated here.

Batches

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

Service



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 service purposes; displays the actual hardware configuration.
- Debug output active: Only for service purposes
- Reset: System bus restart
- Stop/Run: Switchover of the system bus status (Safe-Operational/Operational; independent of system status)
- Reset statistics

5 Operation



CAUTION!

If bus topology mode is activated in the "Operational" system bus status, the system bus goes to the "Initialization" status.

The cyclical transmission of values is therefore interrupted.

► Only use this function for service purposes!

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 9.1 "User rights", Page 121

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 that are usually subject to a fee.



NOTE!

The files for activating extra codes (also called license files or FeatureResponse files) should be stored after they are first received so that they are available again for transmission 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.

As of system version 8.2, there is also the option of adopting the current configuration (must be compatible with the firmware).

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 5.2.2 "Device menu", Page 37

Certificates

Certificates can be added or replaced here

Screenshot

Screenshots of the screen of the JUMO variTRON 500 touch can be made here. The graphic is provided in the download folder of the computer being used.

Set date/time

The date and time can be set here if NTP (⇒ "Time zone/NTP ", Page 87) is inactive. If NTP is active, time synchronization is carried out automatically and manually editing is not possible.

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):

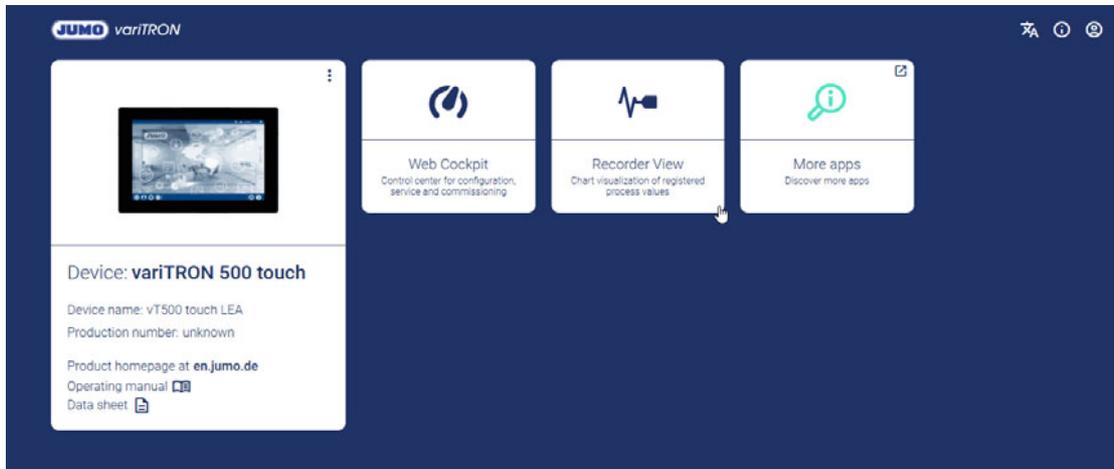
- Create new folder, rename, open, delete
- Download folder (as ZIP file)
- Upload, download, delete file(s)

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

5 Operation

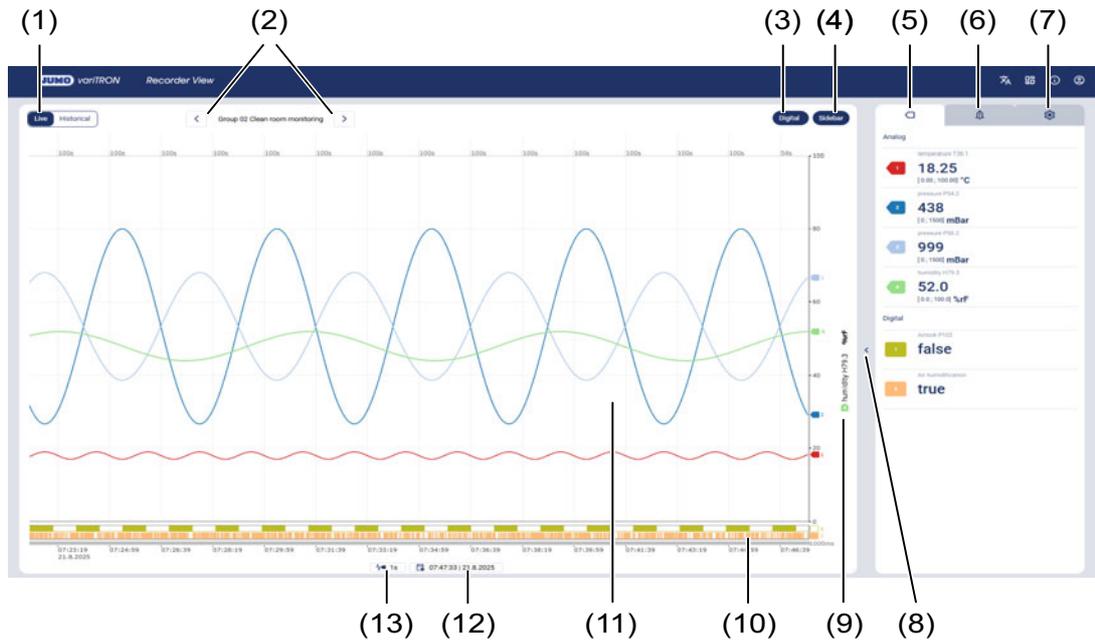
5.4.2 Recorder app

Calling up recorder app



1. Click the "Recorder View" tile.
The live trend in the curve diagram opens in the browser window.

"Live" display



1	"Live" view	2	Display of active group
3	Hide/show digital channels	4	Show/hide sidebar
5	"Channel information analog and digital values" tab	6	"Events" tab
7	"Settings" tab	8	Enlarge/reduce sidebar
9	Rolling scale (alternately in the relevant channel color)	10	Digital channels display
11	Analog channels display	12	Time and date display

13	Operating mode and memory cycle display	
----	---	--

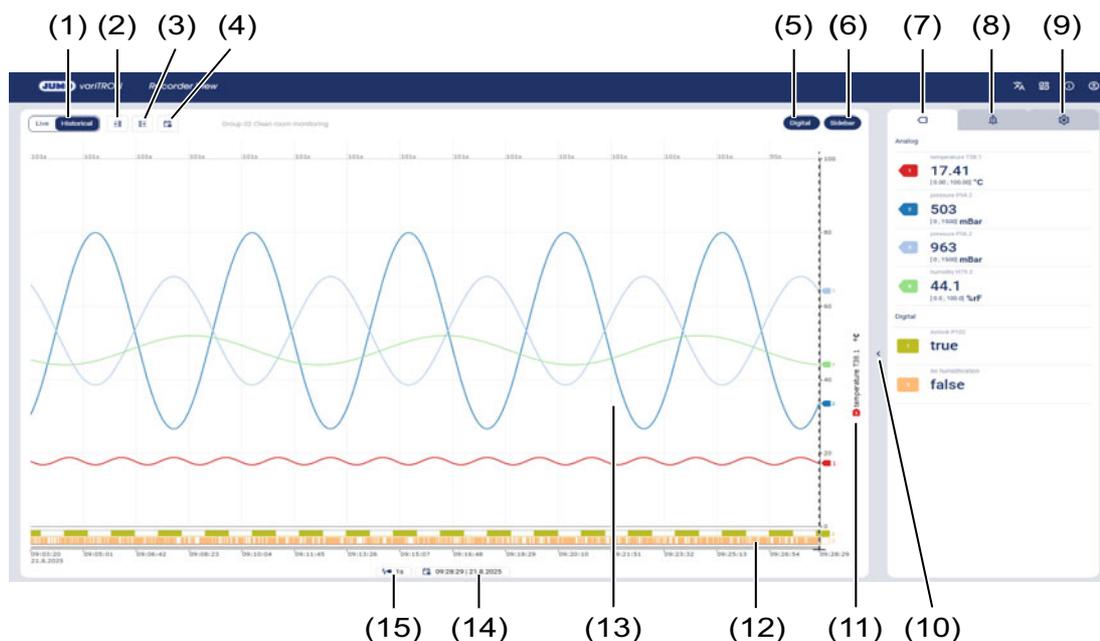


NOTE!

When a change is made to the configuration, the live display of the curve diagram is reset and updated with newly set parameters. The already acquired process data is retained and not deleted.

"Historic" display

If the curve diagram is clicked in the history, the cursor is placed on the selected point in time and the associated process values displayed in the sidebar.



1	"Historic" view	2	Move back in the time range recording
3	Move forward in the time range recording	4	Select previous time range
5	Hide/show digital channels	6	Show/hide sidebar
7	"Channel information analog and digital values" tab	8	"Events" tab
9	"Settings" tab	10	Rolling scale (alternately in the relevant channel color)
11	Enlarge/reduce sidebar	12	Digital channels display
13	Analog channels display	14	Time and date display
15	Operating mode and memory cycle display		



NOTE!

Use the "Time range back" and "Time range forward" buttons to move forward and back on the time scale in the "Historic" display mode.

Clicking causes the screen to move right or left by the amount displayed in the browser window. The smaller the browser window, the smaller the movement.

The "Select time range" button opens a dialog in which you can enter a time that you explicitly want to view.

5 Operation

Recorder View – sidebar

The sidebar of the Recorder View has three tabs:

- Process data display
- Event display
- Channel settings, advanced settings

	<p>1</p> <p>a</p> <p>b</p>	<p>Process data display</p> <p>Display of the analog process value (including scale and unit)</p> <p>Display of the digital process value</p>
	<p>2</p> <p>a</p> <p>b</p>	<p>Event display</p> <p>Event types filter:</p> <ul style="list-style-type: none"> • Alarm • Audit trail • Malfunction • Event <p>Open text search</p>

	<table border="1"> <tr> <td>3</td> <td>Settings</td> </tr> <tr> <td>a</td> <td>Set channel visibility</td> </tr> <tr> <td>b</td> <td>User scale: Activation of the user scale replaces the scale set in the device. Settings such as activated user scales or hidden channels in the web Recorder View are saved in the browser used and are not available on other computers or in other browsers.</td> </tr> <tr> <td>c</td> <td>Set channel visibility</td> </tr> <tr> <td>d</td> <td>Roll scales more slowly: Interval switches from 5 s to 15 s.</td> </tr> <tr> <td>e</td> <td>WebGL: The app checks whether WebGL is possible on the indicating device (PC or web panel).</td> </tr> <tr> <td>f</td> <td>Embedded CPU: Resource-conserving appearance of the recorder screen so that this can be displayed on embedded web panels.</td> </tr> </table>	3	Settings	a	Set channel visibility	b	User scale: Activation of the user scale replaces the scale set in the device. Settings such as activated user scales or hidden channels in the web Recorder View are saved in the browser used and are not available on other computers or in other browsers.	c	Set channel visibility	d	Roll scales more slowly: Interval switches from 5 s to 15 s.	e	WebGL: The app checks whether WebGL is possible on the indicating device (PC or web panel).	f	Embedded CPU: Resource-conserving appearance of the recorder screen so that this can be displayed on embedded web panels.
3	Settings														
a	Set channel visibility														
b	User scale: Activation of the user scale replaces the scale set in the device. Settings such as activated user scales or hidden channels in the web Recorder View are saved in the browser used and are not available on other computers or in other browsers.														
c	Set channel visibility														
d	Roll scales more slowly: Interval switches from 5 s to 15 s.														
e	WebGL: The app checks whether WebGL is possible on the indicating device (PC or web panel).														
f	Embedded CPU: Resource-conserving appearance of the recorder screen so that this can be displayed on embedded web panels.														

5 Operation

5.4.3 CODESYS WebVisu/Remote TargetVisu

The device supports CODESYS WebVisu or CODESYS Remote TargetVisu. By clicking the CODESYS WebVisu tile, visualizations created with CODESYS can be displayed in the browser of the connected PC/laptop and used to operate the system. For visualization by means of a browser, extra code 281 (WebVisu) is required; for visualization via CODESYS Remote TargetVisu, extra code 280 must be selected.

In principle, visualization can also take place on a JUMO web panel connected via Ethernet or a web panel that supports CODESYS visualization.

5.4.4 Other apps

The "Other apps" tile opens a browser window that you can use to access the JUMO Help Center. A QR code or a link is available for this.

The Help Center is an individual website on which JUMO provides further information on the following topics:

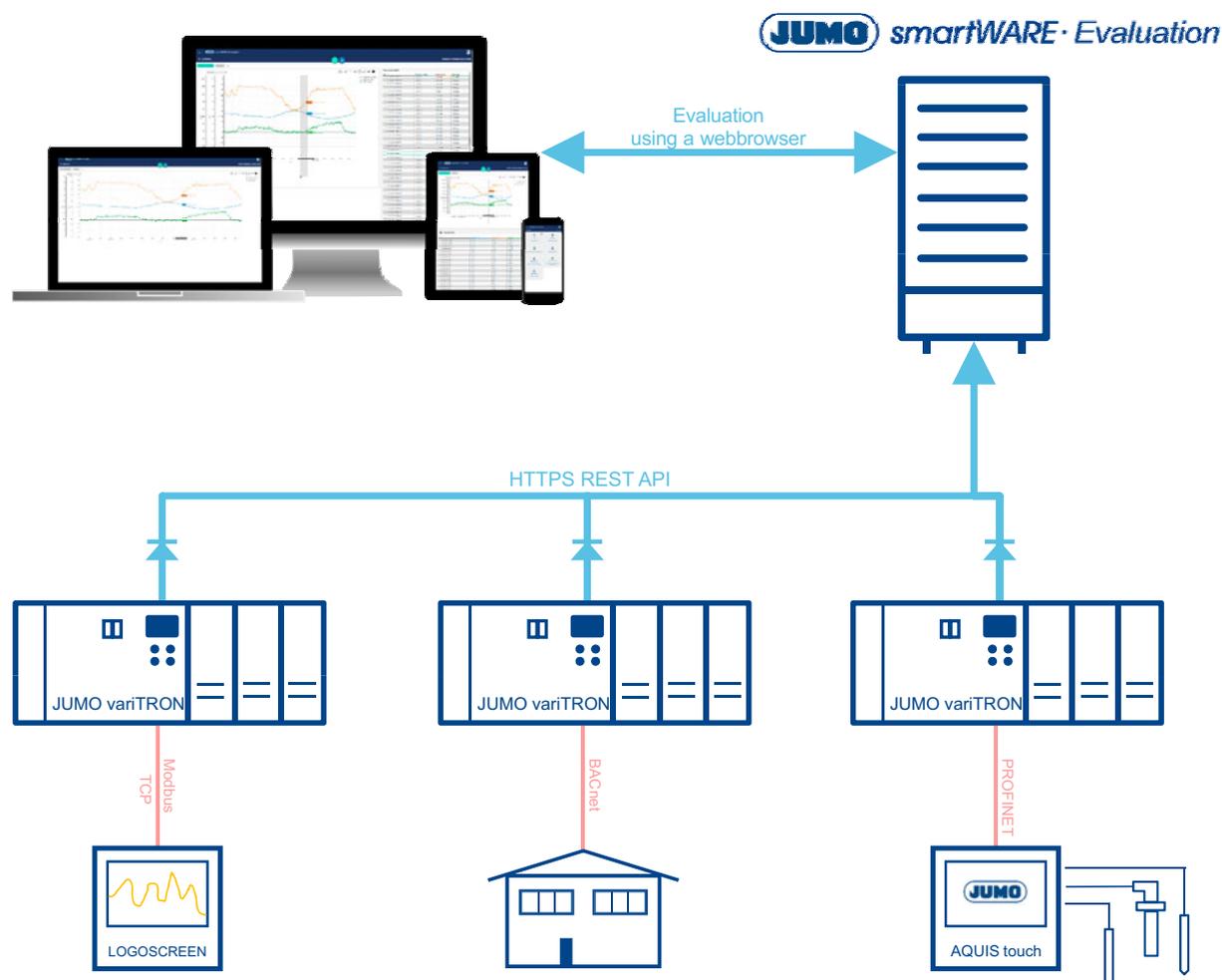
- JUMO Cloud
- JUMO smartWARE SCADA
- JUMO smartWARE Evaluation
- JUMO smartWARE Program
- JUMO variTRON

The information is continuously updated.

5.5 JUMO smartWARE Evaluation

JUMO smartWARE Evaluation is intended for evaluating and visualizing recorded process data from the JUMO variTRON system. The process data can be evaluated in customizable dashboards based on time or batch and transferred into reports (e.g. PDF, Excel®, CSV).

The figure shows a potential configuration and connection of multiple automation systems.



Details can be found on the data sheet 701840 available on the JUMO website.
 JUMO smartWARE Evaluation is available at the following website:
<https://eval2.jumo.digital>

Do you need support?

If you need more information, simple explanations, training courses or support on the JUMO smartWARE Evaluation, there are a range of options available to you from JUMO.



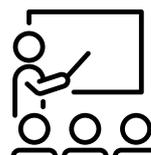
JUMO Help Center
Detailed documentation



Technical Support
Questions and information



JUMO Engineering



JUMO Campus
Training courses



YouTube channel
Explanatory videos

6 Configuration

6.1 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
Network	X	X	X	X
Device manager	X ^a	X ^a	X	X
Unit settings			X	X
System bus			X	X
Data carrier management			X	X
User interface (TFT screen, only with JUMO variTRON 500 touch)		X	X	X
Web server	X	X	X	X
Email			X	X
PLC configuration			X	X
CODESYS configuration			X	X
Programs			X	X
Recorder app			X	
System status UI (LCD display, only with JUMO variTRON 300 and 500)	X		X	X
Datastore gateway			X	X
Cloud gateway			X	X
Wtrans gateway (only with JUMO variTRON 300 and variTRON 500 touch)			X	X
Node-RED			X	X
Batches			X	X

^a Several functions are not available.



NOTE!

The functions HW-Assistent (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 (JUMO variTRON 300, JUMO 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 screen (JUMO variTRON 500 touch):

= Save settings

= Cancel without adopting changes

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".

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.

6.2 Network

6.2.1 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.

6 Configuration

6.2.2 Port configuration

Each of the LAN connections LAN1, LAN2, or LAN3 can be configured separately here.

Parameters	Selection/input	Description
Port management		Select how the relevant port (LANx, device-dependent) is to be used.
	No selection	No use type is set for the relevant port.
	PROFINET device	The relevant port is used as a PROFINET port.
	Ethernet/IP	The relevant port is used as an Ethernet/IP interface.

6.3 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: <ul style="list-style-type: none"> • 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.

6 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).

6.3.1 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)
...	-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

6.3.2 Display

The colors for displaying alarm 1 and alarm 2 can be defined under "Display". Clicking on the field with the color symbol opens a pop-up window. You can either select the provided colors by clicking or by entering a hexadecimal code for the color to be displayed in the "HEX" field.

1. Navigate to the Configuration - Device manager - Display menu item.
2. Click on the button on the right next to the color symbol.
The "Color selection" pop-up window opens.
3. Click the color you want or, if known, enter the relevant hexadecimal code in the "HEX" field.
The point next to the field "HEX" displays the selected color and the relevant hexadecimal code.
4. Confirm the selection by clicking on "OK".
The color symbol in the button switches to the selected color.
5. Click the "Apply" button.
The display color has been changed

6 Configuration

6.4 Unit settings

Units

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

Parameters	Selection/input	Description
Absolute temperature setting		Unit for temperature value
	°C	Degrees Celsius
	°F	Degrees Fahrenheit
	K	Kelvin
Relative temperature setting		Unit for temperature difference
	°C	Degrees Celsius
	°F	Degrees Fahrenheit
	K	Kelvin
Setting pressure	mbar	Millibar
	bar	Bar
	N/m ²	Newton per square meter
	psi	Pound force per square inch
	Pa	Pascal
	hPa	
	kPa	Kilopascal
	MPa	Megapascal
Setting Resistance	μΩ	Microohm
	mΩ	Milliohm
	Ω	Ohm
	kΩ	Kiloohm
	MΩ	Megaohm
Ratio	%	Percent
	‰	Per thousand
	ppm	Parts per million
Setting Mixing ratio	g/kg	Gram per kilogram
	gr/lb	grains per pound grain = 0.0648 g pound = 453.59237 g (avoirdupois pound)
Setting absolute humidity	g/m³	g per cubic meter
	g/ft ³	g per cubic foot
Setting relative humidity	%rH	Percent relative humidity
Setting current	μA	Microampere
	mA	Milliampere
	A	Ampere
	kA	Kiloampere
Setting voltage	μV	Microvolt
	mV	Millivolt
	V	Volt
	kV	Kilovolt

6 Configuration

Parameters	Selection/input	Description
Setting time	μs	Microsecond
	ms	Millisecond
	s	Second
	min	Minute
	h	Hour
Setting memory size	B	Byte
	kB	Kilobyte
	MB	Megabyte
	GB	Gigabyte
Setting specific enthalpy	kJ/kg	Kilojoule per kilogram
	BTU/lb	British Thermal Unit per pound
Setting flow	m^3/s	Cubic meter per second
	l/s	Liters per second
	l/min	Liters per minute
	l/h	Liters per hour
	cm³/s	Cubic centimeters per second
	m^3/h	Cubic meters per hour
	ft^3/min	Cubic feet (28.316 l) per minute
	ft^3/h	Cubic feet per second
	usgal/min	US gallons (3.785 l) per min
	usgal/h	US gallons per hour
	impgal/min	Imperial gallons (4.54609 l) per min
	impgal/h	Imperial gallons per hour
Setting volume	m³	Cubic meter
	l	Liter
	cm^3	Cubic centimeter
	ft^3	Cubic foot
	usgal	US gallon
	impgal	Imperial gallon
Setting speed	m/s	Meters per second
	km/h	Kilometers per hour
	mph	Miles (1609.344 m) per hour
Setting conductivity	$\mu\text{S}/\text{cm}$	Microsiemens per centimeter
	mS/cm	Millisiemens per centimeter
	S/m	Siemens per meter

6 Configuration

6.5 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 15

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.

6.6 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 (as of system version 8)	Off (FALSE) On (TRUE)	Username and password are required for logon. 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.

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6.7 Web server

Parameters	Selection/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 (80)	Port number for HTTP
HTTPS port number	0 to 65535 (443)	Port number for HTTPS
Path to user-defined website	custom	Link is specified when using a user-specific website
CODESYS WebVisu compatibility		Move slider to the right to activate compatibility mode

6.8 CODESYS configuration

Parameters	Selection/input	Description
RetainAutoSync	Active	Retain data is automatically synchronized in the retain memory in the "Storage interval" ^a .
	Inactive	No retain data is synchronized ^b .
Storage interval	1 to 86400 s (5)	CODESYS configuration storage interval

^a If the retain data is to be synchronized in the retain memory (backup through power off) outside the storage interval, this can be carried out through access via the CODESYS component.

^b The user is responsible for the synchronization. This can be carried out through access via the CODESYS component. If no synchronization takes place, this can result in loss of the retain data.

6.9 PLC configuration

6.9.1 Program generator

Nine independent program generators are available in the device as standard, meaning that nine programs can run asynchronously and independently from each other.

With the extra code 001, the program generator is supplemented with the JUMO variTRON Program Editor. The operating manual for the JUMO variTRON Program Editor is available online in the JUMO Help Center.

General

Parameters	Selection/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 at out of range (O-o-R)		Behavior of the program generator in case of measuring range underflow and overflow (out of range)
	Continuation	Program continues to run.
	Program stop	The program is stopped.

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Parameters	Selection/input	Description
Power off		Behavior of the program generator when the power failure is over.
	Cancellation	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 canceled 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 (Program start, ...)		Activate the event message for the relevant event.
	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 in the event list in the case of an event.

Setting of setpoint values: setpoint specification

Parameters	Selection/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 value step	Setpoint value change as step
	Setpoint value ramp	Setpoint value change as ramp
	End value for setpoint value ramp 1 to End value for setpoint value 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

Parameters	Selection/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		
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
Upper tolerance band 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	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

Parameters	Selection/input	Description
Lower tolerance value	-99999 to 99999	Lower value of the tolerance band
Upper tolerance value	-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

Parameters	Selection/input	Description
Lower tolerance value	-99999 to 99999	Lower value of the tolerance band
Upper tolerance value	-99999 to 99999	Upper value of the tolerance band

6 Configuration

Parameters	Selection/input	Description
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

Parameters	Selection/input	Description
Setpoint value 01 unit to setpoint value 30 unit		Unit of the setpoint value concerned
	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	

Names of operating contacts

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

Tolerance band monitoring

Parameters	Selection/input	Description
Alarm type	Inactive	Tolerance band monitoring is not active.
	Event	The tolerance band breach is entered as an event in the event list.
	Alarm	The tolerance band breach is entered as an alarm in the event list and alarm list.
Alarm active at	High	Alarm active at High (1 = actual value outside the tolerance band)
	Low	Alarm active at Low (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 the tolerance band breach.
Stop if tolerance range exceeded		In the event of a tolerance band breach, the program can be stopped until the state has passed.
	Yes	The program is stopped.
	No	The program is not stopped.

6.9.2 Analog variables

These settings concern the use of analog variables (analog PLC outputs) for functions that have been realized in the device firmware (e.g. data recording). 120 analog variables for customization are available.

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

6.9.3 Digital variables

These settings concern the use of digital variables (digital PLC outputs) for functions that have been realized in the device firmware (e.g. data recording). 120 digital variables for customization are available.

Parameters	Selection/input	Description
Name	Enter text (or use existing text)	Designation of the variables concerned

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6.10 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

6.11 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).

6.12 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 32		Operating contacts in the program section
	Off (FALSE)	Operating contact is not active.
	On (TRUE)	Operating contact is active.

6.13 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

6 Configuration

6.14 Recorder

The JUMO variTRON system has an integrated recorder that records process data. The Recorder View is available using the extra code 276 "Recorder App". It enables visualization of the process data from the JUMO variTRON system as a live trend in a curve diagram. The recorded process data is archived and evaluated with JUMO smartWARE Evaluation ⇒ [Data sheet 701840](#).



NOTE!

In addition to archiving and evaluation of the process data with JUMO smartWARE Evaluation, it is possible to transmit the data to the JUMO Cloud or to JUMO smartWARE SCADA.

Groups

The process data is stored in JUMO variTRON 500 touch in so-called groups. The device has a total of 10 groups. In each group, up to 8 analog and 8 digital signals can be displayed as a live trend in the curve diagram (prerequisite: extra code 276 is activated). In total, the JUMO variTRON 500 touch can record up to 240 analog or digital signals that can be spread as wanted over the groups.



NOTE!

In order to transmit the saved process data to JUMO smartWARE Evaluation for archiving or evaluation, the Datastore gateway must be configured.

Parameters

Parameters	Selection/input	Description
Name	Enter text	Designation of the group The designation is displayed in the visualization (Recorder View and JUMO smartWARE Evaluation).
Recording (as of system version 8)	Normal	Amount of data saved in a memory cycle Not only the measured value, but also metadata such as minimum value, maximum value, average value (avg.), validity (Valid/Invalid), measuring range underflows (Under), and measuring range overflows (Over) are saved.
	Compact	Only the current value is saved. This means that memory capacity is saved in both JUMO variTRON and JUMO smartWARE Evaluation.

Diagram view

Parameters	Selection/input	Description
Measured value display	Min. value	The minimum value is displayed.
	Max. value	The maximum value is displayed.
	Current value	The current value is displayed.
	Mean value	The mean value is displayed.
Alignment	Horizontal	Horizontal alignment of the diagram.
	Vertical	Vertical alignment of the diagram.

Analog channels

The display of the analog signals in the curve diagram of the Recorder View is set here (e.g. channel color).



NOTE!

A key symbol after an entry indicates that the entry is blocked for input. The entry can be edited if a valid analog signal is configured at the input using a selector.

Parameters	Selection/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 system monitoring, process values of the modules).
Designation	Enter text (or use existing text)	Designation of the signal
Replace designation	Inactive Active	If active: The channel designation is automatically displayed in JUMO smartWARE Evaluation.
Start of display range	-99999 to 99999 (0)	Lower limit of display range
End of display range	-99999 to 99999 (100)	Upper limit of display range
Replace display parameters	Inactive Active	If active: The display parameters are automatically used in JUMO smartWARE Evaluation.
Scaling type		Scaling of the y axis
	Linear	Linear
	Logarithmic	Logarithmic
Channel color		Any color can be set by selecting a color or entering a hexadecimal value.
Setting the number format for the analog value		
Comma format	Auto	The system sets the number format automatically
	XXXXXp	Display of the value without decimal place
	XXXXpX	Display of the value with a decimal place
	XXXpXX	Display of the value with two decimal places
	XXpXXX	Display of the value with three decimal places
	XpXXXX	Display of the value with four decimal places
Number format	Decimal	Display as decimal value
	Exponential	Display as exponential value
Recorder View	Active	If "Active", the analog signals are displayed as a live trend in the curve diagram. A maximum of 8 analog signals and 8 digital signals can be displayed per group. If there are 10 groups, a total of up to 80 analog signals and 80 digital signals are therefore possible.

Digital channels

The display of the digital signals in the curve diagram of the Recorder View is set here (e.g. channel color).

Parameters	Selection/input	Description
Input signal	Select signal from selector	Setting of the digital input signal

6 Configuration

Parameters	Selection/input	Description
Designation	Enter text or use existing text	Designation of the signal
Replace designation	Inactive Active	If active: The channel designation is automatically displayed in JUMO smartWARE Evaluation.
Channel color		Any color can be set by entering a hexadecimal value.
Recorder View	Active	If "Active", the analog signals are displayed as a live trend in the curve diagram. A maximum of 8 analog signals and 8 digital signals can be displayed per group. If there are 10 groups, a total of up to 80 analog signals and 80 digital signals are therefore possible.

Standard operation

Storage operation is switched on/off for the group and the memory cycle set here.

Parameters	Selection/input	Description
Memory status		Activation of data recording
	On	The data is recorded at the configured interval
	Off	Data recording is not active.
Memory cycle [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

Settings for event operation are configured here.

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

Parameters	Selection/input	Description
Control signal	Select signal from selector	Digital signal (binary signal) that starts and stops event operation.
Post-trigger time [s]	0 to 10 (0)	Extends event operation after which the control signal was deactivated.
Memory cycle [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

A period of time in which the data recording is to take place can be set here.

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

Parameters	Selection/input	Description
Begin [hh:mm:ss]	00:00:00 to 23:59:59 (00:00:00)	Time at which time operation is started. Begin = End: Time operation is inactive.
End [hh:mm:ss]	00:00:00 to 23:59:59 (00:00:00)	Time at which time operation ends.
Memory cycle [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 values
- Number of invalid values

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6.15 Datastore gateway

Datastore interface

Here the connection to the JUMO smartWARE Evaluation (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).

Parameters	Selection/input	Description
Data export		Export of the recorded process data
	Inactive	The function is switched off.
	Active	The function is active. Activates the data export function, meaning data can be exported via USB or http/https.
Export to data server		Activates the automatic export of data via http to the Datastore at the set interval (period).
	Active	
	Inactive	
Datastore URL	Enter the URL of the Datastore of JUMO smartWARE Evaluation (<host>/store)	The URL is usually entered as follows: (host/store) Example: 10.12.54.18/store or eval2.jumo/store Depending on the port configuration of JUMO smartWARE Evaluation, it must also be specified too. If the ports of JUMO smartWARE Evaluation are configured differently to 80/443, <Hostname>:<Port>/store<IP address>:<Port>/store must be entered. For further information ⇒ Operating manual for JUMO smartWARE Evaluation .
Encryption		A setting can be made to determine whether the data is sent to the Datastore via http (unencrypted) or via https (TLS encryption). Depending on this, it may be necessary to enter the correct port in the Datastore.
	None	No data encryption occurs
	SSL/TLS	SSL/TLS encryption (https)
API key		An API key can optionally be defined in the Datastore that restricts data export to devices which also use it. This API key must be entered in the device here if the relevant Datastore defines one.
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.
Memory alarm limit value	0 to 100 % (20 %)	Warning threshold for the remaining database storage capacity for process data. When it is reached, an alarm is generated.

6.16 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.

As of system version 8, the connection to a SCADA system is also configured here.

Parameter	Selection/data input	Description
Connection to cloud or SCADA		Activation of the cloud gateway
	Inactive	Gateway is not active.
	Active	Gateway is activated.
Target server		Selection of the destination server
	JUMO Cloud	The JUMO Cloud is used.
	SCADA (individual)	The destination server is determined by an individual URL (JUMO smartWARE SCADA, compatible third-party systems).
SCADA URL for configuration	Enter URL	Individual URL for connecting to a SCADA system (configuration)
SCADA URL for MQTT	Enter URL	Individual URL for connecting to a SCADA system (MQTT broker)
Device ID	Enter device ID	ID used by the device (data source) to authenticate itself to the JUMO Cloud or the SCADA system. The ID is generated in the JUMO Cloud or in the SCADA system and must be entered here.
Ignoring server certificate	Inactive	In the case of HTTPS connections, this parameter must be set to active, as otherwise no connection will be established. Only HTTPS connections to JUMO Cloud are possible.
	Active	
Password	Enter password	Password used by the device (data source) to authenticate itself to the JUMO Cloud or the SCADA system. The password is generated in the JUMO Cloud or in the SCADA system and must be entered here.

6.17 Node-RED

The graphical development tool Node-RED is available as standard, but has to be activated before it is used.

Parameters	Selection/input	Description
Node-RED development tool		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. The IP address of the central processing unit and / nodered have to be entered to start Node-RED: http://<IP address>/nodered

NOTE!

If Node-RED is active, the tile Node-RED is shown on the device homepage (IP address) once Node-RED has completely started.



6 Configuration

6.18 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 (JUMO variTRON 300: 10 batches; JUMO variTRON 500 and JUMO 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 JUMO 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.

6 Configuration

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
Delete line	Batch duration	Duration of batch reporting (time difference between batch start and batch end)
		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.

7 Startup

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.

Process

1. Connect central processing unit via LAN1 with the system bus.
2. Establish voltage supply.
The boot process starts and ends with the start picture being displayed.
The display must show "System status Run".



4. Switch to the PC/laptop with the installed JUMO smartWARE Setup program and start the program.
5. Click the "+ New project" button
The "Select project template" dialog opens.
6. Select project template for the relevant central processing unit and system version and confirm with "OK".
The setup program switches to the project folder.



7. Switch to the "Project management" tab.
8. Click the "Save as..." button and save the project under a significant name.
9. Switch to the "HW-Assistent Systembus" tab.
The setup program opens the window HW-Assistent Systembus. The window is separated into 3 areas:- Hardware configuration- System components- Settings
The previously selected central processing unit is shown in the upper area of the "Hardware configuration" area.
10. Click on the "+" symbol at bottom right of the "Hardware configuration" area.
The program adds a virtual DIN rail below.



NOTE!

If a central processing unit was connected to an existing bus topology, the hardware arrangement can be loaded with a bus scan (network symbol at the bottom right).



NOTE!

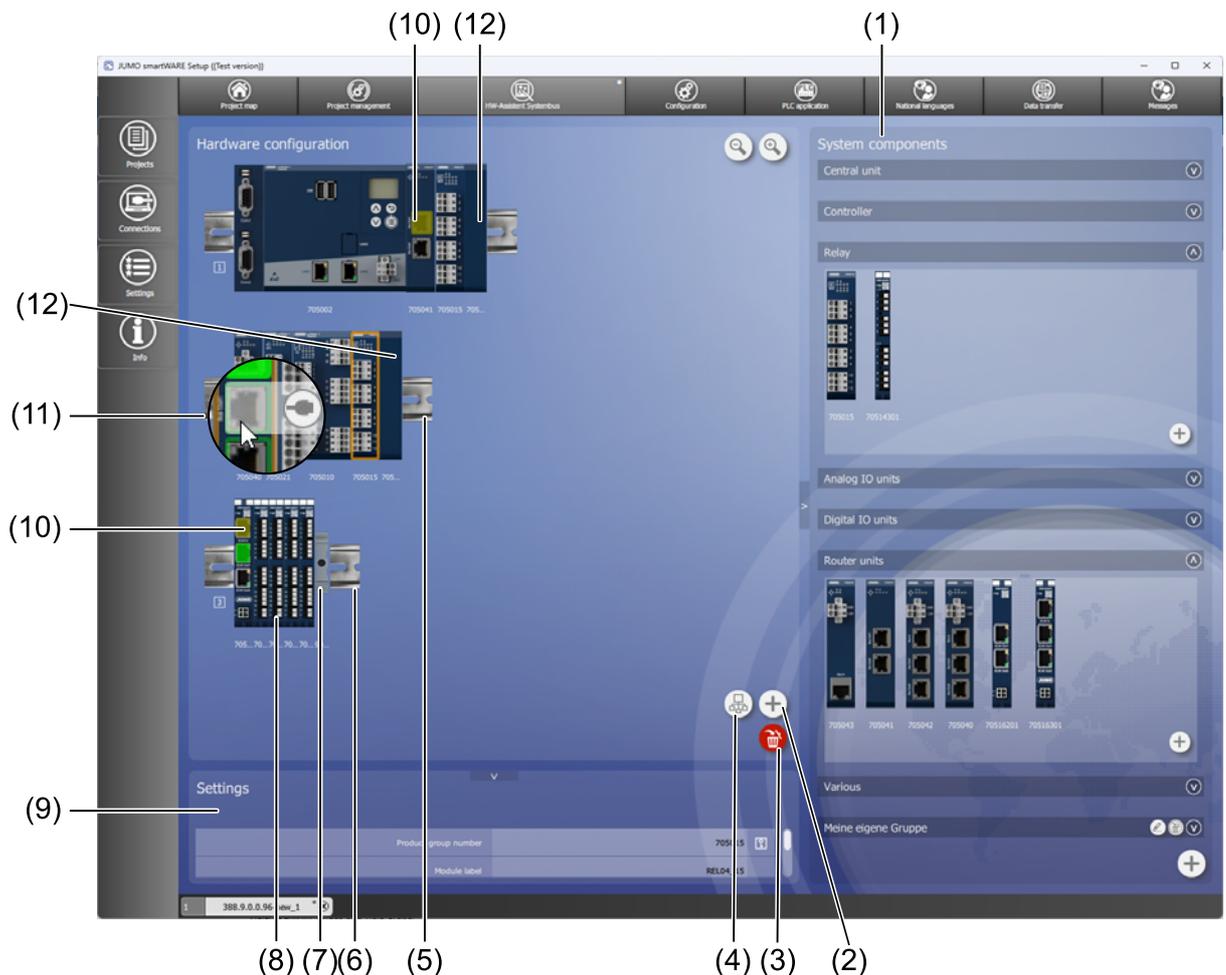
The modules can be found in the HW-Assistent Systembus in the "System components" area. They can be used to configure the control system:

- Central processing unit
- Controller
- Relay
- Analog IO units
- Digital IO units
- Router units
- Various; thyristor power controller (JUMO TYA200), adapter plates, end plates

The system components are arranged in drop-down menus and can be arranged on the central processing unit or DIN rail using drag and drop.

A router unit, a JUMO variTRON module from the 7050xx series, or the system module 705171 from the I/O series can be placed as the first module downstream of the central processing unit.

In addition to the components displayed in the HW-Assistent Systembus, compatible third-party components can be included in the control system configuration with the JUMO system bus.



1	System components area	2	"+" add DIN rail button
3	"Delete module" button	4	"Bus scan" button
5	First DIN rail	6	Optional second DIN rail
7	End Plate JUMO I/O modules	8	JUMO I/O modules (7051xx)

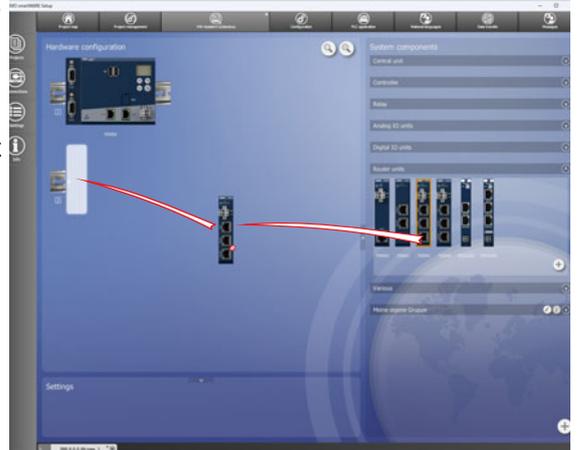
7 Startup

9	"Settings" area, individual settings for modules	10	Already established system bus connection (marked in color)
11	Establish system bus connection	12	End Plate JUMO variTRON

11. Open drop-down menu for router units and drag the desired module onto the DIN rail.

First, a router module 1-port (705043) or router module 3-port (705042) or, if modules from the JUMO I/O series are used, the router module 3-Port (70516301) must be used.

Once the module is grabbed with the mouse, the white field displays where it can be placed on the DIN rail.



12. Arrange modules on the DIN rail.

If required, select expansion slots of the module in the "Settings" area for controller modules.

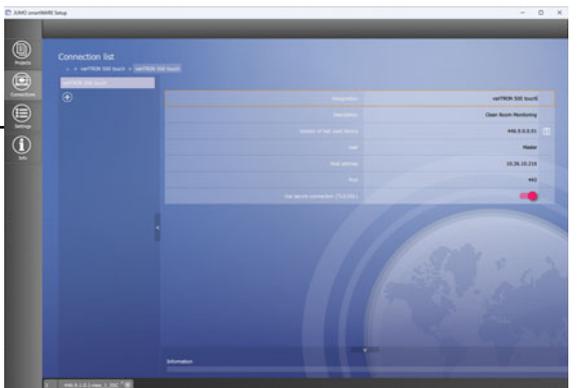
13. If required, add additional DIN rail.
See step 11.

14. Establish system bus connection.

15. Click the "Connections" tab on the left in the program.

The program switches to the connection list.

16. As required, add/change specifications for the designation, description, user (**Master**), host address, and port (**443**).
Confirm changes by clicking "Apply".



17. Call up project folder and click the "Data transfer" tile.

18. Click the "Connecting..." button.

The setup program connects to the central processing unit.

19. Click the "Send to device" button.

The setup program sends the current configuration to the central processing unit.

20. Check the status LED of all modules.

The status LED will light up steady green as soon as the system bus has the status "Operational".



21. Switch to the "Configuration" tab in the setup program.
 - Configure digital and analog inputs and outputs.
 - If necessary, configure the controller function of the controller module (incl. controller parameters).
 - If necessary, configure other functions (e.g., limit value monitoring function, setpoint values).
22. If setpoint value programs are being used: Configure central processing unit:
 - Configure program generator (Configuration > PLC application)
 - Create program (Configuration > Programs)
24. Optional: Create the CODESYS application
Setup program > PLC application
 - Select and apply the appropriate CODESYS version.
 - Start CODESYS.
 - Create the CODESYS application.
27. Optional: Use existing CODESYS application.
Product page: qr-705002-en.jumo.info or [JUMO Software Download Center](#)
 - Either download "*JUMO variTRON 500 Visu-Template*" or
 - download "*JUMO variTRON Template Process-Technology (705002)*" (as of system version 7)
28. Optional: Setting up data recording without using CODESYS (as of system version 6)
 - Setup program > HW-Assistent Systembus:
 - Change module designation if necessary.
 - Setup program > Configuration > Recorder > Data recording > 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 cycle.
 - Setup program > Configuration > Datastore gateway > Datastore interface.
 - Configure and activate connection to the database (Datastore) (condition for data recording).
29. Optional: Setting up data recording using CODESYS (as of system version 6)
 - Setup program > HW-Assistent Systembus:
 - Note the module label.



7 Startup

- Setup program > Configuration > Recorder > 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.
 - Select/set recorder operating mode:
 - Standard operation – takes a snapshot at the interval set under memory cycle.
 - Event operation – takes a snapshot when a set control signal occurs, e.g. a process value.
 - Time operation – starts recording at set times, e.g. a shift.
 - Set memory status and memory cycle.
 - CODESYS application: Connect (map) 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)
 - Setup program > Configuration > Datastore gateway > Datastore interface
 - Configure and activate connection to the database (Datastore) (condition for data recording).
30. After creating the CODESYS application, transfer it to the setup project and close CODESYS if applicable.
31. Transfer the project to the central processing unit:
Setup program > Project > Data transfer
- Send the configuration (incl. CODESYS application) to the central processing unit ("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.en.helpcenter-jumo.net>

8 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.

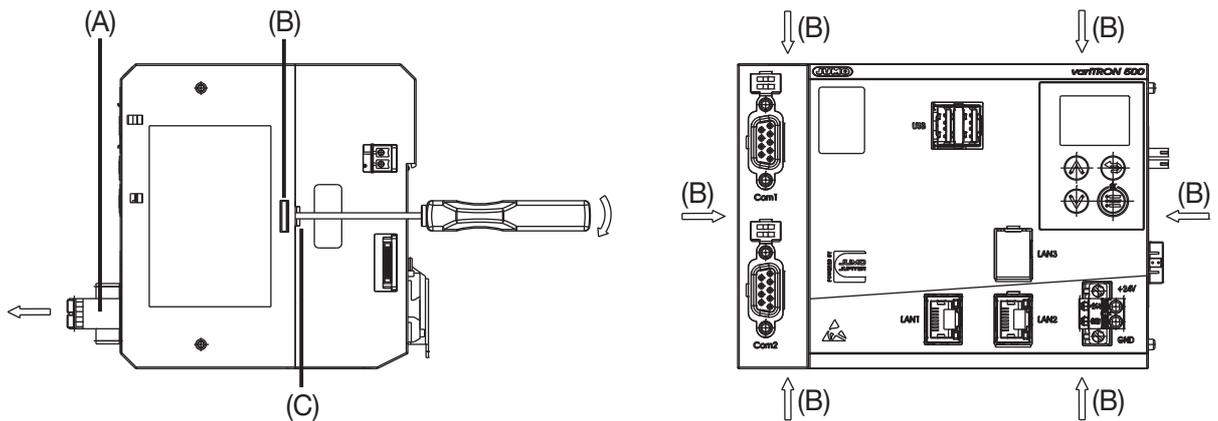
If required, information regarding this can be found in the "Identifying the device version" chapter in operating manual 70500200T90 or installation instructions 70500200T94 (the installation instructions are included in the scope of delivery of the device).

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.

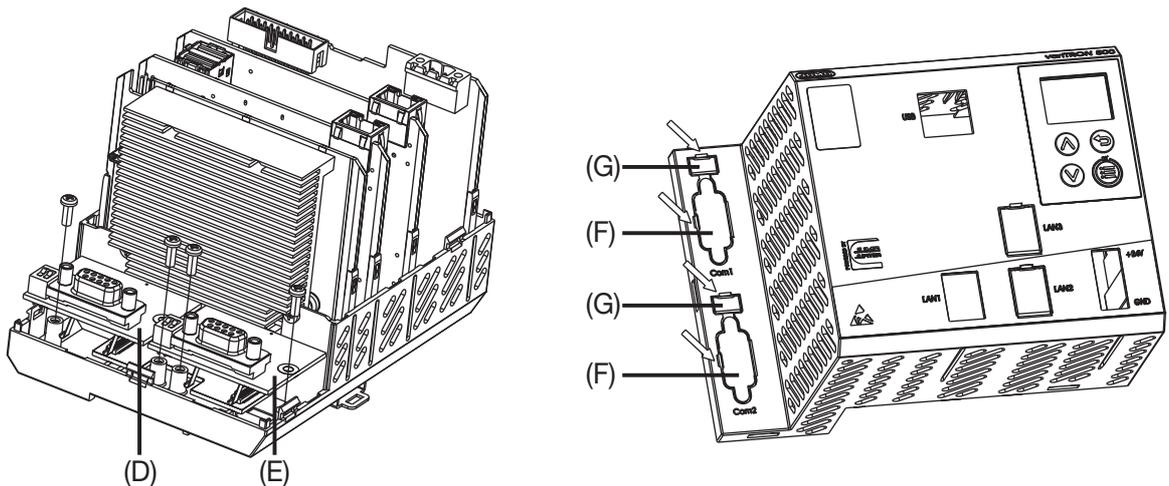
8 Retrofitting interfaces

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.

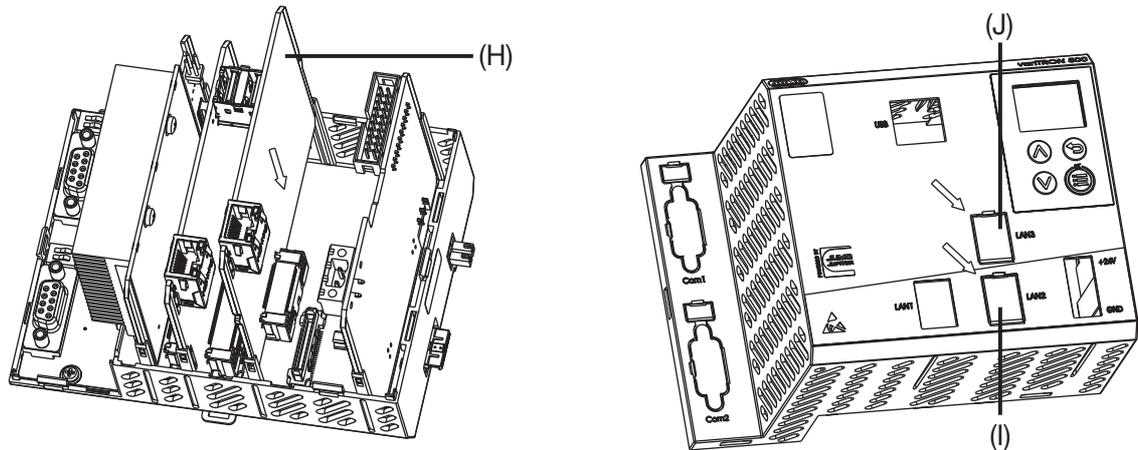
Retrofitting an RS232 or RS485 interface



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.

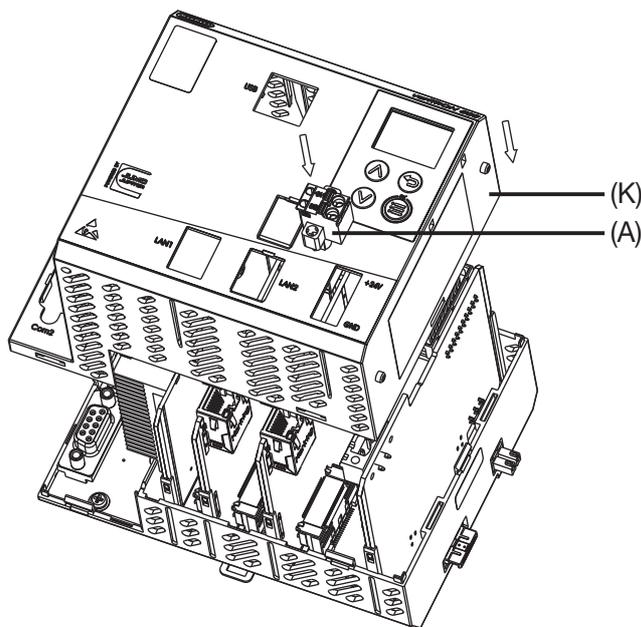
8 Retrofitting interfaces

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.

9.1 User rights

9.1.1 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	<ul style="list-style-type: none"> Administrator BatchAdmin ConfigurationRead ConfigurationWrite Controller SystemStatusUi SystemUi VisuTemplateAdmin WebUi
UnregisteredUser This user must not be deleted!		<ul style="list-style-type: none"> 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 JUMO 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 JUMO 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.

9.1.2 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	<ul style="list-style-type: none"> AdministratorRole CodesysUiRole LcdUiRole TftUiRole WebUiRole
User1	1	<ul style="list-style-type: none"> UserRole CodesysUiRole LcdUiRole TftUiRole WebUiRole
Service	9200	<ul style="list-style-type: none"> ServiceDisplayRole CodesysUiRole LcdUiRole TftUiRole WebUiRole
UnregisteredUser This user must not be deleted!		<ul style="list-style-type: none"> 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 JUMO 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 JUMO 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 JUMO 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 JUMO 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.

9 Annex

9.2 Technical data

9.2.1 Interfaces

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

9.2.2 Display

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

9.2.3 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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9.2.4 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

9.2.5 Approval marks and certificates

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

9.3 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.

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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.

9.4 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 starting up the system later on
 - Opening and closing the housing
-



NOTE!

Only replace the battery with the following battery type (available from the manufacturer of the device):

Battery manufacturer: RENATA

Type: CR2477N

Temperature range: -40 to +85 °C



WARNING!

Use of an unsuitable battery type

Risk of fire or explosion!

- ▶ Only replace the battery with the battery type specified above.
-



WARNING!

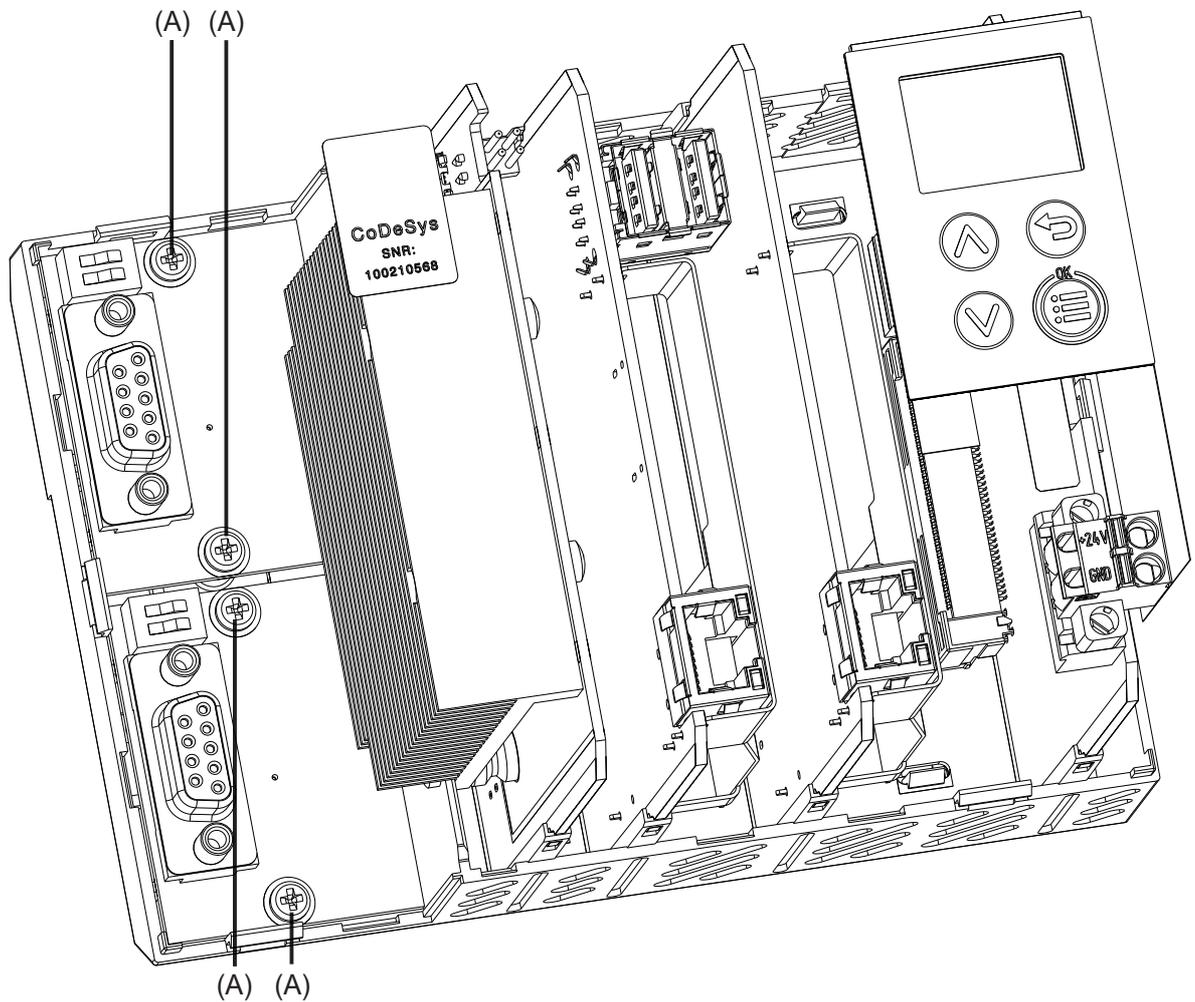
Improper handling of the battery (lithium button cell)

Risk of fire or explosion!

- ▶ Do not recharge, disassemble or dispose of the battery in a fire.
-

Remove the interface modules

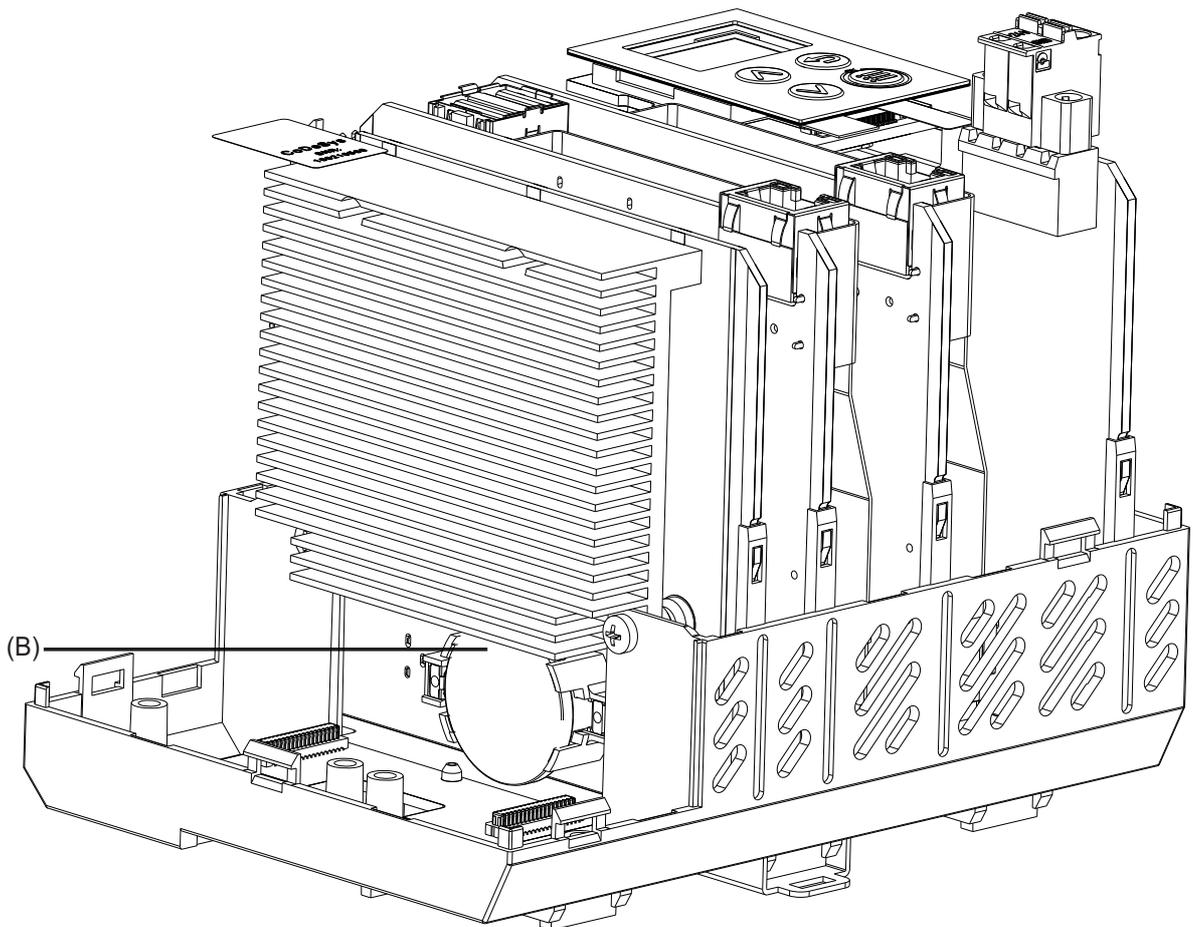
This step is omitted if no interface module is equipped.



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).

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Replace the battery



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

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).

9.5 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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License Compliance
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Email licensecompliance@jumo.net

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9.6 China RoHS

 产品组别 Product group: 705002 部件名称 Component Name	产品中有害物质的名称及含量 China EEP Hazardous Substances Information						
	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)	○	○	○	○	○	○	○
螺母 Nuts (Mutter)	○	○	○	○	○	○	○
螺钉 Screw (Schraube)	○	○	○	○	○	○	○

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.



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