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JUMO mTRON T
Measuring, Control, and Automation System

Central processing unit

Brief description

The central processing unit is the heart of the system. It contains the process image of the application and manages the configuration and parameter data of the complete system.

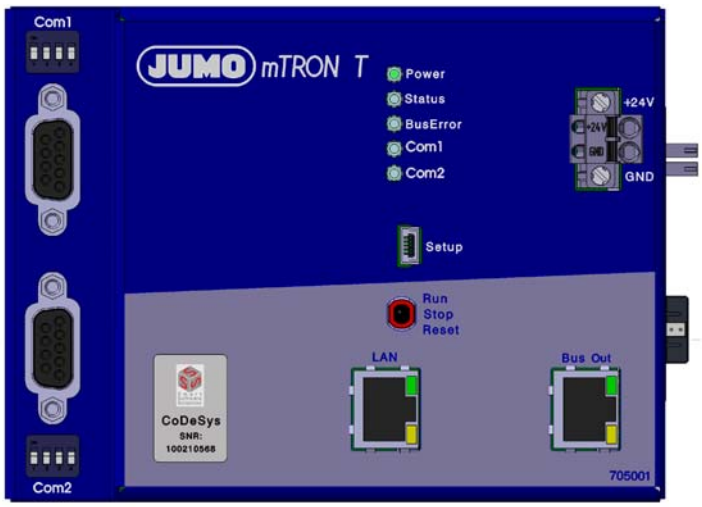
For individual control tasks nine program generators and extensive limit value monitoring functions are available.

LEDs are used to indicate applied voltage supply, the operating status of the PLC, system messages, as well as the communication through interfaces.

A USB device interface, a LAN connection (Ethernet), and two system bus connections are available as standard. Up to two interfaces can be optionally equipped for fieldbus applications.

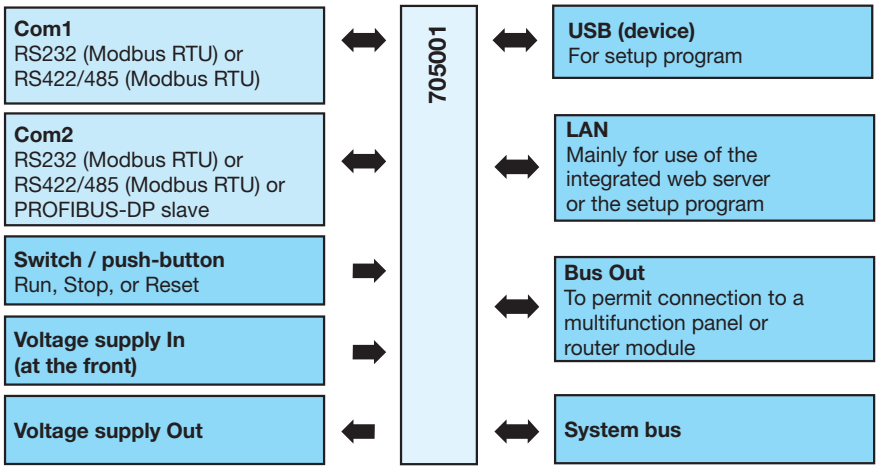
The central processing unit, the input/output modules connected laterally, and modules integrated by a router are comfortably configured and parameterized with the setup program or the multifunction panel 840.

The integrated CODESYS V3.5 PLC completes the parameterizable functions with a powerful control unit. This allows to realize even complex applications.



Type 705001/...

Block diagram



Features

- Process image for up to 30 input/output modules
- Ethernet interface with integrated web server
- One USB interface
- 64 limit values can be monitored
- PLC acc. to IEC 61131-3 (CODESYS V3.5)
- OPC server (OPC DA, in connection with PLC CODESYS V3.5)
- Nine program generators
- Two field bus interfaces
- Math and logic module
- System bus connection on the front (Bus Out)
- Plug and Play when replacing the input/output modules
- Battery buffered RAM
- Real time clock
- Sturdy metal case
- Supply of operating voltage
- Quick wiring of operating voltage and system bus due to easy module connection

Approval/approval marks (see “Technical data”)

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Description

Setup program

The setup program is installed on a PC and connected to the base unit (central processing unit) or the multifunction panel via USB or LAN interface. That way the entire system can be comfortably configured, parameterized, and operated.

The setup data is transmitted to the up to 30 connected input/output modules (system bus).

General setup data and functions:

- Hardware configuration of the entire system
- Selection and editing of the operating languages
- Configuration and parameterization of the input and output modules
- Configuration of the central processing unit and the multifunction panel
- Configuration and programming of the PLC
- Program editor for 99 programs
- Configuration of the 9 program generators
- Configuration of the recording and the batch reporting
- Editor for customer-specific process images

Limit value monitoring

With the limit value monitoring one input variable can be monitored compared to a fixed limit value or a different variable. 64 limit values can be monitored in this way and for each limit value monitoring eight different alarm functions are available. The configuration is carried out in the setup program or with the multifunction panel.

Even extensive functions can be realized due to additional parameters such as position and value of the switching differential, switch ON/OFF delay, pulse function, acknowledgement type, and startup alarm suppression. The startup alarm suppression can, for example, be used to prevent the limit value monitoring function to be tripped during the process startup phase.

Event list

The event list contains all events that occurred in the system including date and time. This includes system messages (configuration changes of a module, mains OFF/ON of the central processing unit), general events (sending an e-mail), malfunctions (module errors, communication malfunction), alarms, and collective alarms.

The list contains the last 150 events and can be invoked as text in the set language via web server and on the multifunction panel. In the event of a mains failure, the event list remains saved.

Event texts

The setup program can be used to define up to 250 event texts, each with a length of up to 31 characters. This way, customized event messages can be created.

Interfaces

The following interfaces are available:

- USB device to connect a PC (e.g. for the setup program)
- LAN (Ethernet)
(HTTP or Modbus/TCP as master/slave)
- Serial RS232
(Modbus RTU as master/slave)
- Serial RS422/485
(Modbus RTU as master/slave)
- PROFIBUS-DP as slave (as of system version 02)
- Bus Out (at the front) to connect a router module or multifunction panel via network cable

External signals

External input signals (variables) can be transmitted to the system via the fieldbus interfaces and the LAN interface (Modbus/TCP) in addition to the internal input signals. As a result, up to 64 analog variables, up to 64 integer variables, and up to 64 digital variables as well as up to 90 text variables are available.

As of system version 05, 128 analog, integer, and digital variables are supported.

Web server

The central processing unit serves as web server and thereby offers the option to comfortably access the system via LAN using a PC (web browser). This access method provides the following information:

- Process values
- Event list

Access can be protected by a password.

Alarm transmission by e-mail

Alerts can be sent by e-mail to three addresses simultaneously via a mail server. Up to five alarm texts can be configured; sending is controlled via binary signals.

If special e-mail addresses that forward to mobile phones (text messaging) or fax machines are provided in the company network, alerts can also be transmitted using these communication channels.

Program generator

Nine independent program generators are available as an option so that nine programs can run asynchronously and independently from each other. A total of 100 programs can be managed in a program pool.

The program editor, which is part of the setup program and the multifunction panel, can be used to create a program.

Each program can consist of up to three program channels with four setpoint values and 16 control contacts. Up to 100 program sections are possible. A tolerance band monitoring can be set for the first set point value of each program channel.

A program can be started, stopped, and aborted by an action on the multifunction panel, a binary signal, or via the PLC. Toggling between the program sections is possible as well. A program can also be started by setting default dates and times. The individual program channels of a program are synchronously started.

The program is completed when all program channels of the program are completed. If a program channel is prematurely completed, its setpoint values and control contacts are set to a defined value (basic status).

For manual mode, separate setpoint values and control contacts can be defined per program channel (basic status). The setpoint values can be adjusted through the multifunction panel.

The behavior after a mains interruption can be configured (e.g. program abort, continued run, or continuation/abort via multifunction panel).

As of system version 02, programs can be marked in the program editor as favorite programs, so that they appear in the program selection at the beginning of the program list.

Cyclic program repetition is supported as of system version 03 . The number of cycles is already specified in the program editor. During program run, the current cycle is indicated in the generator screen.

Program generator with process steps (as of system version 02)

A total of 90 programs can be managed in a program pool. The nine program generators support the use of up to 100 process steps. In every process step the allowed setpoint values and control contacts are selected and the time limits of a program section are defined. This assignment is normally done by the plant manufacturer because special knowledge of the plant is required.

While entering a program using the program editor, a certain process step is assigned to each program section. As a result, the specifications defined with the process step are relevant for the dedicated program section. This means: only the allowed setpoint values and control contacts can be used and the section run time has to be within the time limits.

In a process step, up to 16 process contacts that are used to control PLC functions can be activated (system versions 02 to 04). As of system version 03, the function of the process contacts is configurable (time behavior).

As of system version 03, additional functions for ramp function and section changeover are available. Furthermore, up to 50 programs may be defined as manufacturer programs which are editable by the manufacturer only.

As of system version 05, up to 64 process contacts are available. The contact designations are editable (individually for each program generator).

PLC function

The PLC function (option) is a fully adequate PLC which can be used to read all inputs and to write to all outputs of the modules in the system. A library with predefined function modules and data types including their documentation is available to the user.

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For programming a control application, all editors defined in the IEC 61131-3 standard are provided:

- Structured text (ST)
- Sequential function chart (SFC)
- Continuous function chart (CFC)
- Function block diagram (FBD)
- Ladder diagram (LD)
- Instruction list (IL)

Furthermore, a large number of functions are implemented which can be used to quickly and efficiently debug, test, and start up the application.

In addition, the user has the following functions and possibilities when using the PLC:

- Generation of events saved in the event list of the central processing unit
- Configuration of all system modules
- Process mask control of the multifunction panel

The PLC programming system is started from the setup program. Information about the system hardware (modules) is automatically loaded into the PLC programming system. The user can assign machine specific names to process data so that working with the PLC is more comfortable.

A fully adequate OPC server is available in connection with the PLC function. This simplifies the exchange of data with other systems such as SCADA systems or other control systems.

As of CODESYS version 3.5 SP3 patch 9, up to 62 digiLine sensors for liquid analysis can be integrated in the measuring, control, and automation system by a PLC application. The sensors are connected to the serial interface of the central processing unit (RS485, Modbus RTU) via a bus system.

System version 05 includes an update to CODESYS version 3.5 SP10 patch 0.

As of system version 05 a user can log on to the system through the PLC. As a result, applications such as the user logon via interface (e.g. with RFID chip card) can be implemented by a PLC application.

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Technical data

Interfaces

USB device	
Connector designation	Setup
Connector type	Mini-B
Number	1
Application	Connection to a PC (setup program)
Max. current	100 mA
System bus Out	
Connector designation	Bus Out
Connector type	RJ45
Number	1
Application	Connection of a router module or a multifunction panel
Connection cable	Network cable (patch or crossover cable), at least CAT5 (S/FTP)
Cable length	Up to 100 m
Ethernet	
Connector designation	LAN
Connector type	RJ45
Number	1
Application	Communication with PC (setup program, web server), e-mail server, and Modbus master/slave
Protocol	TCP/IP, HTTP, DHCP, SMTP+POP3, Modbus/TCP
Transfer rate	10 Mbit/s, 100 Mbit/s
RS232 or RS422/485 (serial interfaces)	Depending on the device type
Connector designation	Com1 and Com2
Connector type	D-Sub
Number	2
Application	Fieldbus applications, communication via modem with a PC (setup program) or with an e-mail server
Protocol	Modbus RTU (master or slave); PROFIBUS-DP (slave, Com2 only)
Transfer rate	Modbus: 9600 Bd, 19200 Bd, 38400 Bd; PROFIBUS: max. 12 Mbit/s

Electrical data

Voltage supply	
Connection	At the front (removable 2-pole terminal strip with Push-In technology)
Voltage	DC 24 V +25/-20 % SELV
Residual ripple	5 %
Current consumption	Max. 350 mA (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. 7 W
Conductor cross section (voltage supply)	
Wire or strand without ferrule	Min. 1.5 mm^2, max. 2.5 mm^2
Strand with ferrule	Min. 1.5 mm^2, max. 2.5 mm^2
2 x strand with twin ferrule with plastic collar	1.5 mm^2
Stripping length	10 mm
Electrical safety	Acc. to EN 61010-1 Overvoltage category III, pollution degree 2

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Electromagnetic compatibility	Acc. to EN 61326-1
Interference emission	Class A – only for industrial use –
Interference immunity	To industrial requirements
Data backup	Buffered RAM
Buffer battery service life	Approx. 10 years (Lithium battery)

Case and ambient conditions

Case type	Metal 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 × 67.1 mm (without connection elements)
Weight (fully equipped)	Approx. 670 g
Protection type	IP20, acc. 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 (climatic class 3K3 acc. to DIN EN 60721-3-3 with extended temperature and humidity range)
Site altitude	Up to 2000 m above sea level
Mechanical ambient conditions[a]	Classification acc. to DIN EN 60721-3-3, table 6, class 3M2

[a] Test conditions are listed in the System Descripton B 705000.8.

Approval/approval marks

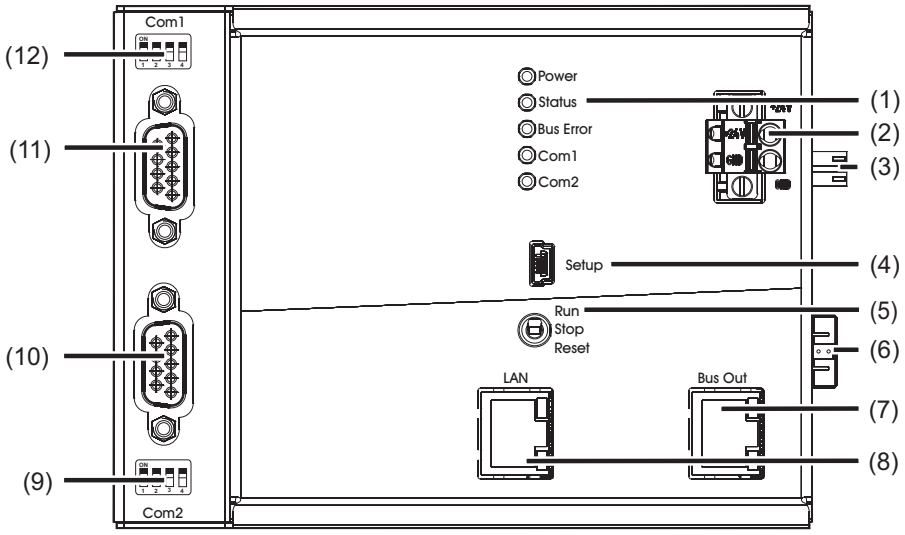
Approval mark	Testing agency	Certificate/certification number	Inspection basis	Valid for
c UL us	Underwriters Laboratories	E201387	UL 61010-1 (3. Ed.), CAN/CSA-22.2 No. 61010-1 (3. Ed.)	all types
DNV GL	DNV GL	TAA000016N	Class Guideline DNVGL-CG-0339	all types; a power supply unit with DNV GL or GL type approval is required (e.g. type 705090)

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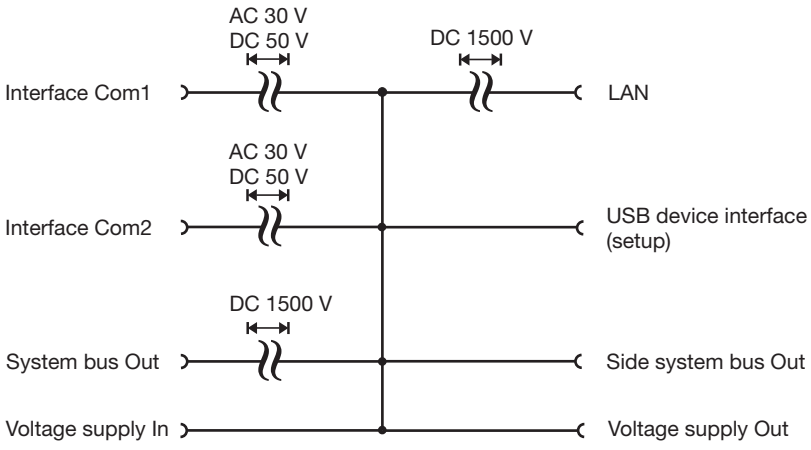
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Display, operating, and connection elements



(1) Status displays (LED)
(2) Voltage supply In, DC 24 V
(3) Voltage supply Out, DC 24 V
(4) USB device interface (setup)
(5) Switch/push-button for Run, Stop, or Reset
(6) Side system bus Out
(7) System bus Out
(8) LAN interface (Ethernet)
(9) Termination resistors Com2
(10) Interface Com2
(11) Interface Com1
(12) Termination resistors Com1

Electrical isolation



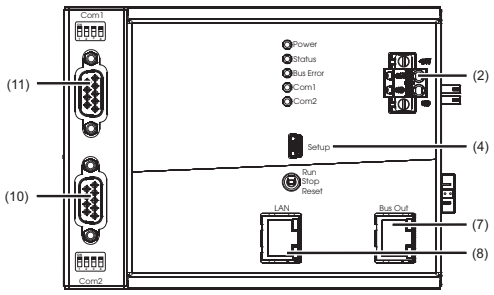
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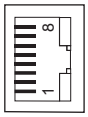
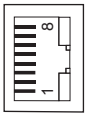
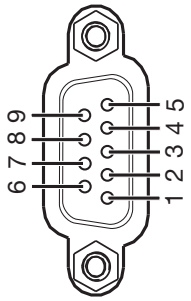
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Connection diagram

The connection diagram included in the data sheet provides initial information about the connection options. Only use the installation instructions or the operating manual for the electrical connection. The know-how and the correct technical implementation of the safety warnings/instructions contained in these documents are the prerequisite for the installation, electrical connection, and initial start as well as for the safety during operation.



Interfaces

Connection	Designation	Number	Connection element		
USB device	Setup	(4)			
System bus Out	Bus Out	(7)		1 TX+ 2 TX- 3 RX+ 6 RX-	Transmit data + Transmit data - Receive data + Receive data -
Ethernet	LAN	(8)		1 TX+ 2 TX- 3 RX+ 6 RX-	Transmit data + Transmit data - Receive data + Receive data -
Serial interface (RS232), option	Com1, Com2	(11), (10)		2 RxD 3 TxD 5 GND	Receive data Transmit data Ground
Serial interface (RS422), option	Com1, Com2	(11), (10)		3 TxD+ 4 RxD+ 5 GND 8 TxD- 9 RxD-	Transmit data + Receive data + Ground Transmit data - Receive data -
Serial interface (RS485), option	Com1, Com2	(11), (10)		3 TxD+/RxD+ 5 GND 8 TxD-/RxD-	Transmit/Receive data + Ground Transmit/Receive data -
PROFIBUS-DP, option (as of system version 02)	Com2	(10)		8 RxD/TxD-N (A) 3 RxD/TxD-P (B) 6 VP (+5 V) 5 DGND	Transmit/Receive data - Transmit/Receive data + Voltage supply + Data ground

Voltage supply

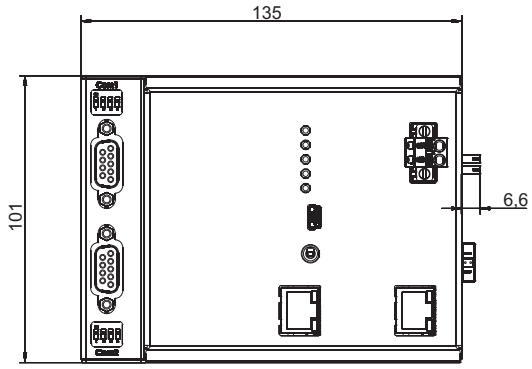
Connection	Designation	Number	Symbol and terminal designation
Voltage supply In	+24 V and GND	(2)	+ ——— +24 V U_x - ——— GND

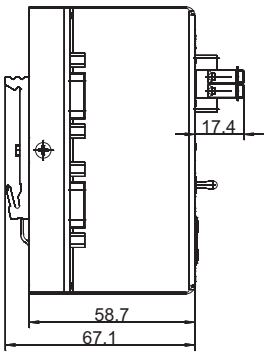
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Dimensions





Module overview

Base units

- Central processing unit
  Data sheet 705001

Input/output modules

- Multichannel controller module
  Data sheet 705010
- Relay module 4-channel
  Data sheet 705015
- Analog input module 4-channel
  Data sheet 705020
- Analog input module 8-channel
  Data sheet 705021
- Analog output module 4-channel
  Data sheet 705025
- Digital input/output module 12-channel
  Data sheet 705030
- Thyristor power controller type 70906x
  Data sheet 709061, 709062, 709063

Special modules

- Router module
  Data sheet 705040

Operating, visualization, recording

- Multifunction panel 840
  Data sheet 705060
- Operating panels
  Data sheet 705065

Power supply units

- 705090/05-33
  Data sheet 705090
- 705090/10-33
  Data sheet 705090

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Order details

	(1)	**Basic type**
705001		Central processing unit (1x Ethernet (RJ45), 1x system bus (RJ45), 1x system bus (E-Bus), monitoring of 64 limit values)
	(2)	**Basic type extension**
0		Standard
	(3)	**Version**
8		With factory settings
	(4)	**Interface Com1**
00		Not used
51		RS232 Modbus RTU[a]
54		RS422/485 Modbus RTU[a]
	(5)	**Interface Com2**
00		Not used
51		RS232 Modbus RTU[a]
54		RS422/485 Modbus RTU[a]
64		PROFIBUS-DP (slave; as of system version 02)
	(6)	**Voltage supply**
36		DC 24 V +25/-20 %
	(7)	**DNV GL approval**
000		Without approval
062		With DNV GL approval[b]
	(8)	**Extra codes**
000		Without extra code
214		Math/logic function (activation for all connected controller modules)
224		PLC acc. to IEC 61131-3 (CODESYS V3.5)
225		Program generator 1 to 9
228		Program generator 1 to 9 with process steps (as of system version 02)

[a] Any interface protocols can be implemented with the PLC (extra code 224).
[b] The power supply unit used must also have a DNV GL or GL type approval (e.g. type 705090).

	(1)		(2)	(3)		(4)		(5)		(6)		(7)		(8)	
Order code		/			-		-		-		/		,		, ...[a]
Order example	705001	/	0	8	-	00	-	00	-	36	/	000		214	

[a] List extra codes in sequence, separated by a comma.

Delivery package

1 central processing unit in the ordered version
1 cover for system bus
2 screw-on end clamps for DIN rail
1 Installation Instructions
Setup program with program editor JUMO mTRON T (30-day trial version, on MiniDVD)

DVD content (2 Mini-DVDs):
- Setup program with program editor JUMO mTRON T (30-day trial version)
- CODESYS programming software (free version)
- CODESYS Repository Package - Operating panels (free version)
- Export files JUMO digiLine (free version)
- GSD file JUMO mTRON T - CPU (free version)
- PC Evaluation Software PCA3000 (30-day trial version)
- PCA Communication Software PCC (30-day trial version)
- Documentation in PDF format

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Accessories

Description	Part no.
Interface modules (expansion boards):	
RS232 Modbus RTU	00569505
RS422/485 Modbus RTU	00569506
PROFIBUS-DP (slave; as of system version 02 and as of the central processing unit‘s production date 27/2013 (calendar week))	00569507
Extra codes (activations):	
Math/logic module (activation for all connected controller modules)	00569509
PLC according to IEC 61131-3 (CODESYS V3.5)	00569510
Program generator 1 to 9	00569511
Program generator 1 to 9 with process steps (as of system version 02)	00606498

General accessories

Description	Part no.
JUMO mTRON T system manual, English	00575577
Setup program with program editor JUMO mTRON T (on MiniDVD), incl. USB cable (A-plug to mini-B-plug, 3 m)	00569494
Program editor JUMO mTRON T (on MiniDVD), incl. USB cable (A-plug to mini-B-plug, 3 m)	00622333
PCA3000/PCC JUMO software package	00431884
PC Evaluation Software PCA3000	00431882
Release automatic print for PC Evaluation Software PCA3000	00505548
PCA Communication Software PCC	00431879
Plant Visualization Software JUMO SVS3000: See data sheet 700755	-
USB cable A-plug mini-B-plug 3 m	00506252

DVD content (2 Mini-DVDs):
- Setup program with program editor JUMO mTRON T in case of part no. 00569494
- Program editor JUMO mTRON T in case of part no. 00622333
- CODESYS programming software (free version)
- CODESYS Repository Package - Operating panels (free version)
- Export files JUMO digiLine (free version)
- GSD file JUMO mTRON T - CPU (free version)
- PC Evaluation Software PCA3000 (30-day trial version)
- PCA Communication Software PCC (30-day trial version)
- Documentation in PDF format