

JUM0 mTRON T – Your System

The scalable measuring, control and automation system



Overview



Operation, visualization and recording	6
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Multifunction panel 840 _____ 6+7



SPS

Automation



Automation _____ 28+29

"We wanted a modular measuring and control system incorporating JUMO process know-how that was user-friendly and easy to configure but also included everything that typifies a PLC."

Thomas Diel, Product Manager Systems,

Business Unit Automation

More than sensors + automation





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Dear Reader,

JUMO is a leading manufacturer in the area of industrial sensor and automation technology. As your reliable partner, JUMO is at your side to help when you have questions about recording measurements, control and automation, to give you fast and innovative solutions.

Proven transmitters, indicators, compact controllers and paperless recorder from JUMO have been used in a wide range of industries worldwide for many years.

The mTRON T is JUMO's response to customers asking us to incorporate our extensive know-how of the devices mentioned above in an automation system.

JUMO mTRON T is a scalable measuring, control and automation system from JUMO with all components fully adapted to each other. Thanks to its universal I/O modules, flexible connection technology and extensive communication, evaluation and automation software, this modularly structured system can be used in a wide variety of industries, from food industry to furnace construction or mechanical engineering. We also offer our users high measuring accuracy and control quality as well as sturdy system mechanics featuring easy service.

This brochure will give you an overview of the system layout, the modules in detail, necessary PC software and some typical applications.

The ultimate result of these solutions is innovative and efficient measuring, control and automation solutions!

Thomas Q-

Yours truly, Thomas Diel

P.S.: You can find detailed information about the JUMO mTRON T system under the specified types/product group numbers at www.JUMO.mTRON-T.net.

Contents





JUMO mTRON T – Your System System layout	4
Operation, visualization and recording Multifunction panel 840	6
Basic module Central Processing Unit	8
Input/output modules Multichannel controller module 4-channel relay module	10
4-channel analog input module 8-channel analog input module	
12-channel digital input/output module	
Special module Router module	18
Software Setup, SPS programming system	20
Applications Recording data	24
Control	
Automation	
Services and support	30





JUM0 mTRON T – Your System

The scalable measuring, control and automation system

JUMO mTRON T combines a reliable system for recording data, a control system featuring intuitive operation and a complete automation solution into a single reliable system for recording data.



System layout

System layout

JUMO mTRON T is modularly designed and uses an Ethernet-based system bus and integrated PLC, even for non-centralized automation tasks. The universal measuring, control and automation system combines JUMO's extensive process know-how with a simple, application-oriented and user-friendly configuration concept.

The core element of JUMO mTRON T is the **central Processing Unit** with a process image for up to 30 input/output modules. The CPU has higher-level communication interfaces including web server. The system has a PLC (CoDeSys V3) for individual control applications, program generator and limit value monitoring functions as well as math and logic modules.

The following components are available as **input/output modules**: The 4-channel analog input module with four electrically isolated universal analog inputs for thermocouples, resistance thermometers and standard signals. This makes it possible to record and digitize process variables precisely with the same hardware, which simplifies planning, resource management and stockkeeping. Multichannel controller modules support up to four independent PID control loops with a fast cycle time and proven control algorithm, without placing any load on the central unit. The system allows for simultaneous operation of up to 120 control loops and meets the needs of demanding control processes. Optional slots can be used to extend and adapt the inputs and outputs of each controller module individually.

The **multifunction panel** provides visualization of data as well as convenient operation of the controller and program generators. User-dependent access to parameter and configuration data of the overall system is also possible. Recording functions of a high-quality paperless recorder including web server are implemented as a special feature. Proven PC programs with standard predefined screen templates are available for reading and evaluating historical data.

A setup program is used for **hardware and software configuration** as well as project design for control tasks and recording measurement values. Users can create their own highly efficient automation solutions with CoDeSys editors in accordance with IEC 61131-3. The entire application is recorded in a single project file.







Multifunction panel 840

The panel provides a structured view of process states as well as parameter and configuration data of your system with the 8.4" TFT touchscreen. A wide range of preconfigured screen templates specially designed for controllers, program generators and recorders save time and money in your engineering processes.



Basic module Input/output modules Special module Software Applications

Operation, visualization and recording

The panel serves as an interface between the operator and machine with access to predefined screen templates, including a controller overview screen, control circuit image, program generator, a completely integrated recording function and batch reports. This reduces commissioning times enormously. The device info window gives the user a quick overview of the planned system.

Process images, program editors, event and alarm lists, device detail images and configuration screens of individual modules are also available.

Properties:

Multifunction panel, type 705060

- TFT touchscreen with resolution of 640×480 pixels and 256 colors
- Sturdy metal enclosure, IP65 on the front
- Three USB interfaces
- Two system bus interfaces
- LAN interface for web server applications

- Two serial interfaces RS232 or RS422/485 (optional), Modbus as master/slave, protocol for barcode scanner
- Configuration of input/output modules
- Customized process images
- Recording function (optional)
- Data backup via memory stick or interface
- Integrated web server

Block diagram:

Multifunction panel 840, type 705060







Central Processing Unit

The unit contains the process image of your application and also administers the configuration and parameter data of your system. Control tasks and tasks for recording measurement values can be commissioned quickly and conveniently with the JUMO setup program. No specialized knowledge is required for this purpose. The web server informs you conveniently and reliably about your process values.



Basic module

A compact, cost-effective central or distributed measuring, control and automation system can be set up with the basic module and up to 30 input/output modules as well as the router module.

Properties: Central Processing Unit, type 705001

- Nine program generators (optional)
- Limit monitoring for 64 values
- Integrated web server
- SPS CoDeSys V3 (optional)
- RAM for PLC with backup battery

- System bus connection on the front (Bus Out)
- Two serial interfaces RS232 or RS422/485 (optional), Modbus as master/slave, PROFIBUS-DP as slave
- Sturdy metal enclosure
- Fast cross-wiring with easy interconnection of modules
- Real-time clock







Multichannel controller module

The multichannel controller module features a thoroughly proven PID control algorithm including self-optimizing functions for precise control of your processes. Independent control provides maximum reliability for you as the control circuits perform their tasks quickly and reliably, independently of the central Processing Unit.



Input/output modules

The modules have removable plug-in terminals with push-in technology for electrical connections. The power supply and operating state of a module as well as the states of the digital inputs and outputs are indicated by LEDs.

Properties:

Multichannel controller module, type 705010

- Up to four controller channels, each with two parameter sets and four setpoints including ramp function
- Self-optimization using th oscillation or step response method
- Math/logic functions (optional)
- Independent operation possible
- One counting input up to 10 kHz

- Inputs and outputs can be added
- Automatic configuration after the plug-in module is replaced
- Connection for inputs and outputs on the front
- Removable terminal strips
- Saves wiring time with plug-in terminals with push-in technology
- Fast cross-wiring with easy interconnection of modules

Block diagram:

Multichannel controller module, type 705010







4-channel relay module

The relay module features visualization of four switching states with LEDs. The relay outputs are each equipped with an AC 230V/3A changeover contact.



System layout Operation, visualization and recording Basic module Input/output modules Special module Software Applications

Input/output modules

The modules have removable plug-in terminals with push-in technology for electrical connections. The power supply and operating state of a module as well as the states of the digital inputs and outputs are indicated by LEDs.

Properties:

- 4-channel relay module, type 705015
- Four relay outputs controlled by the system bus via digital signals
- Automatic configuration after the plug-in module is replaced

- Connection for relay outputs on the front
- Removable terminal strips
- Saves wiring time with plug-in terminals with push-in technology
- Fast cross-wiring with easy interconnection of modules







4-channel/8-channel analog input module

The 4-channel analog input module features four electrically isolated universal data inputs for resistance thermometers, thermocouples and standard signals.

The 8-channel analog input module offers you up to eight analog inputs for resistance thermometers with a two-wire circuit.



Input/output modules

The modules have removable plug-in terminals with push-in technology for electrical connections. The power supply and operating state of a module as well as the states of the digital inputs and outputs are indicated by LEDs.

Properties:

4-channel analog input module, type 705020

- Four high-quality, universal analog inputs for thermocouples, resistance thermometers, resistance transmitters or standard signals
- All analog inputs are electrically isolated from each other
- Customized linearization
- Limit monitoring

Properties:

8-channel analog input module, type 705021

- Eight analog inputs for resistance thermometers Pt100, Pt500, Pt1000 with two-wire circuit
- Limit monitoring

Block diagram:

4-channel analog input module, type 705020



Properties: For both modules, type 705020/705021

- An addition digital input
- Automatic configuration after the plug-in module is replaced
- Connection for inputs on the front
- Removable terminal strips
- Saves wiring time with plug-in terminals with push-in technology
- Fast cross-wiring with easy interconnection of modules

Block diagram:

8-channel analog input module, type 705021







12-channel digital input/output module

The 12-channel digital input/output module offers lots of flexibility with freely selectable digital input or output channels. Maximum permissible loading of 500 mA per digital output ensures convenient planning for your system.



System layout Operation, visualization and recording Basic module Input/output modules Special module Software Applications

Input/output modules

The modules have removable plug-in terminals with push-in technology for electrical connections. The power supply and operating state of a module as well as the states of the digital inputs and outputs are indicated by LEDs.

Properties:

12-channel digital input/output module, type 705030

- Each channel can be used as a DC 0/24V digital input or as a DC 24V digital output, maximum 500mA
- Automatic configuration after the plug-in module is replaced

- Connection for inputs and outputs on the front
- Removable terminal strips
- Saves wiring time with plug-in terminals with push-in technology
- Fast cross-wiring with easy interconnection of modules

Block diagram:

12-channel digital input/output module, type 705030







Router module

The router module makes it possible to achieve a non-centralized arrangement within the automation system, which means that input /output modules can be distributed over multiple DIN rails or in different control cabinets. Two router modules can be positioned up to 100 m from each other or a router module can be positioned up to 100 m from a basic module or a multifunction panel. Up to 30 input/output modules and max. 30 router modules are possible in a system.



System layout Operation, visualization and recording Basic module Input/output modules Special module Software Applications

Special module

Properties: Router module, type 705040

- Three system bus connections on the front (1 × Bus In, 2 × Bus Out)
- Linear topology can be extended to provide "free topology"
- No configuration necessary, or addressing via address selection switch

- Operating voltage connection on the front
- Removable terminal strip
- Saves wiring time with plug-in terminals with push-in technology
- Fast cross-wiring with easy interconnection of modules
- Front interfaces are electrically isolated









Setup program

The setup program is used for project design and configuration of the entire measuring, control and automation system. A high-quality PLC can be enabled optionally.

Properties:

- User-friendly configuration, parameterization and commissioning of basic and input/output modules and the multifunction panel
- Teleservice function (display of process data)
- Automatic transfer of hardware configuration to PLC programming software CoDeSys (Fig. 1)
- Commissioning tools (startup function, etc.)
- Program editor
- Process image editor



System layout Operation, visualization and recording Basic module Input/output modules Special module Software Applications

Software

SPS programming system

The CoDeSys development environment is a comprehensive software tool for industrial automation technology. Based on the PLC programming system as specified by IEC 61131-3, almost all automation tasks can be implemented with CoDeSys.

All editors defined in the standard are available for programming your control application (Fig. 2).



Properties:

- Structured text (ST)
- Process language (AS or SFC)
- Freely definable graphical functional plan (CFC)
- Functional plan diagram (FUP)
- Contact plan (COP)
- Instruction list (IL)









PCA3000 PC evaluation software

This professional evaluation software is used to manage, archive, visualize and evaluate historical process data (measurement data, batch data, messages, etc.). Process data can be read in via USB memory stick or made available through the PCC software.

Properties (Fig. 1):

- Data storage: backup and archiving of all process data in a single data file is easy and comprehensible
- Data backup Archive data can be read and visualized directly from the CD-ROM/DVD
- Data export: On the HTML level or an ASCII text file (for evaluation in Excel) or customized forms
- Communication: The PCC communication software is optimally adapted to the PCA3000, which makes it easy to read data via the interface or modem





System layout Operation, visualization and recording Basic module Input/output modules Special module Software Applications

Software

PCA communication software PCC

The communication software is optimally adapted to the PCA3000, which makes it easy to read data via the interface or modem.

Properties (Fig. 2):

- Data storage: backup and archiving of all process data in a single data file is easy and comprehensible
- Teleservice function (display of process data)

Plant visualization software SVS3000

The SVS3000 plant visualization software with batch-related data logging and evaluation in the network offers you effective operation, visualization and documentation. Preprogrammed graphical elements significantly reduce commissioning time.

Properties (Fig. 3):

- Create applications quickly and easily
- Extensive library with predefined graphical elements
- System operation via grouped mimics

- Extensive documentation function with continuous and batch-related evaluation
- Search function for date/time, system related and freely definable batch data
- Automatic printout and data export





Recording data

JUMO mTRON T provides comprehensive recording of data, convenient visualization and tamper-proof data archiving.





Recording image



Bargraph presentation



History



Text image



System layout Operation, visualization and recording Basic module Input/output modules Special module Software Applications

Applications

Fast and easy project design with predefined screen templates. Project design for visualization of analog and digital signals is fast and easy. Predefined screen template with high-quality graphics are available for this purpose.

Analog and digital process variables recorded by input/output modules, processed and sent continuously to the multifunction panel by way of the system bus.

Up to 54 analog and digital process values can be visualized and recorded with the recording function integrated into the multifunction panel. Nine recording groups are available for this purpose.

Batch reports can be set up for each roup. Batch data can be read in via an interface, for example with a barcode scanner, or entered directly by touchscreen. Historical data is read automatically with the PCA communication software PCC. It is also possible to move data manually to the application with a USB stick.

The PCA3000 PC evaluation software provides convenient management, archiving, visualization and evaluation of historical data. It features automated reports which are available as HTML, pdf, xml or CSV files or in print.





Numeric single channel



Digital image



Report







Control

JUMO mTRON T provides proven and reliable control with easy handling. The system includes a modular multichannel controller module suitable for a wide range of applications. Seven plug-in option cards are available to extend the system for individual needs.









Controller overview screen



Program generator image



Control circuit image



Startup (function in the setup program)



System layout Operation, visualization and recording Basic module Input/output modules Special module Software Applications

Applications

The JUMO mTRON T control system features intuitive operation. No knowledge of programming is required. The selfoptimization function ensures fast and easy commissioning. This may help you cut costs considerably, depending on the system or process.

The JUMO PID control algorithm has proven its worth thousands of times over. It gives you energy-optimized control of your processes and consistently high product quality.

Independent controller modules incorporating JUMO process know-how ensure reliable control regardless of how many pluq-in option cards are activated.

The multichannel controller module can be expanded for individual requirements with seven option cards.

The controller structure (P/PD/PI/PID) and control type (two-point or three-point controller, three-point modulating controller, continuous controller, continuous controller with

integrated position controller) can be freely selected for each control channel.

PID control circuits can be placed in operation quickly and conveniently with the self-optimization function in the module and the startup function integrated into the program. The response of the control loop to specific changes in the manipulated variable is evaluated. The user can select between the oscillatory method or the jump response.

The multi-channel controller module is suitable for fast and slow control loops (adjustable sampling time) in a wide variety of processes.





Automation

The extensive and powerful JUMO mTRON T automation system can also be expanded, by enabling the soft PLC CoDeSys, a widely accepted and used product. We use the modern and forward-looking version 3.







SPS programming system CoDeSys V3

Process image

System layout Operation, visualization and recording Basic module Input/output modules Special module Software Applications

Applications

Individual display of systems, processes and subareas is very important for an automation system. Up to 18 process images are provided for this purpose in the multifunction panel. As many as 150 objects can be represented in each process image.

Product development focused on intuitive and easy to use project design software. The JUMO setup program incorporates hardware and software configuration as well as project design for recording measurement values and control tasks with the familiar look and feel.

An option for opening the CoDeSys V3 programming system was integrated into the JUMO setup program for an automation solution as specified by IEC 61131-3. The hardware arrangement and the designation of the physical inputs/outputs are transferred. All editors defined in the standard are available in CoDeSys for programming the control application.

After the automation solution is programmed with CoDeSys, project data is transferred back from the setup program. This makes it possible to record the entire application in one project file, which greatly simplifies project management and version maintenance.





Process image editor including process image preview



Services & Support

It is the quality of our products that is responsible for such a high level of customer satisfaction. But our reliable after-sales service and comprehensive support are also appreciated. Let us introduce you to the key services we provide around our innovative JUMO products. You can count on them – anytime, anywhere.

JUMO services & support – so that it all comes together!

Production Service



Are you looking for a competitive and efficient system or component supplier? Whether you seek metal technology, electronic modules or perfectly fitting sensors, whether small batches or mass production, – we will gladly be your partner. From development to production, we can provide all the stages from a single source. Our experts will work together closely with your company to find the optimum solution for your application, and will take on all the engineering. JUMO will then make the product for you. You will benefit from state-of-the-art production technologies, as well as our uncompromising quality assurance systems.

Customized Sensor Technology

- Development of temperature probes, pressure transmitters, conductivity sensors or pH and redox electrodes as per your requirements
- Numerous test and inspection systems
- Taking over qualification for the application
- Materials management
- Mechanical testing
- Thermal testing

Electronic modules

- Development
- Design
- Test concept
- Materials management
- Production
- Logistics and distribution
- After-sales service

Metal production

- Tool manufacture
- Stamping and forming systems
- Flexible sheet metal working
- Float production
- Welding, jointing, and assembly systems
- Surface engineering
- Material testing service









Information & Training



Product Service



Maintenance & Calibration



Would you like to improve your process quality, or optimize one of your company plants? Then take us up on our offer on the JUMO homepage and participate in the know-how of a globally respected manufacturer. Under the "Services & Support" menu item, for example, you will find a highly diverse range of seminars. Available under the keyword "eLearning" are videos on specific measurement and control system topics, and under "Literature", you can find important information for beginners and practitioners. It goes without saying that you can also download the latest version of the JUMO software you require, as well as technical documentation for old and new products.

For competent support right across our product portfolio, our customers have recourse at any time to the efficient sales network we maintain on all five continents. Whether you seek advice, a selection of products, engineering or making optimum use of our products, there is always a team of competent JUMO colleagues somewhere nearby, ready to answer your questions. You can count on us after commissioning, as well. You will get a fast response from our telephone support hotline. If an on-site fault has to be eliminated, our express repair service and our 24-hour spare part service are at your disposal. That is real security.

Our maintenance service helps you to maintain optimum system and equipment availability. In this way you prevent failure and downtime. We will work out a far-sighted maintenance concept together with your company officers, and will willingly prepare all the requisite reports, documentation and protocols. Because we know how important precise measurement and control results are for your processes, we naturally also undertake the professional calibration of your JUMO instruments on site, at your company premises. We then record the result in a calibration certificate, as defined by EN 10204.

