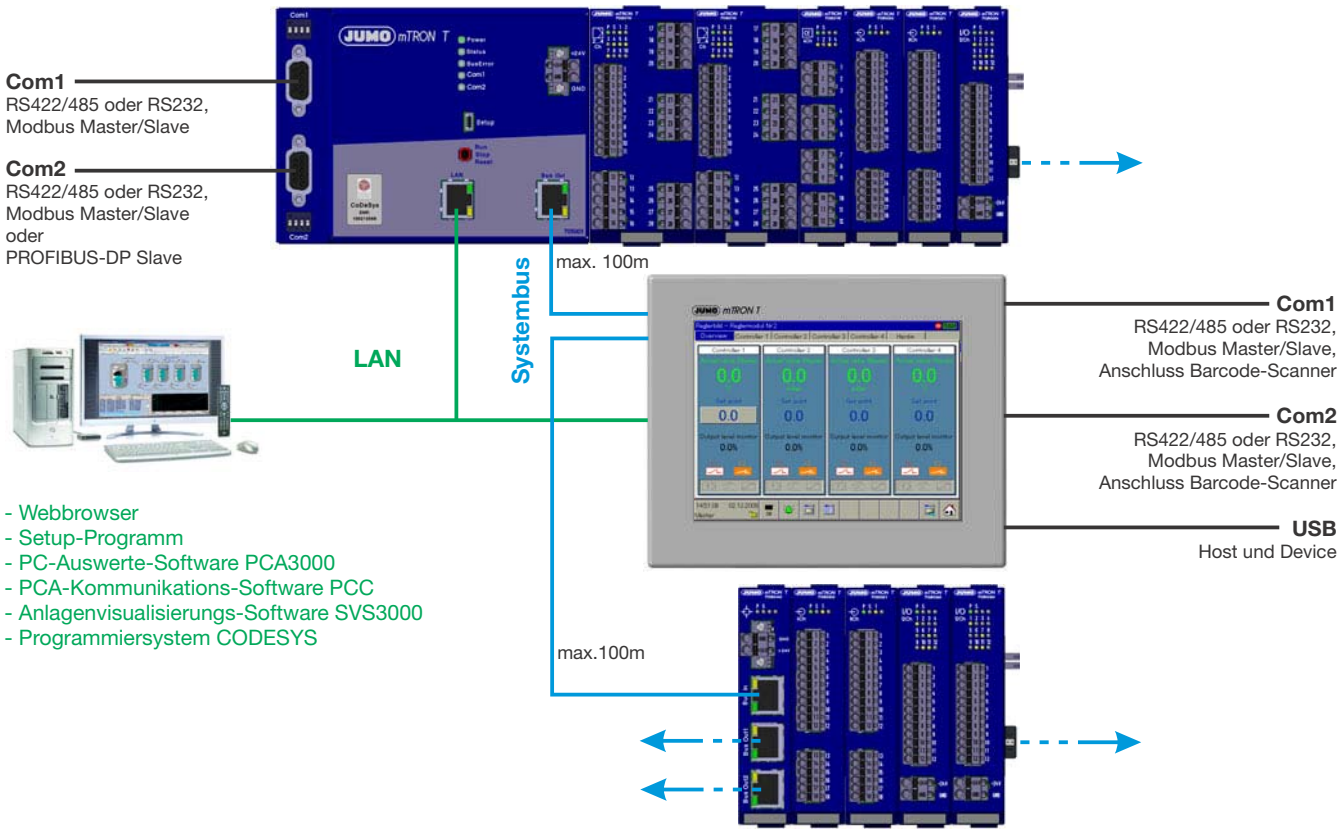
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JUMO mTRON T

Measuring, Control, and Automation System



Brief description

The modular measuring, control, and automation system is suitable for the precise detection, regulation, control, and recording. Special features of the system are the easy operation and the corresponding software components, the high measuring accuracy and regulation quality as well as the sturdy and service-friendly mechanical system.

An application consists of a base unit (central processing unit), a maximum of 30 input/output modules (multichannel controller module, analog input module 4-channel, analog input module 8-channel, analog output module 4-channel, digital input/output module 12-channel, thyristor power controller type 70906x), and if necessary the multifunction panel, up to four operating panels, and router modules for distributed module arrangement. For user-friendly all-in-one solutions, various PC programs are available.

Automation solutions for small and medium size machine lines are possible due to the integration of an optional PLC including programming system according to IEC 61131-3.

The base unit is equipped with a sturdy metal case; the router module and the input and output modules are equipped with a plastic case. All these devices can be fitted on a 35 mm DIN rail. The multifunction panel with TFT touch screen has a metal case with decor foil and is intended for mounting into a panel cut-out.

The system operates at a voltage of DC 24 V. The supply of operating voltage is only required at the base unit (central processing unit), at the router module, and at the multifunction panel.

Features

- Quick wiring of operating voltage and system bus due to easy module connection
- Flexible connection technology due to removable terminal strips with Push-In technology
- Modular device and function concept
- Touchscreen multifunction panel with predefined screen masks and customer-specific process screens
- Universal analog inputs
- Reliable, independent PID controller with self-optimization function
- Integrated PLC acc. to IEC 61131-3 (optional)
- 9 program generators (optional)
- Math and logic functions (optional)
- Fully-fledged recording function for up to 54 analog and 54 digital process values (optional)

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Description

Functionality

- Multichannel controller, program generator (optional)
- Measured data detection, visualization, and recording incl. batch reporting (optional) with multifunction panel
- Measured data archiving and evaluation by means of the PC Evaluation Software PCA3000 and PCA Communication Software PCC
- Operation, visualization und batch reporting with Plant Visualization Software SVS3000
- PLC programming system CODESYS; programming acc. to IEC 61131-3

Multilingual operation

Operation and configuration of the measuring, control, and automation system is possible in many European and Asian languages.

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

Central processing unit

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 (except for the multifunction panel).

For individual control tasks 64 limit values can be monitored.

Nine program generators and a PLC according to IEC 61131-3 are available as an option.

The central processing unit continuously compares the saved system configuration with the data of the existing modules. For this reason Plug and Play replacement of the module insert of controller and input/output modules is possible during service work (Hot-Swapping).

Multichannel controller module

In the standard version, the multichannel controller module is a 2-channel PID controller with relay output or logic output to control a solid-state relay. It is additionally equipped with three optional slots which can be used to extend the number of inputs and outputs. As a result, all common controller types can be utilized including the cascade controller. Even a 4-channel two-state controller is possible.

The module operates independently, the control task is carried out even if the central processing unit fails or the higher-ranking system malfunctions. This behavior can be configured.

All controller channels can operate as a fixed-setpoint controller or a program controller. The programs are specified by the program generator function of the central processing unit or by the PLC.

Math and logic functions can be utilized by the user with the setup program.

Multifunction panel 840

The multifunction panel with TFT touch screen is used for clearly-arranged measured data visualization, operation, configuration, and parameterization of the system.

As an interface between man and machine, it allows a clear look into the process statuses and parameters of the system. It is perfectly suited for the display and operation of the controller screen, process screen, program editor or recording function. Controller setpoint values and texts for batch reporting can be directly entered on the screen.

Operating panels 350, 570, 1040

As of system version 02 the measuring, control, and automation system supports the use of up to four operating panels. The panels contain a CODESYS runtime system (V3.5 SP3 patch 9 or higher) and they are connected via Ethernet to the central processing unit's LAN interface.

The function of an operating panel is implemented as a PLC application (target/web visualization).

Input/output modules

The following input/output modules extend the system in addition to the multichannel controller module:

- Relay module 4-channel
- Analog input module 4-channel
- Analog input module 8-channel
- Analog output module 4-channel
- Digital input/output module 12-channel
- Thyristor power controller, type 70906x

Router module

The router module is used to achieve decentralization within the automation system (the input/output modules are distributed to several DIN rails/control cabinets). Up to 100 m distance between two router modules or between a router module and a base unit/ multifunction panel are possible. Up to 30 router modules and up to 30 input/output modules are possible in a system.

No configuration of the router module is required. It is integrated into the overall system by the setup program.

PLC function

The PLC function can be used to read and write to all inputs and outputs of the system modules. A library with predefined function modules and data types including their documentation is provided for the user.

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 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 screen control of the multifunction panel

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

A fully adequate OPC server (OPC DA) 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.

Event list

The event list within the central processing unit 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.

An alert e-mail can be sent up to three addresses simultaneously. Up to five alarm texts can be configured, the sending is controlled via digital signals.

Recording function

The optional recording function in the multifunction panel detects, visualizes, and records all measuring and process data. The user can transfer the data to the PC Evaluation Software PCA3000 using a USB memory stick or

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the PCA Communication Software PCC. The data can then be evaluated in the software.

Interfaces

The connection to PC programs (setup, evaluation, visualization and PLC programming) and higher-ranking systems is established via standardized interfaces.

The following interfaces are available:

- 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)
- USB device/host

The connection of additional devices (barcode scanner, paperless recorder, power controller, etc.) is possible.

Voltage supply

The measuring, control, and automation system operates at a voltage supply of DC 24 V. The supply is only required at the base unit (central processing unit), at the router module, and at the multifunction panel.

System expansions

The measuring, control, and automation system JUMO mTRON T is continuously expanded by the enhancement of the setup program and by the integration of new hardware. These system expansions are implemented in the context of new system versions (expansion stages).

System version 02

- Program generator with process steps
- Advanced user administration
- Extended process screen editor

System version 03

- Analog output module 4-channel
- Cyclic program repetition
- New and extended functions of the program generators for process engineering (ramp function with end value, manufacturer programs, configurable section changeover)
- Extended function of the process steps (configurable process contacts)
- Process screen input mask with individual text in the title bar
- Touchscreen operation recognized in the PLC
- Hierarchic user administration on the multifunction panel 840
- Horizontal recorder screen (analog and digital channels) in the multifunction panel 840

System version 04

- Connection of thyristor power controllers type 70906x (via system bus)
- Connection of up to 62 digiLine sensors for liquid analysis to the central processing unit (via Modbus RTU) and integration into the system by PLC application (as of CODESYS version 3.5 SP3 patch 9; extra code 224 required)
- 90 external batch texts (text variables) via Modbus
- Additional PLC library functions for configuration and operation of the multifunction panel
- Automatic user logoff after an adjustable period of time
- Setpoint standardization for realizing a cascade control
- Improved ease of use for the process screen editor
- Calculation of the maximum recording time of measurement data (recording data) during group configuration
- Remote maintenance of a customer's PLC application (CODESYS) via TCP connection (no gateway required)

System version 05

- Update to CODESYS version 3.5 SP10 patch 0
- Program preview in the multifunction panel 840 (only for central processing unit with extra code 225)
- Preparation of user logon via interface (e.g. with RFID chip card)
- Expansion of the process contacts in the process steps from 16 to a maximum of 64; introduction of editable designations for the process contacts
- Introduction of editable designations for the limit value monitoring, binary linking, and math/logic functions
- Extension of the TAG numbers (designation for PLC) of inputs and outputs from 7 to 42 characters
- Increase in the number of the analog, integer, and the digital variables within the central processing unit from 64 to 128; introduction of TAG numbers (42 characters) for these variables
- Additional configuration parameters and process values of the multichannel controller module are accessible via Modbus
- Changeable SMTP port number for sending emails
- Copying of PLC generated measurement data to a USB flash drive (in a generally readable format)
- Expanded import and copy functions in the setup program (import module configuration, import Modbus frames, copy frame entries to another frame)
- Expansion of the analog selector in the multichannel controller module for the independent operating mode (current setpoint value and actual value of the controller channel)

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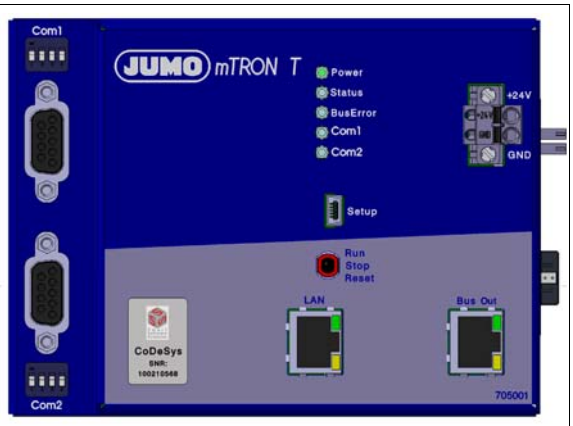
Base units

- The base unit, up to 30 input/output modules, and up to 30 router modules can be used to build a compact and economic central or decentral measuring, control, and automation system (visualization and operation either with the multifunction panel or the plant visualization software JUMO SVS3000).
- The base units contain the process image of the application. Furthermore, all configuration and parameter data of the system are stored in these modules (except for the multifunction panel). As a result, individual input/output modules can be replaced with Plug and Play.
- All base units operate at a voltage supply of DC 24 V.
- The setup program or the multifunction panel can be used to comfortably configure and parameterize the base units.
- LEDs are used to indicate the voltage supply as well as the operating status of a module and of the interfaces.

Central processing unit

CPU

- The central processing unit is the basis for the maximum extension of the system
- Nine program generators (option)
- 64 limit values are monitored
- An integrated PLC acc. to IEC 61 131-3 (option)
- Math and logic function (option) for all connected multichannel controller modules
- Two interfaces for field bus applications; optional:
  - RS232, Modbus RTU as master or slave
  - RS422/485 Modbus RTU as master or slave
  - PROFIBUS-DP as slave (as of system version 02)
- One USB device interface (setup)
- System bus connection at the front (Bus Out)
- A LAN interface (Ethernet) for HTTP and Modbus/TCP as master and slave
- Integrated web server
- E-mail transmission
- The central processing unit operates at a voltage supply of DC 24 V and supplies the connected input/output modules
- Dimensions (W x H x D): 135 mm x 101 mm x 67.1 mm (without connection elements)



For further information: Refer to data sheet 705001

Additional base units in preparation.

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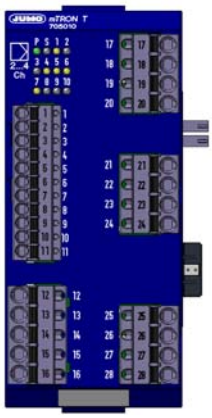
Input/output modules

- The modules are equipped with removable terminal strips with Push-In technology for the electrical connection.
- All input/output modules operate at a voltage supply of DC 24 V.
- The setup program, the multifunction panel or the optional PLC can be used to comfortably configure and parameterize the modules.
- LEDs are used to indicate the voltage supply as well as the operating status of a module and the input/output statuses.
- For service work (replacement) or adding optional boards, the module insert can be easily pulled out of the case at the front.

Multichannel controller module



- 2-channel PID controller with relay output or logic output to control solid-state relays
- Up to 4 PID controller channels can be activated (cascadable)
- Two universal analog inputs, two digital inputs (DC 0/24 V) and two digital outputs (relay or logic DC 0/15 V)
- Supported measuring probes: Thermocouples, RTD temperature probes, resistance transmitters, resistance/potentiometers, or standard signals (current or voltage)
- The analog inputs are electrically isolated from each other
- Three option slots for the extension of up to four universal analog inputs, eight digital inputs, three analog outputs, or eight digital outputs
- Supported controller types: Two-state controller, three-state controller, modulating controller, continuous controller, or continuous controller with integrated actuator controller
- Customer-specific linearization possible by using a formula
- Limit value monitoring
- Four formulae for math and logic functions (option)
- One counting input up to 10 kHz
- The module operates independently (configurable) which means the control task is carried out even if the base unit or the higher-ranking system malfunctions
- If the controller is replaced during service work the new controller (identical type) is automatically configured
- Dimensions (W x H x D): 45 mm x 103.6 mm x 101.5 mm (without connection elements)

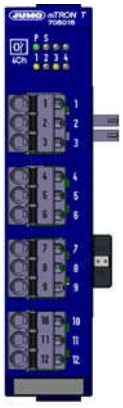


For further information: Refer to data sheet 705010

Relay module 4-channel



- Four relay outputs controlled via the system bus by digital signals
- Each relay is equipped with a changeover contact AC 230 V / 3 A
- Separate terminal strip per relay output
- Automatic configuration after the module insert has been exchanged during service work
- Dimensions (W x H x D): 22.5 mm x 103.6 mm x 101.5 mm (without connection elements)



For further information: Refer to data sheet 705015

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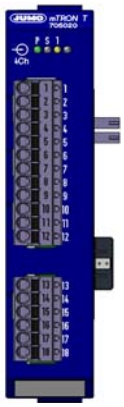
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Analog input module 4-channel



- Four universal analog inputs
- Supported measuring probes: Thermocouples, RTD temperature probes, resistance transmitters, resistance/potentiometers or standard signals (current or voltage)
- The analog inputs are electrically isolated from each other
- Customer-specific linearization possible by using a formula or up to 45 pairs of values
- Limit value monitoring
- Automatic configuration after the module insert has been exchanged during service work
- A digital input (DC 0/24 V) is also provided
- Dimensions (W x H x D): 22.5 mm x 103.6 mm x 101.5 mm (without connection elements)

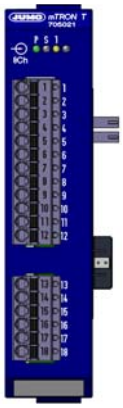


For further information: Refer to data sheet 705020

Analog input module 8-channel



- Eight analog inputs for RTD temperature probes Pt100, Pt500 or Pt1000 in 2-wire circuit
- The analog inputs are not electrically isolated from each other
- Limit value monitoring
- Automatic configuration after the module insert has been exchanged during service work
- A digital input (DC 0/24 V) is also provided
- Dimensions (W x H x D): 22.5 mm x 103.6 mm x 101.5 mm (without connection elements)

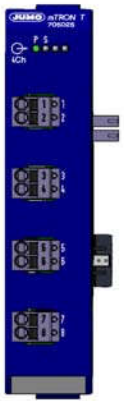


For further information: Refer to data sheet 705021

Analog output module 4-channel



- Four analog outputs 0(2) to 10 V or 0(4) to 20 mA (configurable per channel)
- The analog outputs are electrically isolated from each other
- Configurable behavior in case of an error, e.g. acc. to NAMUR recommendation NE 43
- Automatic configuration after the module insert has been exchanged during service work
- Dimensions (W x H x D): 22.5 mm x 103.6 mm x 101.5 mm (without connection elements)



For further information: Refer to data sheet 705025

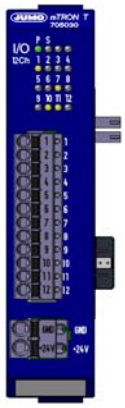
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Digital input/output module 12-channel

- 12 channels which can be respectively configured as digital inputs (DC 0/24 V) or as digital outputs (DC 0/24 V, 500 mA)
- Supply of external voltage through terminal at the front
- Automatic configuration after the module insert has been exchanged during service work
- Dimensions (W x H x D): 22.5 mm x 103.6 mm x 101.5 mm (without connection elements)



For further information: Refer to data sheet 705030

Thyristor power controller type 70906x

- Various device versions for single-phase operation, for operation in three-phase economy circuit and full three-phase operation
- Integration in the measuring, control, and automation system via system bus, using a network cable
- Each power controller counts as one input/output module (a maximum of 30 modules per system)
- Access to various process values of the power controller

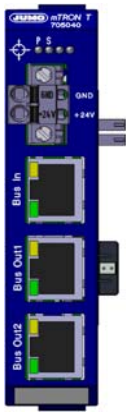


For further information: Refer to data sheets 709061, 709062, 709063

Special modules

Router module

- The router module distributes the input/output modules to several DIN rails/control cabinets (decentralized arrangement)
- It uses the system bus to link modules to the base unit or the multifunction panel
- Up to 100 m distance between two router modules or between a router module and the base unit or the multifunction panel
- Up to 30 router modules are possible
- The router module operates at a voltage supply of DC 24 V and supplies the connected input/output modules
- No configuration of the router module required
- For applications such as Hot Connect, for example, the address of the router module can be set by rotary coding switches
- Three RJ45 system bus connections at the front (1 × Bus In, 2 × Bus Out), electrically isolated
- Dimensions (W x H x D): 22.5 mm x 103.6 mm x 101.5 mm (without connection elements)



For further information: Refer to data sheet 705040

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Operating, visualization, recording

Multifunction panel 840

HMI

- Touchscreen with front made of aluminum incl. design foil (IP67)
- TFT color monitor 21.3 cm (8.4”), resolution 640 x 480 pixels, 256 colors, with LED backlight
- As an interface between man and machine it allows an optimal and clearly-arranged view of the process statuses and parameters of the system
- Display (in real time) and operation of controller screen, process screen, program editor, and recording function (option)
- Configuration of all connected modules
- Setpoint values and batch texts are directly entered on the screen
- Data archiving and evaluation with PC
- The multifunction panel operates at a voltage supply of DC 24 V
- A setup program can be used to comfortably configure the multifunction panel
- Two interfaces for field bus applications; optional:
  - RS232, Modbus RTU as master or slave
  - RS422/485, Modbus RTU as master or slave
- One USB device interface (setup)
- Two USB host interfaces (memory stick)
- Two system bus connections (Bus In and Bus Out)
- A LAN interface (Ethernet) for HTTP and Modbus/TCP as master and slave
- Integrated web server
- E-mail transmission
- Connection possibility for barcode scanner
- Dimensions (W x H x D): 235 mm x 195 mm x 58 mm



For further information: Refer to data sheet 705060

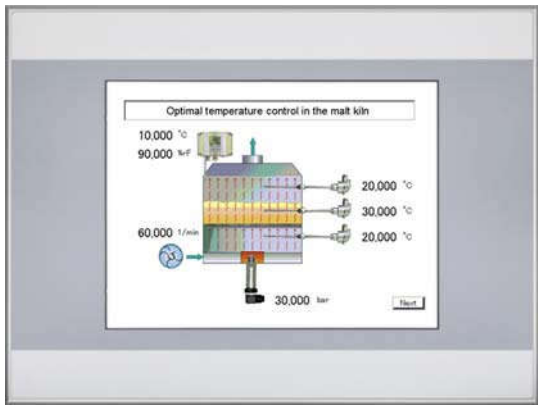
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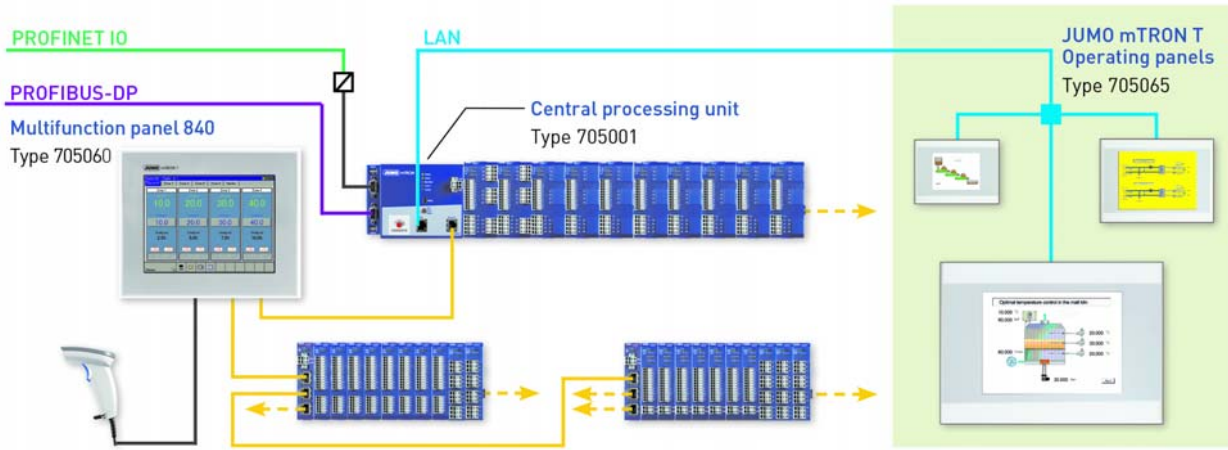
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Operating panels 350, 570, 1040

- TFT color display (64k colors) with resistiv-touch technology
- Display sizes 8.9 cm (3.5"), 14.5 cm (5.7"), and 26.4 cm (10.4")
- Display resolutions 320 × 240 pixels and 640 × 480 pixels
- Different case materials (plastics, metal)
- Protection type IP65 (at the front)
- Voltage supply DC 24 V
- Ethernet interface (RJ45) for connection to the system
- Up to four operating panels per central processing unit (PLC option required)
- Specific process screens for operating the system
- Direct access to PLC variables



System structure:



For further information: Refer to data sheet 705065

Power supply units

These power supply units are suitable for demanding tasks requiring the latest state-of-the-art technology and special flexibility. The excellent efficiency, the high peak load capability, and many additional features distinguish this series.

Power supply units 705090/...

- Voltage supply AC 100 V ... 240 V
- 150 % peak load capability (for typical 4 s)
- Minimum current inrush
- Floating DC-OK relay contact
- Efficiency up to 93.5 %
- Active power factor correction (PFC)
- Active filter against mains transients
- Quick connection due to spring-cage terminals
- Dimensions (W x H x D):
  705090/05-33: 40 mm x 130.5 mm x 121.5 mm
  705090/10-33: 60 mm x 130.5 mm x 121.5 mm





For further information: Refer to data sheet 705090

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PC programs

Setup program

SET

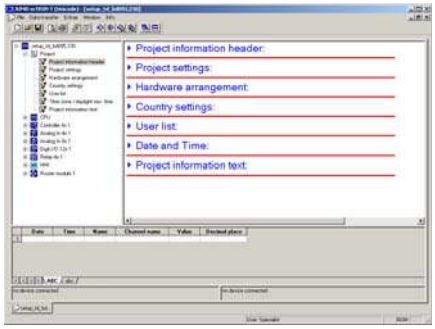
Setup program for project planning and configuration of the entire measuring, control, and automation system

A complete PLC can be activated as an option.

The setup program is distinguished by:

- User-friendly configuration, parameterization, and startup of the base units, the input/output modules, and the multifunction panel
- Automatic import of the hardware configuration into the PLC programming software CODESYS
- Program editor
- Process screen editor

The project file contains all data that is relevant for the configuration, parameterization, and visualization. The file also contains the controller programs and, if applicable, the customer-specific PLC code.



For further information: Refer to operating manual 705000.6

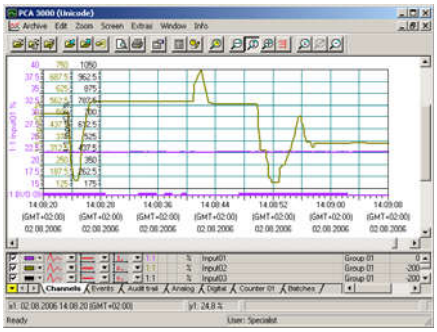
PC Evaluation Software PCA3000

PCA

Professional evaluation software to manage, archive, visualize and evaluate process data (measuring data, batch data, messages, ...)

The process data can be imported via USB memory stick or provided by the software PCC.

- Data memory: Clearly arranged and easy backup and archiving of all process data in a data file
- Data backup: Archive data can directly be imported from CD/DVD and then displayed
- Data export: Data export to HTML level or ASCII text file (for evaluation in Excel) or customer-specific forms
- Communication: The communication software PCC optimally adapted to PCA3000 can be used to comfortably import data via an interface or a modem



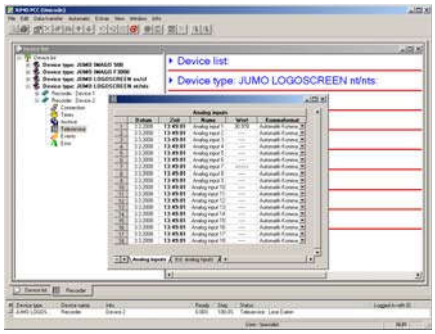
For further information: Refer to operating manual 709701.0

PCA Communication Software PCC

PCC

The communication software PCC optimally adapted to PCA3000 can be used to comfortably import data via an interface or modem.

- Data memory: Clearly-arranged, easy backup and archiving of all process data in a data file
- Teleservice function (display of the process data)



For further information: Refer to operating manual 709702.0

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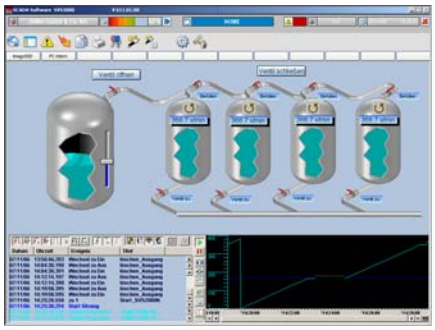
Plant Visualization Software JUMO SVS3000

SVS

Plant Visualization Software for online visualization, batch reporting and operation of the measuring, control and automation system with a networked PC

This software ensures quick familiarity and easy creation of applications. The user is able to quickly configure an individual application according to his/her requirements due to the prepared masks (process, group, trend screens).

- Easy and quick application creation
- Extensive library with predefined graphical elements
- System operation via group masks
- Extensive documentation function with continuous and batch related evaluation
- Search function for date/time, plant, and batch criteria to be defined
- Automatic print and data export
- Recipe function
- Quick and easy commissioning/startup due to installation menu
- Alarm and event list
- Password protected
- History and real time trend
- Network compatible
- Connection of bar code scanner
- Remote alerting (optional)



For further information: Refer to data sheet 700755

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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