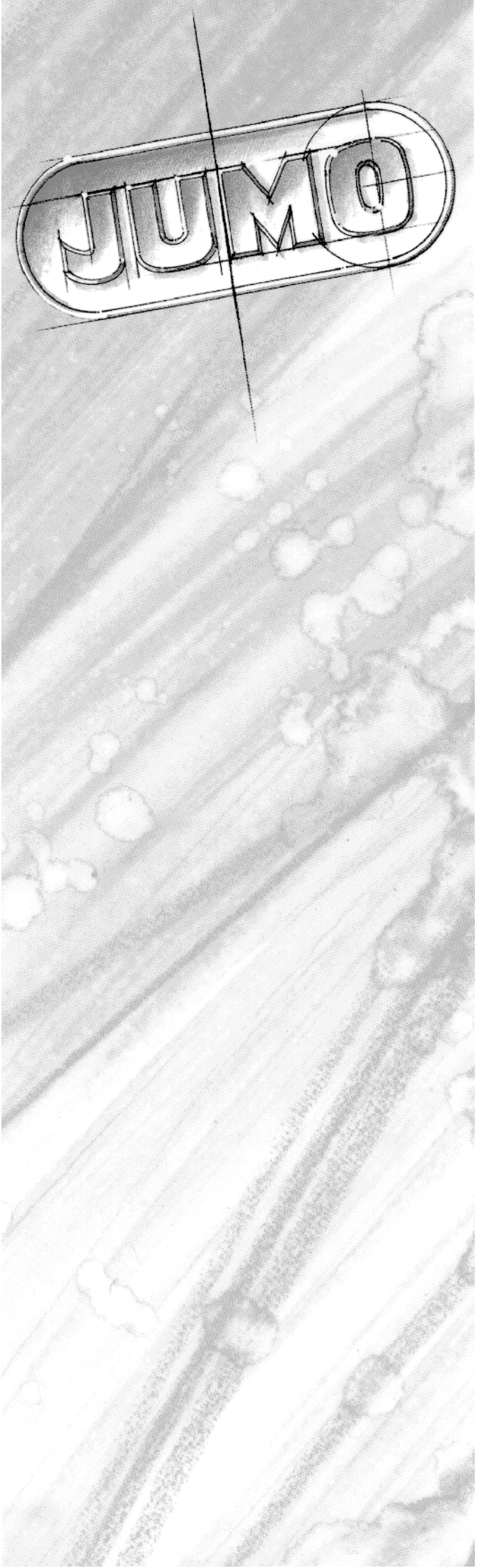


General section

70.4000
System Manual Part 1

Contents

Contents

1.1 Foreword

The System Manual is addressed to the OEM (original equipment manufacturer) and to the user with appropriate technical know-how. It describes the specification of the JUMO mTRON automation system with its modules and provides all the information required for system design and start-up.

This part 1 of the System Manual summarises the information which applies to all the modules. This is supplemented by descriptions on the individual modules in other system manuals.

Part 2 of the System Manual “Project Design Software JUMO mTRON-iTOOL” describes the project design in the mTRON automation system.
Keep this System Manual in a place which is accessible to all users.

If any difficulties should arise during start-up you are asked not to carry out any manipulations which are not permitted. This could endanger your rights under the warranty. Please contact the nearest office or the main factory.

Trademarks

LON and Neuron are registered trademarks of the Echelon Corporation.
Microsoft and Windows are registered trademarks of the Microsoft Corporation.

Please assist us to improve this System Manual where necessary.
Your suggestions will be most welcome.

Phone Germany (06 61) 60 03-7 27
abroad (int.+ 49) 661 60 03-0
Fax Germany (06 61) 60 03-5 08
abroad (int.+49) 661 60 03-500

1.2 List of items supplied

Check each shipment for completeness and damage.
If anything is missing or damaged please contact the nearest JUMO office or the main factory.

Module

The equipment supplied consists of:
- the module(s)
- Installation Instructions
- connector blocks with screw terminals and
- mounting elements.

The installation instructions are addressed to the personnel responsible for installation and electrical connection.
It describes the module with its indications and controls, provides assistance in cabling, and contains the electrical connection diagram.

JUMO mTRON-iTOOL

The JUMO mTRON-iTOOL project design software consists of:
- CD-ROM
- System Manual JUMO mTRON.

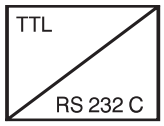
Contents of the CD-ROM

The project design software JUMO mTRON-iTOOL and the installation program are stored on a CD-ROM. It is installed on a PC from the CD-ROM by means of the installation program.

A set of diskettes of the project design software JUMO mTRON-iTOOL can be copied by means of the installation program. With the diskettes the project design software can also be installed on a PC without CD-ROM.

1.3 Accessories

PC interface



A PC interface can be supplied for setting the module parameters. The cable, 2 m long, with TTL/RS232C converter links the module to a PC.
Sales No. 70/00301315

JUMO mTRON-iTOOL

Using the JUMO mTRON-iTOOL project design software, JUMO mTRON automation systems can be designed graphically on the PC. The program in its menu structure follows the arrangement of MDI programs under Windows. This means that several projects can be opened simultaneously, each of which is shown in its own project window. The user is able to link modules together via the network so that data can be interchanged. The settings of application-specific parameters is also possible.

1.4 Typographical conventions

Warnings

The signs for **Danger** and **Warning** are used in this Manual under the following conditions:

Danger
This symbol is used when there may be **danger to personnel** if the instruction is disregarded or not followed accurately.

Warning
This symbol is used when there may be **damage to equipment or data** if the instruction is disregarded or not followed accurately.

Warning
This symbol is used where special care is required when handling electrostatically sensitive components.

Notes

Note
This symbol is used when your **special attention** is drawn to a remark.

Reference
This symbol refers to addtional information in other handbooks or sections.

abc[1]

Footnote
Footnotes are notes which refer to certain points in the text.
Footnotes consist of 2 parts:

Markings in the text and the footnote text.

The markings in the text are arranged as continuous raised numbers.

The footnote text (in smaller typeface) is placed at the bottom of the page and starts with a number and a full stop.

✱

Action
This symbol indicates that an action is being described. The individual steps are indicated by this symbol, e.g.:

✱ switch off the supply

✱ pull connectors off the module

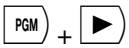
Representation on the operating unit

Scaling start [ScalStart]

The parameter texts are shown in abbreviated form on the operating unit. The abbreviations are given in square brackets.

Presentation

Keys
Keys are shown as boxes. Both symbols and text are possible. Where a key has multiple functions, the text shown is the one corresponding to the actual function discussed.



Key combinations
Depiction of keys together with a plus sign means that the keys must be pressed simultaneously.

Scaling start

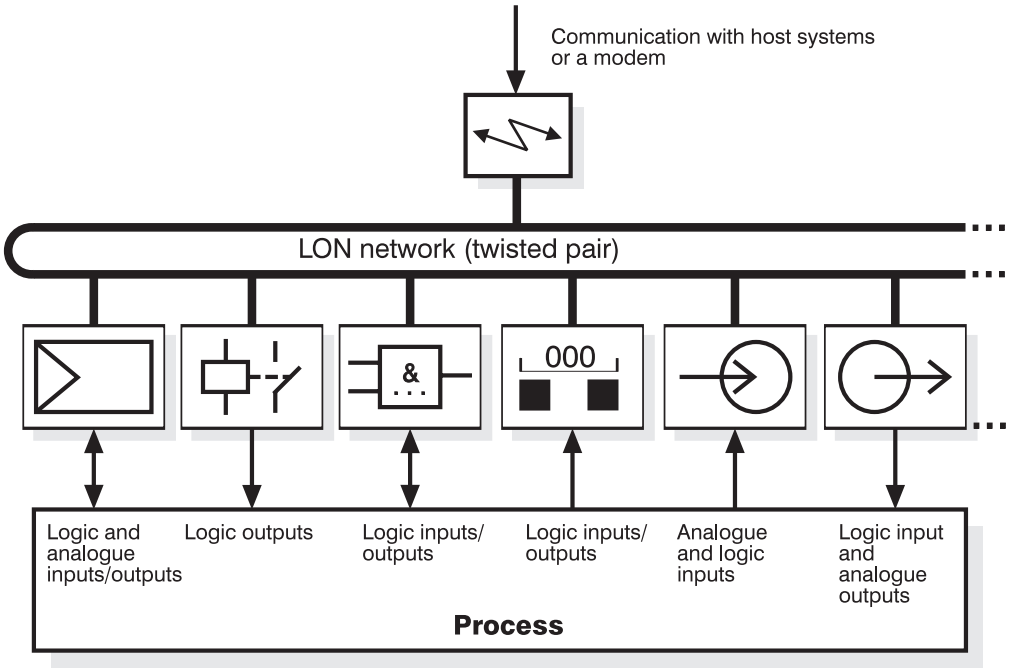
Screen texts
Where this System Manual refers to concepts of the JUMO mTRON-iTOOL project design software these are shown in *italics*, if that is helpful (e. g. block structures).

Edit ➔ *instrument data...*

Menu items
Where this System Manual refers to menu items of the JUMO mTRON-iTOOL project design software they are shown in *italics*.
Menu name, menu item and submenu item are each separated by the symbol "➔".

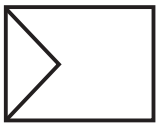
1 Introduction

2.1 JUMO mTRON modules



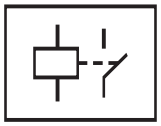
The JUMO mTRON automation system consists of autonomous modules which have defined functions assigned to them. The module housing, size 91 x 85.5 x 73.5 mm (W x H x D) is made from plastics and mounted on a standard rail. Connection to sensors and actors are made through plug connectors with screw terminals.
Each unit incorporates a network connection for communication and for data exchange between the units. Numerous process and status signals can be exchanged with other units via the network. A screened twisted pair is used as transmission line. There is a setup interface for parameter setting and configuration of the units.

Controller module



Apart from logic inputs there are two analogue inputs for standard signals, Pt100 and thermocouples. The outputs consist of two logic outputs and one analogue output. Using the function blocks ramp, maths, controller and limit comperator it is possible to build up complex control structures. Two controller parameter sets are stored for four definable setpoints. A fully developed auto-tuning function automatically adapts the controller to the characteristics of the process.

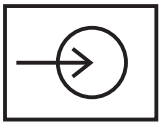
Relay module



This module provides the functions limit comparator, pulse duration modulation and pulse frequency modulation through logic outputs. Switch-on and switch-off delays can be defined on the limit comparator. Integral drivers can be used for operating motorised actuators.

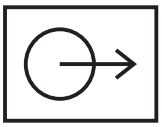
2 The JUMO mTRON automation system

Analogue input module



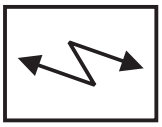
The module has four analogue signal inputs which can be configured for all the usual sensor signals. Linearisation of the signals through a customized table is also available. The four signal inputs are arranged in two groups, with isolation between the groups. The module incorporates a maths function and a comparator through which linkages between the signals can be generated. The results are output to the network.

Analogue output module



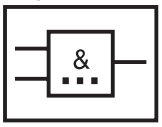
The analogue output module has two isolated analogue outputs. The output signals correspond to the values at the network inputs, converted according to the set parameters (current 0 — 20 mA or 4 — 20 mA, voltage 0 — 10V or 2 — 10V). Using a logic input a process status can be captured and processed in subsequent modules.

Communication module



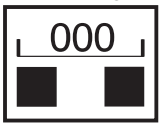
The communcation module can be linked to a PC through an RS232C interface. Networking with other automation units is possible in the version with RS485/422 interface using the MODbus protocol. External alarm messages can be handled using a logic input. Logic network inputs for alarm processing are also available. Together with a modem the module provides a connection to the JUMO mTRON modules via the public telephone system and permits remote operation of the installation. An internal 512kbyte store is available for storing process signals.

Logics module



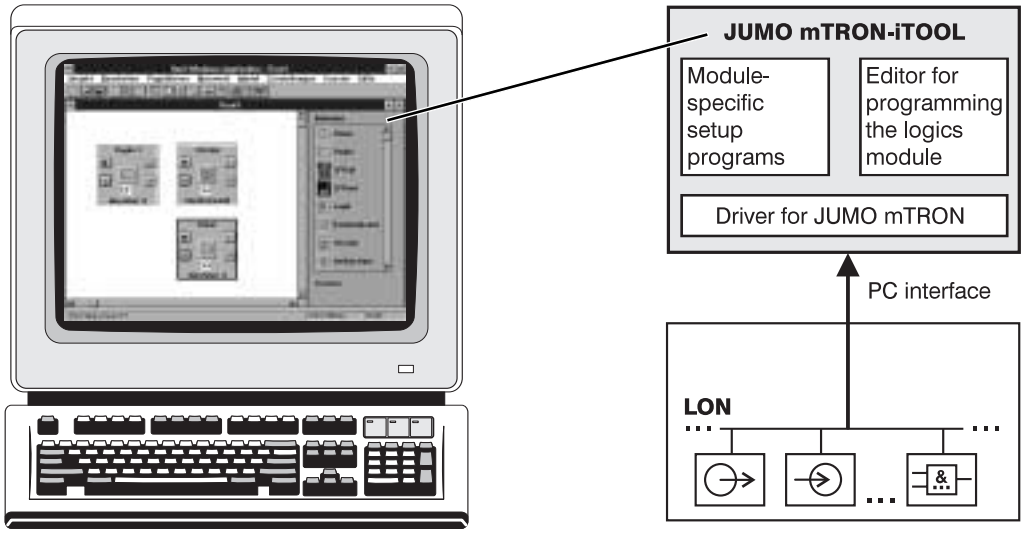
The logics module has eight logic inputs and six logic outputs. With this module the user is able to define his own arithmetic and/or logic functionalities which can be used as required within the overall system.
The input is made using the “Structured Text” user programming language. Logic, arithmetic, bit sequence, comparative, selection and instruction operations are available. A library contains function blocks for e.g. timing elements, counters, edge recognition, bistable functions and many more.

Operating unit



The operating unit is mounted into the cabinet door and permits optimal and orderly insight into the process states and the system parameters of the JUMO mTRON automation system. Using six keys the parameters of the JUMO mTRON modules can be set via the network under menu guidance. In addition, user-defined process windows and alarm messages can be shown on the 2 x 20 place display.

2.2 Project design software JUMO mTRON-iTOOL



JUMO mTRON-iTOOL is the design, start-up and installation tool for LON® networks which are realised with the modules of M. K. JUCHHEIM GmbH & Co.

A module library containing the individual modules as graphic objects can be called up at any time during project design. The modules required for the project are taken from the library using Drag & Drop and can be placed freely on the working area. Any names can be assigned to the modules to provide a direct relationship with the real installation. The object carries a module-dependent pictogram for quick visual recognition. Using JUMO mTRON-iTOOL the user is able to link modules of the JUMO mTRON automation system, to set application-specific parameters with the aid of the embedded setup program, and to load the completed project in the JUMO mTRON automation system.

When the project design has been completed and the project is operating, values of network variables can be indicated online. This provides a direct check on the design of the real installation.

⇨ System Manual Part 2 “Project Design Software JUMO mTRON-iTOOL“

2 The JUMO mTRON automation system

3.1 Location and climatic conditions

Modules

The modules are designed for mounting in cabinets on standard rails 35mm x 7.5mm to EN 50 022. Protection is IP20 to EN 60 529.

Operating unit

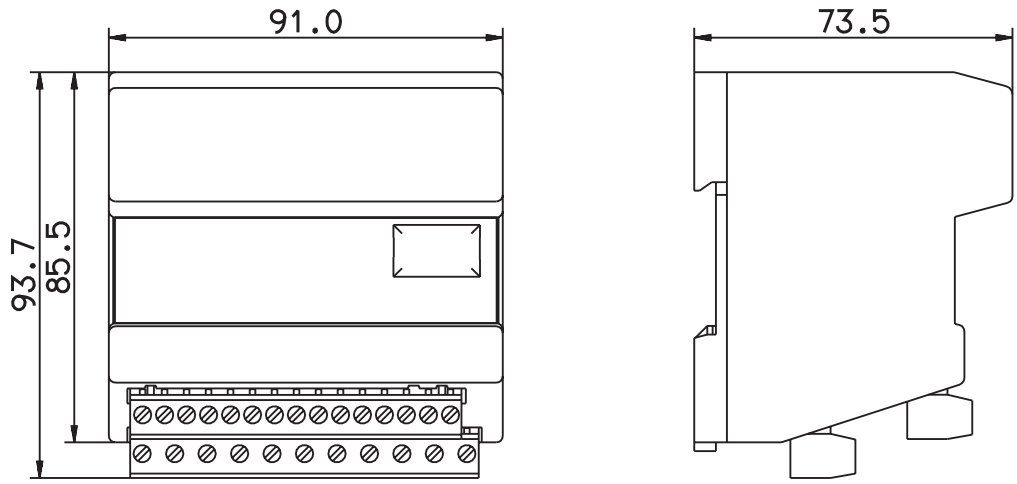
The operating unit is suitable for fitting into control panels. Protection is IP65 on the front and IP20 at the back (EN 60 529).

The ambient temperature at the location can be between 0 and 50°C at a relative humidity not exceeding 80% (EN 61 010) without condensation.

⇨ Section 6.1: “Technical Data”

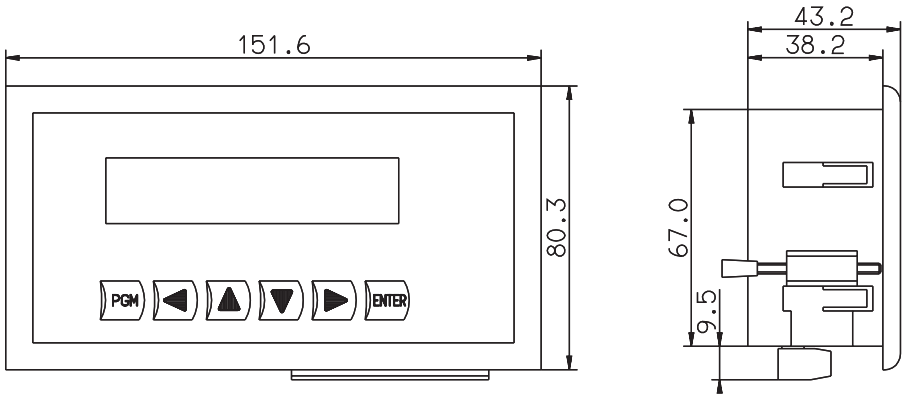
3.2 Dimensions

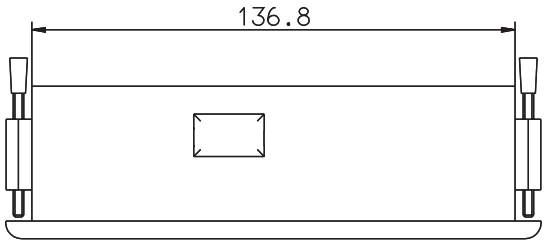
Modules



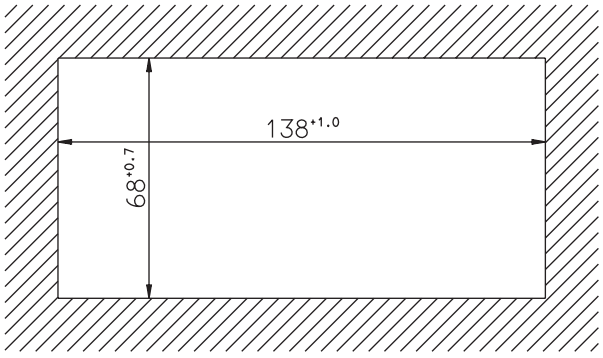
3 Mounting in position

Operating unit



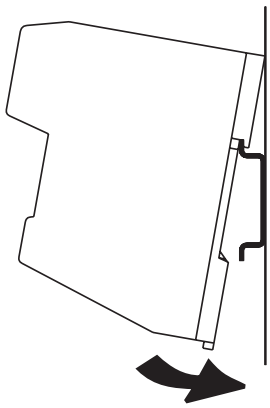


Panel cut-out to DIN 43 700



3.3 Mounting the module on the rail

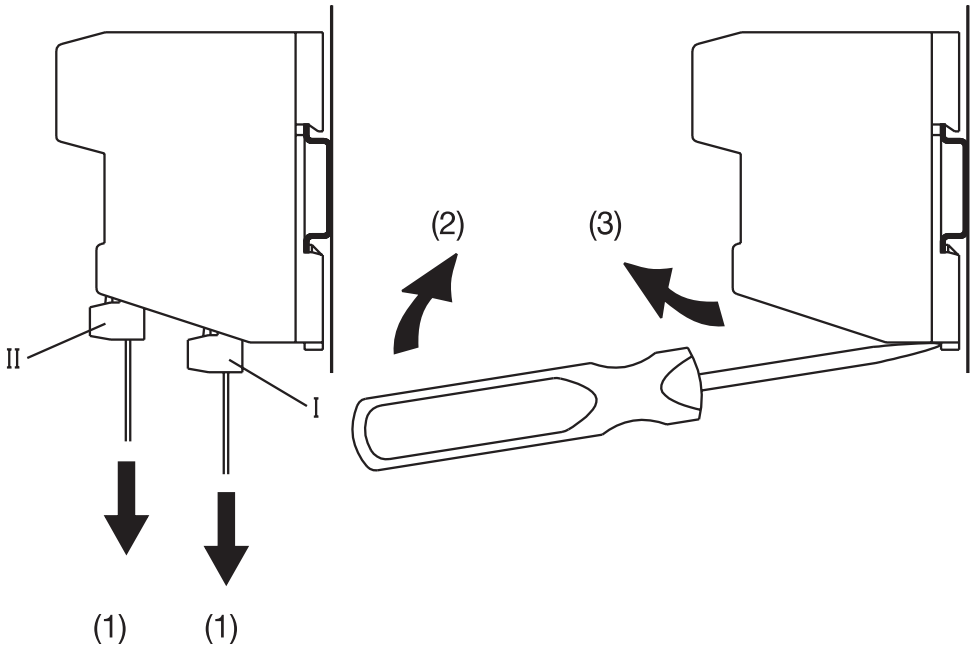
* Hook the module on the rail from above
* Swing it down until the housing clicks home



3.4 Removing the module

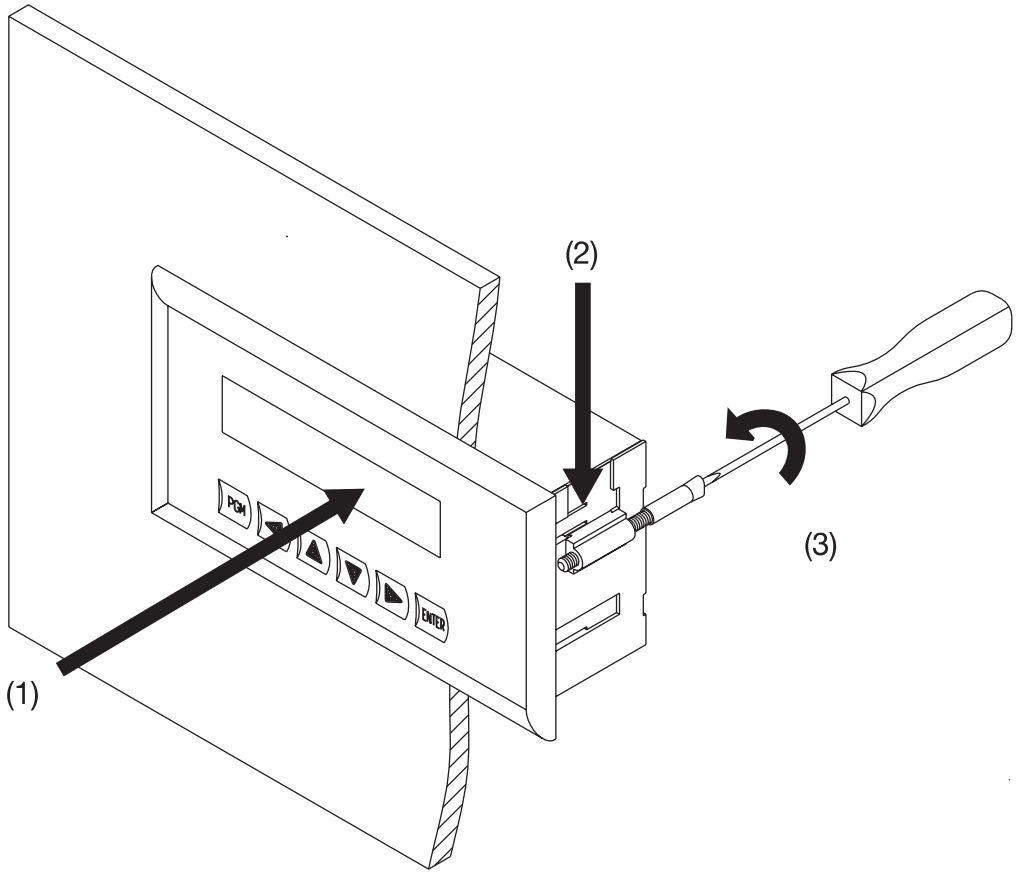
Switch off the power supply!

* Pull off the screw terminal blocks I und II (1)
* Insert a screwdriver into the release clip on the underside of the module and lever it upwards (2). The housing can be swung out forward (3).



3.5 Fitting the operating unit in position

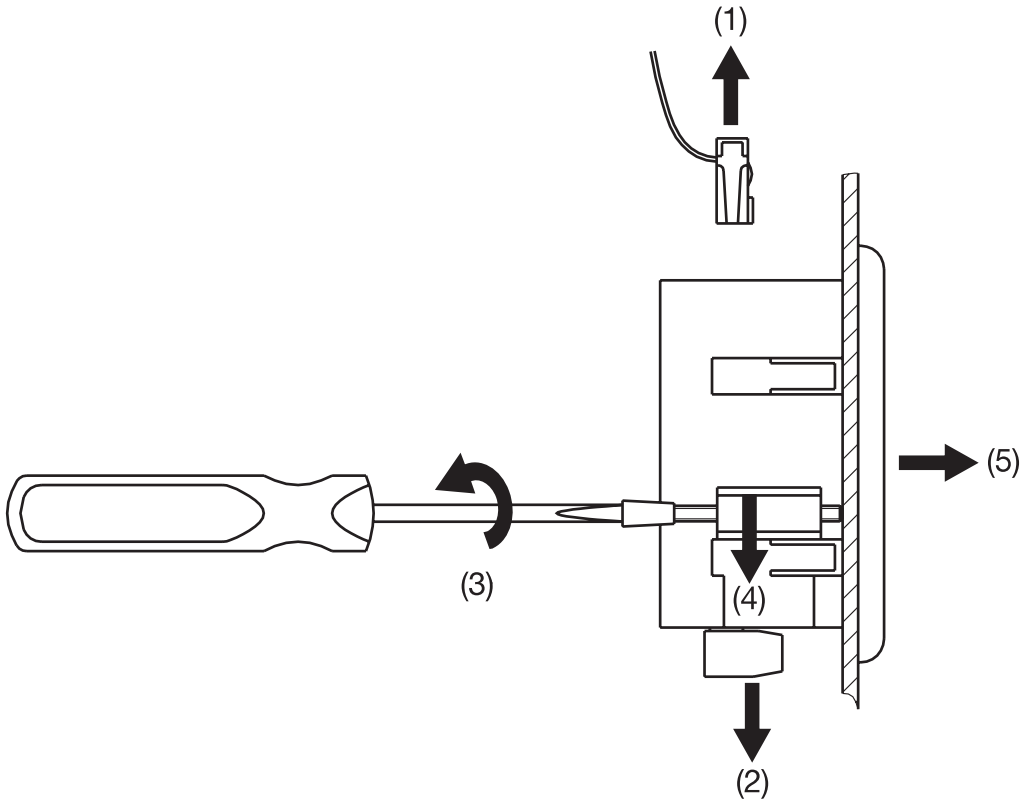
* Insert the operating unit into the panel cut-out from the front (1)
* Insert the mounting brackets into the recesses at the sides (2)
* Tighten up the mounting brackets evenly against the back of the panel (3)



3.6 Removing the operating unit

Switch off the power supply!

* Pull off the setup plug (1)
* Pull off the screw terminal blocks (2)
* Release the mounting brackets using a screwdriver (3) and take them out of the recesses at the sides (4)
* Pull the operating unit forward out of the panel (5)



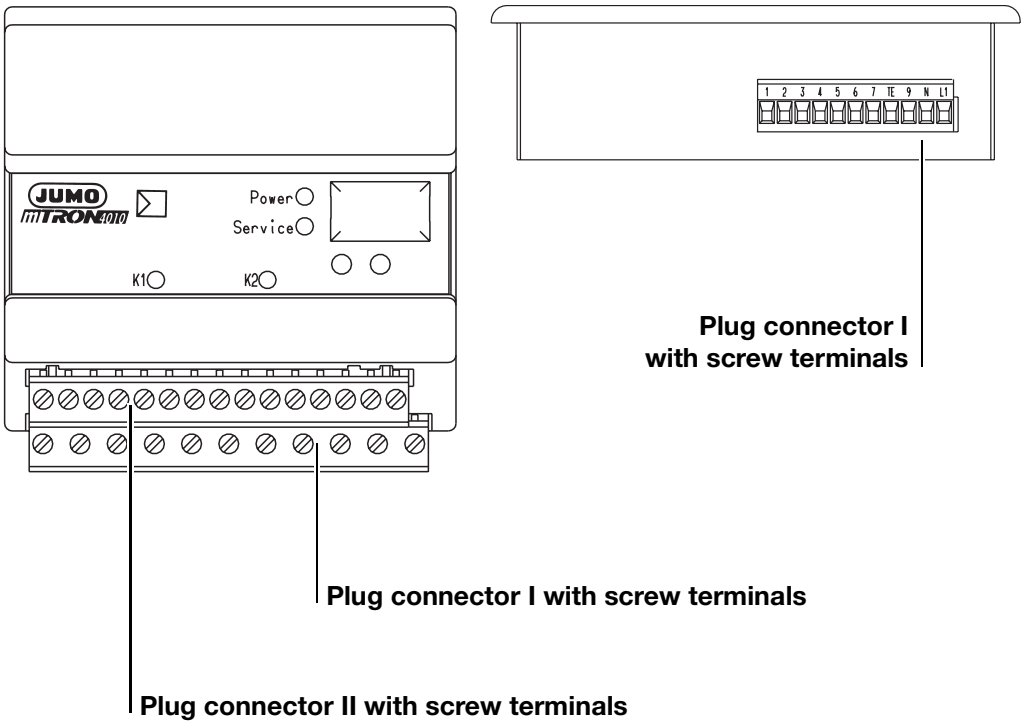
3 Mounting in position

Connections

The following connections are available:

Module

Operating unit



The electrical connection must only be made by a properly qualified electrician!

Label

The label is affixed to the housing and contains all the information on the condition as supplied.

The voltage of the supply must agree with the voltage stated on the label.

4 Electrical connection

4.1 Installation notes

- ☐ The choice of cable, the installation and the electrical connection of the module must conform to the requirements or the appropriate local regulations.

- ☐ Work on the modules must only be carried out to the extent described and, like the electrical connection, only be carried out by properly qualified personnel.

- ☐ If contact with live parts is possible when working on the module it has to be isolated on both poles from the supply.

- ☐ The external fuse of the supply should not be rated above 10 A (slow). The load circuit should be fused for the maximum relay current in order to prevent welding of the output relay contacts in case of an external short-circuit.

- ☐ Electromagnetic compatibility conforms to the standards and regulations listed under Technical Data.

  ⇨ Section 6.1 “Technical Data”

- ☐ The module is not suitable for installation in hazardous areas.

- ☐ Run input, output and supply lines separately and not parallel to each other.

- ☐ Sensor and interface lines should be arranged as twisted and screened cables. Do not run them close to current-carrying components or cables. On temperature probes earth the screen at one end at the module on terminal TE; on the LON interface at both ends (at each module).

- ☐ If the installation does not have a technical earth, connect the TE terminal on the module to the potential earth (PE) terminal.

- ☐ Do not loop earth lines, i.e. do not run them from one terminal to another, but run them singly e.g. to earth terminals on the rail (short leads!).

- ☐ Apart from faulty installation, there is a possibility of interference or damage to controlled processes due to incorrect settings on the module (setpoint, data of parameter and configuration levels). Safety devices independent of the module, such as overpressure valves or temperature limiters/monitors, should always be provided and should be capable of adjustment only by specialist personnel. Please refer to the appropriate safety regulations in this connection.

- ☐ The signal inputs of the module must not exceed a maximum potential of 30 V AC or 50 V DC against TE.

- ☐ Setup interface and inputs are **not** isolated.
  Inputs carrying potentials should be potential-free before setup, using an earthed PC before setup, or the setup should be performed using a non-earthed PC or laptop.
- ☐ Plug connectors with screw terminals should only be unplugged when the circuits are de-energised.

4 Electrical connection

4.2 Network connection

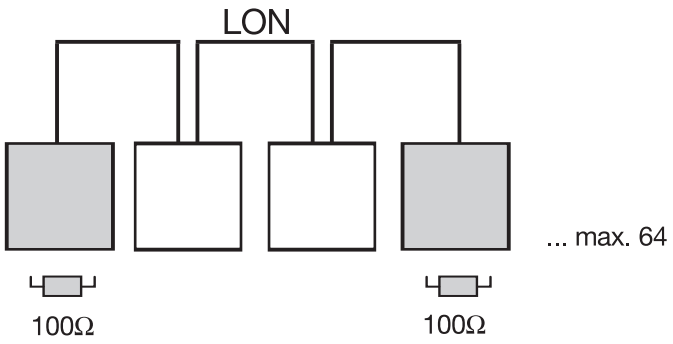
LON

The JUMO mTRON automation system is based on the fieldbus concept called LON (**L**ocal **O**perating **N**etwork).

Each of the autonomous units of the JUMO mTRON automation system incorporates a Neuron chip. The heart of each Neuron chip is formed by three integrated processors (CPUs) which have defined tasks assigned to them. LON technology provides all seven layers of the OSI layer model on the Neuron chip. This concept ensures with three processors a clear division of communication and application tasks.

The JUMO mTRON automation system employs as transmission line a screened twisted pair. Wiring layouts include line, ring, star or mixed structures (free topology).

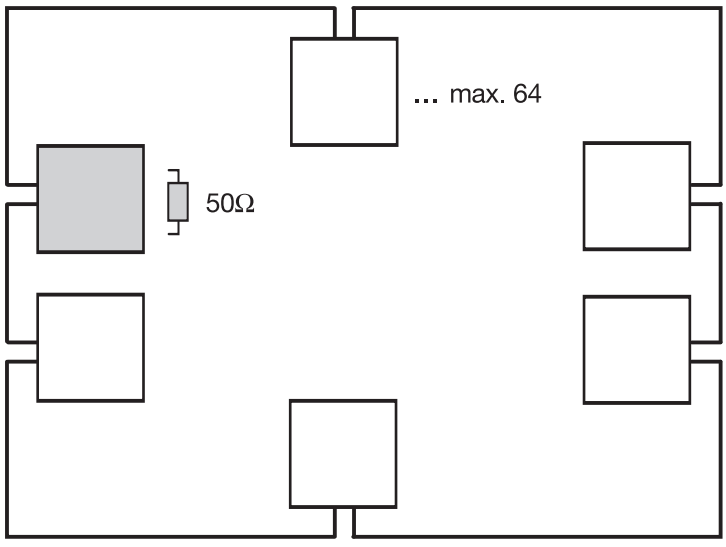
Line structure



The physical ends are provided at both ends with a termination resistance of 100Ω which is activated by a switch on the module.

⇨ Section 4.3 “LON termination resistance”

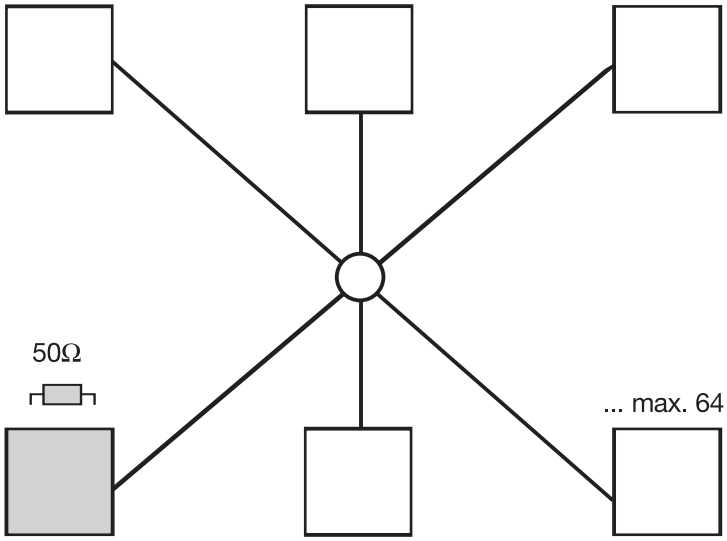
Ring structure



With this wiring layout, the network remains functional even after a break. The termination resistance of any module in the ring has to be set to 50Ω.

⇨ Section 4.3 “LON termination resistance”

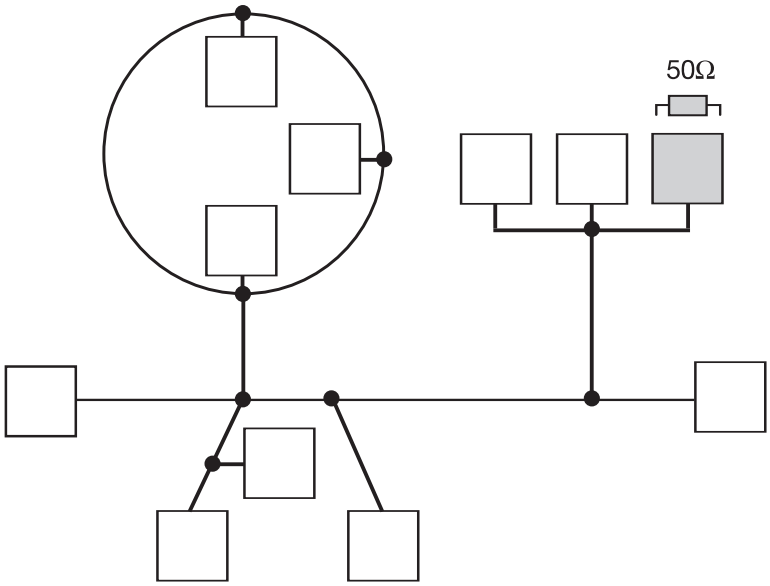
Star structure



The termination resistances of any module in the star has to be set to 50Ω.

⇨ Section 4.3 “LON termination resistance”

Mixed structure



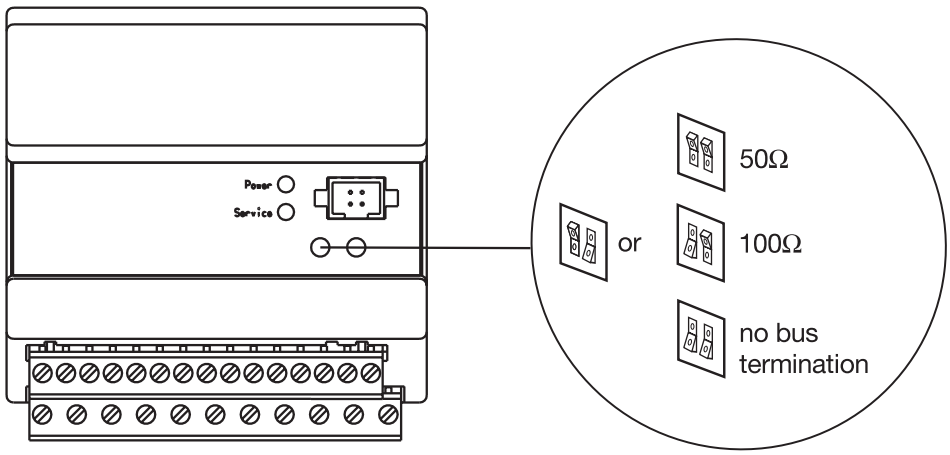
The termination resistances of any module has to be set to 50Ω.

⇨ Section 4.3 “LON termination resistance”

4 Electrical connection

4.3 LON termination resistance

Modules

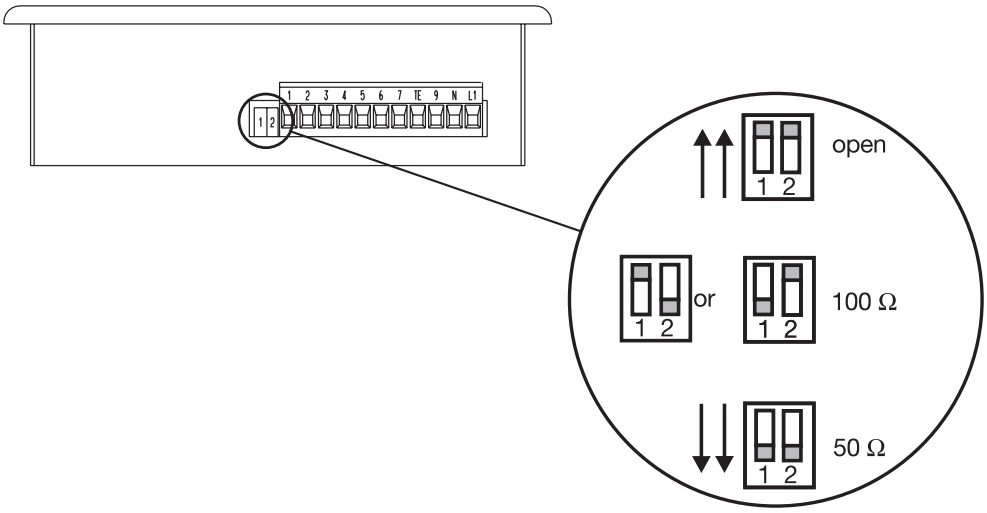


The switches for the termination resistance of the LON network are located on the module front, underneath the setup interface.

✱ Using a screwdriver (width 3 mm max.), move both switches to the required position.

Switches down: termination resistance active (1)
Switches up: termination resistance inactive (2)

Operating unit



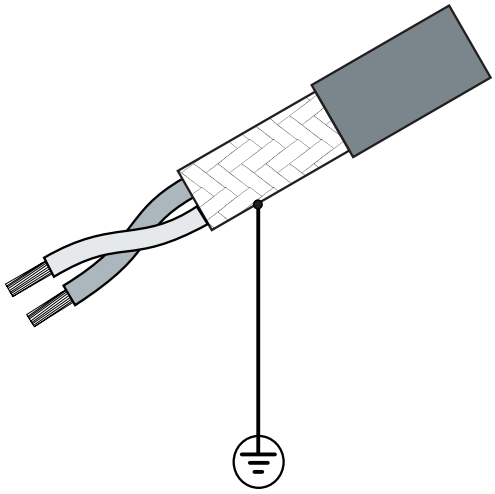
The switches for the termination resistance of the LON network are located on the underside of the operating unit, left of the plug-in screw terminals.

4.4 Suitable cable

LON interface

Screening

A screened twisted pair is used as connecting cable as shown in the illustration. The screen should be protected against static charges by a resistor.



Cable types

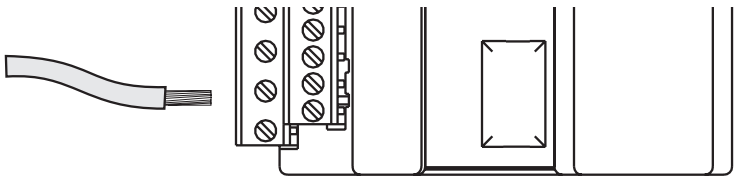
Supplier	Cross-section	maximum cable length
Line	1,4 mm² (AWG 16) 0,34 mm² (AWG 22)	2700 m 1400 m
Ring/Star/Mixed	1,3 mm² (AWG 16) 0,34 mm² (AWG 22)	500 m 400 m

Hersteller Fa.Bekon,
14947 Felgentreu

Typ Bekonflex - Li 2 YCY

Other connections

Conventional stranded copper cable of 1.5 mm² cross-section is suitable for the connection of transducers, supply and logic inputs to screw terminals.



4 Electrical connection

5.1 Plug & Play

The Plug & Play function provides simple and reliable operation of the LON network in case individual modules should fail, need servicing, or have to be repaired.
This function ensures the proper functioning of the module after replacement, without requiring the JUMO mTRON-iTOOL project design software.

Creation and modification of an mTRON network (addition or removal of modules) does, however, involve the use of the JUMO mTRON-iTOOL project design software.

Each modules carries a memory card which contains the configuration data. When a module is replaced, this card only has to be fitted into the new module, which will then operate with the original configuration data.

If the memory card is not replaced, then the module parameters have to be reset via the JUMO mTRON-iTOOL.

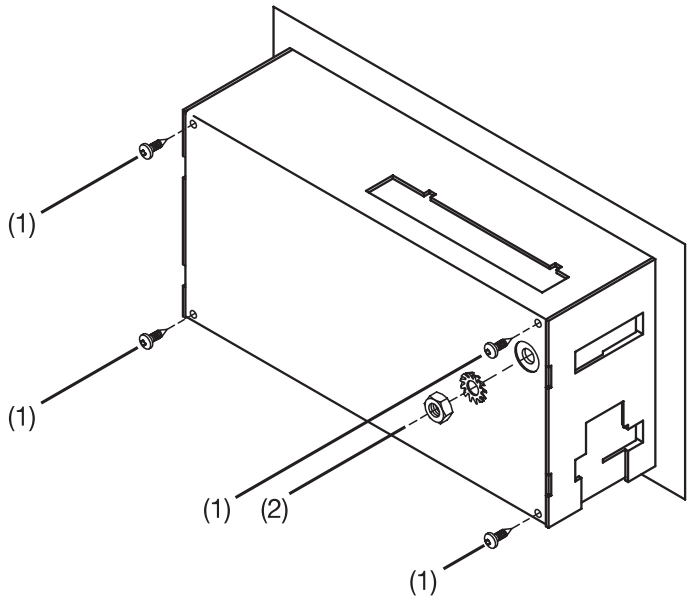
5.1.1 Operating unit

Dismantling the module

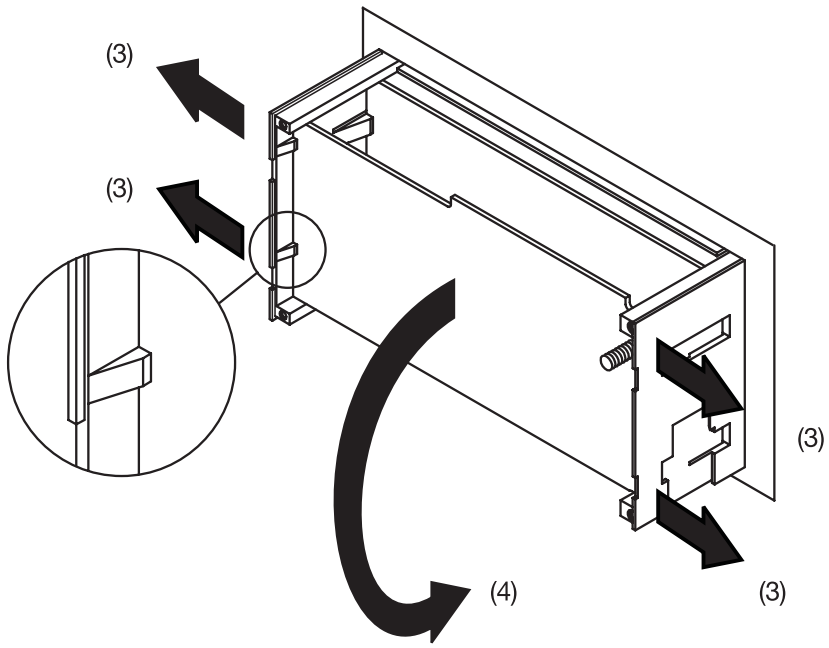
Avoid electrostatic charge when replacing the memory card.

It is advisable to change the card on a workbench which is suitable for carrying out work on semiconductors (earthed worktop, antistatic shoes, etc.).

* Disconnect the module from the supply by pulling off the connectors
* Remove 4 crosspoint screws (1) and 1 nut (2) at the positions marked
* Pull off the aluminimum housing

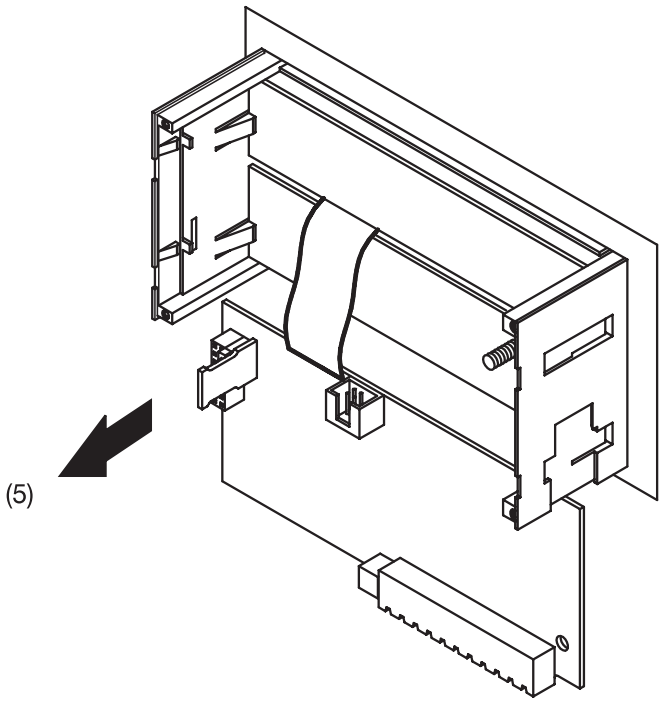


* Push apart the guides on the sides (3) (card is held by the lugs)
* Pull out card and fold it down (4)



Changing the memory card

* Pull out old card from the socket (5) and insert it in the same place in the new operating unit.



Only modules of the same type may be replaced
(e. g. operating unit for operating unit).

If the memory card is inserted into a module with another function, then the network will not recognize the operating unit. Furthermore, the data on the memory card will be deleted.

Assembling the module

* Assemble the operating unit in reverse order
* Refit the connectors

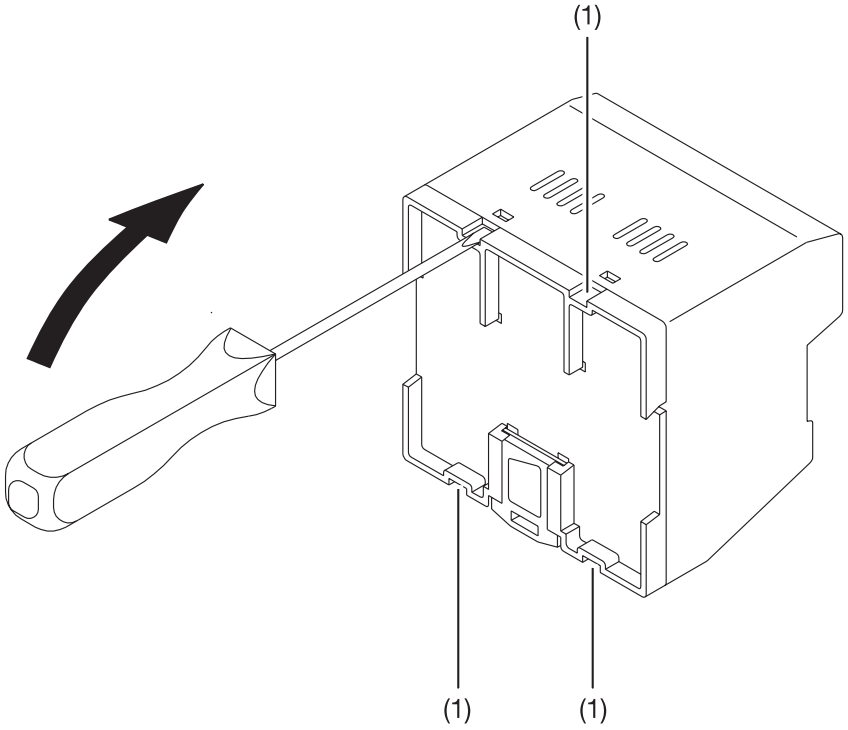
If the memory card is not replaced, then the module parameters have to be reset through JUMO mTRON- iTOOL.

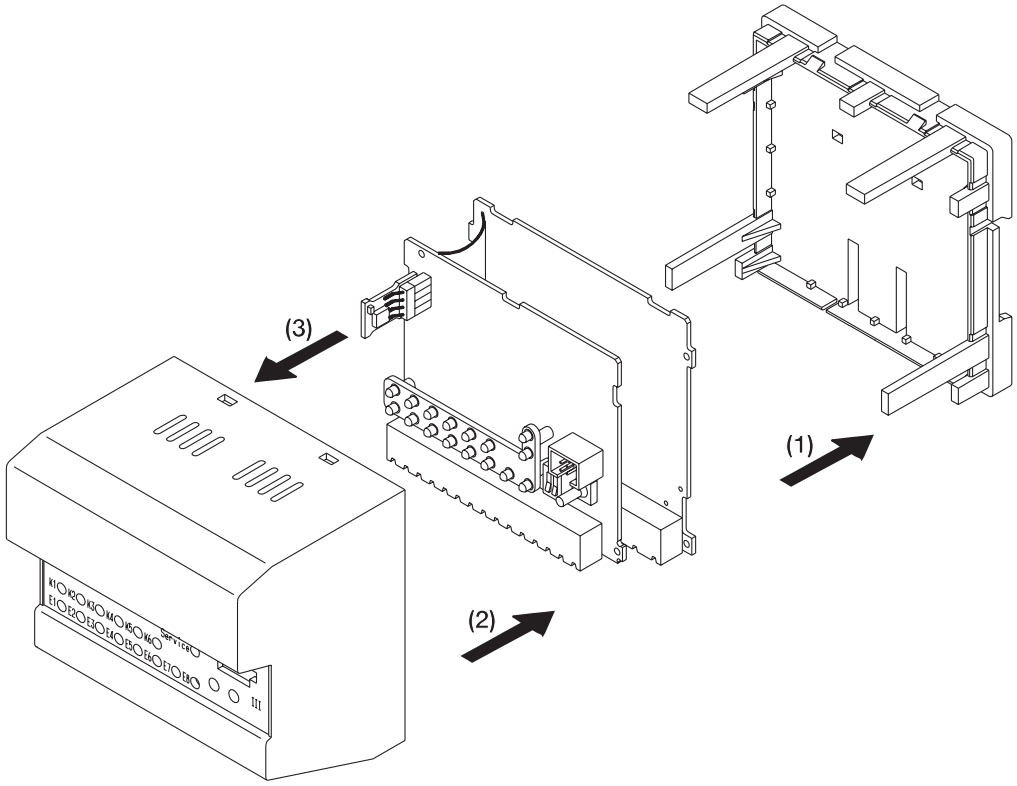
5.1.2 Other modules

Dismantling the module

Avoid electrostatic charge when changing the memory card.

* Disconnect the module from the supply by pulling off the connectors
* Using a suitable tool, release the baseplate at the positions marked (1).





* Pull out baseplate (1).

Remove card downwards from housing (2).

Replacing the memory card

* Pull out old card from the socket (3) and insert in the same position in new module

Only modules of the same type may be replaced
(e. g. controller module for controller module).

If the memory card is inserted into a module with another function, then the network will not recognize the operating unit. Furthermore, the data on the memory card will be deleted.

Assembling the module

* Assemble the operating unit in reverse order
* Refit the connectors

If the memory card is not replaced, then the module parameters have to be reset through JUMO mTRON- iTOOL.

5 Module replacement

6.1 Technical Data

General operating conditions

Operating and ambient temperature
0 — 50 °C (0 — 40 °C according to EN 61 010)

Storage temperature
–40 to +70 °C

Relative humidity
not exceeding 80 % (to EN 61 010)

Pollution
degree 2 (to EN 61 010)

Overvoltage
category 2 (to EN 61 010)

Protection
IP20 (to EN 60 529)
Operating unit front: IP65 (to EN 60529)

Mechanical stress through vibration and acceleration

to EN 61 010
variable sinusoidal test:
vibration frequency: 10 — 55 — 10 Hz
repetition rate: 1 octave per minute
vibration displacement: 0.15 min.
test duration: 30 minutes in each direction (x, y, z planes)

EMC test to IEC 801 and NAMUR

Electrostatic discharge
contact discharge: 8 kV, severity 4
air discharge: 15 kV, severity 4

Electromagnetic field
field strength: 10 V/m, severity 3

Fast transient / burst
on supply 4 kV, severity 4
on I/O lines 2 kV, severity 4

Surge
symmetrical 1 kV, severity 3
non-symmetrical 2 kV, severity 3

Additional requirements to NAMUR recommendations

Function maintained during supply interruptions up to 20 msec at minimum supply voltage

Inrush current limitation
The peak inrush current at a 50 % width of at least 5 msec is less than 15 times the nominal peak value.

EMC interference emission to postal regulation EN 55 022, Class B

6 Appendix

6.2 Training facilities / seminars

Continued education has become essential in today's modern automation technology. As one of the leading manufacturers in measurement and control technology we shall in future increase our activities to pass on to customers and staff our specialised knowledge on products and general basic subject.

For this purpose we have established in Fulda (Germany) a new training centre equipped with the latest technical aids. In addition to theoretical analysis it is the practical training in individual courses, with work on models and simulators, which forms an important part of the training. It is mainly in these practical sessions that the knowledge required for this work can be transmitted.

A summary of the courses available can be found in our Training Calender. For each course there is a detailed description including interest groups, training targets and description of the course contents.

Further information on training, the individual seminars and the application forms can be obtained from the local JUMO office or subsidiary.

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