Technical Information
I/O Module Box

Endress+Hauser
People for Process Automation

Described product
Product name: I/O Module Box

Manufacturer
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Legal information

Original document
This document is an original document of Endress+Hauser SICK GmbH+Co. KG.

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Table of Contents

Seite

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Safety Information

Introduction

The handbooks provided with the instrument contain information and warnings that must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition. Possible hazards that could harm the user or result in damage to the instrument are clearly stated at appropriate places throughout these handbooks.
Any of the following safety conventions can be used throughout these handbooks.

Before using this instrument it is essential to read the handbooks carefully and to pay particular attention to any advice they contain concerning potential hazards that may arise from the use of the instrument.
This advice is intended to supplement, not supersede, the normal safety code of behavior prevailing in the user's country.

Before start-up of the instrument:
Carefully read and observe the safety information and warnings contained in this manual as well as the relevant chapters on installation, start-up and operation of the instrument.

Before starting to work gather the relevant information about the regulations for preventing accidents issued by the professional associations, the legal stipulations (safety regulations concerning hazardous substances) and the standards.

Intended Use

The I/O-module box forms the interface between a measuring system and external instruments.
The measuring system and the I/O-module boxes are connected via fibre optics, the external instruments are connected electrically to the I/O-module box.

This instrument has been designed and produced in accordance with a variety of international safety standards. There is no potential danger from the instrument when used for its intended purpose. To maintain the instrument in a safe condition it is sufficient to observe some simple, widely known rules of behavior.

To ensure optimal operation of the instrument, only appropriately trained and skilled staff should be allowed to operate the instrument.

Warning: Unauthorized Adjustments and Servicing
Only a Endress+Hauser service engineer or similarly trained and authorized person should be permitted to service the instrument.

- ***Do not attempt to make adjustments, replacements, repairs, or modifications to this instrument except as described in the documentation supplied with the instrument.***

When working with the instrument:

- Do not attempt to make internal adjustments or replacements except as directed in this handbook.
- Do not operate the instrument with any covers or parts removed.
- Disconnect the instrument from all voltage sources before opening it for any adjustment, replacement, maintenance, or repair.
  If, afterwards, the opened instrument must be operated for further adjustment, maintenance, or repair, this must only be done by a skilled person who is aware of the hazard involved.

Electrical Safety

Warning: Electrical Hazard
For operation, the instrument must always be connected to earth. Any interruption of the protective conductor inside or outside the instrument or disconnection of the protective conductor (earth/ground) terminal is likely to make the instrument dangerous. Intentional interruption is prohibited.

Lethal voltages are present in the instrument

- *Even with the power switch off, line power voltages can still be present within the instrument.*
- *Capacitors inside the instrument may still be charged even if the instrument has been switched off and disconnected from all voltage sources.*

Warning: Electrical Hazard

- *To avoid a potential hazard of injury by electric voltage and to prevent the instrument from damage, switch **off** the instrument and disconnect it from mains at **all poles** before performing or modifying any electrical connections.*
- *Verify whether the instrument is voltage-free.*
- *Secure the switched-off instrument against any unauthorized or unintentional operation.*

Warning: Electrical Hazard
*Even with the power switch off, especially the following parts within the system cabinet **are** still **live**: Fuse F01, Main Contactor K01, Temperature Sensor S01 and the Q01 switch itself..*

Warning: Electrical Hazard

- *This instrument may only be connected to mains by authorized/qualified personnel*

- Only a Endress+Hauser service engineer or similarly trained and authorized person should be permitted to service or repair the instrument.
- The instrument works with high voltages. Even with the power switch off, high voltages can be present inside the instrument.
- When the instrument is connected to line power, terminals may be live, and opening covers or removing parts is likely to expose live parts
- Capacitors inside the instrument may still be charged even if the instrument has been switched off and disconnected from all voltage sources.
- Do not attempt to make adjustments, replacements, repairs, or modifications to this instrument except as described in the documentation supplied with the instrument.
- Do not operate the instrument with any covers or parts removed.
- Disconnect the instrument from all voltage sources before opening it for any adjustment, replacement, maintenance, or repair.

If, afterwards, the opened instrument must be operated for further adjustment, maintenance, or repair, this must only be done by a skilled person who is aware of the hazard involved and knows the appropriate protective measures.

- Use only fuses with the required current rating and of the specified type for replacement.

  Do not use makeshift fuses or short-circuit the fuse holders.

- In case of inadequate or damaged protective conductor (earth/ground) terminal, make the instrument inoperative and secure it against any unauthorized or unintentional operation.

  Earth/ground connection can be inadequate if the instrument:
  - Shows visible damage;
  - Has been subjected to prolonged storage under unfavorable conditions (e.g. humidity)
  - Has not correctly been handled during transport.

Warning: Damaged Instrument
Do not put a damaged instrument into operation.

- Whenever it is likely that the instrument is no longer electrically safe for use, make the instrument inoperative and secure it against any unauthorized or unintentional operation.

  The instrument is likely to be electrically unsafe when it:
  - Shows visible damage;
  - Fails to operate correctly;
  - Has been subjected to prolonged storage or operation under unfavorable or inadmissible conditions
  - Has been subjected to inadmissible transport stresses.

Warning: Electrical hazard
When removing any covers live parts become accessible.

- *Do not touch any parts or components inside the instrument.*
- *If you have to perform any maintenance, repair or adjustment while the instrument is still connected to line power: It is essential to use only appropriate, insulated tools.*
  Do not touch any components except those specifically mentioned in the manual.

Warning: Electrical Hazard
Unplug power plug before opening the fuse holder.

Caution:

- *Use only fuses with the required current rating and of the specified type for replacement.*

Warning: Electrical Hazard
Do not use makeshift fuses or short-circuit the fuse holders.

Caution: Observe the fuse ratings
The fuse ratings of the mains fuses are dependent of the mains voltage

Electrostatic-Sensitive Devices/Components

Some of the procedures in this manual involve handling electronic components and printed circuit boards. Electrostatic discharges, caused by improper handling of such components, can damage the components and cause subsequent failure. The following precautions minimize the harmful effects of electrostatic discharges:

- Wear a grounded wrist strap, and work on a grounded static-dissipating work surface. If this is not possible, touch an adjacent earth ground (e.g. heating, water pipe) before handling electronic components or printed circuit boards.
- Leave electronic components and printed circuit boards in their original packaging until you are ready to use them.
- Handle electronic components by their body or case, strictly avoid touching the leads.
- Keep electronic components and printed circuit boards away from such static-generating material as white Styrofoam, vinyl's, clear plastic bags, wraps, envelopes, bubble packs, foams, etc.

Caution: Damage of Switching Contacts

- *To protect the switching contacts inductive consumers must be attenuated by a protective circuit.*

Environment

Storage Conditions

You can store the instrument safely under the following conditions:

- Ambient temperature -10 °C to + 60 °C;
- Ambient relative humidity max. 80%, without condensation.

Conditions

The instrument will operate correctly under the following conditions:

- Indoors.
- Ambient temperature +5 °C to +45 °C.
- Ambient relative humidity max. 80%, without condensation.

Operation outdoors prohibited.
Keep dry.

Protect instrument from shock and vibrations!

Note:
When you remove the instrument from storage, before you put it into operation allow it to stand for at least a day under the approved operating conditions.

Explosion

Warning: Explosive Atmosphere
- *The instrument must not be operated in explosive atmospheres, and must not be exposed to any explosive measuring media.*

Instruments designed for use in an explosive atmosphere are available upon request.

Compliances

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Compliances

The technical design of this control unit complies with the following EC directives and
EN standards:

- EC Directive NSP
- EC Directive EMV

Applied EN standards:

- EN 61010-1, Safety requirements for electrical equipment for measurement, control and laboratory use
- EN 61326, Electrical equipment for measurement, control and laboratory use - EMC requirements

Electrical protection

Insulation: Class of protection 1 according to EN 61010-1.

Insulation coordination: Measuring category II according to EN61010-1.

Soiling: The control unit operates safely in an environment up to degree of soiling 2 according to EN 61010-1 (usual, not conductive soiling and temporary conductivity by occasional moisture condensation).

Electrical energy: The wiring system to the voltage supply of the system must be installed and fused according to the relevant regulations.

Chapter 1: Description

1.1 Overview

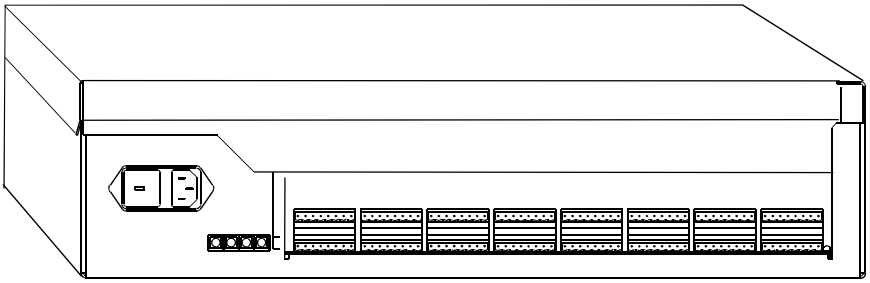


Fig. 1-1: I/O-module box

The I/O-module box is used as an interface between a measuring system (host) and external instruments (actors and sensors).
The measuring system and the I/O-module boxes are connected by fibre optics (to achieve the highest possible interference-proofness for data transfer), the external instruments are connected electrically to the I/O-module boxes.

One I/O-module box can contain the following interfaces:

- Digital inputs and outputs
- Analog inputs and outputs
- Temperature controller

Several I/O-module boxes can be operated in series; whereby all boxes have the same priority.

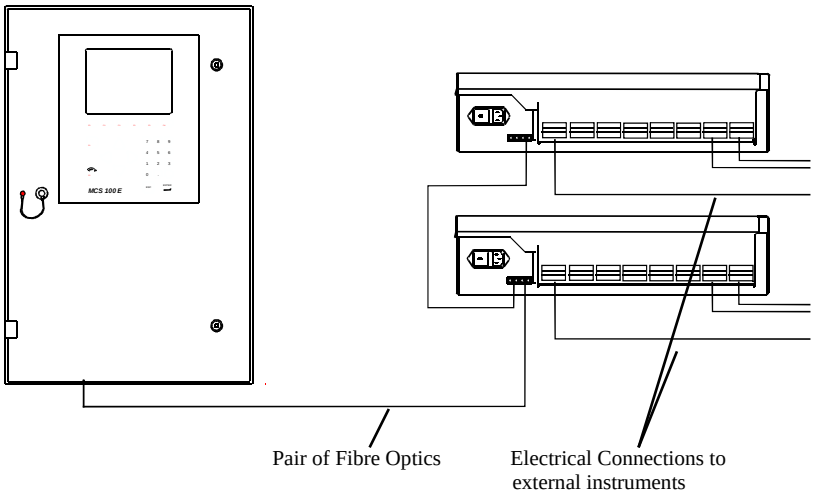


Fig. 1-2: I/O-module boxes as interface between a measuring system (e.g. MCS 100 E) and external instruments.

1.2 Design

The I/O-module box consists of a metal housing containing:
- Mains power supply
- optical interface and
- bus system for accommodation of up to 8 plug-in boards.

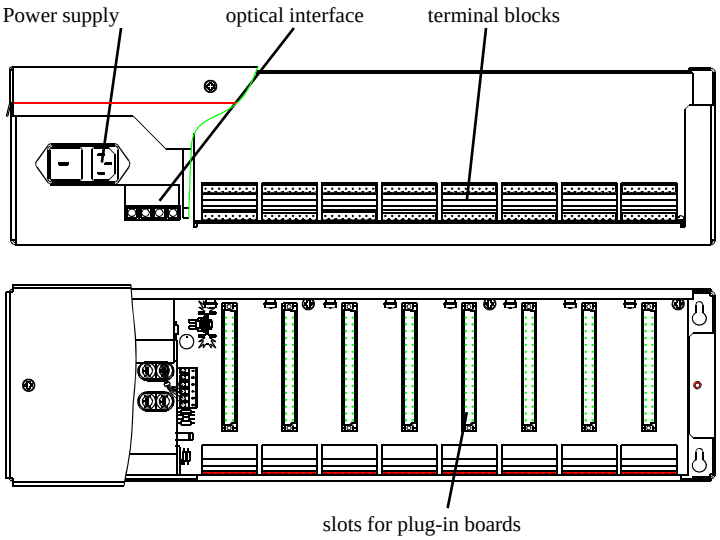


Fig. 1-3: I/O-module box, open

The following types of plug-in boards are available:

- Digital input boards
- Digital output boards
- Carrier boards (for analog in-/output modules)
- Temperature control boards

The plug-in boards can be combined in any desired order.
Each plug-in board is conducted to the outside via an individual terminal block.

1.2.1 Hierarchy of Plug-in Boards

The following hierarchy of plug-in boards applies:
- Master boards
- Slave boards

1.2.1.1 Master boards

Depending on their type, 1 – 4 addresses are allocated for the master boards.

For each address there is a green LED and a pin switch on the board.

Green LED	Mode of operation of the master board
Always on	Board is active
1*flash	Board is not active (not at the bus)
2*flash	Dialog mode
3*flash	Excess temperature at the temperature controller

The red LEDs represent the active conditions of the individual channels. The meaning of the red LEDs is dependent of the individual boards and described in the respective paragraphs.

Master boards can be inserted in any desired slot of the I/O-module box.

1.2.1.2 Slave boards

Slave boards are used as extension boards associated to the master boards. They use the address of the master board; thus do not require an address of their own. Consequently, they do neither have a green LED nor a pin switch.
The red LEDs represent the active conditions of the individual channels. The meaning of the red LEDs is dependent of the individual boards and described in the respective paragraphs.

Slave boards always have to be plugged into the next position to the right of the associated master board.

1.2.2 Maximum Number of I/ O-Module Boxes

Max. 64 addresses can be assigned. The number of the master boards (1 – 4 addresses depending on type) can amount to as many as are possible until all the 64 addresses are occupied.

As many I/O-module boxes can be connected in series until all the master boards and associated slave boards are accommodated.

1.2.3 Electrical Features of the I/O-module box

In additon to providing the voltage supply for the board the I/O-module box provides a potential-free A/C voltage of 24 V for external consumers.

The following plug-in boards use the A/C voltage:
- Digital in- and output boards, if the internal voltage supply for external consumers (e.g. supply of a load).
- Temperature control board to trigger relays.

The A/C voltage has a separate fuse protection, consisting of 2 protection circuits with 4 terminal blocks, each. The max. load for each protection circuit is 4 A.

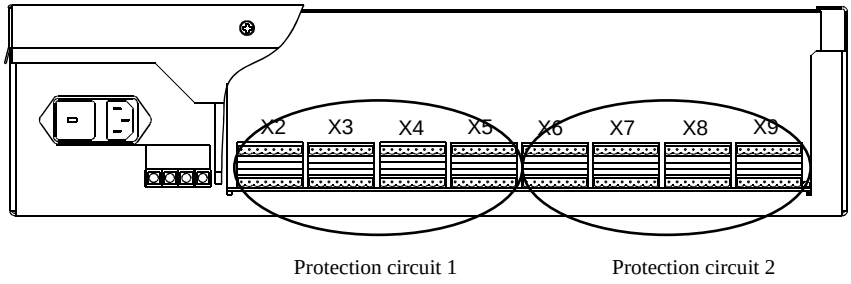


Fig. 1-4: Protection circuits for external A/C voltage

The transformer for the external A/C voltage is equipped with a self-resetting safety temperature switch interrupting the A/C voltage in case of excess load.

Note:
If the safety temperature switch is triggered off, then only the 24 V A/C voltage supply for external consumers is switched off. This does not have any effect on the communication between the I/O-module boxes, nor on the function of the plug-in boards.

1.3 Digital Input Boards (DIM4, DIS4, DIS8)

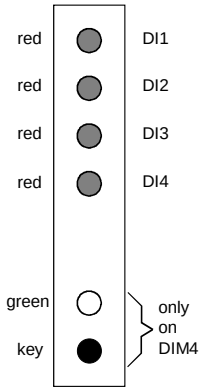
There are three types of digital input boards.

- **D**igital **I**n **M**aster boards with **4** inputs: (DIM4)
- **D**igital **I**n **S**lave boards with **4** inputs: (DIS4)
- **D**igital **I**n **S**lave boards with **8** inputs: (DIS8)

Associated to a master board DIM4 the following slave boards can be added:
- up to two DIS4 or
- one DIS8.

Slave boards always have to be plugged into the **next position to the right** of the associated master board.

1.3.1 DIM4, DIS4



DIM4 and DIS4 have 4 potential-free digital inputs each (DI1 - DI4).
A red LED is associated to each digital input. The red LED is on, if the related input is powered.

The wiring of DIM4 and DIS4 is identical, DIM4 additionally has the master features (and thus a green LED and a pin switch).

The inputs are opto decoupled.
They can be triggered by:
- external control voltage 5 – 40 V DC
- internal supply voltage
  Voltage range: 24 – 32 V DC (uncontrolled)
  Input impedance of the opto-coupler input: 2kΩ
  Max. current: 1 A
  Caution: Overload of a protection circuit
  When using the internal voltage supply, please observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A.

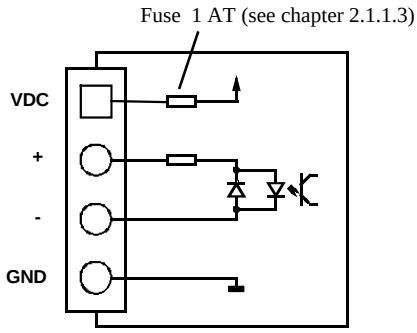
The board is protected by a fuse against overload. (For location and exchange of the fuse please refer to chapter 2.1.1.3).
Fuse rating: 1 AT (slo-blo).

For the allocation of the terminals please refer to chapter 2.1.3.1

1.3.1.1 Number of Addresses

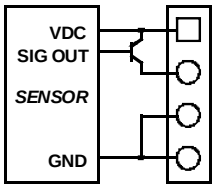
One DIM4 requires 1 address,
a DIS4 does not require an address of its own

1.3.1.2 Internal Wiring

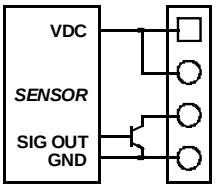


Input Impedance: 2 kΩ

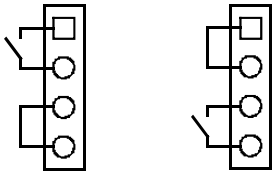
1.3.1.3 Possible Connections



pnp-Transistor

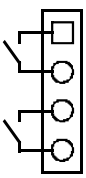


npn-Transistor

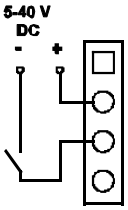


Switch on Supply Voltage

Switch on Ground



2 Switch as „AND“



potential-free switch

Internal supply voltage:
Voltage range: 24 – 32 V DC (uncontrolled)
Max. current: 1 A

external control voltage:
5 – 40 V DC

Caution: Overload of a Protection Circuit
When using the internal voltage supply, please observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A.

For the alloction of the terminals please refer to chapter 2.1.3.1

1.3.2 DIS8

DIS8 has 8 digital inputs (DI1 - DI8). In comparison with DIS4, the wiring is more simple.

Corresponding to each digital input there is a red LED. The red LED is on if the corresponding input is „active“/powered.

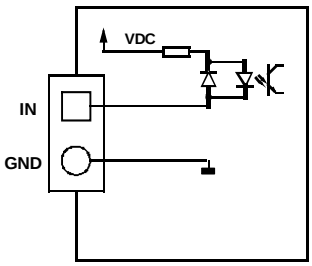
The inputs are optically separated and are triggered against 0 V.
The supply voltage is provided internally.

For the allocation of the terminals please refer to chapter 2.1.3.2

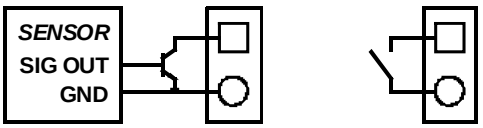
1.3.2.1 Number of Addresses

A DIS8 does not require an address of its own.

1.3.2.2 Internal Wiring



1.3.2.3 Possible Connections



npn-Transistor

Schalter an Masse

Max. Current: 16 mA

Caution: Overload of a Protection Circuit
P*lease observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A.*

For the alloction of the terminals please refer to chapter 2.1.3.2

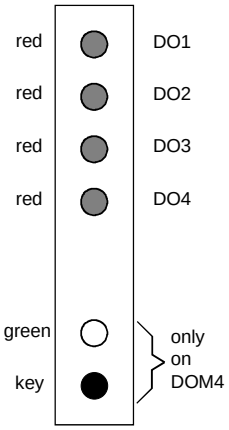
1.4 Digital Output Boards (DOM4, DOS4, DOS8)

There are three types of digital output boards :
- **D**igital **O**ut **M**aster board with **4** outputs: (DOM4)
- **D**igital **O**ut **S**lave board with **4** outputs: (DOS4)
- **D**igital **O**ut **S**lave board with **8** outputs: (DOS8)

Associated to a DOM4 the following slave boards can be added:
- up to two DOS4 or
- one DOS8.

Slave boards always have to be plugged into the **next position to the right** of the associated master board.

1.4.1 DOM4, DOS4



DOM4 and DOS4 have each
- 4 switched potential-free change-over contacts (DO1 - DO4) and
- one 24 V A/C voltage source with 2 voltage outputs.

There is a red LED for each digital output. The red LED is on if the corresponding relay is active.

The wiring of DOM4 and DOS4 is identical. DOM4 additionally has the master features (and thus a green LED and a pin switch).

Load capacity of the outputs:
- external supply voltage
  4 A at 50 V AC
  4 A at 24 V DC
  0,8 A at 50 V DC

internal supply voltage
4 A at 24 V AC

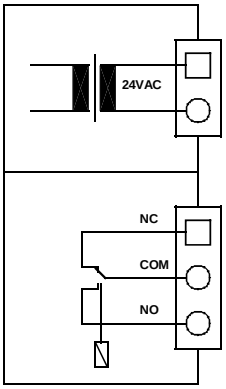
Caution: Overload of a Protection circuit
When using the internal voltage supply, please observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A.

For the allocation of the terminals please refer to chapter 2.1.3.3.

1.4.1.1 Number of addresses

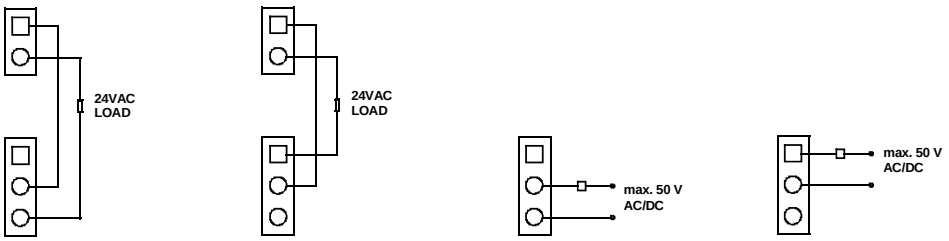
DOM4 requires 1 address,
DOS4 does not require an address of its own.

1.4.1.2 Internal Wiring



1.4.1.3 Possible Connections

Caution: Protection of the Relay Contacts
To protect the relay contacts it is essential that inductive consumers are attenuated by means of a protective circuit.



Internal voltage
„Normally open relay“

internal voltage
„Normally closed relay“

external voltage
„Normally open relay“

external voltage
„Normally closed relay“

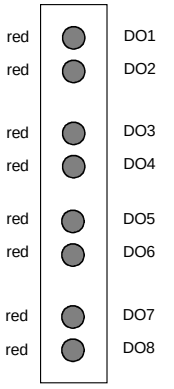
internal supply voltage
Load capacity: 4 A at 24 V AC

external supply voltage
Load capacity:
4 A at50 V AC
4 A at 24 V DC
0,8 A at 50 V DC

Caution: Overload of a Protection circuit
When using the internal voltage supply, please observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A.

For the allocation of the terminals please refer to chapter 2.1.3.3.

1.4.2 DOS8



DOS8 has 8 digital outputs (DO1 - DO8) with one „normally closed relay“ each. All outputs are connected with each other internally.
The relays of the board trigger:
- either an internal 24 V AC (default setting)
- or an external supply voltage,
depending on the position of a jumper (see chapter 1.4.2.2)
There is a red LED for each output: The red LED is on, if the corresponding relay is active.

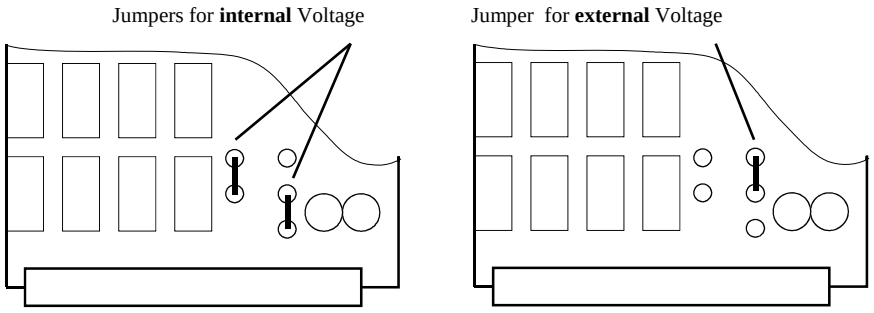
For the terminal allocation please refer to chapter 2.1.3.3.

1.4.2.1 Number of Addresses

DOS8 does not require an address of its own.

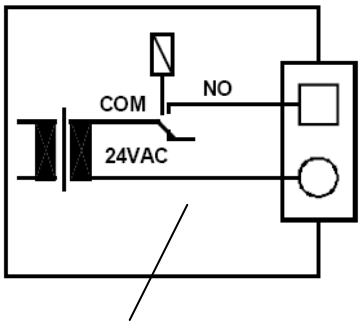
1.4.2.2 Switching-over of internal/external voltage

The internal voltage for DOS8 can be switched off and external voltage can be selected instead.

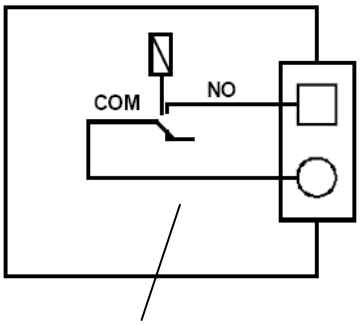


Caution: Overload of a Protection Circuit
When using the internal voltage supply, please observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A.

1.4.2.3 Internal Wiring

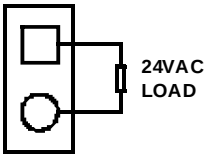


All outputs connected, internally
„internal supply voltage“



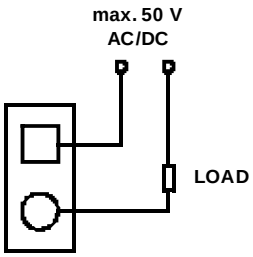
All outputs connected, internally
„external supply voltage“

1.4.2.4 Possible Connections



„Normally closed relay“

internal supply voltage
Load capacity: 4 A at 24 V AC



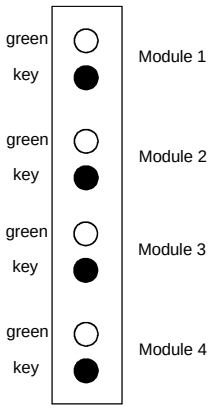
„Normally closed relay“

external supply voltage
Load capacity:
4 A at 50 V AC
4 A at 24 V DC
0,8 A at 50 V DC

Caution: Overload of a Protection Circuit
When using the internal voltage supply, please observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A.

For the allocation of the terminals please refer to chapter 2.1.3.3.

1.5 Carrier board



The carrier board has 4 master slots (with 1 green LEDs and 1 pin switch, each). One module can be plugged into each of these master slots .

All master slots are decoupled galvanically.

The modules can be plugged-in in any desired order.
Assembly from top to bottom is recommended.

For assembly of the modules with components please refer to chapter 2.1.2.1.

1.5.1 Analog Output Module AO

The current range of the outputs is 0-22 mA. An evaluation of the current intensity is performed within the software of the connected measuring system.

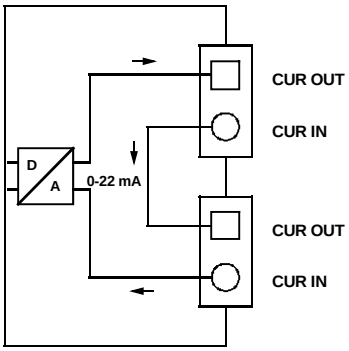
Resolution:	12 Bit
Accuracy:	0,5 %
Load:	500 Ω max.

Due to the special wiring of the current outputs the analog signals can be conducted via additional measurement devices.

1.5.1.1 Number of Addresses

Each assembled module requires one address.

1.5.1.2 Internal Wiring



1.5.1.3 Possible Connections

Current Source for 1 Receiver

Current Source for 2 Receivers

Load: 500 Ω max.

For the terminal allocation please refer to chapter 2.1.3.4.1.

1.5.2 Analog Input Module AI

The current range of the inputs is 0-22 mA. An evaluation of the current intensity is performed within the software of the connected measuring system.

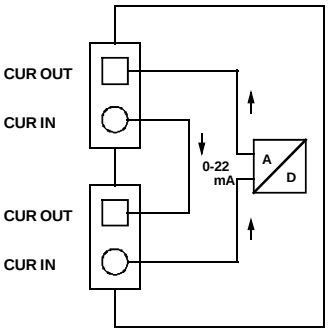
Due to the special wiring of the current inputs the analog signals can be conducted via additional measurement devices.

Resolution:	12 Bit
Input current:	0 - 22 mA or
Input voltage:	0 - 2,2 V
max. input voltage:	5 V
Input impedance:	100 Ω

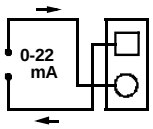
1.5.2.1 Number of Addresses

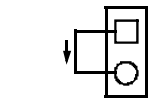
Each assembled module requires one address.

1.5.2.2 Internal Wiring

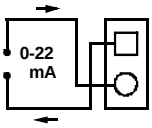


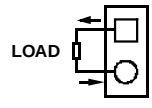
1.5.2.3 Possible Connections





Receiver for Current Source



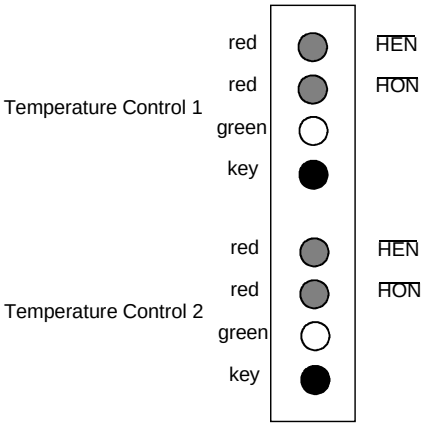


Receiver for Current Source when using the 2nd connector

Input current:	0 - 22 mA or
Input voltage:	0 - 2,2 V
max. input voltage:	5 V
Input impedance:	100 Ω

For the terminal allocation please refer to chapter 2.1.3.4.1.

1.6 Temperature Control Board (HCM2)



One temperature control board HCM2 comprises 2 controllers. 2 external temperature control circuits can thus be controlled. The control cycle time is 1 sec. The control function remains intact, even if the communication with the connected host computer (measuring system) should fail.

One HCM2 requires 2 addresses (thus has 2 green LEDs and 2 pin switches).

Special meaning of the green LED:
Green LED 3* flashes: There is or was a state of excess temperature.
As soon as the temperature drops below a lower temperature threshold the heating becomes active again, the LED, however, continues flashing 3* and must be reset either via the software or the pin switch (press for approx. 1 sec.) (Reset).

The following signals are switched:
HON: Heating ON (inverted signal)
This „open collector“ output switches the heating circuit via an external power switch.
The associated lower red LED indicates the corresponding condition:
Red LED on: Heating on
Red LED off: Heating off
$\overline{\text{HEN}}$: Heating enable (inverted signal)
In case of excess temperature, this „open collector“ output switches-off the heating circuit via an external power switch (safety switch-off).
The associated upper red LED indicated the corresponding condition:
Red LED on: Heating circuit on
Red LED off: Heating circuit interrupted

To trigger the external power switches (relay, contactor) each signal can be loaded with max. 200 mA.

The temperature control board feeds back the actual temperature as well as the status signals, thus these can be interrogated via the software.

Additionally, a controlled 24 V DC output is available.

In total, the board (heating signals and 24 V DC output) can be loaded with 800 mA.

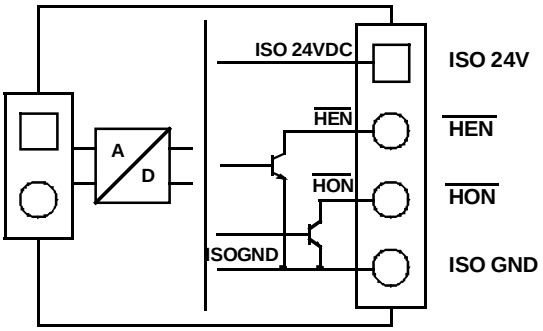
Caution: Overload of a protection circuit
Please observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A.

For the terminal allocation please refer to chapter 2.1.3.5.

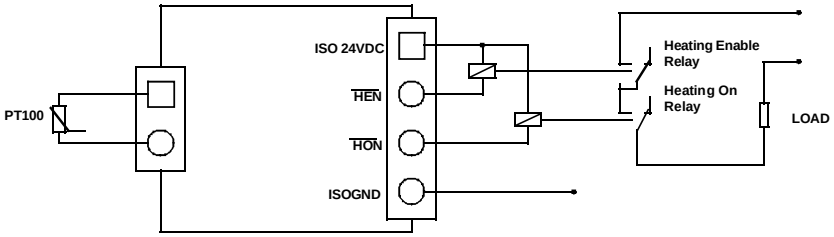
1.6.1 Number of Addresses

HCM2 requires 2 addresses.

1.6.2 Internal Wiring



1.6.3 Possible Connections



2-point temperature controller

Each signal can be loaded with max.. 200 mA.

Caution: Overload of a protection circuit
Please observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A.

For the terminal allocation please refer to chapter 2.1.3.5.

----------O----------

Chapter 2: Installation and Operation

Warning: Electrical Hazard

For operation, the instrument must always be connected to earth. Any interruption of the protective conductor inside or outside the instrument or disconnection of the protective conductor (earth/ground) terminal is likely to make the instrument dangerous. Intentional interruption is prohibited.

Lethal voltages are present in the instrument

- *Even with the power switch off, line power voltages can still be present within the instrument.*
- *Capacitors inside the instrument may still be charged even if the instrument has been switched off and disconnected from all voltage sources.*

Warning: Electrical Hazard

- *To avoid a potential hazard of injury by electric voltage and to prevent the instrument from damage, switch **off** the instrument and disconnect it from mains at **all poles** before performing or modifying any electrical connections.*
- *Verify whether the instrument is voltage-free.*
- *Secure the switched-off instrument against any unauthorized or unintentional operation.*

Warning: Electrical hazard

When removing any covers live parts become accessible.

- *Do not touch any parts or components inside the instrument.*
- *If you have to perform any maintenance, repair or adjustment while the instrument is still connected to line power: It is essential to use only appropriate, insulated tools.*
  Do not touch any components except those specifically mentioned in the manual.

2.1 Mounting (Position)

The following mounting position is recommended: The rear panel of the box is screwed to a wall or mounting plate at the 4 mounting holes. The mains connection is thus at the left hand side and the supply line for the external instruments is at the bottom.

Note:
Designations such as „top/bottom“ resp. „right/left“ refer to this kind of mounting position.

2.1.1 Line Power Supply and Fuse Protection

Caution: Selection of Mains Voltage
- *Before connection to mains check whether the mains voltage selector is set correctly. The required voltage value (230 resp. 115) must be visible in the window of the fuse holder.*

Warning: Electrical Hazard
Do not use makeshift fuses or short-circuit the fuse holders.

For mains connection a power plug is used. There is no power switch.

Mains voltage is set at the fuse holder. The selected voltage is visible in the window of the fuse holder.

Note:
The I/O-module box does not have a power switch. It starts operation automatically after switching mains voltage on. Please note that upon a new installation it is possible that the boards are not yet correctly configured.

2.1.1.1 Mains Voltage and Line Power Fuses

Caution: Observe the fuse ratings
The fuse ratings of the mains fuses are dependent of the mains voltage

To adjust the mains voltage and to replace the line power fuse please proceed as follows:
- Unplug mains connector
- Press fuse holder at the notches at either side and remove.
  If the mains voltage has to be changed:
    - Pull out the voltage selector (marked 230 resp. 115),
    - Insert plug-in module in such a way that the desired mains voltage (230 resp. 115) is visible and the metal edge points to the left.
- Check/replace fuses in the fuse holder (ratings see below).
- Re-insert fuse holder until locked.

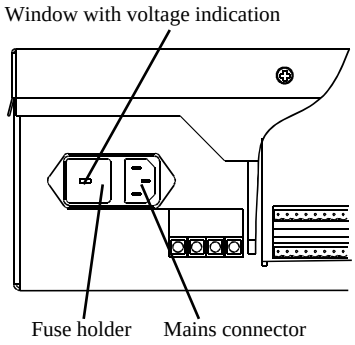


Fig. 2-1: Fuses and mains voltage selection at the power supply

Fuse Types

- 2 fuses (primary side) in the fuse holder
    - For 115 V: 2 AT (slo-blo)
    - For 230 V: 1 AT (slo-blo)

2.1.1.2 Fuses for secondary voltages

4 fuses are used for protection of secondary voltages. The ratings of the fuses are independent of the selected main voltage.

There is a red LED underneath each fuse to control any secondary voltage.
LED on: voltage available
LED off: voltage failure

When removing the cover of the I/O-module box the fuses and LEDs are accessible.

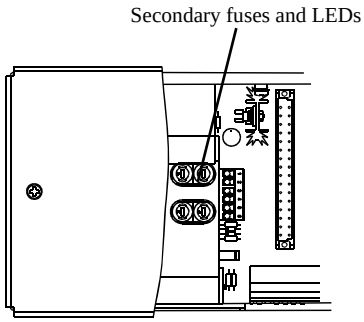
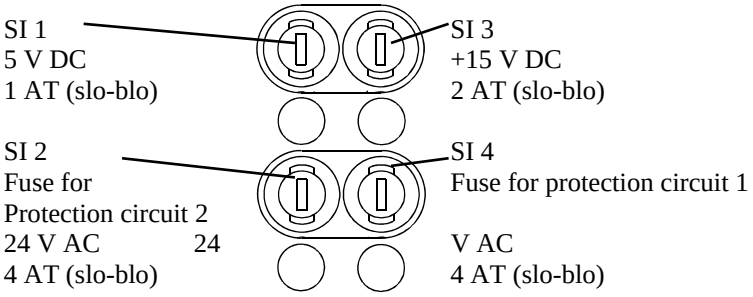
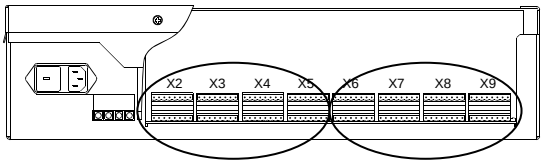


Fig. 2-2: Position of the secondary fuses and LEDs

Fuse Types



SI 1 and SI 3: Fuses for supply of boards
SI 2 and SI 4: Fuses for A/C voltage for external consumers. The protection circuits for SI 2 and SI 4 are divided as follows:



SI 2: Protection circuit 1 SI 4: Protection circuit 2

2.1.1.3 Fuses on digital input boards DIM4 und DIS4

The digital output boards DIM4 and DIS4 are protected by fuses against overload.

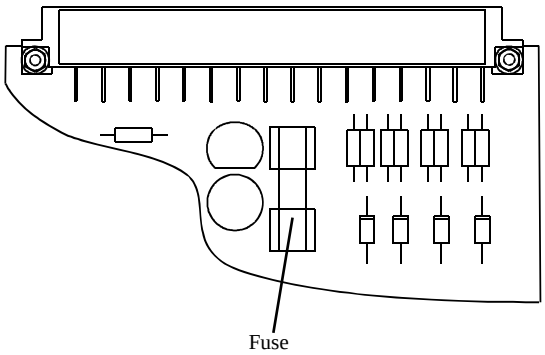


Fig. 2-3: Position of fuse on DIM4 and DIS4

Fuse Type

Fuse rating: 1 AT (slo-blo).

2.1.2 Inserting the plug-in boards

Unscrew and remove the lid of the housing to insert the plug-in boards .

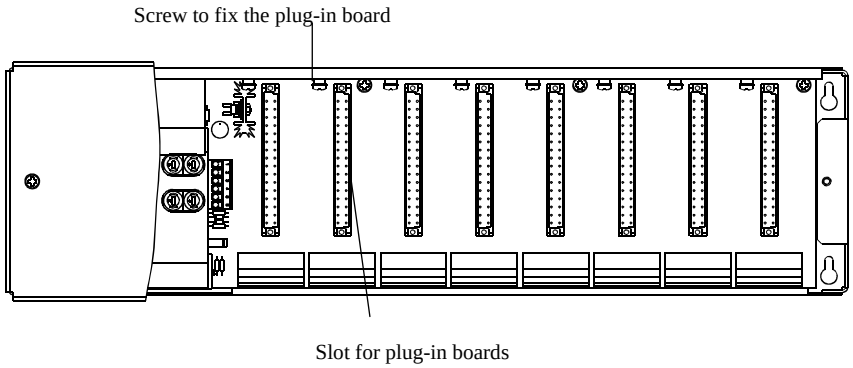


Fig. 2-3: Inserting plug-in boards

Note:
If required, the modules have to be plugged onto the carrier board. Please refer to chapter 1.5 for a general description and to chapter 2.1.2.1 for the assembly

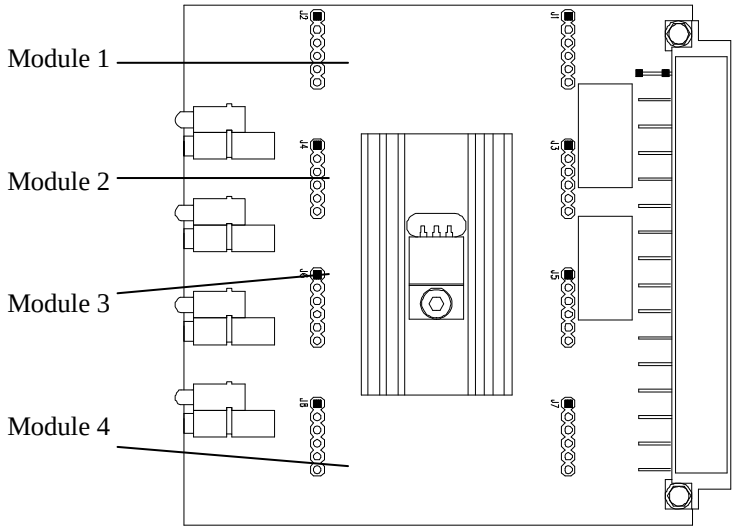
Note:
The master board can be inserted in any of the available slots, however, the associated slave board always has to be plugged into the next position to the right of the master board.

To mount a board, insert it into an empty slot (component side to the right) and screw to the upper side of the box.

After installation of the boards place lid back onto the box and tighten screws.

2.1.2.1 Plugging the modules onto the carrier board

The analog modules may be plugged-on in any desired order. It is, however, recommended to assemble from the top to the bottom.



The modules are plugged-on as follows:

- On the connector of the carrier boards there is a label with the board designation (e.g. Carrier Board)
- On the connector of the carrier board there is a label with the designation of the boards (e.g. Carrier Board)
- On one of the components of the analog module there is a label with the module designation (e.g. AO module)
- Plug-on the analog module to the carrier board in such a way that:
  - the labels are face to face to each other and
  - the pins of the analog module fit into the pin bushings of the carrier board
- Press the analog module on cautiously

The carrier board can now be installed in the I/O-module box.

2.1.3 Connection of external instruments

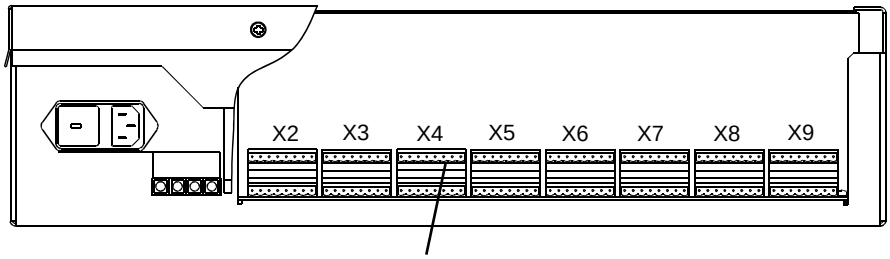


Fig. 2-4: Connection of external instruments

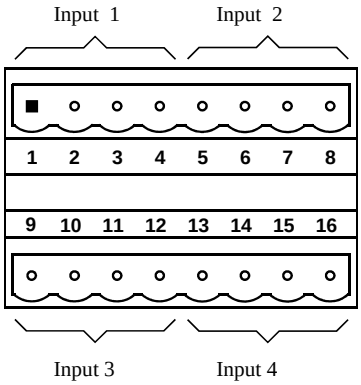
External instruments are connected via terminal blocks at the bottom of the box:
- Remove terminal blocks
- Screw in braids einschrauben
- Re-insert terminal blocks.

Connection data of the terminal blocks:
Wire diameter 0,1 – 2,5 mm^2 rigid or flexible
AWG 24-12
It is recommended to use appropriate end sleeves.

The allocation of the connectors is dependent of the individual plug-in board used. For details please refer to the relevant chapter in the following

Note:
The numbering of the terminals starts with 2. This is of no further significance and is only mentioned here as a matter of providing complete information.

2.1.3.1 Terminal Allocation DIM4, DIS4



Digital Input 1:	1 = internal voltage output + V DC
	2 = Digital input +
	3 = Digital input -
	4 = internal voltage output GND
Digital Input 2:	5 = internal voltage output + V DC
	6 = Digital input +
	7 = Digital input -
	8 = internal voltage output GND
Digital Input 3:	9 = internal voltage output + V DC
	10 = Digital input +
	11 = Digital input -
	12 = internal voltage output GND
Digital Input 4:	13 = internal voltage output + V DC
	14 = Digital input +
	15 = Digital input -
	16 = internal voltage output GND

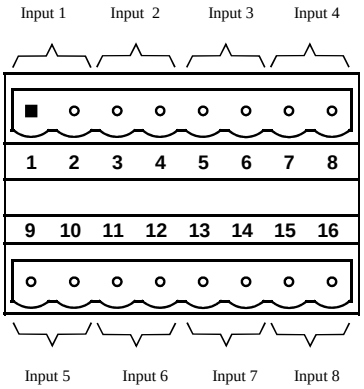
- Digital input:	5 – 40 V DC
Input impedance:	2 kΩ
- Internal voltage output:	24 – 32 V DC (uncontrolled)
Max. current:	1 A

Caution: Overload of a protection circuit

When using the internal voltage supply, please observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A.

For a detailed description of the board please refer to chapter 1.3.

2.1.3.2 Terminal Allocation DIS8



Digital Input 1:	1 = voltage output + V DC
	2 = voltage output GND
Digital Input 2:	3 = voltage output + V DC
	4 = voltage output GND
Digital Input 3:	5 = voltage output: + V DC
	6 = voltage output GND
Digital Input 4:	7 = voltage output + V DC
	8 = voltage output GND
Digital Input 5:	9 = voltage output + V DC
	10 = voltage output GND
Digital Input 6:	11 = voltage output + V DC
	12 = voltage output GND
Digital Input 7:	13 = voltage output + V DC
	14 = voltage output GND
Digital Input 8:	15 = voltage output + V DC
	16 = voltage output GND

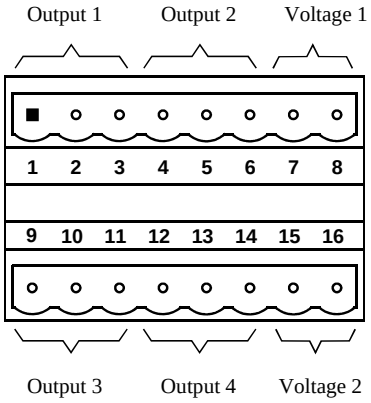
Max. current: 16 mA

Caution: Overload of a protection circuit
When using the internal voltage supply, please observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A.

For a detailed description of the board please refer to chapter 1.3.

2.1.3.3 Terminal Allocation DOM4, DOS4, DOS8

DOM4, DOS4



Digital output 1:	1 = Normally closed relay (NC)
	2 = Root (COM)
	3 = Normally open relay (NO)
Digital output 2:	4 = Normally closed relay (NC)
	5 = Root (COM)
	6 = Normally open relay (NO)
Voltage output 1:	7 = 24 V ~
	8 = 24 V ~
Digital output 3:	9 = Normally closed relay (NC)
	10 = Root (COM)
	11 = Normally open relay (NO)
Digital output 4:	12 = Normally closed relay (NC)
	13 = Root (COM)
	14 = Normally open relay (NO)
Voltage output 2:	15 = 24 V ~
	16 = 24 V ~

Terminal 7 is internally connected to terminal 15; and terminal 8 is internally connected to terminal 16.

Caution: Protection of the Relay Contacts

- *To protect the relay contacts inductive consumers must be attenuated by a protective circuit.*

Note:
To switch from internal to external voltage and vice versa the boards is equipped with a jumper (See chapter 1.4.2.2)
Load capacity of the outputs:

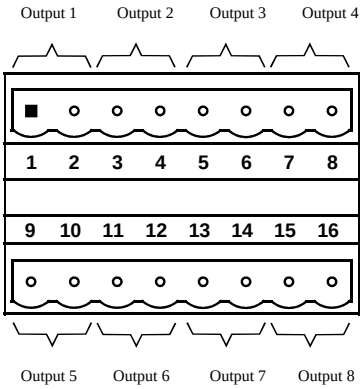
-External voltage supply
4 A at 50 V AC
4 A at 24 V DC
0,8 A at 50 V DC

- Internal voltage supply
4 A at 24 V AC

Caution: Overload of a protection circuit
When using the internal voltage supply, please observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A.

For a detailed description of the board please refer to chapter 1.4.1.

DOS8



Digital output 1: 1 = Normally open relay (NO)
2 = Root (COM)
Digital output 2: 3 = Normally open relay (NO)
4 = Root (COM)
Digital output 3: 5 = Normally open relay (NO)
6 = Root (COM)
Digital output 4: 7 = Normally open relay (NO)
8 = Root (COM)
Digital output 5: 9 = Normally open relay (NO)
10 = Root (COM)
Digital output 6: 11 = Normally open relay (NO)
12 = Root (COM)
Digital output 7: 13 = Normally open relay (NO)
14 = Root (COM)
Digital output 8: 15 = Normally open relay (NO)
16 = Root (COM)

All root are inter-connected internally.

Caution: Protection of the Relay Contacts

- *To protect the relay contacts inductive consumers must be attenuated by a protective circuit.*

Note:
To switch from internal to external voltage and vice versa the boards is equipped with a jumper.
Load capacity of the outputs:

-External supply voltage
4 A at 50 V AC
4 A at 24 V DC
0,8 A at 50 V DC

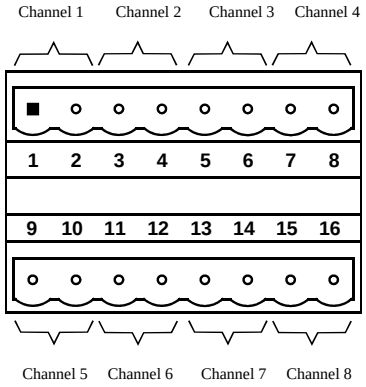
- internal supply voltage
4 A at 24 V AC
Caution: Overload of a protection circuit
When using the internal voltage supply, please observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A.

For a detailed description of the board please refer to chapter 1.4.2.

2.1.3.4 Terminal Allocation of Carrier board

2.1.3.4.1 Terminal Allocation of Analog Modules

The terminal allocation for the analog input and output modules (AI an dAO) is identical.



In-/Output channel 1: 1 = Current output
2 = Current input
9 = Test output
10 = Test input
In-/Output channel 2: 3 = Current output
4 = Current input
11 = Test output
12 = Test input
In-/Output channel 3: 5 = Current output
6 = Current input
13 = Test output
14 = Test input
In-/Output channel 4: 7 = Current output
8 = Current input
15 = Test output
16 = Test input

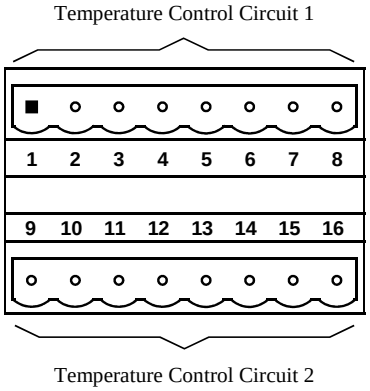
The following terminals are inter-connected internally:
2 with 9, 4 with 11, 6 with 13, 8 with 15.

The in-/output module 1 is the uppermost module.

Note:
Usually, the current outputs and inputs of a channel are wired, while the test outputs and inputs are bridged. If required, additional measuring devices can be connected into the analog signals at the test outputs and inputs (ref. chapters 1.5.1.3 and 1.5.2.3).

For a detailed description of the boards please refer to chapters 1.5.1 and 1.5.2.

2.1.3.5 Terminal Allocation HCM2



Temperature control circuit 1:
1 = Input Pt 100 GND
2 = Input Pt 100 +
3 = not assigned
4 = not assigned
5 = Output GND 24 V
6 = Switching Relay (HON) Output
7 = Safety relay (HEN) Output
8 = Output +24 V

Temperature control circuit 2:
9 = Input Pt 100 GND
10 = Input Pt 100 +
11 = not assigned
12 = not assigned
13 = Output GND 24 V
14 = Switching Relay (HON) Output
15= Safety relay (HEN) Output
16 = Output +24 V

Load:
Heating signals: max. 200 mA, each
Board in total: 800 mA

Caution: Overload of a protection circuit
Please observe that the load of a protection circuit (ref. Chapter 1.2.3.) must not exceed 4 A

For a detailed description of the board please refer to chapter 1.6.

2.1.4 Fibre Optics Connections

Fibre Optics are used for connection to the measuring system, e.g. MCS 100 E.

For this purpose, sender output and receiver input are connected in pairs, each. MA (Master) designates the interface to the superordinate unit (measuring system or I/O-module box), SL (Slave) represents an interface to the next I/O-module box.

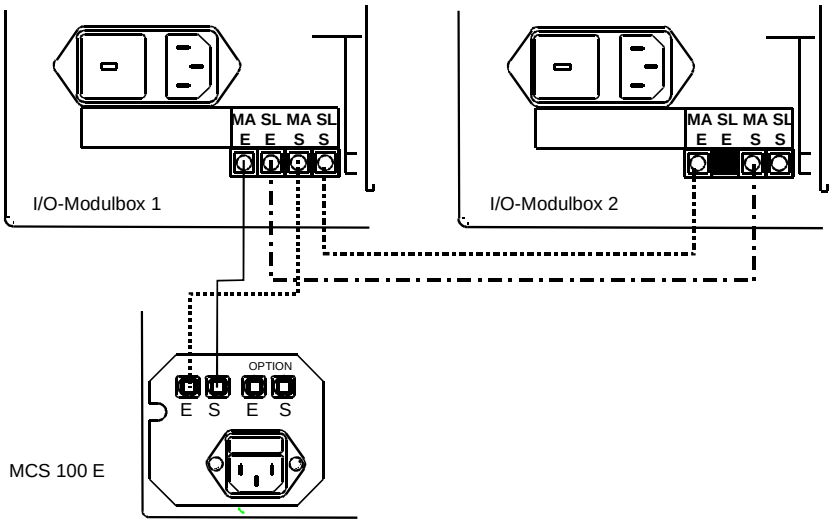


Fig. 2-5: Connection of two I/O-module boxes to e.g. an MCS 100 E

Caution:
The optical slave input (SL E) of the last I/O-module box must be closed with a blind plug. (Represented as a black square in above figure).

2.2 Configuration and Addressing of the Plug-in Boards

In combination with a Endress+Hauser measuring system the I/O module boxes are supplied in factory-configured condition. No further configuration is required.
Configuration of the board can become necessary if further boards are added, boards are replaced or if, e.g. the temperature setting of a board is to be changed.

Warning: Unauthorized Adjustments and Servicing
Only a Endress+Hauser service engineer or similarly trained and authorized person should be permitted to perform any modifications in the ***instrument configuration****.*

Caution: Changes in the configuration may lead to instrument damage

For some of the configuration steps of the boards you have to work at the instrument while it is live.

Warning: Electrical hazard
When removing any covers live parts become accessible.
Be aware of the fact that the power supply at the left inside the I/O module box is live.

- *Do not touch any parts or components inside the instrument.*
- *If you have to perform any maintenance, repair or adjustment while the instrument is still connected to line power: It is essential to use only appropriate, insulated tools.*
  Do not touch any components except those specifically mentioned in the manual.

If you want to change any settings, this is done by:

- MCS 100 E: using the MCS 100 E software for changing addresses or temperature settings.
  Please refer to the manual „MCS 100 E Software Description“.
- general: using the ACQINIT program which is factory-installed on the measuring system. For description please refer to chapter 3.

Should these program not be available for you, you have to use a terminal program which is to be installed on the host computer. For this procedure detailed knowledge of such a program is required as well as a detailed knowledge of the data exchange of the I/O-module boxes.

Caution: Risk of Instrument Damage

- *During configuration of the boards all boards must be switched “not active” and thus are in “currentless ” condition! Be aware of the effect on your external instruments.*

2.2.1 Modes of Operation of the Master Boards

In addition to the **green LED** the master boards have a pin switch, that can be pushed down with a small screw driver or pin.

Warning: Electrical hazard
When removing any covers live parts become accessible.
Be aware of the fact that the power supply at the left inside the I/O module box is live.

- *Do not touch any parts or components inside the instrument.*
- *If you have to perform any maintenance, repair or adjustment while the instrument is still connected to line power: It is essential to use only appropriate, insulated tools.*
  Do not touch any components except those specifically mentioned in the manual.

By pressing the pin switch down (for approx. 1 second, except with the temperature controller: approx. 5 sec.) the following operating modes can be set and are indicated by different kinds of flashing of the green LED:

Green LED	Operating mode (Mode)
Always on	Board is active
1*flash	Board is not active (not at the bus)
2*flashes	Dialogue mode Configuration of the boards can be performed in the dialogue mode. ***Caution**: Only one board at a time may be in the dialogue mode. All other boards must be set to the „not active“ condition (1*flash).*
3*flashes	Excess temperature (only with temperature controller)

2.2.2 Configuration of the Plug-in Boards :

Only master boards (no slave boards) can be configured.

The master boards that is to be configured is set to the dialogue mode (green LED flashing 2*). All other master boards are set to the „not active“ condition (green LED flashing 1*).

***Caution**:*
Only one board at a time may be in the dialogue mode. All other boards must be set to the „not active“ condition (green LED flashing 1).*

The board can now be configured using the MCS 100 E software, the ACQINIT program (see chapter 3) or a standard PC terminal program .

During terminal operation the baud rate is 9600 baud.
During operation baud rate is configurable between 600 ... 38400 baud.
Standard is 9600 baud.

Remark:
Parameters that have not been entered remain unchanged. For boards that are not used standard values will be set automatically.

Note:
Remember the board addresses as – in case of a possible defect – these addresses may be lost. For a delivered Endress+Hauser measuring system these addresses are stated in the system documentation.

For an example of a configuration please refer to the next chapter.

2.2.2.1 Example for Configuration

This chapter presents the description of an examplary configuration for MCS 100 E using the ACQINIT configuration software.

Warning: Electrical hazard
When removing any covers from the I/O module box or from MCS 100 E live parts become accessible.
Be aware of the fact that the power supply at the left inside the I/O module box is live.

- *Do not touch any parts or components inside the instrument.*
- *If you have to perform any maintenance, repair or adjustment while the instrument is still connected to line power: It is essential to use only appropriate, insulated tools.*
  Do not touch any components except those specifically mentioned in the manual.

Caution*: During the following actions the plug-in boards go to the "currentless condition! Be aware of the effect on your external instruments.*

- Go to the DOS level at MCS 100 E
- Switch off the watchdogs (See chapter ACQINIT)
  – „WDOG disable"
  – Remove jumper in MCS 100 E (***Caution: hot components inside MCS 100 E***)
- Set all I/O-module boxes to the „not active" mode.
  For this purpose press each pin switch for approx. 1 sec (5 sec. for the temperature controller).
  The green LEDs are now flashing 1*.
  These boards are in the „not active" condition.
- Press pin switch of the board **that is to be configured** once again.
  Its green LED is now flashing 2*.
  Caution: *Please observe that just one master board may be configured at one time. Thus only ONE green LED may be flashing 2*. ALL OTHER green LEDs must be flashing just 1*!*
- The one board, selected, is now ready for configuration and all of the following actions have an effect on just this very board.
- Enter via external keyboard:
  ACQINIT /C2 /I5 ENTER (Note: space preceeding /)
  The actual configuration of the board is presented.

  With a temperature controller, e.g. the temperature setting is stated in the line:: TCtrl : 185
  To **set the temperature to 100 °C**, type: ACQINIT /C2 /I5 /T100 ENTER
  „T100" sets the temperature to 100 °C and the values of the re-configured board are presented.

To **set a (new) board address** type: ACQINIT /C2 /I5 /A31 ENTER
„A31“ sets the address to 31 and the values of the re-configured board are presented.

To enter a new **remark** use the DOS command SET:
SET ACQINIT=temperature controller for heated tube 1 ENTER
Upon ACQINIT /C2 /I5 /S ENTER the text „temperature controller for heated tube 1“ is presented.

Remark:
Parameters that have not been entered remain unchanged. For boards that are not used standard values will be set automatically.

- Press the pin switch of the configured temperature controller once again.
  The green LED in now on, continuously.
- The board has its new configuration.

- Configure next board, if required.

- As soon as the last master board is configured:
  Press the individual pin switches of the remaining master boards one after the other two times for 1 sec. each (5 sec. for temperature controller).
  Now, these green LEDs are also on, continuously.
- **Before starting the MCS measurement program make sure, that all of the green LEDs are lit continuously.**
- Reconnect the jumper of the watchdogs at the „left“ (***Caution: hot components in MCS 100 E***) (See chapter ACQINIT).
- Enter via the MCS 100 E keyboard: 1 <ENTER>.
  The MCS measurement program starts again.

For a detailed description of ACQINIT please refer to chapter 3.

2.2.2.2 Presetting of addresses for connection to a MCS 100 E

With a Endress+Hauser measuring system such as the MCS 100 E the addresses are usually preset.

„Channel“ refers to the allocation made by the MCS 100 E **software, independently** of the boards that are plugged in and also of the set board address (Example: „DI25“ always reads the 25th digital input that is found; in the example given below this is the 1st input of the 3rd digital board.

Address (decimal)	Plug-in board	Channel
0	Digital Inputs	DI1 .. DI12
1	Digital Outputs	DO1 .. DO12
2	Digital Inputs	DI13 .. DI24
3	Digital Outputs	DO13 .. DO24
5	Digital Inputs	DI25 .. DI36
4	Digital Outputs	DO25 .. DO36
etc.	etc.	etc.
16	Analog Output	AO1
17	Analog Output	AO2
18	Analog Output	AO3
etc.	etc.	etc.
32	Analog Input	AI1
33	Analog Input	AI2
34	Analog Input	AI3
etc.	etc.	etc.
48	Temperature Controller	HC1
49	Temperature Controller	HC2
50	Temperature Controller	HC3
etc.	etc.	etc.

Table: Preset addresses with MCS 100 E

These address settings are given as an example.
For the address settings of your system please refer to your system documentation.

Note:
Remember the board addresses as – in case of a possible defect – these addresses may be lost. For a delivered Endress+Hauser measuring system the preset addresses are stated in the system documentation.

2.3 Start-Up

The I/O-module box does not have a power switch of its own. It starts operation automatically after power-on.

After power-on the plug-in boards are in the following conditions:

Condition before Power-off	Condition after Power-on
Active	Active
Inactive	Inactive
Dialog mode	Inactive

Caution:
Please observe that after new installation of boards, these are not yet configured. In this case do not connect any external instruments and perform configuration of the boards immediately after power-on (see chapter 2.2).

In combination with a Endress+Hauser *measuring system the I/O-module boxes supplied have been configured in the factory. No further configuration is required.*

2.4 Stopping Operation

To stop operation:
- Switch power off or disconnect line power plug.

Caution: Risk of Instrument Damage
- *When switching the mains voltage of one I/O-module box OFF all subsequent „slave“ I/O-module boxes will fail..*

Chapter 3:ACQINIT Configuration Software

Caution: Risk of Instrument Damage
Caution: Modifications of the settings can lead to instrument damage!
- *All settings are preset in the factory.*
  Settings should only be changed, if required.

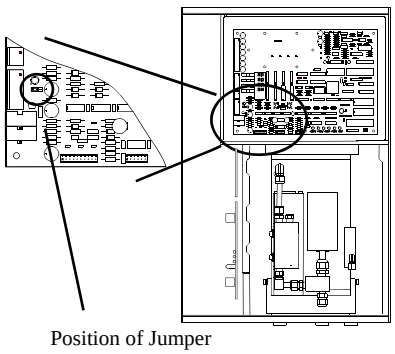
Note:
ACQINIT is no released software. It is only intended to be an aid for the configuration of the I/O-modules. No detailed description of the software is available and the software is intended to be used by trained and skilled personnel, only!

ACQINIT allows to change all internal parameters of the I/O-module box. The program is called-up from the DOS level by entering specific parameters.

For this purpose first quit the MCS 100 E measurement program:
- Quit measurement program
  After having quit the measurement program 2 watchdogs continue operation. To disable the watchdogs:
  - Enter on the DOS level: WDOG disable <RETURN>
  - Remove jumper in MCS 100 E (see below)

Warning: Electrical hazard
When removing any covers live parts become accessible.
- *It is essential to use only appropriate, insulated tools.*
  Do not touch any components except those specifically mentioned in the manual.

Warning: Hot Surface: Risk of Burns
When removing covers/opening the door extremely hot components become exposed.
- *Do not touch any components except those specifically mentioned in the manual.*



Position of Jumper

 Jumper removed: Watchdog disabled

 Jumper to the „left“: Watchdog enabled.

Boot system (CTRL-ALT-DEL or switch off/on)

- Upon screen prompt <Start Program Y/N> : type N

After configuration, re-start the MCS 100 E measurement program by 1(.bat).
Before re-starting the measurement program it is essential to re-connect the jumper for the watchdog.

(For further information on the MCS 100 E measurement program please refer to the MCS 100 E Software Manual)!

Note:
For configuration the respective board must be in the dialogue mode! Only one board at a time may be in the dialogue mode. All other boards must be set to the „not active“ condition.

When calling up the program without any parameters, the following help text is displayed:

```
[w95] F:\>acqinit
ACQINIT utility by MMKrajka '97
Sets parameters of ModBox via serial optical link in Prog mode.
Usage: ACQINIT {/|-<options>}
Options:
 C<c> - COM port used, c=1..4, must be defined
 I<i> - IRQ number, i=0..15, default is 4 for COM1&3, 3 for COM2&4
 B<b> - Baud rate to be programmed, b=600,1200,..38400, default is 9600
 A<a> - Address of ModBox, a=0(default)..63 (dec) or a=$0..$3F (hex)
 F<f> - Function of ModBox, f=AO(default), AI, DO, DI or HC
 G<g> - analog Gain, g=0..2.0, default 1.0, at AI, AO and HC only
 O<o> - analog Offset, o=-4096..4095 LSB, default 0, at AI, AO and HC only
 R<r> - analog coRrection, r=0..1, 0/1: correction off/on
 T<t> - control Temperature, t=0..409.5øC, default 185.0øC, at HC only
 U<t> - Upper limit, t=0..409.5K, default 12.0K, at HC only
 L<t> - Lower limit, t=0..409.5K, default 12.0K, at HC only
 H<t> - Hystheresis, t=0..409.5K, default 5.0K, at HC only
 M<m> - Mode of HC, m=H, T or B (for H1, T1 and B1 version), default H
 S    - Save variable ACQINIT (max 64 chars) as remark in the ModBox
Option C must be defined, the rest uses defaults if not specified.
The communication with ModBox in Prog mode runs always with 9600 Bd.
Example: ACQINIT /c3 /b1200 -fai -a49
uses the ModBox on COM3 at 9600 Bd, IRQ4, 8 data bits, 1 stop bit,
no parity, sets ModBox address to 49 dec and function to analog input (AI)
with 1200 Bd transfer rate in normal (OptoBox) mode
```

If no I/O-module box is found, the following text is presented:

```
[w95] F:\>acqinit /c1
Querying the ModBox...
Time out achieved. ModBox doesn't respond
[w95] F:\>
```

This message is displayed if a temperature controller was found:

```
[w95] F:\>acqinit /c1
Querying the ModBox...
Found:
Check sum : AEBE hex
BaudRate  : 9600 Bd
Address   : 48 dec, 30 hex
Function  : HC
Correction: active
HC Mode   : H1
Gain      : 1.02701
Offset    :  -76.00
TCtrl     :   185.0
TLLim     :    12.0
TULim     :    12.0
THyst     :     5.0
Remark    :
Written:
BaudRate  : 9600 Bd
Address   : 48 dec, 30 hex
Function  : HC
Correction: active
HC Mode   : H1
Gain      : 1.02701
Offset    :  -76.00
TCtrl     :   185.0
TLLim     :    12.0
TULim     :    12.0
THyst     :     5.0
Remark    :
[w95] F:\>
```

This message is displayed after modification of parameters:

```
[w95] F:\>set acqinit=HC programming example

[w95] F:\>acqinit /c1 /s /t182.3 /l15 /h1.5 /u17
Querying the ModBox...
Found:
Check sum : AEBE hex
BaudRate  : 9600 Bd
Address   : 48 dec, 30 hex
Function  : HC
Correction: active
HC Mode   : H1
Gain      : 1.02701
Offset    :  -76.00
TCtrl     :   185.0
TLLim     :    12.0
TULim     :    12.0
THyst     :     5.0
Remark    :
Written:
BaudRate  : 9600 Bd
Address   : 48 dec, 30 hex
Function  : HC
Correction: active
HC Mode   : H1
Gain      : 1.02701
Offset    :  -76.00
TCtrl     :   182.3
TLLim     :    15.0
TULim     :    17.0
THyst     :     1.5
Remark    : HC programming example
[w95] F:\>
```

The check sum changes with each firmware version and can be used to distingiush the different versions.

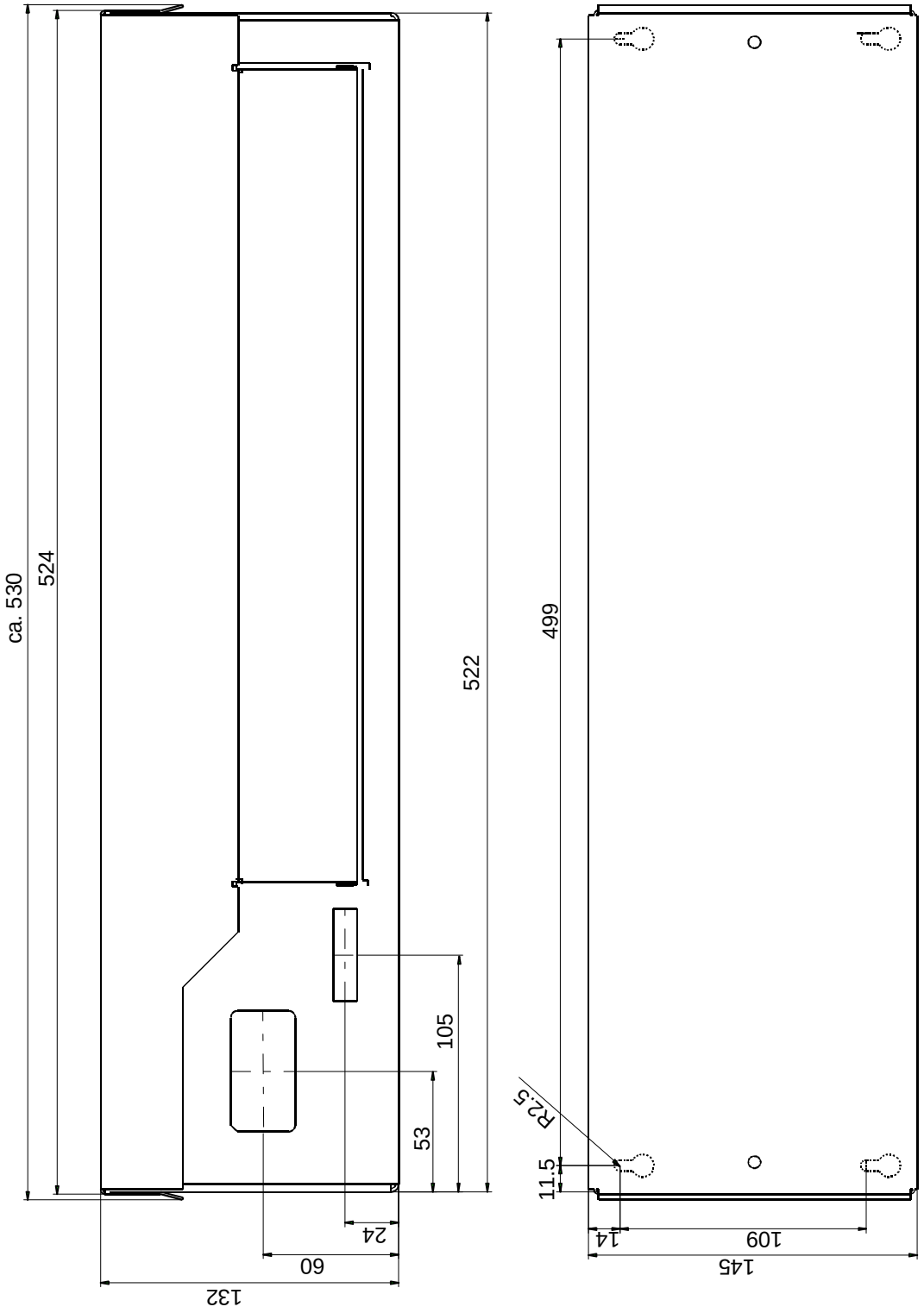
Temperatures are indicated in °C.

If the EEPROM of the I/O-module box is empty (condition HiByte(word) = not LoByte(word) is not met), then the standard values will be programmed. If the data meet the above condition, then they will not be changed, except if the redefinition of the parameters is called up explicity.

The values GAIN & OFFSET are only relevant, if the correction is active. These values are used for correction of the analog input tolerances, they are preset in the factory and must not be changed.

Chapter 4: Technical Data

4.1 Dimensioned Drawing



4.2 Technical Data

I/O-module box:	8 slots for plug-in boards
Number of addresses:	up to max. 64 addresses
Temperature range:	0...45 °C without condensation
Mains voltage supply:	115 V / 230 V 50...60 Hz / 160 VA Deviation + 10 % / -15 %
Fuses:	Mains voltage With 230 V: 2 x 1 AT (slo-blo) With 115 V: 2 x 2 AT (slo-blo) Secondary SI 1: 1 AT (slo-blo) SI 3: 2 AT (slo-blo) SI 2 and SI 4: 4 AT (slo-blo)
Mains connection:	Power plug
Connection data of terminal blocks:	Conductor diameter 0,1 – 2,5 mm^2 rigid or flexiblel AWG 24-12 It is recommended to use appropriate end sleeves
Connection of measuring system:	4 sockets for fibre optical cables
Length of fibre optical cables:	50 m (greater lengths upon request)
Weight:	max. 7,5 kg (incl. plug-in boards)
Dimensions:	(145 * 530 * 132) mm (H*B*T) as related to the „wall“ mounting position
Material:	Steel sheet
Colour:	RAL 7035 (grey)
Protection class:	IP 20
Compliances:	EN 61010-1, EN 61326-1

Plug-in boards:

Analog output modules:	
Range:	0 - 22 mA
Resolution:	12 Bit
Accuracy:	0,5 %
Load:	500 Ω max.
Number of addresses:	1 Address per module
Analog input modules:	
Resolution:	12 Bit
Input current:	0 - 22 mA or
Input voltage:	0 - 2,2 V
max. input voltage:	5 V
Input impedance:	100 Ω
Number of addresses:	1 Address per module
Digital input boards:	12 Opto coupler inputs
Voltage:	5 - 40 V
Input impedance:	2 kΩ
Supply voltage:	24 - 32 V DC uncontrolled, max. 1 A
Number of addresses:	1 Address
Fuse DIM4, DIS4:	1 AT (slo-blo)
Digital output boards:	12 Relay outputs
Load capacity:	4 A at 50 V AC 4 A at 24 V DC 0,8 A at 50 V DC
Supply voltage:	internally: 24 V AC, max. 4 A
Number of addresses:	1 Address
Temperature control boards:	2 Temperature control circuits
Control cycle:	1 per second
Input:	Pt100 sensor
Output:	Open collector
Load capacity, output:	24 V DC for triggering relays, max. 200 mA,
Nominal range:	0..409,5°C (Firmware version 1.x) -50..359,5°C (Firmware version 2.x+) Resolution :0,1K
Hysteresis:	0..409,5K, Resolution 0,1K,
Limit values:	0..409,5K, Resolution 0,1K, upper and lower limit can be set independent of each other.
Number of addresses:	1 Address per control circuit

Index

P

R

S

T

V

W

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