



# MEDICS® UMC710D4-..HA

Four-pole switchover module for medical locations with and without manual/automatic control



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0700BenderHelp \*

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## Table of contents

<b>1</b>	<b>General instructions .....</b>	<b>5</b>
1.1	How to use this manual.....	5
1.2	Indication of important instructions and information .....	5
1.2.1	Signs and symbols .....	5
1.3	Training courses and seminars.....	5
1.4	Delivery conditions.....	5
1.5	Inspection, transport and storage .....	6
1.6	Warranty and liability.....	6
1.7	Disposal of Bender devices.....	6
1.8	Safety.....	6
<b>2</b>	<b>System description .....</b>	<b>9</b>
2.1	Intended use .....	9
2.2	Device-specific safety information .....	9
2.3	MEDICS® .....	9
2.4	UMC710D4-.. features.....	11
2.5	Functionality UMC710D4-.....	11
2.5.1	The changeover module .....	11
2.5.2	Version UMC710D4-..-HA .....	12
2.5.3	Monitoring the device functions.....	13
2.5.4	Monitoring of the neutral conductor .....	13
2.5.5	Power supply .....	13
2.6	System components .....	13
2.7	UMC710D4-160...250-HA design plan .....	14
<b>3</b>	<b>Installation and connection .....</b>	<b>15</b>
3.1	Fuses .....	15
3.1.1	Selecting a fuse with only one load per phase conductor .....	15
3.1.2	Selecting a fuse with several loads at one phase conductor.....	16
3.2	Changeover module .....	16
3.2.1	UMC710D4-..HA .....	16
3.3	Instruction for connection .....	17
3.3.1	Alarm indicator and test combination .....	17
3.3.2	TMX-HA .....	17
3.3.3	GLT/ZLT .....	17
<b>4</b>	<b>Commissioning, setting and testing .....</b>	<b>19</b>
4.1	Setting and testing according to the checklist .....	19
4.2	Assigning addresses - examples.....	20

<b>5</b>	<b>Trouble shooting.....</b>	<b>21</b>
5.1	PRC487 error messages .....	21
5.2	Fuses F1 ...F3 .....	22
5.3	Emergency manual mode of the changeover module.....	23
<b>6</b>	<b>Periodic verification and service .....</b>	<b>25</b>
6.1	Periodic verification.....	25
6.1.1	Testing of the changeover module.....	26
6.2	Maintenance .....	26
<b>7</b>	<b>Data, manufacturer's certificate, checklist, circuit documentation</b>	
<b>27</b>		
7.1	TÜV-test report.....	27
7.2	Standards .....	28
7.3	Technical data .....	28
7.4	Ordering information .....	30
7.5	Manufacturer's certificate, checklist, circuit documentation.....	31

## 1 General instructions

### 1.1 How to use this manual



This manual is intended for qualified personnel working in electrical engineering and electronics! Part of the device documentation, in addition to this manual, is the enclosed "Safety instructions for Bender products".



Read the manual before installing, connecting and commissioning the device. Always keep the manual within easy reach for future reference.

### 1.2 Indication of important instructions and information



**DANGER!** Indicates a high risk of danger that will result in death or serious injury if not avoided.



**WARNING!** Indicates a medium risk of danger that can lead to death or serious injury, if not avoided.



**CAUTION!** Indicates a low-level risk that can result in minor or moderate injury or damage to property if not avoided.



Information can help to optimise the use of the product.

#### 1.2.1 Signs and symbols

	Disposal		Temperature range		protect from dust
	protect from wetness		Recycling		RoHS guidelines

### 1.3 Training courses and seminars

[www.bender.de](http://www.bender.de) > Know-how-> Seminars.

### 1.4 Delivery conditions

The conditions of sale and delivery set out by Bender apply. These can be obtained from Bender in printed or electronic format.

The following applies to software products:



"Software clause in respect of the licensing of standard software as part of deliveries, modifications and changes to general delivery conditions for products and services in the electrical industry."

## 1.5 Inspection, transport and storage

Check the shipping and device packaging for transport damage and scope of delivery. The following must be observed when storing the devices:



## 1.6 Warranty and liability

Warranty and liability claims in the event of injury to persons or damage to property are excluded in case of:

- Improper use of the device.
- Incorrect mounting, commissioning, operation and maintenance of the device.
- Failure to observe the instructions in this operating manual regarding transport, commissioning, operation and maintenance of the device.
- Unauthorised changes to the device made by parties other than the manufacturer.
- Non-observance of technical data.
- Repairs carried out incorrectly.
- Use of accessories and spare parts not recommended by Bender.
- Catastrophes caused by external influences and force majeure.
- Mounting and installation with device combinations not recommended by the manufacturer.

This operating manual and the enclosed safety instructions must be observed by all persons working with the device. Furthermore, the rules and regulations that apply for accident prevention at the place of use must be observed.

## 1.7 Disposal of Bender devices

Abide by the national regulations and laws governing the disposal of this device.



For more information on the disposal of Bender devices, refer to

[www.bender.de](http://www.bender.de) -> [Service & support](#).

## 1.8 Safety

If the device is used outside the Federal Republic of Germany, the applicable local standards and regulations must be complied with. In Europe, the European standard EN 50110 applies.



***DANGER! Risk of electrocution due to electric shock! Touching live parts of the system carries the risk of:***

- A fatal electric shock
- Damage to the electrical installation
- Destruction of the device

Before installing and connecting the device, make sure that the installation has been de-energised. The rules for working on electrical systems must be observed.





## 2 System description

### 2.1 Intended use

The UMC710D4-.. changeover module is a four-pole, automatic changeover module for main distribution systems as well as for distribution systems used in medical locations group 1 and 2 medical locations in accordance with IEC 60364-7-710:2002-11 and DIN VDE 0100-710 (VDE 0100 Part -710)2002-11.

It is used in medical locations and monitors the power supply using two independent three-phase supply sources with neutral conductor. The UMC710D4-.. changeover module detects whether the preferred supply has failed and automatically performs a four-pole changeover to the second supply source. The loads have to be connected between the line conductor and the neutral conductor. It is not permitted to connect loads between the line conductors.

Customised parameter settings must be made on the equipment for the purpose of adapting it to local equipment and operating conditions, in order to meet the requirements of applicable standards.

The equipment can also be used in non-medical areas provided that the intended application has been cleared with Bender in advance. Please note the limits of the area of application indicated in the technical data. Use deviating from or beyond the scope of this is considered non-compliant.

Intended use also implies:

- Device-specific settings in accordance with IEC 60364-7-710:2002-11, sections 556.5.2.2, 556.7, 556.8 and DIN VDE 0100-710 (VDE 0100 Part 710):2002-11, section 710.537.6.2 (changeover periods) and for the IT system.
- The observation of all information in the operating manual.
- Compliance with test intervals.

### 2.2 Device-specific safety information

Device-specific settings are required in order to adapt the MEDICS® module to the existing equipment. To this end, refer to the instructions in [chapter „Commissioning, settings and testing“](#).

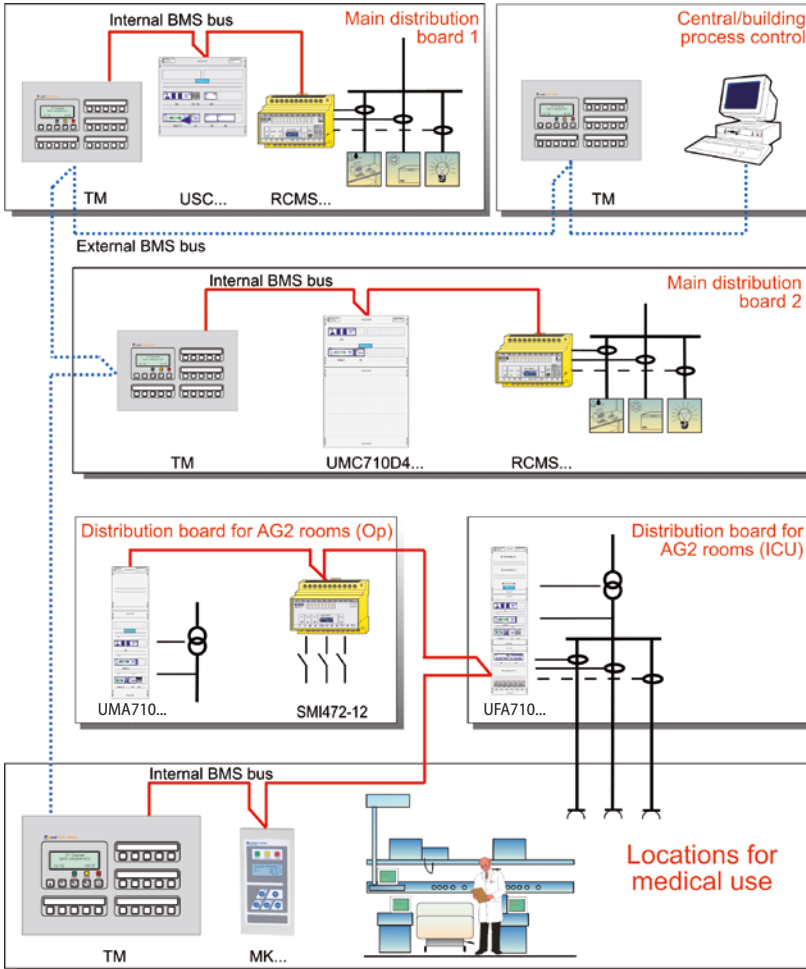


*The MEDICS®-Modul iThe MEDICS® module is a configured unit and is only certified and tested in this assembly. Do not make any changes to the components, their password-protected settings or the wiring without consulting Bender first. In each case you should make the settings that are required for adaptation to the application case in question and local conditions.*

### 2.3 MEDICS®

The UMC710D4-.. changeover module is a part of the MEDICS® system. MEDICS® does not refer to a single product, but rather an intelligent system for safe power supplies in medical locations.

## Example of a section of a hospital with the MEDICS® system



### Key for example

MK...	Alarm indicator and test combination
RCMS...	Residual current monitoring system for TN-S systems
SMI472	Signal converter for third-party technical equipment (e.g. med. gases, UPS)
TM	Alarm indicator and operator panel
UFA107E...	Changeover and monitoring module for IT systems with EDS... insulation fault location system
UMA107E...	Changeover and monitoring module for IT systems
UMC710D...	Changeover module for main distribution boards
USC710D...	Control module for changeover modules (preferably in main distribution boards)

**MEDICS® includes:**

- AC and 3(N)AC- changeover and monitoring modules. Examples of modules in the MEDICS® system include UMC..., USC..., UFC... and EDS.... insulation fault location systems.
- Display and operating units such as alarm indicator and operator panels or alarm indicator and test combinations.
- Communication between these components takes place via the BMS bus (two-wire connection).
- The connection of third-party technical equipment by means of protocol converters (gateways), via digital inputs and relay outputs.

The real strength of MEDICS® is to be found in communication between all involved components and the resulting information provided to the user. Readiness for operation is monitored continuously. Operating states, irregularities, faults and equipment failures are displayed. From the user's point of view, this means high operational reliability.

## **2.4 UMC710D4-.. features**

The UMC710D4-.. changeover module has the following features:

- Four-pole changeover with contactors
- Voltage monitoring on the preferred supply (line 1)
- Voltage monitoring on the second supply (line 2)
- Voltage monitoring at the output of the changeover module (line 3)
- Monitoring of the switching elements to ensure that they are in the correct switching state and for wire breaks (connecting wires respectively the circuits of the drive motors of the switch disconnectors)
- Internal functional testing including checking of the changeover times
- Communication of components with one another via BMS bus
- Communication with remote alarm indicator and test combinations and TM alarm indicator and operator panels via BMS bus
- Possibility to set the time delay for the changeover in 50 ms increments for adaptation to the total off-time according to DIN VDE 0100-710 (VDE 0100 Part 710):2002-11 section 710.537.6.2.k) resp. to the return transfer time according to DIN VDE 0100-710 (VDE 0100 Part 710):2002-11 section 710.537.6.1.f)
- Can be used in systems in accordance with IEC 60364-7-710:2002-11, sections 556.5.2.2, 556.7 and 556.8 and DIN VDE 0100-710 (VDE 0100 Part 710):2002-11, section 710.564.6 with a changeover period =  $\leq 15$  s or =  $\leq 0.5$  ss

## **2.5 Functionality UMC710D4-..**

### **2.5.1 The changeover module**

If the preferred supply should fail, the UMC710D4-.. ensures safe changeover of the power supply:

1. In normal condition (fault-free condition), the preferred supply (line 1) is connected via the switch disconnector Q1. This makes it impossible for the power supply to fail on torn lines or a failure of the control voltage.

2. If the voltage at the end of the preferred supply falls below the set value or exceeds a value of  $115 \% \times U_n$ , the module automatically changes over to the second supply (line 2): Once the set response time  $t(\text{off})$  has elapsed, Q1 is disconnected and following the set idle time  $t(K1-2)$ , Q2 is connected and latched.
3. On voltage recovery on the preferred supply source, switching back to the preferred supply source occurs automatically after the set return transfer time  $t(\text{on})$  has elapsed: Q2 is disconnected and following the set idle time  $t(K1-2)$ , K1 resp. Q1 is connected and latched.

**i** *The response time  $t(\text{off})$ , the idle time  $t(K1-2)$  and the return transfer time  $t(\text{on})$  of the MEDICS®-module can be set and must be adjusted according to the requirements of the specific application case, the short-circuit calculation and the requirements of IEC 60364-7-710:2002-11, sections 556.5.2.2, 556.7 and 556.8 and DIN VDE 0100-710 (VDE 0100 Part 710):2002-11 section 710.537.6 (automatic changeover modules) ([see chapter „Commissioning, setting and testing“](#)).*

The settings made at the factory on MEDICS® modules  $I_g \leq 63 \text{ A}$  ensure a changeover period of  $t \leq 0.5 \text{ s}$  and switching back within five seconds on voltage recovery on the preferred supply. Therefore, the UMC710D4-.. can also be used in IT systems with a requirement for a changeover period  $t \leq 0.5 \text{ s}$  (IT systems with operating theatre lighting circuits, endoscopic field illumination in operating theatres, or other essential sources of light, etc.).

For changeover modules with  $I_g \geq 100 \text{ A}$ , the idle time is factory set to at least 500 ms. Therefore, the factory-set total changeover time for modules above 100 A is  $\geq 0.8 \text{ s}$  and meets the requirements for a changeover period of  $< 15 \text{ s}$ . In this way, overvoltages due to fast switching operations can be avoided. The response time  $t(\text{off})$  and idle time  $t(K1-2)$  must be adjusted according to the requirements of the specific application case.

If the control device detects a supply line failure or a fault, a message appears on the LC display, the LED „ALARM“ lights up, the alarm relay switches and this alarm is transmitted to other Bender devices (such as alarm indicator and test combinations) via the BMS bus.

### 2.5.2 Version UMC710D4-..-HA

Version UMC710D4-..-HA additionally offers the following possibilities:

1. This version is designed to be operated with the alarm indicator and operator panel TMX-HA. That additionally allows manual operation of the changeover module which is required, for example, for revision procedures. When operated in manual mode, an alarm message occurs on the module or via BMS bus on associated remote alarm indicators and test combinations or TM... operator panels. The alarm indicator and operator panel TMX-HA is not included in the scope of delivery.
2. "Internal conditions are assigned to relay contacts and are available as potential-free switching contacts for forwarding to a building control system. Alternatively, messages can be assigned to specific relays. That requires the setting of specific parameters on the PRC487.
3. Switching back interlocking ([see chapter „UMC710D4-..-HA“](#))

### 2.5.3 Monitoring the device functions

The control circuits are constructed in such a way that even if a particular fault will almost certainly occur, it cannot cause the power supply at the output of the automatic changeover module to fail. Examples: Failure of the control voltage, operation of a protective device, a short-circuit to exposed-conductive part or an earth fault, and an open circuit.

In addition to this, the module continuously monitors:

- The control circuit that is required for the next changeover process (coil, control contacts, connections)
- For alarm indicator and test combinations, and alarm indicator and operator panels, device failure monitoring can also be programmed via the BMS bus.

Thanks to the redundant hardware design of the changeover module, it is guaranteed to function safely even if the microcontroller should fail..

### 2.5.4 Monitoring of the neutral conductor

The neutral conductor is also monitored. When monitoring the neutral conductor in normal operation, generally small currents of at least 10 mA are assumed to flow continuously through the neutral conductor. The connection of an additional load avoids the likelihood of completely symmetrical load currents. If the current falls below 10 mA in the neutral conductor, an interruption is to be expected. In this case, changeover takes place and the corresponding messages are triggered. The neutral conductor monitoring can be deactivated (see instruction leaflet PRC487).

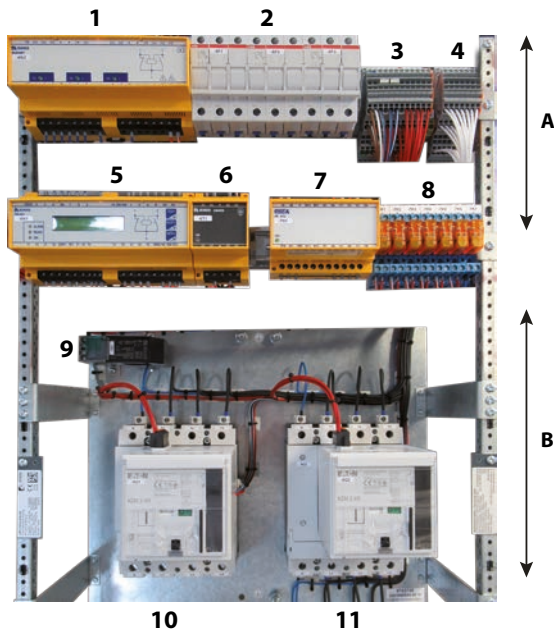
### 2.5.5 Power supply

SUD487 provides the power supply for the PRC487 control device and the control voltage for the switch disconnectors from line 2, (or from line 1 if line 2 fails). It also provides the power supply for the AN 450 power supply unit. The AN450 power supply unit supplies power to a maximum of 2 MK2430 alarm indicator and test combinations. It also provides the power supply for the optional alarm indicator and operator panel manual/automatic TMX-HA.

## 2.6 System components

PRC487	Control device for changeover and monitoring modules
SUD487	Voltage relay
BMS-Bus	Bender Measuring Device Interface
AN450	Power supply unit
RK464, RK474	Relay module
TMX-HA	Alarm indicator and operator panel manual/automatic
W1-S35, W2-S70	Measuring current transformers

2.7 UMC710D4-160...250-HA design plan



Mounting example - individual design may be different.

Legend to design plan

A	Control Section	
B	Power supply section	
1	6N2	Voltage monitoring device SUD487
2	5F1, 5F2 and 5F3	3-pole fuse disconnectors ( <a href="#">see chapter "Fuses F1 ... F3"</a> )
3	X3	Terminal strip X3
4	X5	Terminal strip X5
5	6N1	Control device PRC487
6	6T1	Power supply unit AN450 for the supply of up to 2 alarm indicator and test combinations MK2430
7	7N1	Relay module RK474 for the output of operating and alarm messages on the alarm indicator and operator panel TMX-HA
8	7K	Relay
9	5B1	Measuring current transformer T3 for neutral conductor monitoring
10	8Q1	Switch-disconnector Q1 for line 1
11	8Q2	Switch-disconnector Q2 for line 2

## 3 Installation and connection

### 3.1 Fuses

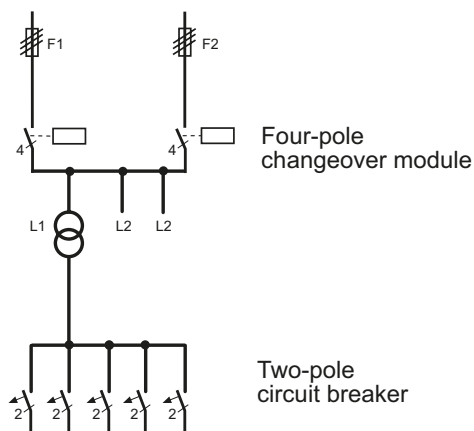
Observe the requirements of IEC 60364-7-710:2002-11 and DIN VDE 0100-710 (VDE 0100 Part 710) when selecting fuses for the supply cables and outgoing circuits of the changeover modules:

- Section: 710.512.1.6.2 (VDE), sections 710.5.3.1, 710.512.1.6 (IEC), Transformers for the IT system: Where transformers, their primary supply conductor and secondary outgoing line are concerned, overcurrent protective devices are only permitted for short-circuit protection. The transformer supply cable from the changeover module and the transformer outgoing cable to the next distribution board section should be laid so that they are short-circuit proof and earthfault proof.
- Section: 710.53.2 (VDE), section 710.413.1 (IEC), Protection of the cable system in Group 2 locations: The choice of protective devices must ensure that when the anticipated short-circuit current occur, the protective device upstream of a fault will selectively trip the protective devices that are further upstream.
- Section 710.537.6.2. (VDE), section 710.413.1.1 (IEC), Connecting several load groups downstream of a changeover module must not lead to all the load groups failing in the event of a fault.

As a result, the choice of fuses F should ensure both short-circuit protection for the transformer and selectivity for the overcurrent devices connected downstream in the IT systems.

When selecting fuses, please observe both the maximum permissible values laid down by the guidelines that apply to the location of use and national and international standards, in order to ensure that the contactor contacts cannot weld. The considerations presented below are based on the standard DIN VDE 0100-710 (VDE 0100 Part 710):2002-11, section 710.537.6.

#### 3.1.1 Selecting a fuse with only one load per phase conductor



The circuit only has one load: the „IT system transformer“ at L1.

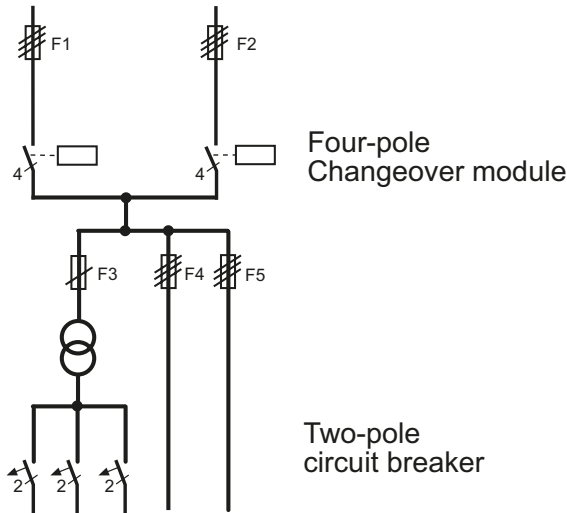
### Changeover modules with switch disconnectors

For changeover modules with switch disconnectors, the following applies:

$I_v$  = Manufacturer's technical data for short-circuit protection

$I_e$  = Manufacturer's technical data for rated continuous current

#### 3.1.2 Selecting a fuse with several loads at one phase conductor



This circuit branches into several load groups. The result is that every fuse of every load group is moved downstream of the changeover module. Regardless of this, the maximum possible fuse is calculated in the same way as described above.

The rating of fuse F1 or F2 must be coordinated with the rating of fuse F3 (and of course F4 and F5) so that selective shutdown is ensured. The fuse specified by the manufacturer for the IT system transformer must therefore be at least two stages smaller in rating than the fuse calculated using the formula above for the changeover module. Of course, the total nominal current for the changeover module must be calculated from the sum and simultaneity factor of all load groups connected, and the required or minimum rated current calculated according to the formula above.

The values listed in the ordering information apply for the changeover modules.

### 3.2 Changeover module

**i** Connect the changeover module according to the supplied circuit diagram.

#### 3.2.1 UMC710D4-..HA

Version UMC710D4-..HA provides the relay module RK474 for the output of different messages via relay contacts. This version is suitable for the following application:

- Use in combination with the alarm indicator and operator panel TMX-HA.
- Output of messages about the condition of the changeover module via relay contacts,



e.g.: line1/line 2 ready for operation, Q1 on / Q2 on. The values can be assigned via the menu of the control device (see instruction leaflet PRC487).

- Switching back interlocking: On recovery of the voltage, switching back to the preferred supply line can be disabled or enabled via an external contact. Please observe the requirements of DIN VDE 0100-710 (VDE 0100 Part 710):2002-11 Abs. 710.537.6.1.f)

### **3.3 Instruction for connection**

#### **3.3.1 Alarm indicator and test combination**

Ex works, the following pairs of terminals are provided for the connection of BMS bus devices:

X3:29 and X3:30 (A/B)

X3:31 and X3:32 (A/B terminals are terminated with 120  $\Omega$  at the factory)

Alarm indicator and test combinations, panels and other Bender-BMS-bus devices can be connected.

1. A BMS device or an existing BMS bus with several devices is connected to terminals X3:29 and X3:30:  
The last device at the other end of the bus must be terminated with 120  $\Omega$ . Terminals X3:31 and X3:32 remain terminated.
2. An existing BMS bus that has already been terminated on both ends, is disconnected; one open branch is connected to terminals X3:29 and X3:30, while the other one is connected to terminals X3:31 and X3:32:  
The 120  $\Omega$  resistor, provided ex works, must be removed and the open bus branches must be connected to the specified terminals.

Please read the information on cable routing in the „BMS bus“ instruction leaflet.

The AN450 power supply unit can supply power to a maximum of 2 MK2430 alarm indicator and test combinations via the terminals X3:33 and X3:34. In this respect, please refer to the documentation for the relevant devices. The AN450 is not suitable for supplying power to TM... operator panels.

#### **3.3.2 TMX-HA**

Connect the alarm indicator and operator panel TMX-HA to the terminals X3:39 ... X3:70 of the changeover module UMC . 710D4-..-HA. The panel is supplied via the power supply unit AN450 via the terminals 33 and 34.

#### **3.3.3 GLT/ZLT**

If messages from the UMC710D4-.. changeover module are to be transmitted to a Building Control System or to a Central Process Control System, you have the following options:

- Protocol converter (gateways)
- OPC server
- Common alarm via the relay outputs of the PRC487 control device
- Conversion between BMS bus and digital inputs and outputs by means of alarm indicator and operator panels (TM...) or signal converters (SMO480-12, SMO482-12, SMI 473-12.



## 4 Commissioning, setting and testing

**i** *Communication via the BMS bus can only be guaranteed when there is only one terminating resistor at the beginning and the end of the BMS bus. Additional terminating resistors can lead to malfunctions and therefore must not be used. Please also note the information in the „BMS bus“ instruction leaflet.*

### 4.1 Setting and testing according to the checklist

A total changeover period of  $t \geq 0.8$  s for modules with  $I_e \geq 160$  A and switching back within five seconds to the preferred supply on voltage recovery is factory set.

The response time  $t(\text{off})$ , the idle time  $t(K1-2)$  and the return transfer time  $t(\text{on})$  of the MEDICS® module can be set and must be adjusted in line with the requirements of the specific application, the short-circuit calculation and the requirements of IEC 60364-7-710:2002-11, sections 556.5.2.2, 556.7 and 556.8 and DIN VDE 0100-710 (VDE 0100 Part 710):2002-11, section 710.537.6 (automatic changeover modules).

- The total off time permitted to occur (from the point at which the fault occurs until the arc in the overcurrent protective device is cleared) must be less than the minimum time delay for the changeover process of the automatic changeover module.  
Setting: Response time  $t(\text{off})$
- If several changeover modules are connected in series in a power supply system, it is recommended that they be time-graded.  
Setting: Response time  $t(\text{off})$ , idle time  $t(K1-2)$  and return transfer time  $t(\text{on})$ .
- As part of the response delay (to be custom-set), you must, at the very least, take into account the periods of time when the circuit experiences short interruptions, and the response times of the short-circuit protective device connected upstream or downstream. Regardless of this, the idle time for the changeover process corresponding to the place of installation must be considered to prevent switching overvoltages.  
Setting: Response time  $t(\text{off})$  and idle time  $t(K1-2)$ .

For this purpose, please consult the changeover time lapse diagram in the instruction leaflet for the PRC487 control device and make the settings required according to the description.

You will find a checklist in [chapter „Manufacturer's certificate, checklist, circuit documentation“](#). This list details the factory settings and the system-specific settings for the MEDICS® module. Please carry out all the work outlined in the list and log each test step.

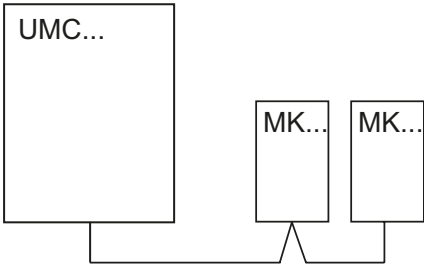
The checklist contains:

- Visual inspection
- Commissioning, settings, factory settings
- Functional test

Keep this checklist with this manual in a location that is close to the MEDICS® module.

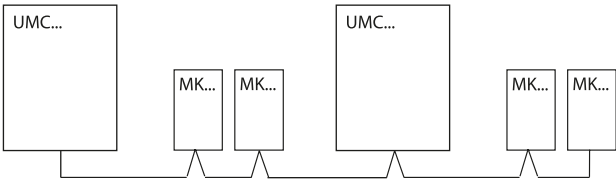
4.2 Assigning addresses - examples

A changeover module with two alarm indicator and test combinations:



Device	Parameters	Adress settings for a changeover module
PRC487	Adress	4
First MK...	Adress	1
	Alarm adress	4, 2*
Second MK...	Adress	2
	Alarm adress	4, 1*

Two changeover and monitoring modules, with two alarm indicator and test combinations each:



Gerät	Parameter	Address setting for the first changeover module	Address setting for the second changeover module
PRC487	Adress	6	8
First MK...	Adress	1	3
	Alarm adress	6, 2*	8, 4*
Second MK...	Adress	2	4
	Alarm adress	6, 1*	8, 3*

\* this address setting refer to reciprocal monitoring of alarm indicator and test combinations for failure.

## 5 Trouble shooting

### 5.1 PRC487 error messages

If a fault occurs, the MEDICS® system messages will enable you to narrow down the possible causes. Some messages can have several causes. The following possible errors are indicated by messages in the PRC487 display.

If you cannot trigger a test function on the PRC487, an alarm message may already be pending, or there may be an open circuit at terminal 9-Ub of the PRC487.

PRC message	Possible causes
Failure line 1	Power supply failure on line 1. SUD487 failure . Open circuit, terminal 6-GND3. Defective fuse 1-L1, 1-L22.
Failure line 2	Power supply failure on line 2. SUD487 failure. Open circuit, terminal 5-GND3. Defective fuse 2-L1, 2-L2.
Failure distribution board	Power supply failure downstream of the changeover module. SUD487 failure. Open circuit terminal 4-GND3.
Failure K3	Failure of the internal relay K3 (SUD487). Open circuit terminal IN3-GND3.
K1/2 manual mode	The control has been changed to manual mode. Automatic changeover will no longer be performed.
Short-circuit distribution board	Short-circuit downstream of changeover module. Following a failure on line 1 and changeover to line 2, line 2 drops out and voltage is present on line 1 again.
Wire break K1 (Q1) on	Open circuit when controlling K1/Q1 via terminals 11/14 of the PRC487, auxiliary contact K2 or resistor R1.
Wire break K1 (Q1) off	Open circuit when controlling K1 via terminals 21/24 of the PRC487 for the purpose of shutting down the latching module.
Wire break K2 (Q2) on	Open circuit when controlling K2/Q2 via the terminals 31/34, auxiliary contact K1 or resistor R2.
Wire break K2 (Q2) off	Open circuit when controlling K2 via terminals 41/44 of the PRC487 for the purpose of shutting down the latching module of K2 resp. the motor drive of Q2.
Fault K1 (Q1) on	K1/Q1 cannot be activated. Motor drive of Q1 cannot be activated within the set time. Open circuit, auxiliary contact at terminal GND1 or IN1 of PRC487.
Fault K1 (Q1) off	K1 cannot be deactivated via latching module. Motor drive of Q1 cannot be activated within the set time. Open circuit auxiliary contact at terminal GND1 or IN1 of PRC487.

PRC message	Possible causes
Fault K2 (Q2) on	K2/Q2 cannot be activated. Motor drive of Q2 cannot be activated within the set time. Open circuit, auxiliary contact at terminal GND2 or IN2 of PRC487.
Fault K2 (Q2) off	K2 cannot be deactivated via latching module. Motor drive of Q2 cannot be deactivated within the set time. Open circuit, auxiliary contact at terminal GND2 or IN2 of PRC487.
Failure K1 (Q1)	K1/Q1 on, but no voltage downstream of K1/Q1. Open circuit, main contacts K1 or line upstream or downstream of K1. SUD487 failure. Ausfall des Lasttrennschalters Q1, weil Taste „Push to trip“ betätigt wurde. Lasttrennschalter spannen und Taste „RESET“ am PRC487 betätigen.
Failure K1 (Q1)	K2/Q2 on, but no voltage downstream of K2/Q2. Open circuit, main contacts K2. SUD487 failure. Open circuit, terminal 4-GND3. Drahtbruch Klemme 4-GND3. Ausfall des Lasttrennschalters Q2, weil Taste „Push to trip“ betätigt wurde. Lasttrennschalter spannen und Taste „RESET“ am PRC487 betätigen.
RS-485 fault	Undefined characters on the BMS bus. There is more than one master in the network. More than one slave has the same address. Interface (A,B) polarity is incorrect
No MASTER	There is no master. No alarm indicator and test combination or operator panel connected. Bus line interrupted.
Fault EEPROM	Defective EEPROM or impermissible value stored in EEPROM.
Fault CV460	Settings made in SETUP OPTION menu, even though no CV460 is connected.
Fault RK474	ESettings made in SETUP OPTION menu, even though no RK474 is connected.
Failure N-conductor	Failure or interruption of the neutral conductor.
Switching back interlocking function	Switching back interlocking function is activated. Automatic changeover to line 1 does not take place (only in case of failure of line 2). To clear the switching back interlocking function, interrupt the connection between the contacts X3:40 und X3:57 ( <a href="#">see chapter „UMC710D4-..HA“</a> ).

Additonal information [see chapter „Manufacture´s certificate, checklist, circuit documentation“](#)

**5.2 Fuses F1 ...F3**



*If the fuses F1...F3 are tripped, there may be a defect in the changeover module. These fuses should only be replaced following consultation with Bender.*

**Data for fuses F1 ...F3**

Tripping current .....	4A , time lag
rated short-circuit current.....	100 kA
ELU type.....	see parts list
Trip .....	3-polig
Dimensions .....	10 x 38 mm

### 5.3 Emergency manual mode of the changeover module



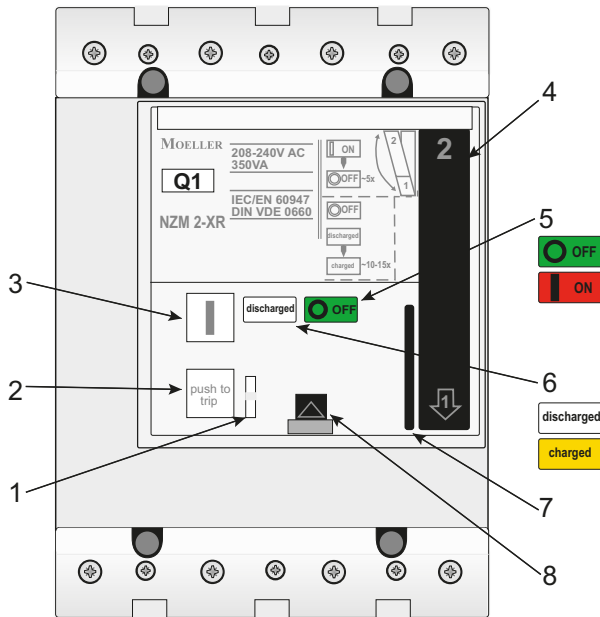
**WARNING of a total failure of the changeover module.** *If both switch-disconnectors are activated at the same time, a fault on one line is also switched to the redundant line. Never activate the two switch-disconnectors simultaneously!*

Changeover modules are equipped with switch disconnectors. These switch disconnectors can also be operated manually in the event of a complete failure of the changeover module. For that purpose proceed as follows:

1. Remove the covers of the control section.
2. Open the 3-pole fuse disconnectors F1 and F2.
3. Remove the power section covers.
4. Deactivate the activated switch-disconnector with the tension lever or push to trip button.
5. Check whether the switch-disconnector of the selected line is tensioned (display „charged“). If necessary, actuate the tension lever until the „charged“ display appears. Press the „I“ key to activate the line.
6. Tension the closing spring of the deactivated switch disconnector using the drive lever.
7. Close all covers.
8. Arrange for a repair.

## Emergency manual operation of the motor drive Q1 or Q2

The transparent cover is opened by pushing up the release button. The PRC487 immediately signals the alarm "Open circuit Q1 (Q2) off (on)" of the corresponding switch disconnector.



1	Sealing device	Can only be sealed when cover is closed
2	Mechanical tripping button	Switches off the switch disconnector. Prerequisite: Switch disconnector is switched on (display: "I on").
3	Mechanical power button	Switches on the switch disconnector. Prerequisite: Switch disconnector is switched off and charged (displays: "0 off" and "charged").
4	Tension lever	Charges the switch spring. Press tension lever several times until "charged" is displayed. If the switch disconnector is switched on, pressing the tension lever several times will switch it off.
5	Switching state display	Displays the switching state of the main contacts of the circuit breaker I on = main contacts switched on • 0 off = main contacts switched off
6	Charging state display	charged = switching is possible discharged = switching on is not possible
7	Mechanical interlock	Lockable with up to 3 padlocks, 0 4...8 mm. Prerequisite: Switch disconnector is switched off and cover is closed.
8	Release button	The transparent cover is opened by pushing up the release button. All electrical functions are deactivated. Manual operation is possible. The PRC487 signals the alarm "Open circuit Q1 (Q2) off (on)".



## 6 Periodic verification and service

### 6.1 Periodic verification

The following periodic verifications of electrical installations have to be carried out according to the local or national standards effective at the time of installation. If no local/national directives apply, you should at least perform periodic verification as recommended by DIN VDE 0100-710 (VDE 0100-710).

Action	To be performed by	Interval
Functional test of the IT system monitoring by pressing the test button on the corresponding operating units.	Medical personnel	Once every working day (recommended by Bender)
Functional test of IT system monitoring on the monitoring device. Functional test of the transfer switching device.	Electrically skilled person	monthly (recommended by Bender)
Testing the transfer switching device, the IT system monitoring as well as the interaction of the components in the system. The test encompasses the following: Inspection: Labels, display elements, mechanical components, wiring, torque settings, parameter settings, connection third-party equipment, evaluation of fault memory Measurement: Internal/external supply voltages/potentials, bus voltage, bus protocol, bus scan Checking the set values and the changeover periods If available: Test the connection to the SCADA system (Supervisory Control and Data Acquisition) Documentation: Test results, recommendations for eliminating defects	Bender service or electrically skilled person	Every 12 months
Proof test in accordance with IEC 61508 The proof test includes regular hardware checks and software updates. The aim is to ensure the availability and flawless functioning of the system throughout its entire life cycle.	Bender service or service partner certified by Bender	Every 2 years

\* Time interval according to DIN VDE0100-710 (VDE 0100-710):2012-10: 12 months

### 6.1.1 Testing of the changeover module

Step	Response
Disconnect line 1: 1. Disconnect the fuse switch disconnecter or fuse or 2. Remove fuse F1 or 3. Remove the microfuse on the SUE487/SUD487	1. Changeover to line 2 2. Alarm message „Failure line 1“ 3. Message on PRC487: „K1 off, K2 on“
Reconnect line 1	1. Changeover to line 1 after delay time t(on). 2. Alarm message „Failure line 1“* goes out 3. Message on PRC487: „K1 on, K2 off“ Exception: If an automatic switching back interlocking function is active, the changeover module remains on line 2 and displays the message „interlocking“. To clear the switching back interlocking function, interrupt the connection between contacts X3:40 and X3:57
Disconnect line 2	1. Alarm message „Failure line 2“* 2. Message on PRC487: „K1 on, K2 off“
Reconnect line 2	1. Alarm message „Failure line 2“* goes out 2. Message on PRC487: „K1 on, K2 off“
TEST on PRC487: Press the TEST button, RESET button and MENU button in sequence	1. Changeover to line 2. Display: „** TEST **“ 2. Changeover to line 1 after t(on). 3. Display of changeover period „t 1->2: xxxxms“ **
To return to the standard display, press the MENU button	Message on PRC487: „K1 on, K2 off“

\* Or corresponding parameterised text. Alarm messages are also transferred via bus or alarm contacts to TMs, MKs or the building services control system. Test, if necessary.

\*\* Up to a maximum of 15 s; above this no indication possible.



*Bender would be delighted to provide on-site service for commissioning and periodic verification. Please contact our Service Department for more information:.*

## 6.2 Maintenance

The MEDICS® does not contain any parts that require maintenance. Despite this, the intervals specified for periodic verification should be adhered to.

## 7 Data, manufacturer's certificate, checklist, circuit documentation

### 7.1 TÜV-test report

TÜV (Technical Inspection Authority) Service GmbH, TÜV Süd Gruppe, Munich, tested the change-over module of the MEDICS® series in 2004. The complete test report is available at Bender.

#### Technischer Bericht



Industrie Service

**Auftraggeber** Fa. Dipl.-Ing. W. Bender GmbH & Co. KG  
Londorfer Str. 65  
D – 35305 Grünberg

Kompetenz:  
Sicherheit,  
Qualität.

**Auftragsnummer** 454779-6784083-1613271

**Gegenstand** MEDICS UMC710D4 - xx

**Art der Untersuchung** Prüfung auf Übereinstimmung der MEDICS - Umschalteneinrichtungen mit den Mindestanforderungen der DIN VDE 0100 Teil 710, Abschnitt 710.521.6 und Abschnitt 710.537.6.2

Datum: 07.4.2004

Unsere Zeichen:  
IS-EG1-MU/Cgeb

**Sachverständiger** Dipl. Ing. Raimund Gebhart

Dokument  
Bender\_UMC710D4\_040407\_Er  
gänzungsprüfung\_Rev01\_Teil  
710\_SUE

**Datum** 2004-04-07

**Zusammenfassung** Die Umschalt- und Überwachungsmodule für medizinisch genutzte Räume vom Typ MEDICS UMC 710D4 - xx erfüllen die Anforderungen an selbsttätige Umschalteneinrichtungen im Hauptverteiler und im Verteiler für medizinisch genutzte Bereiche der Gruppe 2 gemäß DIN VDE 0100 Teil 710, Abschnitt 710.521.6 und Abschnitt 710.537.6.2.  
**(weitere wichtige Hinweise siehe Bericht)**

Das Dokument besteht aus  
5 Seiten  
Seite 1

Die auszugsweise Wieder-  
gabe des Dokumentes und  
die Verwendung zu Werbe-  
zwecken bedürfen der  
schriftlichen Genehmigung  
der TÜV Industrie Service  
GmbH.

Weitere Hinweise, Ein-  
schränkungen etc.  
bezüglich der durchgeführten  
Prüfungen siehe Abschnitte  
„Ergebnis der Prüfung“ und  
„Zusammenfassung“.

Die Prüfergebnisse beziehen  
sich ausschließlich auf die  
untersuchten Prüfgegenstände

Abteilung Elektrotechnik

Der Sachverständige

Thomas Wurl

Raimund Gebhart

Sitz: München  
Amtsgericht München HRB 96 869

Aufsichtsratsvorsitzender:  
Dr. Axel Stapfen  
Geschäftsführer:  
Dr. Manfred Bayerlein (Sprecher)  
Dr. Udo Hesse  
Christian von der Linde

Telefon: (0 89) 57 91-2432  
Telefax: (0 89) 57 91-2425  
Internet: [www.tuev-sued.de](http://www.tuev-sued.de)

TÜV Industrie Service GmbH  
TÜV SUD Gruppe  
Niederlassung München  
Abteilung  
Elektrotechnik  
Weidenstraße 199  
80686 München  
Deutschland

**7.2 Standards**

The changeover module conforms to the following standards:

- DIN VDE 0100-710 (VDE 0100 Part 710):2002-11
- DIN VDE 0100-725 (VDE 0100 Part 725):1991-11
- DIN VDE 0100-718 (VDE 0100-718):2005-10
- ÖVE/ÖNORM E8007:2007-12
- IEC 60364-7-710:2002-11
- DIN EN 61557-8 (VDE 0413 Part 8):2007-12
- IEC 61557-8:2007-01
- EN 61557-8:2007-07
- DIN EN 60439-1 (VDE 0660 Part 500):2005-01

**7.3 Technical data**

**Insulation coordination acc. to IEC 60664-1**

Rated insulation voltage .....	AC 400 V
Rated impulse voltage/pollution degree .....	4 kV/3

**Power section/switching elements**

Switching elements .....	switch disconnectors
Rated operational voltage $U_e$ .....	3 / N AC 400 / 230 V
Operating range $U_e$ .....	0.8 ... 1.15 x $U_e$
Frequency $f_e$ .....	50 ... 60 Hz
Rated operational current $I_e$ (acc.to DIN VDE 0100-710) .....	see ordering information
Fuse UMC710D4-29 .....	see ordering information
Utilisation category .....	AC-3
Adjustable changeover period .....	$\leq 0.5$ s ... 20 s

**Supply voltage, devices**

Supply voltage, devices $U_s$ .....	AC 230 V
Operating range of $U_s$ .....	0.8 ... 1.15 x $U_e$
Frequency range of $U_s$ .....	50 ... 60 Hz
Power consumption .....	see ordering information

**Control and indicating device PRC487**

Display, characters .....	LCD, illuminated, 2 x 16 characters
Control inputs .....	$\leq$ DC 5 V

**Voltage monitoring**

Response value undervoltage, adjustable .....	0.7 ... 0.9 x $U_e$
Response value overvoltage .....	1.15 x $U_e$
Response time $t_{an}$ .....	50 ... 250 ms
Response time t(off) adjustable (50 ms increments) .....	0 ... 9950 ms
Return transfer time t(on) adjustable (1 s increments) .....	0 ... 249 s
Idle time adjustable (50 ms increments) .....	0 ... 9950 ms

**Interface**

Interface/protocol .....	RS-485 / BMS
Baud rate .....	9.6 kBit / s
Cable length .....	$\leq 1200$ m

Cable (twisted pairs, shielded, shield connected to PE on one side) .....	recommended: J-Y(St)Y min. n x 2 x 0.8
Terminating resistor .....	120 Ω (0,25 W)
Device address, BMS bus .....	PRC487: 2...90
Factory device address .....	PRC487: 4

### Switching elements (alarm contacts PRC487)

Number .....	1 changeover contact
Operating principle .....	N/C operation

### Control section connection type

Connection .....	cage clamp spring terminal
Connection .....	
rigid/ flexible / conductor sizes .....	0.08...2.5 mm <sup>2</sup> / AWG 28-12
Stripping length .....	8...9 mm

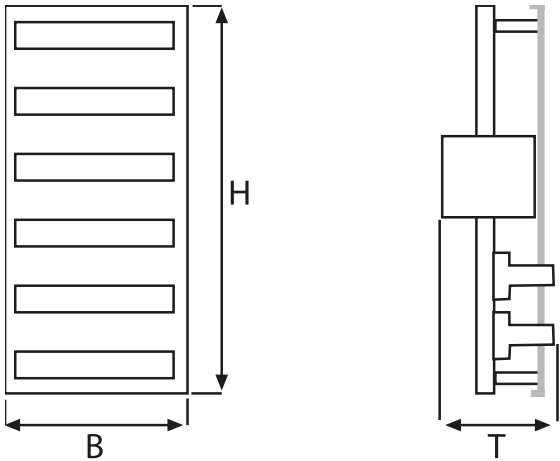
### Power section connection type

Connection .....	cage clamp spring terminal
Connection .....	
rigid/ flexible / conductor sizes .....	6...35 mm <sup>2</sup> / AWG 8-2 (from 63 A: direct connection)
Stripping length .....	23 mm

### General data

EMC immunity acc. to EN 61000-6-2	
EMC emission acc. to EN 61000-6-4	
Classification of climatic conditions acc. to IEC 60721:	
Stationary use .....	3K5
Transport .....	2K3
Long-term storage .....	1K22
Ambient temperature, operation .....	-10 °C...+ 55 °C
Classification of mechanical conditions acc. to IEC 60721:	
Stationary use .....	3M4
Transport .....	2M4
Long-term storage .....	1M12
Operating mode continuous operation	
Mounting position .....	vertical
Degree of protection, internal components (DIN EN 60529) .....	IP30
Degree of protection, terminals (DIN EN 60529) .....	IP20
Mounting into standard distribution panels .....	see table „Dimensions and weights“
Flammability class .....	UL94V-0
Protection class .....	Class I
Weight .....	table „Dimensions and weights“

**Dimensions and weights**



Type	Dimensions Control section Sections/ rows (W /H/D mm)	Dimensions Power section Sections/ rows (W /H/D mm)	Recom- mended Cabinet depth (mm)	Weight (kg)
UMC710D4-160-HA	2 / 2 (500 / 300 / 130)	2 / 3 (500 / 450 / 260)	400	20
UMC710D4-250-HA	2 / 2 (500 / 300 / 130)	2 / 3 (500 / 450 / 260)	400	20
UMC710D4-400-HA	2 / 2 (500 / 300 / 130)	2 x 2 / 4 (2 x 500 / 600 / 280)	400	66
UMC710D4-630-HA	2 / 2 (500 / 300 / 130)	2 x 2 / 4 (2 x 500 / 600 / 280)	400	66

**7.4 Ordering information**

Type	Switching components used	Max. operating current of the contacts (AC-3)	max. rated operational current I <sub>e</sub> according to DIN VDE 0100-710	Fuse max.	Power consumption max.	Art.-No.
UMC710D4-160-HA	L	160 A	160 A	160 A gL/gG	55 W	B92057083
UMC710D4-250-HA	L	250 A	250 A	250 A gL/gG	87 W	B92057084
UMC710D4-400-HA	L	400 A	400 A	800 A gL/gG	172 W	B92057085
UMC710D4-630-HA	L	630 A	630 A	800 A gL/gG	172 W	B92057086

L= motor-operated switch disconnectors

## Accessories

Material	Beschreibung	Artikel-Nr.
TMX-HA	Alarm and operator panel	B92024051
TMX-HA-S	with key switch	B22030105
TMX-HA-PQ-PEM353N	with PEM353N	B22030106
TMX-HA-PQ-PEM575	with PEM575	B22030107
TMX-HA L2/L1	cable 2 left / cable 2 right	B22030108

### 7.5 Manufacturer's certificate, checklist, circuit documentation

The individual documents complied for your MEDICS® module consist of:

Attached in paper form:

- Safety instructions
- Circuit diagram
- Parts list
- Checklist
- Quickstart

The complete documentation is sent by e-mail, the nomenclature of the drawings as @READ-ME(de-en).TXT file.



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**Bender GmbH & Co. KG**

Postfach 1161 • 35301 Grünberg • Deutschland  
Londorfer Str. 65 • 35305 Grünberg • Deutschland  
Tel.: +49 6401 807-0 • Fax: +49 6401 807-259  
E-Mail: [info@bender.de](mailto:info@bender.de) • [www.bender.de](http://www.bender.de)



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**Bender GmbH & Co. KG**

PO Box 1161 • 35301 Gruenberg • Germany  
Londorfer Str. 65 • 35305 Gruenberg • Germany  
Tel.: +49 6401 807-0 • Fax: +49 6401 807-259  
E-Mail: [info@bender.de](mailto:info@bender.de) • [www.bender.de](http://www.bender.de)