

TM800

Remote alarm indicator and operator panels



TM800

Device features

- Display, control and operation of Bender monitoring systems and third-party systems
- Backlit clear LC text display (4 x 20 characters, 8 mm)
- Display of additional text supplies medical and technical personnel with specific information
- A set of LEDs, red, yellow and green, allowing messages to be indicated in an order of priority
- 80 predefined standard texts in 20 languages
- 1000 freely programmable message texts
- Easy parameter setting with PC (USB interface) or menu
- Memory with real-time clock to store 1000 alarm messages with date and time stamp
- Variable illuminated pushbutton modules allow freely configurable function assignment
- Closed foil surface allowing, easy integration of third-party systems, such as operating theatre table controls, medical gases, intercom systems, etc.
- Control of third-party systems by flexible I/O modules with galvanic separation
- Alarm LED at each input/output for fast diagnosis
- Functions can easily be expanded by adding I/O modules
- Clearly defined project structure due to an external and internal bus
- Non-reflecting, multicoloured foil.
- Optionally available with an antibacterial foil surface.

Product description

In terms of the human/machine interface, alarm indicator and operator panels play a crucial role. Their task is to take system information and transform it into clear instructions, particularly in the event of critical operating situations. The flexible TM800 panels provide solutions that meet the requirements of modern medical facilities as well as industrial and functional buildings. They are used for

- indication and visualization of operating status and alarm messages;
- central operation and parameter setting of BMS bus devices;
- visual and audible indication of alarm messages;
- displaying measured values and setting of response values for monitoring purposes from Bender monitoring systems with BMS-bus capability, such as MEDICS, RCMS or EDS. Furthermore, they are used for indication, control and operation of
- operating theatre tables
- medical gas supply equipment
- air conditioning and ventilation systems
- interior lighting
- communication systems

and third-party systems. The integration of third-party systems in one single panel allows the creation of a kind of "technical control centre" in the appropriate room.

LC display with a set of LEDs

Text is displayed on an illuminated LC display in 4 x 20 characters (8 mm high). It supplies medical and technical personnel with information that is always clear and unambiguous, in order to help them to make decisions. Every alarm message comprises three lines which appear spontaneously and three additional lines which can be displayed at the touch of a button. This additional text provides further information, e.g. instructions with the respective telephone number.

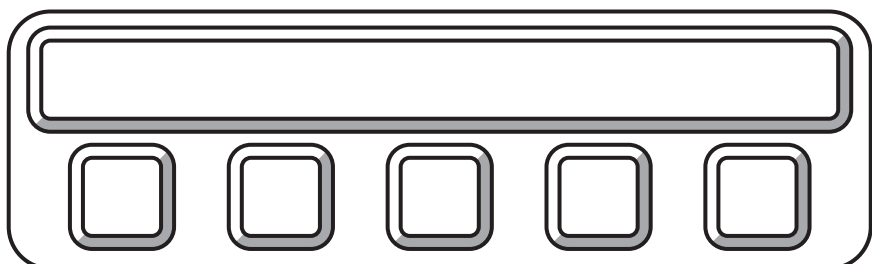
The fourth line contains status information, such as number of messages, test procedures or menu information. Three LEDs in different colours (green, yellow, red) are located below the text display which allow messages to be visually indicated in an order of priority. Five large illuminated buttons are used to operate the system in terms of the following functions:

- Acknowledgement of acoustic alarms
- Functional test of assigned ISOMETER®
- LED test
- Scrolling alarm texts and messages
- Parameter setting

Illuminated pushbutton modules

Each pushbutton module consists of five pushbuttons. Depending on the type of operator panel, a different number of pushbutton modules is available. An individual function can be assigned to each pushbutton (switch, pushbutton, LED audible alarm), by using a PC software. The link between the pushbutton and the appropriate input, output or interface is also carried out via the PC software. In addition, different acoustical messages can be set. This emphasizes the essential benefit of the TM800 panel: Functions can also be modified later without any problems, the hardware need not to be changed.

Example of a pushbutton module

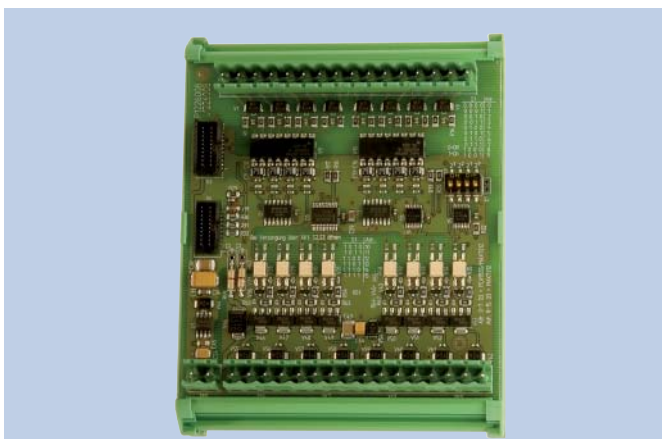


Inputs and outputs

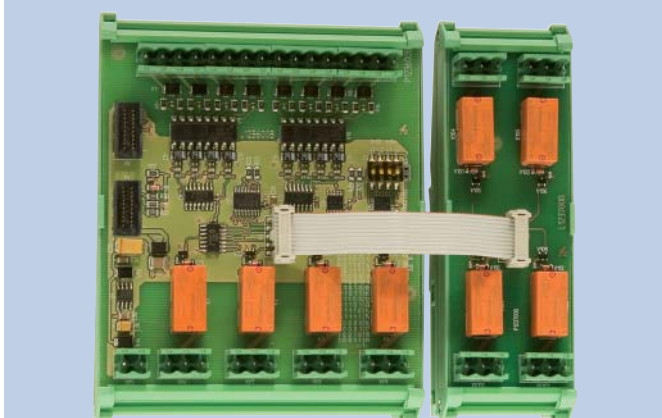
Digital inputs and outputs as well as relay outputs are provided for the control and indication of different technical equipment. The digital inputs are designed for a voltage of AC /DC 0...30 V, but in practical application the messages often arrive as potential-free contacts, this voltage is supplied by the integrated power supply unit. The performance of the alarm contact at the digital input (N/O contact or N/C contact) can be assigned via this PC software. That means that subsequent modifications of the contact performance do not require hardware modifications on the panel. The relay outputs (potential-free contacts) are controlled through operating or alarm messages or via the pushbutton modules. The assignment message resp. pushbutton / relay output is carried out via the TMK-Set PC software. Freely selectable text messages can be assigned to each input / output.

The I/O modules are installed into the flush-mounting box on a DIN rail separately from the display and the pushbutton modules. So the system can easily be expanded. Each input and output provides an alarm LED so that the status is clearly visible at a glance. The following I/O modules are available:

- BMI8/8 8 digital inputs, 8 open-collector outputs
- BMI8/4 8 digital inputs, 4 relay outputs
(one changeover contact each)
- BMI0/4 extension for BMI8/4 by further 4 relay outputs
(BMI0/4 can only be used in connection with BMI8/4).



I/O module BMI8/8



I/O module BMI8/4 with BMI0/4

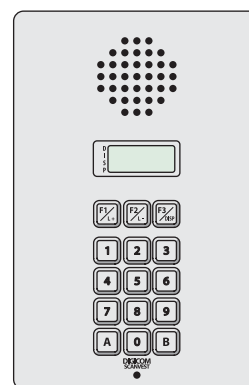
History memory

Warning and alarm messages with date and time stamp are automatically stored in the memory. This guarantees reproducibility at all times. A total of up to 1000 messages can be stored. The history can be read out via the TK-History PC software or the function keys at the TM panel.

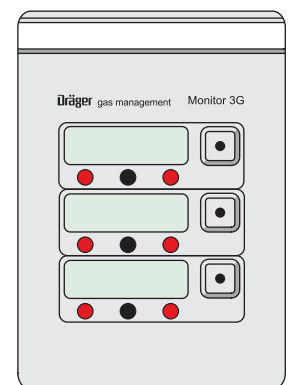
Individual components to be built in

In addition to the operating functions which can be activated via pushbuttons, often complete operating units of third-party systems and systems are integrated into the alarm and operator panel. Typical examples are of operating table controls or intercommunication systems. These modules are integrated into the panel by esb (elektro systembau bender) in order to provide an aesthetically attractive functional solution. The required connections are wired to terminals the designations of which correspond to the indications of the respective manufacturer. In this way, the technician is assisted and connection can be carried out with a minimum of time and effort. Generally, there is no limit on the installation of third-party systems. There are cost-efficient solutions available for special products.

Typical examples of third-party systems used in medical locations			
Medical gases	Intercom systems	Operating theatre luminaires	Operating theatre table
Dräger	Digicom-Scanvest	ALM	Maquet
	Gehrke	Berchtold	Trumpf
	Schneider	Dräger	
	Stentofon	Haraeus	
	Telecom Behnke		



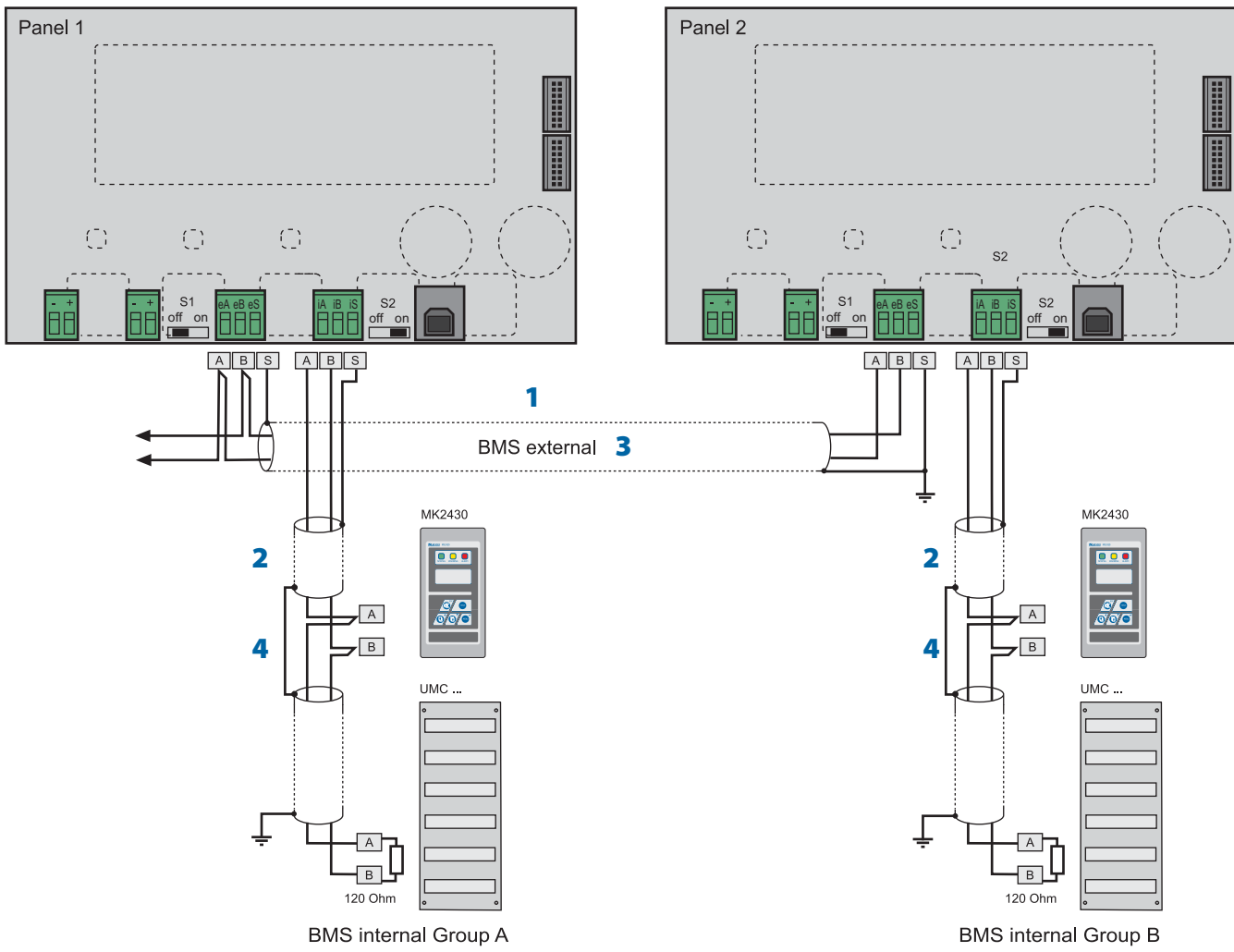
Communication system – Digicom



Dräger Monitor 3G

2.4.2

Example of the categorization into internal and external bus devices



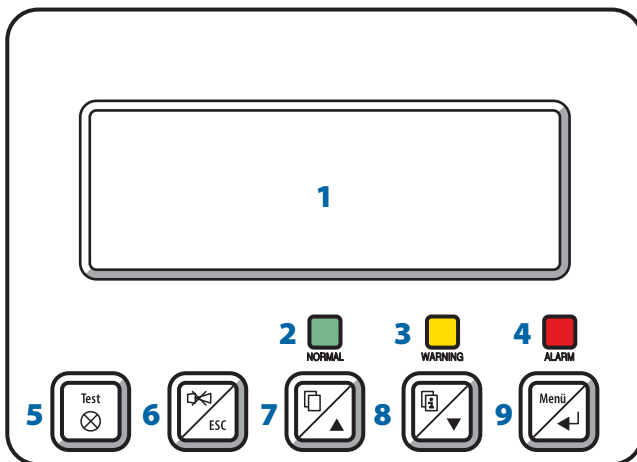
- 1 - External BMS subsystems: All internal BMS subsystems integrated into a higher-level BMS system, e.g. for the central technical control room.
- 2 - Internal BMS subsystems: For all BMS components within one section, e.g. operating theatre section, intensive care unit
- 3 - Bus devices 1...30 (99)
- 4 - Bus devices 1...30 (150)

Communication

The alarm indicator and operator panels of the TM800 series and the changeover and monitoring modules of the MEDICS series (UFC, UMC, LFC ...) can be connected via the BMS bus to exchange data with each other. Generally, a distinction is made between the internal and external bus. That allows a clearly defined project structure and certain areas can easily be grouped. A panel and all the monitoring equipment of an operating theatre section are connected to the internal bus, for example. All panels of the TM800 series or alarm and test combinations of the TM800 series are connected to the external bus. Alarm address assignment allows to predefine which messages from which sector are to be displayed on the respective panel. Up to 30 devices can be connected to each internal bus line (in combination with repeaters up to 150 devices). Each bus device receives an address with which it can be identified within the bus line. On each bus line one master is available who controls the information exchange. Generally, this is the panel (TM800 series) or an alarm and test combination.

2.4.2

Operating and display elements – Basic version



- 1 - LCD: Display of operating status and alarm messages
- 2 - LED "NORMAL": Operation indicator - error-free operation
- 3 - LED "WARNING": Warning messages
- 4 - LED "ALARM": Alarm messages
- 5 - Test button "TEST": To activate the test for connected and assigned insulation monitoring devices
- 6 - "Buzzer mute" button: In operating mode: to mute the buzzer. In menu mode: Buzzer mute and Esc function.
- 7 - "Scroll" button: In operating mode: to scroll messages. In menu mode: Up key
- 8 - "Additional text" button: In operating mode: In menu mode: Down key
- 9 - "Menu" button: In operating mode: to call up the menu mode. In menu mode: Enter function.

Mechanical design

The design of the alarm indicator and operator panels is based on the individual customer requirements in terms of interior design and the architect's and constructor's needs. The following basic versions of alarm indicator and operator panels are available:

- Flush-mounting type enclosure with bezel frame
- Flush-mounting type enclosure with mounting frame
- Surface-mounting type enclosure with a frame of anodized aluminium

But also room-high stainless-steel panels or other versions present no problem. Due to its continuous foil surface, the panel is easy to clean and suits hygiene critical surface applications. For additional protection, the front panel surface can also be delivered with anti-bacterial surface.

The mounting frame is made of anodized aluminium, which can be adjusted accurately to the tile pattern, and in this way permits close wall mounting. Bezel frames are made of anodized aluminium in order to ensure increased mechanical stability. The support frame inside the flush mounting or surface mounting case is provided with a permanent elastic sealing in order to avoid the ingress of cleaning agents into the panel. Depending on the size, the front plate is connected to the flush mounting or surface mounting enclosure by two or more rugged hinges. That ensures easy installation and easy access to the terminal strips. All necessary pcb boards and indicating elements are permanently fixed to the front plate using threaded bolts or plaster frames. The front plate is connected with the mounting plate via a flexible spiral hose that is fixed on both sides with cable clips. The technical equipment and systems are directly connected to the I/O modules, which are fixed on a mounting plate. The power supply unit for the alarm indicator and operator panel is also located on this mounting plate. The mounting plate can easily be dismantled. In this way, it is possible to install the flush mounting or surface mounting enclosure before the final assembly. Since except for the mounting plate no other components are fixed to the baseplate of the flush-mounting/surface-mounting enclosure, the technician has sufficient room for installation.

Parameter setting

The intuitive, user-friendly TMK-Set PC software allows individual texts to be programmed and assigned to 1000 individual messages via USB interface or the BMS bus. A warning or alarm LED as well as an acoustic signal can be assigned to each message. 80 pre-defined standard message texts each in 20 languages facilitate parameter setting.

Standards

The TM800 remote alarm indicator and operator panel complies with the requirements of DIN VDE 0100-710, IEC 60364-7-710.

Flush-mounting type and surface-mounting type enclosures for alarm indicator and operator panels



AP version

AP version

Surface-mounting enclosure (AP) made of anodized aluminium suitable for both pure surface mounting or for partially recessed mounting.

Mounting depth: 90, 150 or 210 mm



UPB version

UPB version

A gap of up to 12 mm between the flush-mounting enclosure and the wall can be concealed with a bezel frame made of anodized aluminium.

This version, for example, is recommended to be used for wallpapered walls or walls with non-standard tiles.



UPE version

UPE version

The plaster frame permits accurate and close wall mounting and is made of anodized aluminium. This type of mounting frame is preferably used where the enclosure must precisely fit the tile pattern.

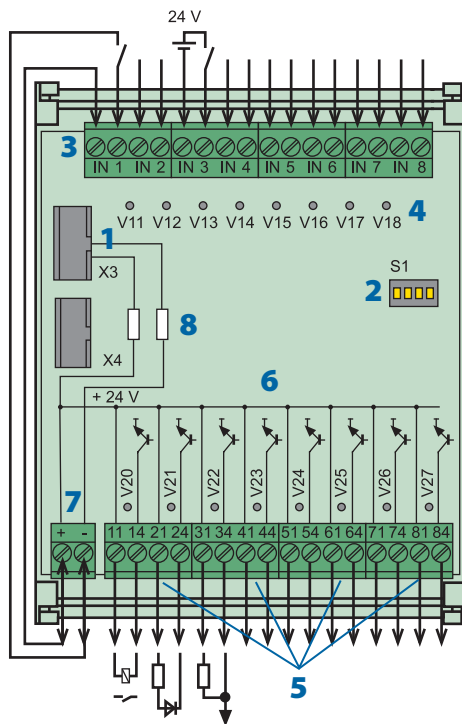
Features:

- Buckling resistant plastic enclosure for flush-mounting or anodized aluminium frame for surface mounting.
- A seal against ingress of liquids into the panel (IP54).
- Easy to install by fixing the front plate to rugged hinges.
- The front plate can be fixed without screws, the foil surface remains closed.
- Customer-specific adaptation of the enclosure dimensions.
- Standard enclosures for different tile patterns.
- Anodized aluminium mounting frame allows close wall mounting.
- Pre-perforated knockouts for cable entry.
- Flame resistant plastic material.

The flush-mounting enclosure of the UPE series (mounting frame) and the UPB series (bezel frame) are made of inherently stable plastic material (flame-resistant, self-extinguishing). The external dimensions of the alarm indicator and operator panel depends on the internal components and the local installation conditions, like the tile pattern, for example. The standard installation depth (top edge front plate / bottom edge flush-mounting enclosure) is 120 mm.

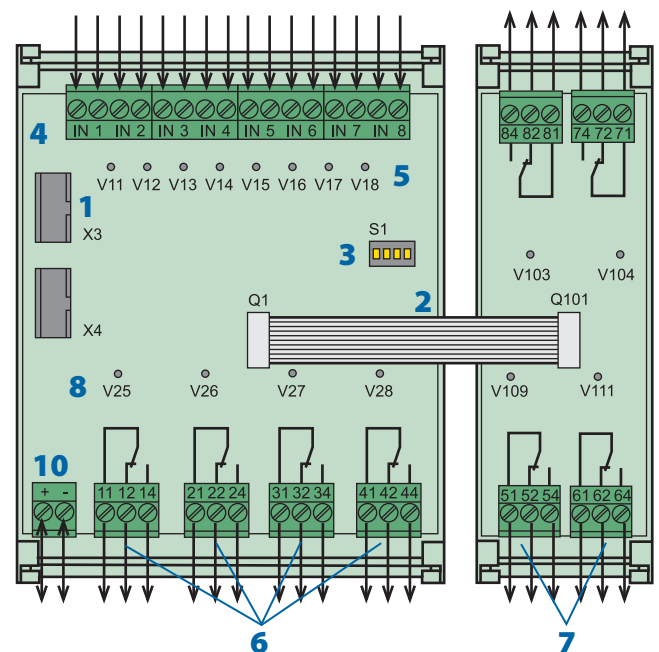
Conforming to the standards, the panel is connected with the built-in enclosure via a rugged hinge. That not only allows easy installation, but also is of advantage when the enclosure has to be opened. The hinge is generally located on the right. Lead the cable into the enclosure from above.

Wiring diagram I/O module BMI8/8



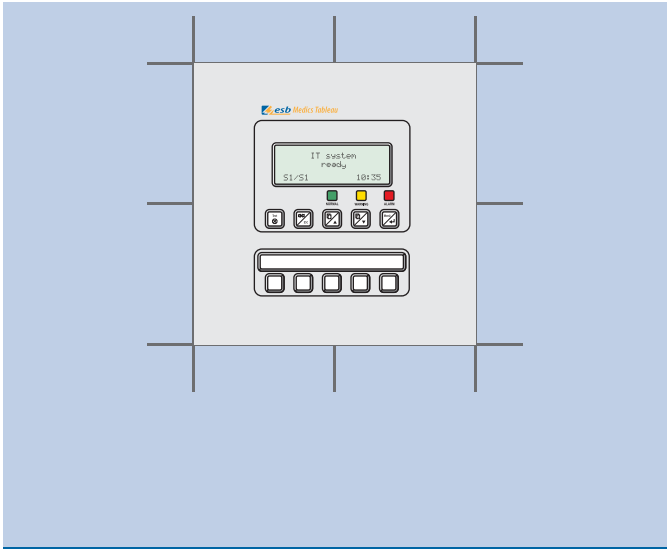
- 1 - X3 Connector for connecting additional I/O modules and connection to the display module
 - 2 - S1 DIP switch for address setting.
 - 3 - IN1...8 Digital inputs 1...8. The digital inputs either have to be activated via potential-free contacts or via voltage signals.
 - 4 - V11...V18 Alarm LEDs, light up when voltage is connected to the associated digital input.
- | Input | Alarm LED | Input | Alarm LED |
|-------|-----------|--------|-----------|
| IN1 | V11 | IN5 | V15IN2 |
| V12 | IN6 | V16IN3 | V13 |
| IN7 | V17IN4 | V14 | IN8 |
| V18 | | | |
- 5 - 11...84 Open-collector output for activating LEDs, relays etc.
 - 6 - V20...V27 Alarm LED, lights up when the associated open-collector output is closed.
- | Output | Alarm LED | Output | Alarm LED |
|--------|-----------|--------|-----------|
| 11, 14 | V20 | 51, 54 | V24 |
| 21, 24 | V21 | 61, 64 | V25 |
| 31, 34 | V22 | 71, 74 | V26 |
| 41, 44 | V23 | 81, 84 | V27 |
- 7 - A1, A2 Supply voltage U_S DC
 - 8 - S2, S3 Remove the bridges R42, R59 entfernen, in case of U_S from an external supply.

Wiring diagram I/O modules BMI8/4 with BMI0/4

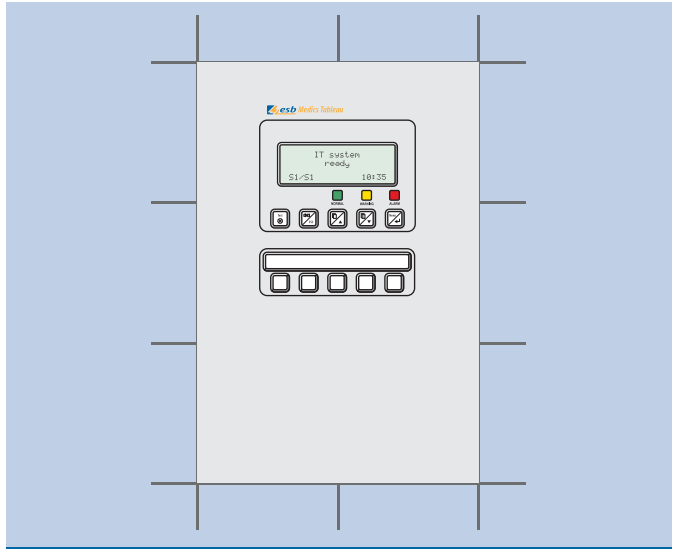


- 1 - X3 Connector for connecting additional I/O modules and connection to the display modules
 - 2 - Q1, Q101 Connecting cable between BMI8/4 and BMI0/4
 - 3 - S1 DIP switch for address setting.
 - 4 - IN1...8 Digital inputs 1...8. The digital inputs either have to be activated via potential-free contacts or via voltage signals.
 - 5 - V11...V18 Alarm LEDs, light up when voltage is connected to the associated digital input.
- | Input | Alarm LED | Input | Alarm LED |
|-------|-----------|--------|-----------|
| IN1 | V11 | IN5 | V15IN2 |
| V12 | IN6 | V16IN3 | V13 |
| IN7 | V17IN4 | V14 | IN8V18 |
- 6 - 11, 12, 14... 41, 42, 44 Four relay outputs on the BMI8/4 I/O module for the activation of loads.
 - 7 - 51, 52, 54... 81, 82, 84 Four relay outputs on the BMI0/4 I/O module for the activation of loads.
 - 8 - V25...V28 Alarm LEDs on the BMI8/4 I/O module, light up when the associated relay is energized.
- | Output | Alarm LED |
|------------|-----------|
| 11, 12, 14 | V25 |
| 21, 22, 24 | V26 |
| 31, 32, 34 | V27 |
| 41, 42, 44 | V28 |
- 9 - V103, V104 Alarm LEDs on the BMI8/4 I/O module, light up, V109, V111 when the associated relay is energized.
- | Output | Alarm LED |
|------------|-----------|
| 51, 52, 54 | V109 |
| 61, 62, 64 | V111 |
| 71, 72, 74 | V104 |
| 81, 82, 84 | V103 |
- 10 - A1, A2 Supply voltage U_S DC

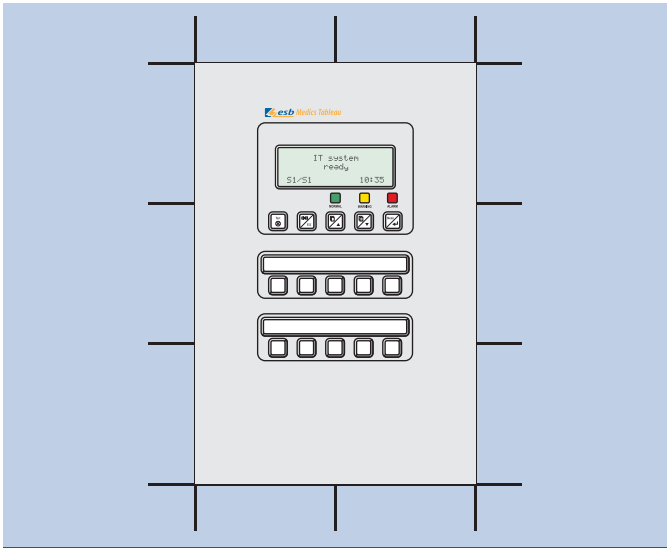
Example of different TM800 alarm indicator and operator panel versions



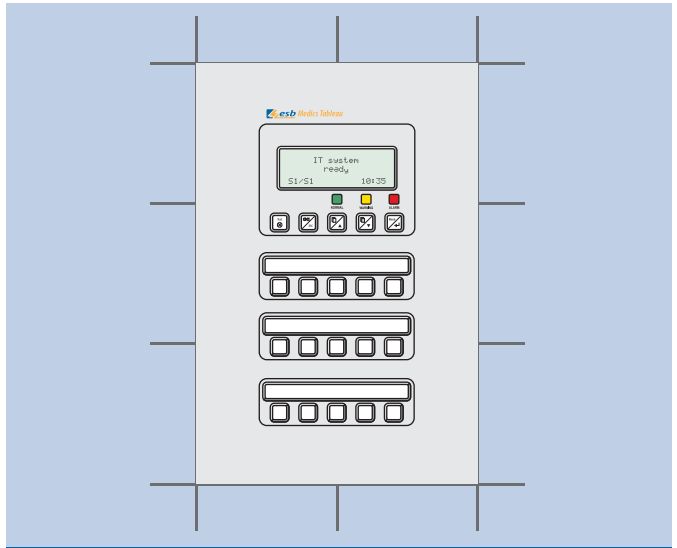
TM 22-0



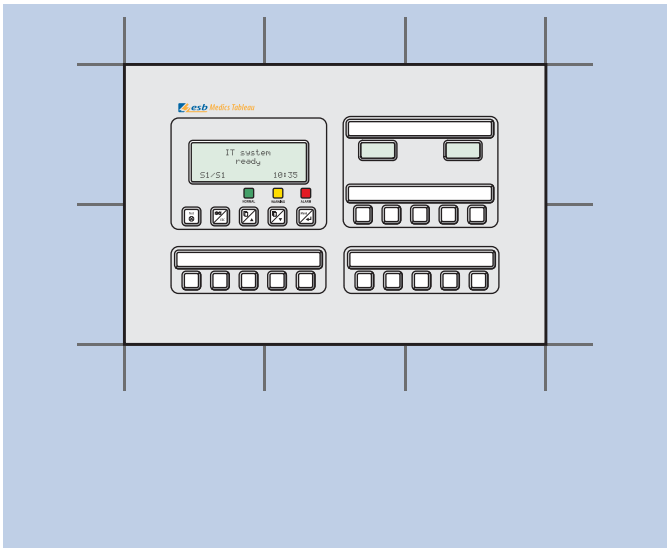
TM 23-0



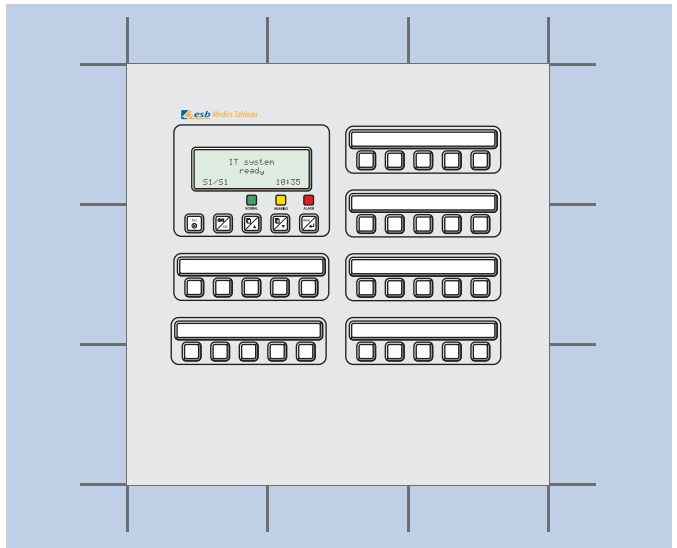
TM 23-1



TM 23-2



TM 32-03

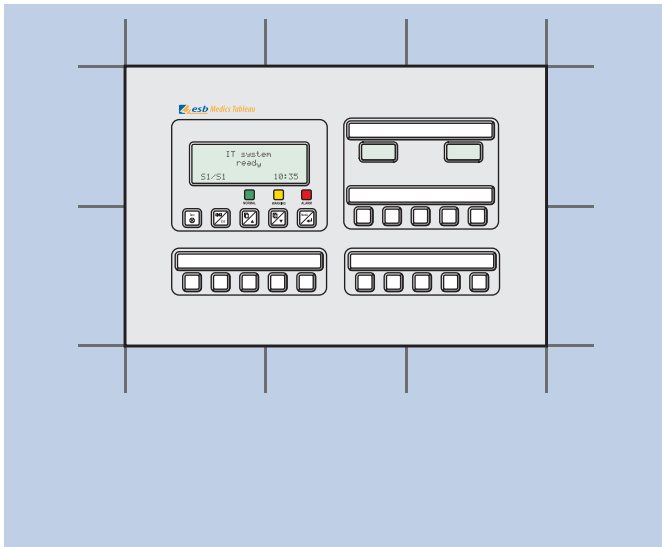


TM 33-14

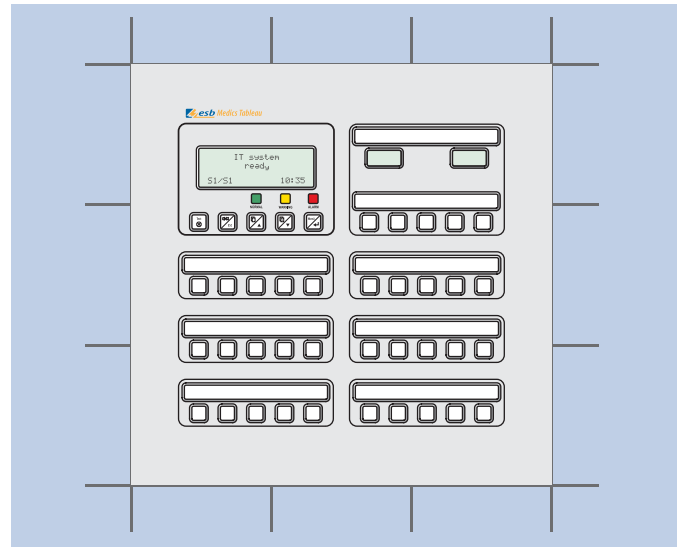
Grid dimensions approx. 150 x 150 mm

2.4.2

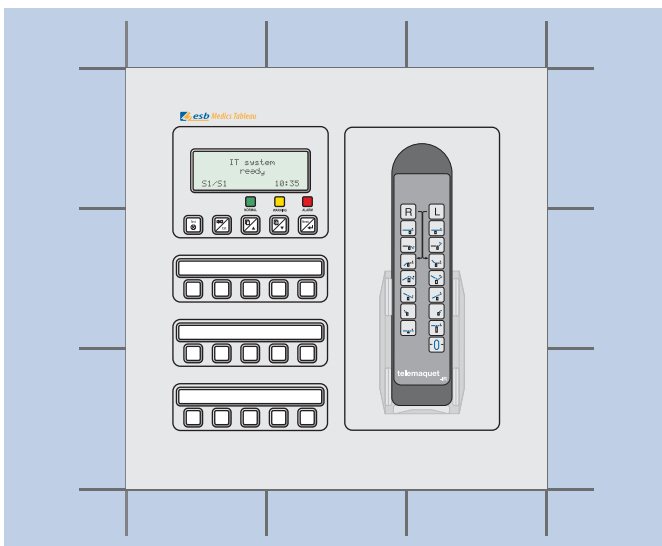
Example of different TM800 alarm indicator and operator panel versions



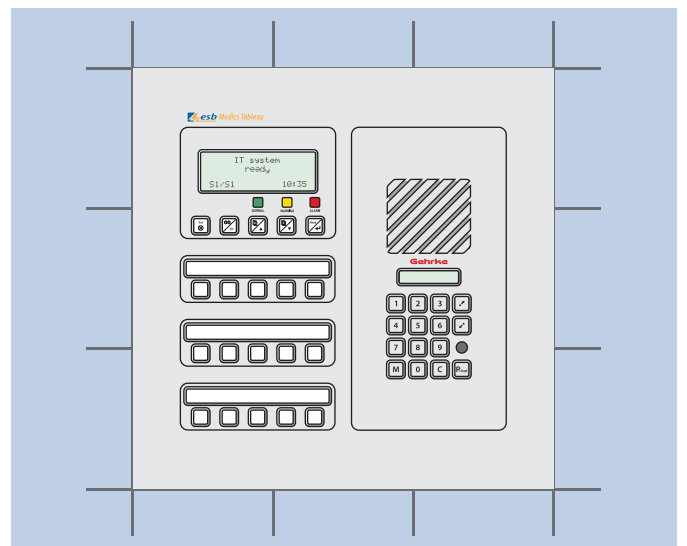
TM 32-02-K1



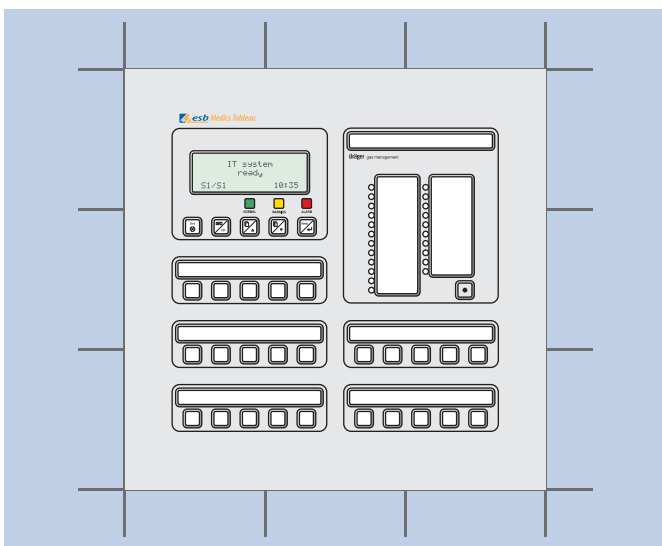
TM 33-24-K2



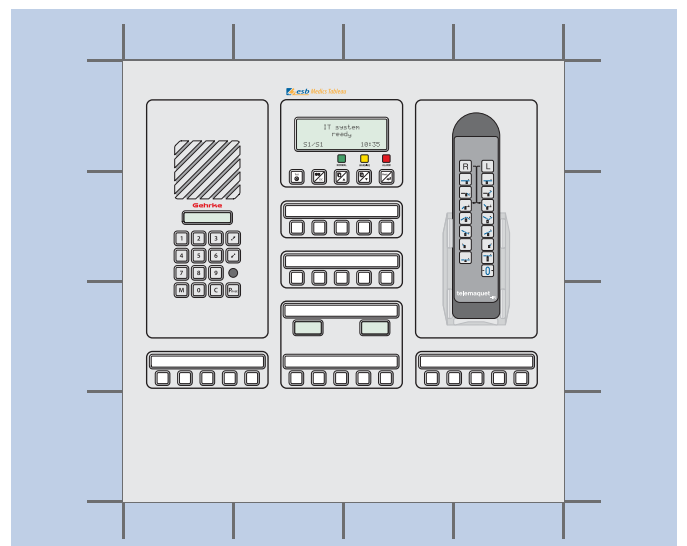
TM 33-20-0M



TM 33-20-S



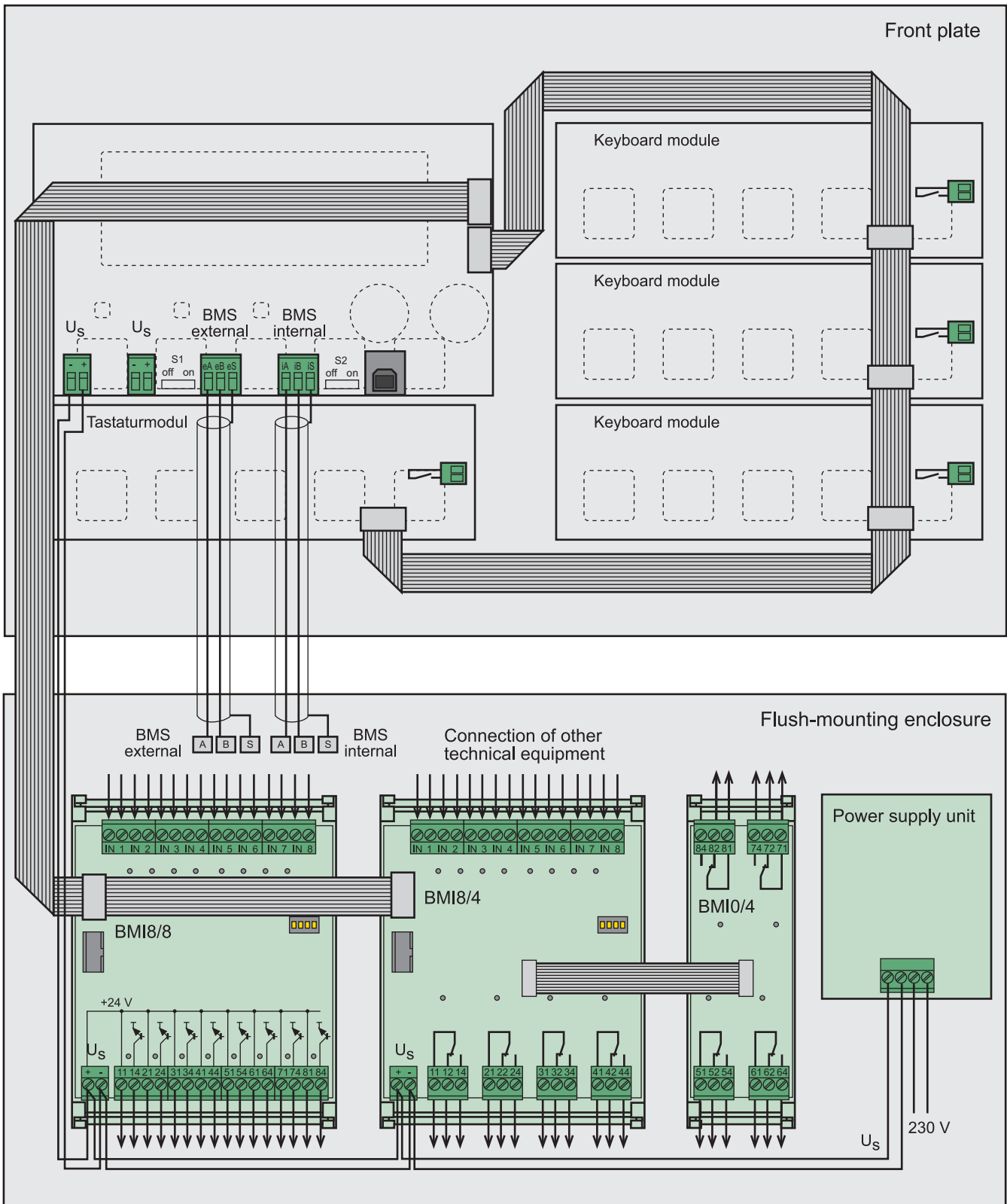
TM 33-22-ML



TM 44-121-SK20M

Grid dimensions approx. 150 x 150 mm

Example of panel design



2.4.2

Technical data TM800
Insulation coordination acc. to IEC 60664-1

Rated insulation voltage	AC 250 V
Rated impulse voltage/pollution degree	4 kV/3

Supply voltage

Supply voltage U_s	AC / DC 24 V
Frequency range U_s	0 / 40...60 Hz
Operating range U_s	AC 18...28 / DC 18...30 V
Supply voltage U_s incl. power supply unit	AC 230 V / 50...60 Hz (-15...+10%)

Display module BM800

Displays and LEDs	
Display, characters	four lines, 4 x 20 characters
Standard message texts in	20 languages
Alarm addresses	≤ 300
Programmable text messages	≤ 1000
History memory (messages)	≤ 1000
Standard text message	3 x 20 characters
Additional text message (accessed via key)	3 x 20 characters
Alarm LEDs (three different colours)	NORMAL (green) WARNING (yellow) ALARM (red)
Menu texts	German/ English
Keys	5 (Isometer test, buzzer mute, additional text, scroll, menu)
Power consumption	≤ 5 VA

Buzzer

Buzzer message	can be acknowledged, adoption of characteristics of new values
Buzzer interval	configurable
Buzzer frequency	configurable
Buzzer repetition	configurable

Interface internal/external

Interface / protocol	2 x RS-485 / BMS
Int. / ext.	baud rate 9.6 kbit/s / 57.6 kbit/s
Cable length	≤ 1200 m
Recommended cable (shielded, shield connected to PE on one side)	min. J-Y(St)Y 2 x 0.6
Terminating resistor	120 Ω (0.25 W) connectable via DIP switch
Device address, BMS bus int. / ext.	1(...150) / 1...99
Int./ext device address factory setting	1 (master) / 1 (master)

Programming

Interfaces	RS-485 / BMS / USB
Software	TMK-SET V 3.0 or higher
Factory setting	password activated

Pushbutton module BI800

Max. number of pushbuttons	120
Buttons/alarm LEDs per field	5
Power consumption	≤ 2 VA

Inputs/outputs

Maximum number of inputs and outputs	192/192
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Supply voltage BMI8/8 I/O modules and 8/4

Supply voltage U_s	DC 24 V
Operating range U_s	DC 18...30 V

Inputs I/O modules BMI8/8 and BMI8/4

Digital inputs	8 (IN1...IN8)
Galvanic separation	yes
Control of digital inputs	via potential-free contacts/ extraneous voltage
Operating principle N/O or N/C operation	can be selected for each input
Factory setting	N/O operation
Voltage range (high)	AC / DC 10...30 V
Voltage range (low)	AC / DC 0...2 V
Power consumption	≤ 2 VA

Outputs BMI8/8

Number	8
Type	open collector
Voltage/ power max.	DC 24 V / 15 W

Outputs I/O-modules BMI8/4 and BMI0/4

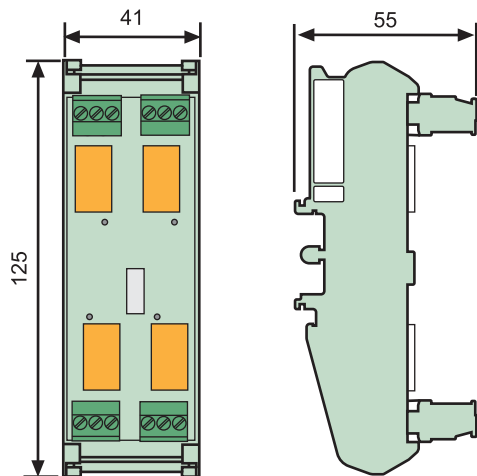
Switching elements	4 changeover contacts (BMI8/4) 4 changeover contacts (BMI0/4)
Operating principle N/C operation / N/O operation	programmable
Electrical service life, number of cycles	10.000
Contact data acc. to IEC 60947-5-1	
Utilization category	AC-13 AC-14 DC-12 DC-12 DC-12
Rated operational voltage	230 V 230 V 24 V 110 V 220 V
Rated operational current	5 A 3 A 1 A 0.2 A 0.1 A
Minimum contact load	1 mA at AC / DC > 10 V

General data

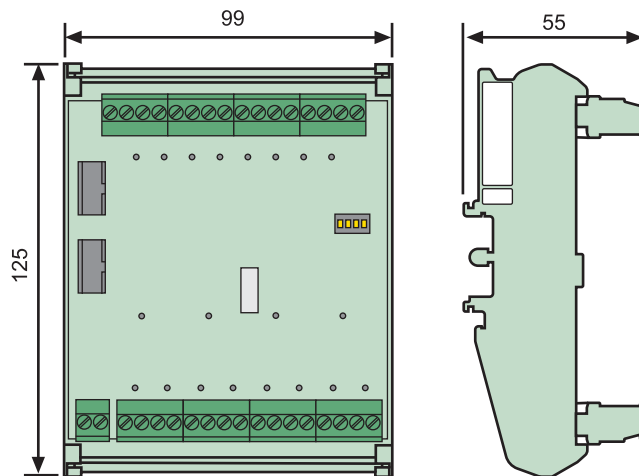
EMC immunity	acc. to EN 61000-6-2
EMC emission	acc. to EN 61000-6-4
Operating temperature	-5...+55 °C
Classification of climatic conditions IEC 60721	
Stationary use	3K5
Transport	2K3
Storage	1K4
Classification of mechanical conditions acc. to IEC 60721	
Stationary use	3M4
Transport	2M2
Storage	1M3
Operating mode	continuous operation
Mounting	any position
Connection type	plug-in terminals
Connection properties (supply voltage, BMS bus)	
rigid / flexible / conductor sizes	0.2...2.5 / 0.2...2.5 mm ² / AWG 24-12
flexible with ferrule without/with plastic sleeve	0.25...2.5 / 0.25...2.5 mm ²
Connection properties (inputs)	
rigid / flexible / conductor sizes	0.08...1.5 / 0.08...1.5 mm ² / AWG 28-16
flexible with ferrule without / with plastic sleeve	0.25...1.5 / 0.25...0.5 mm ²
Stripping length	7 mm
Tightening torque	0.5...0.6 Nm
Degree of protection, internal components (DIN EN 60529)	IP50
Degree of protection, terminals (IEC 60529)	IP20
Flammability class	UL94V-0
Instruction leaflet / TGH	TGH1409
Weight	according to the respective version

Dimension diagrams (dimensions in mm)

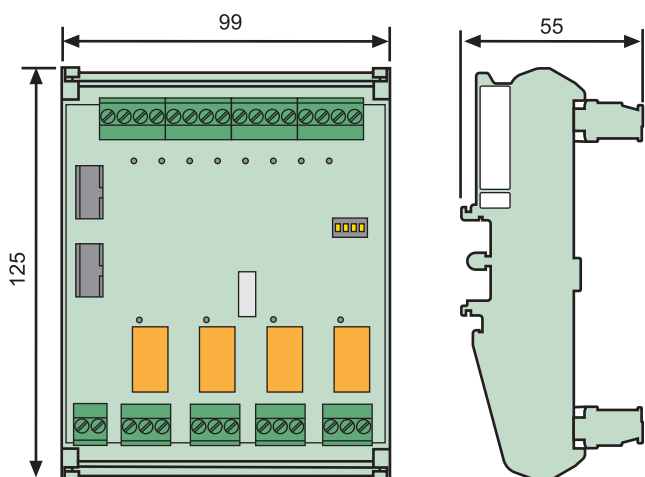
BMI 0/4



BMI 8/8



BMI 8/4



2.4.2