MK Series

Remote Indicators for Line Isolation
Monitors and Fault Location

Remote Indicators
MK2000 Series

MK Series

Device features

- LED display for long life
- No interference with medical equipment
- Interfaces with all BENDER Line Isolation Monitors including the LIM2010
- Uses low voltage wiring (12 VDC or 12 VAC)
- Mounts to standard electrical gang box
- Connection by screw terminal strip
- Easy-to-clean, rugged stainless steel and Lexan design
- Options include test button, overload alarm LED, and digital display showing real-time THC readings

Product Description

MK series remote indicators are designed for use with the BENDER LIM2010 Line Isolation Monitor. A remote indicator duplicates audible and visual alarm indications on the LIM. All remote indicators include a green "SAFE" LED, a red "HAZARD" LED, and a "MUTE" button with an integral amber LED. The "MUTE" button is used to silence the remote audible alarm. Optionally, it can also be used to silence all audible alarms in the system.

Standard features of all remote indicators include:

- Green "SAFE" LED to indicate a normal condition
- Red "HAZARD" LED to indicate an alarm condition
- MUTE pushbutton with integrated amber "MUTE" LED to silence the audible alarm

Models with additional features include:

- **MK2000P:** Test button
- **MK2000C:** Amber "OVERLOAD" alarm LED
- **MK2000CP:** Amber "OVERLOAD" alarm LED and test button
- **MK2000CBM:** Amber "OVERLOAD" alarm LED, test button, and digital displays showing THC reading and % isolation transformer load in real-time

MK2000 series indicators are available in one-gang or two-gang stainless steel faceplates for flush mounting into a panel or wall box with a 2" minimum depth.

The MK2000CBM features a digital display which mimics the LIM hazard current display. The display consists of two seven segment red LEDs that display between 0.1 mA to 9.9 mA. The "CBM" version is only available in a two-gang configuration.

Operational Information

General: The remote indicators are controlled by a 12 VDC signal from the LIM. A green "SAFE" LED stays illuminated while the system is in the normal condition.

When the LIM goes into alarm, the hazard line is energized. The green "SAFE" LED extinguishes and the red "HAZARD" LED illuminates. While in "HAZARD" mode, the audible alarm will sound. When depressed, the "MUTE" button shall mute the audible alarm signal. Actuation of this button shall cause the integral amber LED to illuminate, indicating that the audible alarm has been silenced. When the hazard current has returned to the acceptable level, the alarm indicators shall automatically reset.

Test Button: The "TEST" button will put the LIM through the test cycle. This button must be held for approximately five (5) seconds to complete the test.

Load Monitoring: The load monitoring feature provides the ability to monitor the percentage of load used on the secondary side of the isolation transformer. This is accomplished by feeding one leg of the secondary wires from the transformer through a current transformer, and setting the secondary amperage of the isolation transformer. The LIM calculates the percentage of load being used. When the isolation transformer approaches 80% of rated power, a flashing amber LED illuminates. When 100% of power is reached, a flashing amber LED illuminates as well as an audible alarm.
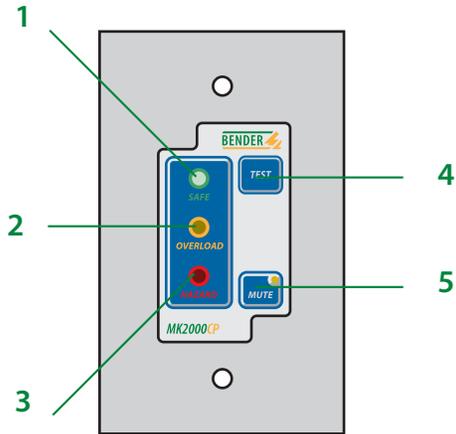
Digital Display: The "CBM" option features a digital display showing both the total hazard current and the percentage of transformer load.
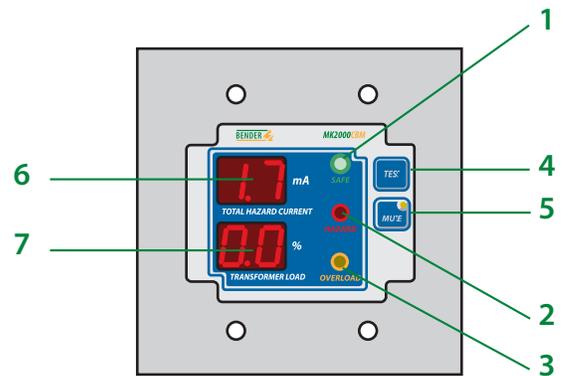
Operating Room   Nurse's Desk   Nurse Station

BENDER

Operating and Display Elements Example: MK2000CP-G1

Operating and Display Elements Example: MK2000CBM

1 - Green "SAFE" LED

2 - Amber "OVERLOAD" LED ("C" option only)

3 - Red "HAZARD" LED

4 - "TEST" button ("P" option only)

5 - "MUTE" button with amber LED

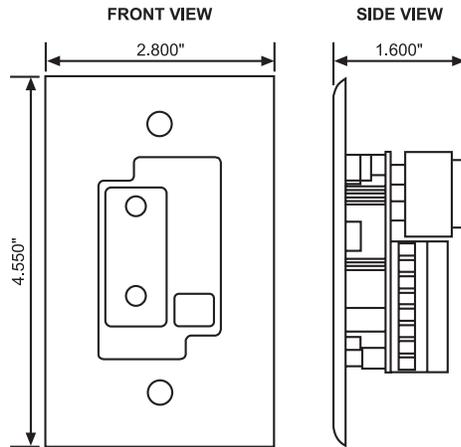1 - Green "SAFE" LED

2 - Red "HAZARD" LED

3 - Amber "OVERLOAD" LED

4 - "TEST" button

5 - "MUTE" button with amber LED

6 - Digital display showing Total Hazard Current
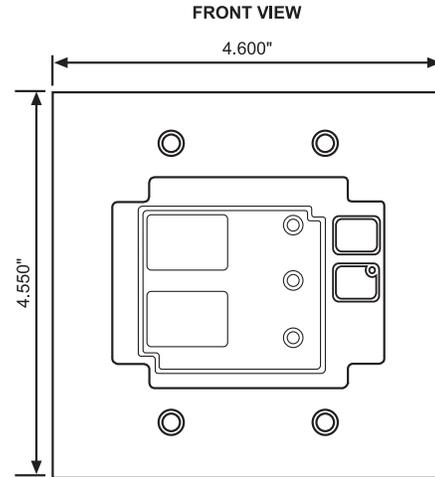
7 - Digital display showing Transformer Load

Dimensions:
MK2000-G1 / MK2000P-G1 / MK2000C-G1 / MK2000CP-G1
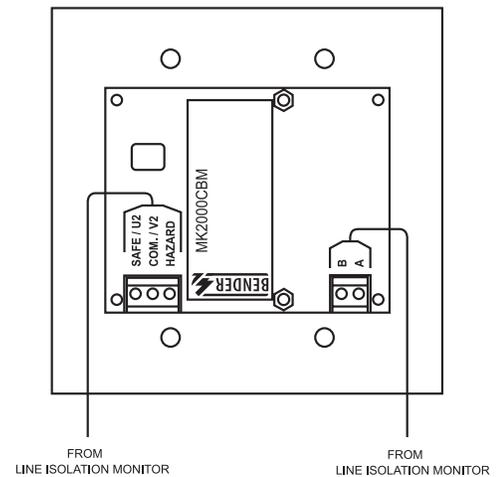
(Dimensions in inches)

FRONT VIEW   SIDE VIEW

2.800"   1.600"

4.550"

Dimensions:
MK2000CBM

(Dimensions in inches)

FRONT VIEW

4.600"

4.550"

BACK VIEW

SAFE / U2
COM. / V2
HAZARD

MK2000CBM

BENDER

B
A

FROM
LINE ISOLATION MONITOR

FROM
LINE ISOLATION MONITOR

Technical Data: MK2000-G1 / MK2000-G2 / MK2000P-G1 /
MK2000C-G1 / MK2000CP-G1 / MK2000CBM

Operating voltage	12V DC or 12V AC
Max. current	50 mA
(MK2000CBM	100 mA)
Operation class	continuous operation
Ambient temperature	
when operating	+32º F to +122º F
	0º C to +50º
when stored	-13º F to +158º F
	-25º C to +70º C
Connection	screw terminal block
Conductor size	AWG 30…12
A/B conductor size (MK200CBM only)	RS485 cable AWG 24…12
Tightening torque	5…7 lb-in.
Mounting	by screws
Weight	
MK2000-G1 / MK2000P-G1 / MK2000C-G1 / MK2000CP-G1	0.25 lb
MK2000-G2 / MK2000CBM	0.32 lb

Ordering Information							
Product Type	Mute	Test	Overload	Digital Display	Size	Approval	Article No.
MK2000-G1	Yes	--	--	--	One-gang	c(UL)us	B 5213 00002
MK2000-G2	Yes	--	--	--	Two-gang	c(UL)us	B 5213 00007
MK2000P-G1	Yes	Yes	--	--	One-gang	c(UL)us	B 5213 00188
MK2000C-G1	Yes	--	Yes	--	One-gang	c(UL)us	B 5213 00020
MK2000CP-G1	Yes	Yes	Yes	--	One-gang	c(UL)us	B 5213 00021
MK2000CBM	Yes	Yes	Yes	Yes	Two-gang	c(UL)us	B 5213 00022
MK2000-2G2	Yes	--	--	--	Two-gang	c(UL)us	B 5213 00099

BENDER

Remote Annunciator Station
RAS Series

RAS Remote Annunciator Station

Device Features

- Contains multiple line isolation monitor remote indicators for centralized monitoring of isolated power systems
- Flush or surface mounted applications

Product Description

RAS series remote annunciator stations utilize multiple MK series remote indicators, each connected to a line isolation monitor. Included remote indicators may feature a built-in test button and a transformer overload LED. Each remote indicator is powered directly by the LIM2010 line isolation monitor, located at the isolated power panel.

Backbox

For flush mounted applications, the backbox is fabricated from minimum 16 GA galvanized steel. Surface mounted enclosures are finished with a coat of hospital ivory epoxy enamel or equivalent.

Faceplate

Manufactured from minimum 14GA type 304 stainless steel with a #4 brushed finish, the faceplate supports the LIM remote indicators. The faceplate for flush mounted units extends 1" on all sides of the backbox. For surface mounted modules, the faceplate matches the dimensions of the backbox.
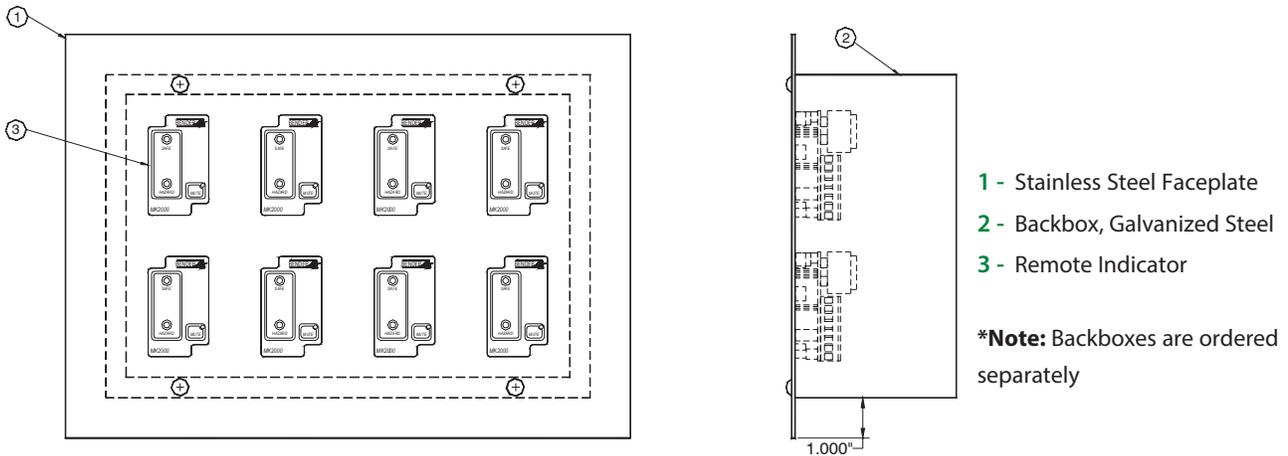
Remote Indicators

Refer to the section "Remote Indicators, MK2000 Series" in this document for more information on available models.
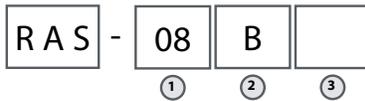
Operating Room	Nurse's Desk	Nurse Station

Sample Outline: Remote Annunicator Station (Example Model: RAS-08B)

1 - Stainless Steel Faceplate

2 - Backbox, Galvanized Steel

3 - Remote Indicator

*Note: Backboxes are ordered separately

Ordering Information

1 - Quantity of Remote Indicators
  02: Two   10: Ten
  04: Four   12: Twelve
  06: Six   14: Fourteen
  08: Eight   16: Sixteen

2 - Type of Remote Indicators*
  A: MK2000P
  B: MK2000
  C: MK2000C
  D: MK2000CP
  E: MK2000CBM

3 - Mounting Type
  F: Flush Mounting
  S: Surface Mounting

* Refer to section "Remote Indicators, MK2000 Series" for information on remote indicators. See table below for information regarding available configurations and backbox sizes.

Flush mounted modules shall have a faceplate that extends 1" on all sides from the backbox. Surface mounted modules shall have a faceplate that exactly matches the dimensions of the backbox.

Available Configurations and Backbox Sizes

Supported Remote Indicators	Supported Quantites of Remote Indicators	Backbox Dimensions (W x H x D)	Backbox Part Number
MK2000, MK2000P, MK2000C, MK2000CP	2, 3, 4, 5, 6, 7, 8	12" x 8" x 4"	B120804
MK2000, MK2000P, MK2000C, MK2000CP	9, 10, 11, 12	12" x 12" x 4"	B121204
MK2000, MK2000P, MK2000C, MK2000CP	13, 14, 15, 16	12" x 16" x 4"	B121604
MK2000CBM	2, 3, 4	12" x 8" x 4"	B120804
MK2000CBM	5, 6	12" x 12" x 4"	B121204
MK2000CBM	7, 8, 9	16" x 12" x 4"	B161204
MK2000CBM	10, 11, 12	18" x 12" x 4"	B181204
MK2000CBM	13, 14, 15, 16	18" x 18" x 4"	B181804

BENDER

Remote Indicating Station
MK2430

MK2430

Device Features

- Displays operating messages and alarms for all connected devices, including multiple, interconnected LIM2010 and EDS devices
- Backlit LCD display
- Predefined texts in 20 languages
- 200 freely programmable message texts including location labels
- Audible alarm with mute button
- Settings changed via easy-to-use on-board menu
- Flush and surface mountable
- 12 digital inputs (MK2430-11 option)
- Stores up to 250 timestamped alarms

Product Description

The universal remote alarm indicator and operator panel MK2430 is intended for visual and audible indication of operating status and alarm messages from BENDER systems, including the LIM2010 and EDS series ground fault location evaluators. The MK2430 displays information regarding each individual device, system, or room and can define custom labels based on each individual application. A complete system test may also be done from this device.

Up to 32 BENDER devices may be displayed by the MK2430.

Alarm and Display Features:
Status and alarms are viewed on an easy-to-read LCD display. Features include:

- Normal operation indicator (green LED)
- Total hazard current
- Overload
- Overtemperature
- Location of fault from EDS devices
- Connection monitoring alarms
- Device errors
- Test results
- Measured values
- Audible and visual indication

During normal operation, the MK2430 indicates the overall status of the system. The MK2430-11 features 12 digital inputs allowing messages from other technical equipment to be recorded and displayed.

Display / Operating Elements

The backlit display features four lines of 20 characters. It supplies medical and technical personnel with clear information to know the status of the system. Every alarm message utilizes three lines. . The fourth line contains status information (number of messages, test procedures, menu information). Three LEDs are located above the text display. They indicate: normal operation (green), warnings (yellow) or alarms (red). Five pushbuttons are available for acknowledging alarms and warnings, and for the menu system.

Programming

Along with customizable labels, standard messages built into the MK2430 are also available. These messages are available in 20 different languages. Device programming can be completed either through the device's built-in menu or through a PC. An LED and an audible signal may be assigned to each individual message.

Operating Room   Nurse's Desk   Nurse Station

History Memory

Timestamped warning and alarm messages are stored in the built-in history memory automatically. Up to 250 text messages can be saved. Messages can be retrieved throuh the MK2430's built-in menu.

MK2430-12

The MK2430-12 is used for visual and audible indication of alarms when using BENDER LIM2010 line isolation monitors and EDS series ground fault location evaluators. This indicator is perfect for nurse desks that oversee several different critical rooms.

MK2430-11

The MK2430-11 additionally features 12 digital inputs controlled by voltage free (dry) contacts. These inputs are ideal for monitoring other medical equipment.

MK2430P...

The MK2430P-… additionally features standard messages and factory activation of up to 20 alarm addresses.

Customizable labels may be programmed individually for each alarm address. These labels will display when an alarm is active to ensure personnel know the location of a problem.

Operating and Display Elements
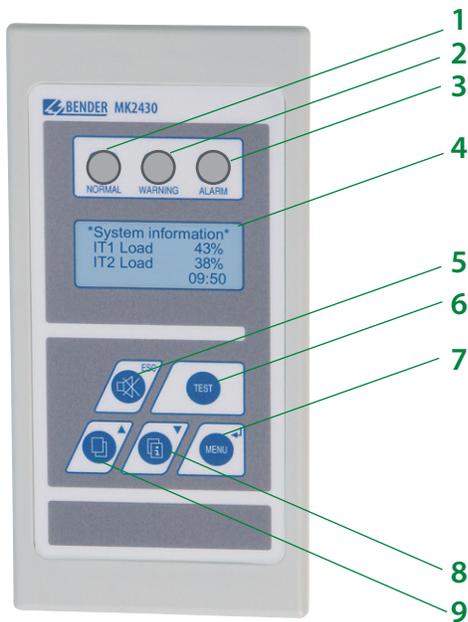
1 - LED "NORMAL": Normal operating mode

2 - LED "WARNING": Warning messages

3 - LED "ALARM": Alarm messages

4 - LCD: Display of operating and alarm messages

5 - "Mute" button
During operation: Mutes buzzer
In menu mode: Moves back a step

6 - "TEST" button:
Activates self-test for interconnected devices

7 - "Menu" button:
During operation: Opens menu
In menu mode: Enter key (confirm changes)

8 - "Additional text" button:
During operation: Displays additional information
In menu mode: Scrolls down

9 - "Scroll" button:
In operating mode: Scrolls through messages
In menu mode: Scrolls up

Sample alarm messages:

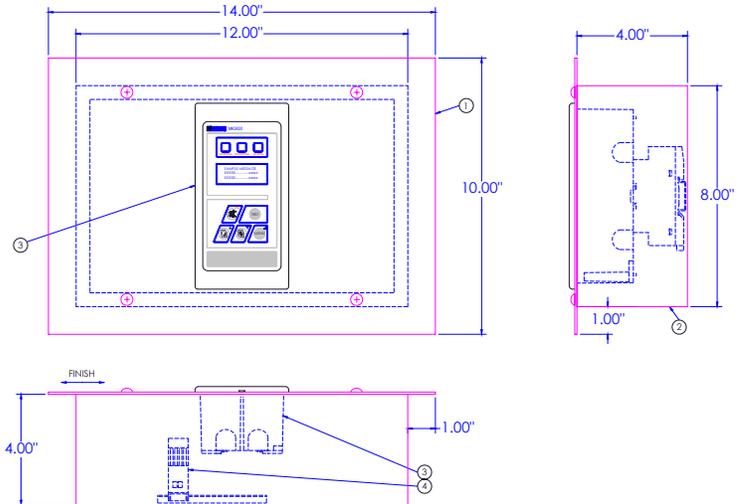Individual alarm text (lines 1…3)

Status line

```
Intensive care unit H034
Current          700µA
Socket        IT7-F305
02/03              14:45
```

Individual additional text (lines 5…7)

Status line

```
since 11.03.05     14:37
Room: E107         UV7
EDS474          003/03
02/03              14:45
```

BENDER

Remote Indicators

Remote Indicating Station

MK2430-11RS

Dimensions: Surface-mounted version

Dimensions in inches

1 - Stainless Steel Faceplate,14"W x 10" H (T1410-MK2430)

2 - Backbox, Galvanized Steel, 12" W x 8" H x 4" D (B120804)

3 - Remote Indicator (MK2430-11)

4 - Power Supply w/ mounting hardware (CP-D 24/0.24)

Remote Indicators Assembly

Product Type	Description	Article No.
MK2430-11RS	Remote indicator with 12 programmable digital inputs, preassembled with front trim, power supply and backbox	B 5213 01095
MK2430-12RS	Remote indicator preassembled with front trim, power supply and backbox	B 5213 01096

Remote Indicators Components and Accessories

Product Type	Description	Article No.
MK2430-11	Remote indicator with 12 programmable digital inputs and a BMS bus interface for flush mounting	B 9510 0001NA
MK2430-12	Remote indicator with a BMS bus interface for flush mounting	B 9510 0002NA
B120804	Backbox for MK2430, 12" W x 8" H x 4" D	B 5213 00367
T1410-MK2430	304SS front trim for MK2430 14" W x 10"H	P 103 00195
CP-D 24/0.42	Power supply with DIN rail 100-240 VAC input	P 138 00049
TMK-Set V3.xx	Software for MK800/MK2430 (download or CD)	B 9602 0087

Remote Station
MK800

MK800

Device Features

- Indication of system status and alarms for a complete BENDER system
- Backlit LCD display
- Large green, yellow, and red LEDs
- 80 predefined standard messages in 20 languages
- 1000 freely programmable labels
- Settings carried out either through on-board menu or via a PC
- History memory storing up to 1000 time-stamped alarms and messages
- 16 digital inputs / outputs (option)
- 1 programmable relay (option)
- Five large function pushbuttons
- Available for flush and surface mounting as well as door mounting

Product Description

The MK800 remote station is a full-featured remote indicating station utilized for:

- indication and visualization of operating status and alarm messages for complete BENDER systems
- Central operation and parameter setting for all interconnected devices
- Displaying measured values and setting of response values for monitoring purposes

The MK800 monitors complete BENDER systems utilizing the LIM2010 line isolation monitor and EDS series Ground Fault Location Evaluator. Visual and audible indication of alarms are built into the device. This device is ideal for nurse stations and technical stations in charge of many different critical areas of a hospital.

Up to 100 devices may be controlled by a single MK800. When utilizing the external bus, MK800 devices may be used to separate large communication systems into subsystems.

Display / Operating Elements

The MK800 features a large, backlit LCD display. It supplies medical and technical personnel with clear information to know the status of the system. Status and alarm messages from every BENDER device connected to the BMS network may be displayed on this device.. Additional text contains status information, (such as number of messages), test status, or menu information. In the event of an alarm, audible indication is also provided to alert personnel in a timely fashion. A central technical station may use the MK800 to carry out parameter settings for all interconnected devices.

Three LEDs (green, yellow, red) give simple visual indication of the system's status. Five large, backlit pushbuttons are provided for simple menu and message navigation. The pushbuttons provide the following functions:

- Visual and audible alarm test
- Scrolling through alarm and warning messages
- Parameter settings
- Navigation through built-in menu

Operating Room | **Nurse's Desk** | **Nurse Station**

Parameter Setting

The MK800 provides 80 predefined alarm messages available in 20 different languages. Parameter setting may be carried out via the onboard menu. Additionally, the TMK-Set PC software allows up to 1000 individual messages to be programmed and stored on the MK800 via a USB or RS-485 connection.

History Memory

Timestamped warning and alarm messages are automatically stored into the MK800's internal memory. Up to 1000 messages may be stored. Each event can be easily accessed directly on the MK800. Additionally, the history memory may be output to the TMK-History software to provide history analysis.

Digital Inputs / Relay Output (MK800-11 option)

The MK800-11 additionally features 16 digital inputs controlled by voltage free (dry) contacts. These inputs are ideal for monitoring other medical equipment.

For test functions or common alarms, a programmable relay is also available.

Operating and Display Elements
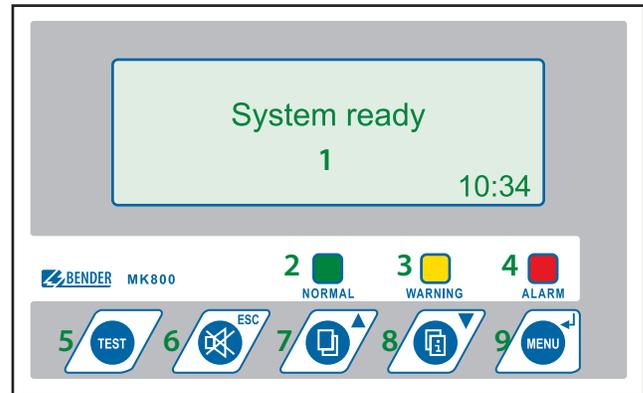
1 - LCD: Display of operating, warning and alarm messages
2 - LED "NORMAL": Operation indicator
3 - LED "WARNING": Warning messages
4 - LED "ALARM": Alarm messages
5 - Test button "TEST": Activates self-test for supporting devices
6 - Buzzer "mute": During operation: Mutes buzzer
    In menu mode: Moves back a step
7 - "Scroll key": During operation: Scrolls through messages
    In menu mode: Scrolls up
8 - "Add. text" key: During operation: Displays additional info
    In menu mode: Scrolls down
9 - "MENU" key: During operation: Opens menu
    In menu mode: Enter key (confirm changes)
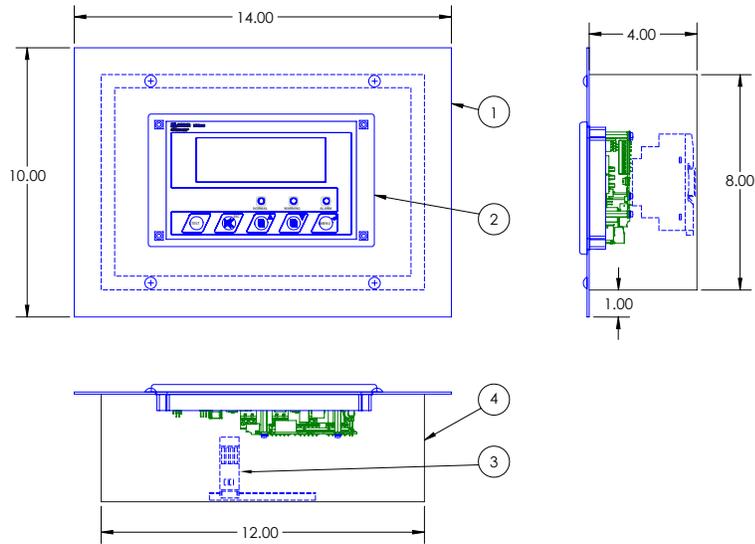
Remote Indicating Station

MK800-11RS

Dimensions: MK800-11RS & MK800-12RS

Dimensions in inches

1 - Stainless Steel Faceplate, 14"W x 10"H (T1410-MK800)

2 - Remote Indicator (MK800E-11)

3 - Power Supply with Mounting Hardware (CP-D 24/0.24)

4 - Backbox, Galvanized Steel, 12"W x 8"H x 4"D (B120804)

Remote Indicators Assembly		
Product Type	**Description**	**Article No.**
MK800-11RS	Remote Alarm indicator with 16 digital inputs, preassembled with front trim, bezel frame, backbox and power supply	B 5213 01093
MK800-12RS	Remote Alarm indicator preassembled with front trim, bezel frame, backbox and power supply	B 5213 01094

Remote Indicators Components and Accessories		
Product Type	**Description**	**Article No.**
MK800E-11	Remote alarm indicator with 16 digital inputs built-in type without enclosure	B 9510 0106NA
MK800E-12	Remote alarm indicator built-in type w/out enclosure	B 9510 0107NA
UP800	Mounting Shell	B 951 00110
BR800-2	White bezel frame for MK800	B 951 00112
B120804	Backbox for MK800 12" W x 8" H x 4" D	B 5213 00367
T1410-MK800	304SS front trim for MK800 14" W x 10"H	P 103 00196
CP-D 24/0.42	Power supply with DIN rail 100-240 VAC input	P 138 00049
TMK-Set V3.xx	Software for MK800/MK2430 (download or CD)	B 9602 0087

Technical Data: MK800/MK2430 Remote Indicating Station

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
Power consumption (MK800 / MK2430)	≤ 5 VA / ≤ 3 VA

Displays and LEDs

Display, characters	four lines, 4 x 20 characters
Standard message texts	20 languages
Alarm addresses (MK800 / MK2430)	< 300 / ≤ 150
Programmable text messages (MK800 / MK2430)	1000 / 250
History memory (messages) (MK800 / MK2430)	1000 / 250
Standard text message	3 x 20 characters
Additional text message (accessed via button)	3 x 20 characters
Alarm LEDs (three different colors)	NORMAL (green)
	WARNING (yellow)
	ALARM (red)
Menu texts	English/Spanish
Keys	5 (LIM test, buzzer mute, additional text, scroll, menu)

Buzzer

Buzzer message	configurable
Buzzer interval	configurable
Buzzer frequency	configurable
Buzzer repetition	configurable

Inputs (MK800-11 / MK2430-11) only

Digital inputs (MK800 / MK2430)	16 (IN1…IN16) / 12 (IN1….IN12)
Galvanic separation	yes
Control of digital inputs	via potential-free contacts/extraneous voltage
Operating principle	N/O or N/C operation / Off can be selected for each input
Factory setting (MK800 / MK2430)	Off / N/O Operation
Voltage range (high) (MK800 / MK2430)	AC / DC 10…30 V / AC/DC 15...30 V
Voltage range (low) (MK800 / MK2430)	AC / DC 0…5 V / AC/DC 0...2 V

Communication Interface

Internal

Interface/protocol	RS-485/BMS
Baud rate	9.6 kBit/s
Cable length	≤3900 ft (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) can be connected via DIP switch
Device address, BMS bus	1(…150)
Factory setting device address	1 (master)

External (MK800 only)

Baud rate (default setting)	57.6 kBit/s
Device address, BMS bus	1…99
Factory setting device address	1 (master)

Programming

Interfaces	RS-485 / BMS / USB
Software TMK-Set	V 3.0 and higher
Factory setting password query	activated

Colors

Front foil	RAL 7035 (light grey) / RAL 7012 (basalt grey)
Marking buttons	RAL 5002 (ultramarine blue): RAL 7035 (light grey)
Front plate	RAL 7035 (light grey)

Switching elements (MK800 Only)

|			
Number of changeover contacts			1 (MK800-11 only)
Operating principle		N/C or 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
Rated operational voltage	24 V	24 V	24 V
Rated operational current	5 A	3 A	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	+ 23 °F…+122°F (- 5 °C…+50°C)
Classification of climatic conditions acc. to IEC 60721	
Stationary use	3K5
Transport	2K3
Storage	1K4
Classification of mechanical conditions acc. to IEC 60721	
Stationary use	3M4
Transport	2M2
Long-time storage	1M3
Operating mode	continuous operation
Mounting	any position
Connection	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	0.25" (7 mm)
Tightening torque	4.4…5.3 lb-in (0.5…0.6 Nm)
Degree of protection, internal components (DIN EN 60529)	IP50 (NEMA 1)
Degree of protection, terminals (IEC 60529)	IP20 (NEMA 1)
Flammability class	UL94V-0
Product standards	IEC 60364-7-710, UL 1022
Operating manual (MK800 / MK2430)	TGH1408 / TGH1389
Weight (MK800 / MK2430)	< 2.1 lb (950 g) / ≤0.46 lb (210 g)

MK800-…RS / MK2430-…RS

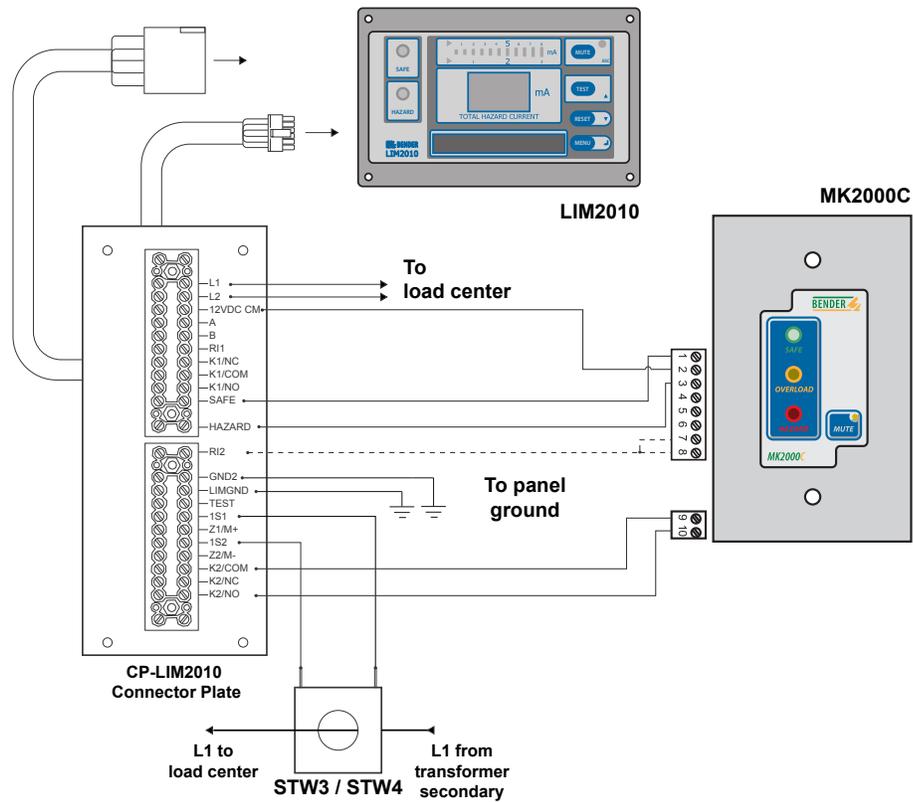|	
Supply voltage U_S	AC 100-240 V
Frequency range U_S	47-63 Hz
Inrush current (115 V AC / 230 V AC)	< 15 A / < 30 A
Operating range U_S	AC 90...264/DC 120...370 V
Weight (MK800 / MK2430)	< 8.7 lb (3628.7 g) / 7.1 lb (3220.5 g)

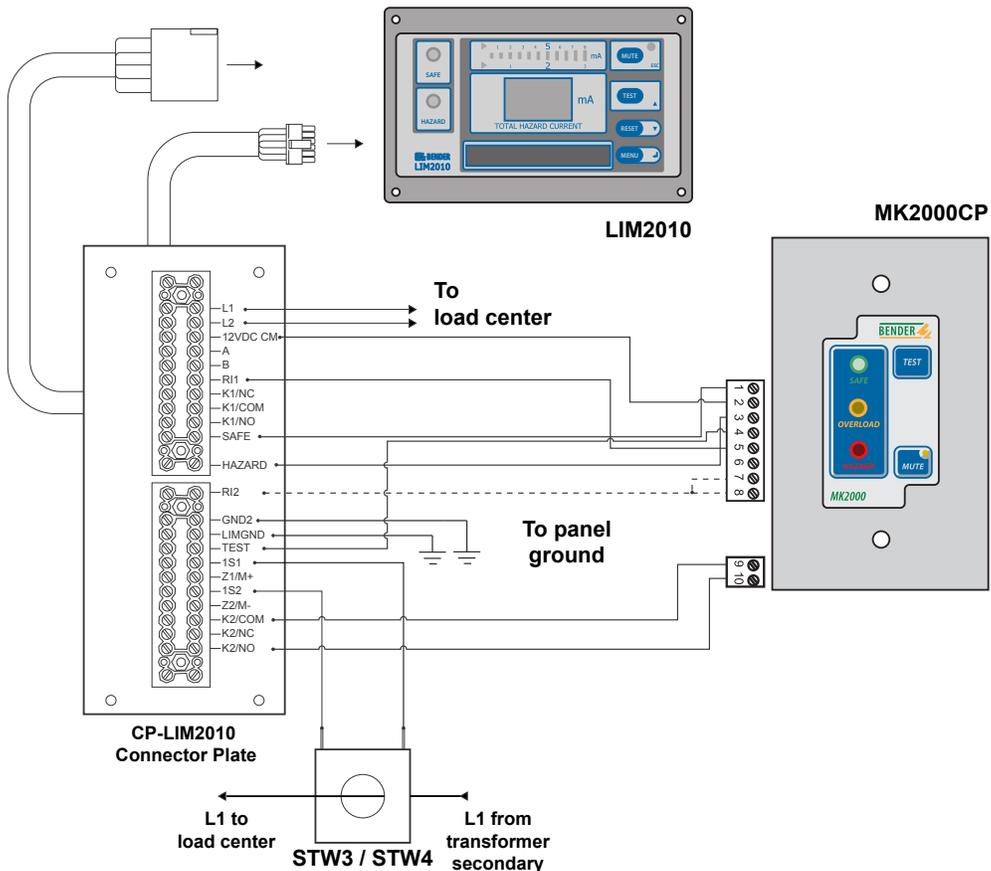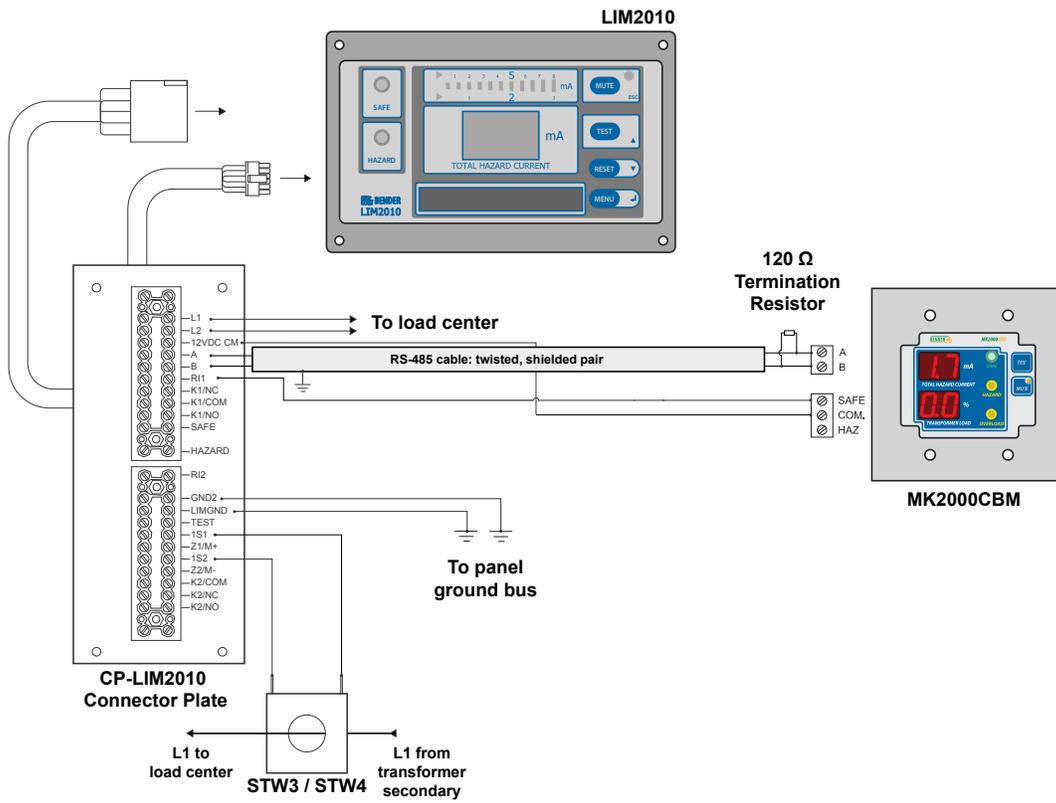## Wiring Diagram: Using MK2000
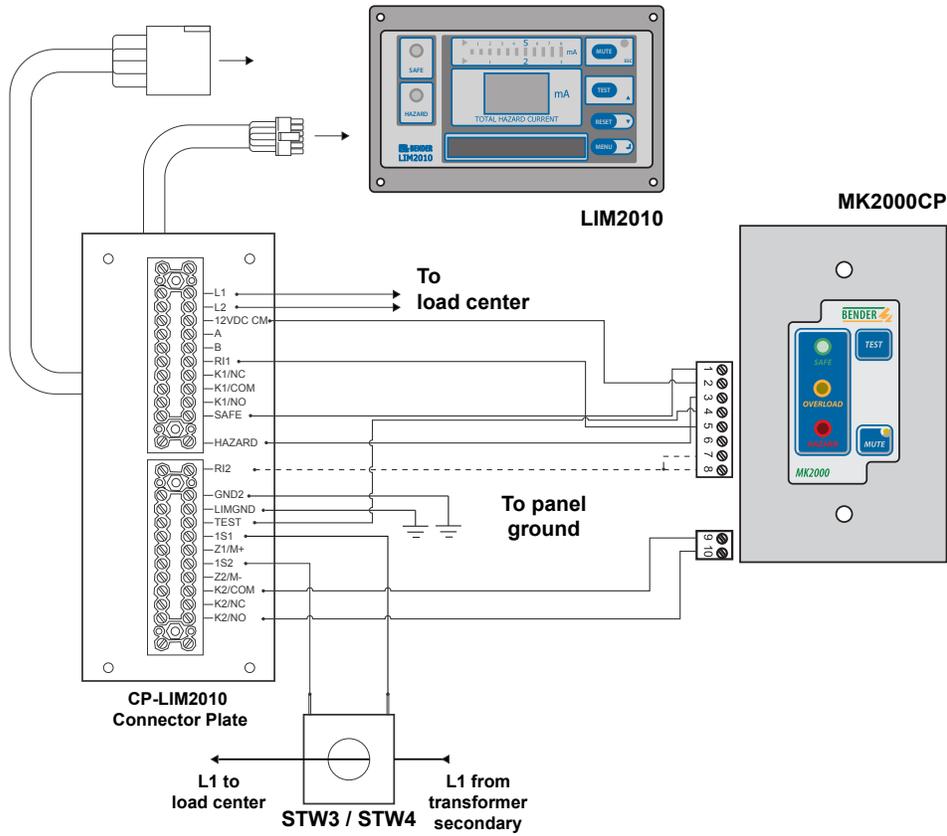
Wiring Diagram: Using MK2000P
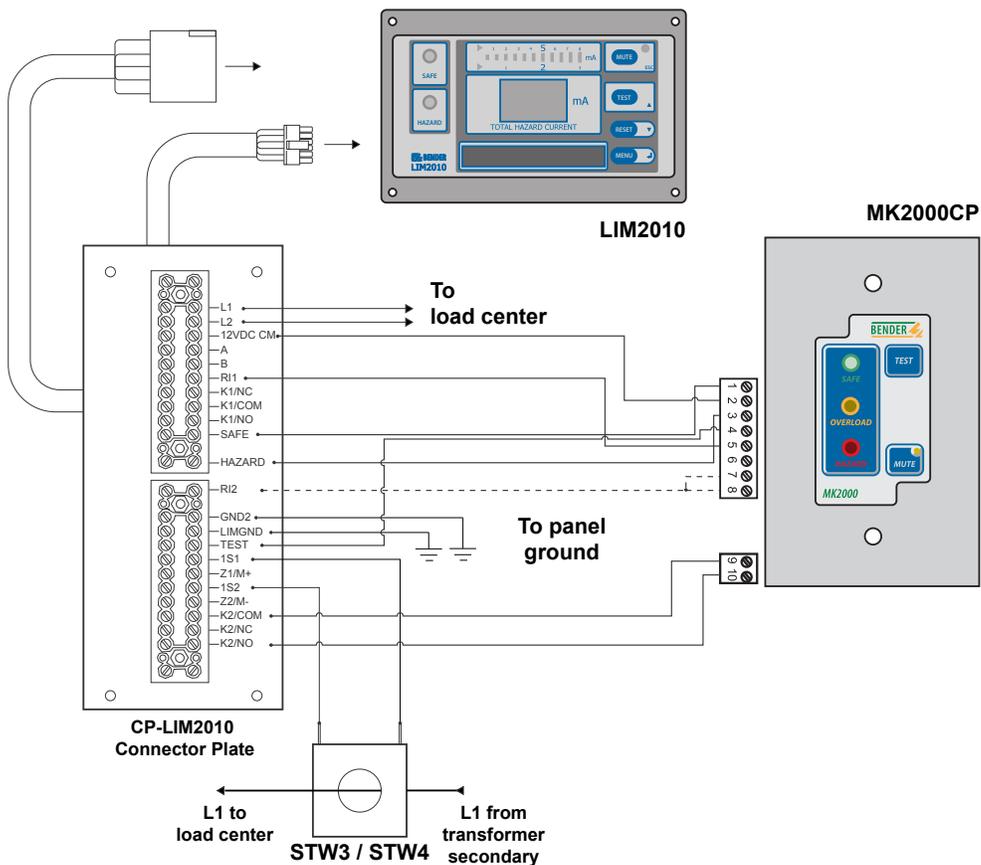
Wiring Diagram: Using MK2000C

Wiring Diagram: Using MK2000CP

Wiring Diagram: Using MK2000CBM

LIM2010

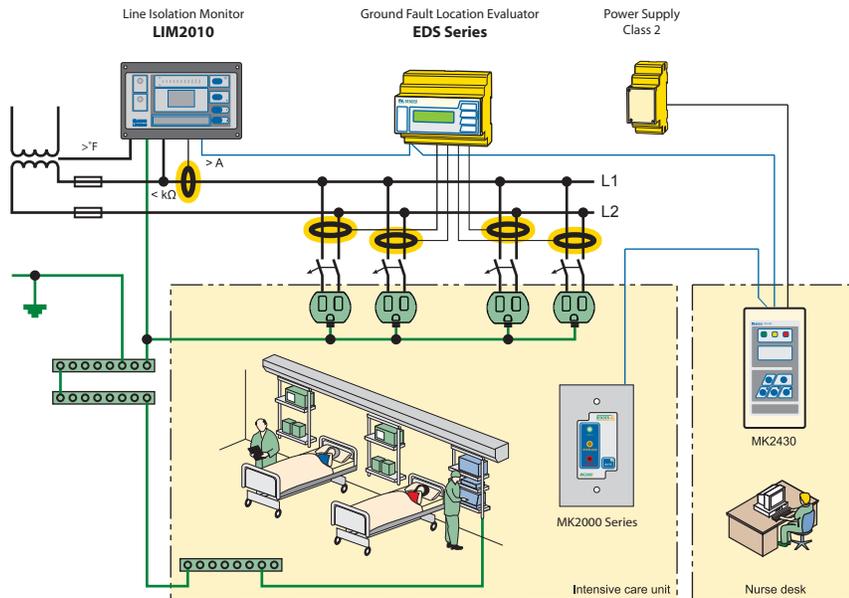**120 Ω Termination Resistor**

A
B

SAFE
COM
HAZ

MK2000CBM

To load center

RS-485 cable: twisted, shielded pair

L1
L2
12VDC CM
A
B
RI1
K1/NC
K1/COM
K1/NO
SAFE
HAZARD
RI2
GND2
LIMGND
TEST
1S1
Z1/M+
1S2
Z2/M-
K2/COM
K2/NC
K2/NO

To panel ground bus

CP-LIM2010 Connector Plate

L1 to load center

STW3 / STW4

L1 from transformer secondary

Wiring Diagram: Using MK2430/MK800

LIM2010

To load center

RS-485 resistor switch inside unit

RS-485 cable: twisted, shielded pair

A
B

L1
L2
12VDC CM
A
B
RI1
K1/NC
K1/COM
K1/NO
SAFE
HAZARD
RI2
GND2
LIMGND
TEST
1S1
Z1/M+
1S2
Z2/M-
K2/COM
K2/NC
K2/NO

120 VAC

L
N

Power Supply

MK2430

To panel ground bus

CP-LIM2010 Connector Plate

L1 to load center

STW3 / STW4

L1 from transformer secondary
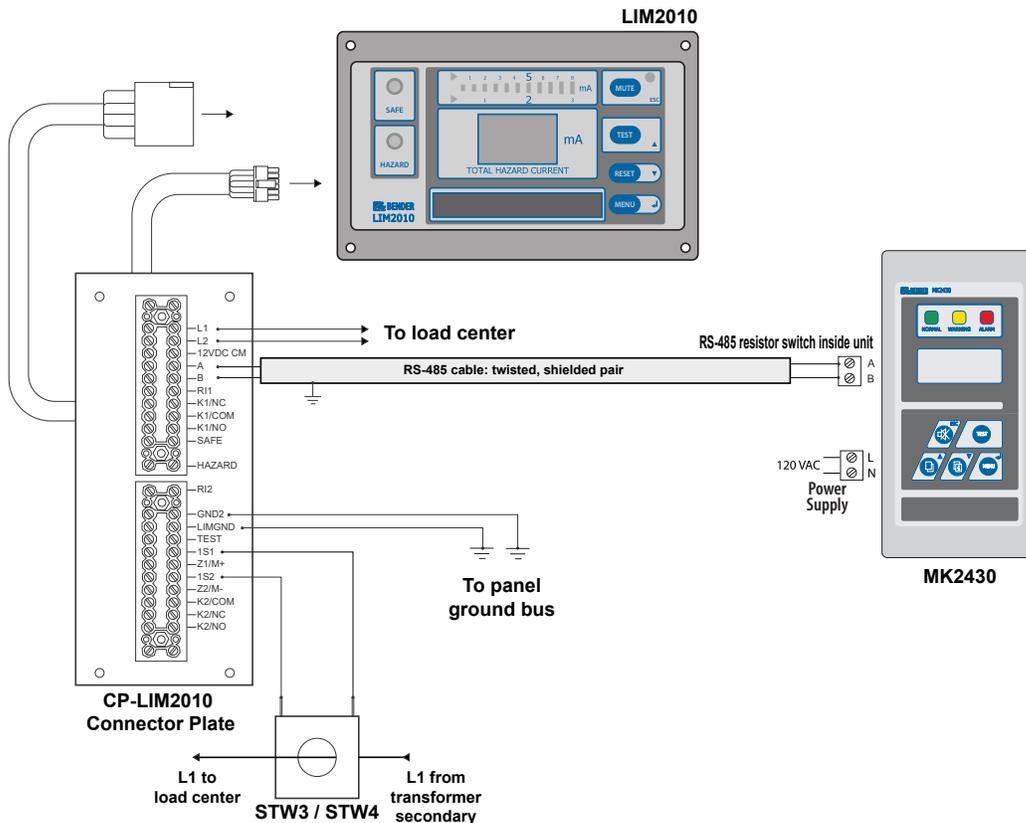
Remote Indicator Comparison

Product Type	Systems Monitored	Mute	Test	Overload	Digital Display	Alarm History	Refer to
MK2000-G1	One	Yes	--	--	--	--	Page 4
MK2000P-G1	One	Yes	Yes	--	--	--	Page 4
MK2000C-G1	One	Yes	--	Yes	--	--	Page 4
MK2000CP-G1	One	Yes	Yes	Yes	--	--	Page 4
MK2000CBM-G2	One	Yes	Yes	Yes	Yes	--	Page 4
MK2430	Multiple	Yes	Yes	Yes	Yes	Yes	Page 9
MK800	Multiple	Yes	Yes	Yes	Yes	Yes	Page 13

BENDER

A complete ground fault location system for hospitals

Line Isolation Monitor
LIM2010

Ground Fault Location Evaluator
EDS Series

Power Supply
Class 2

>°F
> A
< kΩ
L1
L2

MK2430

MK2000 Series

Intensive care unit

Nurse desk

Ground fault location in isolated power systems with EDS series devices

BENDER's complete ground fault location system for hospitals helps increase the reliability of your system, reduce costs, and create predictive maintanence by locating ground faults quickly and easily. The EDS series extends the capabilities of the LIM2010 Line Isolation Monitor to not only know that there is a problem, but to find it as well. The EDS series assists in automating the process of finding faults by connecting to subfeeders or loads and prodiving notification when a fault has been located. Remote indicators also work in conjunction with this system to notify nurse and technical stations quickly when a problem has occured.

Complete system including LIM, EDS ground fault location, and remote indication

Advantages:

- Ground fault location while the system remains online
- Fast location of faults
- Reduced maintenance costs
- Indication of faulty circuit shown on LCD displays at both the location device and remote indicators

System functions:

- Indication of faulty branch circuits
- Modular design allows for simple retrofitting/upgrading
- Current transformers for fault detection available in many different shapes and sizes
- Up to 708 sub circuits can be monitored
- Communication via two-wire connection
- Universally applicable for most types of ungrounded systems

Function

The EDS series works in conjunction with the LIM2010 to create a complete ground fault location system. After an alarm is generated by the LIM2010, the EDS series system activates (this can happen automatically or be manually controlled). A test device generates a test signal for a set period of time. Its amplitude and duration are limited. The signal flows through the location of the ground fault. Current transformers placed around each subfeeder or load will pick up on this test signal. The EDS series device will then evaluate the results. The location of the fault is displayed on the EDS series via either a digital display or an LED bar graph. Special remote indicators connected to the system may also display the location of the fault.

Remote indication and communication solutions

Device communication

BENDER's line of communication products allow for fast notification of personnel when a problem has occured. Critical systems monitored by BENDER equipment may be connected to a variety of remote indicators to notify personnel of the current status of the system. Communication gateways bring your electrical safety network into the 21st century by displaying system information via several standard protocols, such as Ethernet, MODBUS, and PROFIBUS. The Ethernet gateway device additionally features an easy-to-use status page, accessible through a web browser. E-mail and SMS messaging when an alarm has occurred is also available. Utilizing this communication system allows for timely and cost-effective deployment of service personnel and can help avoid equipment damage or failure.
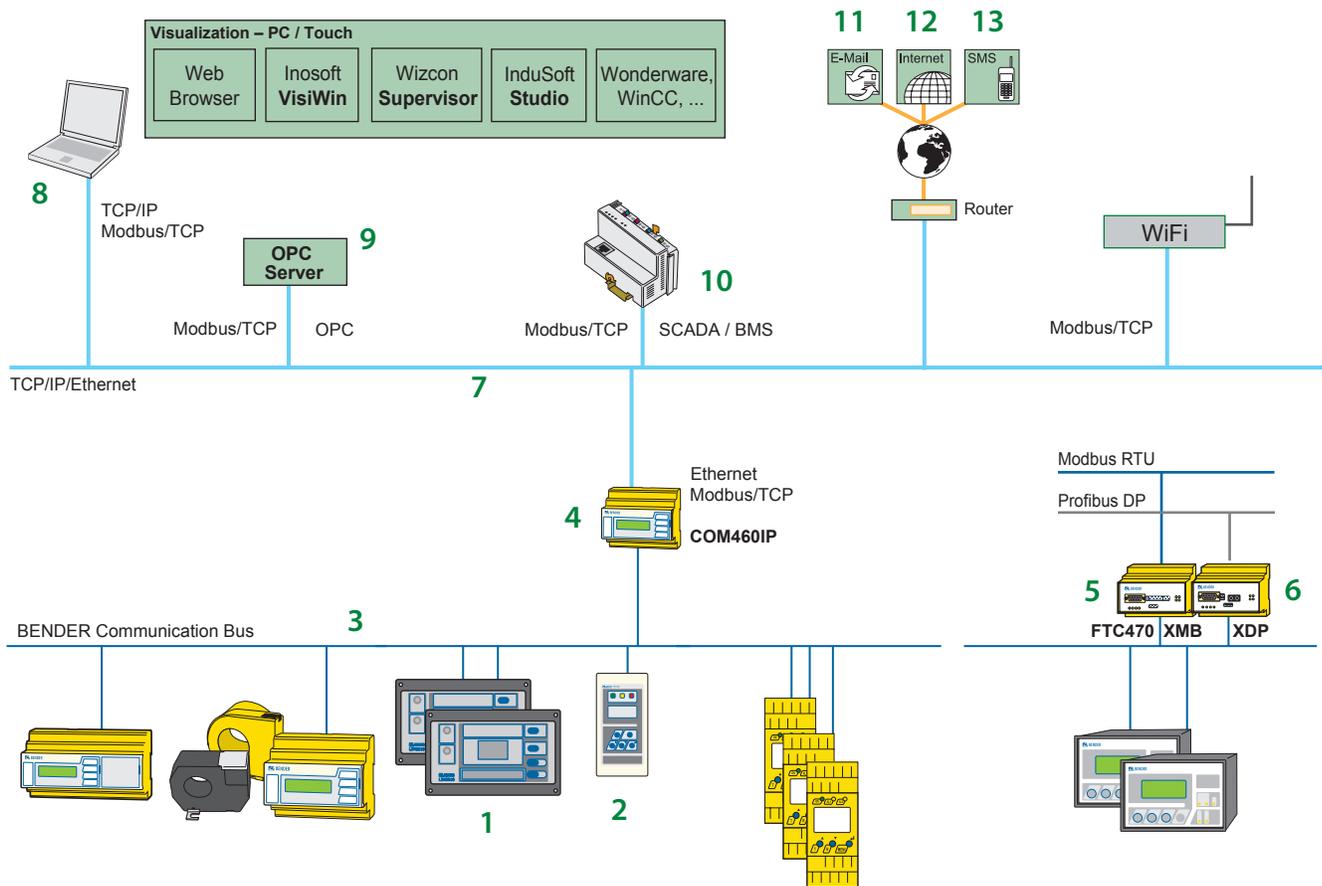
Communication possibilities with BENDER systems and devices

1 - LIM2010 Line Isolation Monitor

2 - MK2430 Remote Indicating Station

3 - BENDER communication bus

4 - COM460IP Ethernet / Modbus/TCP communication gateway

4 - FTC470XMB Modbus/RTU communication gateway

5 - FTC470XDP Profibus/DP communication gateway

7 - Ethernet network or Modbus/TCP network

8 - Connected PC with web browser or visualization software

9 - OPC server connectivity capabilities

10 - SCADA / BMS connectivity capabilities

11 - COM460IP capability: E-mail notification

13 - COM460IP capability:
Web browser based navigation via the Internet

13 - COM460IP capability:
SMS notification

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