BENDER
The Power in Electrical Safety©

Isolated Power Panels

With LIM2010 Line Isolation Monitor

For Hospitals and Critical Care Areas

Technical Bulletin

NAE2092010 / 01.2012

Isolated Power Panels

Isolated Power System with Line Isolation Monitor for hospitals and other critical care areas

Standard Isolated Power Panel

Features

- **Power Distribution:** Loadcenter available for either plug-in and bolt-on circuit breakers
- **Mounting:** Available for flush- or surface-mounted applications
- **Advanced technology:** The LIM2010 line isolation monitor features self-testing, self-calibration, and a wide variety of alarms including voltage, overload, and overtemperature monitoring
- **Outlets:** Optional arrangement of receptacles and/or ground jacks
- **Controller:** Optional combination of PLC and remote / local controls for up to 12 x-ray / laser receptacles
- **Standards:** Listed to UL 1047, the standard for isolated power system equipment
- **Warranty:** Industry-first 5 year warranty

Introduction

BENDER Isolated Power Panels are designed to provide isolated power to electrical systems in operating rooms and other critical areas. Designed in strict compliance with UL 1047, UL 1022, and UL 50, BENDER isolated power panels offer the most up-to-date technology for all isolated power distribution requirements.

Standard Features

Standard isolation power panels typically include:

- Single-phase isolation transformer
- BENDER LIM2010 Line Isolation Monitor (LIM)
- Reference ground bus
- Primary circuit breaker
- Branch circuit breakers (Qty. 8 standard, field-convertable up to 16)

Additional Features

Additional features available include:

- Provision(s) for receptacles and/or ground jacks
- Circuit control via PLC
- Integrated Fault Location
- Transformer Load Monitoring

Refer to the following pages for more information on these options.

Backbox

All backboxes are fabricated from minimum 14GA galvanized steel. Surface mounted enclosures are finished with a coat of hospital ivory baked enamel or equivalent.

Front Trim

Manufactured from minimum 14GA type 304 stainless steel with #4 brushed finish, the front trim contains a door with hidden hinges and a flush mounted key lock covering the loadcenter. A flush mounted front trim extends 1" on all sides of the backbox. For surface-mounted panel boards, the front trim has the same dimensions as the enclosure.

Isolation Transformer

Isolation transformers are available with various primary and secondary single-phase voltages. See ordering information for available primary and secondary voltages.

Line Isolation Monitor

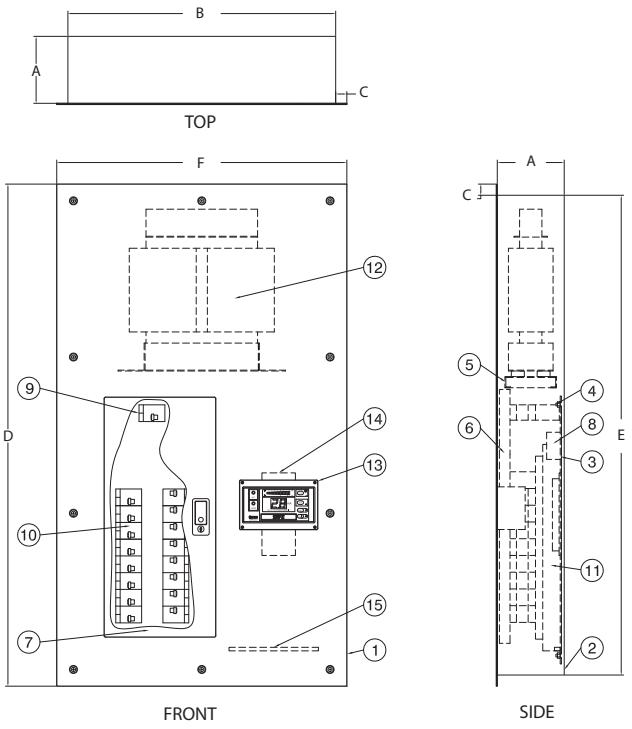
The BENDER LIM2010 series Line Isolation Monitor provides both digital and analog displays. The LIM is available with readouts and response values of 2 mA or 5 mA. The LIM2010 utilizes a unique measuring principle and is capable of detecting all combinations of capacitive and resistive faults, including balanced, unbalanced, and hybrid faults. A self-test and self-calibration function is included.

The LIM2010 can monitor for additional alarms, including over- and undervoltage, load monitoring, over-temperature, and more. The LIM2010 may be combined with an installed BENDER EDS series module to create a ground fault location system. For more information, refer to the LIM2010 technical bulletin (document number NAE2022010).

Loadcenter

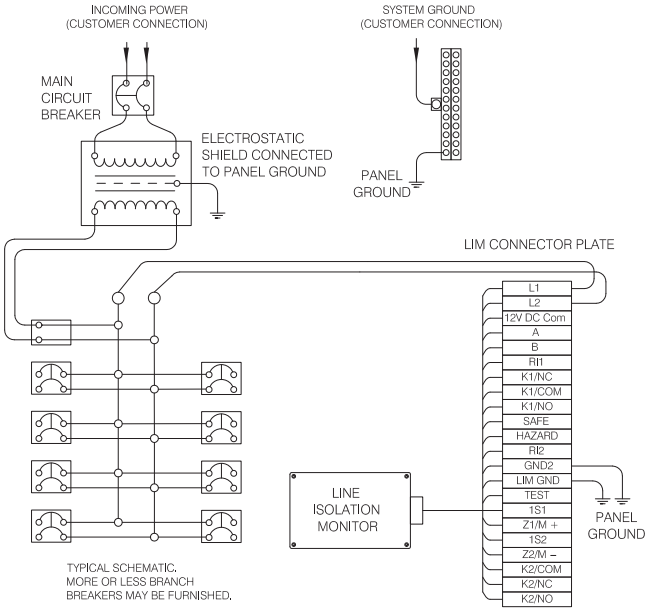
The loadcenter is an integral part of isolated power panels. Included is a primary circuit breaker which provides protection for the isolation transformer. All isolated power panels may be configured with either plug-in (snap-in) or bolt-on branch circuit breakers.

Sample Outline: Standard Isolated Power Panel



1 - Stainless steel front trim
2 - Backbox, galvanized steel
3 - Backplate, galvanized steel
4 - Backplate mounting bracket
5 - Transformer shelf
6 - Circuit breaker deadfront
7 - Stainless steel door with lock
8 - Distribution block, 2P
9 - Circuit breaker, main, 2P
10 - Circuit breaker, branch, 2P
11 - Loadcenter
12 - Isolation transformer, single-phase
13 - Line isolation monitor (LIM), single-phase
14 - LIM connector plate
15 - Ground bus

Wiring Diagram: Standard Isolated Power Panel

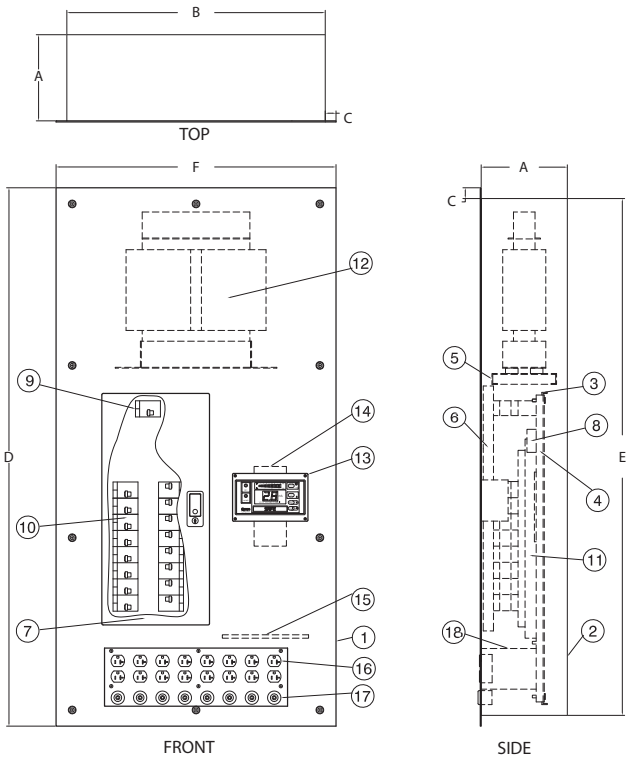


Isolated Power Panels with Receptacles and Ground Jacks

BENDER isolated power panels may have provisions for hospital grade power receptacles and hospital grade ground jacks. The hospital grade power receptacles are available in either straight-blade (single or duplex), or twist-to-lock style. Each section can accommodate either one duplex or single power receptacle and one ground jack, or two ground jacks.

BENDER type HGC hospital grade ground cords are recommended for use with this panel configuration (see accessories).

Sample Outline: Isolated Power Panel with Optional Receptacles and Ground Jacks



1 - Stainless steel front trim
2 - Backbox, galvanized steel
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6 - Circuit breaker deadfront
7 - Stainless steel door with lock
8 - Distribution block, 2P
9 - Circuit breaker, main, 2P
10 - Circuit breaker, branch, 2P
11 - Loadcenter
12 - Isolation transformer, single-phase
13 - Line isolation monitor (LIM), single-phase
14 - LIM connector plate
15 - Ground bus
16 - Duplex receptacle, hospital grade
17 - Ground jack, hospital grade
18 - Receptacle hat station

Isolated Power Panels for X-Ray / Laser Equipment

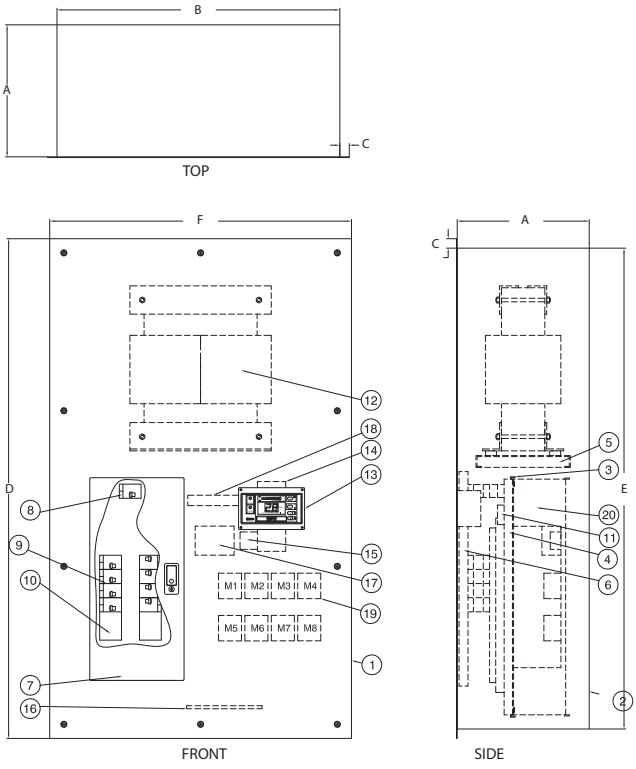
BENDER isolated power panels may also be configured to feed x-ray and laser receptacles at intervals up to 60 A (within the power rating of the panel). The panel is comprised of a power section and a control section. A single panel can supply power for up to twelve (12) circuits. Receptacle modules may be configured with an "in-use" lamp as well as a LIM remote indicator. The access door to the remote power receptacle may also be equipped with a limit switch used to lock out power to other receptacles connected to the panel.

Programmable Logic Controller (PLC)

The PLC, built into the panel, controls which circuits are available. The PLC control logic is configured to a particular system's requirements. Control wiring from push-buttons, door switches, etc. are permanently wired into the input section. Signals or contact closures from the output section may be used to actuate contactors and to apply power to the circuit. The PLC determines how the outputs respond.

BENDER type XRM receptacle modules are recommended for use with this panel configuration (see accessories).

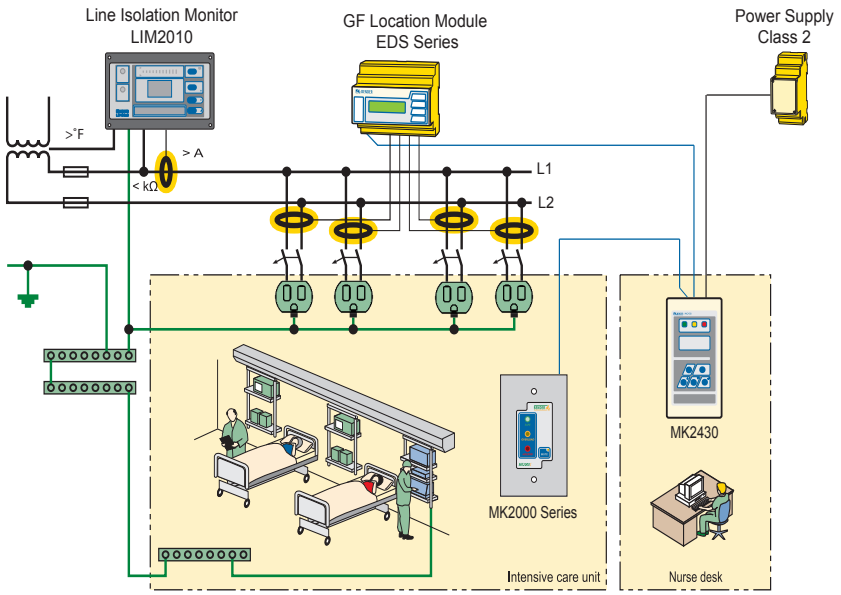
Sample Outline: Isolated Power Panel with Circuit Control



1 - Stainless steel front trim
2 - Backbox, galvanized steel
3 - Backplate, galvanized steel
4 - Backplate mounting bracket
5 - Transformer shelf
6 - Circuit breaker deadfront
7 - Stainless steel door with lock
8 - Circuit breaker, main, 2P
9 - Circuit breaker, branch, 2P
10 - Provision for expansion
11 - Distribution block, 2P
12 - Isolation transformer, single-phase
13 - Line isolation monitor (LIM), single-phase
14 - LIM connector plate
15 - Control transformer
16 - Ground bus
17 - Programmable logic controller (PLC)
18 - Terminal block
19 - Circuit contactors, 2P
20 - Auxiliary backplate*

*Auxiliary backplate is only installed when using greater than eight (8) circuit contactors.

A complete ground fault location system for hospitals



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

The BENDER Advantage

- 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 retro-fitting/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 virtually all types of ungrounded systems

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.

Ground Fault Location Module

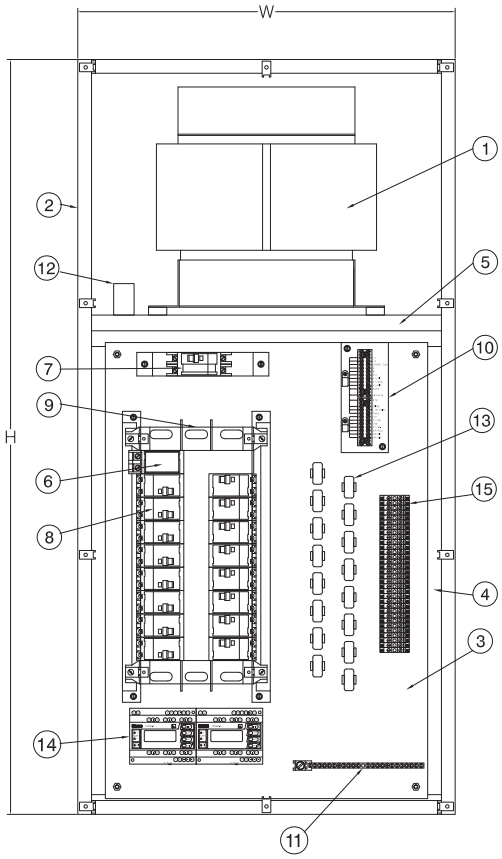
The EDS461 series of ground fault location modules, combined with the LIM2010, create an installed ground fault location system for ungrounded AC and DC systems. Once a ground fault is detected, the test pulse generated by the LIM2010 is scanned by the EDS461 to locate a ground fault down to the load level. Up to 12 separate current transformers may be connected to the device. A total of 90 EDS devices may be interconnected via RS-485. By utilizing the EDS series devices, the source of the fault in the isolated power system can be identified within seconds.

Module Types

Type	Display Type	Outputs
EDS461-D	LCD display	1 DPDT contact
EDS461-L	LED indication	1 DPDT contact

EDS461-D

Sample Outline: Panel w/ Load Monitoring and Integrated Fault Location System



1 - Isolation Transformer, 1Ph w/ Vibration Mounts
2 - Backbox, Galvanized Steel
3 - Backplate
4 - Backplate mounting bracket
5 - Transformer Shelf
6 - Sub-feed Lug
7 - Cicuit Breaker, Main, 2P
8 - Circuit Breaker, Branch, 2P
9 - Load Center
10 - Connector Plate, LIM
11 - Ground Bus
12 - Current Transformer (Load Monitoring)
13 - Current Transformer (CT) (Branch Circuits, EDS)
14 - EDS Units
15 - Terminal Block for Branch Circuit Connections

Ordering Information

BENDER's complete Isolated Power Panels are comprise of four assembly types:

The Interior (Step 1), Isolation Transformer (Step 2), Backbox and Front Trim (Steps 3 and 4).

NOTE: All BENDER isolated power panels, excluding panels with circuit control (Option 1B), contain eight (8) two-pole, 20 A circuit breakers, field expandable to 16 circuits. Panels with circuit control will have the appropriate number of breakers for faciliting the customized circuit control.

STEP 1: Interior

IP	-	15	A	A	SP	-	8	SR	8	-	PN	A2	05	H2	-	D6	LM
		①	②	③	④		⑤	⑥	⑦		⑧	⑨	⑩	⑪		⑫	⑬
							Option 1A				Option 1B					Option 1C	Option 2

Base Information (required):

1 - Panel Interior kVA rating

03: 3 kVA	10: 10 kVA
05: 5 kVA	15: 15 kVA
07: 7.5 kVA	25: 25 kVA

2 - Panel Interior Primary voltage rating

A: 120 V	G: 110 V
B: 208 V	H: 220 V
C: 240 V	I: 230 V
D: 277 V	J: 380 V
E: 480 V	

3 - Panel Interior Secondary voltage rating

A: 120 V	G: 110 V
B: 208 V	H: 220 V
C: 240 V	I: 230 V

4 - Loadcenter/Panelboard Manufacturer

SP: Square D, Plug-On (Snap-In)
SB: Square D, Bolt-On
CP: Cutler-Hammer, Plug-On (Snap-In)
CB: Cutler-Hammer, Bolt-On
GP: General Electric, Plug-On (Snap-In)

OPTION 1: Interior Options

Select EITHER Option 1A,1B OR 1C (leave blank if not required):

Note*: For Option 1B, the amperage per circuit and number of simultaneously hot circuits must be rated properly in accordance with the secondary voltage and the total kVA of the transformer. Contact your local BENDER sales office for additional or custom configurations.

Option 1A: (Power and Ground Outputs)

5 - Quantity of ground jacks (0-8)

0: Zero	8: Eight (max)

6 - Type of receptacle

SR: Single, Red	DI: Duplex, Ivory
SI: Single, Ivory	TB: Twist-to-Lock, Black
DR: Duplex, Red	NN: None

7 - Quantity of receptacles (0-8)

0: Zero	8: Eight (max)

Option 1B: (Circuit Control and Lock-Out Feature)

8 - Type of control and indication

PU: PLC interlock. Door contactor controlled, individual receptacle modules with in-use lamps
PN: PLC interlock. Door contactor controlled, individual receptacle modules (no in-use lamps)
PR: PLC interlock. Circuit selector pushbutton station located remotely

9 - Amperage per circuit*

A2: 20 A	A3: 30 A
A5: 50 A	A6: 60 A

10 - TOTAL quantity of controlled circuits (01-12)

01: One	12: Twelve (max)

11 - Quantity of SIMULTANEOUSLY Active circuits*

H1: One	H4: Four
H2: Two	H5: Five
H3: Three	H6: Six

Option 1C: (Integrated Fault Location System)

12 - Fault Location System (EDS) Type

L6: Using EDS 461L Module
D6: Using EDS 461D Module

OPTION 2: Additional Monitoring Features

13 - Transformer Load Monitoring

[ ]: Feature not required

LM: Load Monitoring Current Transformer

STEP 2: Transformer

Contact your local BENDER sales office for additional or custom configurations.

XM	05	B	A
	①	②	③

1 - kVA of transformer

03: 3 kVA
05: 5 kVA
07: 7.5 kVA
10: 10 kVA
15: 15 kVA
25: 25 kVA

2 - Primary voltage of transformer

A: 120 V
B: 208 V
C: 240 V
D: 277 V
E: 480 V
G: 110 V
H: 220 V
I: 230 V
J: 380 V

3 - Secondary voltage of transformer

A: 120 V
B: 208 V
C: 240 V
G: 110 V
H: 220 V
I: 230 V

STEPS 3 & 4: Backbox and Front Trim

***Note:** All Backboxs support Transformer Load Monitoring from Option 2 above

Backbox / Front Trim Combinations for IP Panels

kVA	Backbox Size (H x W x D)	Front Trim Size (H x W)	Mounting	Supports Option 1A	Supports Option 1B	Supports EDS	Backbox Part Number	Front Trim Part Number
3, 5	43" x 24" x 6"	45" x 26"	Flush	No	No	No	B432406	T4526
7.5, 10	43" x 24" x 8"	45" x 26"	Flush	No	No	No	B432408	T4526
15	51" x 30" x 12"	53" x 32"	Flush	No	Yes	No	B513012	T5332
25	51" x 30" x 14"	53" x 32"	Flush	No	Yes	No	B513014	T5332
3, 5, 7.5, 10	48" x 24" x 8"	50" x 26"	Flush	Yes	No	No	B482408	T5026R
3, 5, 7.5, 10	48“ x 24“ x 8“	50“ x 26“	Flush	No	No	Yes	B482408	T5026E
3, 5	43" x 24" x 6"	43" x 24"	Surface	No	No	No	B432406S	T4324
7.5, 10	43" x 24" x 8"	43" x 24"	Surface	No	No	No	B432408S	T4324
15	51" x 30" x 12"	51" x 30"	Surface	No	Yes	No	B513012S	T5130
25	51" x 30" x 14"	51" x 30"	Surface	No	Yes	No	B513014S	T5130
3, 5, 7.5, 10	48" x 24" x 8"	48" x 24"	Surface	Yes	No	No	B482408S	T4824R
3, 5, 7.5, 10	48“ x 24“ x 8“	50“ x 26“	Surface	No	No	Yes	B482408S	T4824E

Dual Isolated Power Panels

Dual Voltage and Dual System Isolated Power Panels for hospitals and other critical care areas

Dual Output Voltage Isolated Power Panel

Dual System Isolated Power Panel

Features

- **Power Distribution:** Loadcenters available for either plug-in or bolt-on circuit breakers
- **Mounting:** Available for flush- or surface-mounted applications
- **Advanced technology:** The LIM2010 line isolation monitor features self-testing, self-calibration, and a wide variety of alarms including voltage, overload, and overtemperature monitoring
- **Standards:** Listed to UL 1047, the standard for isolated power system equipment
- **Warranty:** Industry-first 5 year warranty

Introduction

BENDER's dual voltage isolated power panels provide two different output voltages simultaneously using one isolation transformer. The typical configuration is provided with one side configured for 208 V or 240 V fixed at 15 kVA and the second side configured for 120 V at 5, 7.5, or 10 kVA.

Ideally suited for:

- Locations where space is limited
- Installations requiring power for both typical hospital equipment and x-ray / laser receptacles

Standard Features: Dual Output Voltage Panel

Dual output voltage isolated power panels provide two separate voltage outputs using a single isolation transformer. A standard dual output voltage panel consists of the following:

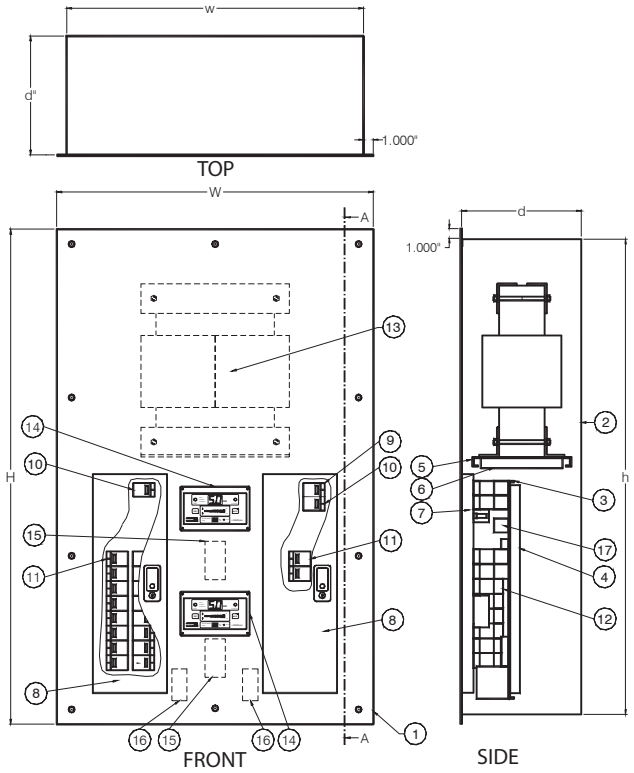
- One (1) single-phase isolation transformer with dual secondary outputs (120 V side and 208 V or 240 V side)
- Two (2) BENDER LIM2010 Line Isolation Monitors (LIM)
- Two (2) Reference ground buses
- One (1) Primary circuit breaker
- One (1) Secondary main circuit breaker for 120 V side
- Eight (8) branch circuit breakers for 120 V side, field-convertable up to 16
- One (1) Secondary main circuit breaker for 208 V or 240 V side
- Provision for two (2) 2-pole branch circuit breakers for 208 V or 240 V side

Standard Features: Dual System Panel

Dual system panels provide two separate voltage outputs from two isolation transformers. This system is equivalent to two independent standard isolated power panels in one enclosure. A standard dual system panel consists of the following:

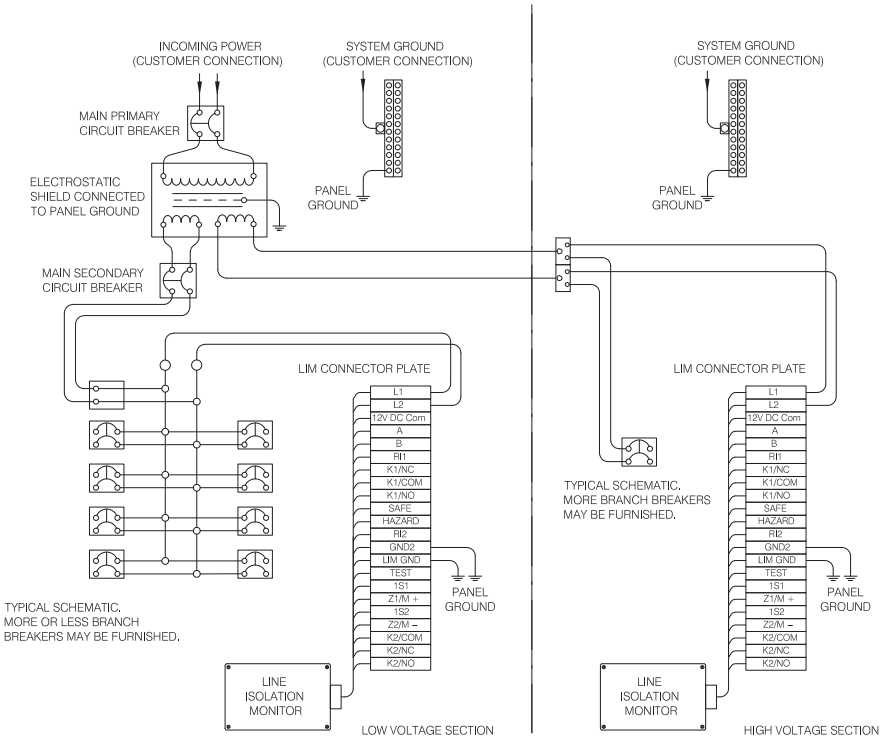
- Two (2) single-phase isolation transformers
- Two (2) BENDER LIM2010 Line Isolation Monitor (LIM)
- Two (2) Reference ground buses
- Two (2) Primary circuit breakers
- Branch circuit breakers (Qty. 8 standard, field-convertable up to 16 per system)

Sample Outline: Dual Output Voltage Isolated Power Panel



1 - Stainless steel front trim
2 - Backbox, galvanized steel
3 - Backplate, galvanized steel
4 - Backplate mounting bracket
5 - Transformer shelf
6 - Transformer shelf mounting bracket
7 - Circuit breaker deadfront
8 - Stainless steel door with lock
9 - Main, primary circuit breaker, 2P
10 - Main, secondary circuit breaker, 2P
11 - Branch circuit breakers, 2P
12 - Loadcenter
13 - Isolation transformer, dual secondary, single-phase
14 - Line isolation monitor (LIM), single-phase
15 - LIM connector plate
16 - Ground bus
17 - Distribution blocks

Sample Wiring Diagram: Dual Output Voltage Isolated Power Panel



Ordering Information: Dual Output Voltage Isolated Power Panel

BENDER's complete Isolated Power Panels are comprise of four assembly types:

The Interior (Step 1), Isolation Transformer (Step 2), Backbox and Front Trim (Steps 3 and 4).

STEP 1: Interior - Dual Output Voltage Panel

ID	-	25	B	B	10	SP	-	A3	2	LM
		①	②	③	④	⑤		⑥	⑦	⑧

1 - kVA rating of transformer
25: 25 kVA

2 - Primary voltage of transformer
B: 208 V
C: 240 V
D: 277 V
E: 480 V
H: 220 V
J: 380 V

3 - Secondary voltage of transformer
B: 208 V
C: 240 V

4 - kVA rating of 120 V secondary
10: 10 kVA

5 - Loadcenter/Panelboard Manufacturer
SP: Square D, Plug-On (Snap-In)
SB: Square D, Bolt-On
CP: Cutler-Hammer, Plug-On (Snap-In)
CB: Cutler-Hammer, Bolt-On
GP: General Electric, Plug-On (Snap-In)

6 - Branch circuit breaker(s) rating, 208 or 240 V side
A2: 20 A
A3: 30 A
A5: 50 A
A6: 60 A

7 - Qty. of branch circuit breakers, 208 or 240 V side
1: One
2: Two

8 - Transformer Load Monitoring
[ ]: Feature not required
LM: Load Monitoring Current Transformer

STEP 2: Transformer (Dual Output Voltage)

Contact your local BENDER sales office for additional or custom configurations.

XM	25	B	B	10
	①	②	③	④

1 - kVA rating of transformer
25: 25 kVA

2 - Primary voltage of transformer
B: 208 V
C: 240 V
D: 277 V
E: 480 V
H: 220 V
J: 380 V

3 - Secondary voltage of transformer
B: 208 V
C: 240 V

4 - kVA of 120 V secondary
10: 10 kVA

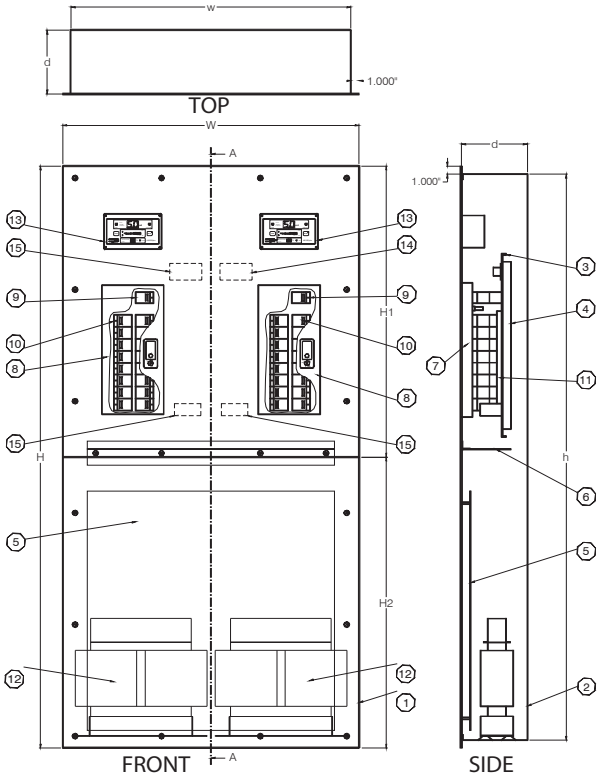
STEPS 3 & 4: Backbox and Front Trim

***Note:** All Backboxs support Transformer Load Monitoring

Backbox / Front Trim Combinations for ID Panels

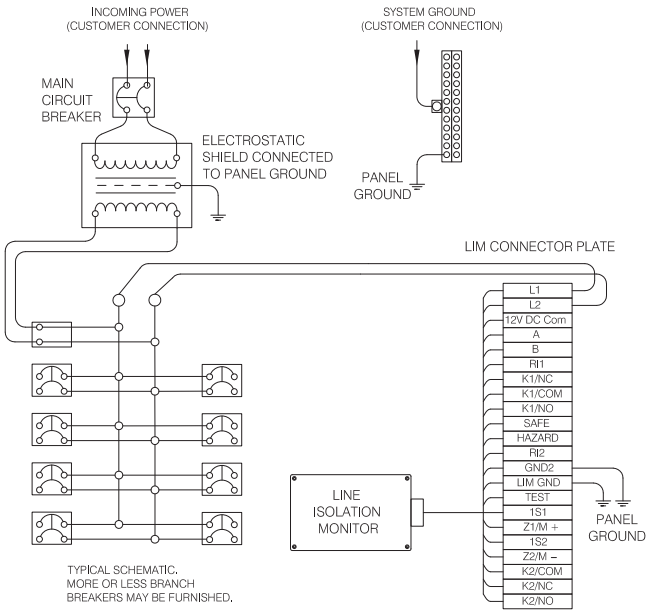
kVA	Backbox Size (H x W x D)	Front Trim Size (H x W)	Mounting	Backbox Part Number	Front Trim Part Number
20, 22.5, 25	51" x 34" x 14"	53" x 36"	Flush	B513414	T5336
20, 22.5, 25	51" x 34" x 14"	51" x 36"	Surface	B513414S	T5134

Sample Outline: Dual System Isolated Power Panel

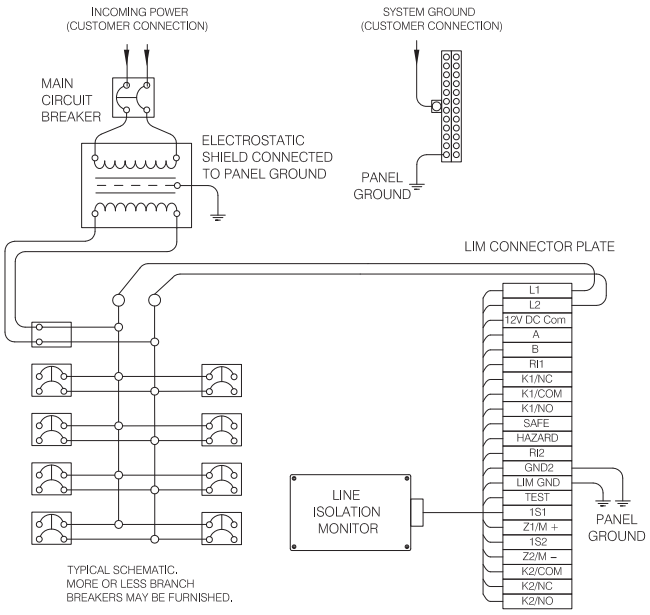


1 - Stainless steel front trim, two (2) sections
2 - Backbox, galvanized steel
3 - Backplate, galvanized steel
4 - Backplate mounting bracket
5 - Heat shield, vertical
6 - Heat shield, horizontal
7 - Circuit breaker deadfront
8 - Stainless steel door with lock
9 - Main circuit breaker, 2P
10 - Branch circuit breakers, 2P
11 - Loadcenter
12 - Isolation transformer, single-phase
13 - Line isolation monitor (LIM), single-phase
14 - LIM connector plate
15 - Ground bus

Sample Wiring Diagram: Dual System Isolated Power Panel



System 1



System 2

Ordering Information: Dual System Isolated Power Panel

BENDER's complete Isolated Power Panels are comprise of four assembly types:

The Interior (Step 1), Isolation Transformer (Step 2), Backbox and Front Trim (Steps 3 and 4).

STEP 1: Interior - Dual System Panel

IX	-	10	B	A	-	10	B	A	-	SP	LM
		①	②	③		④	⑤	⑥		⑦	⑧

System 1

1 - System 1 - Total kVA

03: 3 kVA	07: 7.5 kVA
05: 5 kVA	10: 10 kVA

2 - System 1 - Primary voltage

A: 120 V	G: 110 V
B: 208 V	H: 220 V
C: 240 V	I: 230 V
D: 277 V	J: 380 V
E: 480 V	

3 - System 1 - Secondary voltage

A: 120 V	G: 110 V
B: 208 V	H: 220 V
C: 240 V	I: 230 V

System 2

4 - System 2 - Total kVA

03: 3 kVA	07: 7.5 kVA
05: 5 kVA	10: 10 kVA

5 - System 2 - Primary voltage

A: 120 V	G: 110 V
B: 208 V	H: 220 V
C: 240 V	I: 230 V
D: 277 V	J: 380 V
E: 480 V	

6 - System 2 - Secondary voltage

A: 120 V	G: 110 V
B: 208 V	H: 220 V
C: 240 V	I: 230 V

Both Systems

7 - Loadcenter/Panelboard Manufacturer

SP: Square D, Plug-On (Snap-In)
SB: Square D, Bolt-On
CP: Cutler-Hammer, Plug-On (Snap-In)
CB: Cutler-Hammer, Bolt-On
GP: General Electric, Plug-On (Snap-In)

8 - Transformer Load Monitoring

[ ]: Feature not required
LM: Load Monitoring Current Transformer

STEP 2: Transformer * (Two Required)

Note*: This step must be completed twice. Two transformers are required for a complete dual system isolated power panel. Contact your local BENDER sales office for additional or custom configurations.

XM	10	B	A
	①	②	③

1 - Total kVA of transformer

03: 3 kVA	07: 7.5 kVA
05: 5 kVA	10: 10 kVA

2 - Primary voltage of transformer

A: 120 V	G: 110 V
B: 208 V	H: 220 V
C: 240 V	I: 230 V
D: 277 V	J: 380 V
E: 480 V	

3 - Secondary voltage of transformer

A: 120 V	G: 110 V
B: 208 V	H: 220 V
C: 240 V	I: 230 V

STEPS 3 & 4: Backbox and Front Trim

***Note:** All Backboxs support Transformer Load Monitoring from Option 2 above

Backbox / Front Trim Combinations for IX Panels

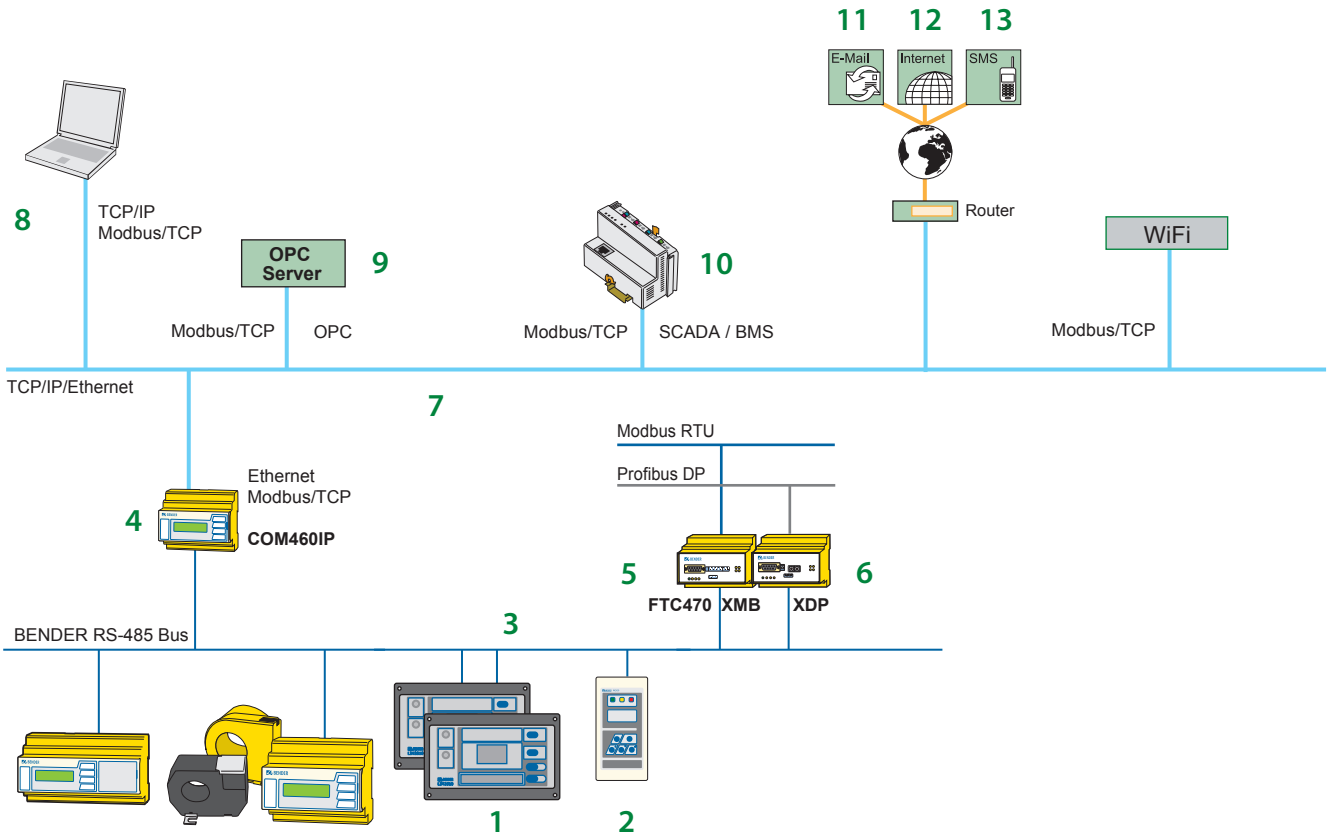
kVA	Backbox Size (H x W x D)	Front Trim Size (H x W)	Mounting	Front Trim Part Number	Backbox Part Number
3, 5, 7.5, 10	71" x 34" x 8"	73" x 36"	Flush	T7336	B713408
3, 5, 7.5, 10	71" x 34" x 8"	71" x 34"	Surface	T7134	B713408S

Additional Accessories for Panels

Additional Circuit Breakers for Isolated Power Panels		
Model No.	**Description**	**Ordering No.**
QO220	Circuit Breaker, Square-D, Plug-On Type, 20 A/ 2P, 120/240 VAC, 10 kAI	P 1230 0001
QOB220	Circuit Breaker, Square-D, Bolt-On Type, 20 A/ 2P, 120/240 VAC, 10 kAI	P 1230 0093
QO215	Circuit Breaker, Square-D, Plug-On Type, 15 A/ 2P, 120/240 VAC, 10 kAI	P 1230 0046
QOB215	Circuit Breaker, Square-D, Bolt-On Type, 15 A/ 2P, 120/240 VAC, 10 kAI	P 1230 0065
BAB2020	Circuit Breaker, Cutler-Hammer, Bolt-On Type, 20 A/ 2P, 120/240 VAC, 10 kAI	P 1230 0107
BAB2015	Circuit Breaker, Cutler-Hammer, Bolt-On Type, 15 A/ 2P, 120/240 VAC, 10 kAI	P 1230 0036
CH*220	Circuit Breaker, Cutler-Hammer, Plug-On Type, 20 A/ 2P, 120/240 VAC, 10 kAI	P 1230 0168
CH*215	Circuit Breaker, Cutler-Hammer, Plug-On Type, 15 A/ 2P, 120/240 VAC, 10 kAI	P 1230 0169
THQP215	Circuit Breaker, General Electric, Plug-On Type, 15 A/ 2P, 120/240 VAC, 10 kAI	P 1230 0099
THQP220	Circuit Breaker, General Electric, Plug-On Type, 20 A/ 2P, 120/240 VAC, 10 kAI	P 1230 0100
Spare Parts List		
LIM2010	Line Isolation Monitor, 100 – 240 V / 1-Phase	B 9207 5021
CP-LIM2010	Connector Plate Assembly for LIM2010, LIM and remote connections	B 5111 0001
STW3	Current sensingTransformer (up to 100 A)	B9802 1000

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
5 - FTC470XMB Modbus/RTU communication gateway
6 - 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
12 - COM460IP capability:
Web browser based navigation via the Internet
13 - COM460IP capability:
SMS notification

Ethernet and Modbus/TCP Communication Modules

The COM460IP is a full-featured communication gateway for connecting BENDER devices to modern networks. The COM460IP connects via Ethernet connections to an existing communication network. The integrated web server displays the status of the entire network of BENDER devices, and may be viewed through the web browser (with Silverlight plugin installed) of any connected PC. No additional software is required. The COM460IP has many customizable options, including the ability to act as a Modbus/TCP gateway for status information.

COM460IP

Features

- Modular, expandable gateway between BENDER communication bus and TCP/IP
- Gateway between BENDER communications bus and Ethernet
- Optional Modular/TCP communication gateway for status information of BENDER devices
- Customizable features available through options
- Capability for remote access via LAN, WAN, and Internet

FTC470XMB

Description

The FTC470XMB is a Modbus/RTU communication gateway for supported BENDER devices. Up to 10 BENDER devices may be connected to one FTC470XMB, and allows for full integration into existing Modbus/TCP communication systems.

The FTC470XMB is recommended for retrofitting existing systems with Modbus/RTU networks. For a communication gateway supporting Modbus/TCP, please refer to the COM460IP.

Applications

- Remote communication of BENDER devices information to Modbus/RTU networks
- Control of BENDER devices via Modbus/RTU
- Connecting to Modbus/RTU compatible building management systems

Function

The FTC470XMB is integrated into a Modbus/RTU network as a slave device, and is integrated into the BENDER communication bus as either a master or a slave. The appropriate Modbus/RTU controller must be programmed to interpret the data from the FTC470XMB. A complete command syntax may be found in the FTC470XMB user manual.

Features

- Modbus/RTU communication gateway for supported BENDER devices

MK2000P-G1 (left) & MK2000 CBM (right)

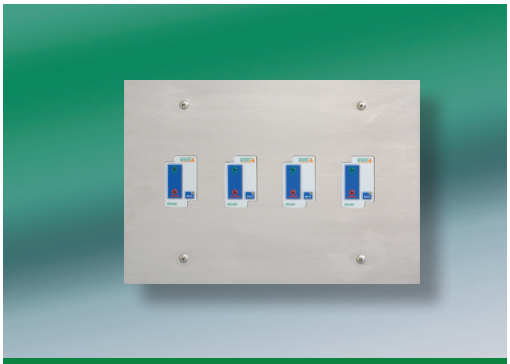
MK2000 Series LIM Remote Indicator

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.

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

RAS Remote Annunciator Station

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.



RAS-04B

MK2430 (left) & MK800 (right)

Advanced MK Series Remote Indicators

The universal remote alarm indicators and operator panels MK2430/MK800 are 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/MK800 displays information regarding each individual device, system, or room and can define custom labels based on each individual application. A LIM test may also be preferred from these devices.

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*
- Over-temperature
- Location of fault from EDS device
- Connection monitoring alarms
- Device errors
- Test results
- Measured values
- Audible and visual indication

During normal operation, the MK2430/MK800 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.

* Note: Overload feature requires the use of BENDER STW series CTs installed in the Isolated Power Panel.

Dual Display Digital Clock and Timer

The ZT1590 digital clock and timer is a complete, microprocessor-based device that displays both the time of day and elapsed time information. The ZT1590 has a dual-row, 7-segment display with large, red LED characters, easily read in high ambient light. All features, as well as the device setup, may be carried out with the four, onboard pushbuttons, or on an optionally connected MK1550 clock remote. No DIP switch configuration is required.

ZT1590RS (left) & MK1550 (right)

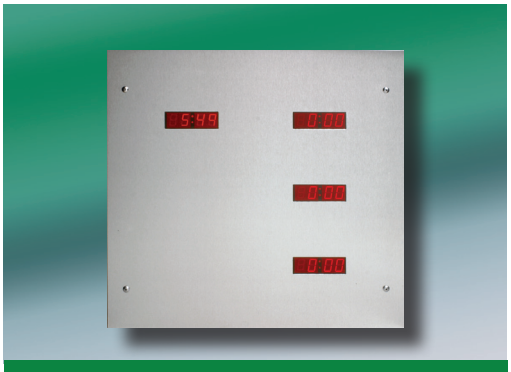
ZT1591

Digital Clock or Timer

The Clock/Elapsed timers are complete microprocessor based units that display either time of day or elapsed time information. The ZT1591 has a large 2-1/2" 7 segment display with large bright red LED characters that are easily read in high ambient light.
The BENDER ZT1591 operates independent of line frequency. This unit has unique power backup systems that requires no battery so there is no need for battery monitoring and replacement. In the event of power outage, both clock and timer functions will continue to work for at least 24 hours. However, the displays are not visible during this time interval.
The Timer may be activated from the remote control MK1550 or an external contact (code blue or other monitoring output). A count may be interrupted, resumed and reset at the remote control MK1550.

Surgical Chronometer

The ZT1594 surgical chronometer is a complete, microprocessor based system that displays time of day and three elapsed times. The system has four seven-segment displays with large, red LED characters easily read in high ambient light. All features, as well as device setup, are carried out on the connected MK1554 chronometer remote.



ZT1594

Isolated Power Systems Equipment and Accessories

GPM Series-Power and Ground Modules

BENDER power and ground modules provide a combination of hospital grade power receptacles and/or hospital grade ground jacks. Straight-blade single, straight-blade duplex, and twist-to-lock receptacles can be provided in a wide array of combinations. Also available are hospital grade ground jacks to facilitate implementation of an equal-potential environment.

Modules are provided on either stainless steel wall plates (compatible with standard contractor supplied electrical gang boxes as shown on the right) or stainless steel cover plates for use with ROHS compliant galvanized steel backboxes.

GPM-F4DR4

HGC-15C (left) & HGJ-1R (right)

HGC Series-Hospital Grade Ground Cords and Jacks

BENDER hospital grade ground cords are available in various lengths for implementing an equal-potential environment. Cords are highly flexible and available with either a heavy duty clip or lug on one end, and plug with rubber handle on the other.

XRM Series-X-Ray/Laser Receptacle Modules

Used in conjunction with circuit-controlling isolated power panels, XRM series modules provide a convenient source of power for portable x-ray and laser equipment. Typical configurations include an x-ray or laser power receptacle matching the NEMA plug configuration of the equipment. An "in-use" lamp and magnetic door switch ensure that the proper amounts of circuits are online simultaneously. The MK series LIM remote indicator may also be built into the module for displaying the status of the connected LIM.

XRM-8B2

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