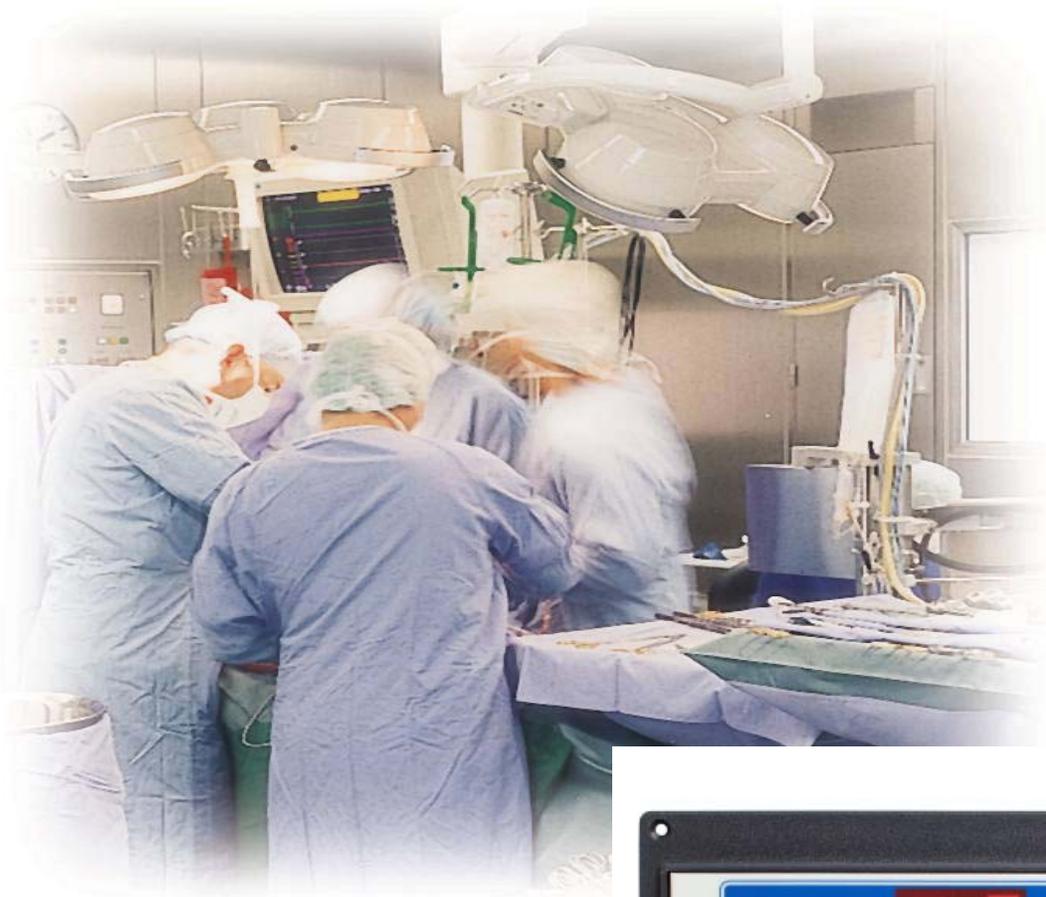


Line Isolation Monitor LIM2000plus™



**Confirms the Integrity of
Isolated Power Systems**

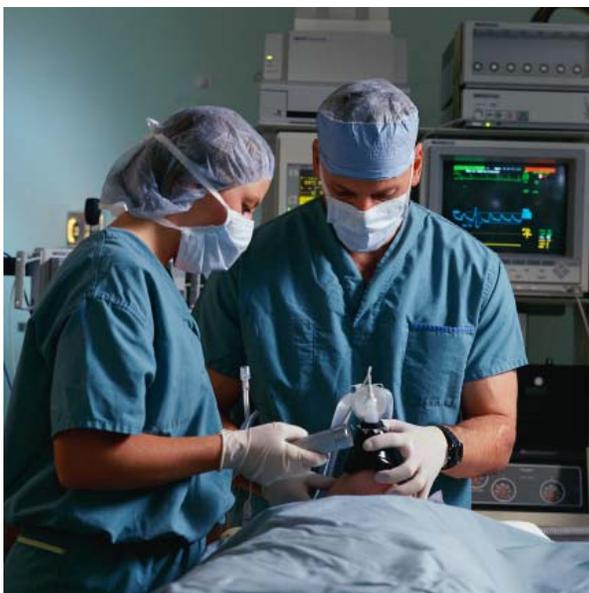


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Electrical Safety in Hospitals

The benefits offered by modern medical knowledge and equipment can be suddenly undermined by an unexpected loss of electrical power.

In ORs, ICUs, and CCUs, the reliable performance of medical devices and their electrical supply is crucial to the safety of patients and staff.



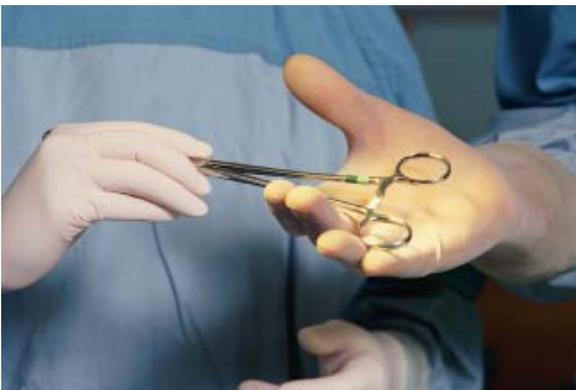
Safe and secure electrical power systems

BENDER Medical Products has provided the answer for reliable and cost effective electrical safety solutions for medical staff and Healthcare Facilities for over 60 years. Hospitals around the world rely on BENDER products and the technical support of BENDER engineers.

Features



LIM2000plus™



MK2000CBM-G2

- No susceptibility to electrical noise
- Variety of remote indicator configurations
- Voltages up to 240V, 1 and 3 phase
- No interference with electrical equipment
- Special phase locking circuitry for ultimate stability and repeatability
- Voltage free SPDT contact for remote alarm
- LIM overload protection with automatic reset
- 2 or 5 mA response value
- Easy to clean rugged Lexan front foil
- Automatic self calibration and self check every twelve hours
- Optional load monitoring and indication: overload alarm
- Optional RS-485 data communication port
- Optional local data logger; upload data to computer via RS-232 port

Why Isolated Power?

The following commentary in the 1999 Edition of the “Health Care Facilities *Handbook*” and other facts as presented below illustrate the futility of an effort by parties harmed with suspicious cost-cutting data to delete the requirements for IPSS [Isolated Power Systems].

As an indication of the struggle, the NFPA Standards Council in reviewing the material for the 1984 edition of NFPA 99 “...recommended that the committee [...on *Anesthetic Agents*] process a Tentative Interim Amendment [TIA] strongly recommending the installation of IPSS since all parties at the council hearing acknowledged **that these systems do provide an added level of electrical safety for patients and staff....**”



JOHN H. STROGER, JR. HOSPITAL OF COOK COUNTY

Added Safety... at no Additional Cost

- Fact:** Separate step-down transformation is required for 120V grounded power...
There are substantial savings derived from 480V/277V distribution. IPS panels can accept either 480V or 277V. Circuits requiring 120V are supplied directly from the built-in step-down transformer.
- Fact:** Normal grounded power panels have a baked enamel finish.
IPS panels installed directly into ORs, ICUs, CCUs, etc., incorporate a Stainless Steel front trim for ease of cleaning and access as well as appearance...
- Fact:** Expensive Hospital Grade GFCI receptacles are required with grounded power.
Associated with an IPS are standard Hospital Grade receptacles...
- Fact:** With grounded power, the GFCIs respond to ground faults downstream of the receptacles.
*With isolated power, a Line Isolation Monitor [LIM] monitors the distribution circuits for ground faults both upstream **and** downstream of the receptacles...*



The Lack of Power Interruption...a Secure Feeling

Fact: A GFCI trips. Power to **life-sustaining equipment is interrupted.**
The LIM alarm activates. Surgical procedures continue. Maintenance personnel, at their leisure, identify and clear the fault...

Fact: A grounded branch circuit experiences a large and damaging line-to-line or line-to-ground fault current. The absence of selective coordination causes multiple branch circuits to be taken out of service.
In an IPS system, a circuit breaker trips in response to a line-to-line fault current. The outage is limited to the faulty branch circuit...

An IPS System...it Can Save Lives

Fact: There is no indication of a developing ground fault in a grounded system; a borderline circuit trip situation may exist but no one will know until the medical devices go dead.
The LIM in an IPS displays the incremental changes in ground leakage current as additional medical devices are plugged into the receptacles; this provides a real time visual indication of an impending ground fault leakage problem...

Fact: There is an open in the grounding conductor serving a medical device. To no one's knowledge, there is a fault between the hot conductor and an accessible conducting surface. It is true that a GFCI-protected circuit trips when a person touches the surface but not before he/she experiences possibly several hundreds of milliamperes.
An IPS system will allow less than 5mA to flow through a person in contact with the faulted surface...

Your partner in the application of the new international standard for electrical safety in hospitals

ISOTROL SYSTEMS and BENDER Medical Products are acknowledged as the experts in the design and installation of Isolated Power Systems. BENDER systems are specially developed for electrical safety management in Healthcare facilities, they provide early detection of critical errors or insulation deteriorations in the power supply of medical electrical devices.



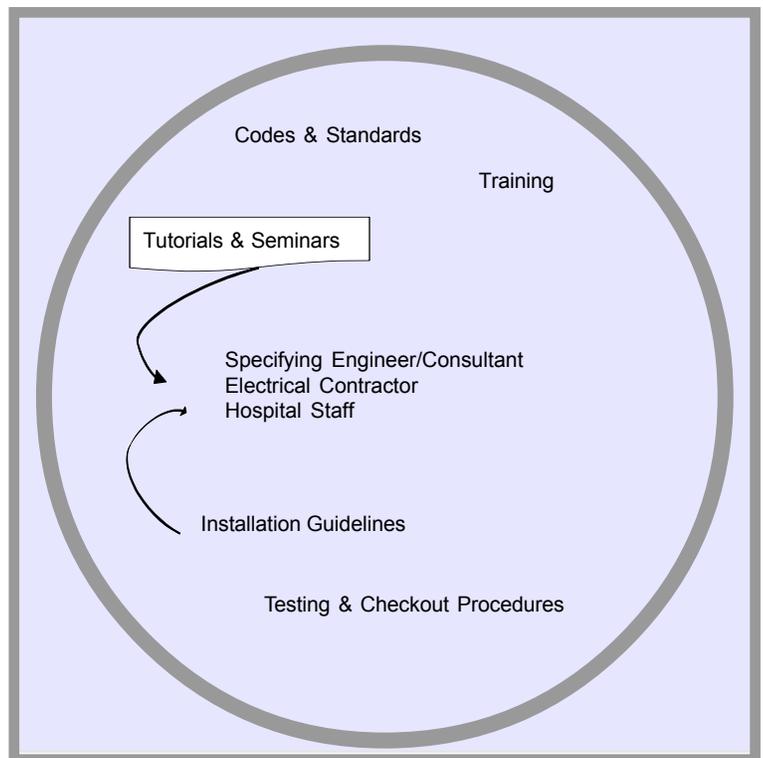
Optimal Electrical Safety

As there can be no compromise concerning the safety of patients and staff, we create flexible solutions for your needs. Let us be your partner and take advantage of our knowledge in the following areas of expertise:

- Retrofit applications
- System modifications
- Code interpretation
- Isolated power
- Personnel hazards
- Functional testing
- Installation guidelines
- System inspection
- System certification
- Operator training

Whoever takes responsibility for the running of a hospital or other healthcare facility has to ensure the highest level of electrical safety.

BENDER Medical Products has developed worldwide system solutions in accordance with NFPA 99, NFPA 70, NEC, CEC, CSA, IEC and other national and international standards.



Product Overview

- Line Isolation Monitor LIM2000plus™
- Remote Indicators MK2000 Series
- LIM2000plus™ Data Logger Equipment
- Digital Clocks / Elapsed Timers
ZT 1490 / ZT 1491
- Digital Clocks / Elapsed Timers
ZT 1491 - RS, - RSH, - RSV
- Surgical Chronometers ZT 1494
- Isolated Power Systems Test Kit LT2000
- LIM / GFCI Tester LT3000
- Power & Grounding Modules
 - Receptacle Ground Modules (RGM)
 - Patient Ground Modules (PGM)
 - Receptacle Modules (RM)
 - Master Ground Modules (MGM)
- Hospital Ground Cords (HGC)
- Hospital Ground Jacks (HGJ)
- X-Ray/Laser Receptacle Modules (XRM/LRM)
- Remote Annunciator Stations (RAS)
- Remote Control Stations (RCS)
- Isolation Transformers



Line Isolation Monitor

LIM2000plus™

Product Description

The Line Isolation Monitor (LIM) detects the total leakage impedance to ground in an isolated (ungrounded) AC power system. Based on this information, the maximum Total Hazard Current (THC) is determined and displayed on digital display and LED bar graph.

The LIM is available for operation in 50 to 60 Hz systems with AC voltages 100 to 240V. The supply voltage for the LIM is taken from the system to be monitored.

Two separate ground connections are provided. Each ground must be wired individually to the Reference Grounding Bus. A break in either connection will cause the LIM to alarm.

The BENDER LIM2000plus™ Series Line Isolation Monitor meets or exceeds all applicable U.S. and Canadian specifications. It complies with **CEC, NEC Article 517, NFPA 99, UL1022, CSA Z32.2** and is recognized under UL file no. **E81789** and CSA file no. **LR60783-3**.

Operational Information

Usually, there will be a different impedance between each isolated conductor and ground. Thus, there will be a different current flowing through a person making physical contact between any one of the isolated conductors and ground. The LIM function is to calculate and display the true maximum value of the Total Hazard Current (THC). The BENDER LIM accomplishes this using a patented measurement technique.

The THC is displayed on a seven segment digital display and a bar graph. Normally, the green "SAFE" LED is illuminated, the display shows a low leakage value and the bar graph is in the non-alarm, or safe, green zone. THC levels will increase as additional loads are connected to the system and/or when a line-to-ground fault has suddenly occurred or is slowly developing. There is a visual and audible alarm when the THC exceeds the LIM setting of either 2mA or 5mA. Relay output contacts are available which can be wired into a circuit to trigger an external alarm.

The visual alarm, red LED "HAZARD" remains illuminated for the duration of the fault. The audible alarm can, however, be silenced by pushing the MUTE button at any time, at the discretion of personnel in the vicinity of the LIM. When the MUTE button is activated, the amber LED in the mute button is illuminated to indicate a muted condition.

Activate the test button to check the LIM operation. Making this test does not add to the hazard current of a system in actual use, nor does the test include the effect of the line-to-ground stray impedance of the system.

The LIM has provisions for connecting one or more Remote Indicators, with or without analog or digital display meter. A Remote Indicator duplicates the LIM audible and visible alarm signals.



LIM2000plus™

- Less than 35 microampere LIM hazard current
- No interference with electrical equipment
- Special phase-locking circuitry for ultimate stability and repeatability
- Voltage-free SPDT contact for external alarm
- Provision for remote indicators
- Internal overload protection with automatic reset
- Easy to clean rugged Lexan front foil
- Digital & analog bar graph display
- Automatic self calibration and self check
- Audible alarm volume is adjustable via menu
- Load Monitoring available
- RS485 communication output available

Available Line Isolation Monitors

Type	Article No.
LIM2000-1 (120V)	92075001
LIM2000-1CB*(120V)	92075002
LIM2000-1(208V)	92075003
LIM2000-1CB*(208V)	92075004
LIM2000-3CB*(208V/3Ph)	92075005
Connector Plate**	92075100

* Includes RS485 communication and load monitoring

** Contact factory for additional information.

Remote Indicators for Line Isolation Monitor



MK2000-G1



MK2000CBM-G2



MK2000P-G1

- LEDs for long life
- No interference with medical equipment
- Interfaces with all BENDER LIM's
- Interfaces with all other manufacturers LIM's
- Uses low voltage wiring (12V DC / 12V AC)
- Mounts to standard electrical gang box
- Connection is by screw terminal strip
- Easy to clean rugged stainless steel and lexan front foil design

Available Remote Indicators

Type	Article No.
MK2000 - G1	923520
MK2000 - G2	923521
MK2000P - G1	923523
MK2000P - G2	923524
MK2000CBM - G2	923545
Connector Plate**	92075100

** Contact factory for additional information.

Product Description

Remote Indicators are used with BENDER Line Isolation Monitors (LIM's) and are mounted in remote locations. A Remote Indicator duplicates the LIM audible and visible alarm signals. A mute switch is used to silence the remote buzzer (local muting). Optionally, it can be used to silence all buzzers in the system (system muting). The test button can remotely perform a function test of the LIM. Remotes with digital display meters, which display THC, are available. For information see the MK2000CBM data sheet.

The Remote Indicators MK2000 and MK2000P are supplied as one-gang (G1) or two-gang (G2) stainless steel faceplates for flush mounting into a panel or wall box with a 2" minimum depth. The basic electrical connection is made via three wires.

Custom Remotes and Remote Annunciator Stations (RAS) are also available. For information see the RAS data sheet.

Operational Information

The Remote Indicators are controlled by a 12V AC/DC signal from the LIM. A green "SAFE" LED remains on as long as the alarm threshold is not exceeded.

When the LIM goes into the alarm condition, the remote "SAFE" LED is extinguished and the red "HAZARD" LED is lit. While in "HAZARD" the remote buzzer will sound. The buzzer can be silenced by pushing the "MUTE" switch. A muted buzzer is indicated by an amber LED integrated in the switch. The muting function is reset automatically when the fault is removed. The test button will put the LIM through the test cycle.

Technical Data for Line Isolation Monitor & Remote Indicators

LIM2000plus™

Rated insulation voltage	300 V
Insulation class in acc. to UL1022	
Dielectric voltage-withstand test	1500 V
Rated service rating	continuous operation
Rated mains voltage of V_N	100V - 120VAC / 200V - 240VAC 1ph. 200V - 240VAC 3ph.
Frequency range of V_N	50 to 60 Hz (+/- 5%)
Operating range of V_N	85 ... 110% of rated voltage
Max. power consumption	12.5 VA
Measuring current	max. 20 μ A
Monitor hazard current	max. 35 μ A
Min. internal impedance at 50/60 Hz	4.7 Meg Ohm
Nominal response value	5 mA changeable to 2 mA
Response tolerance	1.8 to 2 mA or 4.6 to 5 mA
Response retardation	< 4 sec.
Response hysteresis	20% of response value
Output contact assemblies	one voltage-free SPDT contact one 12 V DC, 200mA max Remote Indicator output analog and digital display indicator output
Rated contact voltage	250 V/24VDC
Make capacity	4A AC/ 4A DC
Break capacity	
at 24 V DC and L/R = 0	4 A
Switching life (240 V AC / 60 Hz)	10^5 cycles
Operation mode	continuous
LIM overload protection	built-in thermal overload with automatic reset
Ambient temperature	
when operating	+32 °F to +122 °F 0 °C to +50 °C
when stored	-13 °F to +158 °F -25 °C to +70 °C
Mounting orientation	any
Connector	15 pin Molex, type 03-09-2152
Weight	approx. 1.53 lb

MK2000 -G1/-G2, MK2000P -G1/-G2, & MK2000CBM

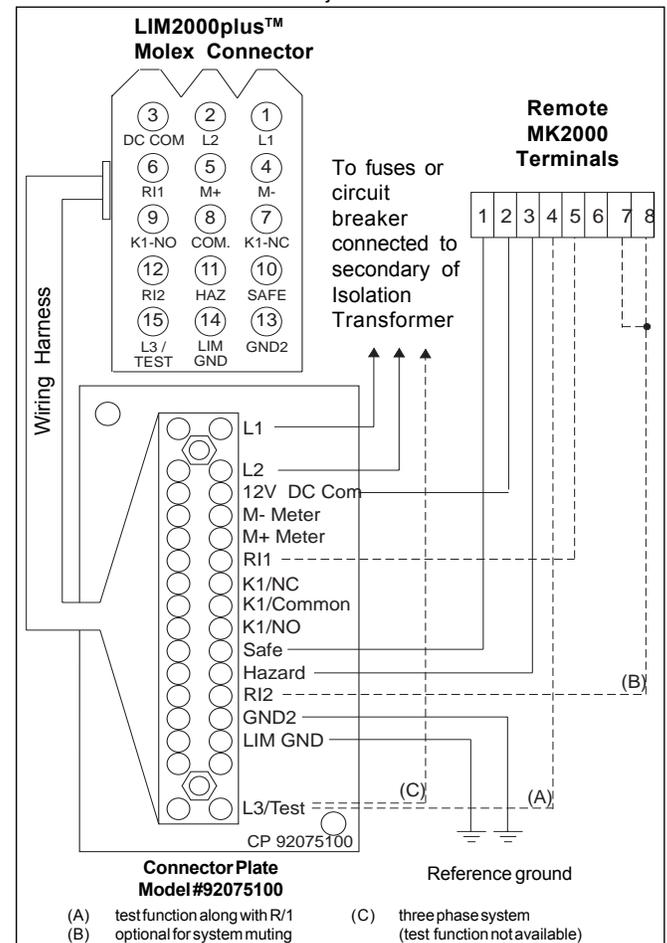
Operating voltage	12V DC / 12V AC
Max. current	40 mA
Operation class	continuous operation
Ambient temperature	
when operating	+32 °F to +122 °F 0 °C to +50 °C
when stored	-13 °F to +158 °F -25 °C to +70 °C
Connection	screw terminal block
Max. conductor size	18 AWG stranded
Mounting	by screws
Weight	
MK2000-G1 & MK2000P-G1	0.25 lb
MK2000-G2 & MK2000P-G2	0.32 lb
MK2000CBM-G2	0.32 lb

Physical Details

The LIM is less than 2-1/2" deep. Cut-out needed for new panel mounting is 7" x 4-7/16" (+0, -1/32"). Cut-out needed for retrofit panel mounting is 5-3/8" x 3-1/4" (+0, -1/32"). Mounting holes are on 4" and 6-1/2" centers.

A 15-pin female Molex connector is built into the back of the LIM2000plus™. A connector plate assembly with 15" cable and 15-pin male Molex connector is available to facilitate field wiring.

The audible alarm sound level adjustment is available via menu.



LIM2000plus™ Data Logger Equipment

LIM2000plus™ Data Logger for LIM2000CB



Data Logger

The data logger package consists of the following components:

- iPAQ PDA
- Serial communication converter
- Cables
- Manual
- Software
- Carrying case

An optional retrofit kit is available for existing applications. The task can be completed in less than one hour. Detailed instructions are included with the kit.

Record trends

Track equipment usage

Establish time dependence between alarm events and OR equipment usage

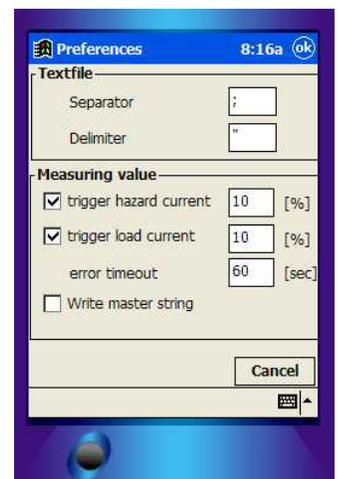
Compare leakage current profile for different OR activities

Use as stand-alone PDA for contact management, scheduling, appointments, etc

Programming Flexibility:

- Selection of logging and reading modes
- Manual start/stop of data logging
- Real-time display of THC and load current
- Writing and reading of log files
- Memo entry for each log file
- Predefined MS Excel sheet for data analysis and graphical display
- Time and date stamp of logged records
- Sampling of THC and/or load current based on % change setting

Note: Load current sensing is an optional feature of the LIM2000CB



Digital Clock / Elapsed Timer ZT 1490

Product Description

The Clock/Elapsed Timers are complete microprocessor based units that displays both time of day and elapsed time information. The ZT1490 has a dual row 4 digit digital 7 segment display with large bright red LED characters that are easily read in high ambient light. A Master/Slave Clock configuration is possible. With this arrangement, the time of day is set at the Master Clock. Only one Clock can serve as a Master.

The BENDER ZT1490 operates independent of line frequency. These units have 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 Clock/Elapsed Timer itself, from the remote control accessory or an external contact (code blue or other monitoring output). A count may be interrupted, resumed and reset at the Clock/Elapsed Timer itself or externally with the remote MK1450. The remote MK1450 is optional and has the same button functions as the ZT1490.

Operational Information Clock

The ZT1490 has a dual row digital 7 segment LED display. The displays indicate the time of day and elapsed time. Use a reference clock to set the time of day in hours and minutes.

Similar buttons on the ZT1490 and on the Remote Control MK1450 and MK1450C are used to set the time.

In the Master/Slave configuration, the time setting can only be done at the master clock.

Operational Information Timer

The timer display on the ZT1490 is off when no timing procedure has been initiated.

Similar buttons on the ZT1490 and on the Remote Control MK1450 are used to set the timer.

Clock/Elapsed Timer & Accessories

Type	Model No.
Clock/Elapsed Timer	ZT1490
Remote Control	MK1450-G1
Remote Control	MK1450-G2
Connector Plate	927775



Clock / Elapsed Timer ZT1490

- UL recognized
- Overload protection with automatic reset
- Microprocessor design with special quartz timing circuitry for ultimate stability and repeatability
- No harness between PC boards, potential for maintenance at board level
- Power outage backup for minimum 24 hours, no batteries
- Protected against HF interference and transient voltages
- Code blue output
- Serial bus RS485, with a twisted pair shielded cable
- Up to 32 Clock/Elapsed Timer (ZT1490/1491) and/ or Surgical Chronometer (ZT1494) can be connected in a Master/Slave arrangement, via approximately 3200 feet of cable

Digital Clock / Elapsed Timer ZT 1491



**Clock / Elapsed Timer ZT1491-RSV
(Contains (2) ZT1491 units)**

- UL recognized
- Overload protection with automatic reset
- Microprocessor design with special quartz timing circuitry for ultimate stability and repeatability
- No harness between PC boards, potential for maintenance at board level
- Power outage backup for minimum 24 hours, no batteries
- Protected against HF interference and transient voltages
- Code blue output
- Serial bus RS485, with a twisted pair shielded cable
- Up to 32 Clock/Elapsed Timer (ZT1490/1491) and/or Surgical Chronometer (ZT1494) can be connected in a Master/Slave arrangement, via approximately 3200 feet of cable

Product Description

The Clock/Elapsed Timers are complete microprocessor based units that display either time of day or elapsed time information. The ZT1491 has a large 7 segment display with large bright red LED characters that are easily read in high ambient light. A Master/Slave Clock configuration is possible. With this arrangement, the time of day is set at the Master Clock via the remote control MK1450. Only one Clock can serve as a Master.

The BENDER ZT1491 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 MK1450 or an external contact (code blue or other monitoring output). A count may be interrupted, resumed and reset at the remote control MK1450.

Operational Information Clock

The ZT1491 has a single row digital 7 segment LED display. The clock can only be set when the ZT1491 is in the clock mode. Use a reference clock to set the time of day in hours and minutes.

Buttons on the Remote Control MK1450 and MK1450C are used to set the time.

In the Master/Slave configuration, the time setting can only be done at the master clock.

Operational Information Timer

The Elapsed Timer can be set only when the ZT1491 is in the Elapsed Timer Mode.

The timer may be activated by the Remote Control MK1450 and MK1450T or an external contact (code blue or other monitoring output).

Clock/Elapsed Timer & Accessories

Type	Model No.
Clock/Elapsed Timer	ZT1491
Remote Control	MK1450 - G1
Remote Control	MK1450 - G2
Remote Control	MK1450C - G1
Remote Control	MK1450T - G1
Connector Plate	927776

Surgical Chronometers

ZT 1494

Product Description

The Surgical Chronometer ZT1494 is a complete microprocessor based unit that displays time of day and three elapsed timers. The unit has four digit digital 7 segment displays with large bright red LED characters that are easily read in high ambient light. A Master/Slave Clock configuration is possible. With this arrangement, the time of day is set at the Master Clock. Only one Clock can serve as a Master.

The BENDER ZT1494 operates independently of line frequency. The unit has a unique power backup system 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.

Each timer may be activated from the remote control accessory or an external contact (code blue or other monitoring output). A count may be interrupted, resumed, and reset with the remote MK1454.

Operational Information Clock

The ZT1494 has four digital 7 segment LED displays. The left display indicates the time of day. Use a reference clock to set the time of day in hours and minutes.

Buttons on the Remote Control MK1454 are used to set the time.

Operational Information Timer

The three timer displays on the right side are always "ON".

The timer may be activated by the Remote Control MK1454 or an external contact (code blue or other monitoring output).

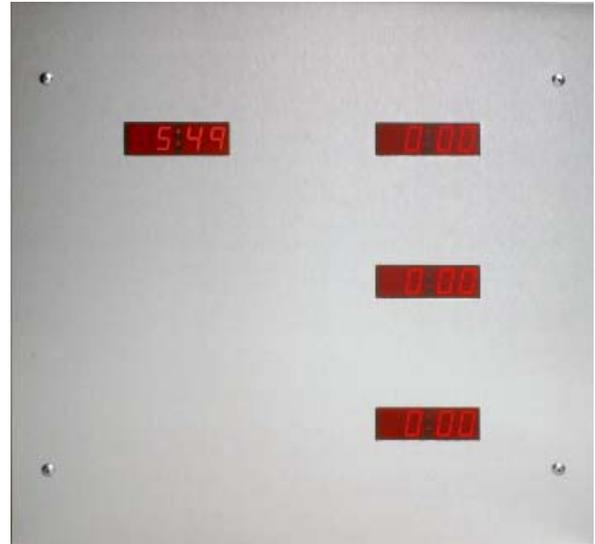
Design Description

The Surgical Chronometer ZT1494 is mounted in a steel wallbox of 18 1/2" (W) x 20" (H) x 6" (D). Connections are made to a 40+1-pole terminal strip on the backside of the stainless steel frontplate. There are no protruding switches on the frontplate.

The 12/24 hour display mode is easily changed by means of a dip switch located on the PC Board inside the unit.

Surgical Chronometer & Remote Control

Type	Model No.
Surgical Chronometer	ZT1494
Remote Control	MK1454
Connector Plate	927775/6



Surgical Chronometer ZT1494

- UL recognized
- Overload protection with automatic reset
- Microprocessor design with special quartz timing circuitry for ultimate stability and repeatability
- No harness between PC boards, potential for maintenance at board level
- Power outage backup for minimum 24 hours, no batteries
- Protected against HF interference and transient voltages
- Code blue output
- Serial bus RS485, with a twisted pair shielded cable
- Up to 32 Clock/Elapsed Timer (ZT1490/1491) and/or Surgical Chronometer (ZT1494) can be connected in a Master/Slave arrangement, via approximately 3200 feet of cable

Isolated Power Systems Test Kit LT2000



LT2000 Test Kit

Equipment

The LT2000 Test Kit comes in an industrial grade case which contains the following items:

- (1) BENDER CT1000 Current/Leakage Tester
 - (1) BK or Amprobe Precision Multimeter
 - (1) BENDER Polarity Tester
 - (1) BENDER FS100 Frequency Shaper
 - (2) BENDER RA-T1xS1 Receptacle Adapter
 - (1) BENDER RA-S1xBJ Adapter
 - (1) 50' #10 Highly Flexible Wire w/Shielded Banana Plug
 - (3) 48" Black Test Lead w/Clip & Shielded Banana Plug
 - (1) 48" Green Test Lead w/Clip & Shielded Banana Plug
 - (2) 48" Multimeter Test Lead Patch Cord
 - (1) Multimeter Test Lead Set w/Clip and Probe
- Complete Check Out Kit
 - Easy Guide via Manual
 - Used by certified ISOTROL SYSTEMS technicians
 - Allows complete testing by own service personnel
 - Savings in time and expense
 - Two year warranty

Product Description

The BENDER Isolated Power Systems Test Kit LT2000 was developed to aid factory authorized technicians checking out newly installed Isolated Power Systems. It is also a valuable tool for check outs on existing Isolated Power Systems which have to be approved during regular intervals. The variety of included measuring instruments and accessories supplied with the LT2000 test kit make it useable for other applications. The tests necessary for an Isolated Power System check out include: Voltage, Panel Leakage, Branch Circuit Leakages, Line Isolation Monitor trip level, Receptacle Polarity, Conductive Surface Potential Difference and Ground Continuity.

Operational Information

The various tests often require the combined use of two or more components of the LT2000 Test Kit. BENDER provides a manual with step by step instructions for the required tests. The manual also includes test related drawings which show in a clear way how the devices have to be connected to an Isolation Power System for getting optimal results.

Standards

The LT2000 is used to determine compliance with the test requirements of Chapter 3 : Electrical Systems in NFPA 99 Standard for Healthcare Facilities. The Impedance of the isolated wiring is measured as per section 3-3.2.2 : Isolated Power Systems. The functional response of the Line Isolation Monitor (LIM) is checked visually, audibly, and by measurements.

Section 3-3.3 Performance Criteria and Testing applies to patient care areas and allows for the determination of the effectiveness of the grounding circuit in each electrical receptacle by voltage and impedance measurements. The correct polarity of each isolated power system receptacle is confirmed. Tests are performed to ensure proper functioning of the LIM circuit.



Isolated Power Systems Test Kit LT2000 Components

■ AMP Probe



■ Polarity Tester



■ CT100



■ FS100



■ RA-T1xS1 Receptacle Adapter



■ RA-S1xBJ



■ 50' Highly Flexible Wire



■ Black Test Leads



■ 48" Multi Meter Test Lead Patch Cord



■ 48" Green Test Lead



■ 48" Multi Meter Test Lead Set w/Clip & Probe



LIM / GFCI Tester LT3000

Product Description

NFPA 99 requires that LIM and GFCI tests be conducted at regular intervals. The LT3000 is an effective and versatile portable test instrument for doing this.

Simply plug it into any wall outlet up to 240V, 50 or 60Hz. Run a simple pretest to confirm the integrity of the isolated system and to give assurance that the system is properly grounded. The LCD meter normally displays system voltage. In the LIM/GFCI test mode, adjust the current until it reads 2, 5, or 6 mA on the LCD display. Alternately push L1 and L2 to confirm that the LIM or GFCI is working correctly.

Standards

NFPA 99, section 3-4.2.3.3.2 states for ISOLATED POWER: "The Line Isolation Monitor shall not alarm for a fault hazard current of less than 3.7 milliamperes."

NFPA 99, section 3-5.2.3.3.1 states for GROUNDED POWER: "If GFCIs are used, a device or component that cause 6 milliamperes to flow to ground shall be momentarily connected between the energized conductor of the power distribution circuit being protected and ground, to verify that the GFCI does indeed interrupt the power."

Operational Information

When the LT 3000 is plugged in, it will enter the pretest mode. The display will indicate the system voltage, the "V" LCD will be lit and the PRETEST LCD (Hazard Current) will light. If the L1 or L2 button is pushed, the system leakage on each line will be indicated in mA (milliamperes). Pushing the top push button (mode selector push button) will get the unit in the compliance test mode and the "LIM/GFCI" LED will light.

Depress and hold the Set Current button and adjust the current knob (potentiometer) until the desired milliamperes setting is displayed. The set current button can be released. Pushing the L1 or L2 button will cause the LIM to indicate the desired leakage.

LIM and GFCI Tester

Type	Model No.
LIM & GFCI Tester	LT3000



Line Isolation Monitor and GFCI Tester LT3000

- Wide range of system voltage 100 to 240V
- LIM and GFCI testing
- Large LCD digital display
- Overload protection with automatic reset
- Easy to clean rugged lexan front foil
- System leakage measurement
- Twist-to-Lock adapter
- Light weight (less than 1 lb.)

POWER AND GROUNDING MODULES

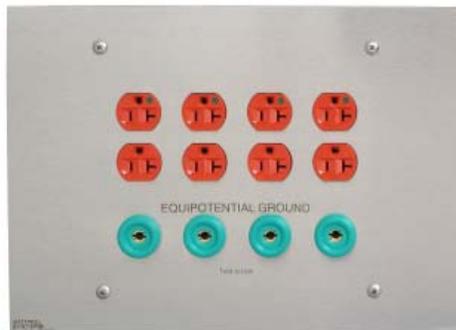
- **Applications**
Hospital Grade Outlet Devices for the Supply of Portable Equipment

- **Features**
 - Hospital Grade Power Receptacles
 - Hospital Grade Ground Jacks
 - Aluminum or Copper Ground Buses

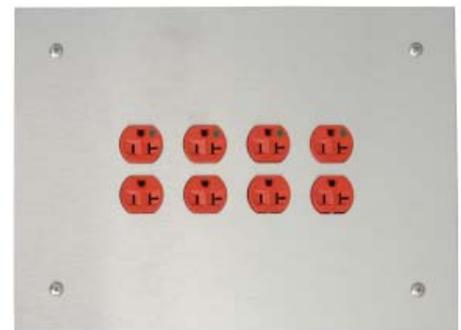
- **Mounting**
Available for flush or surface mounted applications

- **Standards**
UL Listed Product (UL1047)
CSA Listed Product (CSA Z32.2)

- **Warranty**
Industry's first 5 year limited warranty



Receptacle Ground Module
RGM



Receptacle Module
RM



Patient Ground Module
PGM



Master Ground Module
MGM



POWER AND
GROUNDING
MODULES

HOSPITAL GROUND CORDS

HOSPITAL GROUND JACKS

- **Applications**
Hospital Grade Devices
for the supply of
portable equipment
- **Features**
 - Hospital Grade Ground
Cords
(various lengths available)
 - Hospital Grade Ground
Jacks
- **Standards**
UL Listed Product (UL1047)
CSA Listed Product (CSA Z32.2)
- **Warranty**
Industry's first 5 year
limited warranty

**Hospital Grade Ground Jack
HGJ**



**Hospital Grade Ground Cord
HGC**



**Hospital Grade Ground Cord
HGL**



X-RAY / LASER RECEPTACLE MODULE

- **Applications**
Receptacle Modules with flush or surface mounted receptacles for use with X-Ray / Laser Power Centers
- **Mounting**
Available for flush or surface mounted applications
- **Options**
Available with:
 - Door Contacts
 - "IN USE" Lamp
 - BENDER LIM Remote Indicators
- **Advanced Technology**
The BENDER LIM Remote Indicators comply with the latest UL Standards
- **Standards**
UL Listed Product (UL1047)
CSA Listed Product (CSA Z32.2)
- **Warranty**
Industry's first 5 year limited warranty



X-Ray/Laser Receptacle Module
XRM / LRM

REMOTE ANNUNCIATOR STATION

- **Applications**
Multiple LIM Remote Indicators for central monitoring of Isolated Power Systems
- **Mounting**
Available for flush or surface mounted applications
- **Advanced Technology**
The BENDER LIM Remote Indicators comply with the latest UL Standards
- **Standards**
UL Listed Product (UL1047)
CSA Listed Product (CSA Z32.2)
- **Warranty**
Industry's first 5 year limited warranty



**Remote Annunciator Station
RAS**

REMOTE CONTROL STATION

- **Applications**

Remote Control and Monitoring Station for X-Ray / Laser Isolated Power Centers with Programmable Logic Controller (PLC)

- **Mounting**

Available for flush or surface mounted applications

- **Advanced Technology**

The BENDER LIM Remote Indicators comply with the latest UL Standards

- **Standards**

UL Listed Product (UL1047)
CSA Listed Product (CSA Z32.2)

- **Warranty**

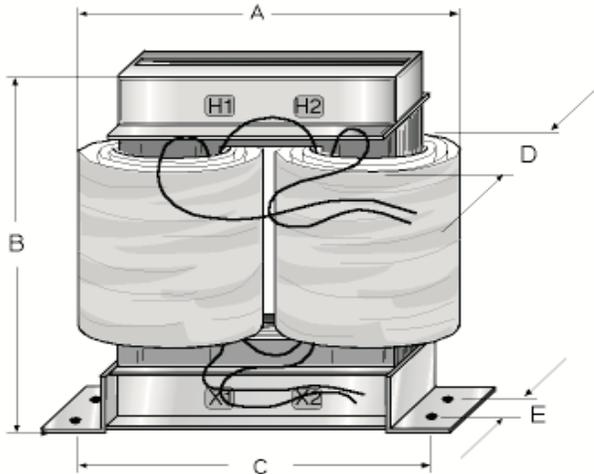
Industry's first 5 year limited warranty



Remote Control Stations
RCS

Isolation Transformers

Transformer Dimension Diagram



Dimension Table (inches)

kVA	A	B	C	D	E
3.0	14.0	13.25	12.0	3.5	2.5
5.0	14.0	15.0	12.0	4.0	2.5
7.5	16.0	15.0	15.25	4.5	2.125
10.0	14.0	14.0	12.0	6.0	4.5
15.0	15.0	17.75	13.25	6.5	5.0

Technical Data

kVA	Leakage current *		Noise dB	% Reg.		Wt. Lb.
	120V sec.	208~277V sec.		Imp.	Reg.	
3.0	12	18	25	3.75	3	65
5.0	20	30	25	3.60	2.6	85
7.5	22.5	33.5	30	3.50	2.6	110
10	25	37	35	4.10	2.6	170
15	30	40	35	4.10	2.6	170

*Maximum Leakage Current (Micro Amps)

Single Phase Low Profile

Product Description

These transformers provide extremely low noise and low leakage. (less than 50 microamps.) This makes them particularly suitable for use in Isolated Power Systems. Such systems find wide usage in critical care areas as ORs, ICUs, CCUs, etc. where an extra layer of electrical safety is desirable.

Suggested technical specifications

- Single phase, 50 or 60 Hz, with primary and secondary voltages as indicated on the contract drawings.
- Class H rated insulation
- Electrostatic shield between primary and secondary windings grounded to enclosure.
- Electrostatic shield designed in a way to prevent direct shorting of primary to secondary windings, and reduce the coupling of harmonic distortions between primary and secondary circuits.
- Core and coils isolated from enclosure by means of suitable vibration dampening system.
- Total leakage current to ground from transformer secondary winding in compliance with UL1047, tables 30.1 and 30.2 and CSA Z32.2.
- Maximum sound level of transformer: 25 dB for units 5KVA or less, 30dB for 7.5KVA, 35dB for 10 - 15KVA units.
- Temperature rise limited to 115 degree C above ambient under full load conditions.
- Transformer UL and CSA recognized as a component, at the voltages, amperages and KVA ratings required.

Contact factory for information on three phase transformers



Recognized

Hospital Reference List

United States (Partial List)

State	Hospital Name	City
AZ	Desert Vista Hospital	Mesa
AZ	St. Joseph's Hospital & Medical Center	Phoenix
AZ	Tuscon Medical Center	Tuscon
CA	Corcoran Prison Hospital	Corcoran
CA	Roseville Hospital	Roseville
CA	St. Agnes Hospital	Fresno
CO	Vail Valley Medical Center	Vail Valley
FL	Baypoint Medical Center	St. Petersburg
FL	HCA Gulf Coast Hospital	Panama City
FL	Humana Hospital	Plantation
FL	Miami Children's Hospital	Miami
FL	Mt. Sinai Medical Center	Miami Beach
FL	North Broward Medical Center	Pompano Beach
FL	South Miami Hospital	Miami
FL	Tampa Bay General Hospital	Tampa
FL	VA Medical Center	West Palm Beach
FL	West Florida Hospital	Pensacola
HI	Kapiolani Medical Center	Honolulu
HI	The Queen's Medical Center	Honolulu
IL	John H. Stroger Jr. Hospital of Cook County	Chicago
IN	Lutheran Hospital	Fort Wayne
IN	VA Medical Center	Indianapolis
KY	Norton Hospital	Louisville
KY	University of Kentucky	Lexington
LA	Dauterive Hospital	New Iberia
LA	Christus Schumpert Medical Center	Shreveport
LA	St. Charles Hospital	Baton Rouge
MA	Brigham Young & Women's Hospital	Boston
MD	Shadygrove Adventist Hospital	Clinton
MI	Detroit Receiving Hospital	Livonia
MI	Mercy Hospital	Muskegon
MI	Oakwood Hospital	Dearborn



Vail Valley Medical Center



The Queen's Medical Center

Hospital Reference List

United States (Partial List)

State	Hospital Name	City
MI	St. Joseph Mercy Hospital	Pontiac
MI	St. Mary's Hospital	Grand Rapids
MI	University of Michigan Hospital	Ann Arbor
MN	Regions Hospital	Minneapolis
MO	Alexian Brothers Hospital	St. Louis
NC	Carolina Medical Center	Charlotte
NC	Duke University	Durham
NC	Moses Cone Hospital	Greensboro
NC	UNC Hospital	Chapel Hill
NC	Wake Medical Center	Raleigh
NY	Methodist Hospital	Brooklyn
NY	Rochester General Hospital	Rochester
NY	VA Medical Center	Albany
NY	Westchester County Medical Center	Vahalla
NY	WCA Hospital	Williamsville
OH	Akron Children's Hospital	Akron
OH	Cleveland Clinic	Cleveland
OK	St. John Medical Center	Tulsa
SC	Anderson Area Medical Center	Anderson
TN	Cookeville Regional Hospital	Cookeville
TN	River Regional Hospital	Nashville
TX	Baptist Medical Center	San Antonio
TX	Marshall Memorial Hospital	Marshall
TX	Plano Surgery Center	Plano
TX	Plaza Medical Center	Ft. Worth
TX	San Angelo Community Hospital	San Angelo
TX	University of Texas Medical School	Dallas
UT	American Fork Hospital	American Fork
VA	VA Medical Center	Salem
WI	St. Clair Hospital	Baraboo
WI	Shawano Community Hospital	Shawano
WI	VA Medical Center	Milwaukee



Regions Hospital



American Fork Hospital

Hospital Reference List

Other Countries (Partial List)

Country	Hospital Name	City
Canada	Brockville Regional Hospital	Brockville
Costa Rica	CIMA	San Jose
Grenada	St. George's New Hospital	St. George
Korea	Seo Dong Hospital	Seoul
Puerto Rico	Hospital La Concepcion	San Juan
Saudi Arabia	King Fahad Medical City	Riyadh
Taiwan	Kaosiung Medical University	Taipei
Venezuela	Caracas Hospital	Caracas



St. George's New Hospital

Additional Products Available from the BENDER Group



Isolated Power Systems

ISOTROLSYSTEMS and ISOLATION SYSTEMS Products, both divisions of the BENDER GROUP, offer a complete line of Isolated Power Panels and accessories built and engineered to stringent quality control standards and in full compliance with UL and CSA requirements.



Unimet 1100ST Electrical Safety Analyzer

Tests are conducted in accordance with ANSI/AAMI, IEC and other National and International Standards. Available with bar code reader and keyboard. The data can be uploaded into a Windows' based PC for access by sophisticated but user friendly equipment management software.



EDS Fault Location Systems

For fault location, Isolated Power Systems can be equipped with an EDS system. Faulty branches can be indicated without power interruption.



President - Mr. Christian D. Bender

Today our vision has become a reality. With full commitment and the ability to assert ourselves, we pursue the objective to be the world market leader in electrical safety products.



The BENDER Inc. Facility

Our know how and the competency of our employees assure that you have put your trust in the right partner.



Overseas Production Facilities

Modern production facilities and thorough testing are the basis for quality products with a long mechanical life.



Seminar Group

Together we develop innovative solutions to meet the demands of our customers.

BENDER Medical Products

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