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**IMU-II/s
Hazardous
Locations
Installation
Manual
(Abridged edition)**



MERCURY INSTRUMENTS
SERVING THE GAS INDUSTRY WORLDWIDE

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It is standard procedure that Mercury Instruments provides one copy of this document with each IMU-II/s product shipped. In the interest of safety, Mercury Instruments will provide additional printed copies upon request for a nominal charge. Electronic copies may also be available for downloading from the Mercury Instruments web-site at www.mercuryinstruments.com. Requests for electronic or printed copies of this manual can be addressed to:

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CHAPTER ONE: INTRODUCTION TO THE MANUAL

PURPOSE OF MANUAL

This document is an abbreviated form of the main 900319 installation manual, with the intent that it is to be used as a reference during the field installation of the IMU-II/s product. Necessary information is provided to guide the Technician through the installation steps, with special emphasis on compliance and safety at hazardous site locations. As required by the U.L. listing, one copy of this manual is provided with each individual IMU-II/s unit shipped. The main installation manual (No. 900319) contains additional information pertaining to configuration steps, trouble-shooting, warranty details, etc. Typically, at least one copy of the 900319 manual is shipped with each order, and then at a ratio of one manual per twenty IMU-II/s units shipped for larger orders.

Mercury Instrument's Industrial Metering Unit Model-II Serial module is designed to operate within Class I, Division 2, Groups A, B, C, and D locations as specified by the National Electric Code (NEC) 500-5(b). The installation instructions contained within this manual must be followed as stated without deviation to ensure compliance with the UL approved listing.

PRODUCT DESCRIPTION

The Industrial Metering Unit Model II/Serial (IMU-II/s) is the remote solid state recorder portion of a reliable automatic data collection system. The IMU-II/s is designed to collect pulse data from up to two inputs and store the data as a function of time (time-tagged interval data). The pulse data detected on these two inputs is also stored in an accumulator register and can be used to track a meter index. The IMU-II/s has 32K bytes of RAM which will allow 70 days of data storage when collecting 15 minute data from two inputs. The IMU-II/s will attempt to call the central computer when its memory is 75% full (52.5 days when collecting 15 minute data) so that no data will be overwritten and lost. This information is stored at the central computer where it is available for analysis and display.

At a preprogrammed time, or when an alarm is detected, the IMU-II/s dials the central computer and transfers the collected information plus any alarm data via standard telephone lines. If the IMU-II/s is unable to successfully complete the call, it will go into its predetermined call retry mode and attempt to communicate the data to the host computer at a later time.

The IMU-II/s can also be used as a modem to remotely access field data collection devices (Data Terminal Equipment [DTE] such as electronic correctors, flow computers, etc.) that have an RS-232 channel. The IMU-II/s is capable of communicating at rates of 300, 1200, and 2400 bits/sec.

The IMU-II/s can also be controlled by the DTE device using AT compatible commands. The DTE can awaken the IMU-II/s using the DTR control line and then use AT commands to force the IMU-II/s to dial and connect with a host modem.

DUAL PORT IMU-II/S

The Dual Port IMU-II/s consists of the standard IMU-II/s with the optional Serial Port Multiplexer (SPM) installed. The SPM plugs into the IMU-II/s input terminal block and allows a single IMU-II/s to communicate with two DTE devices via their RS-232 ports. Both the DTE serial ports can be individually addressed from the host modem by sending a port select command to the IMU-II/s.

Note: To enable dual port functionality, it is also necessary to configure the IMU-II/s properly via the Mercury Instruments configuration software and programming cable.

US TELECOM SAFETY NOTIFICATIONS

This equipment complies with Part 68 of the FCC rules. On the front of this equipment is a label that includes the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most areas, the number of RENs should not exceed five (5.0). To determine the number of RENs that may be connected to the line in a calling area - (maximum REN) - contact the telephone company.

This equipment uses the following USOC jacks: RJ11C.

This equipment is designed to connect to the telephone network or premises wiring using a compatible modular jack that is Part 68 compliant. If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the telephone company will notify you as soon as possible. Also, you will be advised of your right to file a complaint with the FCC.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service. If trouble is experienced with this equipment, please contact Mercury Instruments Technical Support at (800) 327-8559 for repair and warranty information. If the trouble is causing harm to the telephone network, the telephone company may ask you to remove the equipment from the network until the problem is resolved.

CANADIAN TELECOM SAFETY NOTIFICATIONS

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements documents. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION

Users should not attempt to make such connections themselves, but instead should contact the appropriate electric inspection authority, or electrician, as appropriate.

Use only Canadian telecom jack type CA11A when connecting to the telephone network. The Ringer Equivalence Number (REN) of this device is 0.3B.

NOTICE: The **Ringer Equivalence Number (REN)** assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination of an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.0B.

IMPORTANT SAFETY INSTRUCTIONS

When using your telephone equipment, basic safety precautions should always be observed to reduce the risk of fire, electric shock and injury to persons, including the following:

1. Read and understand all instructions.
2. Follow all warnings and instructions marked on the product.

3. This product should be operated only from the type of power source indicated on the marking label.
4. To reduce the risk of electric shock, do not disassemble this product, but return it to Mercury Instruments when service or repair work is required. Incorrect reassembly can cause electric shock when the unit is subsequently used.

FCC PART-15 NOTIFICATION

This equipment has been tested and found to comply with the limits for a Class-B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for assistance.

Any changes made by the user and not approved by Mercury Instruments, LLC. could possibly void the user's authority to operate the equipment.

LIST OF ABBREVIATED TERMS:

AWG	American Wire Gauge.
CSA	Canadian Standards Association.
DTE	Data Terminal Equipment.
ECAT	Electronic Corrector with Audit Trail. (Mercury Instruments, LLC)
FCC	Federal Communications Commission.
IC	Integrated Circuit.
IMU-II/s	Industrial Metering Unit Model II/Serial.
LED	Light Emitting Diode. (Five LED indicators are provided on the IMU-II/s.)
MODEM	Acronym for 'Modulator / Demodulator', most commonly referring to a device that exchanges digital data over phone lines.
'ms'	Milliseconds, unit of time where 1ms = 0.001 seconds.
REN	Ringer Equivalence Number.
SPM	Serial Port Multiplexer circuit board.
U.L.	Underwriters Laboratories Inc.

CHAPTER TWO: PRE-INSTALLATION STEPS

INTRODUCTION

This chapter outlines the necessary materials and the preliminary steps that must be completed before the installation can be performed. Please review this section before going to the field.

LIST OF MATERIALS

This section lists the materials which are provided by Mercury Instruments, and the materials which the Customer must provide before installation of the IMU-II/s in the field. Figure 2-1 illustrates the lithium battery powered IMU-II/s that has only dry contact closure connections. Figure 2-2 illustrates the lithium battery powered IMU-II/s having both dry contact closure connections and a serial cable connection (Note the additional conduit pipe fitting). Figure 2-3 illustrates the optional Serial Port Multiplexer circuit board.

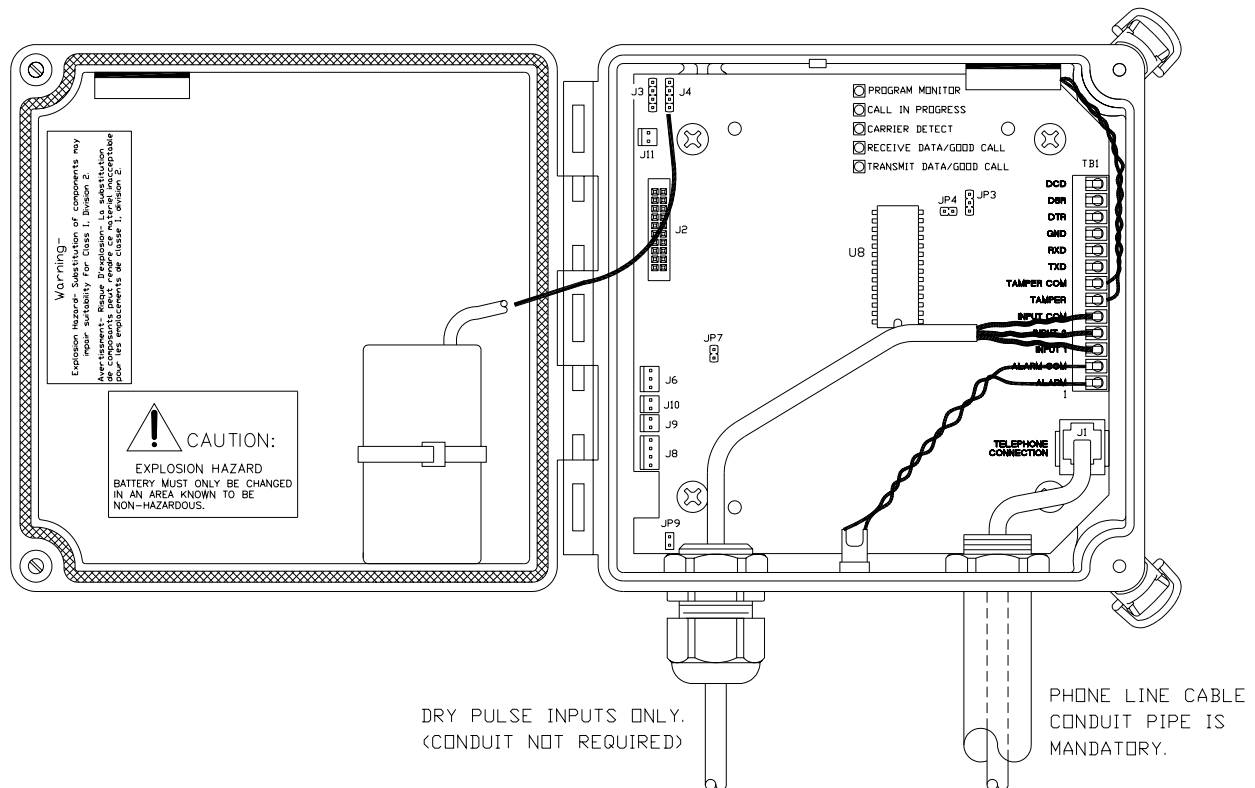


Figure 2-1.
IMU-II/s with Pulse Inputs.

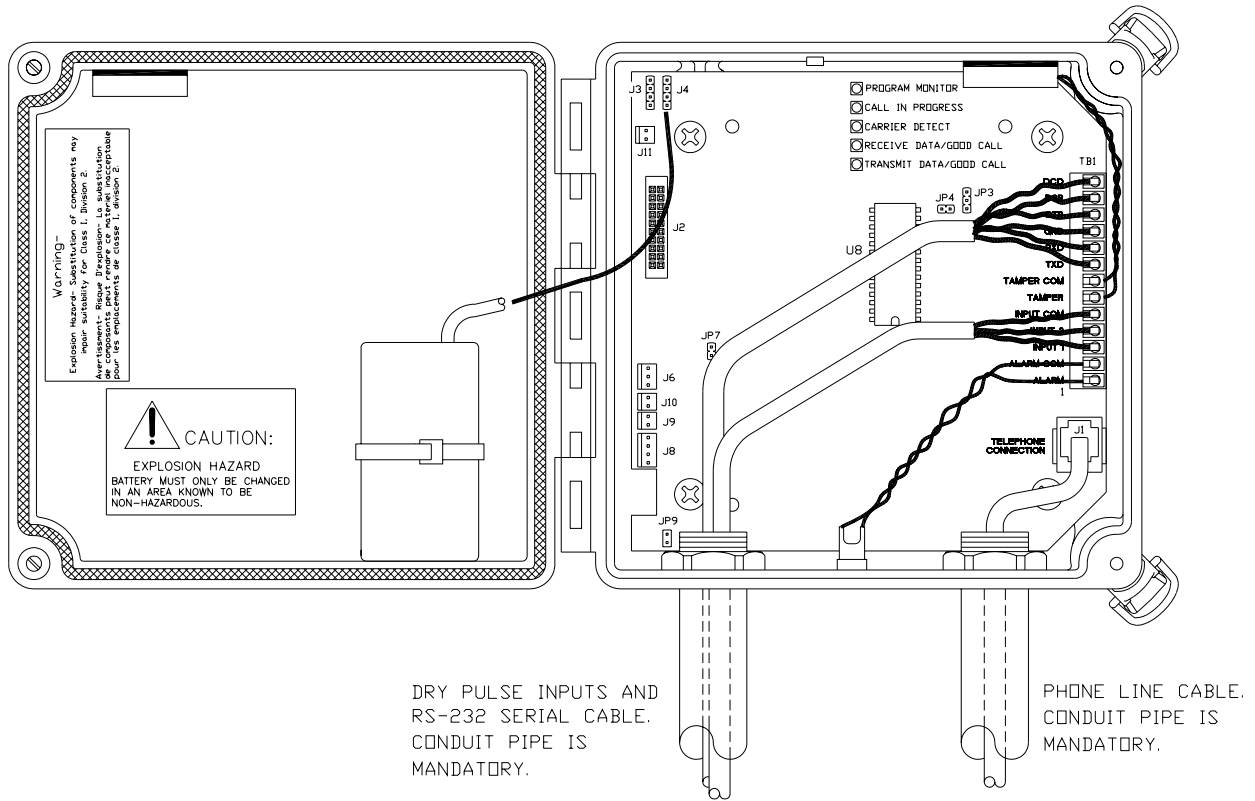


Figure 2-2.
IMU-II/s with Pulse & RS-232 Connections.

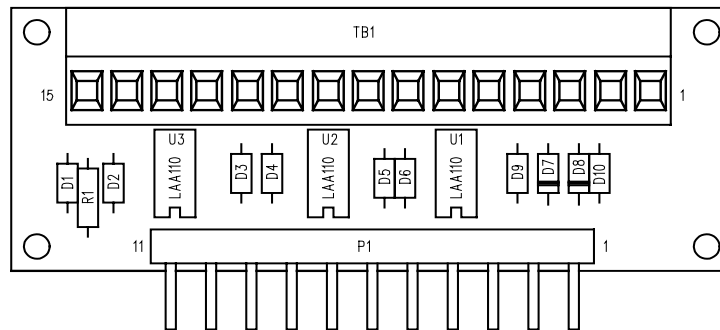


Figure 2-3.
Optional Serial Port Multiplexer.

NOTE

When installing the Serial Port Multiplexer onto the terminal block of the IMU-II/s, the 11 pins must be secured into positions 3~13 of the terminal block. Reference Figure 3-5 for an assembly illustration.

Before leaving for the field, it should be verified that the materials listed below have been collected:

Materials Provided by Mercury Instruments:

1. Mercury Instruments IMU-II/s unit.
2. Serial Port Multiplexer board (optional).
3. Lithium Battery Pack, Mercury Instruments Stock No. 1011-0022B-001.
4. TII telephone line station protector, Model 325.

Additional Materials Purchased from Mercury Instruments:

1. One Mercury Instruments Serial Interface Cable – Mercury Instruments Stock No. 1002-0151C-001.
2. One copy of the Mercury Programmer Software 'MP-32'. This software is used in conjunction with a laptop PC and Serial Interface Cable to configure IMU-II/s.

Materials Provided by the Customer:

1. Cables
 - For connecting earth ground to the TII telephone line station protector;
Recommend: Insulated, No. 12 AWG solid copper, green wire.
 - For connecting the IMU-II/s to the TII telephone line station protector and the telephone network interface;
Recommend: 24 AWG, 4 connector solid phone cable (Carol p/n: C4424).
RJII telephone plugs (KYCON P/N MP 64R-5000S).
 - For connecting the IMU-II/s to the DTE's serial port;
Recommend: 3 conductor insulated shielded cable, stranded, 20 AWG,
Alpha p/n: 35463.
or
4 conductor insulated shielded cable, stranded, 20 AWG ,
Alpha p/n: 35464.
 - For connecting alarm switches to IMU-II/s alarm inputs;
Recommend: 2 conductor insulated cable, stranded, No. 20 AWG
Alpha p/n: 1172.
2. One IBM PC compatible laptop computer with a standard RS-232 serial port;
Note: Used during the configuration process for the IMU-II/s.
3. Metal conduit pipe (trade size 1/2"), along with adaptor fittings as necessary.

LIST OF TOOLS

1. Miniature flat blade screwdriver (1/8 inch) for accessing the terminal strip.
2. A digital voltmeter.
3. Telephone test set.
4. Wire strippers and cutters capable of stripping a 12-24 AWG wire.
5. RJ-11 plug installation tool - AMP Incorporated Part No. 1-231652-0.

OBTAIN A LIST CONTAINING SITE INFORMATION

A list containing the following information will be useful for each IMU-II/s being installed in the field:

- Phone number of the central computer site.
- Customer's address/meter location.
- The IMU-II/s enclosure serial number.
- Utility's account billing number.

CAUTION:

**This unit does not work on digital phone systems.
Connection to a digital phone system could damage the unit.**

HAZARDOUS AREA INSTALLATION

The IMU-II/s is classified as a nonincendive device. As such, the IMU-II/s can be installed in a Class I, Division 2, Group A, B, C, or D hazardous area when all procedures in this manual are followed, and all wiring is in accordance with the control drawing #401073 as shown in Appendix - C.

The IMU-II/s is not classified as intrinsically safe, and is therefore **not permitted** to be installed in a Class I, Division 1 hazardous area.

Throughout this manual, references are often made to 'Hazardous' and 'Non-Hazardous' locations. For the duration of this manual, a 'Hazardous' location will imply a Class I, Division 2, Group D area, and a 'Non-Hazardous' location is an area classified as having no risk for gaseous vapor leakage or explosion potential.

CHAPTER THREE: FIELD INSTALLATION

INTRODUCTION

This chapter explains how to install the IMU-II/s in the field. Appendix - A of this document provides additional specifications pertaining to the IMU-II/s device.

NOTE

If installing a UL Listed IMU-II/s in a Class I, Division 2 area, follow the Division 2 wiring method as specified in Section 501-4(b) of the National Electric Code (NEC), NFPA, 70.

WARNINGS

- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never install telephone wiring during a lightning storm.

EQUIPMENT MOUNTING

Attach the IMU-II/s to a suitable wall, or heavy pipe coming from the meter. Figure 3-1 shows the dimensions of the IMU-II/s with the mounting tabs included.

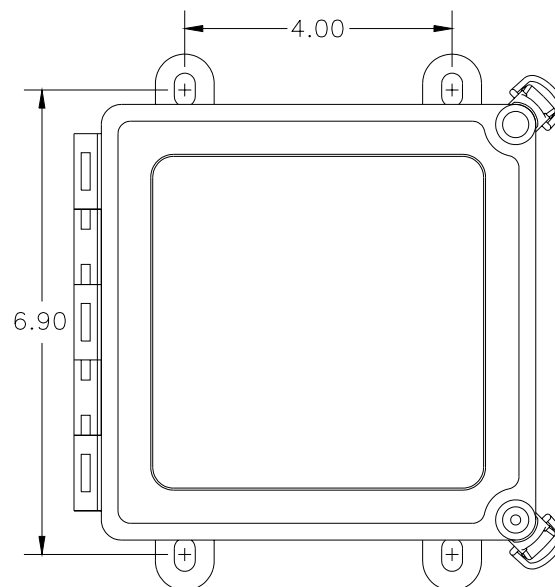


Figure 3-1.
IMU-II/s Mounting Dimensions.

INSTALL CABLES

Common types of connection cables/wires that may be required include:

- Pulse Data and/or Alarm cables.
- RS-232 serial data interface cable(s).
- Solid conductor grounding wire.

WARNING

Do not connect or disconnect live circuits unless the area is known to be Non-Hazardous.

1. Installation of the IMU-II/s and connection of all inputs to the unit must be made as shown in the control drawing, Appendix - C.
2. Feed the pulse input cables and the alarm cables through the left entry hole on the bottom of the IMU-II/s. If a serial data input cable is also being connected to the IMU-II/s, then it is a requirement that these wires must enter the enclosure using conduit as shown in Appendix - C. If the unit is not connecting to a serial input cable, then the dry contact pulse inputs may enter the enclosure through a bushing (conduit pipe is optional).
3. Remove the conduit plug from the bottom right hole of the IMU-II/s.

NOTE

The telephone line must enter the enclosure through 1/2" N.P.T. conduit using an approved Division 2 wiring method as specified in Section 501-4(b) of the National Electric Code (NEC), NFPA, 70. Mercury Instruments recommends using a 1/2" sealing locknut (with PVC molded seal) on the outside of the box as shown in Appendix - C.

4. Feed the telephone cable through the conduit pipe, and into the IMU-II/s. Attach an RJ-11 plug onto the end of the telephone cable. Verify that the red and green wires are connected to the two inside pins of the RJ-11 plug. These two wires are known as the Tip & Ring wires, and are used by the IMU-II/s to connect to the telephone network.

TELEPHONE LINE PROTECTOR INSTALLATION

Follow the steps below to install the telephone line station protector, and to make the final connection to the phone line.

1. Install the telephone receptacle (telephone network interface) if it has not been previously installed.

2. Mount the TII Telephone Station Protector at a suitable Non-Hazardous location. Internal wiring of the station protector is illustrated in Figure 3-2.

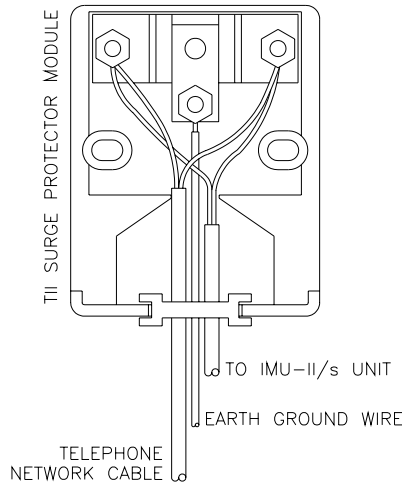


Figure 3-2.
Wiring Method, TII Station Protector.

WARNING

Installation of the TII Station Protector is not permitted within a Class I, Division 2 area, Hazardous location.

3. Connect one end of the 12 AWG earth ground wire to the center terminal on the TII protector. Appendix - B provides a data sheet detailing the TII Telephone Station Protector.
4. Connect the other end of the earth ground wire to a solid earth ground in conformance with national and local electrical code regulations.
5. Route the telephone cables from the telephone company connector, and the IMU-II/s, through the bottom of the TII station protector.
6. Connect the red wires from both of the telephone cables to the left screw inside the TII station protector.
7. Connect the green wires from both of the telephone cables to the right screw inside the TII station protector.
8. Connect the telephone test set to the telephone line plug going to the IMU-II/s board.
9. Check for a dial tone. (This procedure will test both the telephone cable and the telephone network)

NOTE

If no dial tone is detected, then a problem exists with the telephone line which must be repaired before continuing the IMU-II/s installation process.

10. If the IMU-II/s is to be enabled to auto-dial, dial the telephone number assigned to the central modem.
11. Listen to the telephone receiver to verify that the central modem answers the call and responds with an answer tone.
12. Disconnect the telephone test set.

ATTACH INPUT CABLES

Connection of the data and alarm cables to the terminal strip is described below. You may unplug the terminal strip from the unit for easier access when making these connections. Figure 3-3 shows the standard IMU-II/s terminal strip. Figure 3-4 shows the optional Serial Port Multiplexer Board layout. Appendix - C illustrates how the data, alarm, and telephone cables should be routed and attached to the IMU-II/s in a hazardous area.

- **Alarm**

The Alarm input, (TB1-1, TB1-2), is a normally open alarm input and can be wired as a customer specified alarm. The transducer generating the signal must provide a contact closure time of 40ms or longer.

- **Input -1**

Input 1 (TB1-3), can be configured by the Mercury Instruments Programmer as either a Form A pulse counting data input or a Form A alarm input. The transducer generating the signal must provide a contact closure time of 40ms or longer.

- **Input -2**

Input 2 (TB1-4), can be configured by the Mercury Instruments Programmer as either a Form A pulse counting data input or a Form A alarm input. The transducer generating the signal must provide a contact closure time of 40ms or longer.

- **Tamper**

Tamp (TB1-6, TB1-7), is a normally closed alarm input, and is usually pre-wired from the factory as an enclosure tamper alarm. This input is connected

to the small rectangular magnetic switch found on the IMU-II/s enclosure side wall.

NOTE

If connecting an external transducer with polarity sensitive outputs, always connect the negative side of the transducer output to the 'GND' connection point.

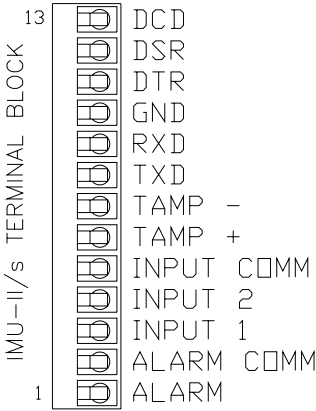


Figure 3-3.
IMU-II/s Terminal Block.

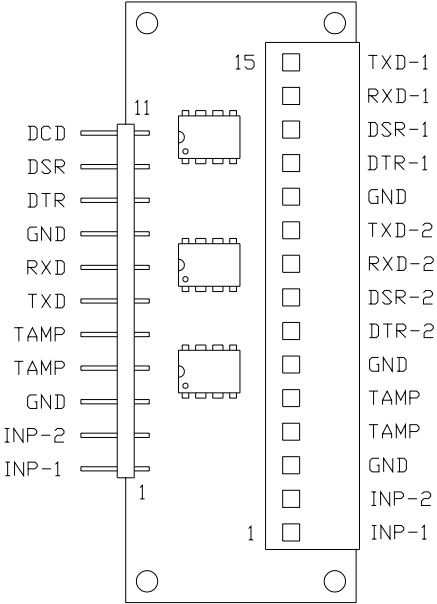


Figure 3-4.
Serial Port Multiplexer Board.

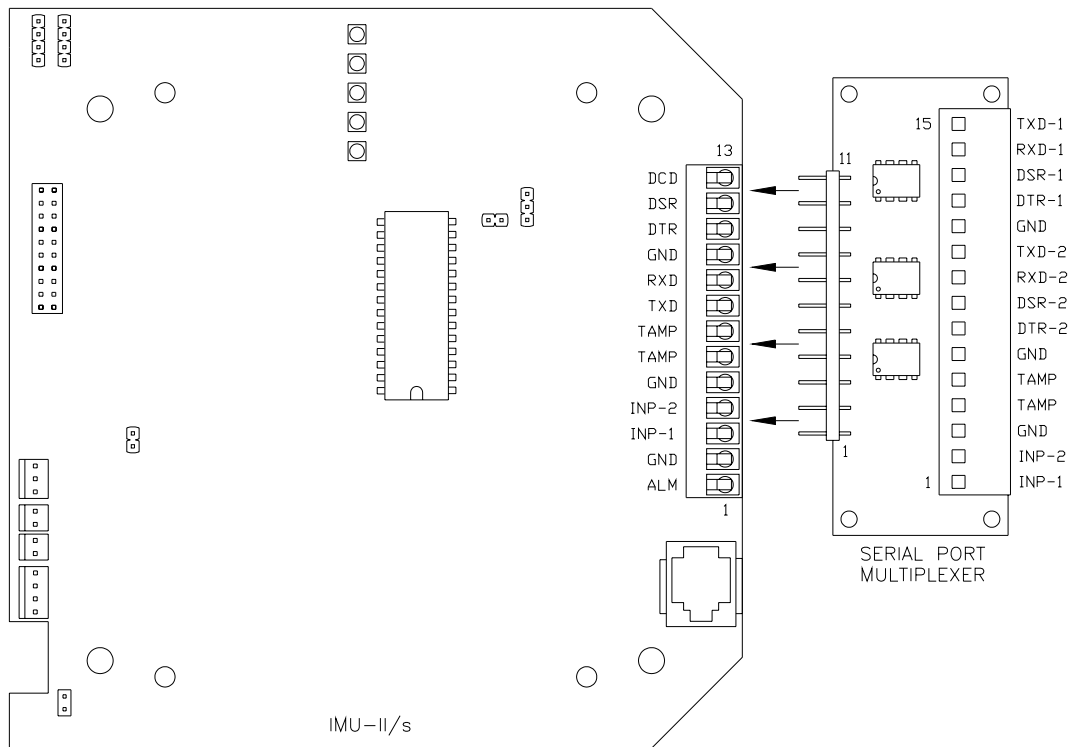


Figure 3-5.
Serial Port Multiplexer Installation.

INSTALL THE MULTIPLEXER BOARD

It is the intent of the Serial Port Multiplexer (SPM) board to enable access to two serial port DTE devices (ECATs for example) with a single IMU-II/s unit. Since only one serial port exists on the IMU-II/s main board, it was necessary to create an adaptor board with electronic switching to achieve this functionality.

Referring to Figure 3-4, the SPM board has extended pins on the left side that are designed for insertion into the terminal block of the IMU-II/s. Because the SPM board has 11 pins, and the IMU-II/s has a 13 position terminal block, it is obvious that some terminal block positions will remain vacant. Figure 3-5 illustrates the correct method of installation with the SPM board inserting into terminal block positions 3-13. Positions 1-2 of the terminal block on the IMU-II/s board remain available for an alarm input.

Pulse input and serial data input connections are then made at the 15 position terminal block of the SPM board. The following section describes these connections in greater detail.

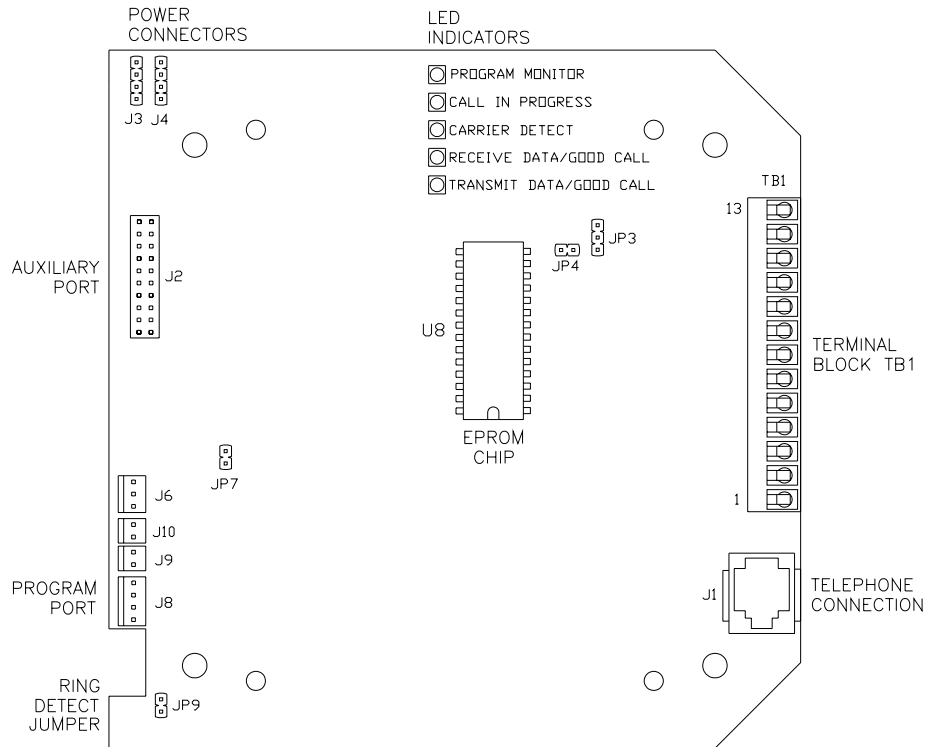


Figure 3-6.
IMU-II/s Component Labels.

Serial Data Connection:

The connection of the DTE's (ECAT, etc.) serial port to the IMU-II/s is made through the terminal block.

All serial data cables must enter the enclosure through 1/2" N.P.T. conduit using an approved Division 2 wiring method as specified by Section 501-4(b) of the National Electric Code (NEC), NFPA, 70. Reference the control drawing in Appendix - C for additional details.

Note: It is possible to remove the terminal strip header from the base for easier access while making these connections.

The following RS-232 signals are present on the standard IMU-II/s:

- | | | |
|-------|--------|--|
| • TXD | Output | Transmit Data, from the IMU-II/s. |
| • RXD | Input | Receive Data, into the IMU-II/s. |
| • DSR | Output | Data Set Ready - Set high by the IMU-II/s when it is time to communicate. |
| • DTR | Input | Data Terminal Ready - Set high by the DTE when it is time to communicate. This signal wakens the IMU-II/s from the idle state. |
| • DCD | Output | Carrier Detect - Set high by the IMU-II/s when a Modem carrier has been detected. |

If the IMU-II/s unit has the optional Serial Port Multiplexer board installed, then the following serial data signals will be available:

- TXD1 Output Port 1 Transmit Data, from the IMU-II/s.
- RXD1 Input Port 1 Receive Data, into the IMU-II/s.
- DSR1 Output Port 1 Data Set Ready - Set high by the IMU-II/s when it is available to communicate.
- DTR1 Input Port 1 Data Terminal Ready - Set high by the DTE when the DTE wishes to communicate. This wakes the IMU-II/s from the idle state.
- TXD2 Output Port 2 Transmit Data, from the IMU-II/s.
- RXD2 Input Port 2 Receive Data, into the IMU-II/s.
- DSR2 Output Port 2 Data Set Ready - Set high by the IMU-II/s when it is available to communicate.
- DTR2 Input Port 2 Data Terminal Ready - Set high by the DTE when the DTE wishes to communicate. This wakes IMU-II/s from the idle state.

To connect a DTE serial port to the IMU-II/s (either with or without the multiplexer board), perform the following steps:

1. Feed the serial data cable from the DTE through conduit, at the left entry hole on the IMU-II/s.
2. Connect the DTE's transmit data wire to the IMU-II/s RXD terminal.
3. Connect the DTE's receive data wire to the IMU-II/s TXD terminal.
4. Connect the DTE's signal ground wire to the IMU-II/s GND terminal.
5. If necessary, connect the DTE's data terminal ready wire to the IMU-II/s DSR terminal. (not always required)
6. If necessary, connect the DTE's data set ready wire to the IMU-II/s DTR terminal. (not always required)
7. If necessary, connect the DTE's carrier detect input wire to the IMU-II/s DCD terminal. Note: This connection is not available if a Serial Port Multiplexer has been installed.

VERIFY RING DETECT JUMPER

Ring Detect allows the IMU-II/s to answer incoming calls from the central computer system. This is accomplished by either installing or removing the small black shorting jumper from JP9. To determine the exact location of JP9, reference Figure 3-6.

- To enable ring detect, install JP9 on the IMU-II/s board.
- To disable ring detect, remove the jumper JP9 from the IMU-II/s board.

BATTERY CELL CONNECTION

This section provides details concerning installation of the lithium battery pack.

NOTE: To remain in full compliance with U.L. certifications, only the Mercury Instruments constructed battery pack shown on the control drawing is permitted for this application. Substitution of components is not permitted.

WARNING

Do not connect or disconnect any batteries until it has been determined that the area is completely safe from any risk of explosion hazard..

1. Install the lithium battery pack on the door of the IMU-II/s enclosure as shown in Figure 3-7. Secure the battery with a nylon tie-wrap.
2. Connect the plug from the lithium battery pack to either battery connector, J3 or J4, on the IMU-II/s board. Figure 3-6 shows the exact location of the battery connectors.

Battery cell voltage is dependant upon a number of factors, including temperature, current drawn by the load, remaining capacity within the battery, and internal passivation layers that accumulate over time. A fresh cell with no load applied, and at room temperature will normally measure within the 3.6 to 3.7 volt range. Under loaded conditions from an IMU-II/s, it can be expected that this will drop to 3.4 or 3.5 volts during a phone call session. Battery cell voltage remains fairly constant over the entire service life, until at the end there is a relatively sharp drop-off.

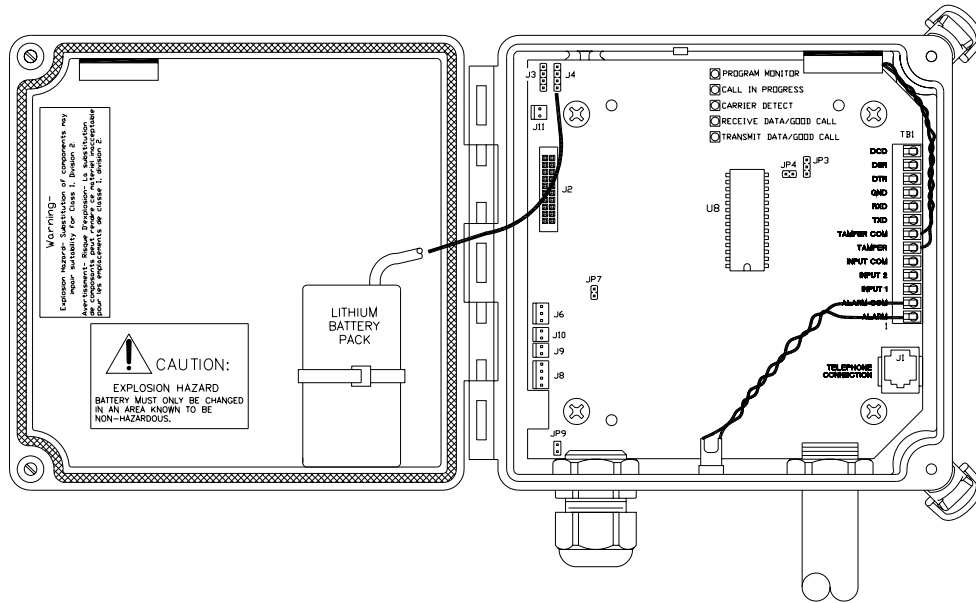


Figure 3-7.
Lithium Battery Powered IMU-II/s.

VERIFY POWER UP

Immediately after the IMU-II/s is powered up, the FIRMWARE MONITOR LED will turn on solid green while it runs its' RAM test. If the RAM test fails, the FIRMWARE MONITOR and OFFHOOK LEDs will be turned off and all other LEDs will be turned on. If the test is successful, the IMU-II/s will momentarily light the RD LED. The FIRMWARE MONITOR LED will then begin to blink. If the IMU-II/s is enabled to auto-dial, it will immediately go off-hook and attempt to call into the central computer modem to report a Unit Reset Alarm.

NOTE

Whenever the IMU-II/s detects a TAMPER alarm (enclosure door open), the LEDs will be activated for 4-1/4 minutes. To re-enable the LEDs after the 4-1/4 minute period has expired, simply close and reopen the IMU-II/s enclosure.

CONFIGURATION OF THE IMU-II/S

Configuration of the IMU-II/s is accomplished using the Mercury Programmer Software. This software operates on a portable computer and programs the IMU-II/s through the Serial Interface Cable. The cable connects to J8 of the IMU-II/s, through which the units' phone number, type of dialing, unit identification number, and other parameters are setup.

WARNING

Do not connect or disconnect live circuits unless the area is known to be nonhazardous.

1. Connect the Serial Interface Cable to the IMU-II/s board at J8. Reference Figure 3-6 for the exact location of the connector.
2. Help screens embedded within the MP-32 software program can provide assistance in case any questions arise during the configuration process.

NOTE

The IMU-II/s cannot communicate with the Mercury Programmer and the central computer modem simultaneously. When the IMU-II/s is being programmed / configured, the unit must not be communicating with the central modem. Likewise, when the IMU-II/s is communicating with the central modem, the Serial Interface Cable should not be connected to the IMU-II/s.

VERIFY OPERATION OF THE IMU-II/S

Verifying Auto-Answer:

If the IMU-II/s is enabled for auto-answer, follow the steps below to verify proper operation:

1. Connect the IMU-II/s telephone jack J1 and the telephone test set in parallel, and then connect them to the telephone company line.
2. Place the telephone test set in the monitor mode.
3. Have the central computer operator call the IMU-II/s using the central modem. This can be accomplished using the DTE manufacturers software, a software communications package such as PROCOMM, or the Mercury Instruments Data Collection Software.
4. Listen to the progress of the call using the telephone test set.
5. After the ring is detected, verify that the Off-Hook (OH) red LED located on the IMU-II/s is illuminated, indicating that the call has been answered. Table 3-1 describes the functions of all the LEDs on the IMU-II/s board.
6. After approximately 5-6 seconds, verify that the Carrier Detect (CD) LED lights to signify a valid connection with the central computer.

NOTE

Whenever the IMU-II/s detects a TAMPER alarm (enclosure door open), the LEDs will be activated for 4-1/4 minutes. To reenale the LEDs after the 4-1/4 minute period has expired, simply close and reopen the IMU-II/s enclosure.

LED NAME	FUNCTION
FIRMWARE MONITOR (green)	Blinks once per second to show that the board is operating in Mercury mode.
OFF-HOOK (red)	Lights when the IMU-II/s Modem circuit has gone off-hook.
CARRIER DETECT (red)	Lights when the IMU-II/s Modem circuit has detected a carrier from a remote Modem.
RECEIVE DATA / GOOD CALL (red)	When the IMU-II/s is off-hook, this LED will light to indicate that data is being received from a remote Modem. When the IMU-II/s is on-hook, this LED stays lit if the call completed successfully, or else goes dark if the call failed.
TRANSMIT DATA / GOOD CALL (red)	When the IMU-II/s is off-hook, this LED will light to indicate that data is being transmitted to a remote Modem. When the IMU-II/s is on-hook, this LED stays lit if the call completed successfully, or else goes dark if the call failed.

**Table 3-1.
LED Functions.**

Verify Auto-Dial Operation:

If the IMU-II/s is enabled to auto-dial due to alarm trigger events, follow the steps below to verify correct IMU-II/s operation. Two calls may be required to test the IMU-II/s if it has been programmed to auto-dial two different phone numbers.

1. Connect the IMU-II/s telephone jack J1 and the telephone test set in parallel, and then connect them to the telephone company line.
2. Place the telephone test set in the monitor mode.
3. To force a test call to phone number 1 (standard IMU-II/s or IMU-II/s with SPM board installed), momentarily short across the alarm inputs (TB1-1 to TB1-2).
4. Listen to the call with the telephone test set.
5. Verify that the Off-Hook (OH) LED located on the IMU-II/s board illuminates signifying that the IMU-II/s is attempting to dial the central computer's telephone number. Table 3-1 describes the function of the LEDs on the IMU-II/s board.

6. After dialing the central computer's phone number and connecting with the central modem, the IMU-II/s Carrier Detect (CD) LED should illuminate signifying a good connection with the central computer.

SEALING THE IMU-II/S

To close the IMU-II/s, perform the following steps:

1. Disconnect the telephone test set from the telephone jack.
2. Plug the telephone cable line into J1 on the IMU-II/s board.
3. Tighten the left-hand bushing (not applicable if conduit is utilized) on the bottom of the IMU-II/s.
4. Close and latch the door of the IMU-II/s enclosure.
5. Padlock the IMU-II/s enclosure and attach a security seal (optional).

FINAL NOTES

As previously stated, this document was created to serve as a condensed version of the main IMU-II/s installation manual 900319. Information pertaining to installing the product in the field, proper methods, control drawings, and all relevant warning statements were retained.

Details concerning trouble-shooting, communications protocols, and long term maintenance were not included. For additional information on these topics, it is advised that the user refer to the primary owners manual document 900319.

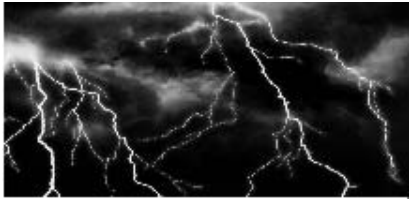
RETAIN THESE INSTRUCTIONS

APPENDIX - A: PRODUCT SPECIFICATIONS

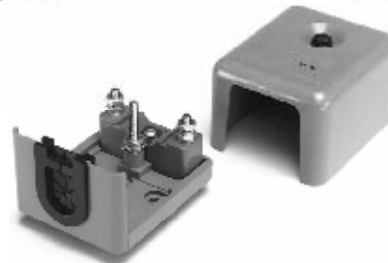
<u>Parameter:</u>	<u>Specification:</u>
Operating Temperature Range:	-22 to 158 deg. F (-30 to +70 deg. C)
Enclosure Dimensions:	
Height	6.5 inches (16.5 cm)
Width	6.9 inches (17.5 cm)
Depth	4.3 inches (10.9 cm)
Total Unit Weight:	2.5 pounds (1.10 Kg), includes the battery.
Lithium Battery Voltage:	3.6 Vdc (at room temperature)
Lithium Battery Capacity:	11.5 Ahr.
Typical Battery Life:	3 years nominal. Battery life will vary depending on the pulse & alarm input connections, quantity and duration of calls, and the average operating temperature.
Ringer Equivalence Number (REN):	0.3 B
FCC Registration Number:	BK5USA-24666-DT-E
Pulse Dialing Mode:	
Dial Rate	10 pulses / second
Percent Break	60%
Interdigit Interval	800ms
Dialing Digits	31 (maximum)
DTMF Dialing Mode:	
Deviation from standard tone	0.73% maximum
Dial Rate	3.3 digits / second
Interdigit Interval	150ms
Output Level	-6 dBm (nominal)
Dialing Digits	31 (maximum)
Pause Mode	Programmable
Communication Signals:	
Modulation Standards	CCITT V.22bis (2400 bps), CCITT V.22 (1200 bps), Bell 212A (1200 bps), Bell 103 (300 bps).
Data Output Level	Less than -9 dBm (fixed)
Modem Sensitivity	-40 dBm (minimum)
Telephone Connector	4-conductor RJ-11C
Data Storage Capacity:	32K RAM (»28K for Time Tagged Intervals)

Serial Data Port:	
Type	RS-232C signals
Bit Rate (transparent mode)	300, 1200, or 2400 bps
Data Bits	7 or 8
Stop Bits	1, 1.5, or 2
Parity	Even, Odd, or None
Contact Closure Inputs:	
Alarm Input (TB1-1)	Form-A (normally open, transition to closed causes an alarm to be triggered).
Input 1 (TB1-3)	Form-A (normally open, transition to closed causes a pulse to be recorded, or an alarm to be triggered).
Input 2 (TB1-4)	Form-A (normally open, transition to closed causes a pulse to be recorded or an alarm to be triggered).
Tamper Alarm (TB1-6, TB1-7)	Form-B (normally closed, transition to open triggers alarm).
Maximum Contact Closure Voltage Drop:	0.8 Vdc
Maximum Contact Closure Series Resist.:	1000 ohms (includes both switch & cable resistance)
Contact Closure Active State:	Must be active for greater than 40ms, then inactive for more than 40ms minimum to register as a valid pulse cycle.
Pulse Count Input Rate:	600 counts / minute maximum
Wetting Voltage per Input:	3 to 5 Vdc (nominal)
Wetting Current per Input:	175uA (nominal)

APPENDIX - B: TII PHONE LINE PROTECTOR



STATION PROTECTORS



TII 320, 321, 325 & 326 Total® Failsafe Station Protectors

Molded Of Tough Flame
Retardant Plastic Material

Comes Complete With Cover
And Fastening Nut

Expandable To Two-Pair

Fully Encapsulated Module

Integral Failshort And Airgap
Backup Features

The TII Total Failsafe® TFS® Station Protectors consist of a mounting base, protector module, grommet, and fitted cover with nylon fastening nut.

KEY PRODUCT BENEFITS

- The cover is molded from a tough flame-retardant plastic material and fits snugly at the base for maximum protection against intrusion of insects and foreign matter.
- A captive nylon nut is provided to give a degree of tamper proofing, and for easy installation and removal.
- The base is molded from a resilient impact-resistant plastic material, which is self-extinguishing and has a high melting point.
- A large grommet in the base allows ample room for drop, ground and station wiring to enter the protector.
- A series of mounting wells which match most protectors are located in the base and are sealed with a web of plastic to prevent moisture ingress.
- A ground stud is centrally located for grounding and bonding the shield of buried drop, as well as to secure module and cover.
- The TII 325 comes equipped with the TII 355 TFS®
- Maximum Duty three-electrode protector module installed.
- The 326 comes equipped with the TII 356 TFS® Heavy Duty three-electrode protector module installed.
- Other TII station protector modules may be provided in the 320 unit.
- Units may be ordered with one or two protector modules installed.
- A one-pair station protector can be upgraded to a two-pair station protector simply by adding a second module. This saves both maintenance time and the need to either add a second single-pair station protector or replace it with a two-pair station protector.
- The TII 321 comes equipped with the TII 126 TFS® Heavy Duty two-electrode protector module installed.
- The protector base has both vertical and horizontal module wells. The TII 126 module is normally mounted in the right side vertical well. The left well can be used to mount a second TII 126 module for two-pair protection. The horizontal wells are provided for mounting the TII 355 Maximum Duty and TII 356 Heavy Duty three-electrode TFS® protector modules.
- TII station protectors are designed for service in all environments, giving many years of low maintenance while providing a high level of protection.

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