BDS–40

Battery Diagnostic System

Installation Instructions
For Open Rack Systems

Vertiv Corporation
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590-2101-501A/SL-39416/4200–079 R5

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1 LEGAL INFORMATION

1.1 FCC DECLARATION OF CONFORMITY

This notice is applicable to Product/System/Hardware/Equipments with the Radio Frequency RF headset communication option installed for Bluetooth®–based communication.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

(i) This device may not cause harmful interference, and

(ii) This device must accept any interference received, including interference that may cause undesired operations.

1.2 REGULATORY INFORMATION

1.2.1 Type Of Service

The MPM Series and the BDS Series Vertiv Corporation.
Product/System/Hardware/Equipment is designed to be used on standard device telephone lines. It connects to the telephone line by means of a standard jack called the USOC RJ11C or USOC FJ45S. Connection to telephone company provided coin service (central office implemented systems) is prohibited. Connection to party line service is subject to state tariffs.

1.2.2 Telephone Company Procedures

The goal of the telephone company is to provide the user with the best service it can. To do this, it may occasionally be necessary for the company to make changes in its equipment, operations, or procedures. If these changes might affect the Original Purchasing End User's service or the operation of the Original Purchasing End User's equipment, the telephone company will give the Original Purchasing End User notice, in writing, to allow the Original Purchasing End User to make any changes necessary to maintain uninterrupted service.

In certain circumstances, it may be necessary for the telephone company to request information from the Original Purchasing End User concerning the equipment that the Original Purchasing End User has connected to the telephone line(s). Upon request of the telephone company, provide the FCC registration number and the Ringer Equivalence Number REN; both of these items are listed on the equipment label. The sum of all the RENs on the telephone line must be less than five in order to assure proper service from the telephone company. In some cases, a sum of five may not be useable on a given line.

1.3 SERVICE

Proper installation and testing are essential to the correct functioning of the system.. Request monitor assistance. Except as explained in this manual, do not attempt to service Vertiv equipment.

WARNING:

Opening the equipment may expose personnel to dangerous voltages.

Any adjustment, maintenance, or repair of this product must be performed by qualified personnel or contact a customer engineer through Vertiv Corporation, 954-377-7101 Request assistance. Never allow unauthorized personnel to operate the equipment. Only qualified and trained personnel are to perform the operations described in this manual. Calibration must be performed by technically qualified trained personnel.

2 SAFETY INFORMATION

All safety information within must be read, understood and strictly adhered to before installing, powering up or using the equipment/software; i.e. the system.

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific WARNINGs elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Vertiv Corporation assumes no liability for the customer's failure to comply with these requirements.

WARNING:

Use of this system in a manner not specified could compromise the designed–in safety.

2.1 General

For Safety Class 1 equipment, e.g. equipment provided with a protective earth terminal, an uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminal or supplied power cable. The protective features of this product may be impaired if it is used in a manner not specified in the operation/installation instructions. This manual describes the general installation and use of the system. If the system has features or accessories not described in this manual, contact Vertiv Corporation at 954-377-7101.

2.2 Before Applying Power

Check configuration and drawings. Double–check all connections. Verify that the system is set to match available voltage, the correct fuses are installed, and all safety precautions are taken.

NOTE:

Notice the system's external markings described under Safety Symbols.

WARNING

High voltage or current may be present inside the equipment and on the equipment terminals.

Observe system's external markings and all electrical safety precautions when removing and installing equipment covers, when connecting leads, and when making adjustments.

Never energize the cabinet or any component with 115VAC (or 230VAC if applicable) or battery voltage until after the installation is complete.

Never exceed equipment voltage, power ratings, or capabilities.

2.3 Ground the Equipment/Chassis

Make sure the equipment chassis and/or other system components are properly grounded when required.

To minimize shock hazard, the system chassis and/or cover must be connected to an electrical protective earth ground. The system must be connected to the AC power mains through a grounded power cable, with the ground wire firmly connected to an electrical/safety ground at the power outlet.

WARNING

Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

2.4 Fuses

For continued protection against fire, only the fuses with the required rated current, voltage, and specified type, i.e. normal slo–blo, blow, time delay, etc. must be used.

WARNING

Do not use repaired fuses or short–circuited fuse holders. To do so could cause a shock or fire hazard.

Some fuses may not be easily removed, contact Vertiv at 954-377-7101. Request monitor assistance.

2.5 Do Not Remove Equipment Cover

Operating personnel must not remove equipment covers, shields, and or panels. Component repair and/or replacement and internal adjustments must be made only by qualified service personnel.

WARNING

Under certain conditions, dangerous voltages may exist even with the equipment switched off.

To avoid dangerous electrical shock, DO NOT perform procedures involving cover, shield and/or panel removal.

2.6 Do Not Operate Damaged Equipment

WARNING

Equipment that appears damaged or defective must be made inoperative and secured against unintended operation until it can be repaired by qualified service personnel.

Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by qualified service personnel. If necessary, request service and repair from Vertiv Corporation Sales and Service Office to ensure that safety features are maintained; 954-377-7101.

2.7 Do Not Service or Adjust Alone

WARNING

While in the battery circuit, do not attempt internal service or adjustment of this equipment unless another person, capable of calling for or rendering first aid and resuscitation, is present.

2.8 Do Not Substitute Parts or Modify Equipment

Due to the possible danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. If necessary, request service and repair from Vertiv Corporation to ensure that safety features are maintained.

2.9 Ensure Rack/Chassis/Shelving/Mounting Stability

To ensure stability of the test bay, place heavier instruments near the bottom of the rack. Check the location of all equipment (including PCs) for stability. Make sure cabinets are well mounted.

2.10 Radiated Immunity

If and when subjected to abnormally high RFI fields they may affect the operation of the equipment.

2.11 Insulation Rating for Wires

Use only when supplied with the installation kit.

2.12 Ventilation

Never block equipment ventilation openings. The equipment must have adequate ventilation to prevent equipment overheating. If using a cabinet, allow at least 8" clearance on all sides of the cabinet for ventilation. Never block ventilation ports, and ensure the equipment is operated within the temperature and humidity ranges found in the Ventilation Guide Table and within the specifications:

Temperature range:	**5° C to 40°C**	**41°F to 104°F**
Humidity range:	**0% to 80% RH (non condensing) at 5° C to 31° C**	**0% to 50% RH (non condensing) at 32°F to 40°C**

2.13 Drawings

Drawings and Figures in this manual may be for reference only or may be superseded by later drawings. For the latest information and revision, refer to the drawings supplied with the system. Reference drawings are located in the rear of the manual.

2.14 Warning

WARNING

Denotes a hazard. It calls attention to a procedure, practice, or condition, which, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING symbol until the indicated conditions are fully understood and met. Refer to enclosed documents as well as OEM documentation.

2.15 Caution

CAUTION

This symbol/box denotes a hazard. It calls attention to an operating procedure, or condition, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product or permanent loss of data. Do not proceed beyond a CAUTION symbol until the indicated conditions are fully understood and met. Refer to enclosed documents.

2.16 Note:

NOTE:

This symbol/box contains important information.

2.17 Safety Symbols

Approved by Underwriters Laboratories			
warning	**protective earth (ground) terminal**		
caution notice	**frame or chassis terminal**		

3 EMERGENCY SHUTDOWN SWITCH/ DISCONNECT DEVICE

In most cases, the three prong AC cord from the cabinet, which connects to the 115VAC or 230VAC receptacle, is considered the primary disconnect device.

3.1 BDS–40 Disconnect Device

The power switch on the rear of the BDS 40 base unit is considered the primary disconnect device.

NOTE:

Different systems may have different disconnect procedures, please refer to the installation instructions or contact Vertiv Corporation at 954-377-7101.

3.2 Uninterruptible Power Supply UPS

WARNING:

The BDS system is designed to connect to UPS systems that are 600VDC or less and a maximum of 300V with respect to earth ground. The user must verify the voltage with respect to earth ground before connecting the system. Do this by measuring the voltage from each battery post referenced to earth ground. The voltage cannot exceed 300V.

If the user is using an optional UPS with the system, be certain the UPS internal battery is functional. Follow instructions in the UPS manufacturer's manual.

4 Preventive Maintenance

4.1 Visual Inspection

Visually inspect all monitor system components for damaged or frayed power cords and cables, and damaged component panels, controls, and connectors. When damage is detected, remove the equipment from service until the damage is repaired.

4.2 Cleaning System Components

Clean system components using a soft cloth, slightly moistened with water. Do not use commercial or industrial cleaners that may attack the computer display and housing. Never expose the computer or system components to water, high humidity, or dampness.

WARNING:

Before cleaning equipment, ensure the system is disconnected and power to the units has been shut off. The user must disconnect system components and the monitor system cabinet, if a cabinet is being used, from AC and/or DC power sources.

4.3 Fans and Vents

Remove dust from fans and vents using a small brush or hand held vacuum. Immobilize fan blades to avoid over–speed when using a vacuum.

4.4 Sense Leads (When Applicable)

Before cleaning the sense lead clips, ensure the system is disconnected and power to the system has been shut off. Clean the sense leads as required. The acid to which the sense lead clips are exposed during testing must be neutralized often, using a water and baking soda mixture. Brush this mixture onto the sense lead clip, and then rinse well with clean, cool tap water. Dry with a clean, soft cloth.

NOTE:

Some equipment and systems may not be equipped with lead clips.

4.5 Internal Components

The monitor system has no user–replaceable components. Since high voltage exists in most system components, only knowledgeable users should remove the covers or cowling from components (monitor, UPS, etc.) when required. Failure to comply with this restriction could pose a safety hazard and/or void the product warranty.

WARNING:

High voltages exist inside the monitor system components and on the terminals.

Calibration must be performed only by technically qualified persons.

Observe electrical safety precautions when removing and installing equipment covers and when connecting leads and making adjustments.

4.6 Shipping, Storage, Normal Use Protection

Protect the system from physical impact during normal use or storage, and when necessary, provide protection during shipment between test sites.

5 Product Overview

The BDS–40 is a stand–alone monitor for UPS applications and is designed for use with UPS battery cabinets. What sets Vertiv Corporation monitors apart from others is their ability to provide early warning of battery problems. The monitor checks the state of health of each cell by performing a proactive resistance test, a reliable predictor of battery performance. In addition, to indicate immediate battery health and monitor status of a given location, the system reports to a Central computer i.e. a generic PC, displaying status screens.

Using polling and data transfer algorithms, the Battery Monitor Data Manager program lets a Central computer manage over 1000 monitor systems. Data is stored in the computer database for later analysis and reporting. At any time, service personnel may call a battery location from the Central computer or a remote location, or directly connect to the monitor without losing contact with the computer.

The Data Manager string and monitor status indicators make central battery monitoring easy. Terms such as Discharging, Alarm, or Warning for string status or Active for monitor status quickly summarize events. Conditions reported to the Central computer are displayed as a list, to identify trouble spots easily. The system also features several methods of automated reporting of alarm occurrences, such as contacting key personnel via a pager, email, or fax.

Flexibility was a major design consideration. Because the monitors are stand–alone units with no external computer needed, a primary protocol using MODBUS ASCII was selected to let the user incorporate the monitor into large–scale facility monitors. This allows third–party interfaces to access all the stand–alone features of the monitor, yet leaves the advanced features of the Data Manager remote communication software available for service personnel.

5.1 Normal Operating Mode

In normal mode, the system scans all parameters in one to five seconds, depending on the configuration. As readings are taken, they are compared to user–programmed alarm levels. The monitor can then call a Central computer and energize an alarm contact if a parameter exceeds a level. Front panel LEDs indicate scan and alarm status, and alarm events are stored in memory for future analysis. The BDS can be programmed for critical and maintenance alarms.

5.2 Discharge Mode

If a discharge is detected, the system goes into a data logging mode and stores battery voltages and discharge current into a discharge record.

5.3 Resistance Test Mode

A battery resistance test may be performed at user–set intervals. The test is similar to that performed by the Cellcorder. On a BDS–40, up to ten intertiers can be configured for this measurement.

5.4 BDS–40 Features

This section describes standard and optional BDS–40 features.

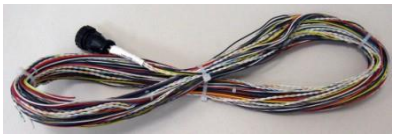
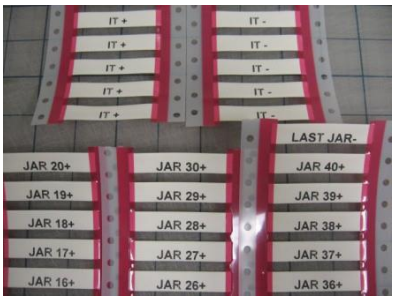
- Scans all pertinent battery parameters, such as overall voltage, cell voltages, current, and temperature.
- Performs a scheduled resistance test of all cells/jars and intertiers, and stores results for trending analysis.
- Auto detects discharges based on Overall Volts or Discharge Current, and stores data for real time or accelerated time playback.
- Signals if any parameter is outside user–programmed limits, energizes a Form C relay contact, and calls a Central computer to report the alarm condition.
- Communicates with an external computer via USB, RS–232, modem, and LAN.

5.4.1 Alarm Features

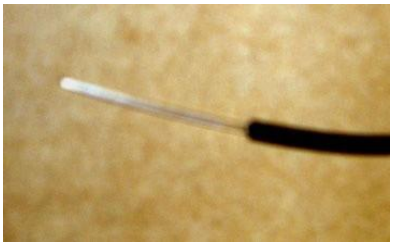
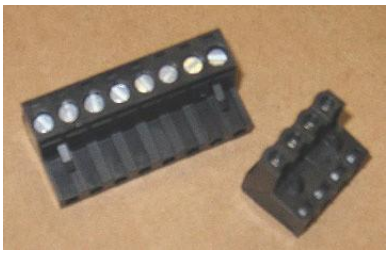
The monitor may be set to call the Central computer to report an alarm condition when detected automatically. The user can program high and low alarm levels on all voltage and temperature parameters, and a high alarm level for resistance. When any parameter goes outside the normal range, the monitor stores the event in memory, the Alarm LED lights, and an alarm relay with a Form C contact energizes. The alarms may be set for latching or non–latching.

5.5 Materials

Standard Materials

Description	Photo	Purpose
Sense Lead Assembly pn 1101–776		Refer to drawings that were sent with the system as systems are configuration dependent
	Figure 1. Sense Cable Assemble	
J5 Load Cable Assembly pn 1101–777		Refer to drawings that were sent with the system as systems are configuration dependent
	Figure 2. J5 Load Cable Assembly	
Lead Label Set pn 1101–775		Used to label lead cables.
	Figure 3. Labels For Lead Cables	
2 Cond 16 Ga Black Zip Cord pn 6002–080		AC power between units, 24VAC connection cord to load module and DCM
	Figure 4. 2 Cond 16 Ga Black Zip Cord	

Standard Materials

Description	Photo	Purpose
Fiber Optic Cable pn 3703–006		Communication link between Controller and DCMs
	Figure 5. Fiber Optic Cable	
Fiber Optic Polishing Kit pn KIT–3703–015		The kit provides the user with polishing materials to terminate the ends of plastic optical fiber correctly.
	Figure 6. Fiber Optic Polishing Kit	
BDS–40 Open Rack Monitoring System		Battery monitoring system
	Figure 7. BDS–40 Open Rack	
2 POS/8 POS Pluggable Terminals pn 2140–011 (2) pn 2140–024 (8)		Pluggable screw terminals for power and relay connections
	Figure 8. 2 POS/8 POS Pluggable Terminals	

Standard Materials

Description	Photo	Purpose
7 foot telephone cable–UL pn 6003–010		Modem/TELCO connection cable

Figure 9. 7' Telephone Cable–UL

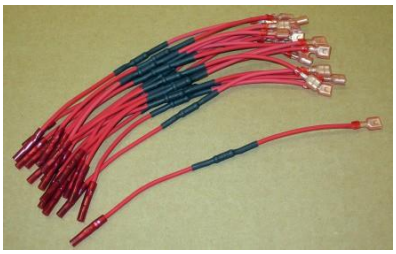
BDS Flex resist w/butt splice pn 1100–437BS		10K resistor–prevents over current conditions. Refer to BDS–1251–A640

Figure 10. BDS Flex Resist w/Butt Splice

NOTE:
The sense lead resistor assemblies include a 10K& 1% flameproof resistor that reduces the risk of a short circuit during installation and maintenance.

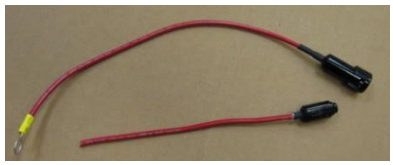
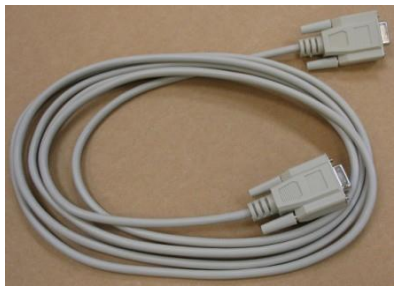
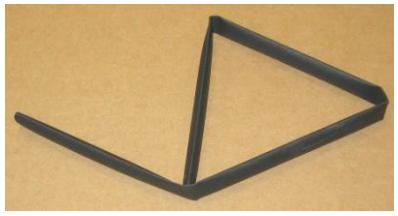
USB2 Hi–speed cable pn 2025–108		For system hardware to computer communication.

Figure 11. Exterior USB Cable

Standard Materials

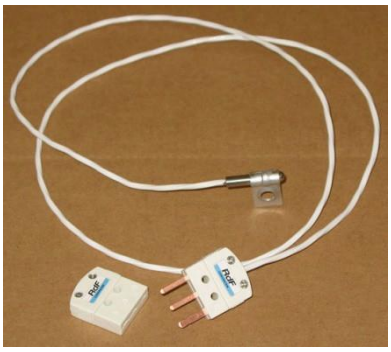
Description	Photo	Purpose
¼ inch tab washer pn 2120–043	 **Figure 12. ¼ Inch Slotted Tab Washer**	Connector interface between harness and cell–Refer to drawing BDS–123–A380. *NOTE:* *Tab washer size is battery dependent, other sizes such as 3/8" and 5/16" are readily available.*
30 amp cartridge fuse pn 4302–030	 **Figure 13. 30 Amp Slo–Blo Ceramic Fuse**	Load step fuse Please refer to drawing BDS–193–A453
Power Cord pn 6003–008 = US, pn 6003–006 = Euro, pn 6003–007 = UK	 **Figure 14.Controller Power Cord(s)**	Power for the Controller.

Standard Materials

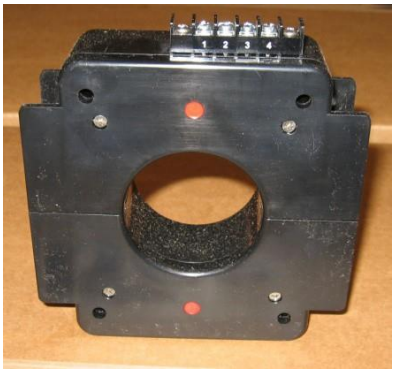
Description	Photo	Purpose
Inline Fuseholder Assembly pn 1100–433UL	 **Figure 15. Inline Fuseholder Assembly**	Inline fuseholder Refer to drawing BDS–193–A453.
RS–232 serial cable pn 2025–117	 **Figure 16. RS–232 Cable**	DB9 computer communication cable
¼ “ heat shrink tubing pn 2880–004 used in Inline Fuseholder Assembly may have $^{3}/_{8}$” heat shrink tubing substituted pn 2880–005	 **Figure 17. ¼” Heat Shrink Tubing**	Helps insulate connection

5.5.1 Optional

Optional Materials

Description	Photo	Purpose
FCCP Kit pn 5610–051	 **Figure 18. Multitel Float Charging Current Probe Kit**	Float current measurement transducer for a single string. Please refer to drawings BDS–1441–B1581 *NOTE:* *Part number 5610–050 supports two strings and includes one more clamp on the probe.*
24V .5A DC Wall Mount Power Supply pn 4000–026	 **Figure 19. AC Wall Plug Transformer**	24V .5A DC Wall Mount Power Supply for the FCCP
Ambient temperature probe/assembled with cable pn 1101–183–50 Separate ambient probe shown in figure pn 2900–029 Cable pn 6002–94	 **Figure 20. Ambient Temperature Probe 2900–029**	Temperature probe that hangs free for ambient temperature measurement. Refer to drawing BDS–1285–A661.

Optional Materials

Description	Photo	Purpose
Electrolyte temperature probe/assembled with cable pn 1101–186–50 Separate electrolyte probe pn 2900–010 shown in figure.	 **Figure 21. Electrolyte Temperature Probe 2900–010**	Teflon coated probe, may be immersed in a flooded cell. Refer to drawing BDS–1293–A669.
600 amp CT pn 5610–019	 **Figure 22. 600 Amp Current Transducer CT**	BDS–40 CT with Cable Assembly Use Drawing BDS–1184–A585–PHOTOS VARY DEPENDING UPON MODEL(S) CHOSEN UP TO 3000 AMPS *NOTE:* *5610–019 Is the part number for the 600 amp CT and it can be ordered with a cable assembly pn 1101–748.*
Open Rack CT Cable pn 1101–184–50	 **Figure 23. CT Cable**	Please refer to Drawing BDS–1282–A658 for Current Transducer DCM–480

5.6 Required Tools

The following tools or equivalents are necessary for BDS–40 Open Rack System installation:

TOOLS		
Description	**Photo**	**Purpose**
Panduit CT–260 crimper Vertiv Corporation pn 5400–002	 **Figure 24. Panduit CT–260 Crimper**	For parallel splices
Panduit CT–1525 crimper Vertiv Corporation pn 5400–007	 **Figure 25. Panduit CT–1525 Crimper**	For crimping ring terminals – Please refer to drawing BDS–1251–A640
Panduit CT–1550 crimper Vertiv Corporation pn 5400–008	 **Figure 26. Panduit CT–1550 Crimper**	For crimping ring terminals – Please refer to drawing BDS–1251–A640
Thomas and Betts crimper WT–111–M	 **Figure 27. Thomas & Betts WT–111–M For Crimper**	For crimping fuse holders
#2 Phillips–head screwdriver with insulated handle	 **Figure *28*. #2 Phillips–Head Screwdriver With Insulated Handle**	For mounting BDS components, and for removing or attaching panels

TOOLS

Description	Photo	Purpose
Flat–head stubby screwdriver		For attaching ground wire

Figure 29. Flat–Head Stubby Screwdriver

Digital Voltmeter		For checking voltage

Figure 30. Digital Voltmeter

Molex Crimp Tool HTR 2445 A pn 5400–006		For crimping specific Molex pins on specific FCCPs

Figure *31*. Molex Crimp Tool

Computer/Printer LT pn 2025–058 DT pn 2025–054 Printer pn 2025–127		

Figure 32. Computer/PC

TOOLS

Description	Photo	Purpose

BMDM Software pn 2027–001		Help to monitor the systems and capture data for reporting, etc.

Figure 33. BMDM Software Icon

5.7 Building Management System Integration

The BDS–40 system can be connected to building management systems. This integration requires writing software that can communicate with the BDS. The communication protocol is MODBUS ASCII. The user may obtain a register map from Vertiv Corporation or download it from the Vertiv Web site technical library at www.Vertivco.com. The connections are made via the RS–232
DB–9 connectors on the rear panel. The only connections made are TX–Pin 2, RX–Pin 3, and GND–Pin 5.

5.8 Panel Controls And Indicators

Items on the front and rear panels are described in the Product Description Guide. Additional descriptions may appear elsewhere in this manual.

5.9 BDS System Specifications

Specification sheets for the discrete components in a typical BDS system are in the BDS–40 Monitor Product Description Guide.

6 BEFORE SYSTEM INSTALLATION

6.1 Required Drawings

IMPORTANT NOTE:

The following drawings are required for BDS–40 installation. The drawings in this manual may not be the most recent revision and are included for reference only.

Drawing	Number
General Assembly, Base Unit	BDS–377–D1695
General Assembly, Plus Unit	BDS–378–D1696
Application Details	BDS–3107–B1359
Installation Details. Full Washer Connect Sense/Load Leads	BDS–123–A380
Sense Lead Test Cable	BDS–1357–A706
Load Lead Test Cable	BDS–1358–A707
Inline Fuse–holder Assembly	BDS–1259–A645/BDS–1100–433UL
Flex Resistor Lead Assembly	BDS–1251–A640
Connection Details, Optional Sensors	BDS–1441–B1581
Connection Details, Power, Data, Alarm Contact Connections	BDS–1193–B986

Drawing	Number
Mounting Detail, Cabinet Top Mounting Dimensions	BDS–1178–D1687
Configuration To Connection Diagram	BDS–1360–C1050
Sub Assembly Current Transducer Connection	BDS–1282–A658/1101–184–50
Sub Assembly Ambient Temperature Cable	BDS–1285–A661/1101–183–50
DCM–48XL Float Current Assembly 50'	BDS–1322–A683/1101–185–50
DCM–XL48 Electrolyte Temperature Cable	BDS–1293–A669/1101–186–50

WARNING:

The BDS system is designed to connect to UPS systems that are 600VDC or less and a maximum of 300V with respect to earth ground. The user must verify the voltage with respect to earth ground before connecting the system. Do this by measuring the voltage from each battery post referenced to earth ground. The voltage cannot exceed 300V.

6.2 System Configurations

Position XXxxxxxx Open Rack Options	Open Rack Configurations
70xxxxxx	1x17x12
71xxxxxx	1x18x12
72xxxxxx	1x19x12
73xxxxxx	1x20x12
74xxxxxx	1x21x12
75xxxxxx	1x22x12
76xxxxxx	1x23x12
77xxxxxx	1x24x12
78xxxxxx	1x25x12
79xxxxxx	1x26x12
80xxxxxx	1x27x12
81xxxxxx	1x28x12
82xxxxxx	1x29x12
83xxxxxx	1x30x12
84xxxxxx	1x31x12
85xxxxxx	1x32x12
86xxxxxx	1x33x12

Position XXxxxxxx Open Rack Options	Open Rack Configurations
87xxxxxx	1x34x12
88xxxxxx	1x35x12
89xxxxxx	1x36x12
90xxxxxx	1x37x12
91xxxxxx	1x38x12
92xxxxxx	1x40x12

6.3 Location Consideration

6.3.1 Check Service Access

Mount the DCMs close to the battery, making sure they are accessible for servicing.

6.3.2 Maximum Wire And Cable Lengths

Install an insulated wire tray along the length of each battery tier, making sure it does not interfere with cell replacement. Install the sense leads, test current leads, 24VAC cable, and runs of wire, cable, and fiber optic cable have length limitations as follows:

- The maximum length for each sense lead, resistance test cable, and is 35 feet (10.7 meters).

CAUTION:

Do not wrap excess load cable into a coil. A tight coil will result in induction that can adversely affect equipment operation. Leave excess cable in loose, flat lengths.

6.3.3 Fiber Optic Cable And BDS–40 Communication Information

The BDS–40 communicates via fiber optic cable and the system forms a communication ring network.

NOTE:

The maximum length of standard plastic fiber optic cable that may be used is 250 feet or 76 meters.

Transmit TX/FO on the Controller connects to Receive RX/FO on a DCM. Transmit on this DCM connects to Receive on the next DCM, and so on until Transmit on the last DCM returns to Receive on the Controller.

IMPORTANT NOTE:

Unlike the requirement for connecting DCMs to battery strings, the string and address assignments on the DCM nameplates do not determine the order in which DCMs are connected within the fiber optic ring.

Look at the system drawing and the physical facility and determine how the fiber optic and power cables to the DCMs must be situated. When installing the fiber optic cable, do not bend the cable in a radius tighter than 35mm.

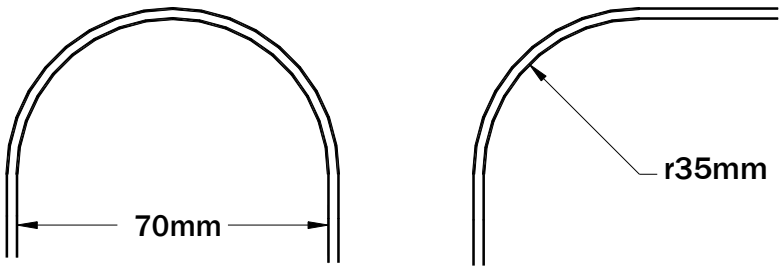


Diagram Not To Scale

Figure 34. Minimum Bend Radius Of Fiber Optic Cable

6.3.4 Sense Lead Harness Routing From BD–40 To The Battery

The installer normally determines the wire routing. Do not route the wires in the same conduit as other wires in the facility. A Panduit slotted cable tray with cover or equivalent is normally used to distribute wires to the cells.

6.3.4.1 Conduit

Conduit can be used to route harnesses from the BDS components to the battery rack and to a wire tray to distribute the wires to each cell.

6.3.4.2 Panduit

A Panduit slotted cable tray with cover or equivalent is normally used to distribute wires to the cells. Suggested slotted cable trays and covers are Panduit E1X1L66 with C1L66, or E5X5L66 with C5L66.

7 Begin System Installation

The following steps are required for system installation.

7.1 Identify and Verify Cells, Markings, Load Steps, Configuration, etc.

1. Identify cell 1.
2. Identify and verify that all cells are marked correctly. Mark if necessary.
3. Verify wire routing, per drawing if provided; i.e. conduit, Panduit etc.

WARNING:

Never route the wires in the same conduit with other wires in the facility. Never run the wires parallel to the battery bus. Some inverters emit large signal spikes that could cause induction problems through the connection cables.

4. Identify load step connections.
5. Double check the configuration by referring to the drawings provided with the system.

WARNING:

Check the configuration before installation. If the wrong configuration is installed onto the battery, the unit could be permanently damaged.

7.2 Prepare All Batteries

7.2.1 Fit Tab Washers

Install tab washers on every positive post and on the last negative post. Every point of connection to the battery requires its own tab washer. Pay attention to detail and refer to BDS–123–A380 when installing the washers. Negative posts that are associated with an intertier, if intertier resistances are monitored need tab washers as well.

NOTE:

Remember, fit tab washers per drawings provided with the system and manual and place extra tab washers when applicable. Installer of the Tab Washer should be aware of the tab's orientation to avoid possible interference with any battery jar's protective covers when the sense lead wire is attached.

NOTE:
In cuses where both Load and SenseLeads are connected at the same point. the Load (Current) Lead must be fastened closest to the Battery Terminal. Load Lead must be a Ring Terminal.

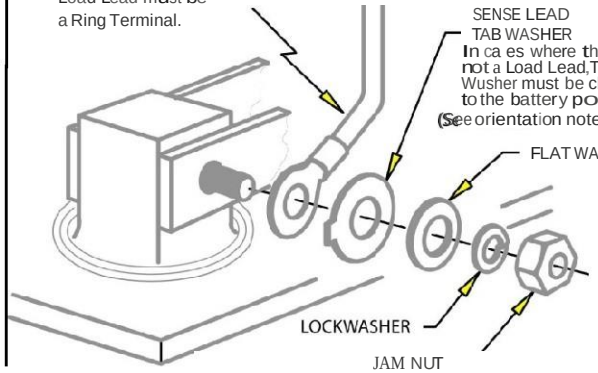
FUSED LOAD LEAD TO RESISTANCE TEST MODULE

SENSE LEAD TAB WASHER
In ca es where there i not a Load Lead,Tcb Wusher must be closest to the battery pot.
(See orientation note bel ow)

FLAT WASHER

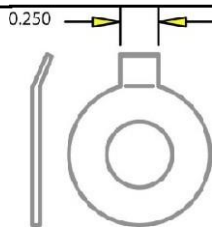
LOCKWASHER

JAM NUT



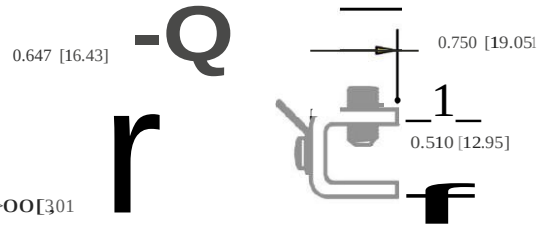
TAB WASHER ORIENTATI ON

NOTE: Installer of the Tab Washer should be aware of the tab's orientation to avoid possible interference with any battery jar's protective covers when the sense lead wire is attached.



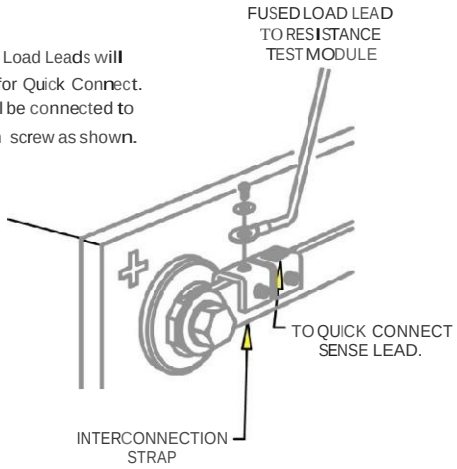
TAB WASHER
for Quick Connect Sense Leuds

SIZE WILL VARY ACCORDING TO REQUIREMENTS



OPTICXIIAL "C" CLAMP
for Quick Connect Sense Leads

NOTE: "C" Clamps for Load Leads will not have ugs for Quick Connect. Load Lead will be connected to "C" Clamp with screw as shown.



FUSED LOAD LEAD TO RESISTANCE TEST MODULE

BATTERYTERMINAL

SENSE LEAD TIIBWIISHER

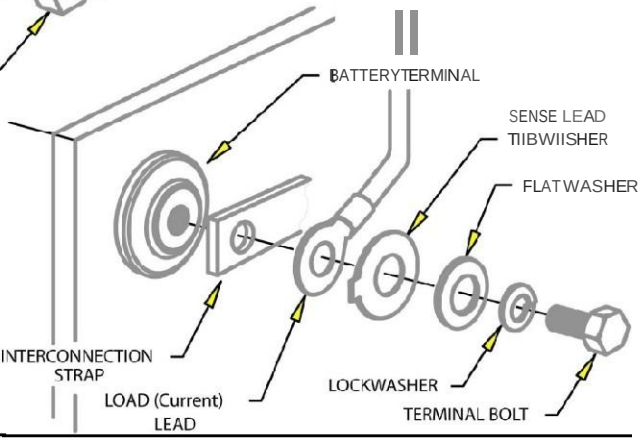
FLAT WASHER

INTERCONNECTION STRAP

LOAD (Current) LEAD

LOCKWASHER

TERMINAL BOLT



7.2.2 Check Sense Lead Routing From BD–40 To The Battery

The installer normally determines the wire routing but double–checking measurements and lengths is advised. Please refer to section 6.3.2 Maximum Wire And Cable Lengths on page 20 for details.

CAUTION:

Do not route the wires in the same conduit as other wires in the facility.

7.2.3 Cut Sense Leads To Appropriate Lengths

Voltage sense leads connect from each DCM to the individual cells. Cut each sense lead to the appropriate length and assemble it using BDS–1360–C1050 Schematic for Configuration to Connection Diagram.

NOTE:

A 10K 2W 1% flameproof resistor that reduces the risk of a short circuit during installation and maintenance is included in the sense lead resistor assemblies. Refer to drawing BDS–1251–A640 for fabrication details.

Properly identify each sense lead to simplify the connection process. When connecting a sense lead to the same battery terminal as the load cable, the load cable must be closest to the cell post. Refer to the userr copy of BDS–123–A380.

Please refer to BDS–1357–A706 for Jar sense lead installation information.

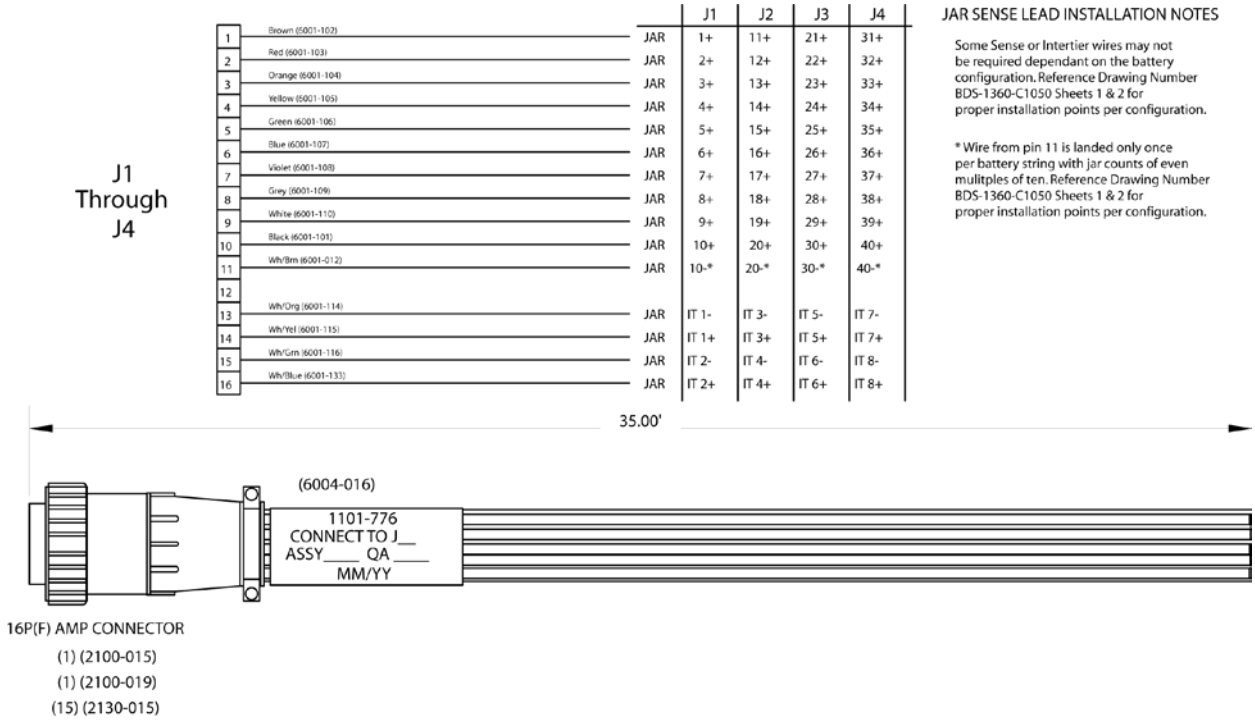


Figure 36. Snapshot BDS–1357–A706

7.2.3.1 Intertier Connections

Most battery installations have cables connecting groups of cells on different levels (tiers) within a battery string. Since these intertier cables normally have higher resistance than intercell connections, additional sense leads are used to monitor the resistance of these cables. Wires for two intertier connections are included within each sense lead with a maximum of eight intertiers monitored per BDS Base or Plus.

7.2.4 Internal Resistance Load Lead Cable Cutting And Connecting

The 14 GA wires of the load lead test cable connect to certain cells in the battery string. Cable is supplied based on an average of 35 feet per lead, unless a special length is ordered. Cut these cables to the proper length before termination.

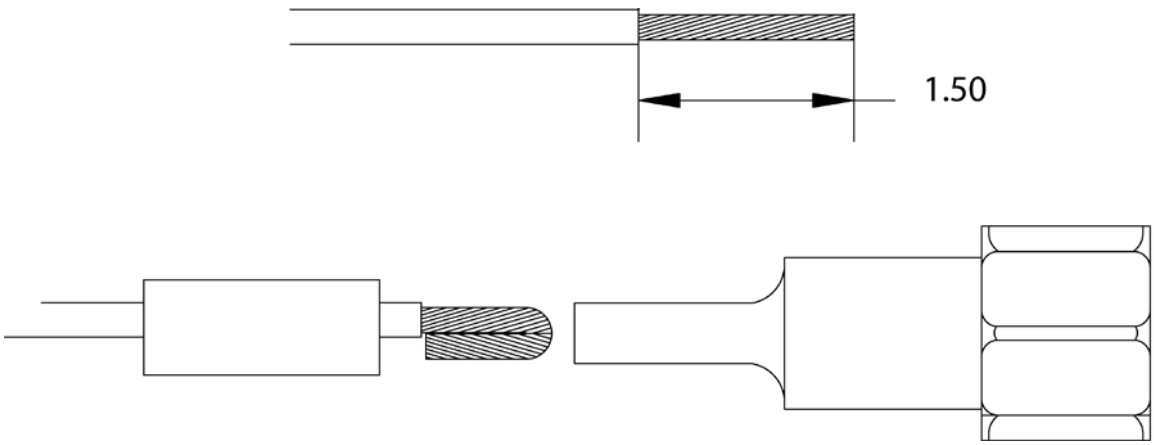


Figure 37. Snapshot Part 1100–433UL Drawing BDS–1259–A645

WARNING:

Before making any load lead connections, ensure that the fuses are removed from the fuse holders. Refer to BDS–1259–A645.

Do not install the fuses until the time that the entire system is commissioned.

Connect the first resistance test current cable to the positive post of the first cell. The last lead connects to the negative post of the last cell. Other connections depend on the battery configuration.

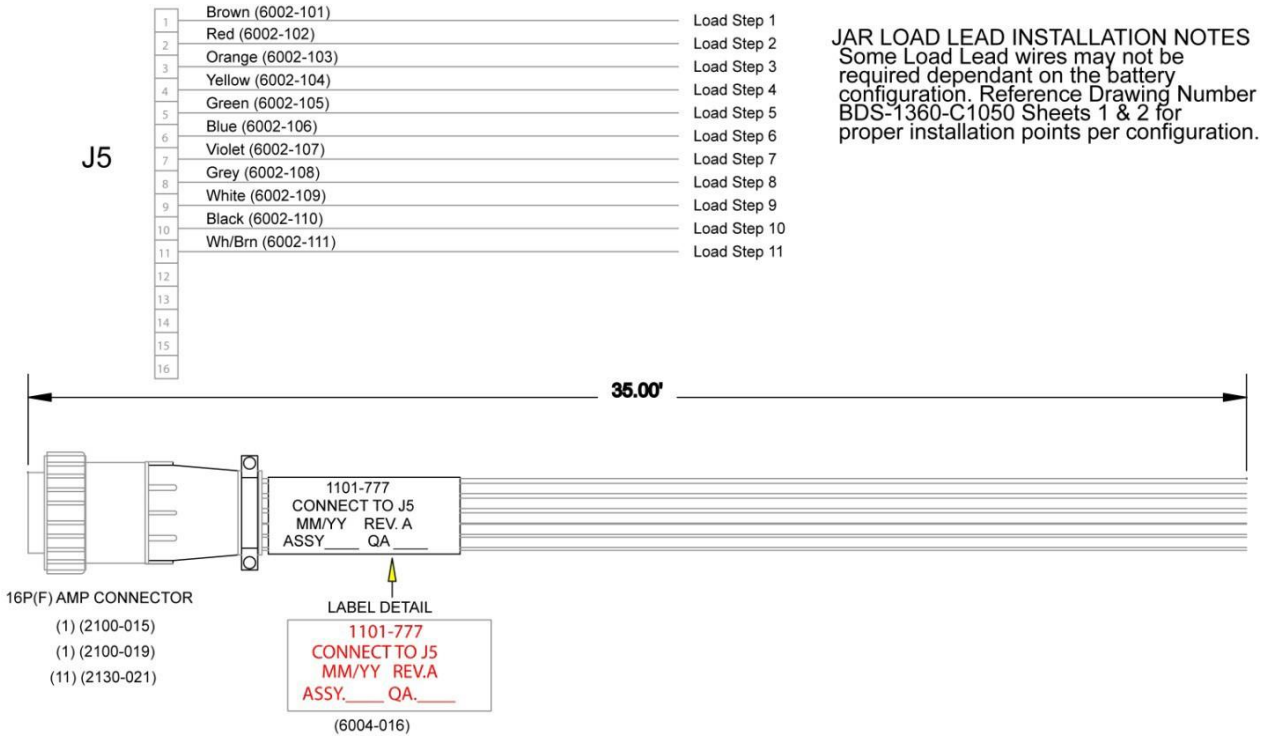


Figure 38. Snapshot J5 BDS–1358–A707

Refer to the drawing BDS–1360–C1050 for a connection diagram. Again, verifyfusesare removed from fuse holders before making any battery connections. Refer to the user's drawings for resistance test current cable construction details.

WARNING:

Before making any connections to the battery, verify the fuses have been removed from the fuse holders. Do not install the fuses until the time that the entire system is commissioned.

In hazardous voltage applications where battery voltage is greater than 60VDC, remove the load cable fuse before disconnecting the load cable connector.

7.2.5 Discharge Current Sensor (Optional)

The BDS–40 can be used with a magnetic Current Transducer CT to measure discharge current. This item can be specified at time of order. When using a magnetic current transducer CT, connect it to the Current connector on the rear of the unit. The CT provided depends on the application. Refer to BDS–1441–B1581.

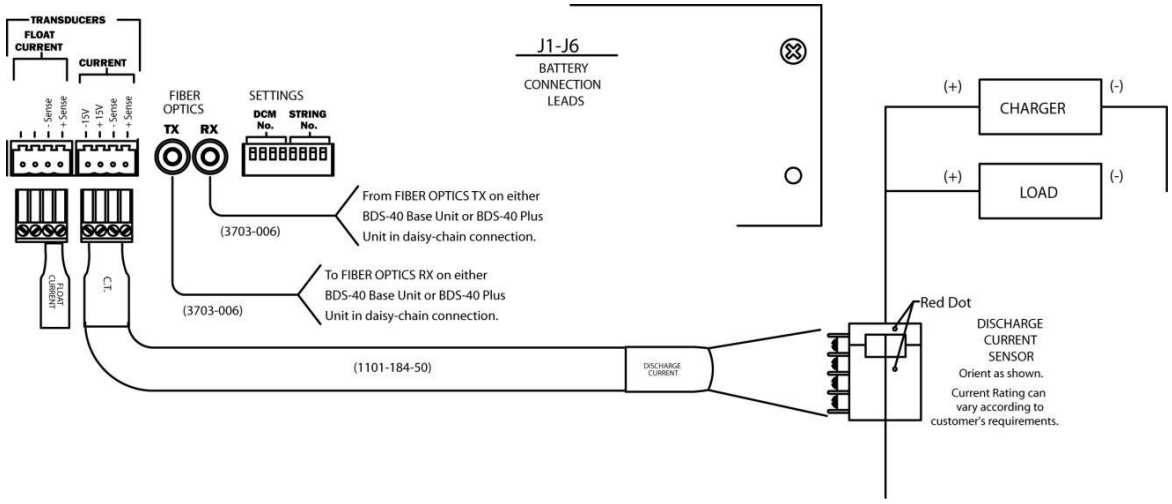


Figure 39. Snapshot CT BDS–1441–B1581

7.2.6 Temperature Sensor (Optional)

Two types of temperature probes are available for the BDS. One probe hangs free for ambient temperature measurement or mounts on a cell post surface. The other, a Teflon coated probe, may be immersed in a flooded cell. Refer to BDS–1441–B1581.

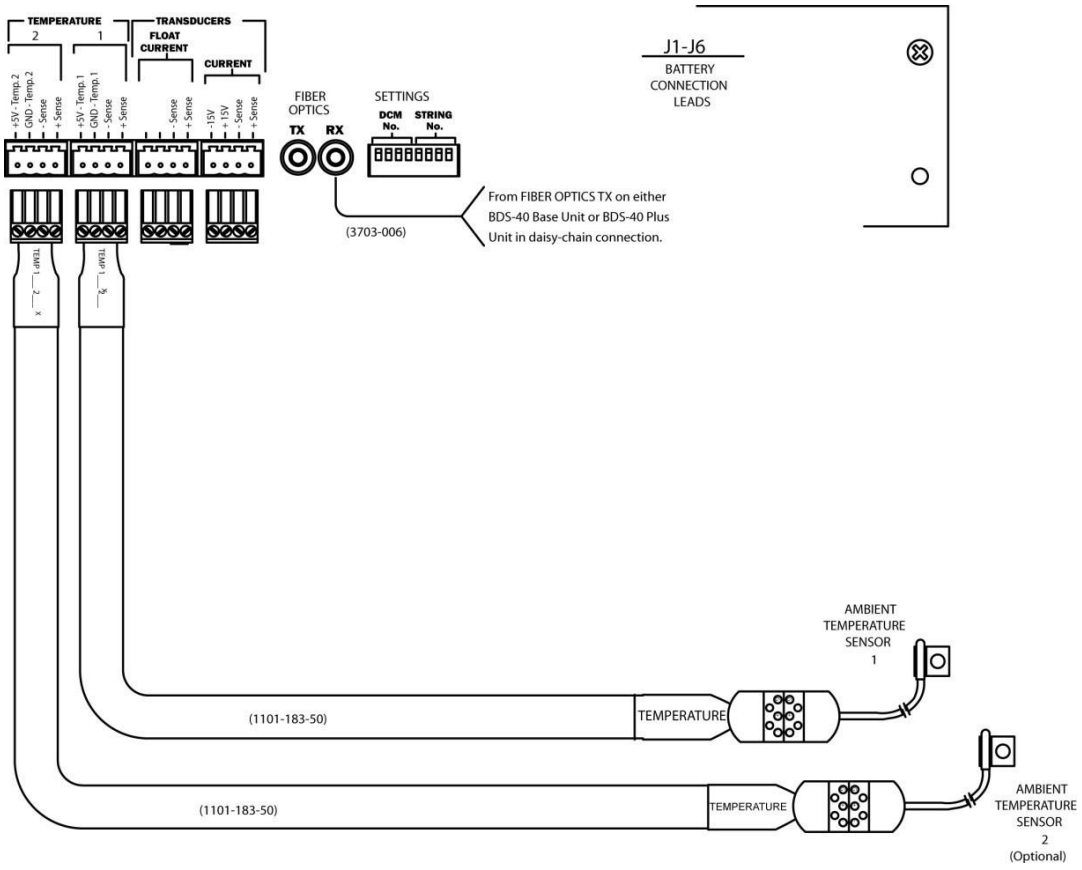


Figure 40. Temperature Sensor Connections Snapshot BDS–1441–B1581

Using 4–conductor shielded cable, wire these sensors to the rear connectors marked Temperature 1 or Temperature 2. The user may use two temperature probes per battery string. If using only one probe, connect it to Temperature 1.

7.2.7 Float Current Sensor (Optional)

There is one float current sensor channel available. Connect to the rear panel Float Current connector.

Please refer to BDS–1441–B1581 and BDS–1322–A683 for FCCP assembly for termination details and to section 6.3 of Multitel's *Float Charging Current Probe Installation Manual*, displayed here for convenience.

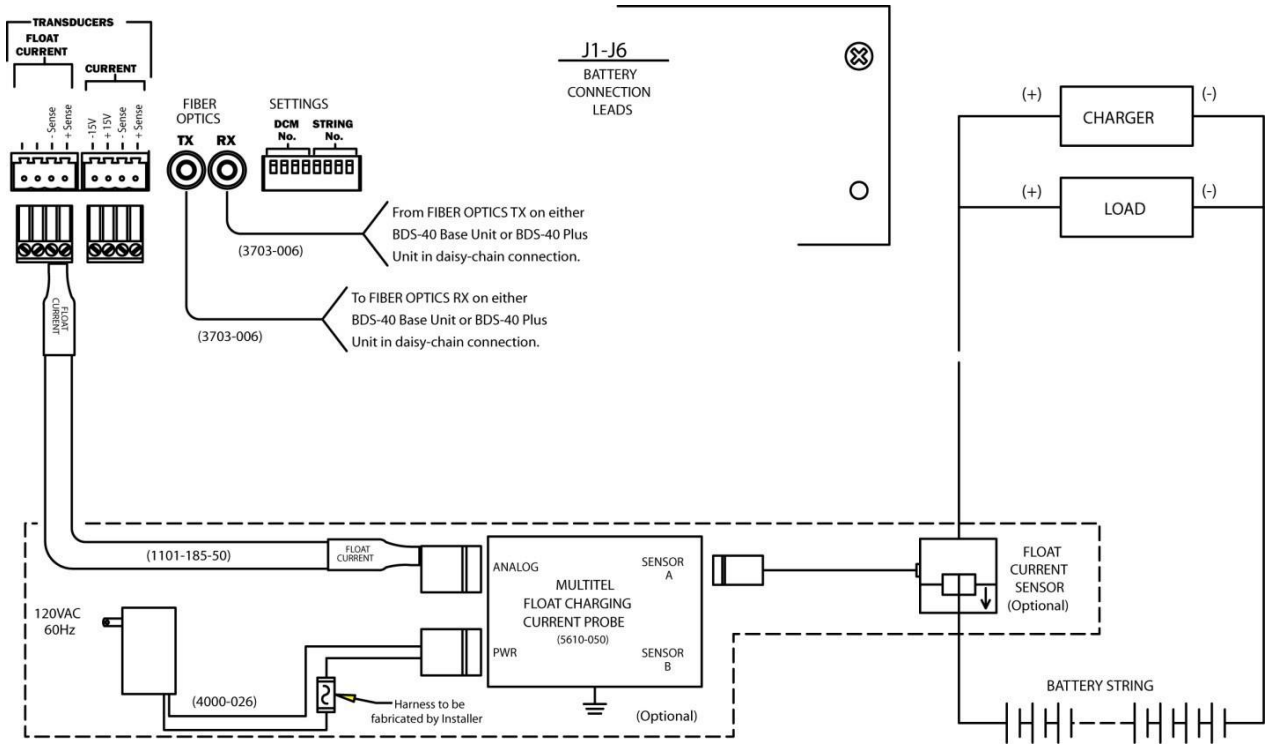


Figure 41. FCCP Snapshot Of BDS–1441–B1581

Figure 42. Multitel FCCP pn 5610–051 Part Of KIT–1101–749

Figure 43. FCCP Cable pn 1101–185–50 50’ OR

Figure 44. Multitel FCCP Rear Panel

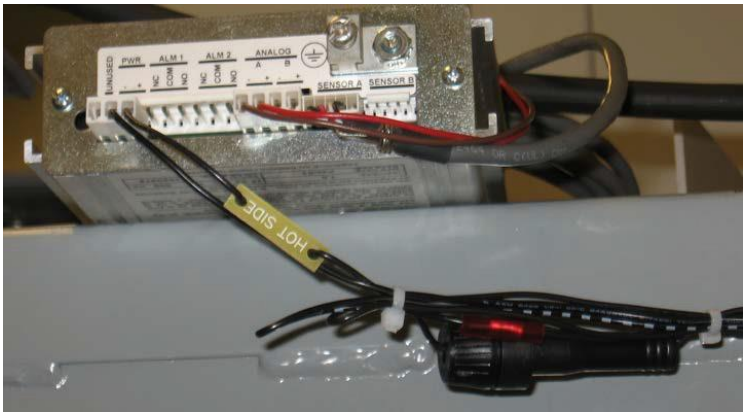


Figure 45. FCCP Connections

Figure 46. Multitel’s FCCP With The Power Source And Inline Fuseholder

Figure 5 – Routing the cable

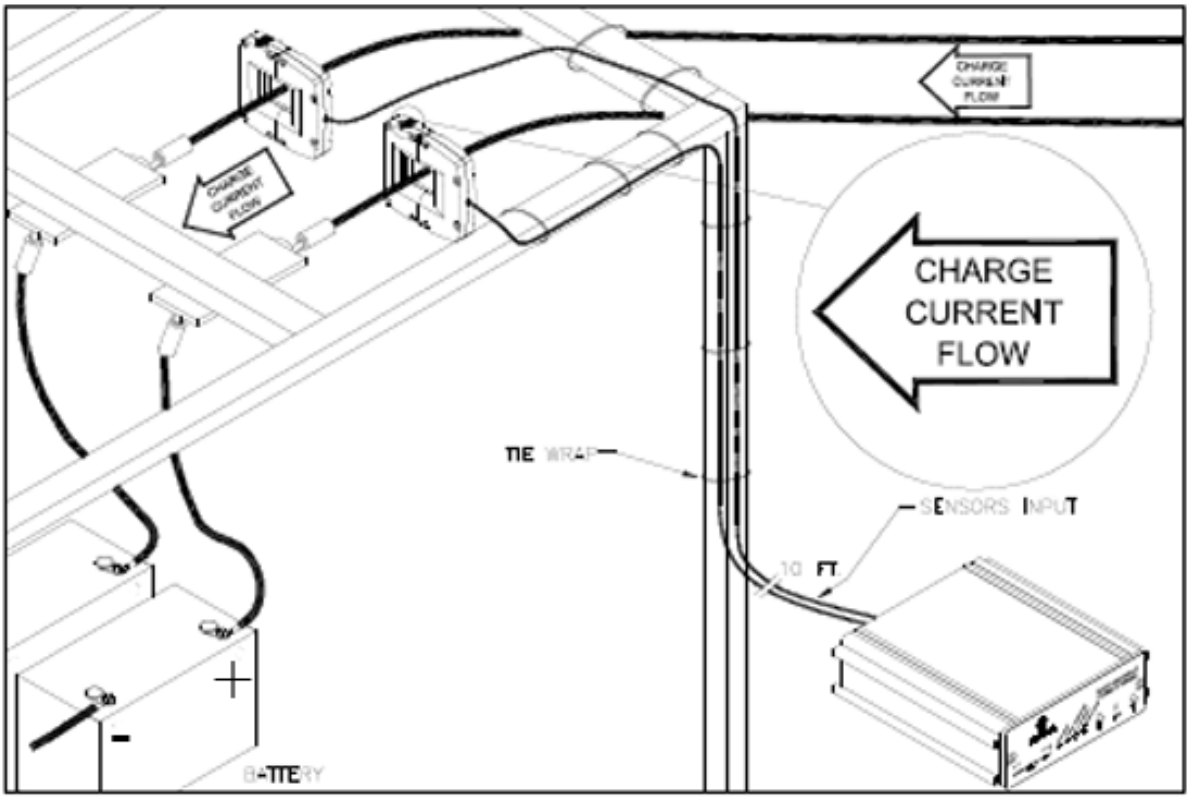


Figure 47. From Multitel's FCCP Manual–Routing The Cable

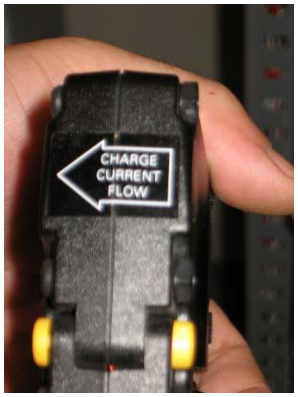


Figure 48. Float Current Sensor

NOTE:

For best results follow the manufacturer's instructions, and please refer to BDS-1441-B1581 for FCCP assembly.

FLOAT CHARGING CURRENT PROBE INSTALLATION

6.3 WIRING A POWER CABLE TO THE FCCP

1. Locate the voltage source to power the FCCP control unit. Using a DVM, verify that the voltage difference between the polarities is between 18 and 60 volts DC.
2. Using shielded cable, route from the control unit's mounting location to the located and verified voltage source. If access to the rear of the control unit is restricted, be sure to leave enough cable length to attach the power connector to the rear of the control unit and then to slide the complete assembly into its final installation position. Leave enough cable length to allow connection to the power source.
3. Permanently secure the cable run with cable ties.
4. Install inline fuse holders to the power source end of the shielded cable. The fuses should be as close to the power source as possible. Leave the fuses out of the fuse holder temporarily. Place the fuses somewhere safe where they can be found later.
5. Permanently connect the power source cable to the power source, paying close attention to polarity. Be sure to connect the cable ground to a reliable system ground connection, close to the utilized power source.
6. Turn your attention to the control unit end of the cable. Strip only enough insulation and shield from the cable as necessary to crimp the connector pins and install the connector housing.

NOTE: To maintain the expected FCC emissions, the cable shield needs to come to the base of the connector housing. Therefore, it is critical to only strip away as much insulation as needed to install the connector pins and housing.

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Figure 49. Section 6.3 Of Multitel's FCCP Installation Manual Pg. 38

FLOAT CHARGING CURRENT PROBE INSTALLATION

7. Using the tool, permanently crimp the pins to the wires exposed at the end of the shielded cable to go to the control unit. Slide the crimped wires into the connector housing, making sure to observe the correct polarity and to leave the ground conductor free.
8. Return to the fuse holders and install the fuses temporarily removed earlier.
9. Plug the connector housing into the control unit and verify that the unit becomes active. Remove the connector from the control unit and continue the installation.

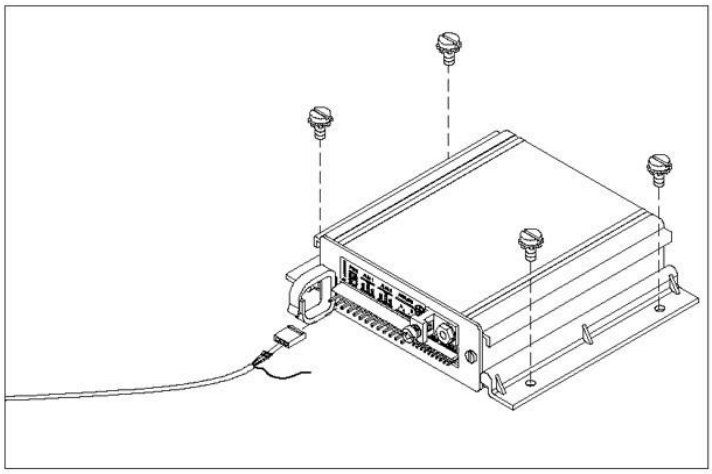

Figure 8 – Inserting the Power Connector

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Figure 50. Section 6.3 Of Multitel's FCCP Installation Manual Pg. 39

7.2.8 Alarm Contacts And Remote Alarm Reset

There are two sets of Form C alarm contacts, labeled Critical and Maintenance, on the BDS–40 Base Unit rear panel. Each set of connections has a COM (Common), NC (Normally Closed), and NO (Normally Open) terminal. These alarms are BMDM program configurable under Setup on the Main Menu.

Connection can be made directly to a facility's alarm reporting system. If there is more than one BDS at the same location and only one set of contacts can be monitored, the alarm contacts can be wired in parallel. Refer to BDS–1193–B986.

The plus and minus remote reset input contacts are on the BDS–40 Base Unit rear panel. Connecting a +12VDC signal to the reset input contacts will reset alarms for all strings. If there is more than one BDS at the same location, and only one set of contacts is available for reset, these inputs can be wired in parallel.

7.3 Base To Plus Unit Fiber Optic Connection

When using a BDS–40 Base unit with one or more BDS–40 Plus units, connect the Base and Plus units as shown in the following figure.

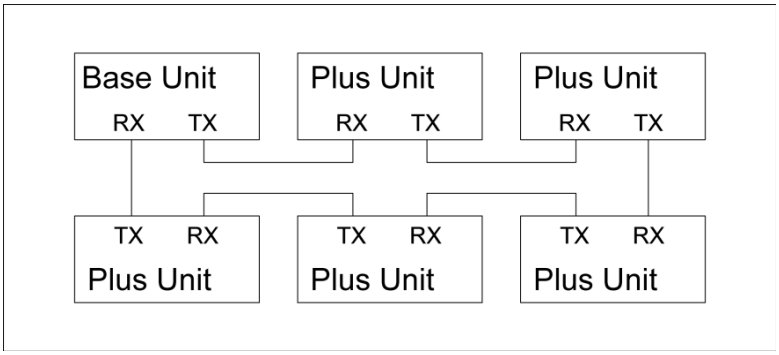

Figure 51. Base to Plus Unit Connection

Connect TX from the Base unit to RX of the first Plus unit. Continue the sequence until TX of the final Plus unit connects to RX of the Base unit. A maximum of five Plus units may be connected to a Base unit.

8 Final Steps Connecting To Battery Terminals

8.1 Connect Cell Voltage Sense Lead Harness To BDS–40

The BDS–40 open rack system is normally supplied with generic drawings and installation harnesses un–terminated. For illustrative purposes, refer to drawings supplied with the system.

After the user install the tab washers, install the harness to the BDS–40. The cable connectors on the rear of the BDS–40 are labeled J1 to J5 where J5 is used exclusively for the load connections attached to the battery.

WARNING:

Failure to connect the sense leads to their specified locations could result in hardware failure.

NOTE:

Depending upon the configuration, 2 to 4 sense lead harnesses and 1 load lead harness will be included and require termination on installation. Please refer to drawings BDS–1357–A706 and BDS–1358–A707.

8.2 Installing The Cable Hood

After all cables are connected to the Base or Plus unit, secure the cable hood to the rear of the unit using four #10–32 screws (supplied). This hood closes the rear of the unit and protects the cables and connectors from damage or inadvertent removal.

NOTE:

If using a computer and cabinet, place the cabinet where it will be permanently mounted. Keep the back of the cabinet accessible for servicing. Prepare the computer and cabinet, if included, and the Controller. This includes unpacking, mounting, and connecting the modules.

9 Final Steps Communication Connections

9.1 Use With Local Computer

If using a computer and cabinet, place the cabinet where it will be permanently mounted.

NOTE:

If using a cabinet(s), make sure the back of any cabinet is fully accessible to service and securely anchor all four corners of all cabinets used to the floor.

If the cabinet is not screwed into the floor then, fill the container at the bottom of all cabinets with ballast. This provides stability to help prevent the cabinet from tipping over. The recommended ballast is all–purpose sand (Sure–Mix® All Purpose Sand or equivalent) available at most home improvement stores.

WARNING:

Do not energize the cabinet or any component with battery voltage until after the installation is complete.

Look at the system drawing and the physical facility and determine how the fiber optic and power cables must be situated. If a cabinet is used, pass the AC power cord for the power strip mounted inside the cabinet through the lower left hole and plug it into a UPS–protected outlet after installation is complete.

NOTE:

The electrical service required is less than 10 amps at 115VAC or 5A at 230VAC.

When using an internally mounted Uninterruptible Power Supply/UPS, plug the power strip AC cord into the UPS and plug it into an AC outlet after installation is complete. If using an optional UPS, install it near the bottom of the rack.

Optionally, if using a cabinet, pass conduit through the lower left hole and mount an outlet box inside the cabinet. This must be done by a qualified electrician and meet NEC requirements.

Install the remaining components as follows. Refer to the drawings provided with the userr system.

WARNING:

The BDS system is designed to connect to UPS systems that are 600VDC or less and a maximum of 300V with respect to earth ground. The user must verify the voltage with respect to earth ground before connecting the system. Do this by measuring the voltage from each battery post referenced to earth ground. The voltage cannot exceed 300V.

- Install the computer monitor on top of the cabinet or the highest shelf to be used.
  - Connect the power cord to the power strip.
- Install the computer/PC on the shelf below the video display.
  - Connect the power cord to the power strip.
  - Connect the monitor to the computer.
- Install the keyboard in the keyboard drawer and connect it to the computer.
- Connect an RS–232 cable (one to one) from the computer to the rear panel of the BDS–40 Base Unit.

9.2 Use With No Local Computer

If not using a local computer and cabinet, install the BDS–40 Base Unit as follows.

- Provide UPS–protected AC power to the location where each Base Unit will be installed.
  - Connect the AC power cord to the UPS protected outlet.
- If using a modem to dial out, connect the phone line to the RJ–11 jack on the rear panel.
  - Use a minimum 26AWG TELCO line cord.

If connecting to a LAN, connect the customer–supplied network cable to the RJ–45 connector.

9.3 Communications Connections

Communication connections to the BDS can be via:

6. a modem,
7. the USB (front panel)
8. RJ–45 and RS–232 (rear panel).

All methods allow battery parameters to be checked. Connection to a BDS can be via a modem or Wide Area Network/WAN from a remote location or on–site using the RS–232 Local port, Local Area Network/LANport or USB port. Any method lets the user check all battery parameters. When connecting via modem, use 26AWG (minimum) Telco line cord. Refer to BDS–1193–B986.

9.3.1 Modem

The BDS can connect to a telephone line using the TELCO RJ–11 connector on the rear panel. To communicate with a BDS from a remote location, connect the BDS rear panel modem connector to a telephone line. Connect the remote computer's modem to the telephone line according to the computer manufacturer's instructions.

When connecting via modem, use 26AWG (minimum) TELCO line cord. Pins 2 and 3 of the RJ–11 TELCO connector are for the tip and ring connection.

Figure 52. TELCO RJ–11 Modem Connection

9.3.2 USB

Use the front panel USB port for connecting a portable computer for service or data analysis.

Figure 53. USB Cable

Figure 54. Laptop

9.3.3 RS–232

Use the 9–pin RS–232 Local port on the rear panel of the Controller for connecting to a permanent Local computer or a building management system.

For a permanently connected computer, connect a 9–pin female to female cable (pin to pin construction) to the rear panel port available and to an available port on the computer to be used.

The connection between the BDS and the computer must not exceed 25 feet.

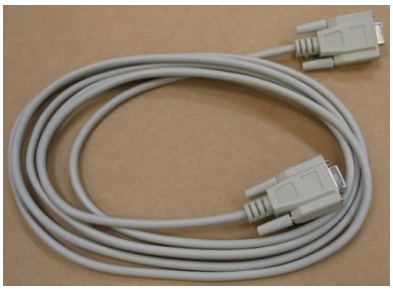

Figure 55. RS–232 9 Pin Female to Female Cable

9.3.4 RJ–45

If the network option is installed, there is an RJ–45 connector installed on the rear panel.

Connect an Ethernet patch cable between the controller and the network to be utilized.

Figure 56. RJ–45

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