

DYNAMIC RATINGS

DR-C50 Series

USER CONFIGURABLE SOLUTION

for Transformer Monitoring, Control and Communication

Product Overview

DR-C54

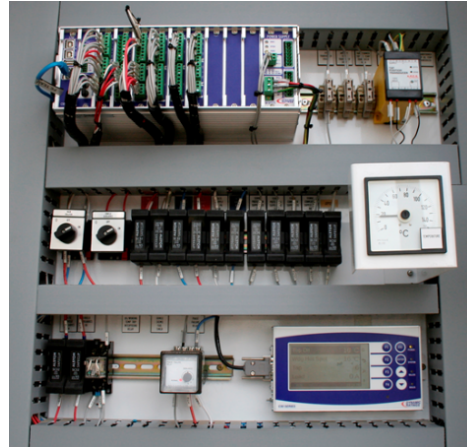
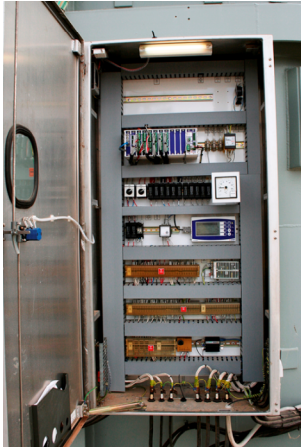


DR-C59



Features & Benefits

- **RC Δt Technology**
 - Making C50 the industry's easiest device for OEMs or End Users to deploy.
- Scalable Hardware Platform
- Supports Numerous Applications for
 - Cooling Monitoring and Control
 - OLTC Monitoring
 - Voltage Monitoring and Control
- Annunciator Functions
- Multiple Secure Communication Options
- 24/7 Continuous Monitoring



DR-C50 and Graphical User Interface Shown

The DR-C50 Series (C50) Transformer Monitor can detect changes in oil temperature, windings, OLTC, insulation, and cooling systems. The C50 is capable of cooling and voltage control.

C50 provides 24/7 continuous monitoring of operational and performance data to provide early and accurate indication of the location, type, and rate at which asset operating conditions are changing.

The C50 with **RC Δ t** Technology is easy to use. This technology enables customers to easily configure a system for their unique application, rapidly present data, notices, or alarms via a Web Dashboard, or Graphical User Interface allowing for rapid access and visualization of collected data.

C50 Series Monitors are compact and rapidly configured – the best value in transformer monitoring to date!

RC Δ t Technology Advantage

Simply connect a C50 to a computer and power the **RC^t** technology. Minutes later, critical asset condition data can be flowing!

- **RC Δ t** - Repeat Configuration technology
 - o Automatically detects your chosen hardware and presents an accurate Web-based system depiction, rendering the device ready for your application specific configuration.
 - o Saves you time and money in deploying additional units. Simply click "Load Configuration from PC" for automated programming of future C50s using existing data sets!
- **RC Δ t** - Robust and Compact
 - Three devices in one. A monitor, control and communications solution with a graphical user interface... all in the industry's smallest size, which reduces control cabinet costs and space.

Features & Benefits

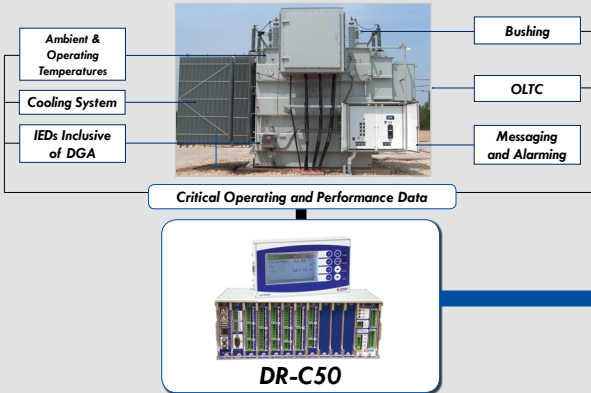
- Configure the C50 Series Monitor to your unique application using the included Initial Configurator software.
- Log in to the Web Dashboard to securely monitor your asset's history and condition.
- Modular hardware platform allows for a broad variety of applications and on-site upgrades by the user.
- Programmable functions for cooling and voltage control, enabling fast, automatic response to alarms.

RC Δ t is a registered trademark of Dynamic Ratings.

Three-in-One

Monitor, Control, and Communications Solution

Transformer Asset Health Monitor



2

Control

- **Cooling Control**
 - Load Activated, Cooling Turn On
 - Fail-Safe Configurable
 - Fan Sequencing
 - Fan/Pump Test
- **Voltage Control**
 - Paralleling Options
 - Master/Follower
 - Reverse Reactance
 - LDC
 - Voltage Graphing Display

1

Monitoring

per IEC and ANSI/IEEE standards

- **Temperatures**
 - Top Oil
 - Bottom Oil
 - Winding Hot Spots
 - Ambient
- **Cooling System**
 - Fan/Pump Current
 - Contactor Status
 - Loss of Power
- **DGA & Moisture**
 - Serial or Ethernet Link to Third Party Dissolved Gas Analyzers (DGA)*
- **OLTC**
 - Position
 - Operation Counters
 - OLTC Temperature Differential
 - Motor Current
 - Contact Wear
 - Reversing Switch Operation
 - Hunting
- **Alarms**
 - Built-in Annunciator
 - Major/Minor Groups
- **Data Logging**
 - Chronological Data Log
 - Alarm Log

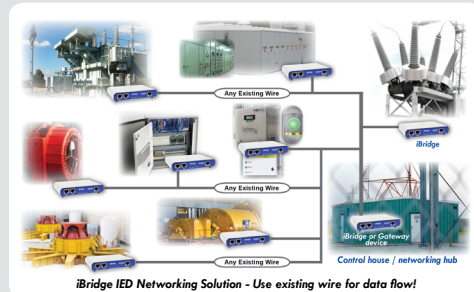
* Consult the factory for a list of compatible devices.

3

Communications


multiple secure options

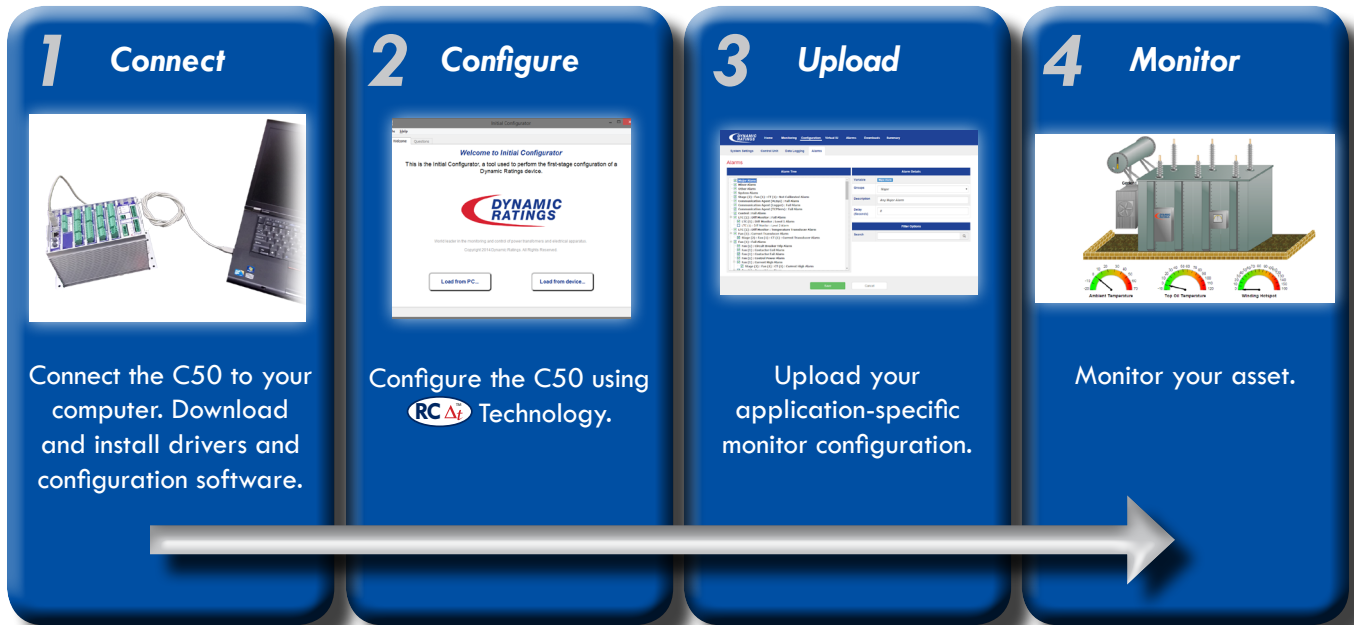
- **SCADA Connections**
 - Serial (Half or Full Duplex)
 - Fibre, RS-485, RS-232
 - Protocols: DNP 3.0, Modbus
 - Ethernet
 - Copper, 10/100 Base T; Fiber, 100 Base FX; Ethernet over USB
 - Protocols: IEC-61850, DNP 3.0, Modbus
 - SCADA Test Utility
- **iBridge IED Networking Solution Capable**



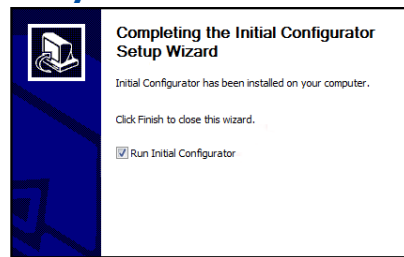
- **Ethernet Switch Function**
 - Provides simultaneous copper and fibre connection

Four Easy Steps to Monitoring Your Assets

Transformer monitoring is made easy for OEMs and End Users, simply connect a C50 to a computer and power the  Technology.

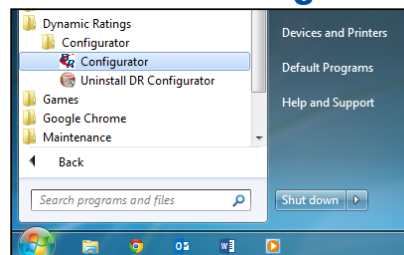



Easy Installation



The C50 Configurator software is compatible with Windows computers and typically downloads directly to your computer from the DR-C50 Monitor via a USB Ethernet connection - no Internet access required.

Launch the Configurator

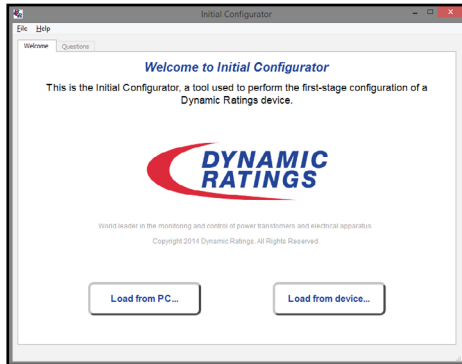


To launch the Initial Configurator, open the  Start Menu and run  Configurator.

Save Time With Automated Configuration

RC_Δi technology ensures you only program the attributes relevant to your application create new configuration files or copy prior configurations. This allows for rapid configuration and deployment of large-scale applications.

Automating Configuration



To **copy** prior configurations, click **Load from PC...**.

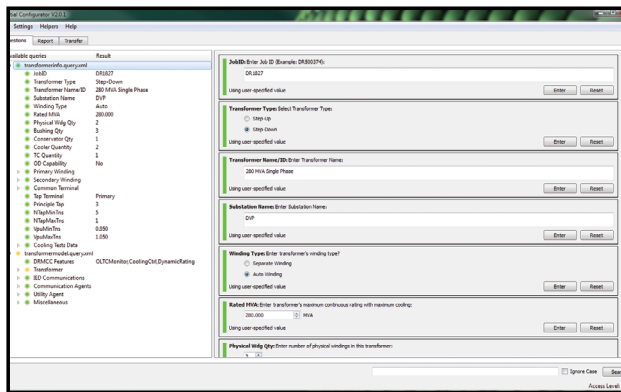
The Configurator allows for programming incremental devices using previously created DR-C50 configurations.

Copy existing application configurations to your 2nd, 3rd, etc. asset monitor.

To **load** the device's configuration or **create** new configurations, click **Load from device...**.

Create application specific configurations for new monitoring systems.

Intuitive Configuration Screens



Configuration screens provide easy-to-use, intuitive windows and menus.

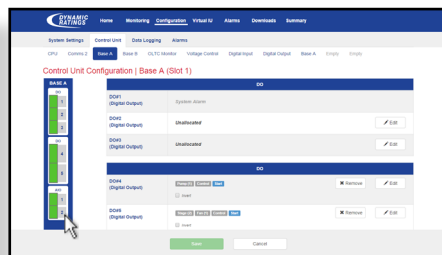
RC_Δi technology determines what to ask about your transformer and its use, saving time and avoiding confusion by focusing only on information relevant to your application.

The Configurator allows tailoring to your application.

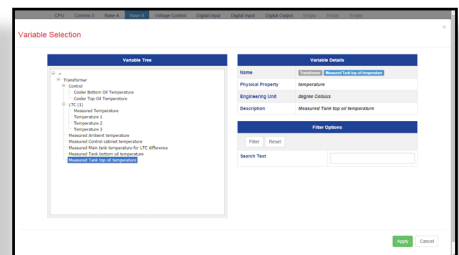
Configuration windows for each installed module provide clear and concise configuration selections. By clicking the module's graphic, you are able to configure the device for your application.



Click a module



Tailor to your application



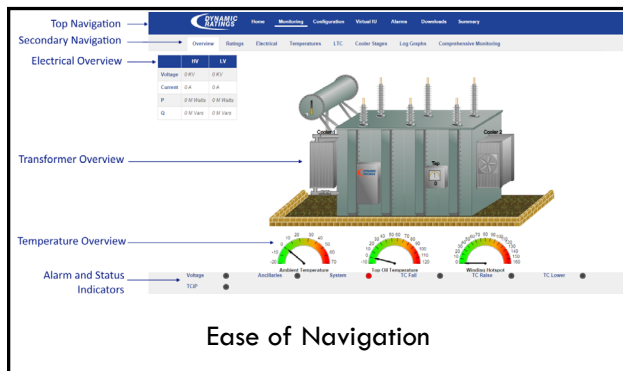
Apply changes

Monitoring Dashboard

The C50 Monitoring Dashboard is a powerful tool for managing and monitoring your assets. Logging in to the monitor via a web browser, operators can view the current status of the devices being monitored and alarm history.

The main dashboard provides navigation toolbars and critical electrical, temperature, and alarm status overviews. The dashboard monitoring tab allows for detailed visual presentations of vital operating conditions of your transformer.

Main Dashboard

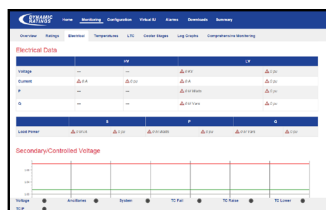


Monitoring Dashboard features:

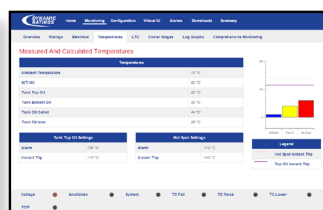
- Real-time at-a-glance load and temperature data
- Configuration of custom alarms
- Customized data logging
- GUI-based configuration of the control unit
- Configuration of digital output for application-specific control mechanisms
- Secure remote access
- OLTC Monitoring
- Voltage Control

Review Real Time Data

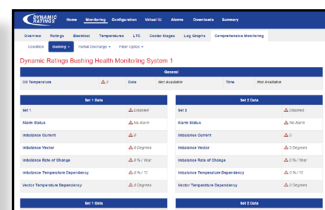
The dashboard provides real time data to track alarms, view data history, and configure responses and reactions to changing conditions of your transformer



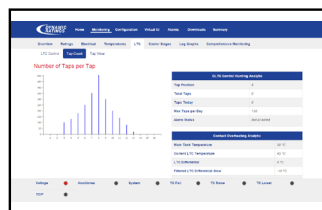
View Electrical Data



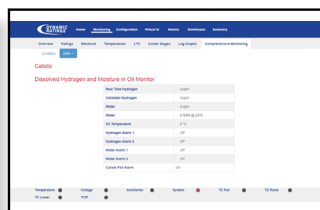
Measured and Calculated Temperatures



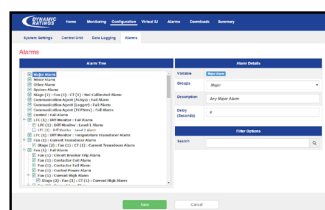
Bushing Health



Tap Wear Data



DGA IED Data



View Alarms

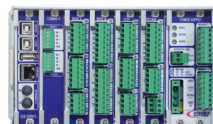
Hardware Overview

The C50 Series is a scalable system. The basic components of each system are a Control Unit and a Graphical User Interface (GUI).

Control Unit

The DR-C50 monitoring system is offered in two frame sizes:

- o DR-C54, supports up to four expansion cards
- o DR-C59, supports up to nine expansion cards



C54



C59

Each C50 control unit is comprised of the following:

- 1 x expansion rack (Two frame sizes are offered)
- 1 x CPU module
- 1 x Communications module
- 1 or more I/O modules (user selectable expansion cards)
- 1 x Universal Input, Power Supply module

Electrical connections are made using terminal blocks that can be unplugged to facilitate testing, rewiring, or replacement of hardware.

C50 controls feature **RCΔT** technology. This technology allows each control unit to perform various self-checks when it turns on. Additionally, during power up the **RCΔT** technology automatically detects installed expansion hardware selections and prepares data sets for configuration. This accurate system depiction makes the device ready for your application specific configuration.

Graphical User Interface

The GUI connects to the control using the provided cable terminated with DB9 connectors. The inter-connection cable carries the keypad signals, LCD data information, and the 24V power supply source.

Graphical Display

Data is presented in a graphical format to easily interpret and diagnose trends.

Voltage and control settings are drawn graphically for easier system testing.

Smart Menu Buttons

One touch buttons (F1-F4) immediately access functionality.

Navigate menus with Esc, Enter, and up or down scrolling.



System Status LEDs

Provide quick status indication.

The GUI can be mounted in several manners: panel, DIN rail, or 19 inch rack mount installation. Each GUI ships with the hardware required for all methods above. Rack mount plate shown below.



Powerful Monitoring Options

CPU & Ethernet Card



- 1× USB Type B Console Port
- 1× USB Type B Device Port (Configuration/Setup)
- 1× USB Type A Host Port (Data Download)
- 1× 10/100 Base T RJ45 Ethernet
- 1× Fibre Ethernet Connection 100 Base FX

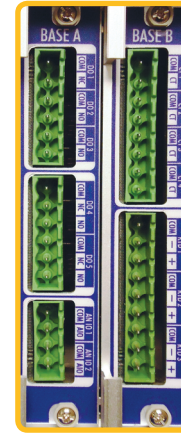
Communications Card



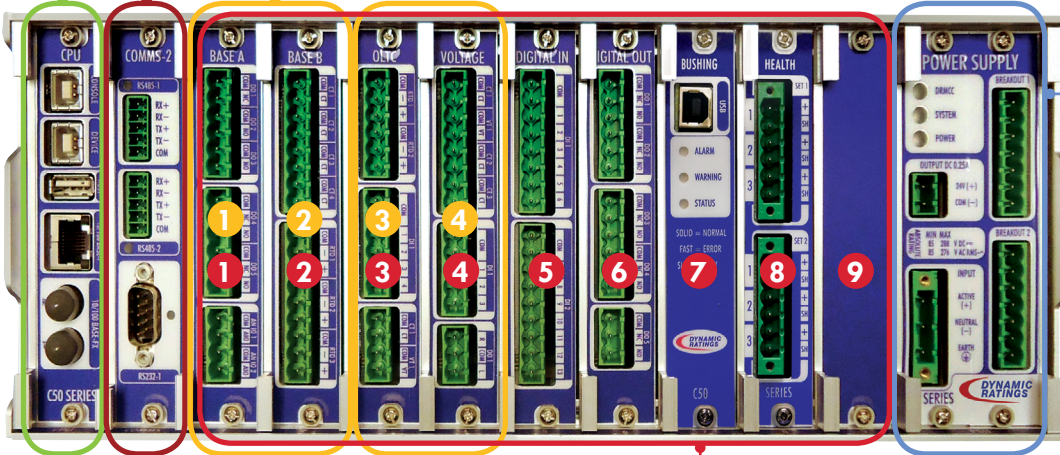
- 2× RS-485 Connections for SCADA or other serial device connections. These EIA compatible connectors can be either two wire or four wire
- Optional Serial Port
 - Serial Fibre Optic
 - RS-232 (shown)
 - RS-485

Base System Cards (see Relay Definitions)

Select from Base A or Base B Cards providing:



- Base A:**
 - 2× Form A Relay Outputs + 1× Form B + 2× Form C + 2× DC Analog Inputs/Outputs
- Base B:**
 - 3× RTD Inputs + 4× CT Inputs



Universal Power Supply

Status LEDs: DRMCC, System, and Power

Electrically isolated 24v DC output supplies up to 250mA for digital inputs.

Input Power:

88-288 VDC

88-276 VAC 50/60 Hz

Breakout 1 and 2 supply voltage to digital input devices.

System Frame Options

- **DR-C54** Provides four card slots for optional expansion cards (Slots 1-4)
- **DR-C59** Provides nine card slots for optional expansion cards (Slots 1-9)

Relay Definitions

Form A = SPST-NO. A single, normally open contact that closes upon actuation.

Form B = SPST-NC. A single, normally closed contact that opens upon actuation.

Form C = SPDT. A Form A contact connected to a Form B. The Form C contact has three wires, NO (normally open), NC (normally closed) and C (common). Upon actuation, the NO contact closes (continuity from NO-C) and the NC contact opens (no continuity from NC-C).

Optional Expansion Cards (see relay definitions)

Select from the following card options for slots 1-9.

Select one Voltage Control card.

Select one OLTC Monitoring card.

N - None

A - Base A, (Two Form A Relay Outputs + One Form B + Two Form C + Two DC Analog Inputs/Outputs)

B - Base B, (Three RTD Inputs + Four CT Inputs)

C - Digital Input (Thirteen Digital Inputs)

D - Digital Output (Five Form C Relay Outputs)

E - Voltage Control (One Voltage Transformer (VT) Input + Three CT Inputs + Three Digital Inputs + Two Form A Outputs)

F - OLTC Monitoring (Two RTD Inputs + Four Digital Inputs + OLTC Motor Current)

G - Bushing Health Monitoring (Six BAU Sensor Inputs)

Packaging Options

The DR-C50 may be ordered as a standalone instrument, or in an enclosure with or without iBridge communications. All models ship with installation drill templates.

Standalone (S)



DR-C54

Includes:

- Monitoring Instrument Populated with Connectors
- Graphical User Interface with Connection Cable
- Configuration software
- USB Configuration Cable

Enclosure Mounted (E)



DR-C54



DR-C59

Includes Option (S) and:

- NEMA 4x Enclosure

Enclosure With Communications (C)



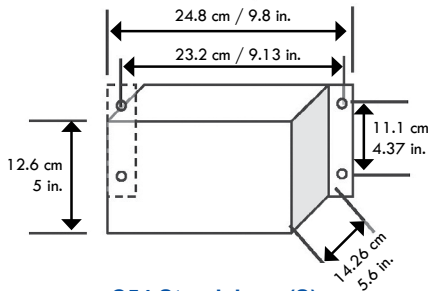
DR-C54

Includes Option (E) and:

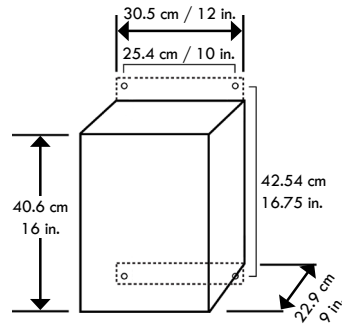
- iBridge Communications Device

For other enclosure options, please contact the factory.

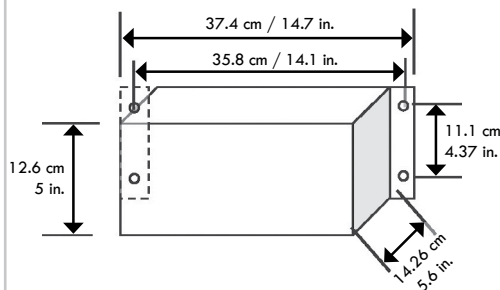
Overall Dimensions and Mounting Hole Locations



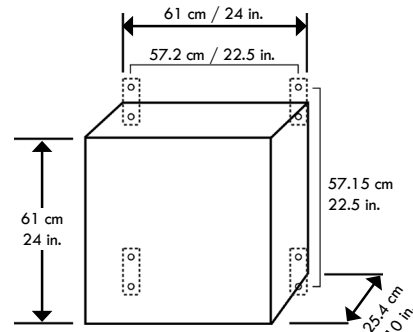
C54 Standalone (S)



C54 Enclosure (E or C)



C59 Standalone (S)



C59 Enclosure (E or C)

DR-C50 — ORDERING INFORMATION

To Order, Fill Boxes with Feature Selections

All base systems include one of each of the following: CPU, Ethernet Card with 10/100 Base T (RJ45) and Fiber Optic (100 Base FX), Communications Option including two RS-485 Ports, Power Supply, Graphic User Interface with Cable, USB A to USB B Cable, and a quick-start booklet.

Select Base System Type
DR-C5 - - -

Expansion Cards
 1 2 3 4 5 6 7 8 9

Select a Packaging Option
Select Serial Communication Option

Base System

- 4** Base System + Select up to four optional expansion cards.
- 9** Base System + Select up to nine optional expansion cards.

Optional Expansion Cards (see relay definitions)

- N** None. (Each **N** will include one blank slot cover.)
- A** Base A: Two Form A Relay Outputs + One Form B + Two Form C + Two DC Analog Inputs/Outputs.
- B** Base B: Three RTD Inputs + Four CT Inputs.
- C** Digital Input: Thirteen Digital Inputs.
- D** Digital Output: Five Form C Relay Outputs.
- E¹** Voltage Control: One Voltage Transformer (VT) Input + Three Current Transformer (CT) Inputs + Three Digital Inputs + Two Form A Outputs.
- F²** OLTC Monitoring: Two RTD Inputs + Four Digital Inputs + OLTC Motor Current.
- G³** Bushing Health Monitoring: Six BAU Sensor Inputs

N	N	N	N	N	N	N	N	N	N
A	A	A	A	A	A	A	A	A	A
B	B	B	B	B	B	B	B	B	B
C	C	C	C	C	C	C	C	C	C
D	D	D	D	D	D	D	D	D	D
E	E	E	E	E	E	E	E	E	E
F	F	F	F	F	F	F	F	F	F
G	G	G	G	G	G	G	G	G	G

Packaging Options

- S** Stand-alone. Ready for DIN rail or panel mounting. Included is a Graphical User Interface 48 cm / 19 in. rack mounting plate.
- E** Base System, NEMA 4x Enclosure Mounted
- C** Base System, NEMA 4x Enclosure Mounted with one CE-525 iBridge Communication Device, one IND2000N signal coupler, one Ethernet cable, and one mounting bracket.

Serial Communications Options

- 0⁴** Two RS-485 Ports (factory default)
- 1** Two RS-485 Ports + Serial Fiber Optic
- 2** Two RS-485 Ports + RS-232
- 4** Three RS-485 Ports

Notes

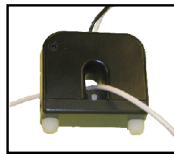
- ¹ Select no more than one Voltage Control Card per system
 - ² Select no more than one OLTC Monitoring Card per system.
 - ³ Select no more than one Bushing Health Monitoring Card per system.
 - ⁴ Every base system includes a Serial Communications card, providing two RS-485 ports.
- Cables, sensors, and wiring are not included and must be ordered separately.

SPECIFICATIONS

Power Requirement:	88-288 VDC or 88-276 VAC 50/60 Hz
Internal Memory:	2 GB
Temperature Range:	-40°C to +70°C / -40°F to +158°F
User Interface:	Backlit LCD (Daylight Readable) connected via supplied cable.

SENSORS — ORDERING INFORMATION

Part #	Description
CT-054	Auxiliary CT: Split Core CT 1000:1 Ratio w/5A Primary
CT-055	Auxiliary CT: Fixed Core CT 1000:1 Ratio w/5A Primary
MMTS-3C	Temperature Sensor, RTD - Magnetic Mount w/ 1/2" NPT Thermal Well
MMTS-3W	Temperature Sensor, RTD - Magnetic Mount w/ 7.6m (25ft.) S/S Cable
SE-060	Temperature Sensor, Probe for 1/2" NPT Thermal Well
SE-065	Temperature Sensor, Dual element probe for 1/2" NPT Thermal Well
SE-070	Ambient Temperature RTD with Weather Shield Assembly
SE-075	Ambient Temperature RTD with fitting for enclosure mounting



CT-054



CT-055



MMTS-3W



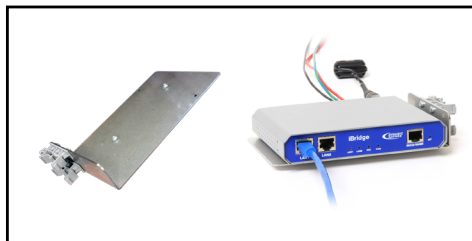
SE-060



SE-070

iBridge DEVICES and ACCESSORIES — ORDERING INFORMATION

Part #	Description
CE-520	iBridge with a 1.83m / 6 ft. power cord with NEMA 5-15 plug
CE-525	iBridge with a field wiring plug
CE-530	Gateway with a 1.83m / 6 ft. power cord with NEMA 5-15 plug
CE-535	Gateway with field wiring plug
CE-562	One RS-232 connection adaptor
CE-564	One RS-232 (25 pin) connection adaptor
IND2000N	One 9mm / 0.35 in. signal coupler
IND2020N	One 13mm / 0.51 in. signal coupler
IND2040N	One 18mm / 0.71 in. signal coupler
IND2100N	One 25mm / 0.98 in. signal coupler
SLRS5DIN00RXX	iBridge mounting kit includes: (1) DIN mount L-bracket and hardware


SLRS5DIN00RXX
iBridge Mounting L-bracket, iBridge on Mounting Kit

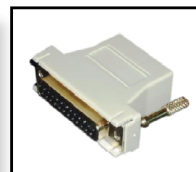

iBridge CE-520



CE-562



iBridge CE-525



CE-564



IND-; 2000N, 2020N, 2040N, 2100N



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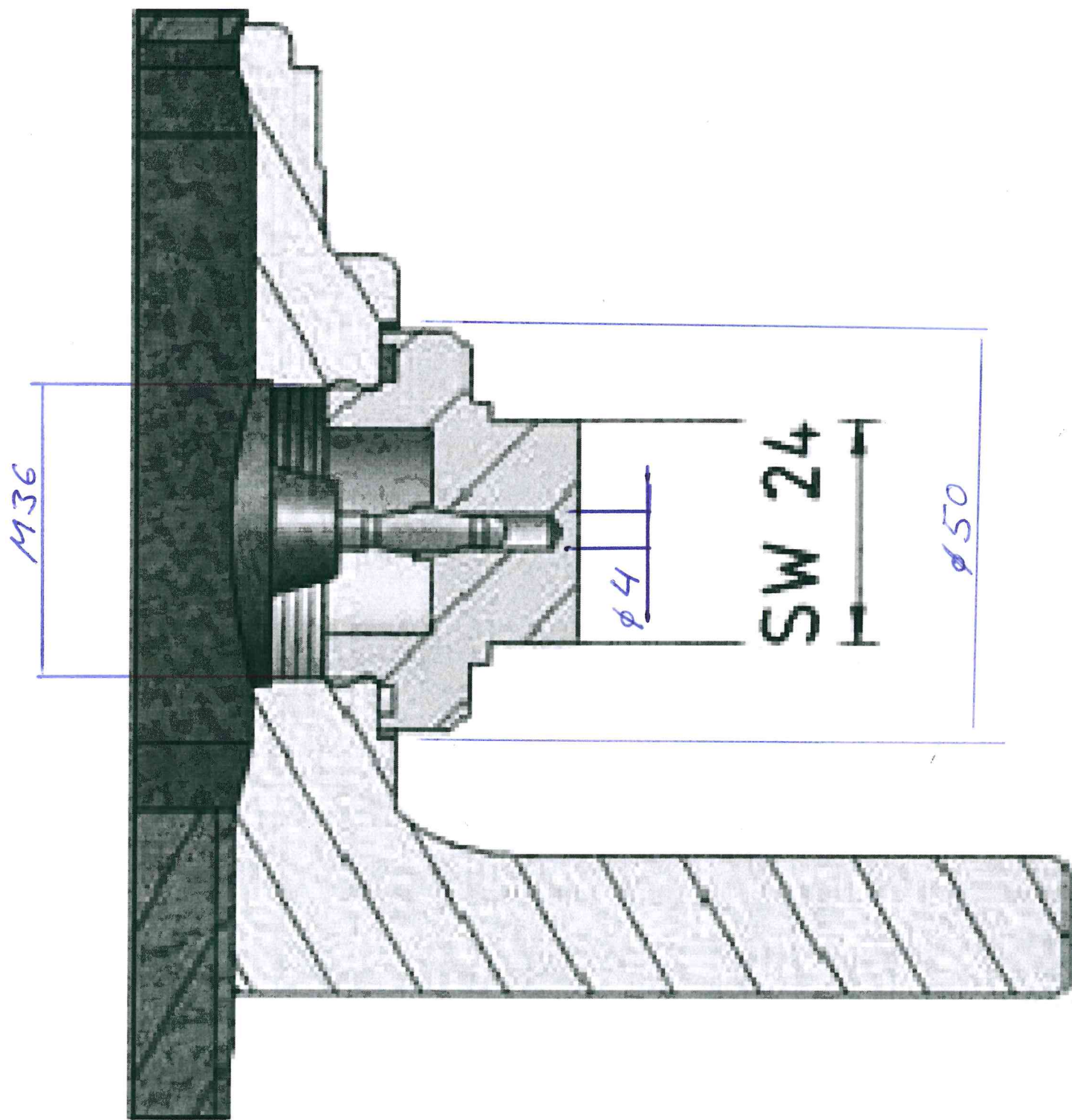
Americas /Europe

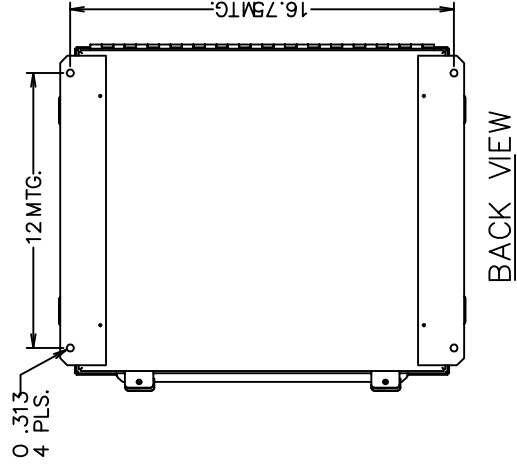
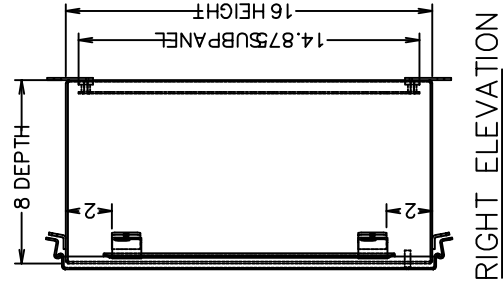
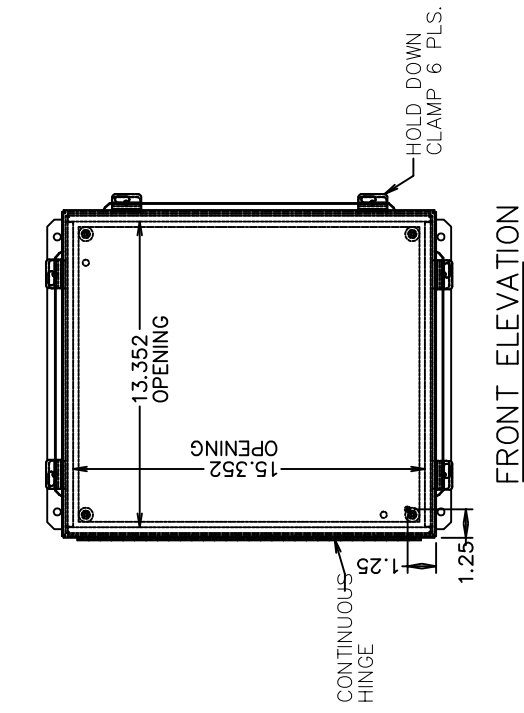
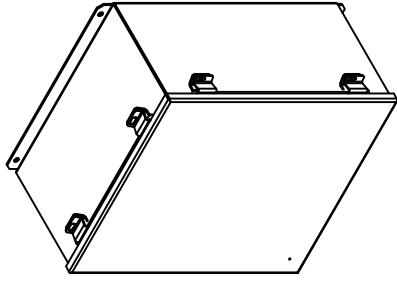
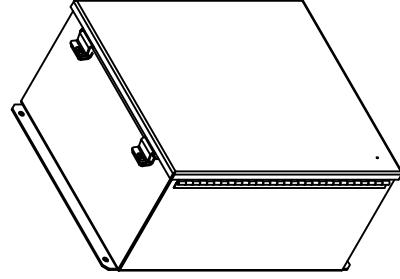
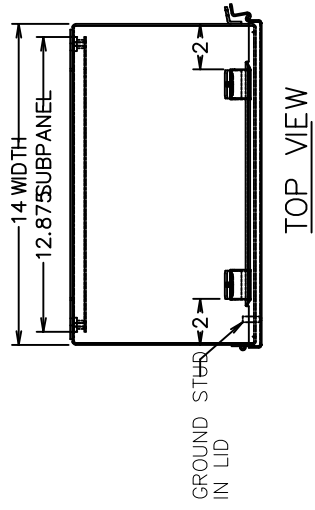
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*For any enquiry, please contact
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Assembly Procedure #1

Step 1: Place item #10 RTD thru item #11 thermocouple connector approximately 2.000 inches / 5.080 cm past the edge of item #11 thermocouple connector hex nut.

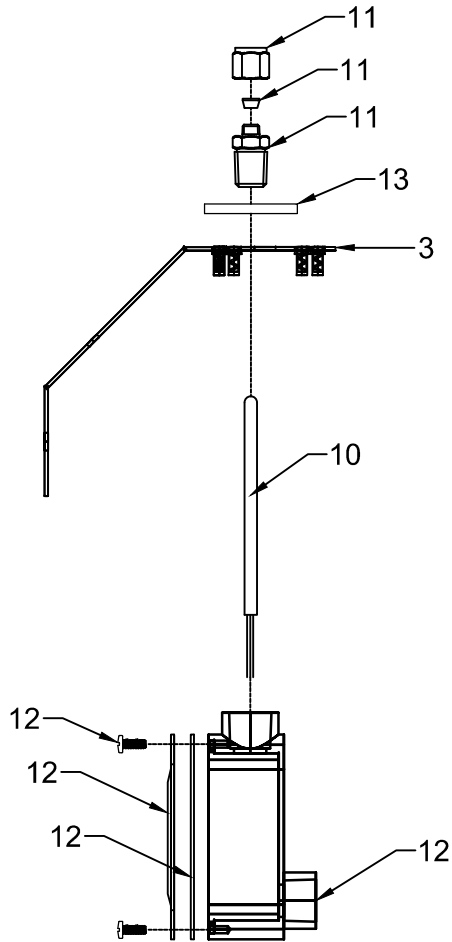
Step 2: Then tighten item #11 thermocouple hex nut so item #10 RTD will not move freely.

Step 3: Take item #11 thermocouple connector and item #10 RTD assembly, and place item #13 flat washer around item #11 thermocouple connector threads as shown in assembly #1.

Step 4: Now put item #11 thermocouple connector threads thru item #3 mounting bracket as shown in assembly #1. Next tighten item #11 thermocouple connector into item #12 aluminum body LB so item #3 mounting bracket will not move freely.

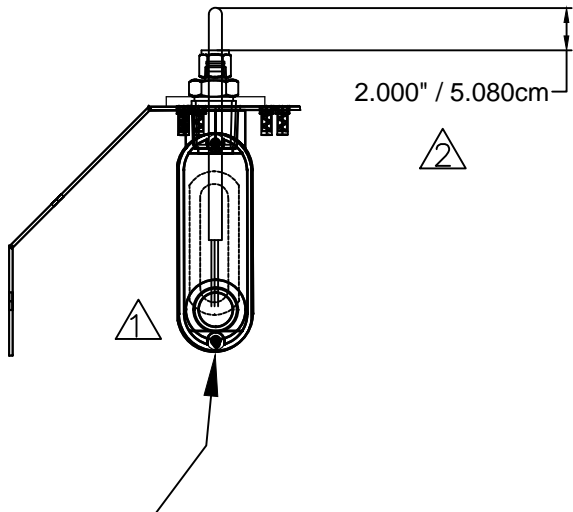
Step 5: Finished assembly #1 shows how the orientation of item #12 aluminum body LB cover and customer conduit needs to be parallel with item #3 mounting bracket.

Assembly #1



Exploded View

Finished Assembly #1



Collapsed View

ITEM#	DESCRIPTION	Part #	QTY
1	Circular Disk Without Center	(SE-070) Kit	6
2	Circular Disk With Center	(SE-070) Kit	2
3	Mounting Bracket	(SE-070) Kit	1
4	Pan Head Machine Screw 0.025" (1/4") Length #8-32 Thread	(SE-070) Kit	4
5	Male-Female Threaded Hex Standoff 0.625" (5/8") Length #8-32 Thread	(SE-070) Kit	26
6	U-Bolt 2.750" (2-3/4") Length 1/4"-20 Thread	(SE-070) Kit	1
7	U-Bolt Hex Nut 0.438" (7/16") Hex 1/4"-20 Thread	(SE-070) Kit	2
8	U-Bolt Bracket	(SE-070) Kit	1
9	U-Bolt Thermal Isolation Pad	(SE-070) Kit	2
10	4.000" Three Wire RTD	RBBGL-KW04A-00-1003B	1
11	PT-100 Thermocouple Connector	4-8FH4BZ-B	1
12	Aluminum Body LB With Gasket and Cover	MID LB15 CGN	1
13	0.875" (7/8") I.D. Flat Washer	98119A037	1
14	3 Position Touch Safe Terminal Block	21.311.0157.001K	1

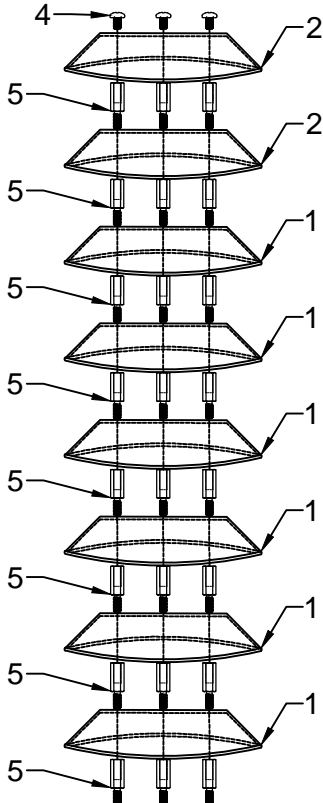
Assembly Procedure #2

Step 1: Install three item #5 hex standoffs to the #3 mounting bracket, then place one of item #1 circular disk without center on installed standoffs and use three more item #5 hex standoffs to secure disk as shown in assembly #2.

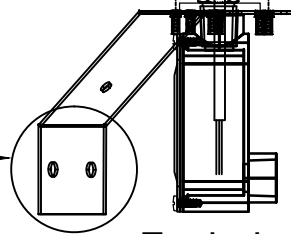
Step 2: Secure five more item #1 circular disk without centers using the supplied item #5 hex standoffs.

Step 3: Secure two item #2 circular disk with centers last, then install three item #4 pan head screws to secure final disk.

Assembly #2



Detail A

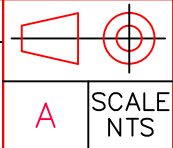


Exploded View

REV	DESCRIPTION	COMPILED	APPROVED	DATE
O	ORIGINAL ISSUE	AJZ		07/07/16

DIMENSIONS ARE IN INCHES/MILLIMETERS

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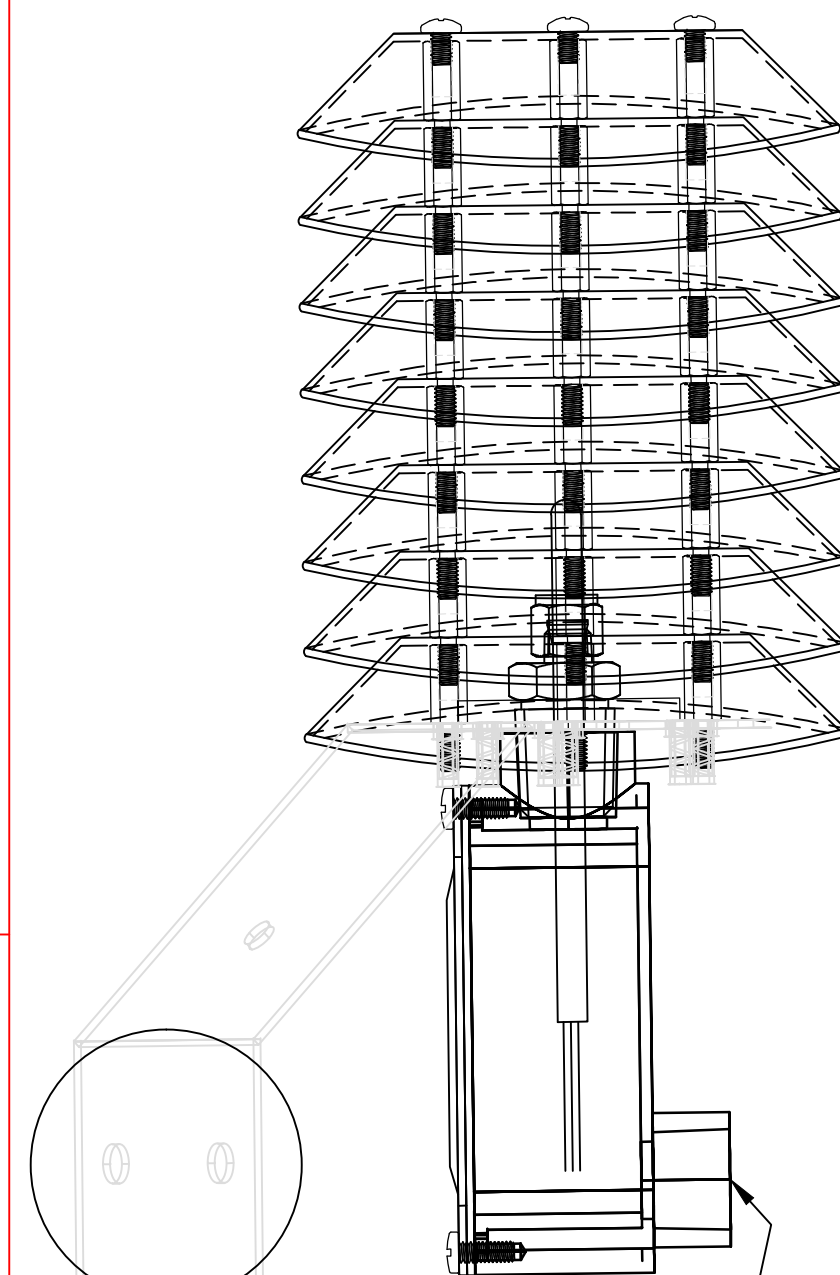


Ambient Temperature Assembly
Radiation Shield



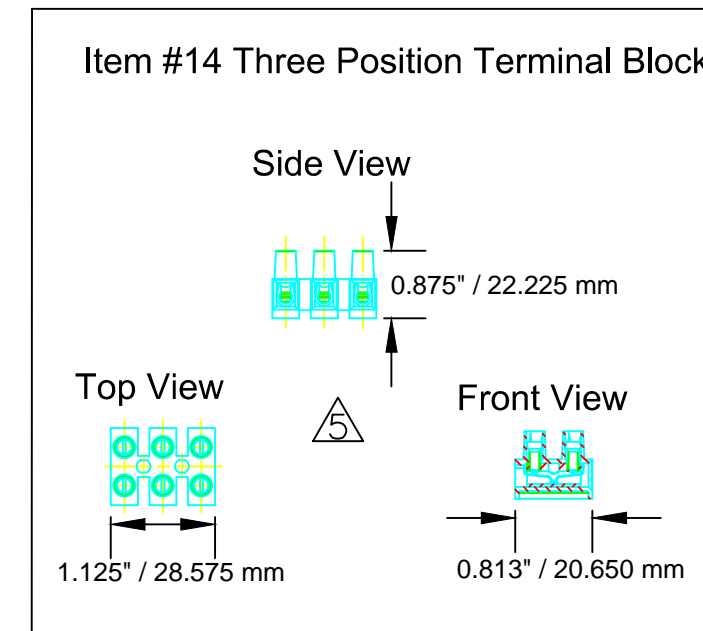
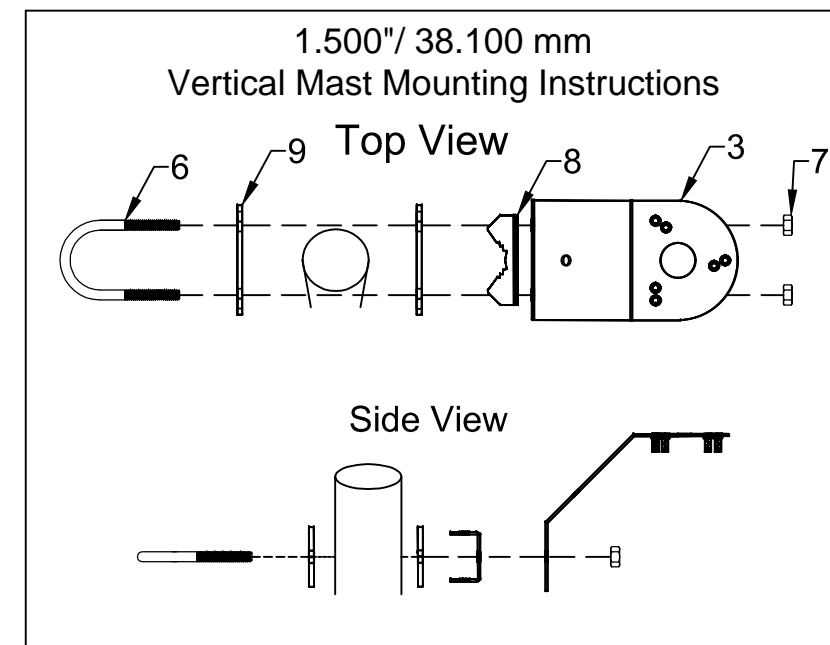
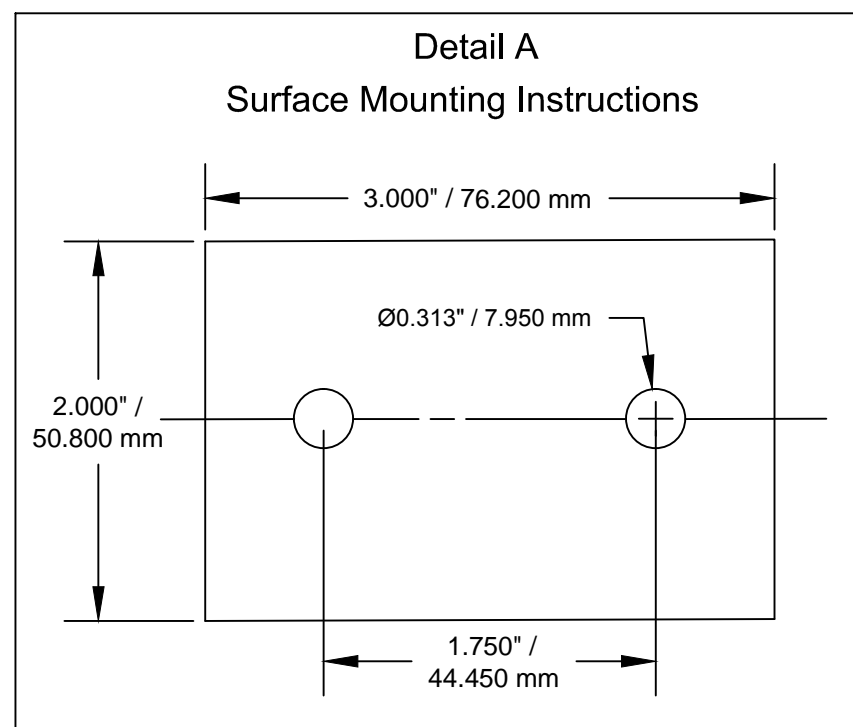
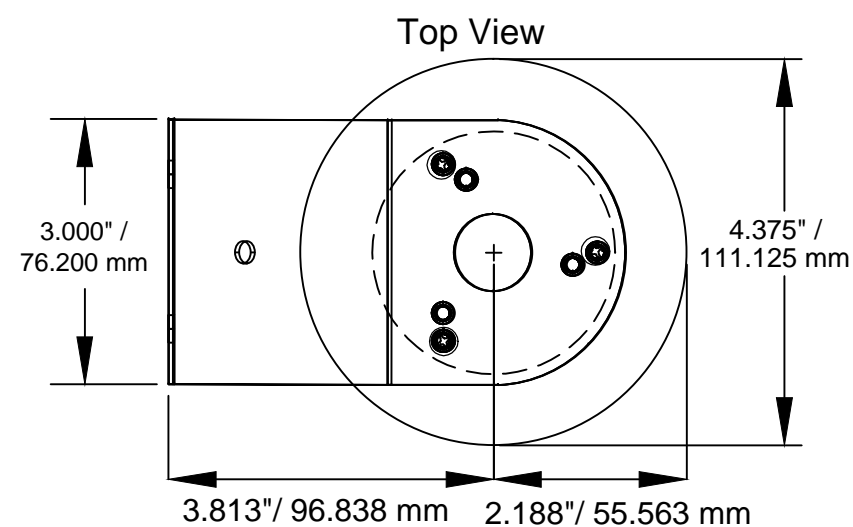
DR-SE070E-2

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Detail A

0.500" (1/2") / 12.700 mm NPT Conduit Fitting

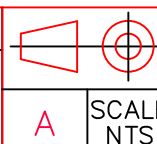


- 1 Item #12 aluminum LB must be tightened so item # 12 cover and conduit opening are both easily accessible.
- 2 Item #10 RTD to extend 2.000" / 50.800 mm above item #11 hex nut.
- 3 Mount assembly 12.000" / 304.800 mm from any heat source and out of direct sunlight, if possible.
- 4 Mount assembly off the ground above potential snow drifts.
- 5 Item #14 three position terminal block sent loose inside item #12 aluminum LB body.

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0	ORIGINAL ISSUE	AJZ		07/07/16

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Ambient Temperature Assembly
Radiation Shield



DR-SE070E-1

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