User Manual

Allen-Bradley

Bulletin 1608N MiniDySC® Dynamic Sag Corrector

Single Phase Voltage Sag Correction 12...50 Amps

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited.

Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http:/www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Notes:

Installation

Installation Check List

Before proceeding, please take a few minutes to review the necessary steps to install your MiniDySC.

- All packing materials and restraints have been removed.
- The MiniDySC is placed in its installed location.
- All conduits and cables are properly routed to the MiniDySC.
- All power cables are properly terminated.
- A ground conductor is properly installed.
- If neutral connection is required that it is properly terminated on the MiniDySC.
- The area around the installed MiniDySC is clean and dust-free.
- Operational checks have been reviewed and completed.

ATTENTION: Metallic contamination inside the MiniDySC enclosure will void the warranty

Inspecting and Unpacking

- Carefully inspect the outer packaging for evidence of damage during transit. Do not install a damaged cabinet. Report any damage to the carrier and contact your local sales or service immediately.
- Check the MiniDySC label for correct model number with the packaging list to ensure you have received the correct voltage, current, and wiring configurations.
- After removing the packaging material, inspect the contents for any evidence of physical damage, and compare each item with the Bill of Lading. If damage has occurred or shortages are evident contact your carrier immediately.

Location (Environment)

NOTICE: Install this equipment in an indoor temperature-controlled area, free from condensation and conductive contaminants such as carbon dust.

The MiniDySC must be installed in a protected environment. The location must provide adequate airflow around the MiniDySC in an atmosphere free from excessive dust, corrosive fumes, or conductive contaminants. Do not operate the MiniDySC in an environment where the ambient temperature or humidity is beyond the specified limits given in this manual.

Mounting Considerations

The MiniDySC can be wall mounted. It can also be mounted inside an enclosure as long as the ambient temperature remains at or below 40°C.

Note: The input and output wiring is from the bottom of the MiniDySC and considerations should be made to accommodate the additional space. The weights for the MiniDySC are given on page 18.

Rack Mount Considerations

Special instructions for installing the rack-mount MiniDySC are in Appendix A.

Heat Dissipation

The table below provides full-load power dissipation for the three MiniDySC sizes. Refer to this chart when calculating heat dissipation for placing the MiniDySC in your cabinet.

Table 1 - Power Dissipation

MiniDySC rating (A)	SR/ER	Heat Loss (W)	Heat Loss (Btu/h)	Efficiency (%)
12	SR	30	103	98
25	SR	47	161	98.5
	ER	70	240	98.0
50	SR	94	321	98.5
	ER	140	479	98.0

Mounting Dimensions

12 A -25 A SR/ER and 50 A SR MiniDySC

Figure 1 - Top Keyed MiniDySC

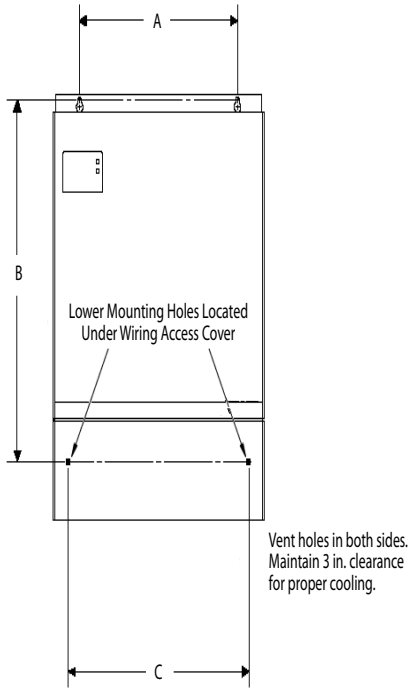


Figure 1 shows the top keyed and bottom hole dimensions for the 12 A, 25 A (Standard and Extended ride through SR/ER) and 50 A SR MiniDySC. To access the lower mounting holes, four cover screws (two on each side of lower cover) must be removed.

ATTENTION: DO NOT REMOVE THE TOP COVER. WARRANTY WILL BE VOIDED IF IT IS REMOVED.

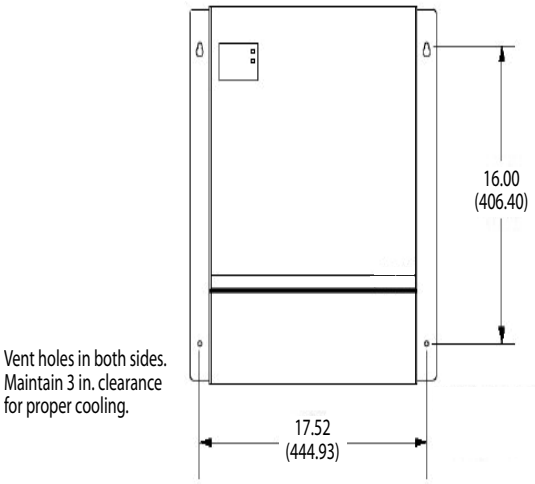
Table 2 - 12/25/50 Amp SR/ER Mounting Dimensions

Rating	A	B	C
	in. [mm]		
12 A	7.0 [177.8]	17.95 [455.9]	7.0 [177.8]
25 A SR			
25 A ER	12.0 [304.8]	17.95 [455.9]	13.75 [349.3]
50 A SR			

50 A ER MiniDySC

Figure 2 provides mounting dimensions for the 50 A extended ride through (ER). Key slot dimensions are provided in Figure 14.

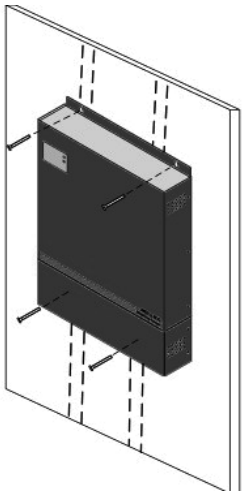
Figure 2 - 50 A ER Mounting Dimensions



Wall Mounting the MiniDySC

There are two methods of mounting the MiniDySC to wall board as show in Figure 3

Figure 3 - Wall Mounting



- **Option 1**: Mount the MiniDySC to ½ inch wallboard using (4) #6 hollow wall fasteners or (4) #10 toggle bolts.
- **Option 2:** Center one side of the MiniDySC on the wall stud and fasten to a wood stud with (2) 2 – inch long #8 Phillips bugle-head screws or to a metal stud with (2) 2-inch long #8 Philip bugle-head self drilling screws. Fasten the other side of the MiniDySC with (2) hollow wall fasteners or (2) #10 toggle bolts.

Circuit Breaker Recommendations

Branch circuit protection upstream of the MiniDySC is required

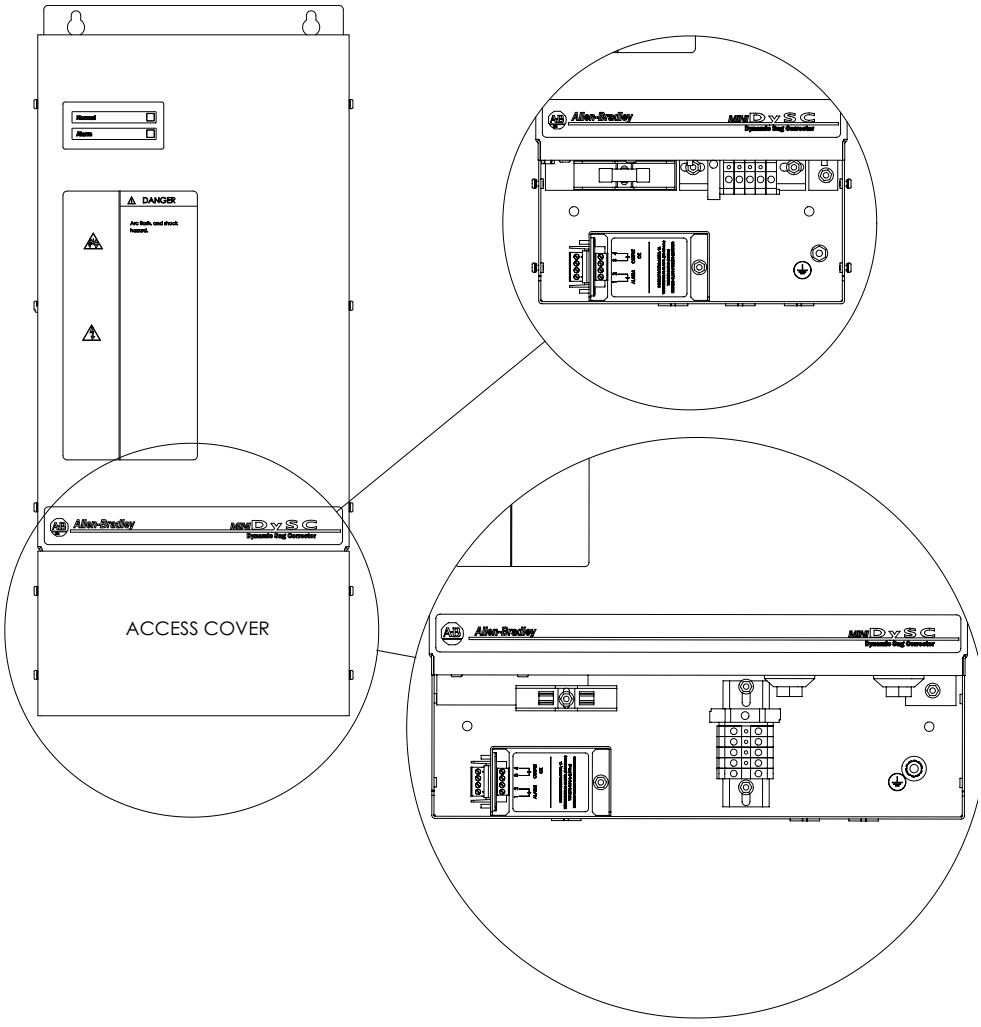
Table 3 - Circuit Breaker Recommendations

Rated MiniDySC (Amps)	Maximum Rated Breaker (Amps)
12	15
25	35
50	70

Electrical Terminations

A qualified electrician must install the MiniDySC. To access the connections, remove the four screws on the bottom cover and lift off the cover. The MiniDySC is furnished with one of the terminal block configurations as shown in the figures below.

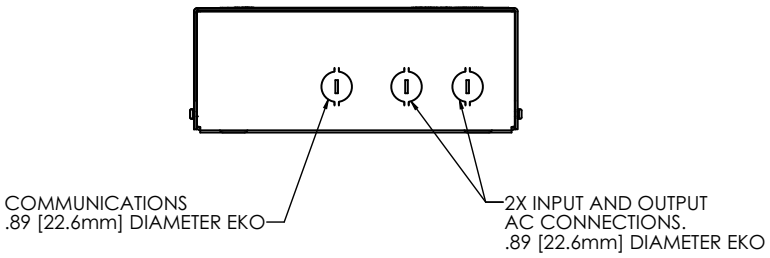
Figure 4 - Power Terminal Locations



Accessing Terminations

Three knockout holes are provided for conduit entry, as shown in Figure 5. Take care to avoid dropping any metal filings inside the enclosure. Metallic contamination will void the product warranty. See Figure 8, Figure 9, and Figure 10 for input/output terminal locations.

Figure 5 - Knockout Hole Locations



IMPORTANT Metallic Particles inside the enclosure will void the warranty

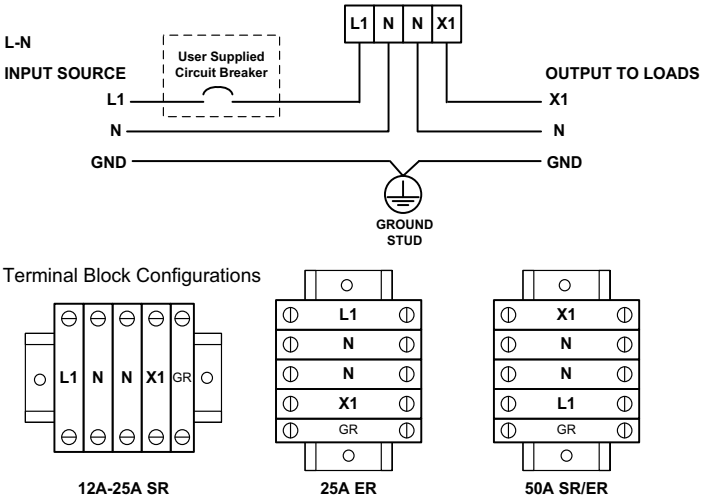
L-N Versus L-L Configuration

MiniDySC terminals are labeled in accordance with the AC input source type. Bulletin 1608N part numbers containing V2 are configured for single-phase line-to-neutral (phase-to-neutral) input, with input terminals labeled L1 and N. Part numbers containing V1 are configured for line-to-line (phase-to-phase) input, with input terminals labeled L1 and L2. Select the correct connection diagram between Figure 6 (L-N) and Figure 7 (L-L).

Line to Neutral

MiniDySC L-N models must be connected as in Figure 6 to operate properly.

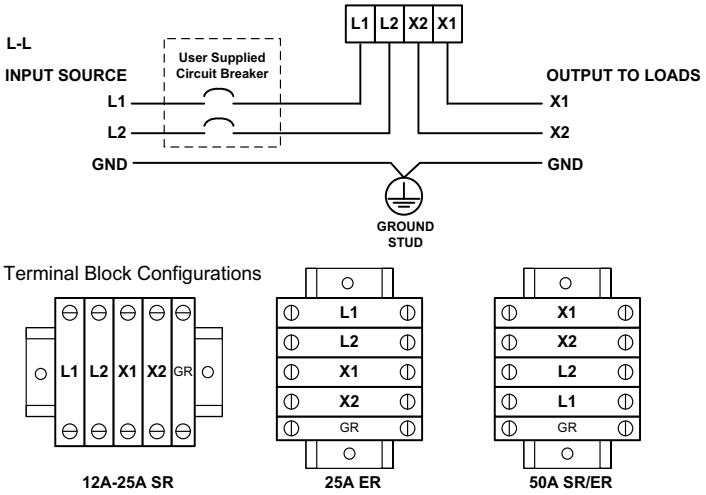
Figure 6 - Line to Neutral Configuration



Line to Line

MiniDySC L-L models must be connected as in Figure 7 to operate properly.

Figure 7 - Line to Line Configuration



Completing Terminations

Output terminals are marked X1 and N or X1 and X2. If multiple loads are served by the MiniDySC a separate distribution box must be provided. Only one conductor should be terminated in each MiniDySC terminal block position. Terminal torque requirements are shown in Figure 8, Figure 9, Figure 10, and Figure 11.

Figure 8 - 12 and 25 Amp Standard Ride-through (SR)

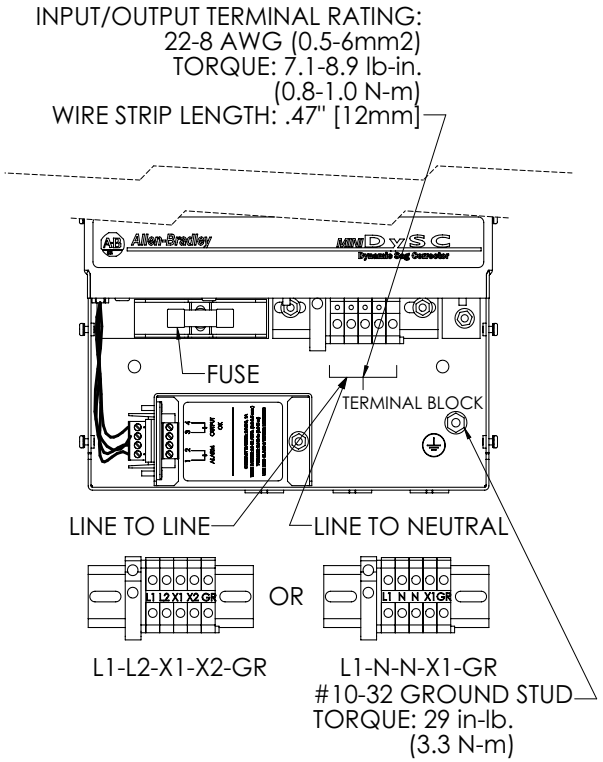


Figure 9 - 25 Amp Extended Ride Through (ER)

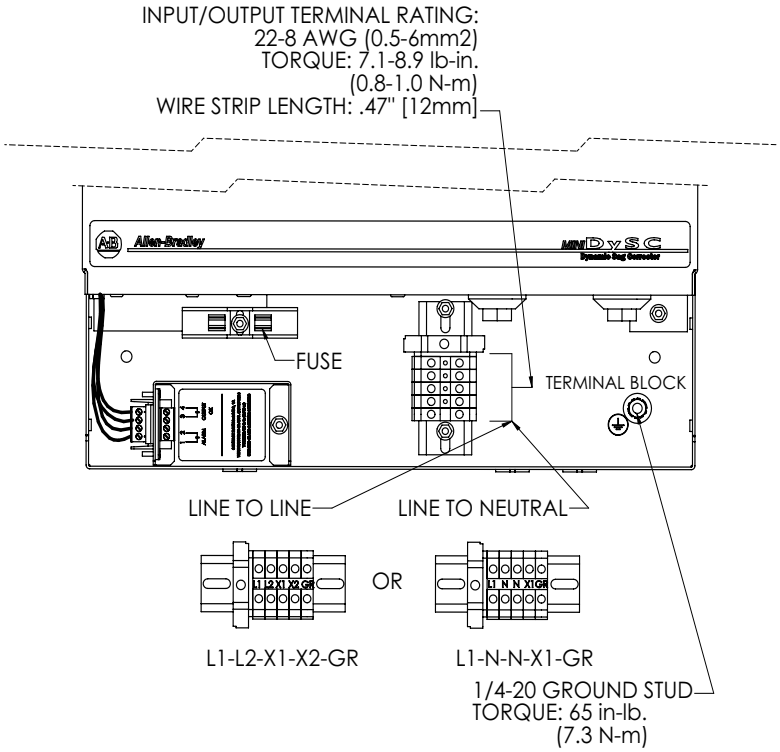


Figure 10 - 50 Amp Standard/Extended Ride-through (SR/ER)

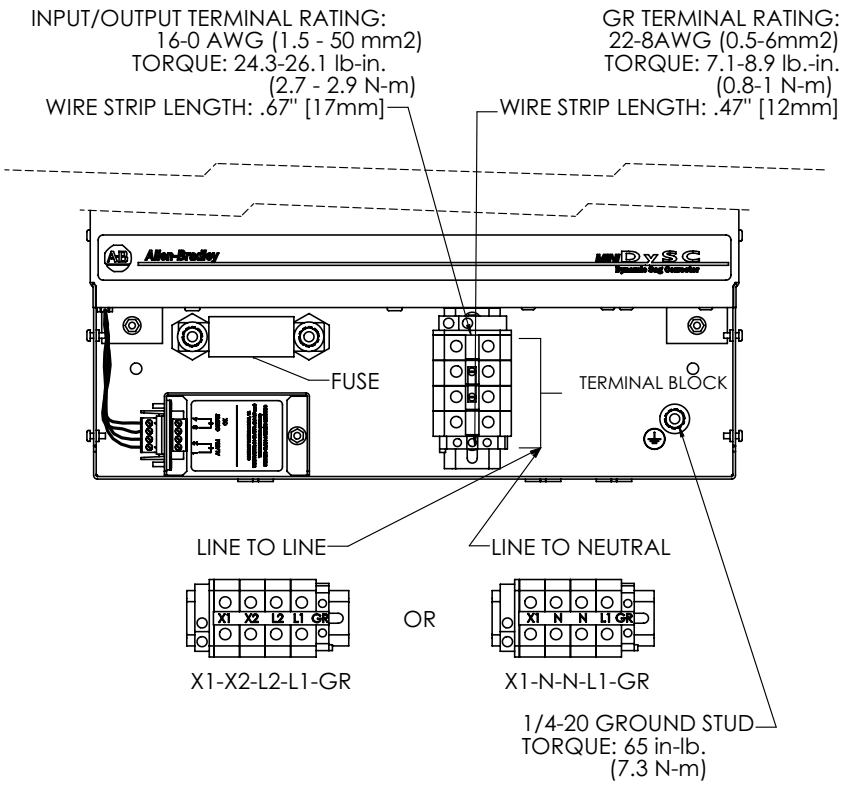
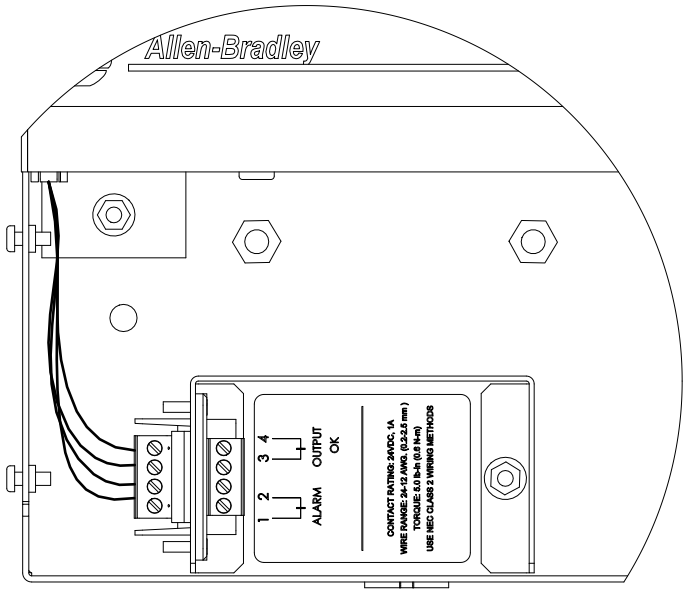


Figure 11 - Communications (Dry Contacts)



CUSTOMER COMMUNICATIONS
CONNECTION AREA.
24-12 AWG (0.2-2.5mm2)
TORQUE: 5.0 lb-in (0.6 N-m)

Notes:

Operation

The MiniDySC is fully automatic and requires no user intervention for normal operation.

Applying Power

1. Before applying power to the MiniDySC, ensure that all input/output wiring including grounding has been completed and that the wiring access cover is on and screwed down.
2. The load should be connected prior to performing system checks.
3. Apply power, note that the green “Normal” LED will be illuminated.
4. Verify that the output (load) voltage is present and within nominal rating.
5. During normal operation the green LED will remain on.

NOTICE: Cycling input power in the sequence OFF--ON--OFF--ON within a one minute period will cause a "Inverter Limit Cycle Timeout" alarm. In such case, the red LED will blink and sag correction will be inhibited for one minute (the condition will automatically reset after one minute).

Alarm LED Flash Sequence

The MiniDySC continuously monitors its condition to help ensure reliable operation. Status is provided by two front panel indicators, a green Normal LED and a red Alarm LED. The green Normal LED will be lighted under normal operating conditions. Events that may affect the ability of the MiniDySC to protect the load will activate the Alarm LED. Conditions that the user can correct, such as an overload condition, will be indicated by an encoded series of red LED flashes. The flash code is repeated after a two second pause for as long as the condition persists. User correctable Alarm conditions are listed in Table 4. For any other Alarm code, or a constant series of rapid flashing, consult Rockwell Automation Technical Support.

Table 4 - Alarm LED Flash Descriptions

Alarm Name	Number of Flashes	Alarm Description	Alarm Resolution
Inverter Run Time out	3	DySC inverter had a total cumulative runtime of more than rated.	No action is needed
Inverter Limit Cycle Timeout		Power was re-applied more than once within a 58 second period.	No action is needed
Overload	4	Inverter inhibited because load current exceeded maximum rating.	Reduce the load
Static Switch Over - Temperature		Static switch heatsink temperature was greater than maximum rating.	• Verify ambient temperature is within specification • Check for damaged fans • Check for dirty or obstructed air vents.
DC Bus Over-Voltage	5	Positive or negative half of DC bus voltage exceeded maximum rating.	• Verify line voltage is within ratings. • Verify proper DySC application • Call Service

Communications

Two relay contacts indicate MiniDySC status. The contacts are form A and close upon occurrence of the named event: (a) OUTPUT OK, when output voltage remains between 87...110% of nominal value; and (b) a system ALARM event. The relay contact ratings are 24V DC at 1 A. The communications wiring area detail is shown in Figure 11. A barrier plate prevents contact between communications wiring and power wiring.

Specifications and Dimensions

Table 5 - Technical Specifications – MiniDySC (12…50 Amps)

Electrical Input/Output (Normal Mode—Static Switch)	
Connection Configuration	Series-connected with load. Under normal line condition, the static switch passes utility voltage directly to the load
Standard Input Voltage DySC	1Phase: 120, 208, 220, 230, 240V
Voltage Range	± 10%
Output Current (Static Switch)	0...100% of rated rms current, continuous
Current Overload (Static Switch) for 12A, 50A models	200% @ 30 Sec., 400% @ 5 Sec., 600% @ 0.5 Sec.
Current Overload (Static Switch) for 25A models	200% @ 30 Sec., 280% @ 5 Sec., 450% @ 0.5 Sec.
Frequency	50/60 Hz Auto Sensing
Frequency Range (tracking)	45 to 65 Hz
Surge Protection Device (SPD)	Built-in 3-Layers consisting of MOVs & Capacitors
Efficiency	> 98%
Phase (wiring)	1 phase (L-L & L-N)
Sag Detection Voltage	88.5% of rated voltage
Response Time (typical)	0.7 ms detection, 1.2 ms inverter reaction (<2ms)
Electrical Output (Sag Correction Mode—Inverter)	
Output Voltage	Matches pre-sag input voltage
Voltage Regulation	+/- 5% typical, +5% / -13% of nominal max
Output Current	Rated RMS (12, 25, or 50 A)
Crest Factor (at rated load)	1.45
Load	Power factor range -0.5 to +0.9 DC component <2% of rated current
Voltage Waveform (typical)	Sine wave
Voltage Sag Correction Times	
Single Event	
87% to 50% voltage remaining	5 seconds SR & ER
Sags to zero voltage remaining	50ms or 200ms (SR or ER). Based on load at nameplate ratings with a power factor of 0.7
Multiple Events	
Max Sag Correction Time	5 seconds cumulative usage
Seqential Sag Recovery	0 seconds (assuming cumulative run-time available)
Full Recovery Time	Max 5 minutes to full recovery
Mechanical	
Enclosure Ratings	NEMA 1 (IP20)
Cable Entry	Bottom
Cooling	Forced Air
Access	Lower front for servicing and connections
Accessibility (Wiring)	DIN compression terminal block
Communications / User Interface	
Indicators	Normal and Alarm LEDs
Connectivity	OUTPUT OK and ALARM contacts, Form A, 24VDC at 1A
Environmental	
Ambient Temperature	0 ...+40°C
Storage Temperature	-40°C ...+75°C
Relative Humidity	0 to 95% non-condensing
Altitude	Rated current available to 1000m (3300ft). De-rate output current 10% per 1000m, from 1000m to 3000m (9900ft).
Heat Dissipation (max)	12A – 100 BTU/Hr 25A – 160 BTU/Hr 50A – 320 BTU/Hr.
Audible Noise	< 50dBA at 1 meter
Certifications	
Agency Approvals	cULus 1012 Listed, Exceeds SEMI F47 Standard

Approximate Dimensions

Dimensions		
Rating (A)	**H x W x D in. [mm]**	**Weight lbs.[kg]**
Standard Run-time (SR)		
12, 25	22 x 10 x 4 [550.8 x 254 x 101.6]	18.6 [8.44]
50	21 x 19 x 4 [533.4 x 482.6 x 101.6]	34.5 [15.5]
Extended Run-time (ER)		
25	21 x 19 x 4 [533.4 x 482.6 x 101.6]	32.5 [14.7]
50	21 x 19 x 7 [533.4 x 482.6 x 177.8]	51.5 [23.4]

Dimensions in inches [mm]. Dimensions are not intended to be used for manufacturing purposes.

Figure 12 - 12 Amp and 25 Amp SR Dimensions

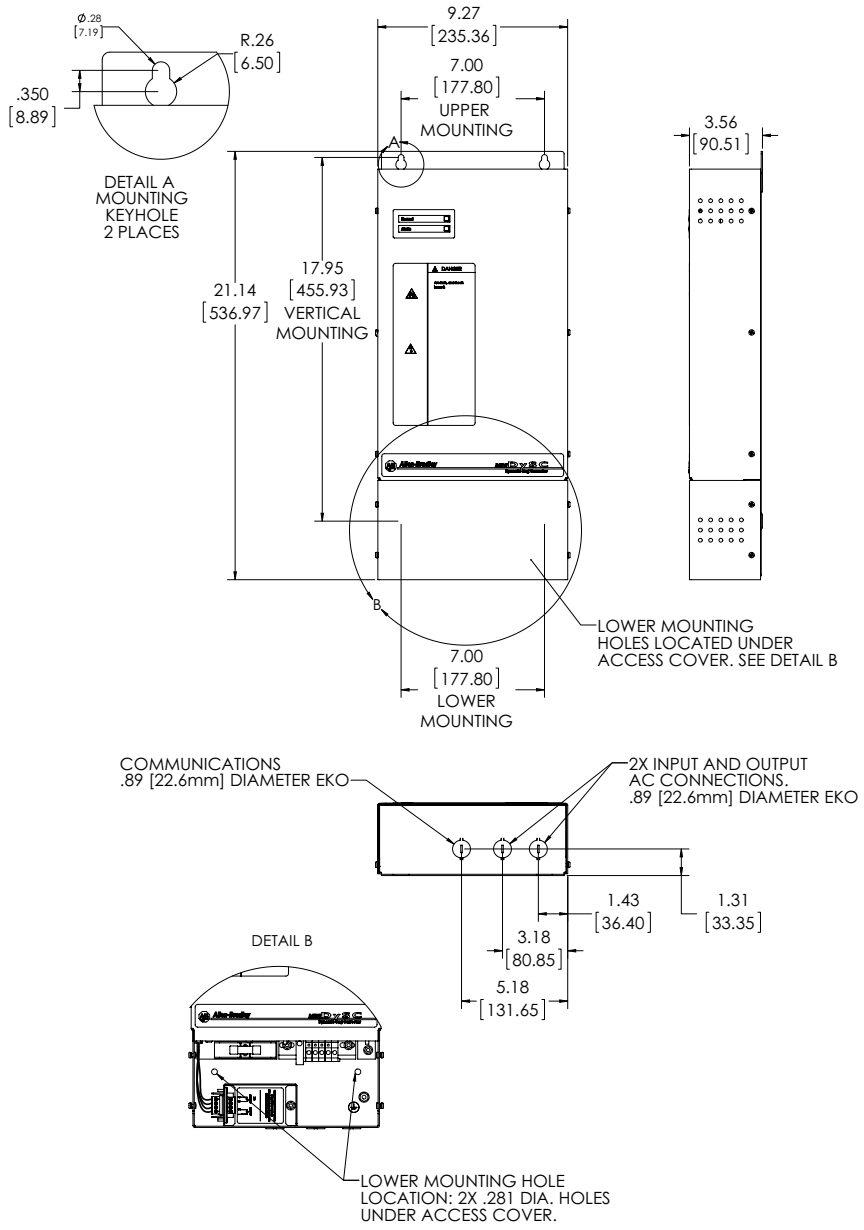


Figure 13 - 25 Amp ER /50 Amp SR Dimensions

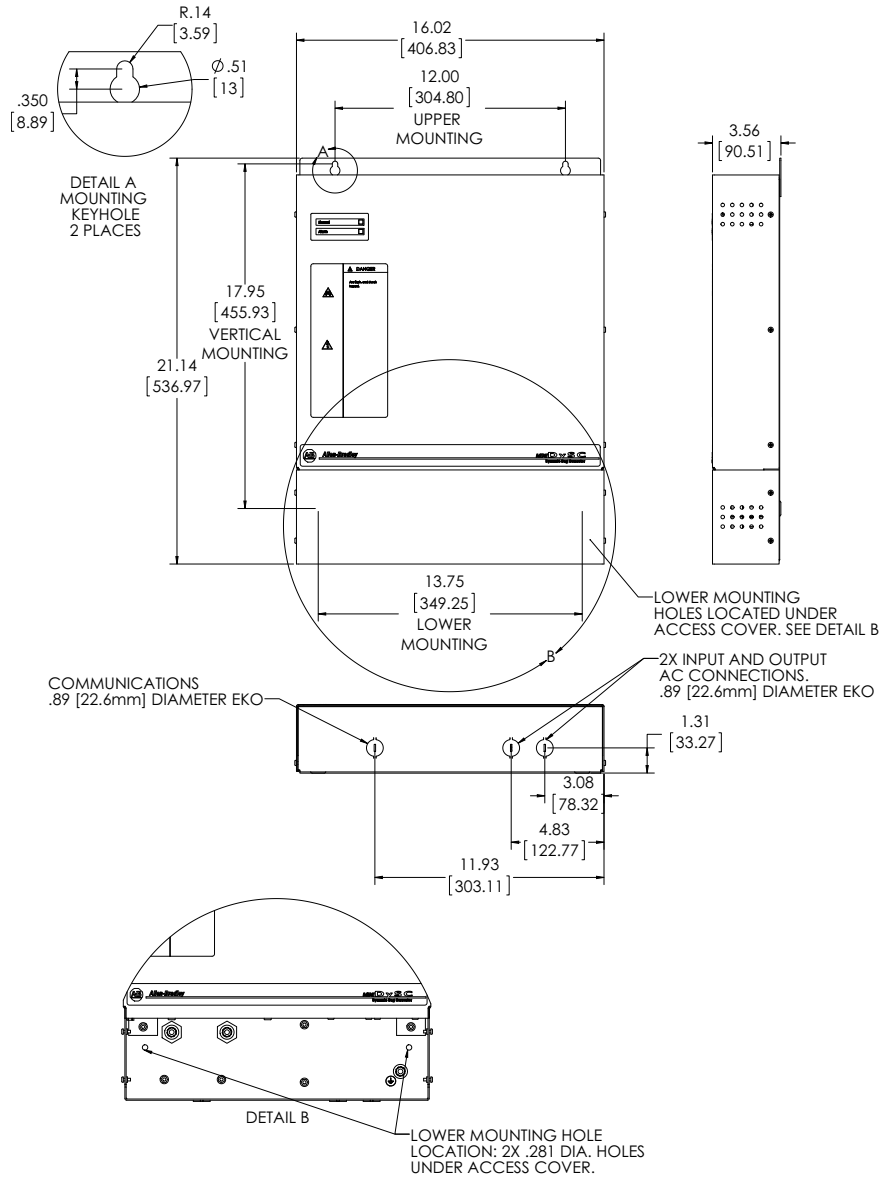
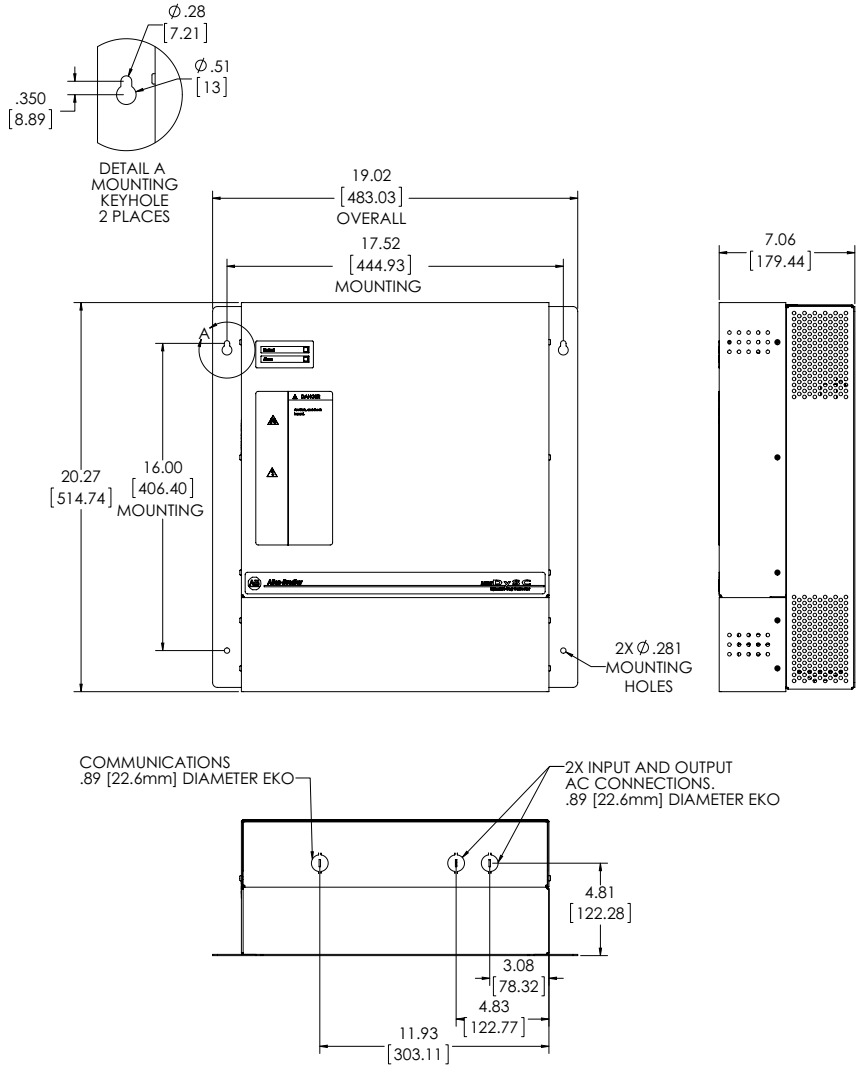
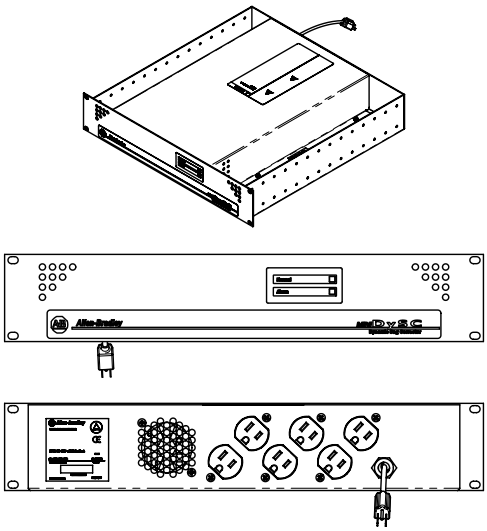


Figure 14 - 50 Amp ER Dimensions



Special Instructions for Model 1608N-012A120V2S-R Rack-Mount MiniDySC



MiniDySC model 1608N-012A120V2S-R is configured to protect line-corded loads in a 19-inch IT rack environment.

Amended specifications and dimensions for this model are listed in Table 6. All other specifications, including environmental and certifications, are as listed in Table 5. This model does not include alarm contacts. LED indicators are front-facing.

Included mounting hardware will accommodate any of the mounting orientations shown in Figure 15, including 4-post mounting in racks up to 26 in. deep.

This MiniDySC model contains no user-serviceable parts.

ATTENTION: DO NOT REMOVE THE TOP COVER. WARRANTY WILL BE VOIDED IF IT IS REMOVED.

Table 6 - Technical Specifications - Rack-Mount MiniDySC, PN 1608N-012A120V2S-R

Electrical	
Input Voltage (nominal)	1 Phase (L-N), 120V ±10%
Output Current	12 A
Upstream Circuit Breaker (required) Rating	15 A
Mechanical	
Mounting Hardware Kit (included)	(2) Mounting Brackets (see Figure 16) (8) Cage Nut, 10-32 (16) Screw, 3/8 in. Phillips, 10-32, with lock washer (8) Screw, 3/4 in. slotted Truss, 10-32
Weight	22.5 lb
Line Cord Length	6 ft (minimum)
Line Plug	NEMA 5-15P
Load Receptacles	Six (6) NEMA 5-15R
Cooling	Forced air: rear intake, side exhaust
Dimensions	
Height	2U (3.459 in.)
Width	19 in. (front panel)
Depth	18.9 in., excluding line cord bend radius

Figure 15 - Rack Mounting Options for model 1608N-012A120V2S-R

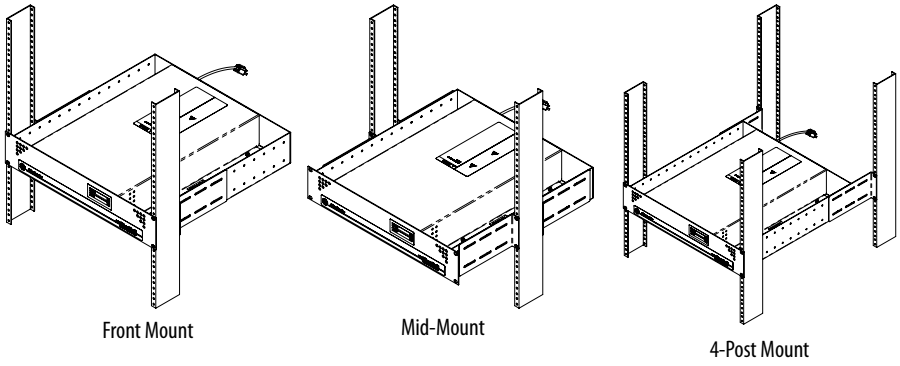
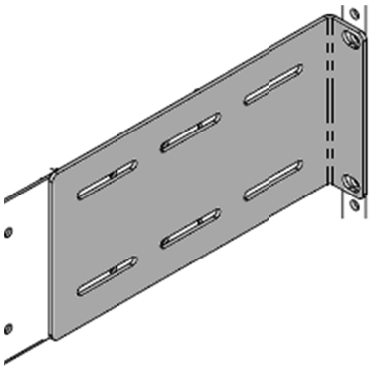


Figure 16 - Mounting Bracket



Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support, you can find technical manuals, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools. You can also visit our Knowledgebase at http://www.rockwellautomation.com/knowledgebase for FAQs, technical information, support chat and forums, software updates, and to sign up for product notification updates.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect^{SM} support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/support/.

Installation Assistance

If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/rockwellautomation/support/overview.page, or contact your local Rockwell Automation representative.

New Product Satisfaction Return

Rockwell Automation tests all of its products to help ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete this form, publication RA-DU002, available at http://www.rockwellautomation.com/literature/.

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 1608N-UM002B-EN-P - May 2014 DIR 10000723485