Installation Instructions

Allen-Bradley

Bulletin 1608P ProDySC Dynamic Voltage Sag Corrector

Catalog Numbers 1608P – 25 and 50 Amp Models

Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://www.rockwellautomation.com/literature/) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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.

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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.
	**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.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

ATTENTION: 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.

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.
Bulletin 1608P ProDySC User Manual - 25 and 50 Amp - Publication 1608P-UM001_EN-P	Provides installation and specifications in addition to maintenance and display screen information.

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:

Introduction

The Allen-Bradley Bulletin 1608P ProDySC Dynamic Sag Corrector is engineered to provide years of trouble-free voltage sag (dip) protection. The patented ProDySC technology does not use batteries, requires only routine maintenance, includes three-stage transient voltage surge suppression, and has unparalleled energy efficiency. Most electronic devices found in industry today are susceptible to power disturbances. A momentary sag in line voltage can reset or damage sensitive production equipment. The ProDySC provides instantaneous dynamic sag correction to help your equipment ride through these common events. The ProDySC connects normal utility power directly to the load until a voltage sag occurs. During a sag, the ProDySC inverter is activated-adding missing voltage to keep the load voltage within the normal range. When utility power returns to normal, the inverter is deactivated and the ProDySC is quickly ready to correct the next sag.

The ProDySC reports these voltage sag events through its integrated touch screen display and provides system status, voltage sag notification and history, runtime statistics and system history in a simple and intuitive touch-based user interface.

Safety Considerations

The ProDySC is designed to operate in industrial applications. Follow these guidelines to ensure that the safety and installation of the ProDySC are handled with appropriate care.

SHOCK HAZARD: The ProDySC has high voltage remaining up to 5 minutes after disconnection from the AC line. Touching exposed or disconnected terminals, cables or parts of the ProDySC can lead to serious injuries or even death. Wait for a minimum of 5 minutes before performing any service or testing on the ProDySC after power is removed.
Keep the cabinet doors closed to ensure proper cooling airflow and to protect personnel from dangerous voltages inside the ProDySC.

ATTENTION: To reduce the risk of fire or electric shock, install this ProDySC in a temperature and humidity controlled, indoor environment, free of conductive contaminants.

- Avoid installing the ProDySC directly near heat-emitting equipment such as ovens, heaters, or furnaces.
- Ambient temperature must not exceed 40°C (104°F).
- Do not operate near water or excessive humidity (95% max).
- When punching or drilling holes for conduit fittings, take care to avoid dropping metallic particles inside the enclosure as this can result in electrical damage.
- The system is not intended for outdoor use.
- The operating environment should be maintained within the parameters stated in this manual.
- Only authorized service personnel should perform service on the ProDySC.
- Ensure all power is disconnected before performing installation or service.

ATTENTION: Internal components can be easily damaged by electrostatic discharge (ESD). Do not touch circuit boards or electronic components with hands or metal objects. Use an insulated screw driver when connecting the lines.

- The ProDySC is not rated to directly power life support equipment.
- Ensure the area around the ProDySC is clean and uncluttered.
- Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.

Installation

Installation Check List

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

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

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 ProDySC 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)

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

Mounting Considerations

The ProDySC must be mounted vertically, as shown in the figures, and may be mounted inside another enclosure if the ProDySC inlet temperature remains at or below specified limits. Read this entire user manual to understand the additional space requirements around the ProDySC for power conductor entry, communications conductors, and airflow. Refer to Specifications and Dimensions on page 19 for temperature ratings and heat dissipation.

Mounting the ProDySC

Using the 3/8" hardware and four (4) wall mounting brackets supplied, mount the wall mount brackets to the back of the ProDySC. Mount each bracket to the back of the ProDySC with a single 3/8"-16 x 1" hex cap head screw. Mount the brackets so the flat portion of the mounting bracket is against the back of the ProDySC. Bolt two 2 x 4 pieces of lumber horizontally to the wall using 3/8" by 4" hex-head lag bolts.

Make certain that:

1. The lag bolts line up with the wall studs.
2. The distance between the centers of the pieces of lumber is equal to the distance between the centers of the mounting holes. Refer to Figure 1.
3. Bolt unit to the 2 x 4 pieces of lumber with (4) 3/8" by 2" long hex-head lag bolts.

NOTICE: Weights and complete mounting dimensions are provided in Chapter 5

Figure 1 - 25 A Mounting dimensions, in. [mm]

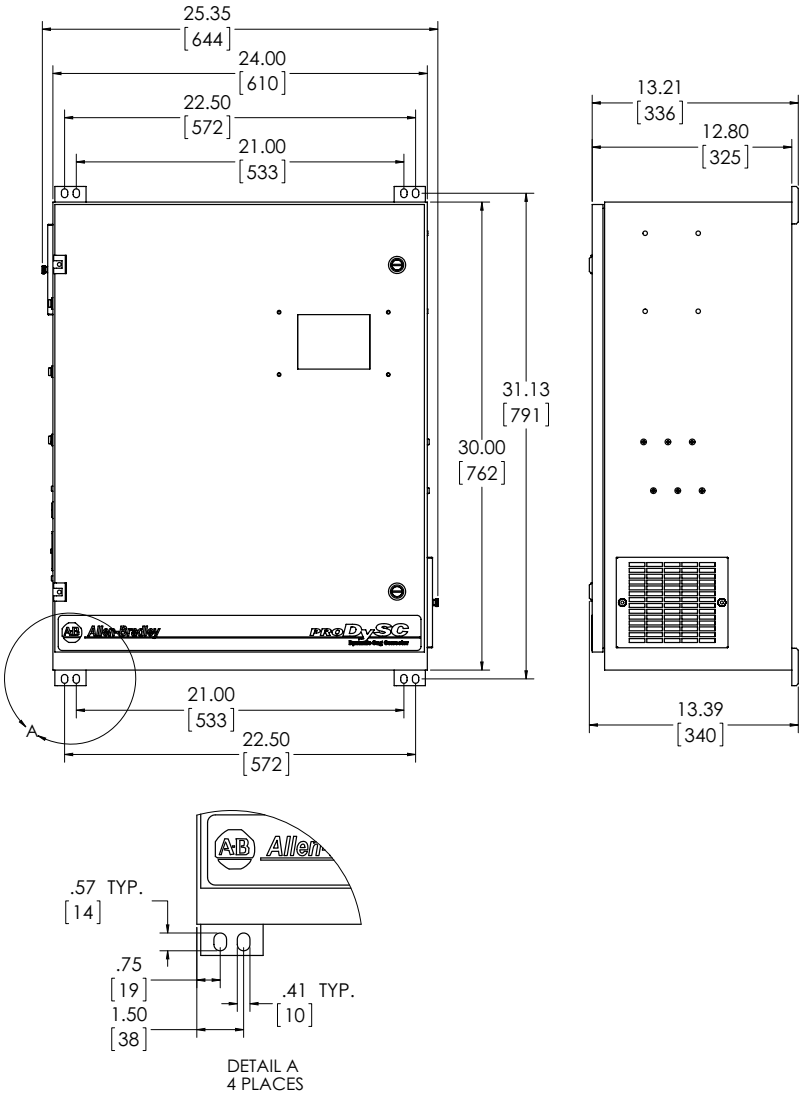
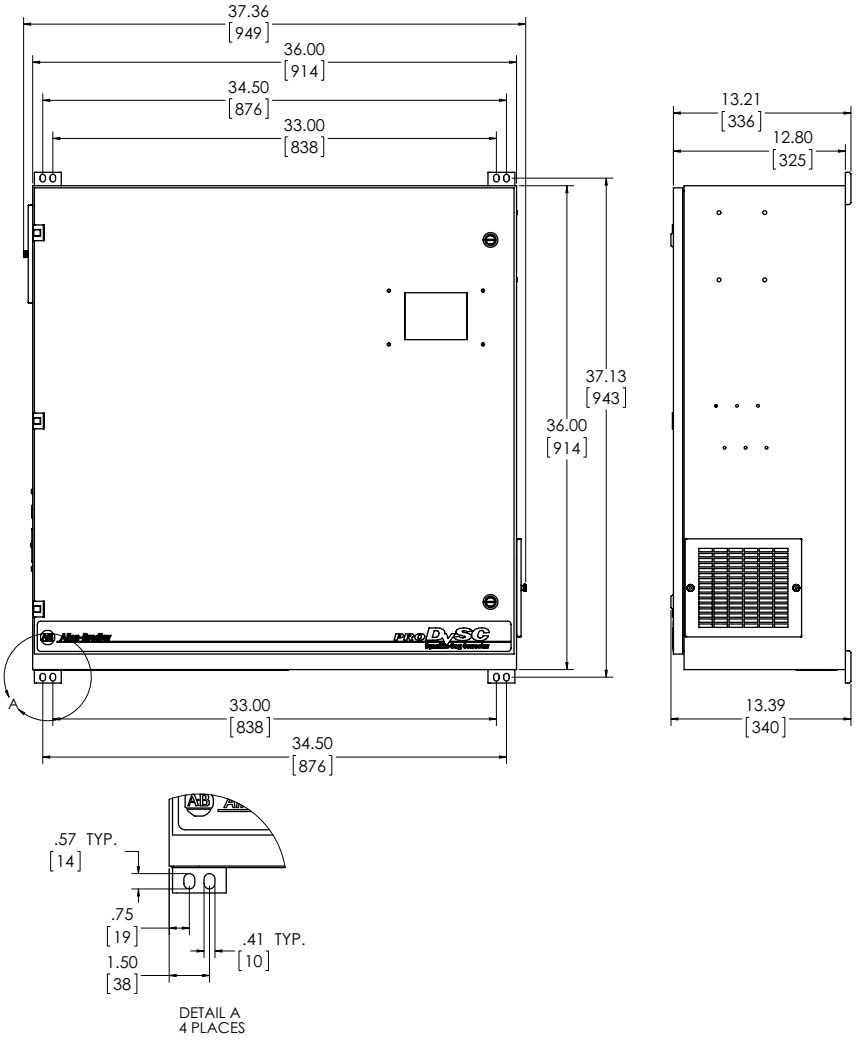


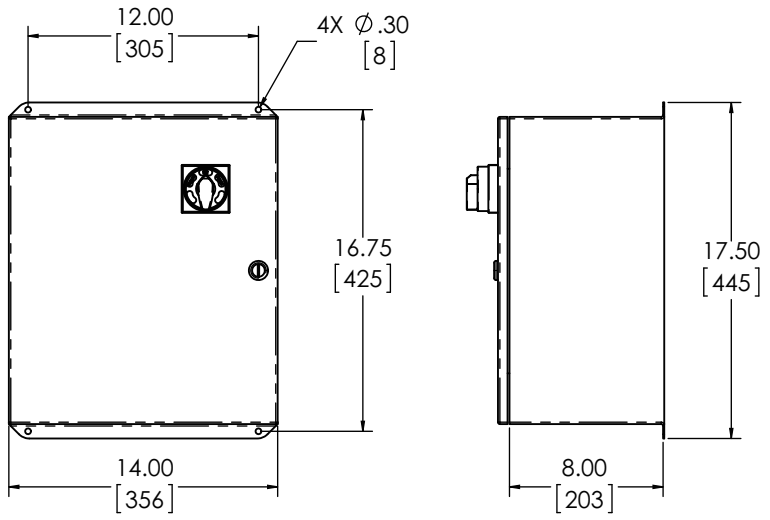
Figure 2 - 50A Mounting dimensions, in. [mm]



Bypass Switch

Installation of the ProDySC with an external maintenance bypass is required to avoid power interruptions to the critical loads during maintenance, service, or testing. Mount the bypass close to the ProDySC to provide quick access and visual coordination when testing or providing service. The 1608P bypass is a wall mounted enclosure with a 3 position rotary switch. Its dimensions and mounting locations are shown in Figure 3.

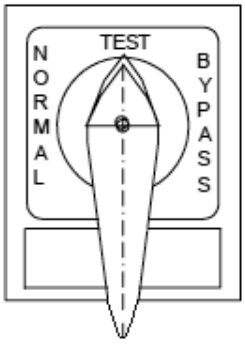
Figure 3 - 25A and 50A bypass mounting dimensions



Bypass Switch Modes

The 1608P bypass switch has three modes of operation and is configured as shown in Figure 4

Figure 4 - Bypass switch and mode operation



NORMAL Mode - Power flows from the utility source through the ProDySC to the load.

TEST Mode - Power flows directly from the utility to the load. ProDySC outputs are not connected to the load. ProDySC inputs have power provided for testing by a qualified technician.

BYPASS Mode - Power flows directly from the utility to the load. No power is present on ProDySC inputs or outputs.

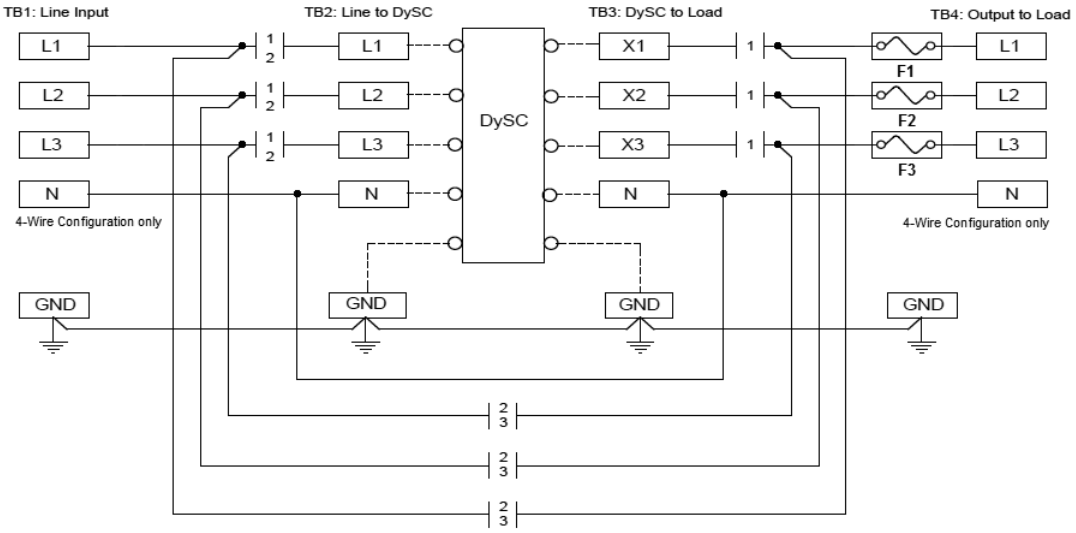
NOTICE: The 1608P bypass switch contacts are designed to make-before-break and will not disrupt power to the load during any mode transitions. The switch has lockout/tagout (LOTO) provisions.

Bypass Switch Wiring Diagram

The maintenance bypass has input and output terminals labeled and located inside the bypass enclosure as shown in Figure 5. The neutral connection is available for 4-wire ProDySC configurations.

NOTICE: All electrical connections must be completed by a qualified electrician, in compliance with all local codes and the National Electric Code.

Figure 5 - Bypass wiring diagram



Circuit Breaker Recommendations

Branch circuit protection upstream of the ProDySC is required. Recommended circuit breakers and maximum allowed circuit breaker ratings are listed in Table 1. Branch circuit protection rated less than the ProDySC current rating may result in nuisance tripping.

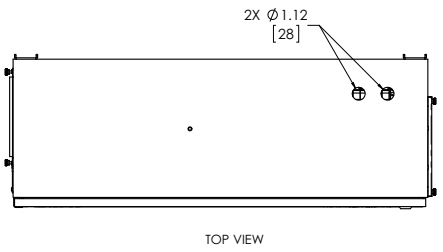
Table 1 - Recommended Branch Circuit Protection

ProDySC Rating	Recommended MCCB Cat. No.	Max. MCCB Rating
25 A	**140U-H3C3-C35**	35 A
50 A	**140U-H6C3-C70**	70 A

Accessing ProDySC Terminations

Two holes are provided for punch-out locations to provide the appropriate hole size for conduit fittings in the ProDySC. Take care to avoid dropping any metal filings inside the enclosure. Metallic contamination will void the product warranty. See Figure 6 for preferred Input/Output wiring locations.

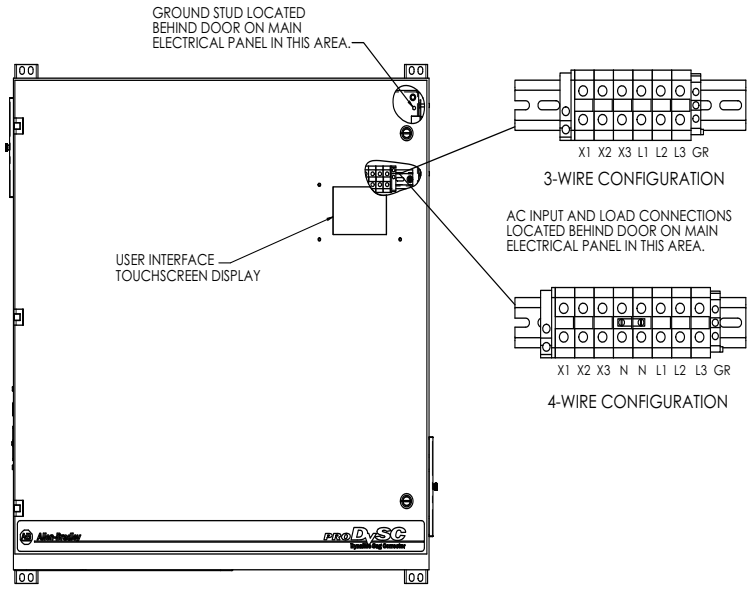
Figure 6 - Knockout Hole Locations



ProDySC Terminations and Ratings

A qualified electrician must install the units. To access the ProDySC Electrical Terminations, turn the two ¼ - turn latches CCW and swing open the door. The unit is furnished with one of the terminal block configurations as shown in Figure 7. For power cable termination specifications see Table 2 for the 25A rated units andTable 3 for the 50A rated units.

Figure 7 - Input/Output terminal locations



ATTENTION: All electrical connections must be completed by a qualified electrician, in compliance with all local codes and the National Electric Code

Input:

- Ground (Earth): Connect the safety ground conductor to the ground stud.
- 3-Wire Input: Connect source L1, L2, and L3 to terminals labeled L1, L2, and L3 respectively.
- 4-Wire Input: Connect source L1, L2, L3, and Neutral to terminals labeled L1, L2, L3, N respectively.

IMPORTANT 4-wire ProDySCs (units with "… V4" in their part number) must also have a neutral connected to the neutral terminal block. The neutral terminal block is labeled "N". Neutral must be connected for these units to operate properly.

Output:

- Terminal blocks are provided marked X1, X2, X3 and N (if used) as shown inFigure 7 If there are multiple loads, a separate distribution box must be provided so that there is only one set of output wires terminated inside the ProDySC enclosure.

IMPORTANT The 480V 3 phase 3W ProDySC has not been evaluated by Underwriter's Laboratories, Inc.® for connection to a corner-grounded delta power source.

Table 2 - ProDySC 25 Amp Power Cable Terminations

Terminal Connection	Function	Terminal Marking	Wire Range AWG (mm^2)	Torque lb-in (Nm)
3 Wire with a Ground				
AC Input	Phase A, B, C	L1, L2, L3	24- 8 (0.5-6)	7.1- 8.9 (0.8-1)
	Ground	⏚	¼-20 Stud	65 (7.3)
AC Output	Phase A, B, C	X1, X2, X3	24-8 (0.5-6)	7.1- 8.9 (0.8-1)
	Ground	⏚	¼-20 Stud	65 (7.3)
4 Wire with a Ground				
AC Input	Phase A, B, C	L1, L2, L3	24- 8 (0.5-6)	7.1- 8.9 (0.8-1)
	Ground	⏚	¼-20 Stud	65 (7.3)
	Neutral	N	10-0 (6-50)	24.9- 26.7 (2.8-3)
AC Output	Phase A, B, C	X1, X2, X3	24- 8 (0.5-6)	7.1- 8.9 (0.8-1)
	Neutral	N	10-0 (6-50)	24.9- 26.7 (2.8-3)
	Ground	⏚	¼-20 Stud	65 (7.3)

Table 3 - ProDySC 50Amp Power Cable Terminations

Terminal Connection	Function	Terminal Marking	Wire Range AWG (mm^2)	Torque lb-in (Nm)
3 Wire with a Ground				
AC Input	Phase A, B, C	L1, L2, L3	10-0 (6-50)	24.9-26.7 (2.8-3)
	Ground	⏚	¼-20 Stud	65 (7.3)
AC Output	Phase A, B, C,	X1, X2, X3	10-0 (6-50)	24.9-26.7 (2.8-3)
	Ground	⏚	¼-20 Stud	65 (7.3)
4 Wire with a Ground				
AC Input	Phase A, B, C and Neutral	L1, L2, L3, N	10-0 (6-50)	24.9-26.7 (2.8-3)
	Ground	⏚	¼-20 Stud	65 (7.3)
AC Output	Phase A, B, C and Neutral	X1, X2, X3, N	10-0 (6-50)	24.9-26.7 (2.8-3)
	Ground	⏚	¼-20 Stud	65 (7.3)

WARNING: The ProDySC must be safety-grounded according to the National Code. In addition, all local, state, and federal regulations applicable to the installation of electrical systems as well as accident prevention regulations must be strictly observed.

Notes:

Communications

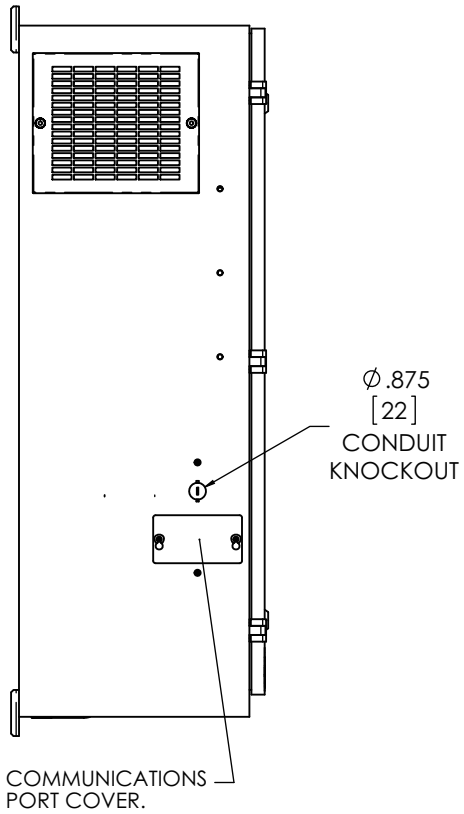
Both dry contacts (relays) that indicate status and a Serial Communications Port (RS-232) are available for monitoring the ProDySC.

Dry Contacts

Three relay contacts indicate ProDySC status. The contacts are form A and close upon occurrence of the named event: (a) any SAG EVENT, when rms input voltage drops below 88.5% of rated value; (b) OUTPUT OK, when output voltage remains between 87% and 110%; and (c) a system ALARM event. The relay contact ratings are 24V at 1 amp.

- For access, remove the Communications Port cover (See Figure 8).
- A removable connector (plug) is provided to facilitate wiring.
- All wiring is to be Class 2, limited to 24 Volts, AC or DC.
- Acceptable wire gauges range from 24AWG to 12AWG (0.2-2.5 mm^2).
- Torque connections to 4.5-5.3 lb-in (0.5 - 0.6 N-m).
- For permanent installations, a standard conduit knockout is located within the wiring area (SeeFigure 8).

Figure 8 - Access Cover Location

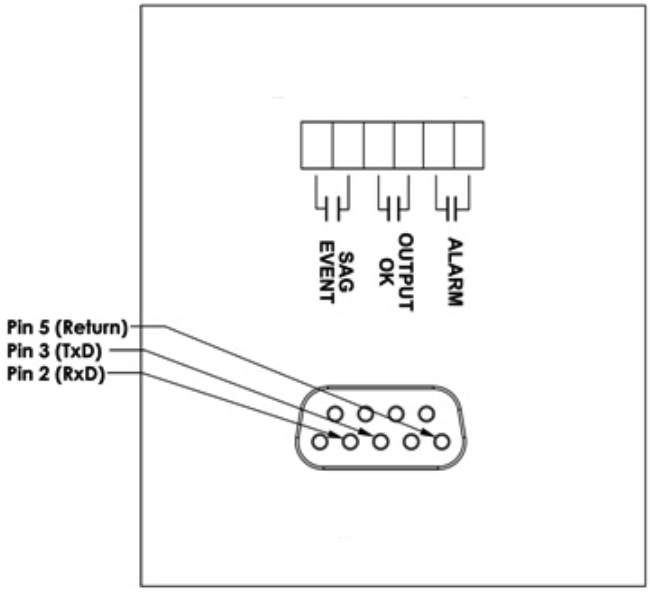


Serial Communications Port

The ProDySC serial port is a DE-9 female connector. The pin-out follows standard RS-232 protocol: pin 2 is RxD, pin 3 is TxD and pin 5 is common (return). All other pins are unused. Contacts are galvanically isolated from the system power and grounds.

- Protection: The RS-232 port is ESD-protected to 15kV
- Protocol: 57.6k bps, 8 data bits, one stop bit, no parity, flow control off
- Data packets are SLIP encoded (with 2 byte length field)
- Data accessible through this port includes line and load voltages, line and load currents, status, and event and diagnostic logs.
- Consult Rockwell Automation technical support for specifications to the ProDySC SLIP protocol.

Figure 9 - Serial Communications Port



Applying Power

- Verify that the ProDySC voltage rating matches the source voltage.
- Before applying power to the ProDySC, make certain there are no metal filings or any conductive debris in or on any components inside the ProDySC.
- Ensure that all input/output wiring including grounding has been completed and that all access doors are closed.
- Place the maintenance bypass in “Bypass” mode.
- Apply power from the upstream branch protection device. Power will flow through the maintenance bypass directly to the load.
- Place the maintenance bypass in “Test” mode. The ProDySC touchscreen will become active but the load will still be powered through the bypass.
- Ensure that the touchscreen displays “OK” in the upper left corner and that the nominal voltage, current, and frequency in the status display are correct
- If a “Critical” or “Fatal” system event appears on the touch screen (1) place the maintenance bypass switch in BYPASS and (2) call for technical support
- Place the maintenance bypass in “Normal” mode.
- Verify that the output (load) voltage is present and within its nominal rating.
- If a “Critical” or “Fatal” system event appears on the touch screen (1) place the maintenance bypass switch in BYPASS and (2) call for technical support.

ATTENTION: For Information regarding the operation of ProDySC, including information on the display screen and maintenance, see Publication 1608P-UM001_-EN-P.

Notes:

Specifications and Dimensions

Table 4 - Technical Specifications

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 Voltages	3 ∅: 208, 380, 400, 415, 480V[1]
Voltage Range	± 10%
Current Overload (Static Switch)	150% @ 30Sec., 400% @ 5 Sec., 600% @ 0.5 Sec.
Frequency	50/60 Hz Auto Sensing
Frequency Range (tracking)	45 to 65 Hz
TVSS	Built-in 3-Layers consisting of MOVs & Capacitors
Efficiency	> 99% @ 480V
Electrical Output (Sag Correction Mode - Inverter)	
Output Voltage	Pre-sag rms voltage
Voltage Regulation	+5%-13% of nominal
Output Current [2]	Rated RMS (25A or 50A). Not rated for DC loads: max. allowable 2% DC loading
Crest Factor (at nameplate rms load)	1.45
Voltage Waveform	Sine wave
Voltage Sag Correction Times	
Single Event	
3 phase 87% to 50% Voltage Remaining	5 seconds
All three phases to zero voltage remaining	50ms or 200ms (SR or ER). Based on load at nameplate ratings with a power factor of 0.7
Multiple Event	
Max Sag Correction Time	5 seconds cumulative usage
Sequential Sag Recovery	0 seconds (assuming cumulative run-time available)
Full Recovery Time	Max 5 minutes
Mechanical	
Enclosure Ratings	NEMA 1 (IP20)
Cable Entry	Top
Cooling	Filtered Forced Air
Access	Front for servicing and connections
Bypass (External)	Panel mounted for PM or servicing ProDySC
Environmental	
Ambient Temperature	0 to 40°C
Storage Temperature	-40°C to 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).
Safety	
Agency Approvals	cULus Listed

1. ProDySC has not been evaluated for use in Corner Grounded or Ungrounded Delta Power Systems

2. When using ProDySC with motor drive loads, either insert 3% to 5% line reactance at ProDySC output or limit motor drive loads to 60% of ProDySC rating

Heat Dissipation

Rating (A)	Heat Loss (W)	Heat Loss (Btu/h)	Efficiency (%)
Standard Run-time (SR)			
25	280	957	97.8%
50	350	1196	97.2%
Extended Run-time (ER)			
25	420	1435	98.2%
50	560	1913	97.7%

Approximate Dimensions

Rating (A)	H x W x D in. [mm]	Weight lbs.[kg]
Standard Run-time (SR)		
25	32 x 26 x 14 [813 x 660 x 356]	277 [126]
50	38 x 38 x 14 [965 x 965 x 356]	330 [150]
Extended Run-time (ER) Voltage independent; may be either 3 or 4 wire		
25	32 x 26 x 14 [813 x 660 x 356]	307 [140]
50	38 x 38 x 14 [965 x 965 x 356]	398 [181]

Dimensions are shown in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.

Figure 10 - 25AStandard/Extended Run

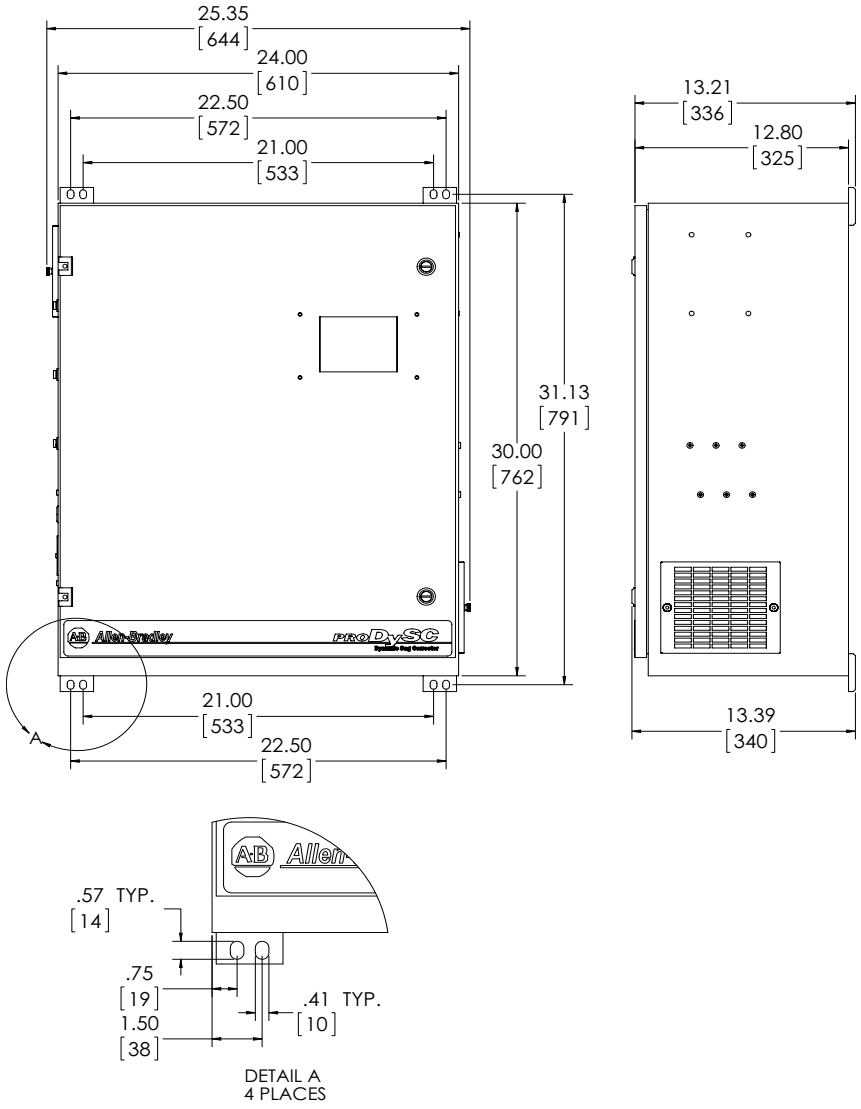
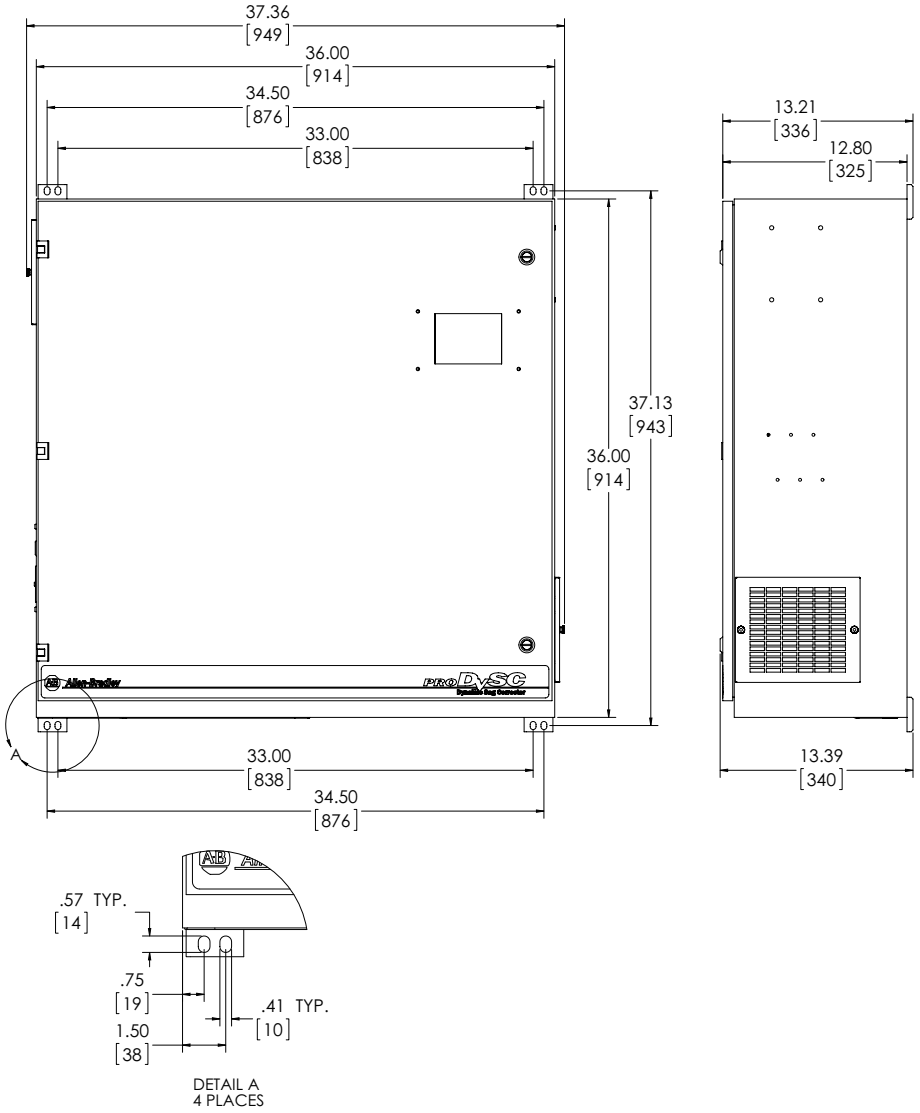


Figure 11 - 50A Standard/Extended Run



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.

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