User Manual

Allen-Bradley

Bulletin 1608M MegaDySC Dynamic Voltage Sag Corrector

1608M—400 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.

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.

Introduction

The Allen-Bradley Bulletin 1608M MegaDySC Dynamic Sag Corrector is engineered to provide years of trouble-free voltage sag (dip) protection. The patented DySC 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 MegaDySC provides instantaneous dynamic sag correction to help your equipment ride through these common events. The MegaDySC connects normal utility power directly to the load until a voltage sag occurs. During a sag, the MegaDySC 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 MegaDySC is quickly ready to correct the next sag.

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

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

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

- Avoid installing the MegaDySC 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 MegaDySC.
- 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. The MegaDySC is not rated to directly power life support equipment.

- Ensure the area around the MegaDySC is clean and uncluttered.
- Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.

Installation

System Components

The MegaDySC system consists of two enclosures including one "DySC 400 A Module" MegaDySC section and one Automatic Bypass Switchboard, which are shipped separately and must be mechanically and electrically interconnected at the time of installation. The MegaDySC section houses the static bypass and voltage sag-correction electronics as well as the optional extended-run (ER) module. The Automatic Bypass Switchboard houses the maintenance bypass circuit breaker (CBB), the MegaDySC input (CBI) and output (CBO) circuit breakers, automatic controls, and the i-Sense® voltage-monitoring sensor.

This document applies to the following MegaDySC System Models:

Table 1 - MegaDySC System Models

Catalog Number	Current Rating	Voltage Rating	3 / 4-wire	SR / ER
1608M-400A380V3S	400A	380V	3	SR
1608M-400A380V3E	400A	380V	3	ER
1608M-400A380V4S	400A	380V	4	SR
1608M-400A380V4E	400A	380V	4	ER
1608M-400A400V3S	400A	400V	3	SR
1608M-400A400V3E	400A	400V	3	ER
1608M-400A400V4S	400A	400V	4	SR
1608M-400A400V4E	400A	400V	4	ER
1608M-400A415V3S	400A	415V	3	SR
1608M-400A415V3E	400A	415V	3	ER
1608M-400A415V4S	400A	415V	4	SR
1608M-400A415V4E	400A	415V	4	ER
1608M-400A460V3S	400A	460V	3	SR
1608M-400A460V3E	400A	460V	3	ER
1608M-400A460V4S	400A	460V	4	SR
1608M-400A460V4E	400A	460V	4	ER
1608M-400A480V3S	400A	480V	3	SR
1608M-400A480V3E	400A	480V	3	ER
1608M-400A480V4S	400A	480V	4	SR
1608M-400A480V4E	400A	480V	4	ER

System Layout

Figure 1 - Standard Run (SR) System Layout

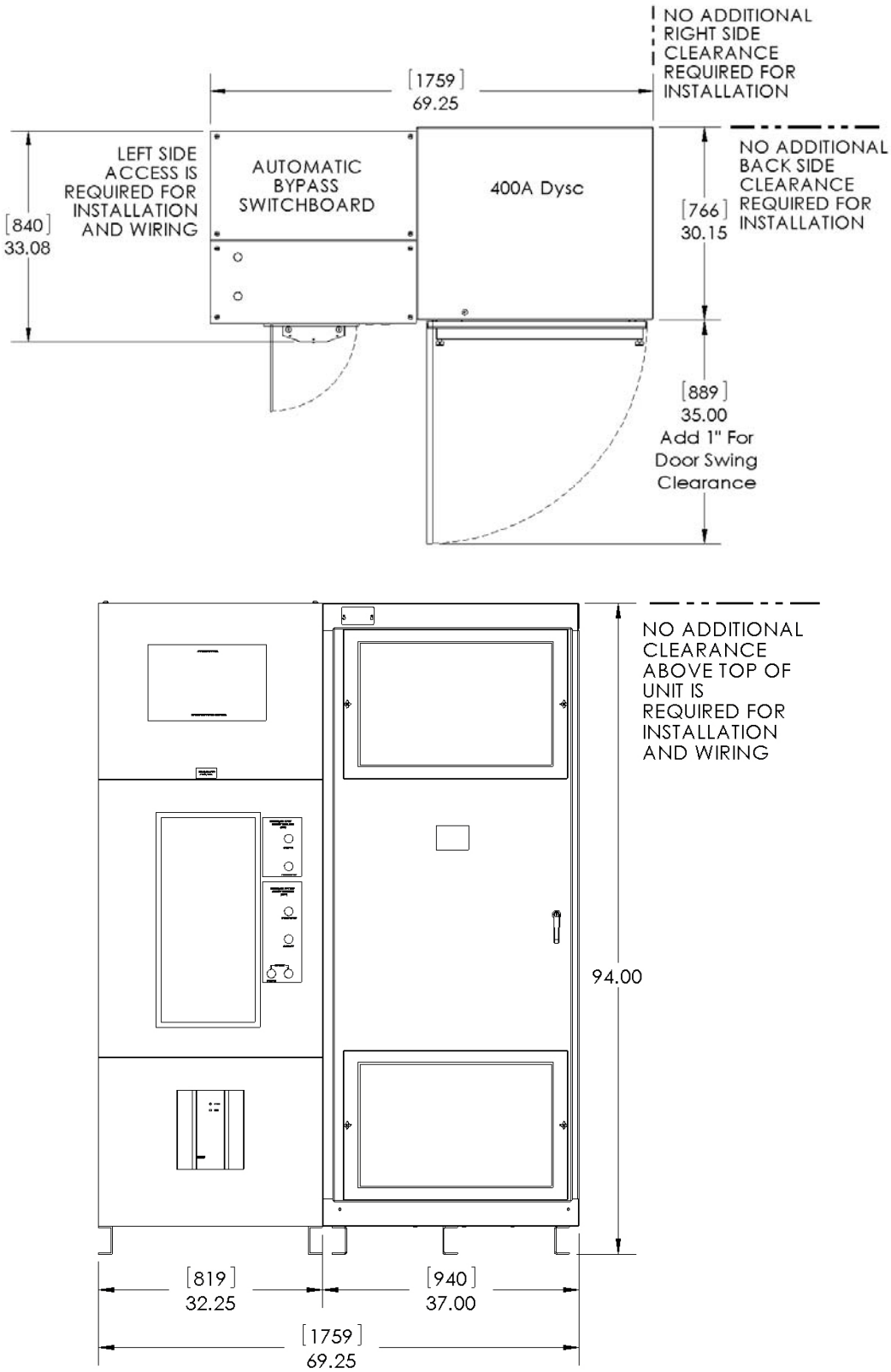
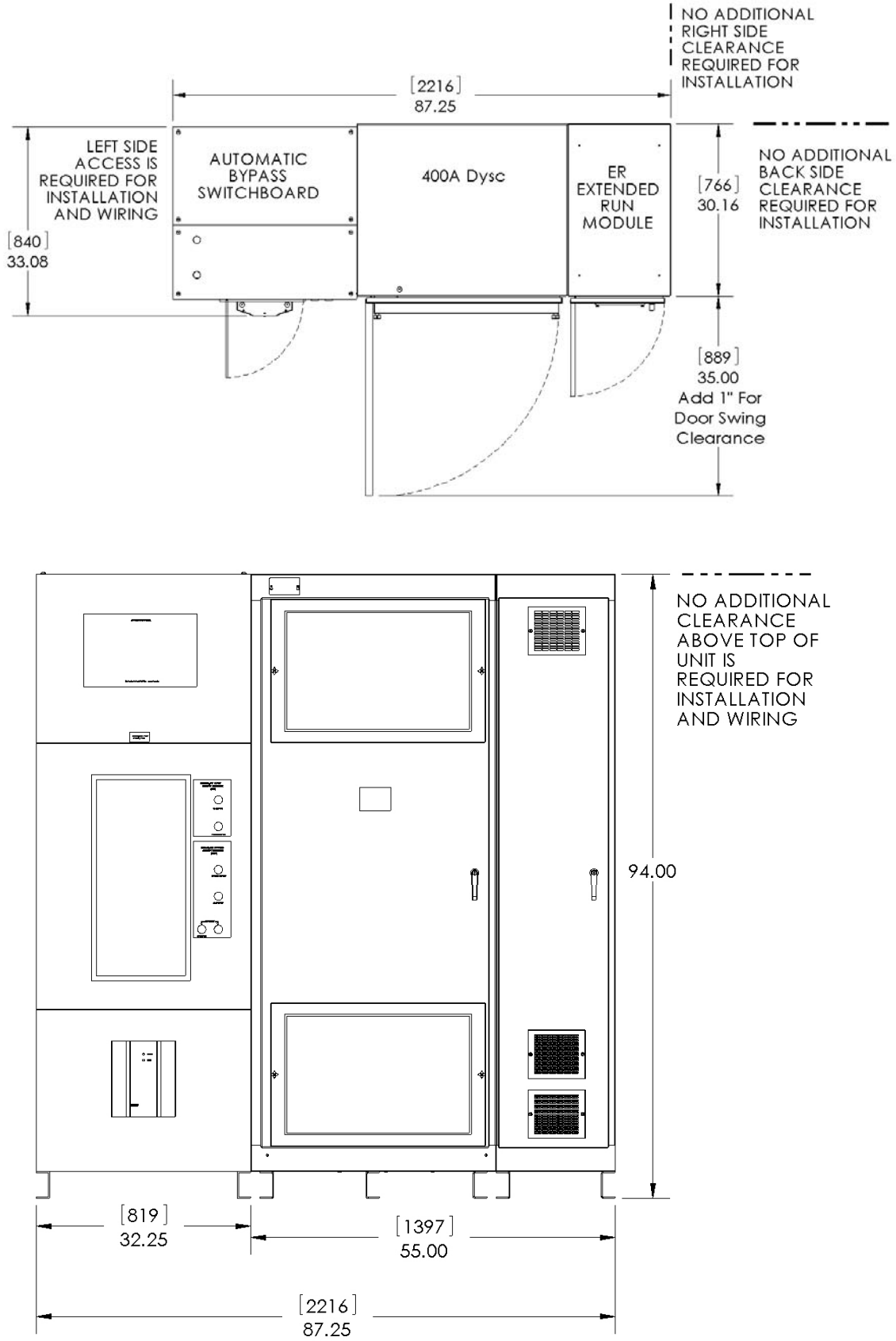


Figure 2 - Extended Run (ER) System Layout



System Clearance

The MegaDySC doors are hinged on the left, and clearance must be given to allow the door to swing open 90 degrees to the front of the enclosure.

Clearance for the Automatic Bypass switchboard must allow the front panels to swing (left side hinged) open 90 degrees to the front of its enclosure.

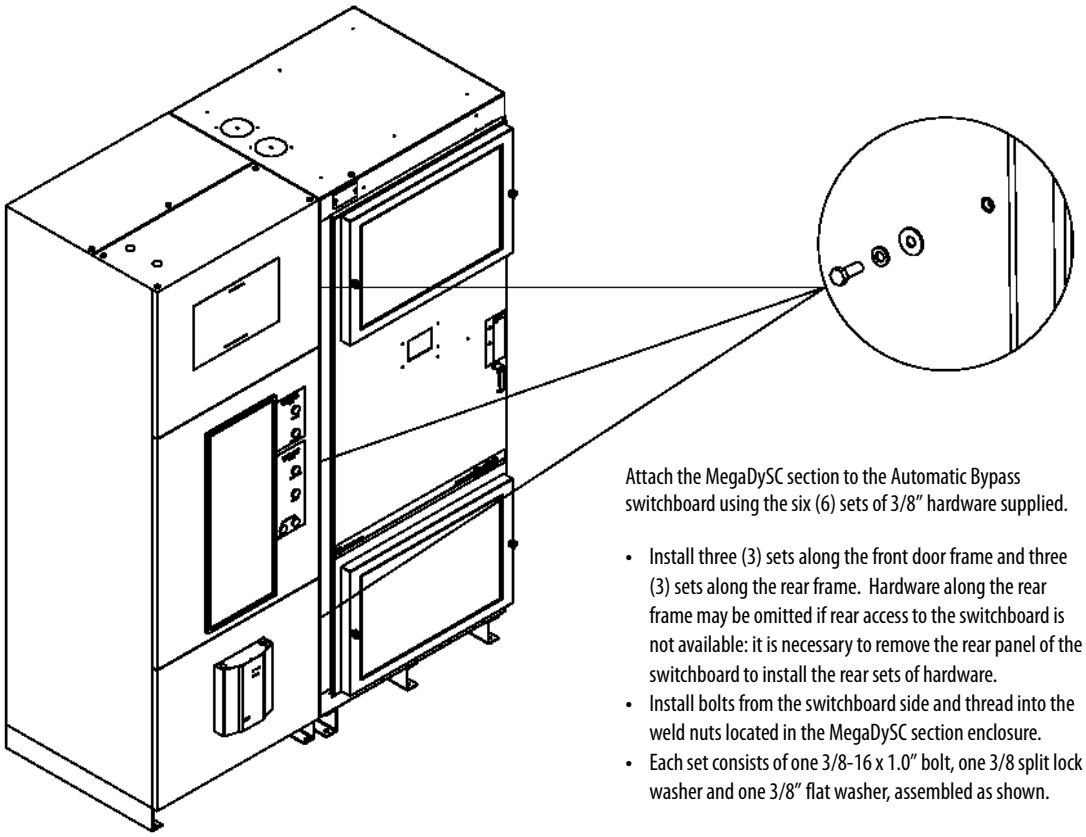
Either rear (preferred) or left side access to the Automatic Bypass switchboard will be required during installation wiring and cabinet interconnect wiring.

System Mounting

The MegaDySC system is floor-mounted, and should be secured using the 0.63" diameter mounting holes provided along the bottom channels. The MegaDySC section is provided with all necessary interconnect wiring to the Automatic Bypass switchboard section. Proper line-up is critical: The MegaDySC section must be located to the right of the Automatic Bypass section when viewed from the front of the system.

The "DySC 400A Module" MegaDySC section is shipped separately from the Automatic Bypass switchboard. The MegaDySC section must be secured to the Automatic Bypass enclosure with the 3/8" hardware supplied. See Figure 3 for fastening locations and hardware arrangement. The optional ER enclosure is permanently connected to the MegaDySC section prior to shipment.

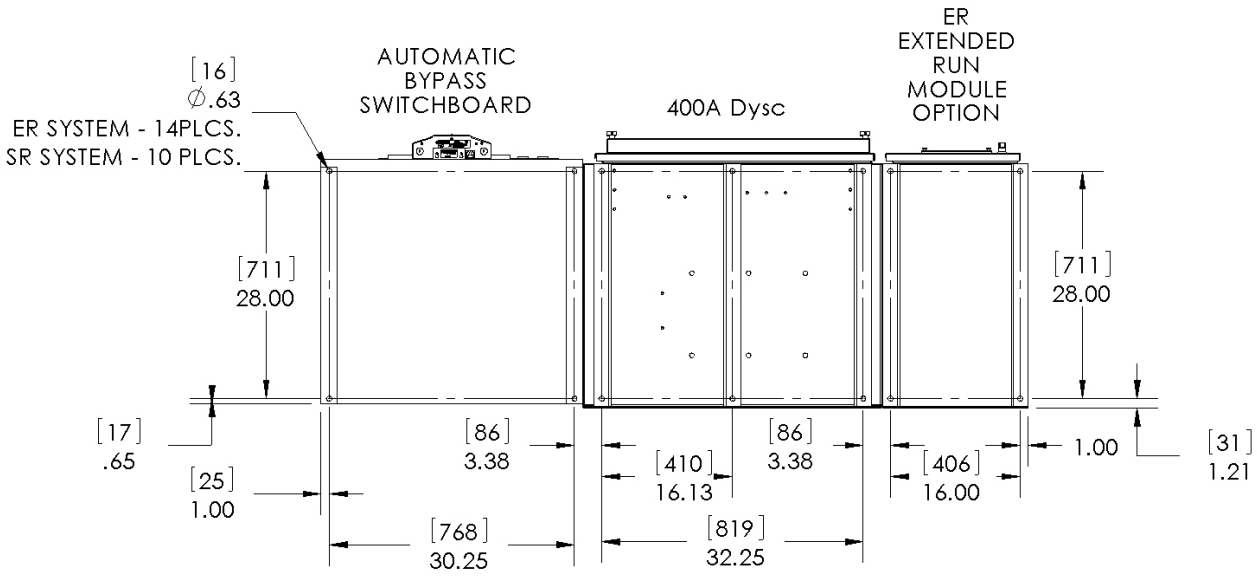
Figure 3 - System Mounting



Attach the MegaDySC section to the Automatic Bypass switchboard using the six (6) sets of 3/8" hardware supplied.

- Install three (3) sets along the front door frame and three (3) sets along the rear frame. Hardware along the rear frame may be omitted if rear access to the switchboard is not available: it is necessary to remove the rear panel of the switchboard to install the rear sets of hardware.
- Install bolts from the switchboard side and thread into the weld nuts located in the MegaDySC section enclosure.
- Each set consists of one 3/8-16 x 1.0" bolt, one 3/8 split lock washer and one 3/8" flat washer, assembled as shown.

Figure 4 - Floor Mounting Detail



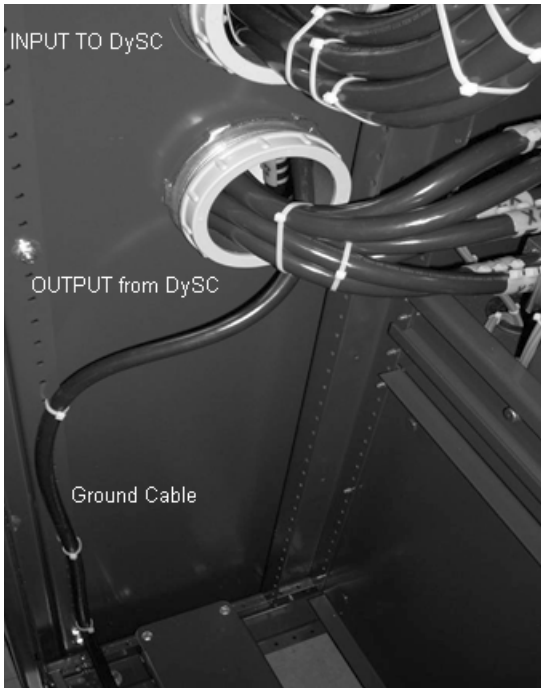
Electrical Interconnections

WARNING: Equipment must be earth-grounded according to local and national electrical codes. Failure to supply proper equipment grounding may result in electrical shock or death. **All interconnection wiring will be installed by a factory-trained technician during system commissioning.**

The MegaDySC cabinet and the Automatic Bypass (ABP) Switchboard are shipped separately. The customer is responsible for system mounting. All interconnecting power cables are provided (shipped inside the ABP switchboard) and will be connected by a factory-trained technician during commissioning. At installation the loose ends of the main cables will be routed through the bushings in the side of the ABP switchboard and connected inside the MegaDySC cabinet to the appropriately labeled terminals. A control wiring harness is also provided in the ABP and must be connected to the MegaDySC cabinet. This cable harness is routed through two large holes, one in the ABP cabinet and one in the MegaDySC cabinet, located at the bottom front of the cabinets. The harness is plugged into the associated terminal block located in the lower, left corner of the MegaDySC cabinet. Finally, the incoming electrical service and outgoing load cables are brought in through the top (or bottom) of the ABP switchboard and connected to the appropriate bus locations, as shown in Figure 6. AC input is connected to the bus bar terminals labeled L1, L2, L3 and the protected load is connected to the bus bar terminals labeled X1, X2, X3.

Instructions for energizing loads before commissioning

Figure 5 - Rear view of Automatic Bypass Switch board



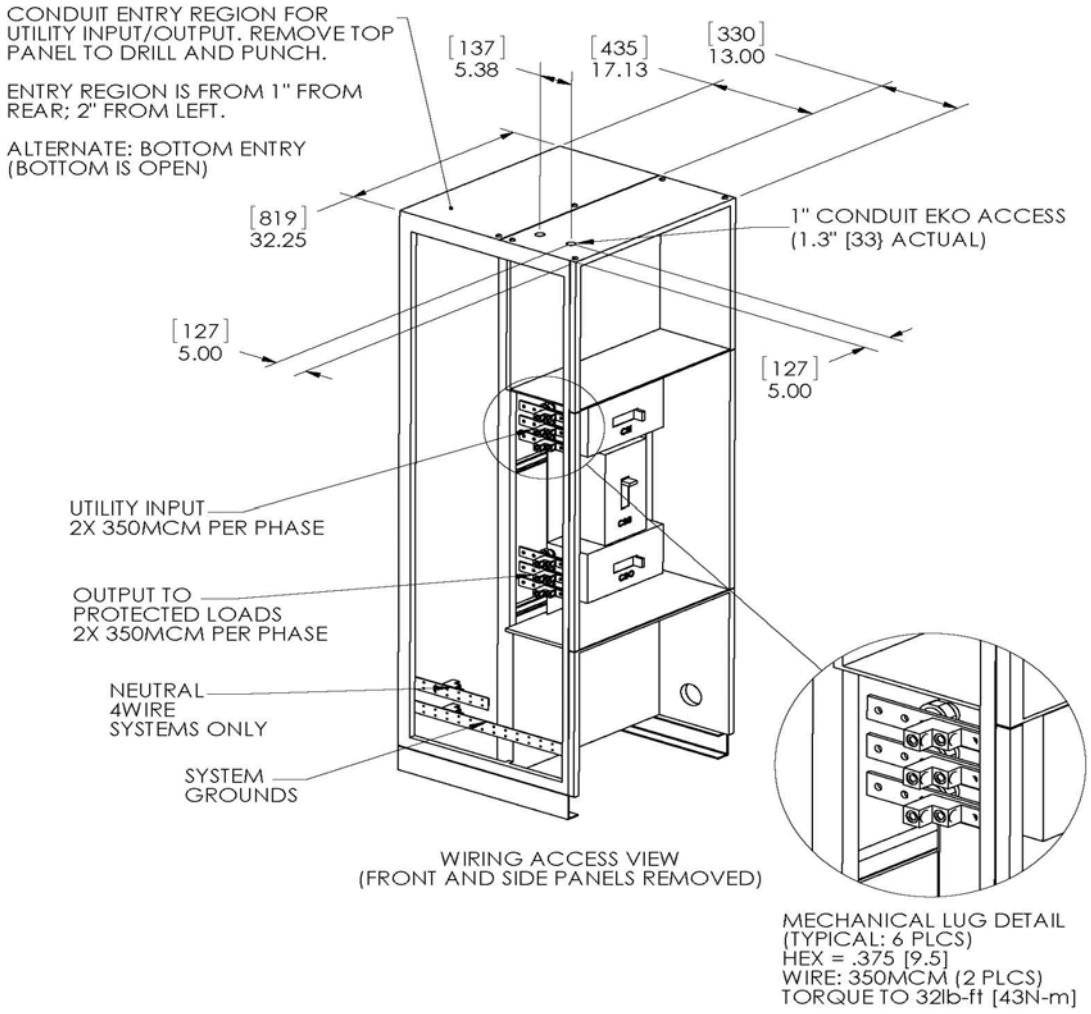
If the MegaDySC system must be installed and put into maintenance bypass mode before commissioning, the installers should put the system enclosures in place as described on page 10, then feed the loose ends of inter-cabinet cables from the switchboard into the MegaDySC cabinet:

1. Route the INPUT power cables (labeled L1, L2, L3) through the top bushing in the right-side wall of the switchboard, labeled “Input to DySC”
2. Route the OUTPUT power cables (X1, X2, X3) and Ground cable through the bottom bushing labeled “Output from DySC”
3. Route the control cable harness from the lower front switchboard pan into the MegaDySC section through the matching holes in the lower front side panels. Install the 3.5” snap-in grommet so that it protrudes into the MegaDySC cabinet before routing the harness. Plug the harness header into connector TB5 on the MegaDySC floor.

WARNING: 120VAC is present at several pins of the harness header when the switchboard is energized.

4. Lockout circuit breakers CBI and CBO in the Automatic Bypass Switchboard.
5. Install utility input and load output conductors.
6. Energize the switchboard.
   The MegaDySC touch screen display will be active only if the control harness has been plugged in on the MegaDySC side. If the screen is active then 120VAC is present at several points within the MegaDySC enclosure.
7. Push the green CLOSE CBB button to energize loads.
   The remaining interconnections and commissioning must be completed by factory-trained technicians.

Figure 6 - Switchboard Terminations and Conduit landing areas



MegaDySC System Installation Connections Checklist

- Connect the Automatic Bypass Switchboard ground bus to an earth ground in accordance with the National Electrical Code and local codes.
- Connect the AC input (line) conductors to the terminals labeled "L1", "L2" and "L3". The set is labeled "UTILITY INPUT". These terminals are located left of the switchboard. See Figure 6.
- Connect the AC output (load) conductors to the terminals labeled "X1", "X2" and "X3". The set is labeled "OUTPUT TO PROTECTED LOADS". See Figure 6.
- For 4-wire models only: connect input and output Neutral (N) conductors to the NEUTRAL bus bar. The input N connection is required for proper operation of 4-wire models. Do not connect to the NEUTRAL bus bar in 3-wire models.
- Check all electrical terminations for properly torqued connections. See Figure 6.
- For i-Sense communications: connect either an analog telephone line to RJ11 jack or Ethernet cable to RJ45 jack. The RJ11 and RJ45 jacks are located in the upper switchboard compartment. They can be accessed through a 1" conduit knockout in the top of the cabinet. See Figure 6 and Refer to i-Sense Voltage Monitor Communications on page 18.

MegaDySC System Interconnections Checklist

(To be completed by factory-trained technician)

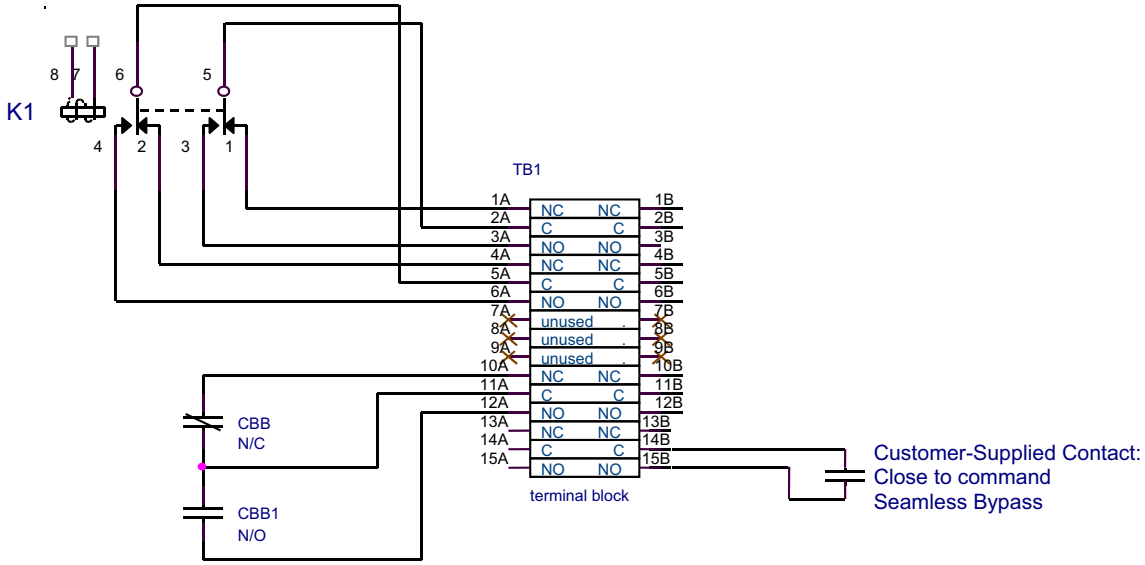
- Connect the Automatic Bypass (ABP) Switchboard-to-MegaDySC ground cable to the ground bus in the MegaDySC.
- Connect line side cables from input circuit breaker (CBI) located in the ABP Switchboard to the MegaDySC section bus bars labeled RH1-L1, RH1-L2 and RH1-L3 respectively.
- Connect load side cables from the output circuit breaker (CBO) located in the ABP Switchboard to the MegaDySC section bus bars labeled RH1-X1, RH1-X2 and RH1-X3 respectively.
- Plug the control cable from the ABP Switchboard into the MegaDySC cabinet.

Communications

Remote Diagnostics and Remote Bypass

Relay dry contacts are available for remote monitoring of the state of the Bypass Circuit Breaker CBB and the Input Circuit Breaker CBI shunt-trip condition (See Figure 7). In addition, a customer-supplied relay may be used to remotely command a Seamless Bypass operation, as described in Automatic Bypass Switchboard Operation on page 22. These functions are available from terminal block TB1 located in the upper compartment of the bypass switchboard. See Figure 9 and Figure 6 for recommended conduit entry location.

Figure 7 - Schematic Diagram - Status Relay Contacts



CBB Contacts (Bypass Circuit Breaker)

"Normal" position for the Bypass Breaker is defined as the breaker being OFF, or Open. As such, the Normally-Open contacts are open when the Breaker is open; the Normally-Closed contacts will open when the breaker is closed.

Example: Normal run: CBB will be Open; therefore TB1/11B will be electrically connected to TB1/10B.

CBI Contacts (Input Circuit Breaker)

Relay K1 activates on any input circuit breaker shunt-trip signal ("CBI-ST"). Heatsink over-temperature, cabinet over-temperature, SCR Failure, Blown-Fuse or Open-Door indicators will all assert the CBI ST signal to open the input circuit breaker, removing power from the MegaDySC. When this signal is present, Relay K1 is activated and its Normally-Open contacts close. Note that this is not a position indicator for the CBI circuit breaker: the CBI ST signal will be present for only one (1) second when the shunt-trip command is asserted. The Input breaker CBI will not automatically reclose after any shunt trip operation; user intervention is required to manually reset the system to operational status.

Remote Seamless Bypass Command-EPO

A normally-open PLC contact, relay contact, or push-button contact may be connected between TB1/14 and TB1/15. Contacts must be rated for at least 120V AC at 25 mA. Note that 120V AC is present at TB1/15 when the switchboard is energized. Close the contact to initiate an automatic seamless bypass operation: CBB will close, then CBI and CBO will open, removing power from the MegaDySC cabinet; voltage sag correction will then be disabled.

This feature may be utilized as an Emergency Power Off (EPO) function for the MegaDySC cabinet. Power to the output loads or output distribution panel, if present, will not be interrupted. Note that the automatic bypass functionality requires that nominal AC power is present at the switchboard input terminals.

Contact Ratings

The CBB aux. contacts (Terminals 10B-12B of TB1) are rated at 6A @ 600VAC, 0.5A @ 125VDC or 0.25A @ 250VDC. The DC ratings are for non-inductive loads only. The K1 contacts (Terminals 1B - 6B of TB1) are rated at 10A @ 110VAC Resistive, 7.5A @ 110VAC Inductive, 10A @ 24V DC resistive and 5A @ 24V DC inductive.

WARNING: Remove power from the DySC system prior to connecting any alarm notification device. Access to the terminal contacts risks exposure to a potential arc flash and/or electrocution hazard unless power to the switchboard is removed.

MegaDySC Status Contacts

Three relay contacts indicate MegaDySC electronics status; refer to Figure 8. 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. These relay contact are rated 24V at 1A.

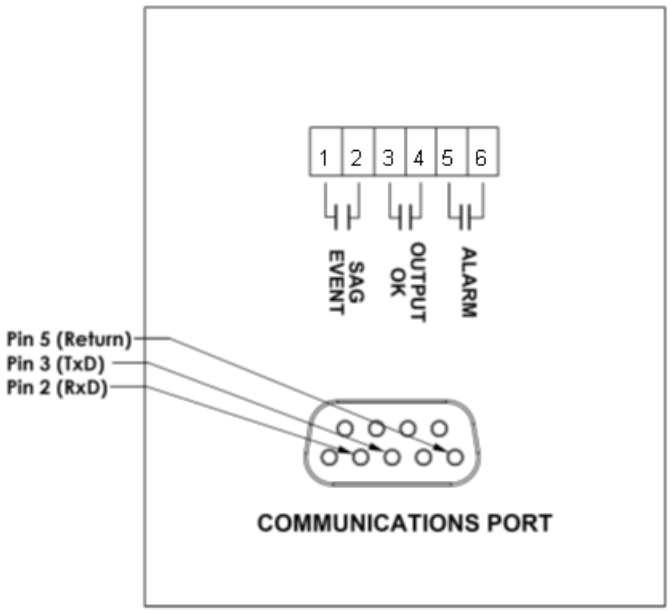
For access, remove the small metal cover above the door of the MegaDySC section

- All wiring is to be Class 2, limited to 24 Volts, AC or DC.
- Acceptable wire gauges range from 24AWG to 12AWG (0.205-2.5mm2).
- Tighten connections to 5.0 lb-in (0.6 N-m). A plug-in connector is provided to facilitate wiring.
- For permanent installation of communications conductors, a standard conduit knockout is located on the cabinet top.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 (0.205 - 2.5 mm2). Torque connections to 5lb-in (0.6 N-m)

RS-232 Serial communications

A DE-9 male connector is provided for remote communications. Contact Rockwell Automation Technical Support for protocol details.

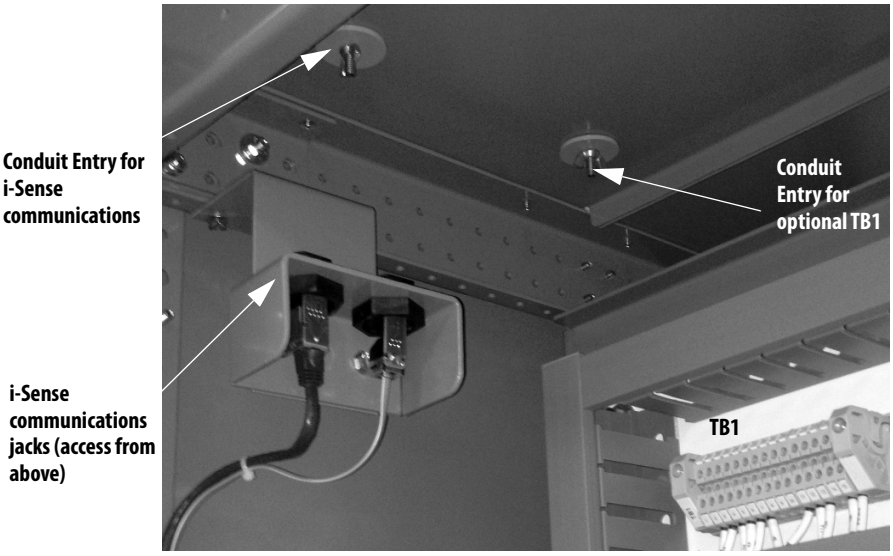
Figure 8 - Serial Communications Port and MegaDySC Status Relay Contacts



i-Sense Voltage Monitor Communications

The i-Sense voltage monitor is located on the bottom front of the bypass switchboard and is pre-wired to monitor the MegaDySC input and output voltages. The i-Sense Ethernet and Modem communications ports are internally connected to the RJ45 and RJ11 jacks, respectively, located in the upper compartment of the bypass switchboard. See Figure 6 and Figure 9 for conduit entry locations. A communications connection is required to enable i-Sense monitoring. See publication 1608S-UM001A-EN-P for more information.

Figure 9 - Communications Conduit Entrance view from within upper switchboard compartment



Applying Power

ATTENTION: The MegaDySC system must be commissioned by factory-trained engineers. Do not energize the MegaDySC until instructed to do so by commissioning engineers. If the Automatic Bypass switchboard must be installed and energized before commissioning, follow instructions next to Figure 5.

- After installation make certain there are no metal filings or any conductive debris in or on any components inside the cabinets.
- Verify MegaDySC system voltage rating matches ac source voltage.
- Ensure all input and output terminations including grounding have been completed and properly tightened.
- Replace all covers. Close and lock all cabinet and switchboard doors.
- Allow commissioning technicians to complete connections and initial checks
- Apply power from the upstream branch protection device when instructed to do so by the commissioning technicians.
- After commissioning, follow instructions on the Automatic Bypass switchboard to put the system into Normal mode. The load is now being protected by the MegaDySC. The display should show “OK” in the upper left corner.

WARNING: The MegaDySC and (optional) ER cabinets are interlocked. Opening cabinet doors while in the MegaDySC "normal" mode will cause immediate automatic bypass operation and subsequent loss of voltage sag protection while in "maintenance bypass" mode. Automatic Bypass switchboard cabinet doors are not interlocked and should be kept locked to avoid exposure to dangerous voltages. (see MegaDySC SYSTEM OPERATION)

NOTES:
1.Cycling input power in the sequence OFF--ON--OFF--ON within a one minute period will cause a "Limit Cycle Timeout" alarm. In such case sag correction will be disabled for one minute, after which the alarm will automatically reset.
2. Pushbutton "Close CBI" is disabled for one minute after CBI is opened for any reason.

Notes:

Operation

System Description

Raw utility power enters and routes through the Automatic Bypass switchboard to the load. In maintenance bypass mode the power bypasses the MegaDySC cabinet and passes directly to the load. In this mode the load is unprotected from voltage sags. In the Normal operation mode the MegaDySC cabinet is energized and the power is directed through the MegaDySC, protecting the load. See the following sections for MegaDySC and Automatic Bypass operation details.

WARNING: Operation in Normal Mode requires that the maintenance bypass circuit breaker (CBB) be open (OFF)-otherwise, voltage sag correction will be defeated by the mechanical bypass.

MegaDySC Operation

The MegaDySC section contains three power electronics modules (one module per phase) and controls that continuously monitor the line voltage. The modules are series-connected to the input line, and operate by adding the compensating voltage needed to restore the line to its nominal output. When the utility line voltage is within normal range the ac static switch components remain closed and no compensating voltage is added. When an insufficient line voltage event occurs, the static switches open and the sag-correcting electronics quickly add the balance of voltage necessary to regulate the load voltage.

The MegaDySC accepts line input power over 3 wires into terminals L1, L2, L3 and provides sag compensated three-phase output power at terminals X1, X2, and X3 when not in the Maintenance Bypass mode. In 4-wire systems the input Neutral is connected directly to the output Neutral terminal.

Thermal switches are included to activate fans if the cabinet temperature or other internal temperatures exceed set limits.

A touchscreen display provides indication of the status of the MegaDySC operation. After power is switched on, the green "OK" box will be displayed in the upper left hand corner of the display, indicating that the output voltage is within a normal range of -13% to +10% of nominal.

A red "FAULT" box is displayed in the upper left hand corner of the display when a fault condition is present on the MegaDySC. During this period sag correction is disabled and the MegaDySC will continue to bypass the utility voltage directly to the load through the static bypass path.

An orange “FAULT OVER" box is displayed when the previous fault condition has cleared. Sag correction will remain inhibited until the reset period expired (approximately 1 minute). A blue “SYSTEM OFFLINE” box is displayed

whenever the MegaDySC system is in the maintenance bypass mode (CBB closed and CBI open).

A list of conditions and indications is given in Table 2. Refer to Chapter 6 for further information on system alarms and status display.

Table 2 - Operational Conditions and Indications

CONDITION	DEFINITION	Touchscreen Display STATUS text*	INVERTER OPERATION	BYPASS MODE
Normal:	88.5% < V_{LINE} < 110%	Green "OK"	Standby	Static BP
Sag Event:	V_{LINE} < 88.5% for less than available runtime.	Green "OK"	Running	Inverter
Runtime Exceeded:	Cumulative runtime exceeded	Blinks Red, then Orange for 1 min. Repeats is condition persists	Inhibited	Static BP
Normal Mode, Overload:	Load current > 110%	Red during OL condition, Orange for 1 min. after OL ends	Inhibited	Static BP
Inverter Run Mode, Output Overcurrent: (I^2t)	Load current > 150% for 3 cycles	Blinks Red, then Orange for 1 min. Repeats is condition persists	Inhibited	Static BP
Inverter Module Over-temperature	Module temperature limit exceeded	Blue, MegaDySC offline	Disconnected	Mech. Bypass
MegaDySC Over-temperature	Internal temperature limit exceeded	Blue, MegaDySC offline	Disconnected	Mech. Bypass
Static Switch Failure	Open SCR(s)	Blue, MegaDySC offline	Disconnected	Mech. Bypass
Main Fuse Open	Open Fuse(s)	Blue, MegaDySC offline	Disconnected	Mech. Bypass
Enclosure Door Open	Door Open	Blue, MegaDySC offline	Disconnected	Mech. Bypass

* The touchscreen will power down if both input and output voltages fall below approx. 75% of nominal

**An error message will be displayed while the red or orange text box is displayed. Refer to Chapter 6 for further information on accessing fault codes and status history.

Automatic Bypass Switchboard Operation

The Automatic Bypass Switchboard consists of a bypass circuit breaker (CBB), an input circuit breaker (CBI), and an output circuit breaker (CBO). Under normal operating conditions raw input power is routed through CBI to the input of the MegaDySC. The output of the MegaDySC is routed to the load through CBO. CBB is normally open. CBB connects utility power to the load, bypassing the MegaDySC, when operating in the maintenance bypass mode.

Refer to page 25 for descriptions of the automatic bypass modes

WARNING: Dangerous voltages can still exist within the MegaDySC enclosure even if the system is in bypass mode. Refer servicing to qualified personnel.

ATTENTION: - Follow these instructions to avoid interrupting load power! Contact the factory immediately if the system fails to operate as outlined below. Voltage sag protection is not available whenever CBB is closed (red lamp lighted)

Automatic Bypass Switchboard Operating Instructions

Automatic System

In the event of a fault in the MegaDySC system, bypass (CBB) will close. The system will remain in bypass until manually transferred back to the MegaDySC

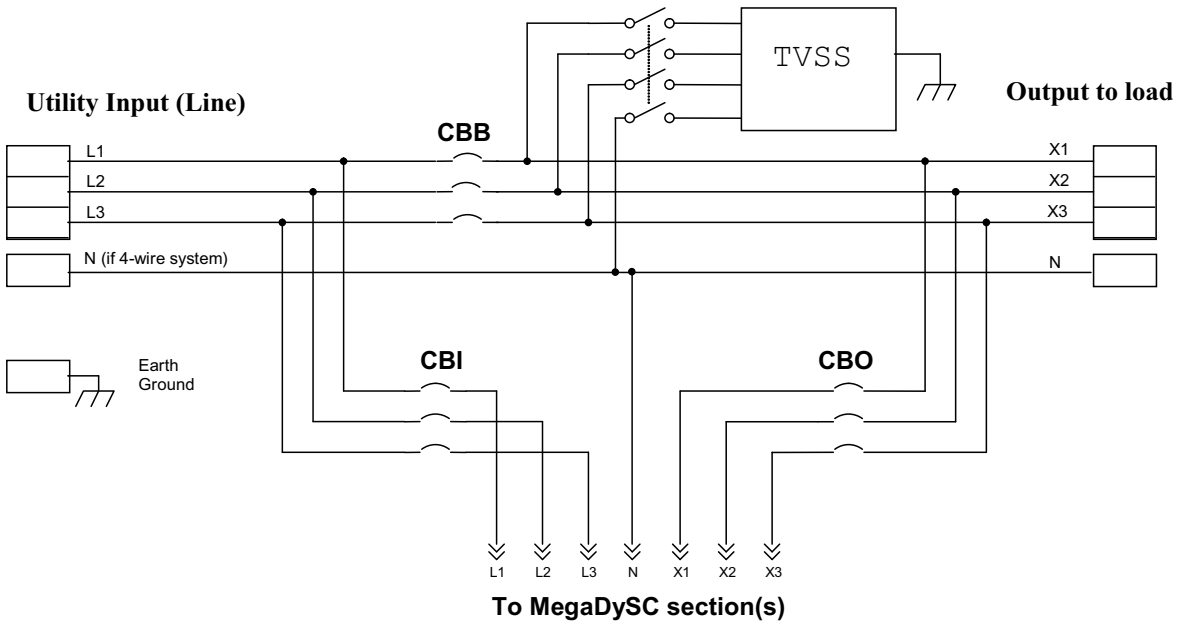
Manual Transfer to Maintenance Bypass (Bypass Mode)

1. If CBB is tripped, Press both "CBB RESET" pushbuttons.
2. Press green "CLOSE CBB" pushbutton.
3. Confirm that red "BYPASS CLOSED" lamp is lit.
4. Press red "OPEN/RESET CBI" pushbutton. Output breaker (CBO) will open automatically.
5. Confirm that both CBI and CBO are open.
6. The MegaDySC is now bypassed and isolated for maintenance.

Manual Transfer to MegaDySC (Normal Mode)

1. Press red "OPEN/RESET CBI" pushbutton then press green "CLOSE CBI" pushbutton. *Note: "CLOSE CBI" is inhibited for one minute after power cycling.*
2. Confirm that the MegaDySC screen is lit, is green and displays "OK" in the upper-left corner.
3. Close CBO by manually moving the handle to the "OFF" (0) position and then to the “ON” (|) position.
4. Confirm that the screen on the MegaDySC displays "OK".
5. Press red “OPEN CBB” pushbutton
6. The MegaDySC system is now providing power to the load.

Figure 10 - Schematic Diagram of Automatic Bypass Switchboard Power Circuit



Note: The 3-wire MegaDySC models have not been evaluated by Underwriter's Laboratories, Inc.® for connection to a corner-grounded or ungrounded delta power source. Contact Technical Support for assistance.

Transient Voltage Surge Suppression

Over voltage transient protection is provided on the output of the MegaDySC. Indicator lights for each phase on the front of the TVSS panel (behind Bypass cabinet top front panel) are illuminated under normal operation. In case of a severe over-voltage transient event, internal fuses in the TVSS module may open. If TVSS operation is compromised, one or more of the indicator lights will be extinguished. A form C contact is provided inside the TVSS module for remote fault indication, if desired. Refer to the TVSS user manual for details on accessing that contact. If a fault is indicated, the TVSS disconnect fuse block (F25-F26-F27-F34) may be opened to allow servicing of the TVSS module. Refer servicing to qualified personnel.

Troubleshooting Notes

Refer servicing to qualified and factory authorized personnel. Opening the MegaDySC cabinet door will shut down the MegaDySC system and force an automatic mechanical bypass. Refer to manual bypass instructions to perform a seamless transfer of power before opening the enclosure door for servicing.

WARNING: This enclosure contains energy storage devices. Dangerous voltages may exist within this enclosure after AC power has been removed. Do not touch any components within the enclosure if the red LEDs located above capacitor banks are lighted. If the red LEDs do not extinguish within 5 minutes, close the enclosure door and contact Technical Support.

Normal Mode

The **NORMAL** mode for the MegaDySC is Input Breaker (CBI) and Output Breaker (CBO) closed. The bypass breaker (CBB) must be open or the MegaDySC will not be able to correct voltage sags. There is a red indicator light on the bypass enclosure that is lighted when the bypass is closed. The green "OK" status box should be shown on the touchscreen display. The green "OK" box indicates that the voltage at the output of the MegaDySC is within the +10%, -13% normal window. Refer to Table 2 for operational conditions and indications.

Bypass Mode

The **BYPASS** mode for the MegaDySC is for Input Breaker (CBI) and Output Breaker (CBO) to be open. The bypass breaker (CBB) must be closed to provide power to the load while the MegaDySC is being serviced.
Refer to Automatic Bypass Switchboard Operation on page 22 for the placard on the bypass switchboard for instructions on transferring the system into and out of bypass mode.

WARNING: Servicing must only be performed by factory authorized and qualified personnel.

Test Mode

The **TEST** mode for the MegaDySC is for Input Breaker (CBI) to be closed and Output Breaker (CBO) to be open. The bypass breaker (CBB) must be closed to provide power to the load while the MegaDySC is being tested off-line.

WARNING: Testing must only be performed by factory authorized and qualified personnel.

Fault Protection

Fault protection is provided by a variety of protection devices including electronic, circuit breakers and fuses.

CBI and CBO are set to protect the MegaDySC conductors. If an upstream circuit breaker is present, CBB is typically coordinated to allow the upstream breaker to be the primary protection for the branch circuit.

The MegaDySC section contains semiconductor fuses rated 800 A. These fuses provide short circuit protection for the MegaDySC modules. In the event of a short circuit, this fuse will clear and trigger an automatic transfer to mechanical bypass mode.

In addition, each module has an electronic current limit function that will

protect the inverter module from peak over currents during sag protection operation.

IMPORTANT In the event of the operation of any over current protection function, check the touchscreen display on the MegaDySC for error codes that may indicate the type of over current condition.

ATTENTION: Circuit Breaker settings must not be changed without consulting Technical Support.

Each of CBB, CBI, CBO contains an electronic trip unit with adjustable "Short Delay Pickup." These are factory-set to CBI: 7, CBB: 8 (max.), CBO: 8 (max.)

Diagnostic Indicators

Diagnostic indicators available on the MegaDySC system:

- Touchscreen display on the door of the MegaDySC enclosure.
- Red lamp on Bypass enclosure indicates mechanical bypass is closed when lit.
- Circuit breaker status (OPEN or CLOSED)
- Remote contacts and RS-232 serial communications port

IMPORTANT Record any Alarm or System Event messages seen on the display before contacting Technical Support

Open circuit alarm conditions:

1. Open static switch (failure in static switch path)
2. Open main input fuse (F1-F2-F3)
3. Overload of static switch (may cause over-current trip in CBI; see Specifications)
4. Over-temperature of static switch heatsink
5. Over temperature of MegaDySC cabinet ambient air
6. Open cabinet door

NOTE: Alarm types 1, 2, and 3 may result in momentary interruption of power to the load before transferring to mechanical bypass. Types 4 through 6 will result in a seamless transfer to mechanical maintenance bypass, without interruption.

Display Screen

Overview

The MegaDySC® touch screen display is a window to voltage sags and MegaDySC protection. The display provides system status, voltage sag notification and history, runtime statistics and system history in a simple and intuitive touch-based user interface.

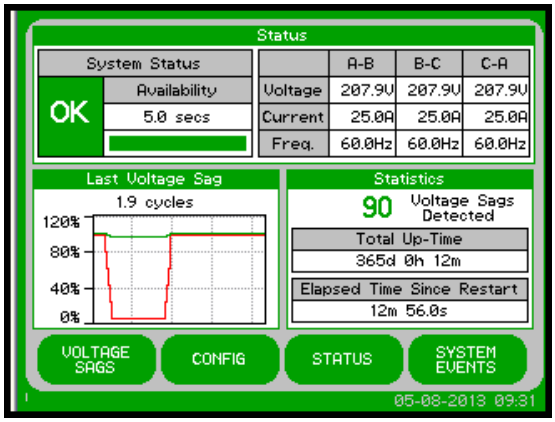
When the system first starts, a welcome screen displaying the MegaDySC product logo appears. This screen disappears after 5 seconds, when the "Home" screen appears.

Note: The touch screen is optimized for use with a plastic stylus or bare finger.

At installation time perform the following steps to configure your system:

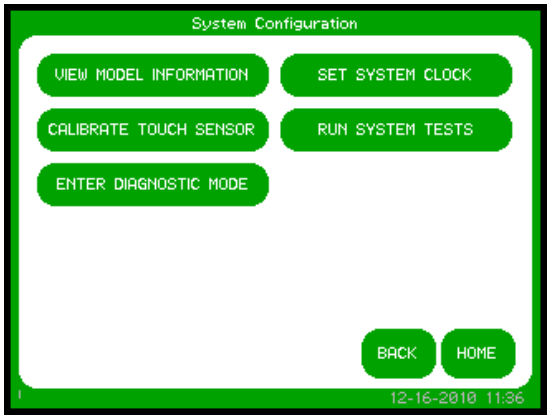
Step 1: Press the "CONFIG" button at the bottom of the "HOME" screen (See Figure 11).

Figure 11 - Home Screen



Step 2: Begin calibration by pressing "CALIBRATE TOUCH SENSOR" (See Figure 12).

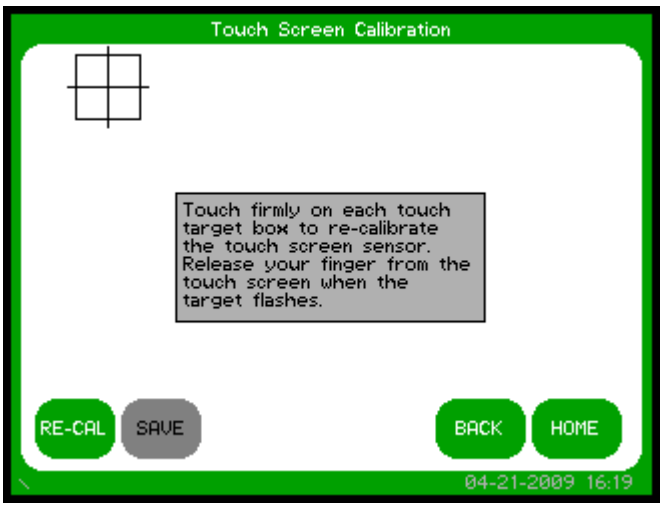
Figure 12 - System Configuration



Note: To recalibrate from any screen, hold anywhere on the screen for 10 seconds. You will see a small progress bar at the bottom of the screen. When the progress bar reaches 100 percent, the calibration screen will open.

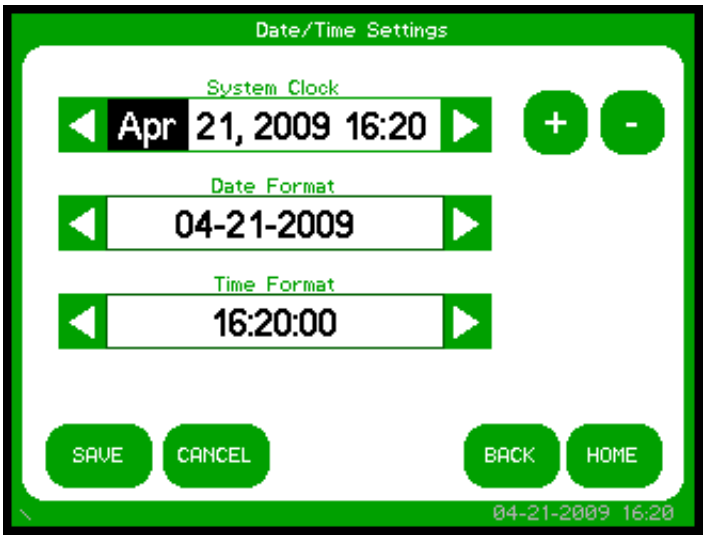
Step 3: The "Touch Screen Calibration" screen will then appear (See Figure 13). Press and hold on the center of the touch target, release when the touch target begins to flash. Repeat with the next two touch targets.

Figure 13 - Touch Screen Calibration



Step 4: The screen uses the new calibration configuration. You can test the calibration before saving by pressing anywhere on the screen to ensure the touch target appears where you press. After testing, press the "SAVE" button. Press the "BACK" button to return to the "System Configuration" screen.

Figure 14 - Set System Date and Time



Step 5: Set date and time by pressing "SET SYSTEM CLOCK" in "System Configuration." Press "SAVE" when completed.

Home Screen

The “HOME” screen of the display provides a snapshot view of the status of the entire system (See Figure 15). You can return to this screen from any other screen by pressing the “HOME” button. After 5 minutes of inactivity (i.e. not pressing the screen), the touch screen will automatically return to the “HOME” screen. The “HOME” screen is divided into four main areas described inTable 3.

Figure 15 - Home Screen

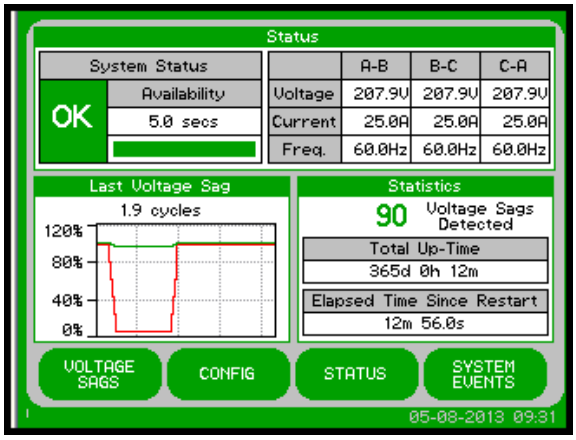


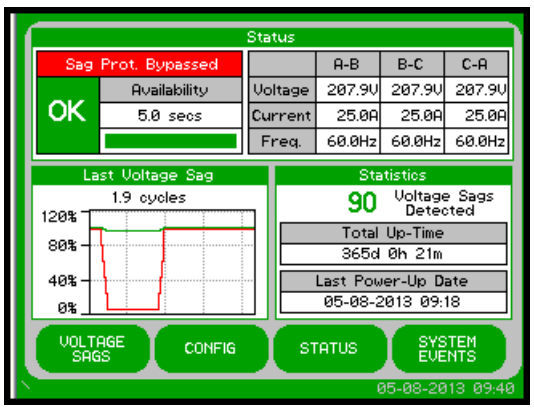
Table 3 - Home Screen Description

Description	Function	
Status	Real-time system operation: available runtime, output line-to-neutral (L-N) or line-to-line (L-L) voltage (model dependent), load current, and frequency	
Last Voltage Sag	Rotating information about the last voltage sag: event start time, event duration, and sag depth	
Statistics	Summary view of MegaDySC performance based on sags detected, plus a rotating display of last power-up date, elapsed time (since power up), and total up-time	
Main Menu	The menu buttons at the bottom of the screen navigate through: **VOLTAGE SAGS:** Displays the “Voltage Sag Log” screen **CONFIG:** Displays the “System Configuration” screen	**STATUS:** Displays the “System Status” screen **SYSTEM EVENTS:** Displays the “System Event Log” screen

Mechanical Bypass

Some systems equipped with a mechanical bypass display the bypass status in the System Status panel on the Home Screen. When the mechanical bypass is closed, the DySC unit is bypassed and voltage sags on the line will NOT be corrected.

Figure 16 - Home Screen Mechanical Bypass



System Status

The “System Status” screen displays the real-time overall system status. Reach this screen by pressing “STATUS” on the “HOME” screen or the “Status” area at the top of the “HOME” screen

Figure 17 - System Status Summary

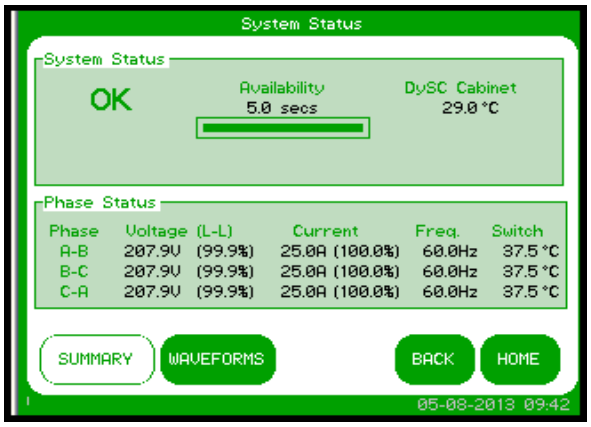


Figure 18 - - System Status Waveforms

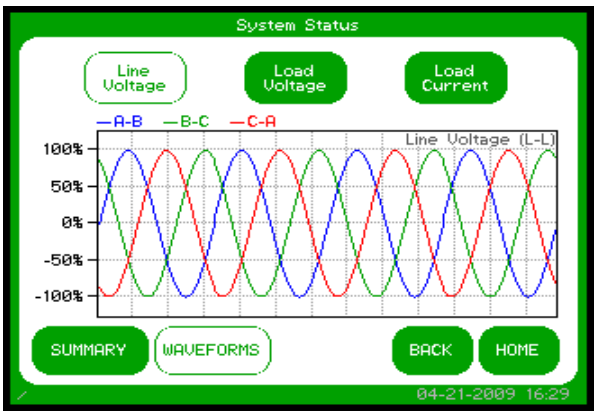


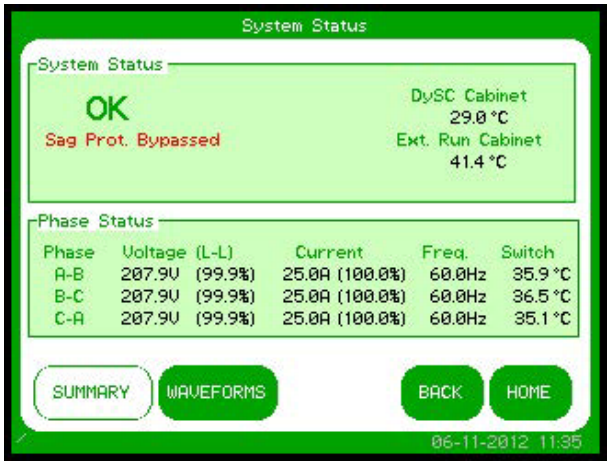
Table 4 - System Status Description

Description	Function
System Status	Overall system status including current operational status, availability to correct sags, and internal cabinet temperature
Phase Status	Voltage, current, frequency, and static switch temperature are displayed for all phases. The percentage displayed following the voltage and current is the percent of nominal value for the MegaDySC. Nominal values are listed on the “View Model Information” screen.
Waveforms	A sample of a 4 cycle waveform that includes real-time line voltage, load voltage, or load current can be selected for display

Mechanical Bypass

Some systems equipped with a mechanical bypass will display the bypass status in the System Status panel on the Status Screen. When the mechanical bypass is closed, the DySC unit is bypassed and voltage sags on the line will NOT be corrected.

Figure 19 - Status Screen Bypass Status



Voltage Sag Events

A voltage sag is defined as the period when input RMS voltage drops to less than 88.5% of the rated DySC voltage. Details of each voltage sag and corresponding MegaDySC protection are captured and saved to the voltage sag log.

Voltage Sag Log

The "Voltage Sag Log" screen (See Figure 20) displays a list of the last 61 voltage sags. Reach this screen by pressing "VOLTAGE SAGS" button on the "HOME" screen.

Figure 20 - Voltage Sag Log

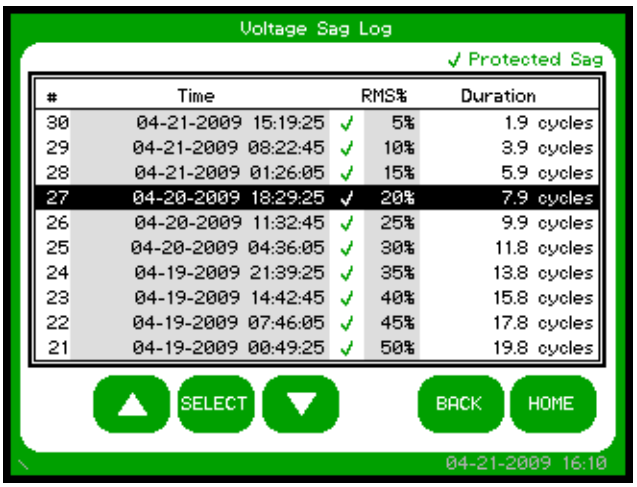


Table 5 - Voltage Sag Log Description

Description	Function
#	Unique ID within the list (0-60) to identify the voltage sag
Time	Start time and date of the voltage sag
Check Mark	Denotes the MegaDySC protected the voltage sag
RMS%	Worst-case RMS voltage (percent of nominal) across all phases
Duration	Duration of the voltage sag

Note: Use the up/down arrows to navigate through the list. Press the "SELECT" button to view additional details about the voltage sag

Voltage Sag Detail

Voltage Sag Detail" screen (See Figure 21) displays all information related to the selected event. Details for the most recent sag event can also be accessed by pressing anywhere in the Last Voltage Sag area of the HOME screen.

The worst-case RMS voltage recorded during the event is displayed in the upper window along with the corresponding voltage percentage and the event duration. Table 6 describes the remaining screen content.

Figure 21 - Voltage Sag Detail

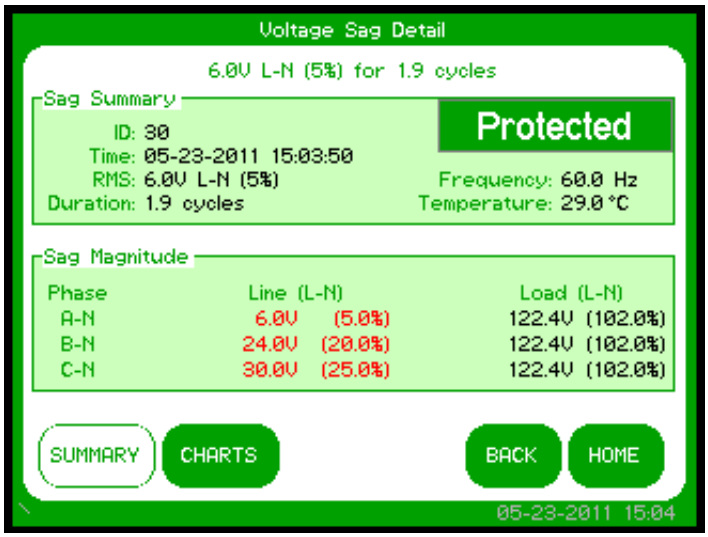


Table 6 - Voltage Sag Detail Description

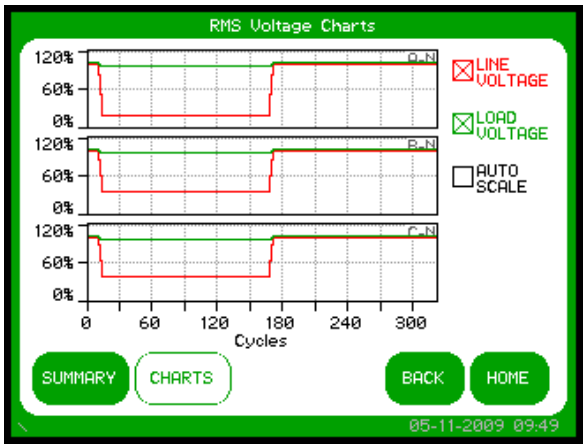
Description	Function
Sag Summary	**ID**: Unique ID within the list (0-60) to identify the voltage sag **Time:** Start time of the voltage sag **RMS:** Worst-case RMS voltage (L-N) and percent of rated voltage across all phases **Duration:** Duration of the voltage sag **Frequency:** Frequency of the line prior to the start of the voltage sag **Temperature:** Internal temperature of the MegaDySC prior to the start of the voltage sag
Sag Magnitude	**Line Voltage:** Line RMS voltage and percent of rated (L-N). Voltages ≤ 80% of nominal are displayed in red. **Load Voltage**: Load RMS voltage and percent of nominal (L-N).
Correction Result	The "Correction Result" is displayed in a box in the upper-right-hand corner of the "Event Summary" section. The "Correction Result" conveys how the MegaDySC performed correcting the voltage sag. The possible values are: **Protected**: The output RMS voltage on all phases is ≥ 85 percent of nominal and the MegaDySC correction was active for the duration of the voltage sag (will be displayed in green). **Run Error**: An unexpected system event occurred during the sag (will be displayed in orange) **Run Inhibited**: The MegaDySC system was inhibited when the sag occurred (will be displayed in orange).

Note: The "Voltage Sag Detail" for the most recent event can also be accessed by pressing the "Last Voltage Sag" area of the "HOME" screen.

Voltage Sag RMS Voltage Charts

The line and load RMS voltage (L-N) of each phase is recorded for 8 cycles prior to the start of the voltage sag followed by the first 300 cycles of the voltage sag (See Figure 22). Reach this screen by pressing "CHARTS" on the "Voltage Sag Detail" screen as shown in Figure 21 on page 32.

Figure 22 - RMS Voltage Charts



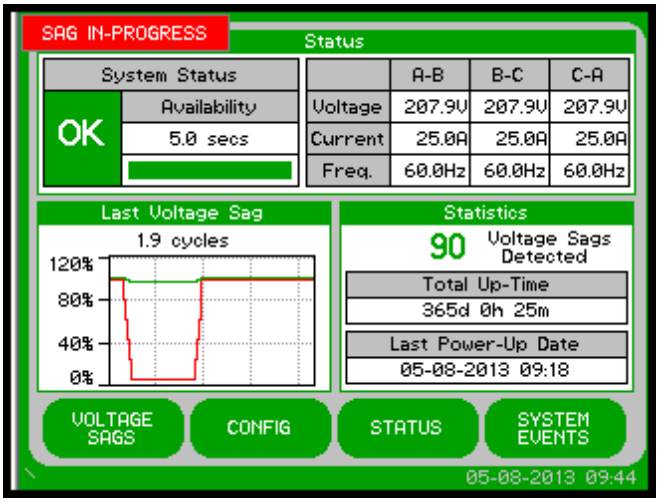
Line voltage is shown in red and load voltage is shown in green. By pressing the check boxes in the right column, you can toggle each data series Off and On as well as enable y-axis auto-scaling.

Note: 300 cycles = 5.0 seconds at 60 Hz or 6 seconds at 50 Hz.

Voltage Sag Notification

While the voltage sag is in-progress, a flashing red box in the upper left-hand corner will display "SAG-IN-PROGRESS." This box will appear on every screen until the voltage sag ends. See Figure 23.

Figure 23 - Voltage Sag Detected



System Events

The MegaDySC tracks all operational events which are classified into five groups based on severity.

Table 7 - System Event Description

Description	Function
Informational	Purely informational. No action is required.
Auto-Resetting	The MegaDySC will reset within 60 seconds. No user action is required.
User Attention	User action may be required to correct a problem. The MegaDySC will reset 60 seconds after the error condition is corrected.
Manual-Reset	For system events that cause circuit breaker CBI to open a manual reset of the DySC system will be required.
Call Service	For events classified as Call Service, factory trained service support will be required. Contact Rockwell Automation technical support.

System Event Log

The "System Event Log" screen displays a list of the last 40 system events in chronological order (See Figure 24). Reach this screen by pressing "SYSTEM EVENTS" on the "HOME" screen.

Figure 24 - System Event Log

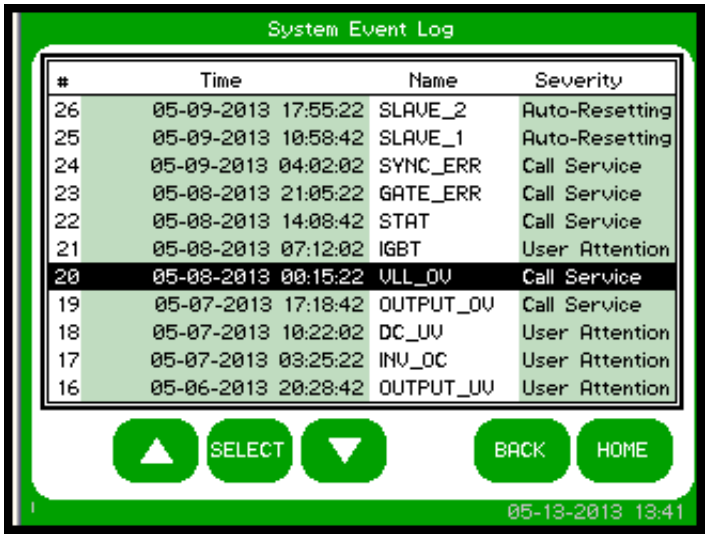


Table 8 - System Event Log Description

Description	Function
#	Unique ID (0-39) to identify the system event (unique within the list)
Time	Start time of the system event
Name	Short name of the system event.
Severity	Severity of the system event

Note: Use the up/down arrows to navigate through the list. Press the "SELECT" button to view additional detail about the system event.

System Event Detail

The "System Event Detail" screen is displayed when a specific system event is selected by pressing on the "SELECT" button on the "SYSTEM EVENT LOG" screen (See Figure 24 on page 34). It provides detailed information that was recorded during the event (See Figure 25).

Figure 25 - System Event Detail

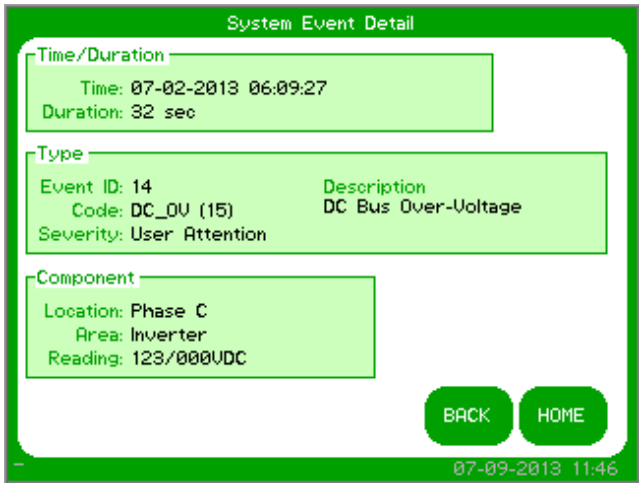


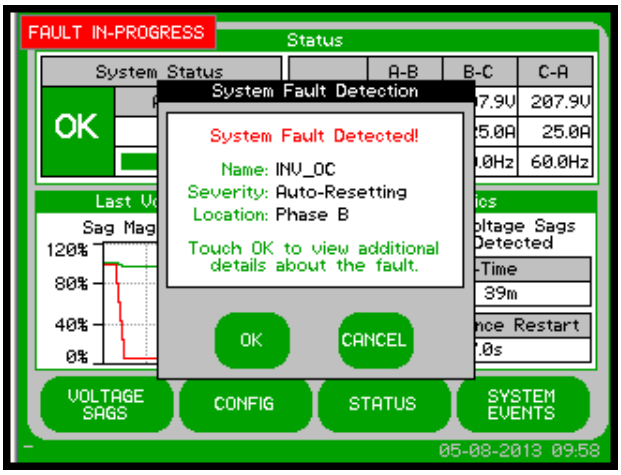
Table 9 - System Event Detail

Description	Function
Time/Duration	**Time:** Date and start time of the system event **Duration:** The amount of time the event lasted.
Type	**Event ID:** Unique ID within the list (0-39) to identify the event. **Code:** Abbreviation of the event followed by a numeric event code in parentheses. (For a list of codes and abbreviations see Table 11 on page 40 **Severity:** Severity of the event **Description:** Name of the event see Table 11 on page 40
Component	**Location:** The location in the system where the event originated (i.e. Phase A, Phase B, Phase C, etc.). **Area:** The specific area within the location where the event originated (i.e. Inverter, etc.). **Reading:** a data value relevant to the System Event may be recorded in some cases, e.g., detail for an "Inverter Over-Current" alarm would include a reading of the causal high current value. The reading "N.A." is displayed if no appropriate data value exists.

System Event Notification

When the MegaDySC system first detects an event condition, the "System Fault Detection" dialog box will be displayed (See Figure 26). Within the "System Fault Detection" box, the name, severity, and location of the event will be displayed.

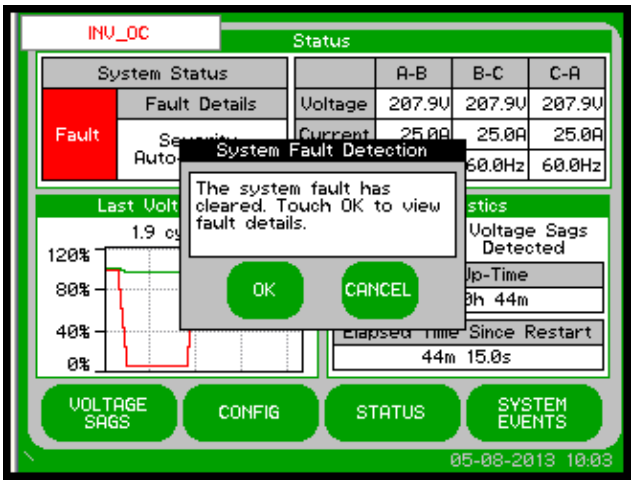
Figure 26 - System Fault Detection



Pressing the "OK" button will open the "System Event Detail" screen. The event will appear in the event list after the event is over. The window can be closed by pressing the "CANCEL" button or waiting 15 seconds.

When the event condition clears, a new dialog box will be displayed. Press "OK" to view the complete event detail, or "CANCEL" to close the dialog box (See Figure 27).

Figure 27 - System Fault Detection - Cleared

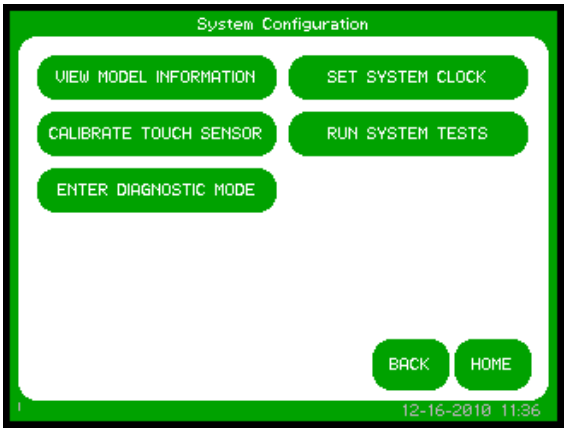


If a "Call Service" severity event is detected, record the event details including: name, description, location, and reading. Contact product support immediately. If the event clears, the touch screen will automatically go back to normal operation.

System Configuration

Press the "CONFIG" button at the bottom of the "HOME" screen to enter the "System Configuration" screen (See Figure 28). The "SET SYSTEM CLOCK" and "CALIBRATE TOUCH SENSOR" functions are described at the start of this chapter.

Figure 28 - System Configuration



Model Information

Touch "VIEW MODEL INFORMATION" to go to the "Model Information" screen. (See Figure 29).

Figure 29 - Model Information

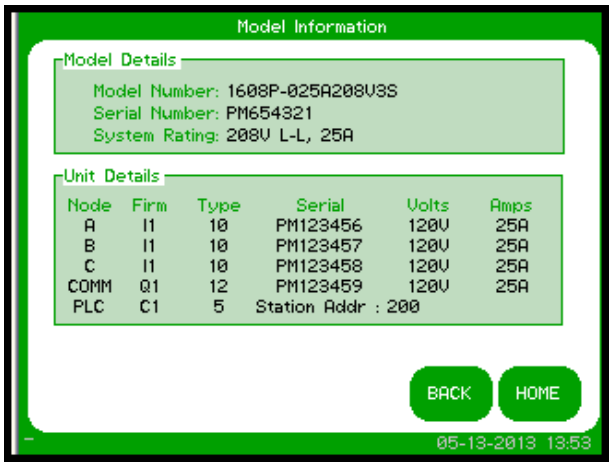


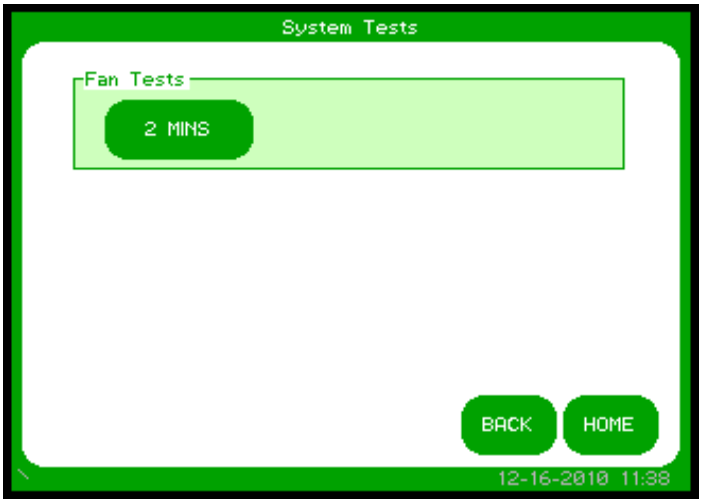
Table 10 - Model Information

Description	Function
Model Details	**Model Number:** System Model number **Serial Number:** System serial number **System Rating:** System voltage and current ratings
Unit Details	**Node:** The location index for the details listed to the right **Firm:** The firmware version for the location indexed. **Type:** Unique code specifying firmware part number for the location indexed. **Serial:** The serial number for the location indexed **Volts:** The rated voltage for the locations **Amps:** The rated current for the location indexed

Run System Tests

Press the “RUN SYSTEM TESTS” to enter the “System Tests” screen. Press “2 MINS” to run the system fans for 2 minutes (See Figure 30).

Figure 30 - System Tests



Diagnostics Mode

This is not a user function. It is numerical code protected for authorized service personnel.

Maintenance

Preventative Maintenance

The MegaDySC requires very little preventative maintenance. The MegaDySC should be checked periodically for proper air flow and status indicator operation.

Monthly Checks

- Ensure the touch screen display is working and no active events are displayed.
- Verify that the bypass switch is in the NORMAL mode.
- Update system time, if needed, Figure 14 on page 28.
- Use a soft cloth to clean the touch display. DO NOT USE harsh detergent, abrasive sponges, alcohol, ammonia, toluene, or acetone on the touch display.
- Ensure air intake and exhaust filters are not covered or obstructed.

3-6 Month Checks

- Check air filters and clean when necessary.
  - Air filters for the MegaDySC will require periodic cleaning, with the frequency depending on the environment. Filters are located on the front side of the MegaDySC, and can be accessed with the door closed. The MegaDySC need not have power removed for this operation. Remove the grill covers by unscrewing the knurled nuts; the washable foam filter pads are behind the grill cover. Gently wash the foam filter pads as needed with a light non-abrasive soap and water mixture. Towel-dry; do not wring-out. Place the filter and grill cover back into their location and replace the screw caps by rotating clockwise until finger tight. Replace filter if damaged. Consult Rockwell Automation technical support for replacement filters. Replacement filters must be no more restrictive to air flow than the original equipment filters.
- Check fan for proper operation.
  - Tap on “CONFIG” on the touch screen display. Tap on “Run System Test”. This will bring up a “System Test” screen to test the fans. After tapping the “Fan Test” button, you should hear the fans run for two minutes.

Table 11 - System Event Table

Event Code	Code Name	Full Name	Severity	Area	Event Description	Event Resolution
1	POWER_ON	DySC Power On	Informational	Unit	Power re-applied to the DySC.	No action needed.
4	T_FAN_ST	Fan Test Start	Informational	Unit	Start acknowledgment of DySC fan test.	No action needed.
5	T_IN_ST_1	Inverter Test (.5 cycles) Start	Informational	Unit	Start acknowledgment of DySC 0.5 cycle inverter test.	No action needed.
6	T_IN_ST_2	Inverter Test (3 cycles) Start	Informational	Unit	Start acknowledgment of DySC 3 cycle inverter test.	No action needed.
7	T_IN_ST_3	Inverter Test (5.5 seconds) Start	Informational	Unit	Start acknowledgment of DySC 5.5 second inverter test.	No action needed.
9	EXTERNAL	External Inhibit	Auto-Resetting	Inverter	Controller is inhibited by another phase controller.	Review event details from other phase controllers.
11	RUN_TO	Inverter Run Timeout	Auto-Resetting	Inverter	DySC inverter had a total cumulative runtime of more than rated.	No action needed.
12	LIM_CYCLE	Inverter Limit Cycle Timeout	Auto-Resetting	Inverter	Power was re-applied more than once within a 58 second period.	No action needed.
13	STAT_OT	Static Switch Over-Temperature	User Attention	Static Switch	Static switch heatsink temperature was greater than maximum rating.	Verify ambient temperature is within DySC specification. Check for damaged fans. Check for dirty or obstructed air filters.
14	OVERLOAD	Overload	User Attention	Unit	Inverter inhibited because load current exceeded maximum rating.	Reduce load. In parallel DySC systems, verify proper current sharing among slave cabinets.
15	DC_OV	DC Bus Over-Voltage	User Attention	Inverter	Positive or negative half of DC bus voltage exceeded maximum rating.	Verify line voltage is within ratings. Verify proper DySC application. Call service.
16	CNTRL_UV	Controller Power Under-Voltage	User Attention	Inverter	DySC control power supply is out of tolerance.	Verify DySC is online and line voltage is within ratings. Call service.
17	OUTPUT_UV	Output Under-Voltage	User Attention	Inverter	DySC output voltage was less than 80% of nominal during sag correction. Sag condition likely outside of DySC specification.	Verify line voltage is within ratings. Verify proper DySC application.
18	INV_OC	Inverter Over-Current	User Attention	Inverter	Inverter current exceeded maximum rating during sag correction.	Verify load current is within ratings. Verify mechanical bypass switch is open. Verify proper DySC application.
19	DC_UV	DC Bus Under-Voltage	User Attention	Inverter	DC bus voltage below operational range.	Verify line voltage is within ratings. Call service.
20	OUTPUT_OV	Output Over-Voltage	Call Service	Inverter	DySC output voltage was greater than 115% of nominal during sag correction.	Call service.
22	IGBT	IGBT Pack	User Attention	Inverter	IGBT pack reported error. Possible sag condition outside of DySC specification.	Verify line voltage is within ratings. Verify proper DySC application. Call Service.
25	SYNC_ERR	Line Synchronization Error	Call Service	Inverter	Inverter not synchronized to line when sag detected.	Call service.
31	CONFIG	Configuration Alert	Call Service	Inverter	Controller configuration has changed.	Call service.
32	CNTRL_MEM	Controller Memory Busy	Auto-Resetting	Inverter	Controller is loading new data into Flash memory.	No action needed.
33	UNBALANCE	Start-Up Test: DC Bus Unbalance	Call Service	Inverter	Positive and negative halves of the DC bus did not charge equally during power up.	Call service.

Event Code	Code Name	Full Name	Severity	Area	Event Description	Event Resolution
34	AC_V_CHK	Start-Up Test: AC Voltage Check	Call Service	Inverter	Output voltage was detected out of tolerance during the start-up test.	Call service.
35	ROLL_CALL	Start-Up Test: Controller Roll Call Timeout	Call Service	Unit	Controller communication problem detected during start-up test.	Call service.
36	COM_VER	Start-Up Test: Communication Compatibility Mismatch	Call Service	Unit	Firmware communication compatibility problem detected during start-up test.	Call service.
37	CNFG_TO	Start-Up Test: Controller Configuration Timeout	Call Service	Unit	Controller communication problem detected during start-up test.	Call service.
38	CNFG_ERR	Start-Up Test: Controller Configuration Mismatch	Call Service	Unit	Controller firmware configuration problem detected during start-up test.	Call service.
39	FIRM_TO	Start-Up Test: Controller Firmware Check Timeout	Call Service	Unit	Controller communication problem detected during start-up test.	Call service.
40	FIRM_DIFF	Start-Up Test: Controller Firmware Revision Mismatch	Call Service	Unit	Controller firmware revision mismatch detected during start-up test.	Call service.
41	SRL_TO	Start-Up Test: Controller Serial Number Check Timeout	Call Service	Unit	Controller communication problem detected during start-up test.	Call service.
42	SRL_DIFF	Start-Up Test: Serial Number Mismatch	Informational	Unit	Controller serial number mismatch detected during start-up test.	No action needed.
44	T_INV_TO	Inverter Test Timeout	Call Service	Unit	Phase control board failed to respond to Comm board's Inverter test.	Call service.
46	DOOR_OPEN	DySC Cabinet Door Open	Manual Reset	Unit	DySC door was opened. Mechanical bypass commanded.	Close door. Manually reset DySC.
47	CRIT_OT	Critical Over-Temperature	Manual Reset	Unit	Internal DySC temperature exceeded maximum rating. Mechanical bypass commanded.	Verify ambient temperature is within DySC specification. Check for damaged fans. Check for dirty or obstructed air filters. Manually reset DySC.
48	FUSE_OPEN	Fuse Open	Call Service	Unit	One of the DySC fuses was detected open. Mechanical bypass commanded.	Call service.
49	OPEN_SCR_A	Open SCR Phase A	Call Service	Static Switch	The SCR on the phase A module was detected open.	Call service.
50	OPEN_SCR_B	Open SCR Phase B	Call Service	Static Switch	The SCR on the phase B module was detected open.	Call service.
51	OPEN_SCR_C	Open SCR Phase C	Call Service	Static Switch	The SCR on the phase C module was detected open.	Call service.
52	EXT_MB	External Mechanical Bypass Command	Manual Reset	Unit	The DySC was externally commanded to transfer to mechanical bypass.	Manually reset DySC.
53	DYN_BRAKE	Dynamic Brake Error	Call Service	Unit	A problem was detected with the DySC dynamic brake controller.	Call service.
58	PLC_ERR	Programmable Logic Controller Error	Call Service	PLC	PLC error detected.	Call service.

Servicing

ATTENTION: Service must be performed by qualified personnel only.

Before attempting any servicing that requires opening the MegaDySC doors first put the system into Maintenance Bypass mode as described in the section Automatic Bypass Switchboard Operation on page 22

WARNING: The MegaDySC and optional ER cabinets are interlocked. Opening cabinet doors while in the MegaDySC "normal" mode will cause immediate automatic bypass operation and subsequent loss of voltage sag protection while in "maintenance bypass" mode. Automatic Bypass switchboard cabinet doors are not interlocked and should be kept locked to avoid exposure to dangerous voltages.

Automatic Circuit Breakers, Safety Interlocks and Stored Energy

Figure 10 on page 24 shows the arrangement of circuit breakers CBI, CBO, and CBB of the Automatic Bypass switchboard. If the MegaDySC cabinet doors are opened while the system is operating in normal mode the circuit breaker CBB will automatically close and CBI and CBO will be automatically opened, putting the system into maintenance bypass mode until it is manually reset. Voltage sag protection is not possible in the maintenance bypass mode. All doors should be kept locked to avoid this situation.

The MegaDySC includes a fast-discharge circuit to quickly dissipate stored energy when the circuit breaker CBI is opened. CBI may be operated automatically by the door interlock switches or other protection devices. CBI can also be operated manually.

If the upstream power is interrupted before CBI is opened the fast-discharge circuit will not be triggered. In that case wait at least 30 minutes before opening the MegaDySC cabinet or ER cabinet doors to avoid exposure to charged capacitors. High voltage remains on capacitors if the red LED indicators above the module capacitor banks are lighted.

Fuses

Fast-acting fuses are included to protect the MegaDySC system in the event of a load-short circuit or other conditions. Fuses are located within the Automatic Bypass switchboard cabinet, the MegaDySC cabinet and the optional ER storage cabinet. To maintain protection of the MegaDySC system, fuses must be replaced with the same or exact replacement type. Replacement fuses are available through Rockwell Automation Technical Support and should only be replaced by qualified and factory authorized service personnel.

Automatic Bypass Switchboard Fuses

Refer to the fuse listing label located on the switchboard cover for fuse size and type. Before replacing a switchboard fuse authorized service personnel will require removal of power to the Automatic Bypass switchboard by opening and locking-out the upstream circuit breaker.

WARNING: De-energize the Bypass switchboard before removing covers to access fuses. Failure to comply with this warning can result in injury or death

MegaDySC and ER Cabinet Fuses

A large label inside the MegaDySC door shows fuse locations. A similar label is located within the optional ER storage cabinet. Fuse types are listed in Table 12. Before replacing a MegaDySC cabinet fuse, factory authorized service personnel must transfer the MegaDySC system to maintenance bypass mode. No attempt should be made to service the MegaDySC if red LEDs located above the DC bus capacitors are lighted.

WARNING: De-energize the MegaDySC electronics by placing the system into Maintenance Bypass mode before opening the MegaDySC or ER cabinet doors to replace any fuse.

WARNING: The MegaDySC has high voltage remaining up to 30 minutes after disconnection from the AC line. Touching exposed or disconnected terminals, cables or parts of the MegaDySC can lead to serious injuries or even death. Wait for a minimum of 5 minutes before performing any service or testing on the MegaDySC after power is removed. Keep doors closed until all internal LED indicators are extinguished.

WARNING: Keep the cabinet doors closed to ensure proper cooling airflow and to protect personnel from dangerous voltages inside the MegaDySC

IMPORTANT A qualified electrician must replace the fuses. Open the front cabinet door(s) to access the fuse holders and fuses.

To maintain protection of the MegaDySC, be sure to replace the fuse with the same type and rating. These fuses are available through Rockwell Automation Technical Support.

Table 12 - MegaDySC Fuse Schedule

MegaDySC Main Cabinet Fuses				
Fuse Reference	**Fuse Location**	**Fuse Rating**	**Manufacturer Part Number**	**Factory Part Number**
F1, F2, F3	Main Cabinet: Main Power Input	800A/500V	Mersen A50QS800-4IL	43-00042
F4, F5, F6	Main Cabinet: Cross-Coupling Transformer	200A/600V	Mersen AJT200	43-00017
F10, F11	Main Cabinet: Output Control Transformer	4A/600V	Mersen TRS4R	43-00110
F12	Main Cabinet: Input Control Transformer	2A/600V	Mersen TRS2R	43-00109
F13 - F24 (SR Models)	Main Cabinet: Dynamic Brake	20A/600Vdc	Mersen ATM20	43-00093
F13 - F24 (ER Models)	Main Cabinet: Dynamic Brake	25A/600Vdc	Mersen ATM25	43-00094
MegaDySC Power Module Fuses				
Fuse Reference	**Fuse Location**	**Fuse Rating**	**Manufacturer Part Number**	**Factory Part Number**
F1, F2	Power Module (x3): Voltage Feedback	2A/600V	Mersen ATQR2	43-00030
F3	Power Module (x3): Inverter Output	400A/500V	Mersen A50QS400-4IL	43-00062
MegaDySC ER Cabinet Module Fuses (ER models only)				
Fuse Reference	**Fuse Location**	**Fuse Rating**	**Manufacturer Part Number**	**Factory Part Number**
F1, F2, F3, F4	ER Module (x6)	70A/500Vdc	Mersen A50QS70-4	43-00041

Specifications

Table 13 - Technical Specifications 400 A MegaDySC

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	3-Phase: 380, 400, 415, 460, 480V[1]
Voltage Range	±10%
Static Bypass Current	400A-rms continuous, 150%-400% @ 5 sec., 400%-600% @ 0.5 sec., 600% @ 0.1s
Frequency	50/60 Hz Auto Sensing
Frequency Range (tracking)	45 to 65 Hz
TVSS	Output SPD, 80kA/mode. Protects L-L & L-G on all models; L-N & N-G (4-wire models)
Efficiency	> 99%
Phase (wiring)	3 phases+Ground (3-wire models) or 3 phases+Neutral+Ground (4-wire models)
Electrical Output (Sag Correction Mode—Inverter)	
Sag Detection Voltage	88.5% of rated voltage
Response Time (typical)	0.7 ms detection, 1.2 ms inverter reaction (<2ms)
Output Voltage	Pre-sag rms voltage
Voltage Regulation	±5% typical, +5% / -13% of nominal max
Output Current	400A-rms[2]
Crest Factor (at rated load)	1.45
Load	Power factor -0.5 to +0.9. Not rated for DC loads; max. allowable 2% DC loading
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 (SR) or 200ms (ER). Based on 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
Mechanical	
Enclosure Ratings	NEMA 1 (IP20)
Cable Entry	Top or Bottom of Switchboard section
Cooling	Filtered Forced air
Access	Front for servicing. Left or Rear access for installation.
Environmental	
Ambient Temperature	0 to 40°C (32°F to 104°F)
Storage Temperature	-40°C to 75°C (-40°F to 167°F)
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).
Audible Noise	< 70dBA at 1 meter
Safety and Compliance	
Agency Approvals	cULus Listed (UL 1012)
Standards Compliance	Exceeds SEMI F47 Standard; IEEE Std C62.41.1 and UL 1449 3rd Ed. Compliant

1. MegaDySC has not been evaluated for use in Corner Grounded or Ungrounded Delta Power Systems in systems rated over 240V.

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

Table 14 - MegaDySC Heat Loading and Typical Efficiency

Rated Voltage	SR/ER	Heat Loss (W)	Heat Loss (Btu/h)	Efficiency
480V	SR	2421	8270	> 99%
480V	ER	2852	9740	> 99%
380V	SR	2321	7925	> 99%
380V	ER	2624	8960	> 99%

Table 15 - MegaDySC System Weight

3-wire / 4-wire	SR / ER	MegaDySC / MegaDySC+ER weight	Automatic Bypass Switchboard Weight	Total System Weight
3W	SR	1792 lb [813 kg]	1075 lb [488 kg]	2867 lb [1300kg]
3W	ER	2656 lb [1205 kg]	1075 lb [488 kg]	3731 lb [1692 kg]
4W	SR	1792 lb [813 kg]	1039 lb [471 kg]	2831 lb [1284 kg]
4W	ER	2656 lb [1205 kg]	1039 lb [471 kg]	3695 lb [1676 kg]

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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