User Manual

Allen-Bradley

MegaDySC Dynamic Voltage Sag Corrector - 208 Volt, One Second Extended Runtime Models

Bulletin 1608M

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

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

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

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

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

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

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

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

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

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

This manual contains new and updated information. Changes throughout this revision are marked by change bars, as shown to the right of this paragraph.

New and Updated Information

This table contains the changes made to this revision.

Topic	Page
Fault Protection	29

Notes:

Chapter 6

Display Screen

Chapter 7

Maintenance

Chapter 8

Specifications

Additional Resources

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

Resource	Description
MegaDySC Dynamic Voltage Sag Corrector - 400 Amp Model User Manual 1608M-UM001	Provides information on installation, operations, maintenance and specifications.
MegaDySC Dynamic Voltage Sag Corrector - 800 Amp Models User Manual -1608M-UM002	Provides information on installation, operations, maintenance and specifications.
MegaDySC Dynamic Voltage Sag Corrector - 800 Amp 208 V Models User Manual - 1608M-UM003	Provides information on installation, operations, maintenance and specifications.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

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

Notes:

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 corrector provides instantaneous dynamic sag correction to help your equipment ride through these common events. The MegaDySC corrector connects normal utility power directly to the load until a voltage sag occurs. During a sag, the 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 corrector is quickly ready to correct the next sag.

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

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

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

- Avoid installing the MegaDySC unit 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 corrector.
- Verify 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 corrector is not rated to directly power life support equipment.

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

Installation

System Components

The Extended Run (ER) MegaDySC system consists of three enclosures including one MegaDySC module, one Extended Run (ER) module and one Automatic Bypass Switchboard. The enclosures are shipped separately and must be mechanically and electrically interconnected at the time of installation.

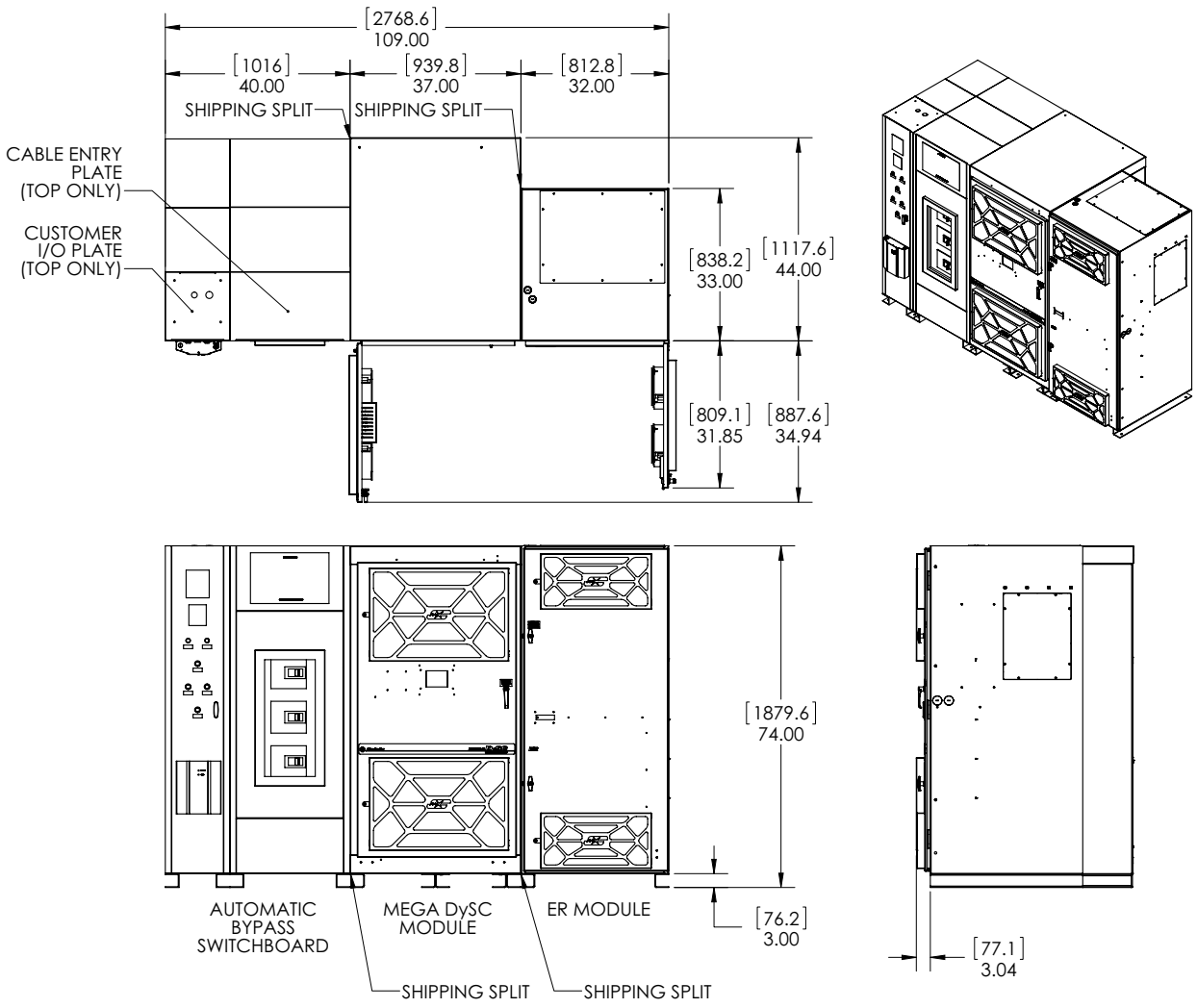
The MegaDySC module houses the static bypass and voltage sag-correction electronics. The ER module houses the ER energy storage capacitors. The Automatic Bypass Switchboard houses the maintenance bypass circuit breaker (CBB), the MegaDySC input (CBI) and output (CBO) circuit breakers, automatic controls and the i-Sense® voltage-monitoring sensor.

This document applies only to the following MegaDySC system models.

Catalog Number	Current Rating	Voltage Rating	3 / 4 Wire
1608M-833A208V3E2S09	833 A	208V	3
1608M-833A208V4E2S09	833A	208V	4
1608M-555A208V3E2S09	555 A	208V	3
1608M-555A208V4E2S09	555 A	208V	4

System Layout

Figure 1 - System Layout



System Clearance

The two Automatic Bypass Switchboard doors are hinged on the left, the MegaDySC module door is hinged on the left, and the ER module door is hinged on the right. Clearance must be given to allow the doors to swing fully open as shown in the System Layout on page 12.

Only front access and top access are required for installation and commissioning. Rear access and left side access should be maintained when possible, to simplify future maintenance tasks.

Pre-Installation Configuration

IMPORTANT Perform system configuration steps before mounting and anchoring.

Preparing the System for Installation

1. Remove all tan-colored masking dots, blue-colored tape, and all plastic sheets.
2. Remove all eight plastic 13mm hole plugs in the right side of the switchboard cabinet.
3. Remove and save for later step: eight hex-head bolts with lock washer and flat washer in left side of MegaDySC cabinet. [tool required: 9/16-inch wrench or socket].
4. Remove the four 13 mm plastic hole plugs in the right side of the MegaDySC cabinet.
5. Remove and save for later step: four hex-head bolts with lock washer and flat washer in left side of ER storage cabinet. [tool required: 9/16-inch wrench or socket].

System Mounting

The MegaDySC system is provided with interconnect bus links between cabinets; proper line-up is critical. The system must be configured as shown in the system layout. The system must be placed on a flat level surface or shimmed during installation to achieve the same effect.

The MegaDySC module is shipped separately from the Automatic Bypass Switchboard and the ER module. The MegaDySC Module, the Automatic Bypass Switchboard and the ER module must be mechanically interconnected with the supplied hardware and each enclosure must be secured to the floor.

The cabinets should be brought tightly together and all interconnection bolts should be installed and tightened before tightening the anchor bolt connections.

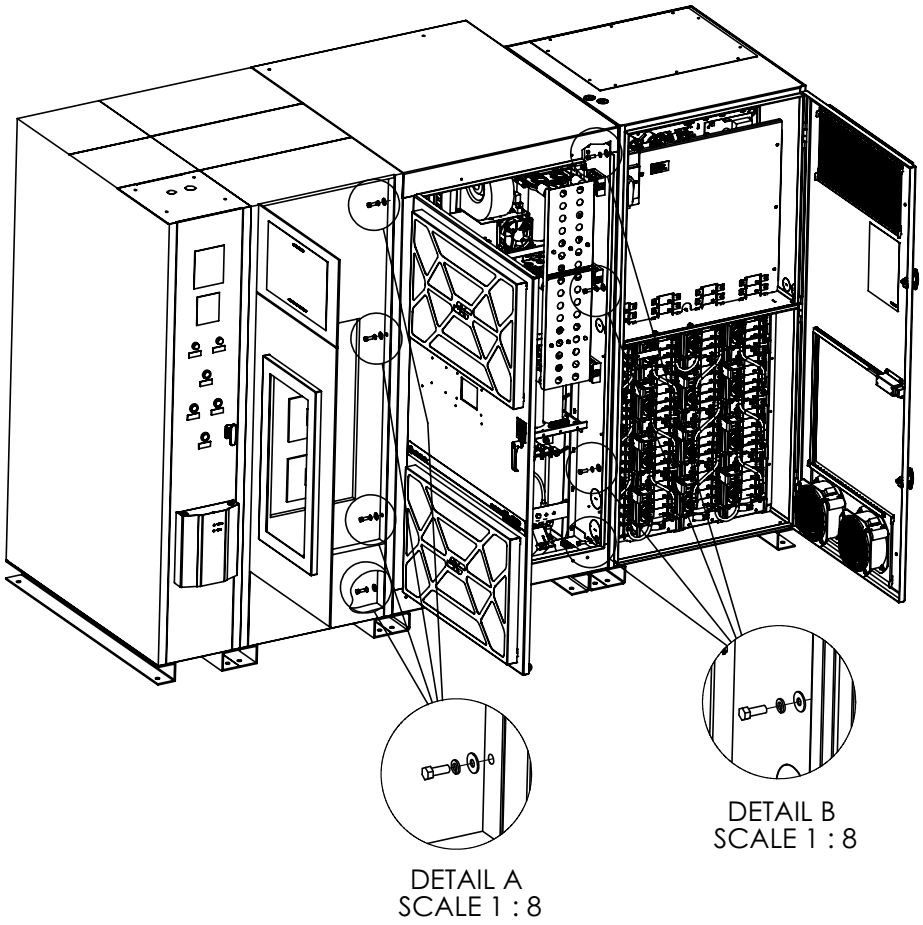
Mechanical Interconnection of Cabinets

To attach the MegaDySC module to the Automatic Bypass Switchboard use four sets of 3/8-16 [inch-thread/inch] hardware (this is the hardware that was removed and saved during the pre-installation configuration). All hardware should be installed from the Automatic Bypass Switchboard side and threaded into the PEM nuts located in the MegaDySC module. Each hardware connection set consists of one 3/8-16 x 1.0 in. bolt, one (1) 3/8 in. split lock washer, and one 3/8 in. flat washer assembled as shown in Figure 2. Tighten each bolt to 20 N•m [180 in•lb]. The required wrench size is 9/16 in. (14.3 mm).

To attach the MegaDySC module to the ER module, install the four sets of 3/8-16 interconnection bolts along the front of the cabinets, as shown in detail B of Figure 2. Tighten each bolt to 20 N•m [180 in•lb].

Finally, after all interconnection hardware is installed; tighten the anchor bolt connections to the torque specified by the anchor manufacturer.

Figure 2 - Mechanical Interconnections Between MegaDySC Module, Automatic Bypass Switchboard, and ER Module

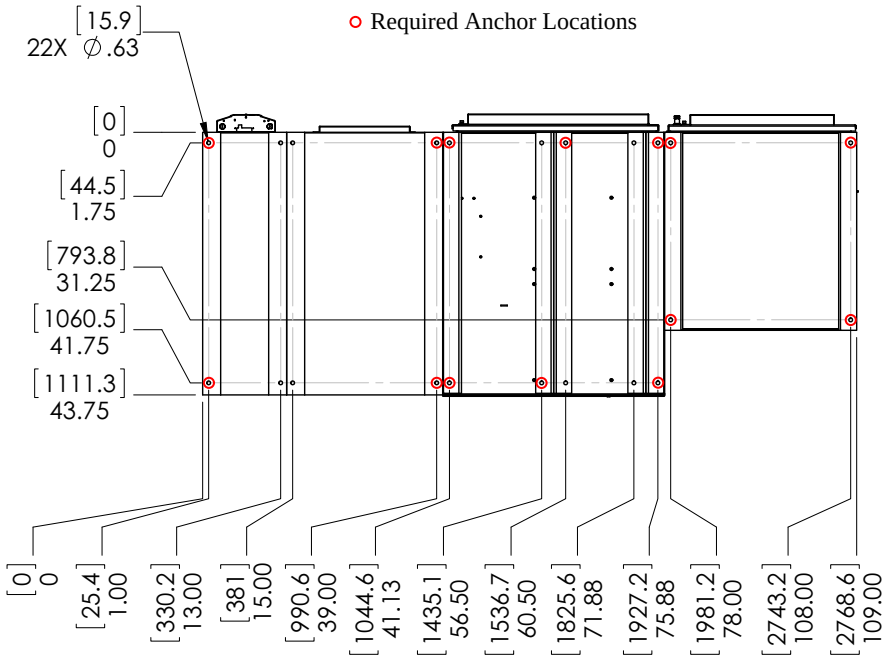


MegaDySC Floor Mounting

The MegaDySC system is floor-mounted, and should be secured using the 0.63 in. (15.9 mm) diameter mounting holes provided along the bottom channels. The system should be secured to the floor in the locations indicated in Figure 3. The minimum number of anchor bolts is 14:

- Automatic Bypass Switchboard: 4 places (one in each corner)
- MegaDySC module: 6 places (one in each corner and one in each end of the middle rail)
- ER module: 4 places (one in each corner)

Figure 3 - Floor Mounting Detail



Electrical Interconnections

WARNING: Equipment must be earth-grounded according to local and national electric codes. Failure to supply proper equipment grounding may result in electrical shock or death.

The MegaDySC module is shipped separately from the Automatic Bypass Switchboard and the ER module. The customer is responsible for system mounting and electrical supply and load connections. All interconnecting bus bars and power cables are provided and will be connected by a factory-trained technician during commissioning. At commissioning the bus links will be connected between the Automatic Bypass Switchboard and the MegaDySC module. A control wiring cable is also provided in the Automatic Bypass Switchboard and must be connected to the MegaDySC module. This control cable is routed through two large holes, one in the Automatic Bypass Switchboard and one in the MegaDySC module, located at the bottom front of the enclosures. The cable is plugged into the associated terminal block located in the lower, left corner of the MegaDySC module. Two other cable harnesses are routed between the MegaDySC module and the ER module.

Electrical Supply and Load Connections

Electrical termination hardware is supplied with each system. One box contains all needed hardware for one system installation. The box is labeled:

MegaDySC
CUSTOMER CONNECT HARDWARE KIT

The incoming 3-phase electrical service and outgoing load cables enter through the top of the switchboard enclosure and connect to the appropriate bus locations. To access the main electrical terminals:

1. Remove the CABLE ENTRY PLATE on the top of the switchboard
2. Open the two right side doors of the switchboard
3. Remove the dead front panel covering the circuit breakers (four screws) (Refer to Figure 4). Remove the transparent shield

The cable entry plate may be fitted for conduit or cable ladder as needed. The other top panels may also be removed if needed. All panels must be replaced after installation. Locations of the main electrical terminals are shown in Figure 5 and Figure 6.

Figure 4 - Switchboard Covers

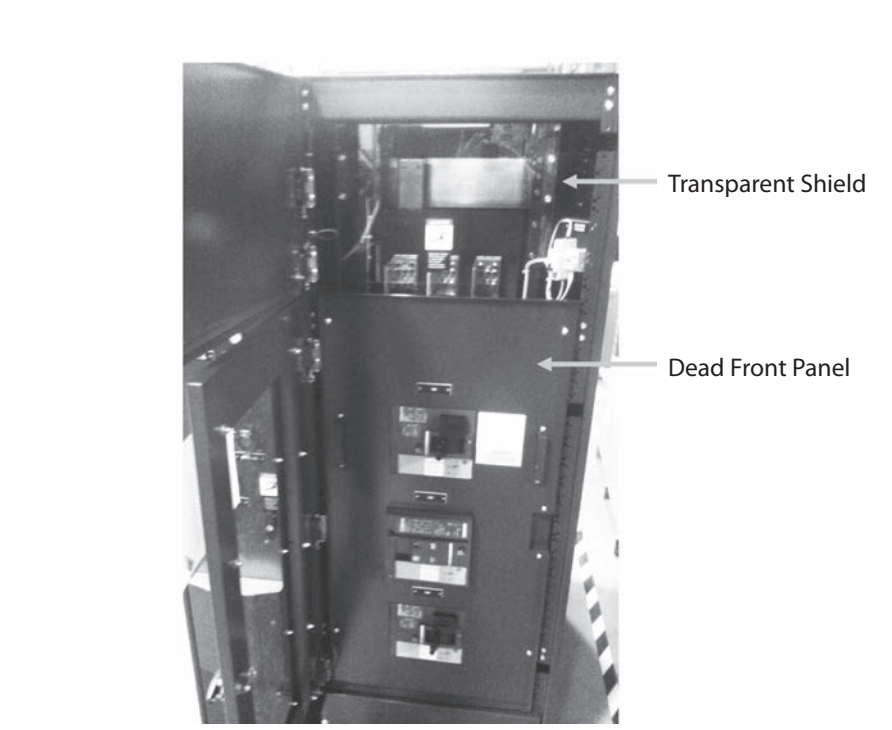


Figure 5 - Main Power Terminals (front view)

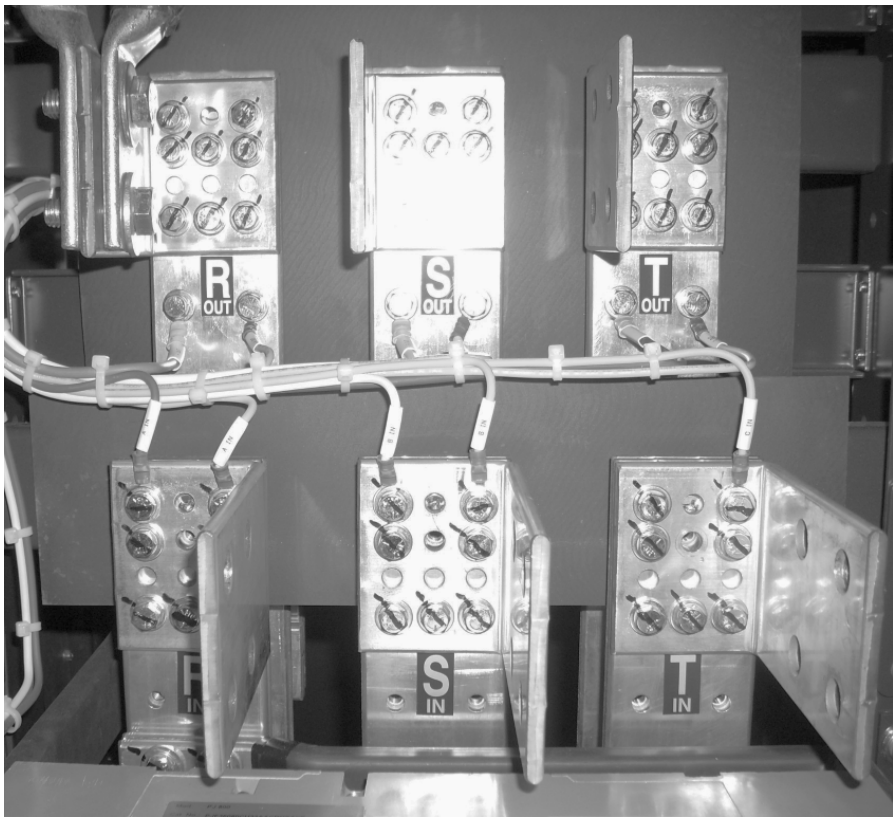
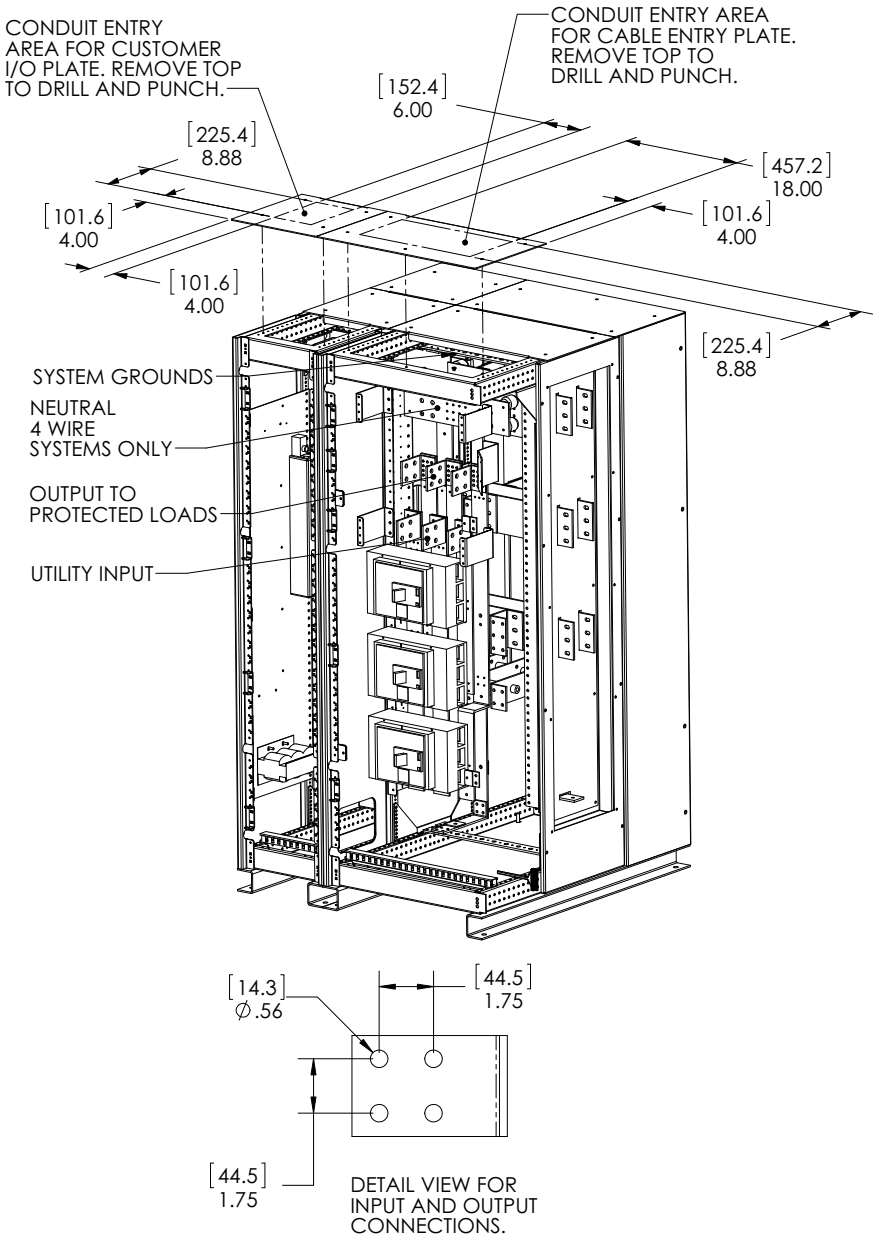


Figure 6 - Automatic Bypass Switchboard Terminations and Conduit Landing Areas



MegaDySC System Installation Connections Checklist

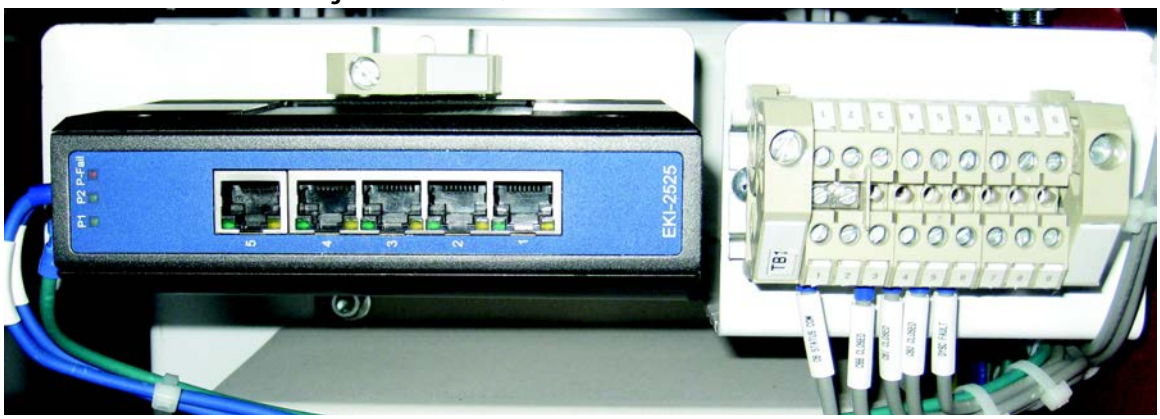
- Connect the Automatic Bypass Switchboard ground bus to an earth ground in accordance with the National Electrical Code and local codes.
- Connect the AC input (line) conductors to the terminals labeled “R in”, “S in”, and “T in”. The set is labeled “UTILITY INPUT”.
- Connect the AC output (load) conductors to the terminals labeled “R out”, “S out” and “T out”. The set is labeled “PROTECTED LOAD”.
- 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.
- Check all electrical terminations for properly torqued connections.
- For i-Sense and MegaDySC communications: connect an Ethernet cable to the Ethernet switch located in the upper left compartment of the Automatic Bypass Switchboard. Refer to Chapter 3 - Communications on page 21 for details.
- For remote status indication via dry contacts, connect to the “TB1” terminal block located in the upper left compartment of the Automatic Bypass Switchboard. Refer to Chapter 3 - Communications on page 21 for details.

Notes:

Communications

Communication connections enter through the top of the switchboard enclosure marked CUSTOMER I/O PLATE inFigure 1. This plate can be fitted as needed for conduit entry. Communications terminals are described on the following pages. The ports are located at the top of the left Automatic Bypass Switchboard and are shown in Figure 7. Use RJ45 port number 5 for the communications connection.

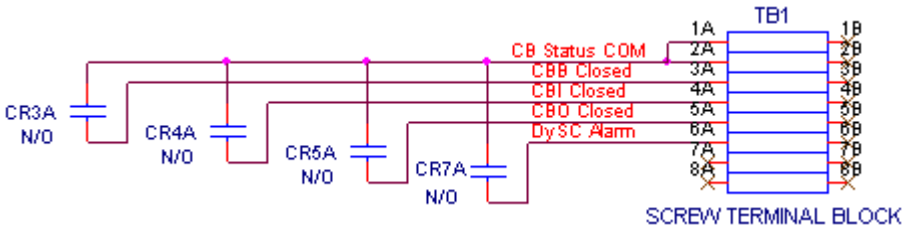
Figure 7 - Customer I/O Terminals



Remote Diagnostics (TB1 Customer Contacts)

Customer-accessible dry contact-closures are available for relaying the state of the circuit breakers and the state of the MegaDySC system. Connect to terminal block TB1, located at the top of the left compartment of the Automatic Bypass Switchboard. See Figure 8 for connection details. The contact ratings are: 10 A @ 240V AC resistive, 7 A @ 240V AC inductive, 10 A @ 28V DC resistive, and 8 A @ 24V DC inductive.

Figure 8 - Schematic of Customer Dry Contacts



- CBB Closed (CR3A) – Contact is closed when the bypass circuit breaker (CBB) is closed. Contact is open when CBB is open.
- CBI Closed (CR4A) - Contact is closed when the input circuit breaker (CBI) is closed. Contact is open when CBI is open.

- CBO Closed (CR5A) - Contact is closed when the output circuit breaker (CBO) is closed. Contact is open when CBO is open.
- DySC Alarm (CR7A) – Contact is closed when there is an active alarm on the MegaDySC system. Contact is open when there is no alarm on the MegaDySC system.

Modbus TCP/IP Communications

MegaDySC system status and other items are communicated over a Modbus TCP/IP connection. This can be accessed through RJ45 port number 5 on the Ethernet switch in the Automatic Bypass Switchboard. Contact Rockwell Automation technical support for protocol details.

i-Sense® Voltage Monitor

A six-channel i-Sense voltage monitor is mounted on the Bypass Switchboard. The i-Sense continuously monitors both the 3-phase input voltage and the 3-phase output voltage of the MegaDySC system. The i-Sense is wired in parallel with the bypass circuit breaker CBB. For 3-wire systems, the i-Sense monitors Line-Line voltages; for 4-wire systems the i-Sense monitors Line-Neutral voltage.

The i-Sense requires communication over the Internet. The i-Sense should be connected through RJ45 port number 5 on the Ethernet switch in the Automatic Bypass Switchboard.

See Rockwell Automation publication 1608S-UM001 for more information.

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, contact Rockwell Automation technical support.

- 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 corrector. The display should show “OK” in the upper left corner.

WARNING: The MegaDySC cabinet is 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)

IMPORTANT

- 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.
- Push button “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.

IMPORTANT Operation in Normal Mode requires that the maintenance bypass circuit breaker (CBB) be open (OFF)—otherwise CBB will short the sag correction inverter and prevent sag correction.

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 R_{in}, S_{in}, T_{in} and provides sag compensated three-phase output power at terminals R_{out}, S_{out}, and T_{out} 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 1. Refer to Chapter 6 for further information on system alarms and status display.

Table 1 - 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 27 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

Bypass (CBB) will close in the event of a fault in the MegaDySC system. System will remain in bypass until manually transferred to back to the MegaDySC system. If CBB trips due to an over current condition, press reset button on CBB. CBB will automatically close!

Manual Transfer to Maintenance Bypass

1. Press green “CLOSE CBB” push button
2. Confirm that red “BYPASS CLOSED” lamp is lit.
3. Press red “OPEN CBI” push button. Output breaker (CBO) will open automatically.
4. Confirm that both CBI and CBO are open.
5. The MegaDySC is now bypassed and isolated for maintenance.

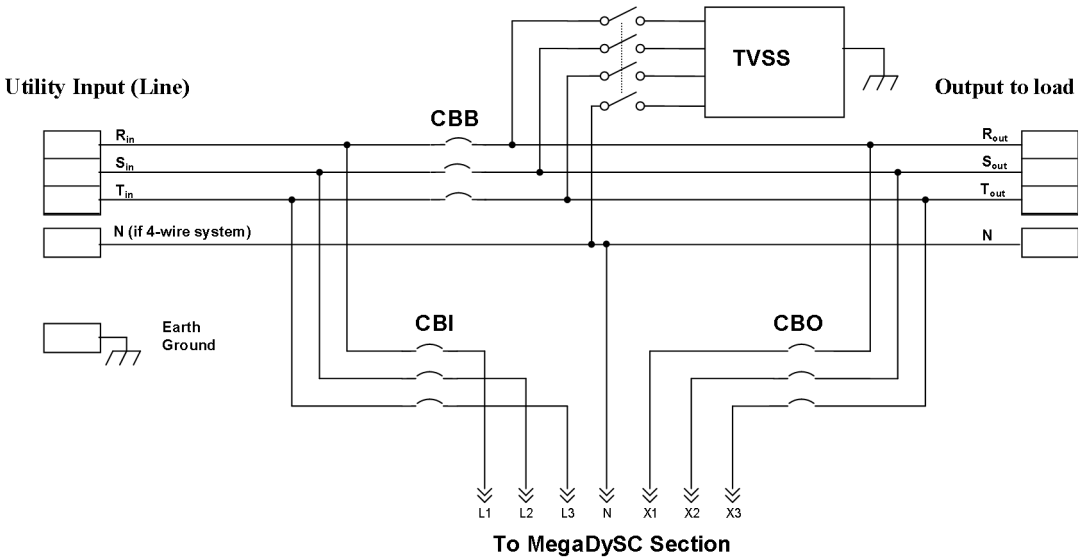
Manual Transfer to the MegaDySC System

1. Confirm green "READY TO CLOSE CBI" lamp is on.

IMPORTANT Close CBI is inhibited for one minute after power cycling.

2. Manually close breaker CBI.
3. Confirm that the MegaDySC touchscreen is lit, is green and displays “OK” in the upper left corner.
4. Manually close breaker CBO.
5. Confirm that the screen on the MegaDySC displays “OK”.
6. Press red “OPEN CBB” push button.
7. The MegaDySC system is now providing power to the load.

Figure 9 - Schematic Diagram of Automatic Bypass Switchboard Power Circuit



Transient Voltage Surge Suppressor (TVSS)

Over voltage transient protection is provided on the output of the MegaDySC. Indicator lights for each phase on the front of the TVSS panel (upper left compartment of the Automatic Bypass Switchboard) 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 (F14-F15-F16-F17) 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 1 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 26 or 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 at 1600 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 trip settings. Refer to label on the Automatic Bypass Switchboard for circuit breaker factory settings.

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 Modbus TCP/IP 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-F4-F5-F6)
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

IMPORTANT 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.

Notes:

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.

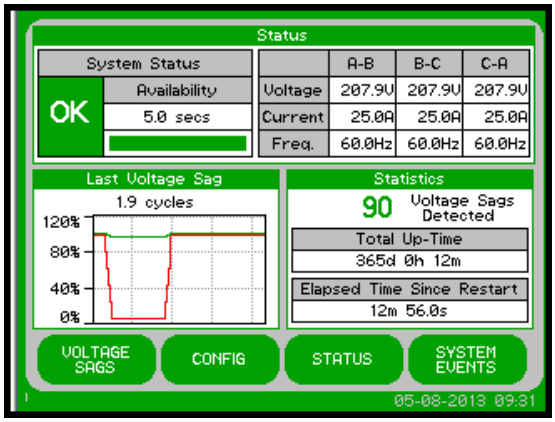
When the system first starts, a welcome screen displaying the MegaDySC product logo appears. This screen disappears after 5 seconds, when the "Home" screen appears.

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:

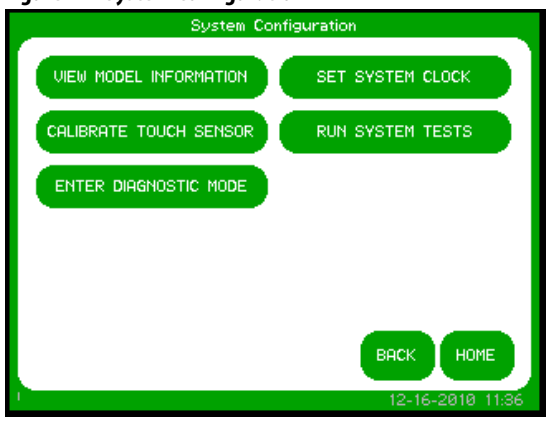
Step 1: Press the "CONFIG" button at the bottom of the "HOME" screen (See Figure 10).

Figure 10 - Home Screen



Step 2: Begin calibration by pressing "CALIBRATE TOUCH SENSOR" (See Figure 11).

Figure 11 - System Configuration



IMPORTANT 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 12). 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.

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 12 - Touch Screen Calibration

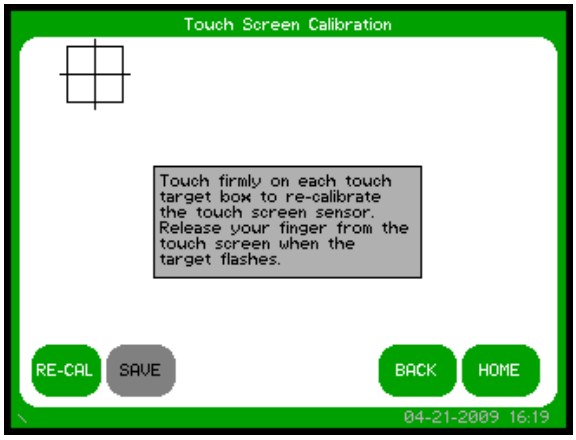
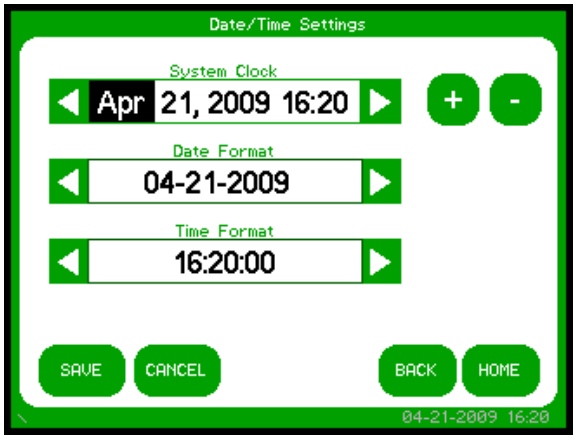


Figure 13 - Set System Date and Time



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 14). 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 in Table 2.

Figure 14 - Home Screen

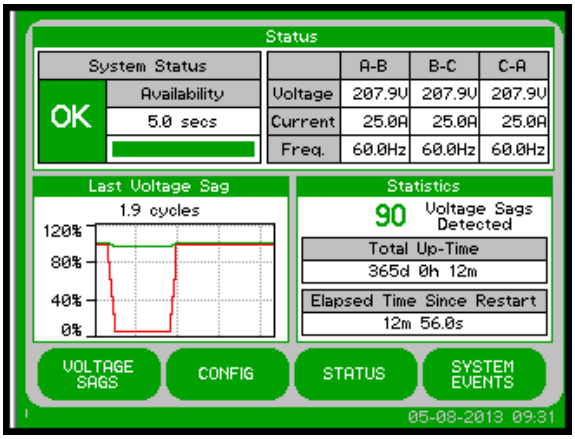


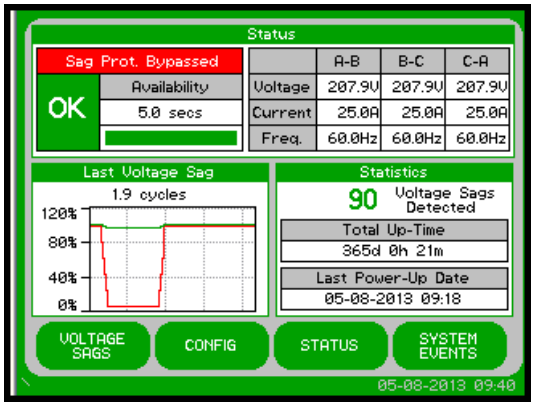
Table 2 - Home Screen Description

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 15 - 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 16 - System Status Summary

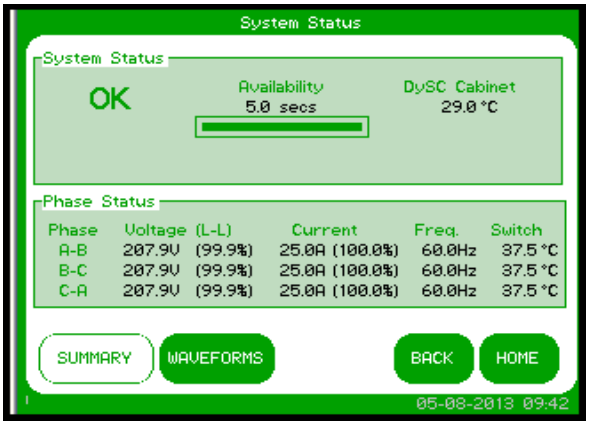


Figure 17 - - System Status Waveforms

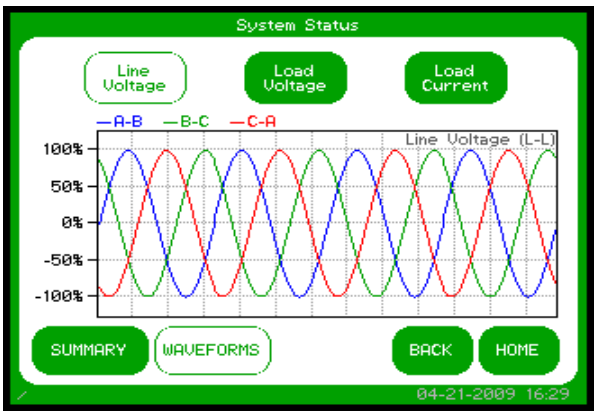


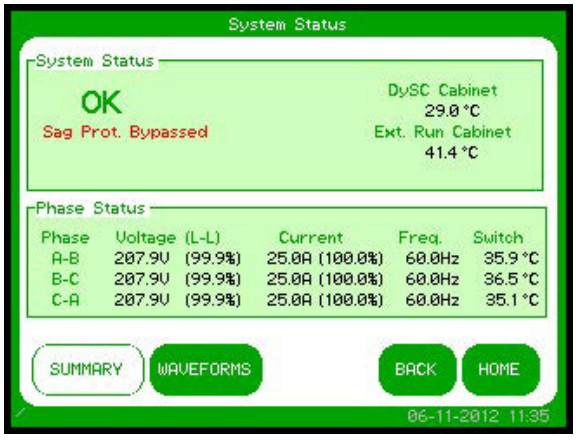
Table 3 - System Status Description

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 18 - 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 19) displays a list of the last 61 voltage sags. Reach this screen by pressing "VOLTAGE SAGS" button on the "HOME" screen.

Figure 19 - Voltage Sag Log

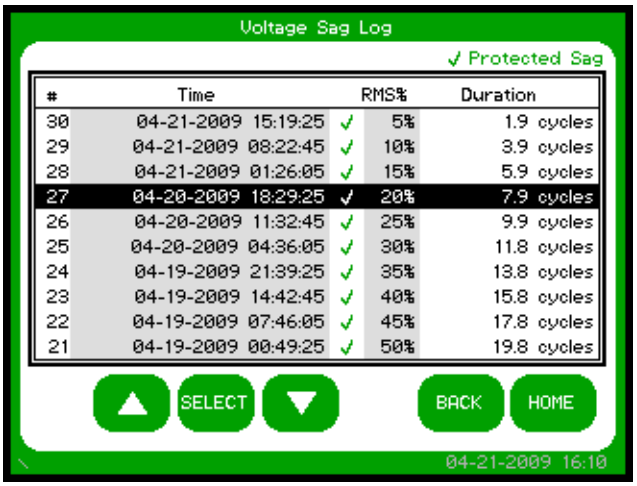


Table 4 - Voltage Sag Log Description

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

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 20) 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 5 describes the remaining screen content.

Figure 20 - Voltage Sag Detail

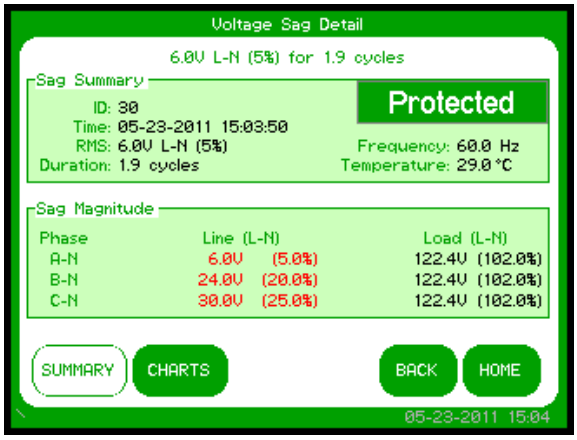


Table 5 - Voltage Sag Detail Description

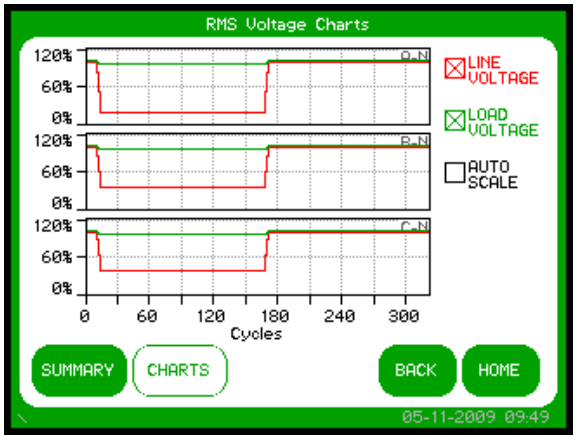
Description	Function
Sag Summary	**ID**: Unique ID within the list (0-60) to identify the voltage sag **Time:** Start time of the voltage sag **RMS:** Worst-case RMS voltage (L-N) and percent of rated voltage across all phases **Duration:** Duration of the voltage sag **Frequency:** Frequency of the 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).

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 21). Reach this screen by pressing "CHARTS" on the "Voltage Sag Detail" screen as shown in Figure 20 on page 38.

Figure 21 - RMS Voltage Charts



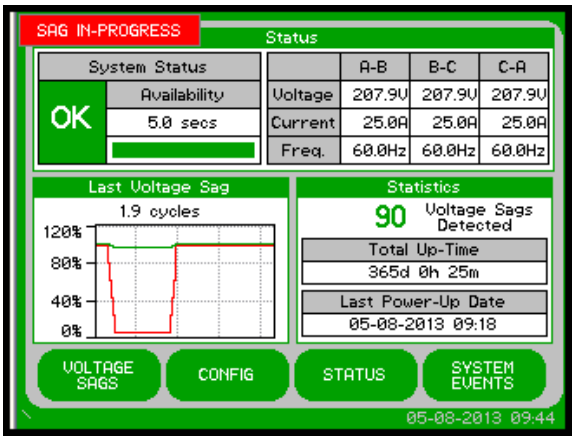
Line voltage is shown in red and load voltage is shown in green. By pressing the check boxes in the right column, you can toggle each data series Off and On as well as enable y-axis auto-scaling.

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 22.

Figure 22 - Voltage Sag Detected



System Events

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

Table 6 - 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 23). Reach this screen by pressing "SYSTEM EVENTS" on the "HOME" screen.

Figure 23 - System Event Log

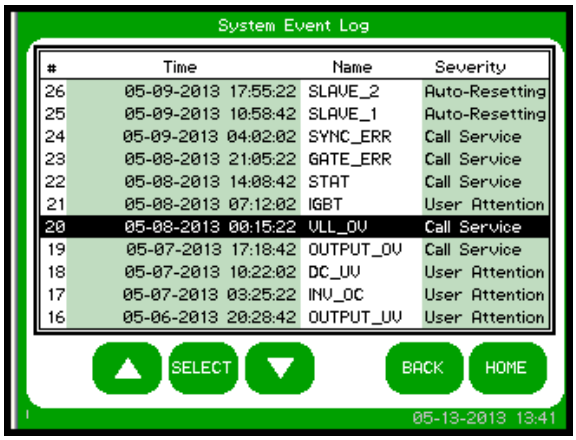


Table 7 - System Event Log Description

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

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 23 on page 40). It provides detailed information that was recorded during the event (See Figure 24).

Figure 24 - System Event Detail

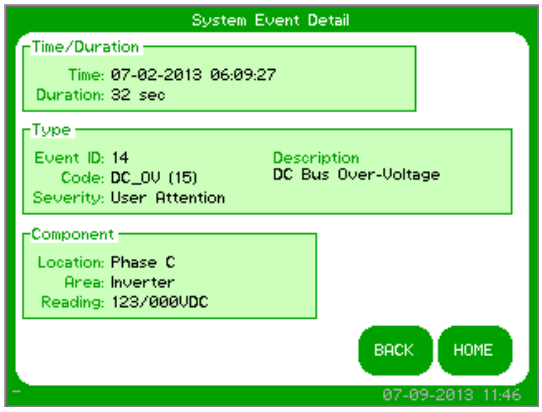


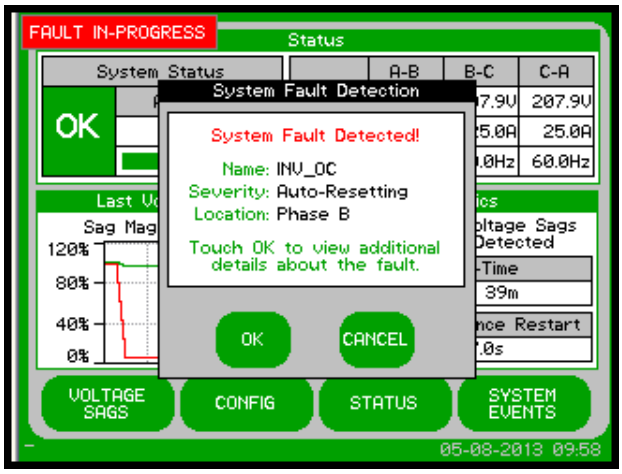
Table 8 - System Event Detail

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 10 on page 46 **Severity:** Severity of the event **Description:** Name of the event see Table 10 on page 46
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 25). Within the "System Fault Detection" box, the name, severity, and location of the event will be displayed.

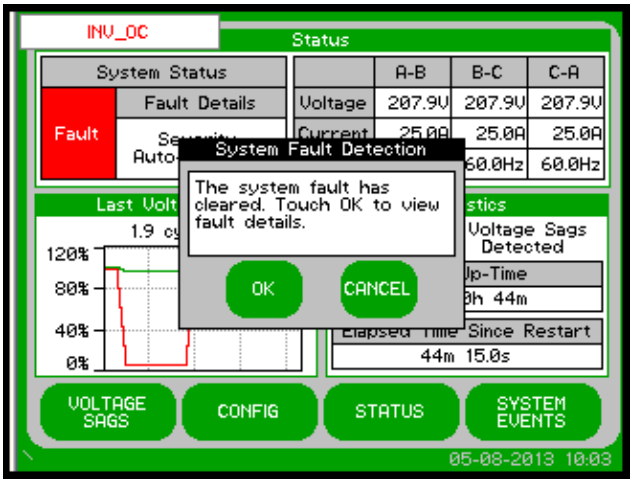
Figure 25 - System Fault Detection



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 26).

Figure 26 - System Fault Detection - Cleared

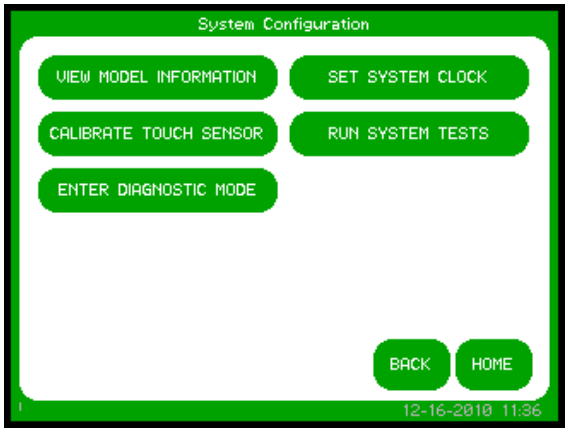


If a "Call Service" severity event is detected, record the event details including: name, description, location, and reading. Contact product support immediately. If the event clears, the touch screen will automatically go back to normal operation.

System Configuration

Press the “CONFIG” button at the bottom of the “HOME” screen to enter the “System Configuration” screen (See Figure 27). The “SET SYSTEM CLOCK” and “CALIBRATE TOUCH SENSOR” functions are described at the start of this chapter.

Figure 27 - System Configuration



Model Information

Touch “VIEW MODEL INFORMATION” to go to the “Model Information” screen. (See Figure 28).

Figure 28 - Model Information

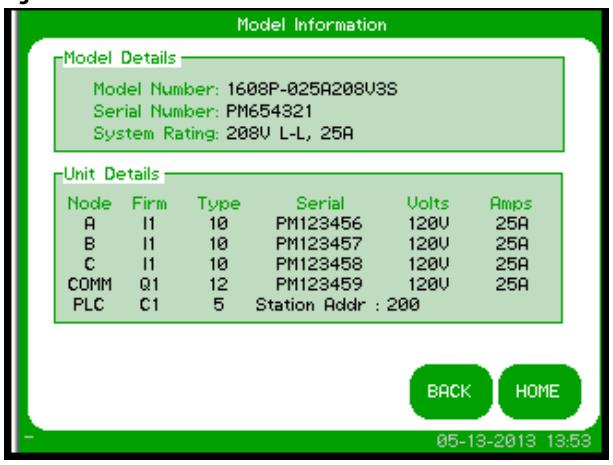


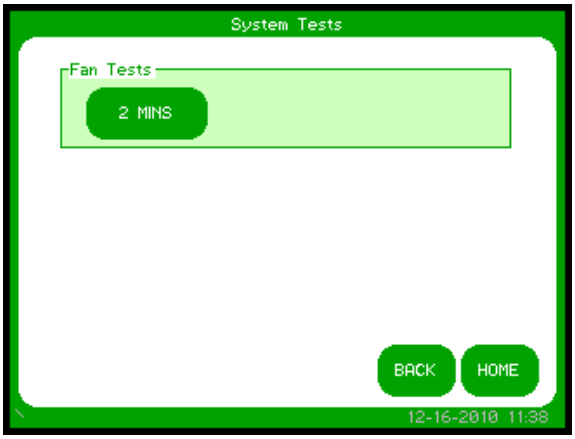
Table 9 - Model Information

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 29).

Figure 29 - 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 13 on page 34.
- 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 grill covers by unscrewing the thumb screw on the left side and sliding the filter retainer up; 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 10 - 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.

Event Code	Code Name	Full Name	Severity	Area	Event Description	Event Resolution
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.
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.

Event Code	Code Name	Full Name	Severity	Area	Event Description	Event Resolution
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.
59	PLC_ST_MM	Programmable Logic Control State Mismatch	Call Service	Unit	PLC feedback error detected.	Call service.
64	ER_CAP_OV	ER Capacitor Over-Voltage	User Attention	Unit	The voltage of a capacitor in the ER cabinet exceeded the maximum voltage rating. ER cabinet disconnected.	Verify line voltage is within ratings. Verify proper DySC application. Call service.
65	ER_FUSE	ER Cabinet Fuse Open	Call Service	Unit	One of the fuses in the ER cabinet was detected open. ER cabinet disconnected.	Call service.
66	ER_UNBAL	ER Cabinet DC Bus Unbalance	Call Service	Unit	Positive and negative halves of the DC bus are not equal. ER cabinet disconnected.	Call service.
67	ER_CAP_OT	ER Capacitor Over-Temperature	User Attention	Unit	The temperature of one of the capacitors in the ER cabinet exceeded the maximum rating. ER cabinet disconnected.	Verify ambient temperature is within DySC specification. Check for damaged ER cabinet fans. Check for dirty or obstructed air filters in the ER cabinet.
68	ER_CAB_OT	ER Cabinet Over-Temperature	User Attention	Unit	ER cabinet internal air temperature exceeded maximum rating. ER cabinet disconnected.	Verify ambient temperature is within DySC specification. Check for damaged ER cabinet fans. Check for dirty or obstructed air filters in the ER cabinet.
69	GND_FLT	DySC Ground Fault	Call Service	Unit	Ground (Earth) fault was detected in the DySC.	Call service.
70	PLC_AN_ERR	PLC Analog Input Error	Call Service	PLC	Programmable logic controller analog input channel error.	Call service.
71	ER_ST_MM	ER Cabinet PLC State Mismatch	Call Service	Unit	Programmable logic controller analog input channel error.	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 26

WARNING: The MegaDySC cabinet is 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 9 on page 28 shows the arrangement of circuit breakers CBI, CBO, and CBB of the Automatic Bypass switchboard. If the MegaDySC cabinet door is 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. The ER module will be electrically disconnected from the MegaDySC module. Voltage sag protection is not possible in the maintenance bypass mode. All doors should be kept locked to avoid this situation.

If the ER module door is opened, the ER module will be electrically disconnected from the MegaDySC cabinet and the energy storage capacitors will be discharged. The MegaDySC system will remain in the normal mode. Limited sag protection will be available; however, the energy stored in the ER module will not be available to the sag correction electronics. All doors should be kept locked to avoid this situation.

The ER module door has both mechanical key locks as well as an electronic lock. The electronic lock is controlled by the MegaDySC system. The electronic lock will only be released when it is safe to open the ER module door. A light on the front of the ER module door will indicate if the ER module door has been unlocked by the MegaDySC system. If control power to the MegaDySC system is interrupted, the ER module door will remain locked.

The MegaDySC includes a fast-discharge circuit to quickly dissipate stored energy in the MegaDySC module and the ER module. Stored energy in the MegaDySC module is discharged 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. Stored energy in the ER module is discharged when the ER module door is opened.

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 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 ER storage cabinet. Fuse types are listed in Table 11. 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 11 - MegaDySC Fuse Schedule

Fuse Reference	Fuse Location		Fuse Rating	Manufacturer	Manufacturer Part Number	Rockwell Automation Cat. No.
F1, F2, F3, F4, F5, F6	**Main Cabinet**	Main Power Input	800 A/500V	Mersen	A50QS800-4IL	43-00042
F7, F8, F9		Inverter Input				
F10, F11, F12 (200KVA)		Cross-Coupling Transformer	450 A/600V		AJT450	43-00112R
F10, F11, F12 (300KVA)		Cross-Coupling Transformer	500 A/600V		AJT500	43-00204R
F13, F14, F15		Series Injection Transformer	200 A/600V		AJT200	43-00017
F16, F17		Input Control Transformer	2 A/600V		ATQR2	43-00030
F18 - F29		Dynamic Brake	25 A/600V DC		ATM25	43-00094
F30, F31		Output Control Transformer	8 A/600V		TR8R	43-00115R
F32, F33, F34, F35, F36, F37		DC Bus	400 A/500V DC		A50QS400-4	43-00209R
EA4-F1		Ground Filter Assembly	20 A/600VDC		ATM20	43-00093
F1, F2	**Power Module (x3)**	Voltage Feedback	2 A/600V	Mersen	ATQR2	43-00030
F3		Inverter Output	400 A/500 V		A50QS400-4IL	43-00062
F1, F2	**ER Cabinet**	Main Power Unit	400 A /500V DC	Mersen	A50QS400-4IL	43-00062
F3, F4, F5, F6		Main SCRs	200 A /500V DC		A50QS200-4IL	43-00191R
F7, F8, F9		DC Voltage Feedback	2 A /600V DC		ATM2	43-00145R
Snub 1 - F1 Snub 2 - F1 Snub 3- F1 Snub 4- F1		SCR Snubber Assemblies	20 A /600V DC		ATM20	43-00093
PCB19-F1		Ground Filter Assembly				

Notes:

Specifications

Table 12 - Technical Specifications 800A 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: 208V
Voltage Range	±10%
Static Bypass Current	555 A-rms continuous (200 kVA), 833 A rms continuous (300 kVA) 110%-150% @ 60 sec., 150%-300% @ 5 sec., 300%-400% @ 0.5 sec., 400%-600% @ 0.05 sec.
Frequency	60 Hz
Frequency Range (tracking)	55 to 65 Hz
TVSS	Output SPD, 80kA/mode. Protects L-L & L-G on all models; L-N & N-G (4-wire models)
Efficiency	> 98.5%
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	555 A-rms[1] (200 kVA), 833 A-rms[1](300 kVA)
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	1 second based on nameplate ratings with a power factor of 0.9
Multiple Events	
Max Sag Correction Time	5 seconds cumulative usage
Sequential Sag Recovery	0 seconds (assuming cumulative runtime available)
Full Recovery Time	Max. 5 minutes
Mechanical	
Enclosure Ratings	NEMA 1 (IP20)
Cable Entry	Top 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% noncondensing
Altitude	Rated current available to 1000m (3300ft). De-rate output current 10% per 1000m, from 1000m to 3000m (9900ft).
Audible Noise	< 70 dBA 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. 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 13 - MegaDySC Heat Loading and Typical Efficiency

Rated kVA	Heat Loss (W)	Heat Loss (BTU/h)	Efficiency
200	2800	9600	> 98.5%
300	3700	12600	> 98.5%

Table 14 - MegaDySC System Weight

Rated kVA	MegaDySC Weight	ER Weight	Automatic Bypass Switchboard Weight	Total System Weight
200	2875 lb [1304 kg]	1240 lb [562 kg]	1700 lb [771 kg]	5815 lb [2637 kg]
300	3375 lb [1531 kg]	1320 lb [599 kg]	1700 lb [771 kg]	6395 lb [2901 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 and application notes, sample code, and links to software service packs. You can also visit our Support Center at https://rockwellautomation.custhelp.com/ for software updates, support chats and forums, technical information, FAQs, and to sign up for product notification updates.

In addition, we offer multiple support programs for installation, configuration, and troubleshooting. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/services/online-phone.

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.

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