MegaDySC Dynamic Voltage Sag Corrector, 800-2400 A
Bulletin Number 1608M
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.

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

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</tr>
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<tbody>
<tr>
<td>Bulletin 1608 DySC Voltage Sag Correctors Technical Data, publication 1608-TD001</td>
<td>Provides specifications and approximate dimensions for 1608 DySC Voltage Sag Correctors.</td>
</tr>
<tr>
<td>Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1</td>
<td>Provides general guidelines for installing a Rockwell Automation industrial system.</td>
</tr>
</tbody>
</table>

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

Summary of Changes

This manual contains new and updated information as indicated in the following table.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
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<tbody>
<tr>
<td>Modbus TCP/IP Communications</td>
<td>15</td>
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<tr>
<td>Clean the Computer</td>
<td>35</td>
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<tr>
<td>Hard Reset</td>
<td>37</td>
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Chapter 1

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 system provides instantaneous dynamic sag correction to help your equipment ride through these common events. The MegaDySC system 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 system is quickly ready to correct the next sag.

The MegaDySC system 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 system is designed to operate in industrial applications, follow these guidelines to ensure that the safety and installation 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 in a temperature and humidity controlled, indoor environment, free of conductive contaminants.

- Avoid installing system 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 personnel should service the MegaDySC system.
- Verify that 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 system is not rated to directly power life support equipment.

- Verify 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.
Chapter 2

Installation

System Components

The MegaDySC® voltage sag corrector is comprise several sections, including multiple DySC 400 A modules, MegaDySC electronics cabinets and one automatic bypass switchboard. These separate shipping, split components must be mechanically and electrically interconnected at the time of installation. The MegaDySC cabinets house the static bypass (semiconductor switches) and voltage sag correction electronics. The automatic bypass switchboard houses the maintenance bypass circuit breakers, master control circuits and voltage and current monitoring circuits. Table 1 shows the system components (shipping splits) of 480V-rated MegaDySC systems. Models with other voltage ratings are similarly configured.

Table 1 - MegaDySC System Models

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Current Rating</th>
<th>3-Wire / 4-Wire</th>
<th>SR / ER</th>
<th>Switchboard</th>
<th>DySC 400A Modules</th>
<th>DySC 400A Modules with ER</th>
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<tbody>
<tr>
<td>1608M-800A480V3S</td>
<td>800A</td>
<td>3W</td>
<td>SR</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1608M-800A480V3E</td>
<td>800A</td>
<td>3W</td>
<td>ER</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>1608M-800A480V4S</td>
<td>800A</td>
<td>4W</td>
<td>SR</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1608M-800A480V4E</td>
<td>800A</td>
<td>4W</td>
<td>ER</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>1608M-1K2A480V3S</td>
<td>1200A</td>
<td>3W</td>
<td>SR</td>
<td>1</td>
<td>3</td>
<td></td>
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<tr>
<td>1608M-1K2A480V3E</td>
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<td>3W</td>
<td>ER</td>
<td>1</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>1608M-1K2A480V4S</td>
<td>1200A</td>
<td>4W</td>
<td>SR</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1608M-1K2A480V4E</td>
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<td>-</td>
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<td>SR</td>
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<td>4</td>
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<tr>
<td>1608M-1K6A480V3E</td>
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<td>ER</td>
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<td>-</td>
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</tr>
<tr>
<td>1608M-1K6A480V4S</td>
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<td>4W</td>
<td>SR</td>
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<td>4</td>
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</tr>
<tr>
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<tr>
<td>1608M-2K0A480V3S</td>
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<td>5</td>
<td></td>
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<td>1608M-2K0A480V4E</td>
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<td>5</td>
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<tr>
<td>1608M-2K4A480V3S</td>
<td>2400A</td>
<td>3W</td>
<td>SR</td>
<td>1</td>
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<td>6</td>
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<tr>
<td>1608M-2K4A480V4S</td>
<td>2400A</td>
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<tr>
<td>1608M-2K4A480V4E</td>
<td>2400A</td>
<td>4W</td>
<td>ER</td>
<td>1</td>
<td>-</td>
<td>6</td>
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</tbody>
</table>

(1) Other voltages available (380V, 400V, 415V, 460V, or 480V), contact Rockwell Automation for more information.

IMPORTANT This document applies to 1608M MegaDySC systems rated 800A to 2400A at 380V, 400V, 415V, 460V, or 480V.
System Orientation and Layout

The required layout places the MegaDySC enclosures on the right-hand (RH) and left-hand (LH) sides of the Automatic Bypass Switchboard when viewed from the front. Each MegaDySC enclosure is labeled with its required position in the lineup. System components are labeled as in Table 2.

Table 2 - System Components Layout

<table>
<thead>
<tr>
<th>Current Rating (A)</th>
<th>LH3</th>
<th>LH2</th>
<th>LH1</th>
<th>Switchboard</th>
<th>RH1</th>
<th>RH2</th>
<th>RH3</th>
</tr>
</thead>
<tbody>
<tr>
<td>800</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>1200</td>
<td>■</td>
<td>■</td>
<td>■</td>
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<td>■</td>
<td>■</td>
</tr>
<tr>
<td>1600</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>2000</td>
<td>■</td>
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</tr>
<tr>
<td>2400</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
</tbody>
</table>

The enclosures must be mounted so that they abut tightly with no gap between. Typical layout is shown in Figure 1 and Figure 2. The “ER” components shown in the figures are included only with ER models, not with SR models.

Figure 1 - Typical System Layout, Top View (800A ER model shown)

Figure 2 - Typical System Layout, Front View (800A ER model shown)
System Clearance

The MegaDySC and ER cabinet 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, as shown in Figure 1. Clearance for the Automatic Bypass switchboard should allow the door to swing (left side hinged) open 90 degrees to the front of its enclosure.

System Mounting

The MegaDySC system is floor mounted, and should be secured using the 0.63" diameter mounting holes provided at the bottom of each section. Since each MegaDySC cabinet is provided with interconnecting cables to the automatic bypass switchboard, proper arrangement is critical. Follow the MegaDySC cabinet arrangement label located on the front of the automatic bypass switchboard for proper unit arrangement. MegaDySC cabinets are identified with a label located just above the main door handle.

Mechanical Interconnections

The MegaDySC and switchboard cabinets should be bolted together for maximum stability. 3/8" x 1" bolts with 1" flat washer and lock washer are provided for this purpose (tighten to 25 lb-ft [42.4 N•m]). The bolts pass through the right side of each cabinet and screw into the weld nuts in the next enclosure in the lineup. There are three holes vertically aligned along the front edge and another three holes along the rear edge. The three rear bolts are optional and installation will require access from the rear.

In addition, the top-mounted wireway sections must be bolted together using the provided 1/4" hardware (torque to 66 lb-in [7.5 N-m]). See Figure 3 for typical fastening locations and hardware arrangement.

Figure 3 - Mechanical Interconnections.
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. All interconnection wiring must be installed by a qualified electrician in compliance with the National Electrical Code standards.

The DySC 400A Module MegaDySC cabinets and the automatic bypass (ABP) switchboard are shipped separately. The customer is responsible for system mounting. All interconnecting power cables are provided and will be connected by a factory-trained technician during commissioning. At commissioning the main cables will be routed from the MegaDySC cabinets to the appropriate ABP switchboard busbar terminals via the overhead wireway. A control wiring harness is also provided in the ABP and must be connected to the MegaDySC cabinets. 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 4. 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.

**Figure 4 - Bus Bar Details for Utility Input and Load Output Terminations**
MegaDySC System Interconnections Checklist

The following list of checks is provided for reference only. Interconnections must be completed by factory-trained and authorized installation personnel.

- Connect each MegaDySC unit’s ground cable to the ground bus in ABP switchboard.
- Connect line side cables from each MegaDySC unit to the respective line input bus in the ABP Switchboard labeled L1, L2 and L3 respectively.
- Connect load side cables from each MegaDySC unit to the respective load output bus in the ABP Switchboard labeled X1, X2 and X3 respectively.

**IMPORTANT** It is critical to match the phases on each MegaDySC section.

- Install 3.5” plastic grommets into the control wire pass-through holes in the bottom front of each cabinet.
- Plug the 4 duplex fiber optic cables into the appropriate transceiver found on the control PC boards of each MegaDySC unit’s phase inverter module.
- Plug in the control wire harnesses that interconnect the enclosures at the bottom of each unit.
- Check wiring for correct source and destination locations against approved drawings.
- Check all electrical terminations for proper torque.
- Refer start-up and commissioning to factory-trained and authorized service personnel.
Electric Termination for Input and Output Power

Customer power cables (3-phase input, 3-phase output to protected loads) enter the top of the automatic bypass switchboard enclosure at the location labeled CUSTOMER CONNECTION ENTRANCE in Figure 1. The top panel should be removed to punch conduit holes. Bus bar locations and hole pattern are shown in Figure 4.

Utility Input and Load Wiring

Connect incoming earth ground conductor to the GROUND bus bar in accordance with the National Electrical Code and local codes.

**UTILITY INPUT** cables are terminated at bus bars labeled (left to right)
- L1
- L2
- L3

The Neutral input cables are terminated at the bus bar labeled
- **NEUTRAL** (For 4-wire systems only: Neutral connection is required for proper operation)

**OUTPUT FOR PROTECTED LOADS** cables are terminated at bus bars labeled
- X1
- X2
- X3

The Neutral output cables, if needed, are terminated at the same bus bar labeled
- **NEUTRAL** (present only in 4-wire systems)

Put Automatic Bypass Switchboard circuit breakers in these positions before energizing the system:
- CBI = OFF (open)
- CBB = ON (closed)
- CBO = OFF (open)

Replace all insulating panels, covers, close and lock all doors before energizing the system.
Communications

Modbus TCP/IP Communications

The MegaDySC system status and other items are communicated over a Modbus TCP/IP connection. This can be accessed through the DySC/i-Sense RJ45 port located at the top of the Bypass Switchboard. Refer to Figure 5. Contact Rockwell Automation technical support for protocol details.

i-Sense Voltage Monitor

An i-Sense voltage monitor is mounted on the automatic bypass switchboard to continuously monitor the 3-phase input and output voltages 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, it monitors line-neutral voltages.

The i-Sense requires communication via the Internet to access the recorded voltage data. Two options for communication are provided: Ethernet (RJ45 port) or PSTN (analog only) telephone line (RJ11 port). These communications ports are extended to the top of the Bypass Switchboard for permanent wiring installation. The ports are labeled as shown in Figure 5. Refer to the i-Sense User Manual (publication 1608S-UM001) for registration, configuration, and operation instructions.

Remote Diagnostics, TB1 Relay Contacts

The Automatic Bypass Switchboard contains relay dry contacts, available at terminal block TB1, for remote monitoring of the state of the Bypass Circuit Breaker and certain status conditions in the MegaDySC. Refer to Figure 6. TB1 is located in a compartment at the top of the right switchboard section. The terminal block is labeled TB1 customer contacts.

ATTENTION: Remove power from the MegaDySC system prior to connecting any alarm notification device. Access to the terminal contacts risks exposure to 120 VAC potential. Accidental operation of the automatic bypass circuit is possible.
Relay Contact Ratings

Terminals 1-9 of TB1

Relays ratings are:

- 110...277V AC 10 A continuous, 16 A short time
- 110...120V AC 1/3 hp max
- 220...250VAC 1/2 hp max
- 28V DC 10 A continuous, 16A short time
- Min. recommended load: 100 mA @ 5V DC or 0.5 W

CBB Contact Ratings

Terminals 10-12 of TB1

- 110...600V AC 6 A
- 24...48V DC 2.5 A
- 125...250V DC 0.5 A

Remote Bypass Customer-Provided Contact Rating

Terminals 14-15 of TB1

The customer-provided contact must be rated for at least 120V AC. Coil power is 2 VA at 120V AC (17 mA).
**TB1 Contacts Functionality**

The following describes the functionality of the TB1 contacts.

**ALARM Contacts**

The normally closed (NC) contact will be closed during normal operating conditions. The NC contact will open if an alarm condition occurs that inhibits sag correction. It will also close when the DySC system is powered down (when the touchscreen display is off).

If and when an alarm condition clears (for example, a Static Switch Overload no longer exists) the relay will revert to its pre-fault position.

Alarms that will energize the Alarm Relay K1 coil are all those listed in Table 6 on page 40 with a severity of auto-resetting or call service.

**Output OK Contacts**

The NC contact will be open during normal output (load) voltage conditions. The NC contact will close if the output rms voltage falls below 87% of rated for more than 3 cycles. It will also close when the DySC system is powered down.

**SAG EVENT Contacts**

The NC contact will be closed during normal input (line) voltage conditions. The NC contact will open during a detected voltage sag event. It will also close when the DySC system is powered down.

During a voltage sag, the relay coil will be energized for a minimum of 1 cycle, (16 ms in 60 Hz application, 20ms in 50 Hz application), and for the duration of the detected event. The maximum relay close time is 25 ms, so some single-cycle events may not operate this relay contact. The maximum relay release time is 25 ms; the expected minimum pulse width is approximately 15…25 ms.

**CBB STATUS Contacts**

“Normal” position for the CBB Bypass Breaker is defined as the breaker being OFF, or Open. The Normally-Open (NO) auxiliary contacts are open when the Breaker is open.

**IMPORTANT**

When the CBB breaker is closed, the MegaDySC cannot provide protection against sags. Example: Normal mode: CBB will be Open; therefore CBB-NO = open, CBB-NC = closed. If CBB is closed, these states will be reversed.

Conditions that will automatically close the Bypass Circuit Breaker (CBB) are the last five rows of Table 3 on page 22.

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*Rockwell Automation Publication 1608M-UM002B-EN-P - March 2018*
Remote Seamless BYPASS Command Operation

A normally-open PLC contact, relay contact, or push-button contact may be connected between TB1/14 and TB1/15. Close the contact to initiate an automatic seamless bypass operation: CBB will close, then CBI and CBO will open, removing power from the MegaDySC cabinets; voltage sag correction will then be disabled.

This feature may be utilized as an emergency power off (EPO) function for the MegaDySC cabinets only. 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.
Chapter 4

Applying Power

Application of Power Instructions

ATTENTION: The MegaDySC® system must be commissioned by factory-trained engineers. Do not energize the MegaDySC until instructed to do so by commissioning engineers.

- 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 are properly tightened.
- Replace all covers. Close and lock all cabinet and switchboard doors.
- Allow commissioning technicians to complete connections and initial checks
- Apply power only 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. (Refer to Servicing Notes on page 24)

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.
- Pushbutton CBI ON 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® cabinets and passes directly to the load. In this mode the load is unprotected from voltage sags. In the normal operation mode the MegaDySC cabinets are energized and the power is directed through the MegaDySC, protecting the load. See the following sections for MegaDySC and Automatic Bypass operation details.

ATTENTION: 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

A master control panel, located in the switchboard enclosure, constantly monitors the line voltages and issues commands to the parallel-connected MegaDySC sections. Each MegaDySC section contains three power electronics modules (one module per phase). The modules act in parallel with the like phase modules in the other MegaDySC sections, under command of the master controls. Each module consists of a static switch and the sag-correcting electronics. The parallel 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 adequate, the static switch will remain closed and no compensating voltage is added. When an insufficient line voltage event occurs, the static switch opens and the sag-correcting electronics (inverters) quickly add the balance of voltage necessary to regulate the load voltage.

- Thermal switches are included to activate fans if the cabinet temperature or other internal temperatures exceed set limits.
- A central touch screen 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 88.5% to 110% of nominal.
- A red “FAULT” box is displayed in the upper left hand corner of the display when an alarm condition is present on the MegaDySC. During this period sag correction is inhibited and the MegaDySC will continue to bypass the utility voltage directly to the load through the static bypass path.
- An orange “Resetting” box is displayed when the previous alarm condition has cleared. Sag correction will remain inhibited until the reset period has 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 3. Refer to Chapter 6 for further information on system alarms and status display.

Table 3 - Operational Conditions and Indications

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Definition</th>
<th>Touchscreen Display Status Text(1)</th>
<th>Inverter Operation</th>
<th>Bypass Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal:</td>
<td>88.5% &lt; ( V_{\text{LINE}} ) &lt; 110%</td>
<td>Green &quot;OK&quot;</td>
<td>Standby</td>
<td>Static BP</td>
</tr>
<tr>
<td>Sag Event:</td>
<td>( V_{\text{LINE}} ) &lt; 88.5% for less than available runtime.</td>
<td>Green &quot;OK&quot;</td>
<td>Running</td>
<td>Inverter</td>
</tr>
<tr>
<td>Runtime Exceeded:</td>
<td>Cumulative runtime exceeded</td>
<td>Blinks Red, then Orange for 1 min. Repeats if condition persists</td>
<td>Inhibited</td>
<td>Static BP</td>
</tr>
<tr>
<td>Normal Mode, Overload:</td>
<td>Load current &gt; 110%</td>
<td>Red during OL condition, Orange for 1 min. after OL ends</td>
<td>Inhibited</td>
<td>Static BP</td>
</tr>
<tr>
<td>Inverter Run Mode, Output Over current: ((I^2t))</td>
<td>Load current &gt; 150% for 3 cycles</td>
<td>Blinks Red, then Orange for 1 min. Repeats if condition persists</td>
<td>Inhibited</td>
<td>Static BP</td>
</tr>
<tr>
<td>Inverter Module Over-temperature</td>
<td>Module temperature limit exceeded</td>
<td>Blue, MegaDySC offline</td>
<td>Disconnected</td>
<td>Mech. Bypass</td>
</tr>
<tr>
<td>MegaDySC Over-temperature</td>
<td>Internal temperature limit exceeded</td>
<td>Blue, MegaDySC offline</td>
<td>Disconnected</td>
<td>Mech. Bypass</td>
</tr>
<tr>
<td>Static Switch Failure</td>
<td>Open SCR(s)</td>
<td>Blue, MegaDySC offline</td>
<td>Disconnected</td>
<td>Mech. Bypass</td>
</tr>
<tr>
<td>Main Fuse Open</td>
<td>Open Fuse(s)</td>
<td>Blue, MegaDySC offline</td>
<td>Disconnected</td>
<td>Mech. Bypass</td>
</tr>
<tr>
<td>Enclosure Door Open</td>
<td>Door Open</td>
<td>Blue, MegaDySC offline</td>
<td>Disconnected</td>
<td>Mech. Bypass</td>
</tr>
</tbody>
</table>

(1) 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). Refer to Figure 7. Under normal operating conditions raw input power is routed through CBI to the input of the MegaDySC sections. The output of the MegaDySC sections is routed to the load through CBO. CBB is normally open. CBB connects utility power to the load, bypassing the MegaDySC sections, 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 enclosures even if the system is in Bypass mode. Refer servicing to qualified personnel.

**ATTENTION:** Follow these instructions to avoid interrupting load power! Do not attempt to change the position of any circuit breakers without becoming familiar with the operation of the MegaDySC system. Contact the factory immediately if the system fails to operate as outlined below. Voltage sag protection is not available whenever CBB is closed (red BYPASS CLOSED lamp is 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

Perform the following steps to manually transfer the MegaDySC system to maintenance bypass.

1. Press the green “CBB ON” pushbutton.
2. Confirm that red the “BYPASS CLOSED” lamp is lit.
3. Press red “OPEN CBI” pushbutton. 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 MegaDySC

Perform the following steps to manually transfer power the to the MegaDySC system.

1. Wait for the MegaDySC touchscreen to display, “Ready to Close CBI”.
2. Charge CBI with pump handle. Press green “CBI ON” pushbutton.
3. Confirm that the MegaDySC touch screen is lit, and the status displays “OK” in the upper-left corner.
4. Charge CBO with pump handle. Close CBO by pressing the green pushbutton “CBO ON”.
5. Confirm that the MegaDySC touchscreen status displays “OK”.
6. Press the red “CBB OFF” pushbutton.
7. The MegaDySC system is now providing power to the load.
Transient Voltage Surge Suppression (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 (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-F32) may be opened to allow servicing of the TVSS module. Refer servicing to qualified personnel.

Servicing 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 3 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 or the placard on the bypass switchboard for instructions on transferring the system into and out of bypass mode.

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

![WARNING] Testing must only be performed by factory authorized and qualified personnel.

Over-Current and 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.

Each MegaDySC section contains semiconductor fuses F1, F2, F3. These fuses provide short circuit protection for the MegaDySC modules. In the event of an internal short circuit, a fuse will clear and trigger an automatic transfer to mechanical bypass mode. Fuse tables appear in Chapter 7.

In addition, each module has an electronic current limit function that will protect the module from peak over currents during sag protection operation.
Circuit Breaker Configuration

See the separate Circuit Breaker User Manuals for instructions on how to adjust the breaker set points.

Each of CBB, CBI, and CBO contains an electronic trip unit with several adjustable settings. These should be set as follows for Square-D Masterpact NW breakers:

CBB Set Points:
- Long-time Ir = 1 (100% of rating)
- Long-time tr = 24
- Short-time Isd = 10
- Short-time tsd = OFF/.4
- Instantaneous Ii = OFF

CBI and CBO Set Points:
- Long-time Ir = 1 (100% of rating)*
- Long-time tr = 4
- Short-time Isd = 6
- Short-time tsd = ON/.3
- Instantaneous Ii = OFF

IMPORTANT CBI and CBO Long-time Ir = 0.95 for 2400 A systems only (2500 A breaker frame).

Troubleshooting Notes

Diagnostic indicators available on the MegaDySC system:
- Touchscreen display
- Red lamp on Automatic Bypass switchboard indicates mechanical BYPASS CLOSED.
- Circuit breaker status (OPEN or CLOSED)
- System status relay contacts at TB1 (see Chapter 3)
- Modbus TCP/IP Port (see Chapter 3)
- i-Sense® voltage monitoring results via i-Grid (see Chapter 3)

IMPORTANT Record any Alarm or System Event messages seen on the display before contacting Technical Support.
Chapter 6

Display Screen

Overview

The MegaDySC touch screen display is a window to voltage sags and DySC 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.

Quick Start

At commissioning time perform the following steps to configure your system. When the system first starts, the “HOME” screen is displayed.

1. Press the “Configuration” button at the top of the screen (See Figure 8).

2. Set date and time by pressing “Set System Clock” on the left side of the screen (See Figure 8).

3. Use the left/right arrows under “System Clock” to highlight each component. Use the plus (+) and minus (-) buttons to set the correct time and/or date.

4. Press the “Save” button to store the new date/time and format settings.
Chapter 6  Display Screen

**IMPORTANT** Pressing “View Model Information” on the “Configuration” screen provides model information about the MegaDySC system. It includes model number, serial number, voltage and current ratings. Unit details are also present including component serial numbers and firmware version numbers.

**ATTENTION:** TO AVOID DAMAGING THE TOUCH DISPLAY:
Do not subject the touch display to heavy impact. Use your bare finger to tap the touch display. Do not use anything that might cut or damage the touch screen. The touch display panel is not waterproof. Do not use alcohol, ammonia, toluene, or acetone cleaners on the display.

---

**Home Screen**

The “HOME” screen of the display provides a snapshot view of the status of the entire system (See Figure 9). You can return to this screen from any other screen by pressing the “Return to Home” button at the top of the screen.

**Figure 9 - Home Screen**

![Home Screen](image)

**Table 4 - Home Screen**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Status</td>
<td>Real-time system status: available runtime, output voltage, load current, and frequency.</td>
</tr>
<tr>
<td>2</td>
<td>System Operation</td>
<td>Graphical view of operational state.</td>
</tr>
<tr>
<td>3</td>
<td>Last Event Details</td>
<td>Information about the last voltage sag: event start time, event duration, and sag depth.</td>
</tr>
</tbody>
</table>
| 4    | Main Menu            | The menu buttons at the bottom of the screen navigate through:  
  **Voltage Sags:** Displays the “Voltage Sag Log” screen. 
  **System Events:** Displays the “System Event Log” screen. 
  **System Status:** Displays the “System Status” screen. 
  **Configuration:** Displays the “System Configuration” screen. |
The “System Status” screen displays the real-time overall system status (See Table 5). You can access this screen by pressing the “System Status” button in the menu.

**Table 5 - System Status**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>System Status</td>
<td>Overall system status including: status, availability to correct sags, and internal cabinet temperature. 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 unit. Nominal values are listed on the “View Model Information” screen.</td>
</tr>
<tr>
<td>2</td>
<td>Cabinet Layout</td>
<td>The system component cabinets are displayed; press a cabinet for more detail.</td>
</tr>
<tr>
<td>3</td>
<td>Waveforms</td>
<td>Real-time waveform capture; line voltage, load voltage, or load current can be selected for display.</td>
</tr>
</tbody>
</table>

**IMPORTANT** You can toggle between the two screens in Figure 10 by pressing “System Summary” and “Line & Load Waveforms” on the left side of the screen.
Cabinet Status

When a cabinet image is pressed, detailed status for the selected cabinet will be displayed in a popup window (See Figure 11). Press the “Close” button to close the popup and return to the System Status screen.

Figure 11 - Cabinet Status

Voltage Sags

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

Voltage Sag Log

The “Voltage Sags” screen (See Figure 12) displays a list of the last 60 voltage sags. You can access this screen by pressing the “Voltage Sags” button in the menu.

Figure 12 - Voltage Sag Log
The left side of the screen contains the list of voltage sags, which are identified by the following fields:

<table>
<thead>
<tr>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>Unique ID within the list identifying each voltage sag.</td>
</tr>
<tr>
<td>Time</td>
<td>Start date and time of the voltage sag.</td>
</tr>
<tr>
<td>RMS%</td>
<td>Worst-case RMS voltage (percent of nominal) across all phases.</td>
</tr>
<tr>
<td>Duration</td>
<td>Duration of the voltage sag.</td>
</tr>
</tbody>
</table>

Use the up/down arrows to navigate through the list. The currently selected voltage sag will appear in the detail pane on the right side of the screen.

**Voltage Sag Detail**

The right-side of the Voltage Sag screen shows detailed information about the selected voltage sag (See Figure 13).

**Figure 13 - Voltage Sag Detail, Summary Data**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
</table>
| 1    | Summary     | Event ID: Unique ID within the list (0-29) to identify the voltage sag.  
Event Date: Start date and time of the voltage sag.  
RMS: Worst-case RMS voltage 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. |
| 2    | Magnitude   | Line Voltage: Line RMS voltage and percent of rated (L-N basis).  
Load Voltage: Load RMS voltage and percent of nominal (L-N basis). |
Voltage Sag RMS Voltage Charts

The line and load RMS voltage are displayed for each phase (See Figure 14). You can access this screen by pressing the “Charts” button as shown in Figure 13.

By pressing the A, B, or C buttons to the right of the charts, you can show or hide each of the three phase voltages.

Figure 14 - Voltage Sag Detail, RMS Voltage Charts

Voltage Sag Notification

When the MegaDySC system first detects a voltage sag, a red box displaying “Sag In Progress” will appear in the upper left hand corner of the screen. (See Figure 15)

When the voltage sag is over, the red box will disappear.

Figure 15 - Voltage Sag Detected
System Events

The MegaDySC tracks all operational alarms. These “System Events” are classified into five groups based on severity, as listed in the following table.

<table>
<thead>
<tr>
<th>Severity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informational</td>
<td>Purely informational. No action is required.</td>
</tr>
<tr>
<td>Auto-Resetting</td>
<td>The DySC will reset within 60 seconds. No user action is required.</td>
</tr>
<tr>
<td>User Attention</td>
<td>User action may be required to correct a problem. The DySC will reset 60 seconds after the error condition is corrected.</td>
</tr>
<tr>
<td>Manual-Reset</td>
<td>For system events that force an automatic transfer to mechanical bypass, a manual reset of the DySC system will be required.</td>
</tr>
<tr>
<td>Call Service</td>
<td>For events classified as Call Service, factory trained service support will be required.</td>
</tr>
</tbody>
</table>

System Event Log

The “System Event Log” screen displays a list of the last 40 system faults in chronological order (See Figure 16). You can access this screen by pressing the “System Events” button in the menu.

Figure 16 - System Event Log

The left side of the screen contains the list of system events, which are identified by these fields:

<table>
<thead>
<tr>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>Unique ID within the list identifying each system event</td>
</tr>
<tr>
<td>Time</td>
<td>Start time of the fault.</td>
</tr>
<tr>
<td>Name</td>
<td>Name and description of the alarm.</td>
</tr>
</tbody>
</table>

Use the up/down arrows to navigate through the list. Detail for the currently selected event is shown to the right of the list.
System Event Detail

The right side of the System Event Detail page displays detailed information that was recorded during the selected event (See Figure 16).

The “Animate” button displays a time-lapse view of the system events as they were recorded.

<table>
<thead>
<tr>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time/Duration</td>
<td>Event Date: Date and start time of the system event.</td>
</tr>
<tr>
<td></td>
<td>Duration: The amount of time the event lasted.</td>
</tr>
<tr>
<td>Type</td>
<td>Event ID: Unique ID within the list (0-39) to identify the event.</td>
</tr>
<tr>
<td></td>
<td>Code: Abbreviation of the event followed by a numeric fault code in parentheses.</td>
</tr>
<tr>
<td></td>
<td>Severity: Severity of the fault.</td>
</tr>
<tr>
<td></td>
<td>Description: Name of the event (Reference Table 6 on page 40).</td>
</tr>
<tr>
<td>Component</td>
<td>Location: The location in the system where the event originated (e.g.: Phase A, Phase B, Phase C).</td>
</tr>
<tr>
<td></td>
<td>Area: The specific area within the location where the event originated (e.g.: Inverter).</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

System Event Notification

IMPORTANT Each time the unit is powered up, the system will generate an informational “Unit Power On” event to record the power up time. The duration of this event is the time since the last power down.

When the MegaDySC system first detects an alarm condition, a popup window will be displayed (See Figure 17). The popup window can be closed by tapping the “Close” button or waiting 15 seconds. While the alarm is active the display will show “Fault” in the status field. (See Figure 18).

Figure 17 - System Event Detection

Figure 18 - System Event In Progress
After the alarm condition is corrected, the MegaDySC must reset before sag correction is available. During this time the display will show “Resetting” in the status field and indicate the amount of time left before the reset is complete. (See Figure 19). When the reset time is complete a new popup window will be displayed. Tap “View Event” to view the complete event detail, or “Close” to close the popup window (See Figure 20).

If a “Call Service” severity system event is detected, record the system event details including: name, description, location, and reading. Contact Rockwell Automation Technical Support. If the alarm clears, the touch screen will automatically go back to normal operation.

Maintaining the Touch Screen Panel

- Take care not to damage the touch display.
  - Do not subject the touch display to heavy impact.
  - Use your bare finger to tap the touch display.
  - Do not tap, push, or rub the touch display surface with any object that might cut or damage the touch screen (no glass, metal, pens, pencils, or screwdrivers).
- The touch display panel is not waterproof.

Clean the Computer

To maintain your computer, it is important to clean the display, cooling fins, and vent holes, and to remove grease or paint.

<table>
<thead>
<tr>
<th>IMPORTANT</th>
<th>VersaView 5000 computers resist the following chemicals:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alcohol (methyl, ethyl, or isopropyl)</td>
</tr>
<tr>
<td></td>
<td>Ammonia (10% dilute solution)</td>
</tr>
<tr>
<td></td>
<td>Automatic transmission fluid</td>
</tr>
<tr>
<td></td>
<td>Bleach</td>
</tr>
<tr>
<td></td>
<td>Commercial glass cleaners</td>
</tr>
<tr>
<td></td>
<td>Diesel fuel</td>
</tr>
<tr>
<td></td>
<td>Gasoline (unleaded)</td>
</tr>
<tr>
<td></td>
<td>Oil (hydraulic or motor)</td>
</tr>
<tr>
<td></td>
<td>Silicone-based lubricant</td>
</tr>
</tbody>
</table>
Clean the Integrated Display

Perform the following steps to clean a display (applies to VersaView® 5200 thin client and VersaView 5400 computers with an integrated display).

1. Disconnect power from the computer at the power source.

   ATTENTION: Since the display is a touch screen, it is possible for screen objects to activate during equipment wash-downs if the computer is turned on.

2. Clean the display with a mild soap with a clean sponge or a soft cloth.

   ATTENTION: Use of abrasive cleansers, solvents, and high-pressure washes can damage the display window. Do not scrub or use brushes.

3. Dry the display with a chamois or moist cellulose sponge to avoid water spots.

Clean the Air Openings and Cooling Fins

Perform the following steps to clean all VersaView 5000 industrial computers.

1. Disconnect power from the computer at the power source.

2. Disconnect all peripheral devices from the computer.

3. Vacuum dust and debris from the vent holes on the sides of the display computers, and from the cooling fins on the chassis of all computers.

   Remove stubborn dirt on the cooling fins with a mild detergent and soft cloth.

Restarting the Touch Screen Interface

If the touch screen interface becomes unresponsive, it can be reset by one of the following methods:

Soft Reset

Perform the following steps to complete a soft reset.

1. Press and hold the bottom-left corner of the screen for 5 seconds to reinitialize the touch screen interface.

2. While you are holding this corner, you will see “gui restart” and a timer counting down in the status bar.
Hard Reset

Perform the following steps to complete a hard reset.

3. Press and hold the power button on the rear bottom of the computer until the computer turns off (approximately five seconds). The power button is indicated by the symbol on VersaView 5400 Display Computer Models, shown in Figure 4.

4. Then press the power button a second time to restart the computer.


Chapter 7

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.
- Check that the Automatic Bypass switchboard is in the MegaDySC Normal mode.
- Update system time, if needed, see Figure 8 on page 27.
- Clean the display screen if needed. See page 35.
- 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 doors of each MegaDySC and ER cabinet, and can be accessed with the doors 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.
  - Replace or 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 re-install the knurled nuts until finger tight.
  - Replace filters 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.
  - Refer to the Hardware Service Manual for fan test instructions.
### Table 6 - System Event Table

<table>
<thead>
<tr>
<th>Event Code</th>
<th>Code Name</th>
<th>Full Name</th>
<th>Severity</th>
<th>Area</th>
<th>Event Description</th>
<th>Event Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>POWER_ON</td>
<td>DySC Power On</td>
<td>Informational</td>
<td>Unit</td>
<td>Power re-applied to the DySC.</td>
<td>No action needed.</td>
</tr>
<tr>
<td>4</td>
<td>T_FAN_ST</td>
<td>Fan Test Start</td>
<td>Informational</td>
<td>Unit</td>
<td>Start acknowledgment of DySC fan test.</td>
<td>No action needed.</td>
</tr>
<tr>
<td>5</td>
<td>T_IN_ST_1</td>
<td>Inverter Test (.5 cycles)</td>
<td>Informational</td>
<td>Unit</td>
<td>Start acknowledgment of DySC 0.5 cycle inverter test.</td>
<td>No action needed.</td>
</tr>
<tr>
<td>6</td>
<td>T_IN_ST_2</td>
<td>Inverter Test (3 cycles)</td>
<td>Informational</td>
<td>Unit</td>
<td>Start acknowledgment of DySC 3 cycle inverter test.</td>
<td>No action needed.</td>
</tr>
<tr>
<td>7</td>
<td>T_IN_ST_3</td>
<td>Inverter Test (5.5 seconds)</td>
<td>Informational</td>
<td>Unit</td>
<td>Start acknowledgment of DySC 5.5 second inverter test.</td>
<td>No action needed.</td>
</tr>
<tr>
<td>9</td>
<td>EXTERNAL</td>
<td>External Inhibit</td>
<td>Auto-Resetting</td>
<td>Inverter</td>
<td>Controller is inhibited by another phase controller.</td>
<td>Review event details from other phase controllers.</td>
</tr>
<tr>
<td>10</td>
<td>EXT_SLAVE</td>
<td>External Slave Cabinet Inhibit</td>
<td>Auto-Resetting</td>
<td>Inverter</td>
<td>Master controller is inhibited by another phase master controller.</td>
<td>Review event details from slave controllers.</td>
</tr>
<tr>
<td>11</td>
<td>RUN_TO</td>
<td>Inverter Run Timeout</td>
<td>Auto-Resetting</td>
<td>Inverter</td>
<td>DySC inverter had a total cumulative runtime of more than rated.</td>
<td>No action needed.</td>
</tr>
<tr>
<td>12</td>
<td>LIM_CYCLE</td>
<td>Inverter Limit Cycle Timeout</td>
<td>Auto-Resetting</td>
<td>Inverter</td>
<td>Power was re-applied more than once within a 58 second period.</td>
<td>No action needed.</td>
</tr>
<tr>
<td>13</td>
<td>STAT_OT</td>
<td>Static Switch Over-Temperature</td>
<td>User Attention</td>
<td>Static Switch</td>
<td>Static switch heatsink temperature was greater than maximum rating.</td>
<td>Verify ambient temperature is within DySC specification. Check for damaged fans. Check for dirty or obstructed air filters.</td>
</tr>
<tr>
<td>14</td>
<td>OVERLOAD</td>
<td>Overload</td>
<td>User Attention</td>
<td>Unit</td>
<td>Inverter inhibited because load current exceeded maximum rating.</td>
<td>Reduce load. In parallel DySC systems, verify proper current sharing among slave cabinets.</td>
</tr>
<tr>
<td>15</td>
<td>DC_OV</td>
<td>DC Bus Over-Voltage</td>
<td>User Attention</td>
<td>Inverter</td>
<td>Positive or negative half of DC bus voltage exceeded maximum rating.</td>
<td>Verify line voltage is within ratings. Verify proper DySC application. Call service.</td>
</tr>
<tr>
<td>16</td>
<td>CNTRL_UV</td>
<td>Controller Power Under-Voltage</td>
<td>User Attention</td>
<td>Inverter</td>
<td>DySC control power supply is out of tolerance.</td>
<td>Verify DySC is online and line voltage is within ratings. Call service.</td>
</tr>
<tr>
<td>17</td>
<td>OUTPUT_UV</td>
<td>Output Under-Voltage</td>
<td>User Attention</td>
<td>Inverter</td>
<td>DySC output voltage was less than 80% of nominal during sag correction. Sag condition likely outside of DySC specification.</td>
<td>Verify line voltage is within ratings. Verify proper DySC application.</td>
</tr>
<tr>
<td>18</td>
<td>INV_OC</td>
<td>Inverter Over-Current</td>
<td>User Attention</td>
<td>Inverter</td>
<td>Inverter current exceeded maximum rating during sag correction.</td>
<td>Verify load current is within ratings. Verify mechanical bypass circuit breaker CBB is open. Verify proper DySC application.</td>
</tr>
<tr>
<td>19</td>
<td>DC_UV</td>
<td>DC Bus Under-Voltage</td>
<td>User Attention</td>
<td>Inverter</td>
<td>DC bus voltage below operational range.</td>
<td>Verify line voltage is within ratings. Call service.</td>
</tr>
<tr>
<td>20</td>
<td>OUTPUT_OV</td>
<td>Output Over-Voltage</td>
<td>Call Service</td>
<td>Inverter</td>
<td>DySC output voltage was greater than 115% of nominal during sag correction.</td>
<td>Call service.</td>
</tr>
<tr>
<td>22</td>
<td>IGBT</td>
<td>IGBT Pack</td>
<td>User Attention</td>
<td>Inverter</td>
<td>IGBT pack reported error. Possible sag condition outside of DySC specification.</td>
<td>Verify line voltage is within ratings. Verify proper DySC application. Call Service.</td>
</tr>
<tr>
<td>24</td>
<td>GATE_ERR</td>
<td>Gate Command Error</td>
<td>Call Service</td>
<td>Static Switch</td>
<td>Master/Slave gate command error.</td>
<td>Call service.</td>
</tr>
<tr>
<td>25</td>
<td>SYNC_ERR</td>
<td>Line Synchronization Error</td>
<td>Call Service</td>
<td>Inverter</td>
<td>Inverter not synchronized to line when sag detected.</td>
<td>Call service.</td>
</tr>
<tr>
<td>26</td>
<td>SLAVE_1</td>
<td>Slave Cabinet 1 Inhibit</td>
<td>Auto-Resetting</td>
<td>Inverter</td>
<td>Master controller inhibited by slave controller.</td>
<td>Review event details from slave controllers.</td>
</tr>
<tr>
<td>27</td>
<td>SLAVE_2</td>
<td>Slave Cabinet 2 Inhibit</td>
<td>Auto-Resetting</td>
<td>Inverter</td>
<td>Master controller inhibited by slave controller.</td>
<td>Review event details from slave controllers.</td>
</tr>
<tr>
<td>Event Code</td>
<td>Code Name</td>
<td>Full Name</td>
<td>Severity</td>
<td>Area</td>
<td>Event Description</td>
<td>Event Resolution</td>
</tr>
<tr>
<td>------------</td>
<td>------------------</td>
<td>----------------------------------</td>
<td>-----------</td>
<td>--------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>31</td>
<td>CONFIG</td>
<td>Configuration Alert</td>
<td>Call Service</td>
<td>Inverter</td>
<td>Controller configuration has changed.</td>
<td>Call service.</td>
</tr>
<tr>
<td>32</td>
<td>CNTRL_MEM</td>
<td>Controller Memory Busy</td>
<td>Auto-Resetting</td>
<td>Inverter</td>
<td>Controller is loading new data into Flash memory.</td>
<td>No action needed.</td>
</tr>
<tr>
<td>33</td>
<td>UNBALANCE</td>
<td>Start-Up Test: DC Bus Unbalance</td>
<td>Call Service</td>
<td>Inverter</td>
<td>Positive and negative halves of the DC bus did not charge equally during power up.</td>
<td>Call service.</td>
</tr>
<tr>
<td>34</td>
<td>AC_V_CHK</td>
<td>Start-Up Test: AC Voltage Check</td>
<td>Call Service</td>
<td>Inverter</td>
<td>Output voltage was detected out of tolerance during the start-up test.</td>
<td>Call service.</td>
</tr>
<tr>
<td>35</td>
<td>ROLL_CALL</td>
<td>Start-Up Test: Controller Roll Call Timeout</td>
<td>Call Service</td>
<td>Unit</td>
<td>Controller communication problem detected during start-up test.</td>
<td>Call service.</td>
</tr>
<tr>
<td>36</td>
<td>COM_VER</td>
<td>Start-Up Test: Communication Compatibility Mismatch</td>
<td>Call Service</td>
<td>Unit</td>
<td>Firmware communication compatibility problem detected during start-up test.</td>
<td>Call service.</td>
</tr>
<tr>
<td>37</td>
<td>CNFG_TO</td>
<td>Start-Up Test: Controller Configuration Timeout</td>
<td>Call Service</td>
<td>Unit</td>
<td>Controller communication problem detected during start-up test.</td>
<td>Call service.</td>
</tr>
<tr>
<td>38</td>
<td>CNFG_ERR</td>
<td>Start-Up Test: Controller Configuration Mismatch</td>
<td>Call Service</td>
<td>Unit</td>
<td>Controller firmware configuration problem detected during start-up test.</td>
<td>Call service.</td>
</tr>
<tr>
<td>39</td>
<td>FIRM_TO</td>
<td>Start-Up Test: Controller Firmware Check Timeout</td>
<td>Call Service</td>
<td>Unit</td>
<td>Controller communication problem detected during start-up test.</td>
<td>Call service.</td>
</tr>
<tr>
<td>40</td>
<td>FvRM_DIFF</td>
<td>Start-Up Test: Controller Firmware Revision Mismatch</td>
<td>Call Service</td>
<td>Unit</td>
<td>Controller firmware revision mismatch detected during start-up test.</td>
<td>Call service.</td>
</tr>
<tr>
<td>41</td>
<td>SRL_TO</td>
<td>Start-Up Test: Controller Serial Number Check Timeout</td>
<td>Call Service</td>
<td>Unit</td>
<td>Controller serial number mismatch detected during start-up test.</td>
<td>No action needed.</td>
</tr>
<tr>
<td>42</td>
<td>SRL_DIFF</td>
<td>Start-Up Test: Serial Number Mismatch</td>
<td>Informational</td>
<td>Unit</td>
<td>Phase control board failed to respond to Comm board's Inverter test.</td>
<td>Close door. Manually reset DySC.</td>
</tr>
<tr>
<td>44</td>
<td>T_INV_TO</td>
<td>Inverter Test Timeout</td>
<td>Call Service</td>
<td>Unit</td>
<td>DySC door was opened. Mechanical bypass commanded.</td>
<td>Close door. Manually reset DySC.</td>
</tr>
<tr>
<td>46</td>
<td>DOOR_OPEN</td>
<td>DySC Cabinet Door Open</td>
<td>Manual Reset</td>
<td>Unit</td>
<td>DySC door was opened. Mechanical bypass commanded.</td>
<td>Close door. Manually reset DySC.</td>
</tr>
<tr>
<td>47</td>
<td>CRIT_OT</td>
<td>Critical Over-Temperature</td>
<td>Manual Reset</td>
<td>Unit</td>
<td>Internal DySC temperature exceeded maximum rating. Mechanical bypass commanded.</td>
<td>Verify ambient temperature is within DySC specification. Check for damaged fans. Check for dirty or obstructed air filters. Manually reset DySC.</td>
</tr>
<tr>
<td>48</td>
<td>FUSE_OPEN</td>
<td>Fuse Open</td>
<td>Call Service</td>
<td>Unit</td>
<td>One of the DySC fuses was detected open. Mechanical bypass commanded.</td>
<td>Call service.</td>
</tr>
<tr>
<td>49</td>
<td>OPEN_SCR_A</td>
<td>Open SCR Phase A</td>
<td>Call Service</td>
<td>Static Switch</td>
<td>The SCR on the phase A module was detected open.</td>
<td>Call service.</td>
</tr>
<tr>
<td>50</td>
<td>OPEN_SCR_B</td>
<td>Open SCR Phase B</td>
<td>Call Service</td>
<td>Static Switch</td>
<td>The SCR on the phase B module was detected open.</td>
<td>Call service.</td>
</tr>
<tr>
<td>51</td>
<td>OPEN_SCR_C</td>
<td>Open SCR Phase C</td>
<td>Call Service</td>
<td>Static Switch</td>
<td>The SCR on the phase C module was detected open.</td>
<td>Call service.</td>
</tr>
<tr>
<td>52</td>
<td>EXT_MB</td>
<td>External Mechanical Bypass Command</td>
<td>Manual Reset</td>
<td>Unit</td>
<td>The DySC was externally commanded to transfer to mechanical bypass.</td>
<td>Manually reset DySC.</td>
</tr>
<tr>
<td>53</td>
<td>DYN_BRAKE</td>
<td>Dynamic Brake Command</td>
<td>Call Service</td>
<td>Unit</td>
<td>A problem was detected with the DySC dynamic brake controller.</td>
<td>Call service.</td>
</tr>
<tr>
<td>54</td>
<td>SLAVE_OL</td>
<td>Critical Slave Cabinet Overload</td>
<td>User Attention</td>
<td>Unit</td>
<td>Slave cabinet current exceeded maximum rating. Mechanical bypass commanded.</td>
<td>Verify proper current sharing among slave cabinets. Verify proper DySC application. Call service.</td>
</tr>
<tr>
<td>55</td>
<td>MSTR_A_UV</td>
<td>Phase A Master Controller Under-Voltage</td>
<td>Call Service</td>
<td>Unit</td>
<td>Phase A master controller power supply failure. Mechanical bypass commanded.</td>
<td>Call service.</td>
</tr>
</tbody>
</table>
Chapter 7  Maintenance

Servicing

ATTENTION: Service must be performed by qualified personnel only.

Refer to the Hardware Service Manual for detailed instructions. 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 7 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 doors shows fuse locations. A similar label is located within the optional ER storage cabinets. Fuse types are listed in Table 7. 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 7 - MegaDySC Fuse Schedule

<table>
<thead>
<tr>
<th>Fuse Reference</th>
<th>Fuse Location</th>
<th>Fuse Rating</th>
<th>Manufacturer Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MegaDySC Main Cabinet Fuses</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1, F2, F3</td>
<td>Main Cabinet: Main Power Input</td>
<td>800A/500V</td>
<td>Mersen A50QS800-4IL</td>
</tr>
<tr>
<td>F4, F5, F6</td>
<td>Main Cabinet: Cross-Coupling Transformer</td>
<td>200A/600V</td>
<td>Mersen AJT200</td>
</tr>
<tr>
<td>F10, F11</td>
<td>Main Cabinet: Output Control Transformer</td>
<td>4A/600V</td>
<td>Mersen T5S4R</td>
</tr>
<tr>
<td>F12</td>
<td>Main Cabinet: Input Control Transformer</td>
<td>2A/600V</td>
<td>Mersen T5S2R</td>
</tr>
<tr>
<td>F13 - F24 (SR Models)</td>
<td>Main Cabinet: Dynamic Brake</td>
<td>20A/600Vdc</td>
<td>Mersen ATM20</td>
</tr>
<tr>
<td>F13 - F24 (ER Models)</td>
<td>Main Cabinet: Dynamic Brake</td>
<td>25A/600Vdc</td>
<td>Mersen ATM25</td>
</tr>
<tr>
<td><strong>MegaDySC Power Module Fuses</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1, F2</td>
<td>Power Module (x3): Voltage Feedback</td>
<td>2A/600V</td>
<td>Mersen A5QR2</td>
</tr>
<tr>
<td>F3</td>
<td>Power Module (x3): Inverter Output</td>
<td>400A/500V</td>
<td>Mersen A50QS400-4IL</td>
</tr>
<tr>
<td><strong>MegaDySC ER Cabinet Module Fuses (ER models only)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1, F2, F3, F4</td>
<td>ER Module (x6)</td>
<td>70A/500Vdc</td>
<td>Mersen A50QS70-4</td>
</tr>
</tbody>
</table>
# Specifications

## 800...2400A MegaDySC

### Table 8 - Typical Technical Specifications

<table>
<thead>
<tr>
<th>Electrical Input/Output (Normal Mode—Static Switch)</th>
<th>Connection Configuration</th>
<th>Series-connected with load. Under normal line condition, the static switch passes utility voltage directly to the load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Input Voltage</td>
<td>3-Phase: 380, 400, 415, 460, 480V(1)</td>
<td></td>
</tr>
<tr>
<td>Voltage Range</td>
<td>±10%</td>
<td></td>
</tr>
<tr>
<td>Static Bypass Current</td>
<td>100% rated rms current continuous, 150%–400% @ 0.5 sec., 400%–600% @ 0.5 sec., 600% @ 0.1s</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz Auto Sensing</td>
<td></td>
</tr>
<tr>
<td>Frequency Range (tracking)</td>
<td>45 to 65 Hz</td>
<td></td>
</tr>
<tr>
<td>TVSS</td>
<td>Output SPD, 80kA/mode. Protects L-L &amp; L-G on all models; L-N &amp; N-G (4-wire models)</td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td>&gt; 99%</td>
<td></td>
</tr>
<tr>
<td>System Short Circuit Current Rating (SCCR)</td>
<td>65kA (800A, 1200A models), 85kA (1600A, 2000A models), 100kA (2400A models)</td>
<td></td>
</tr>
<tr>
<td>Phase (wiring)</td>
<td>3 phases + Ground (3-wire models) or 3 phases + Neutral + Ground (4-wire models)</td>
<td></td>
</tr>
</tbody>
</table>

| 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                                       | rated current, rms ampere(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 |
| Sequential Sag Recovery                               | 0 seconds (assuming cumulative run-time available) |
| Full Recovery Time                                    | Max. 5 minutes |

### Mechanical

| Enclosure Ratings                                   | NEMA 1 (IP20) |
| Cable Entry                                         | Top or Bottom of Switchboard section |
| Cooling                                             | Filtered Forced air, controlled |
| Access                                              | Front for servicing. Rear access required for bottom entry 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

| 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.
Notes:
End User License Agreement (EULA)

Microsoft Software License Terms

Windows 10 IOT Enterprise & Mobile (All Editions)

If you live in (or if your principal place of business is in) the United States, please read the binding arbitration clause and class action waiver in Section 9. It affects how disputes are resolved.

Thank you for choosing Microsoft!

Depending on how you obtained the Windows software, this is a license agreement between (i) you and the device manufacturer or software installer that distributed the software with your device; or (ii) you and Microsoft Corporation (or, based on where you live or if a business where your principal place of business is located, one of its affiliates) if you acquired the software from a retailer.

This agreement describes your rights and the conditions upon which you may use the Windows software. You should review the entire agreement, including any supplemental license terms that accompany the software and any linked terms, because all of the terms are important and together create this agreement that applies to you. You can review linked terms by pasting the (aka.ms/) link into a browser window.

By accepting this agreement or using the software, you agree to all of these terms, and consent to the transmission of certain information during activation and during your use of the software as per the privacy statement described in Section 3. If you do not accept and comply with these terms, you may not use the software or its features. You may contact the device manufacturer or installer, or your retailer if you purchased the software directly, to determine its return policy and return the software or device for a refund or credit under that policy. You must comply with that policy, which might require you to return the software with the entire device on which the software is installed for a refund or credit, if any.

1. Overview.

a. Applicability. This agreement applies to the Windows software that is preinstalled on your device, or acquired from a retailer and installed by you; the media on which you received the software (if any); any fonts, icons, images or sound files included with the software, and also any Microsoft updates, upgrades, supplements or services for the software, unless other terms come with them. It also applies to Windows apps developed by Microsoft that provide functionality such as mail, calendar, contacts, music and news that are included with and are a part of Windows. If this agreement contains terms regarding a feature or service not available on your device, then those terms do not apply.

b. Additional terms. Depending on your device’s capabilities, how it is configured, and how you use it, additional Microsoft and third party terms may apply to your use of certain features, services and apps:

(i) Some Windows apps provide an access point to, or rely on, online services, and the use of those services is sometimes governed by separate terms and privacy policies, such as the Microsoft Services Agreement at (aka.ms/msa). You can view these terms and policies by looking at the service terms of use or the app’s settings, as applicable; please read them. The services may not be available in all regions.

(ii) The manufacturer or installer may also preinstall apps, which will be subject to separate license terms.

(iii) The software may include third party software such as Adobe Flash Player that is licensed under its own terms. You agree that your use of Adobe Flash Player is governed by the license terms for Adobe Systems Incorporated at (aka.ms/abodeflash). Adobe and Flash are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.

(iv) The software may include third party programs that are licensed to you under this agreement, or under their own terms. License terms, notices and acknowledgements, if any, for the third party program can be viewed at (aka.ms/thirdpartynotices).

2. Installation and Use Rights.

a. License. The software license is permanently assigned to the device with which you acquired the software. You may only use the software on that device.

b. Device. In this agreement, “device” means a physical hardware system with an internal storage device capable of running the software. A hardware partition or blade is considered to be a device.

c. Restrictions. The manufacturer or installer and Microsoft reserve all rights (such as rights under intellectual property laws) not expressly granted in this agreement. For example, this license does not give you any right to, and you may not:

(i) use or virtualize features of the software separately;

(ii) publish, copy (other than the permitted backup copy), rent, lease, or lend the software;

(iii) transfer the software (except as permitted by this agreement);

(iv) work around any technical restrictions or limitations in the software;

(v) use the software as server software, for commercial hosting, make the software available for simultaneous use by multiple users over a network, install the software on a server and allow users to access it remotely, or install the software on a device for use only by remote users;

(vi) reverse engineer, disassemble, or disassemble the software, or attempt to do so, except and only to the extent that the foregoing restriction is (a) permitted by applicable law; (b) permitted by licensing terms governing the use of open source components that may be included with the software; or (c) required to debug changes to any libraries licensed under the GNU Lesser General Public License which are included with and linked to by the software; and

(vii) when using Internet-based features you may not use those features in any way that could interfere with anyone else’s use of them, or to try to gain access to or use any service, data, account, or network, in an unauthorized manner.
Appendix A  
End User License Agreement (EULA)

d. Multi-use scenarios.
   (i) Multiple versions. If when acquiring the software, you were provided with multiple versions (such as 32-bit and 64-bit versions), you may install and activate only one of those versions at a time.
   (ii) Multiple or pooled connections. Hardware or software you use to multiplex or pool connections, or reduce the number of devices or users that access or use the software, does not reduce the number of licenses you need. You may only use such hardware or software if you have a license for each instance of the software you are using.
   (iii) Device connections. You may allow up to 20 other devices to access the software installed on the licensed device for the purpose of using the following software features: file services, print services, Internet information services, and Internet connection sharing and telephony services on the licensed device. The 20 connection limit applies to devices that access the software indirectly through "multiplexing" or other software or hardware that pools connections. You may allow any number of devices to access the software on the licensed device to synchronize data between devices. This section does not mean, however, that you have the right to install the software, or use the primary function of the software (other than the features listed in this section), on any of these other devices.

w. Remote access. Users may access the licensed device from another device using remote access technologies, but only on devices separately licensed to run the same or higher edition of this software.

v. Remote assistance. You may use remote assistance technologies to share an active session without obtaining any additional licenses for the software. Remote assistance allows one user to connect directly to another user's computer, usually to correct problems.

3. Privacy; Consent to Use of Data. Your privacy is important to us. Some of the software features send or receive information that may be triggered by changes to your device's components), the software may determine that the installed instance of the software is counterfeit, improperly licensed or includes unauthorized changes. If activation fails the software will attempt to repair itself by replacing any tampered Microsoft software with genuine Microsoft software. You may also receive reminders to obtain a proper license for the software. Successful activation does not confirm that the software is genuine or properly licensed. You may not provide you with those updates. The software provides only the following functions: (i) process sales and service transactions, scan and track inventory, record and/or transmit customer information, and perform related management functions, and (or (ii) provide information directly and indirectly to customers about available products and services. You may use other programs with the software as long as the other programs: (i) directly support the manufacturer's specific use for the device, or (ii) provide system utilities, resource management, or anti-virus or similar protection. For clarification purposes, an automated teller machine ("ATM") is not a retail point of service device.

vii. Cloud Computing Devices. If your device uses Internet browsing functionality to connect to and access cloud hosted applications: (i) no desktop functions may run locally on the device, and (ii) any files that result from the use of the desktop functions may not be permanently stored on the system.

2. Device connections. You may allow up to 20 other devices to access the software installed on the licensed device for the purpose of using the following software features: file services, print services, Internet information services, and Internet connection sharing and telephony services on the licensed device. The 20 connection limit applies to devices that access the software indirectly through "multiplexing" or other software or hardware that pools connections. You may allow any number of devices to access the software on the licensed device to synchronize data between devices. This section does not mean, however, that you have the right to install the software, or use the primary function of the software (other than the features listed in this section), on any of these other devices.

w. Remote access. Users may access the licensed device from another device using remote access technologies, but only on devices separately licensed to run the same or higher edition of this software.

v. Remote assistance. You may use remote assistance technologies to share an active session without obtaining any additional licenses for the software. Remote assistance allows one user to connect directly to another user's computer, usually to correct problems.

3. Privacy; Consent to Use of Data. Your privacy is important to us. Some of the software features send or receive information when using these features. Many of these features can be switched off in the user interface, or you can choose not to use them. By accepting this agreement and using the software you agree that Microsoft may collect, use, and disclose the information as described in the Microsoft Privacy Statement available at (aka.ms/privacy), and as may be described in the user interface associated with the software features.

4. Transfer
   a. Software preinstalled on device. If you acquired the software preinstalled on a device, you may transfer the license to use the software directly to another user, only with the licensed device. The transfer must include the software and, if provided with the device, an authentic Windows label including the product key. Before any permitted transfer, the other party must agree that this agreement applies to the transfer and use of the software.

   b. Stand-alone software. If you acquired the software as stand-alone software, you may transfer the software to another device that belongs to you. You may also transfer the software to a device owned by someone else if (i) you are the first licensed user of the software and (ii) the new user agrees to the terms of this agreement. You may make a single copy of the software for backup purposes, and may also use that backup copy to transfer the software if it was acquired as stand-alone software, as described below.

   c. Specific Use. The manufacturer designed the licensed device for a specific use. You may only use the software for that use.

   d. Backup copy. You may make a single copy of the software for backup purposes, and may also use that backup copy to transfer the software if it was acquired as stand-alone software, as described below.

5. Authorized Software and Activation. You are authorized to use this software only if you are properly licensed and the software has been properly activated with a genuine product key or by other authorized method. When you connect to the Internet while using the software, the software will automatically contact Microsoft or its affiliate to confirm the software is genuine and the license is associated with the licensed device. You can also activate the software manually by Internet or telephone. In either case, transmission of certain information will occur, and Internet, telephone and SMS service charges may apply. During activation (or reactivation that may be triggered by changes to your device's components), the software may determine that the installed instance of the software is counterfeit, improperly licensed or includes unauthorized changes. If activation fails the software will attempt to repair itself by replacing any tampered Microsoft software with genuine Microsoft software. You may also receive reminders to obtain a proper license for the software. Successful activation does not confirm that the software is genuine or properly licensed. You may not bypass or circumvent activation. To help determine if your software is genuine and whether you are properly licensed, see (aka.ms/ genuine). Certain updates, support, and other services might only be offered to users of genuine Microsoft software.

6. Updates. You may obtain updates only from Microsoft or authorized sources, and Microsoft may need to update your system to provide you with those updates. The software periodically checks for system and app updates, and may download and install them for you. To the extent automatic updates are enabled on your device, by accepting this agreement, you agree to receive these types of automatic updates without any additional notice.

7. Geographic and Export Restrictions. If your software is restricted for use in a particular geographic region, then you may activate...
the software only in that region. You must also comply with all domestic and international export laws and regulations that apply to the software, which include restrictions on destinations, end users, and end use. For further information on geographic and export restrictions, visit (aka.ms/georestrict) and (aka.ms/exporting).

8. Support and Refund Procedures. For the software generally, contact the device manufacturer or installer for support options. Refer to the support number provided with the software. For updates and supplements obtained directly from Microsoft, Microsoft may provide limited support services for properly licensed software as described at (aka.ms/lookup). If you are seeking a refund, contact the manufacturer or installer to determine its refund policies. You must comply with those policies, which might require you to return the software with the entire device on which the software is installed for a refund.

9. Binding Arbitration and Class Action Waiver if You Live in (or if a Business Your Principal Place of Business is in) the United States.

We hope we never have a dispute, but if we do, you and we agree to try for 60 days to resolve it informally. If we can't, you and we agree to binding individual arbitration before the American Arbitration Association ("AAA") under the Federal Arbitration Act ("FAA"), and not to sue in court in front of a judge or jury. Instead, a neutral arbitrator will decide and the arbitrator’s decision will be final except for a limited right of appeal under the FAA. Class action lawsuits, class-wide arbitrations, private attorney-general actions, and any other proceeding where someone acts as a representative capacity aren’t allowed. Nor is combining individual proceedings without the consent of all parties. "We," "our," and "us" includes Microsoft, the device manufacturer, and software installer.

a. Disputes covered—everything except IP. The term "dispute" is as broad as it can be. It includes any claim or controversy between you and the manufacturer or installer, or you and Microsoft, concerning the software, its price, or this agreement, under any legal theory including contract, warranty, tort, statute, or regulation, except disputes relating to the enforcement or validity of your, your licensors', or our, or our licensors' intellectual property rights.

b. Mail a Notice of Dispute first. If you have a dispute and our customer service representatives can't resolve it, send a Notice of Dispute by U.S. Mail to the manufacturer or installer, ATTN: LEGAL DEPARTMENT. If your dispute is with Microsoft, mail it to Microsoft Corporation, ATTN: LCA ARBITRATION, One Microsoft Way, Redmond, WA 98052-6399. Tell us your name, address, how to contact you, what the problem is, and what you want. A form is available at (aka.ms/disputeform). We’ll do the same if we have a dispute with you. After 60 days, you or we may start an arbitration if the dispute is unresolved.

c. Small claims court option. Instead of mailing a Notice of Dispute, and if you meet the court’s requirements, you may sue us in small claims court in your county of residence (or in a business your principal place of business) or our principal place of business—King County, Washington USA if your dispute is with Microsoft. We'll do the same if we have a dispute with you. After 60 days, you or we may start an arbitration if the dispute is unresolved.

d. Arbitration procedure. The AAA will conduct any arbitration under its Commercial Arbitration Rules (or if you are an individual and use the software for personal or household use, or if the value of the dispute is $75,000 USD or less whether or not you are an individual or how you use the software, its price, or this agreement) in the Washington USA if your dispute is with Microsoft. In a dispute involving $25,000 USD or less, any hearing will be telephonic unless the arbitrator finds good cause to hold an in-person hearing instead. Any in-person hearing will take place in your county of residence (or if a business your principal place of business) or our principal place of business—King County, Washington USA if your dispute is with Microsoft. You choose. The arbitrator may award the same damages to you individually as a court could. The arbitrator may award declaratory or injunctive relief only to you individually to satisfy your individual claim.

e. Arbitration fees and payments.

(i) Disputes involving $75,000 USD or less. The manufacturer or installer (or Microsoft if your dispute is with Microsoft) will promptly reimburse your filing fees and pay the AAA's and arbitrator's fees and expenses. If you reject our last written settlement offer made before the arbitrator was appointed, your dispute goes all the way to an arbitrator’s decision (called an "award"), and the arbitrator awards you more than this last written offer, the manufacturer or installer (or Microsoft if your dispute is with Microsoft) will: (1) pay the greater of the award or $1,000 USD; (2) pay your reasonable attorney’s fees, if any; and (3) reimburse any expenses (including expert witness fees and costs) that your attorney reasonably accrues for investigating, preparing, and pursuing your claim in arbitration. The arbitrator will determine the amounts unless you and we agree on them.

(ii) Disputes involving more than $75,000 USD. The AAA rules will govern payment of filing fees and the AAA’s and arbitrator’s fees and expenses.

(iii) Disputes involving any amount. If you start an arbitration we won’t seek our AAA or arbitrator’s fees and expenses, or your filing fees we reimbursed, unless the arbitrator finds the arbitration frivolous or brought for an improper purpose. If we start an arbitration we will pay all filing, AAA, and arbitrator’s fees and expenses. We won’t seek our attorney’s fees and expenses from you in any arbitration. Fees and expenses are not counted in determining how much a dispute involves.

f. Must file within one year. You and we must file in small claims court or arbitration any claim or dispute (except intellectual property disputes — see Section 9.a.) within one year from when it first could be filed. Otherwise, it’s permanently barred.

g. Severability. If the class action waiver is found to be illegal or unenforceable as to all or some parts of a dispute, those parts won’t be arbitrated but will proceed in court, with the rest proceeding in court. If any part of Section 9 is found to be illegal or unenforceable, that provision will be severed but the rest of Section 9 still applies.

h. Conflict with AAA rules. This agreement governs if it conflicts with the AAA’s Commercial Arbitration Rules or Consumer Arbitration Rules.

i. Microsoft as party or third-party beneficiary. If Microsoft is the device manufacturer or if you acquired the software from a retailer, Microsoft is a party to this agreement. Otherwise, Microsoft is not a party but is a third-party beneficiary of your agreement with the manufacturer or installer to resolve disputes through informal negotiation and arbitration.

10. Governing Law. The laws of the state or country where you live (or if a business where your principal place of business is located) govern all claims and disputes concerning the software, its price, or this agreement, including breach of contract claims and claims under state consumer protection laws, unfair competition laws, implied warranty laws, for unjust enrichment, and in tort, regardless of conflict of law principles. In the United States, the FAA governs all provisions relating to arbitration.

11. Consumer Rights, Regional Variations. This agreement describes certain legal rights. You may have other rights, including
Appendix A  End User License Agreement (EULA)

consumer rights, under the laws of your state or country. You may also have rights with respect to the party from which you acquired
the software. This agreement does not change those other rights if the laws of your state or country do not permit it to do so. For
example, if you acquired the software in one of the below regions, or mandatory country law applies, then the following provisions
apply to you:

a. Australia. References to "Limited Warranty” are references to the express warranty provided by Microsoft or the
manufacturer or installer. This warranty is given in addition to other rights and remedies you may have under law,
including your rights and remedies in accordance with the statutory guarantees under the Australian Consumer Law.

In this section, "goods" refers to the software for which Microsoft or the manufacturer or installer provides the express
warranty. Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are
entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or
damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the
failure does not amount to a major failure.

b. Canada. You may stop receiving updates on your device by turning off Internet access. If and when you re-connect to
the Internet, the software will resume checking for and installing updates.

c. European Union. The academic use restriction in Section 12.d(i) below does not apply in the jurisdictions listed on this
site: (aka.ms/academicuse).

d. Germany and Austria.

(i) Warranty. The properly licensed software will perform substantially as described in any Microsoft materials
that accompany the software. However, the manufacturer or installer, and Microsoft, give no contractual
guarantee in relation to the licensed software.

(ii) Limitation of Liability. In case of intentional conduct, gross negligence, claims based on the Product
Liability Act, as well as, in case of death or personal or physical injury, the manufacturer or installer, or
Microsoft is liable according to the statutory law.

Subject to the preceding sentence, the manufacturer or installer, or Microsoft will only be liable for slight negligence if
the manufacturer or installer or Microsoft is in breach of such material contractual obligations, the fulfillment of which
facilitate the due performance of this agreement, the breach of which would endanger the purpose of this agreement and
the compliance with which a party may constantly trust in (so-called "cardinal obligations"). In other cases of slight
negligence, the manufacturer or installer or Microsoft will not be liable for slight negligence.

e. Other regions. See (aka.ms/variations) for a current list of regional variations


a. Networks, data and Internet usage. Some features of the software and services accessed through the software may
require your device to access the Internet. Your access and usage (including charges) may be subject to the terms of your cellular
or internet provider agreement. Certain features of the software may help you access the Internet more
efficiently, but the software’s usage calculations may be different from your service provider’s measurements. You are
always responsible for (i) understanding and complying with the terms of your own plans and agreements, and (ii) any issues arising from using or accessing networks, including public/open networks. You may use the software to connect to
networks, and to share access information about those networks, only if you have permission to do so.

b. H.264/AVC and MPEG-4 visual standards and VC-1 video standards. The software may include H.264/MPEG-4
AVC and/or VC-1 decoding technology. MPEG LA, L.L.C. requires this notice:

THIS PRODUCT IS LICENSED UNDER THE AVC, THE VC-1, AND THE MPEG-4 PART 2 VISUAL
STANDARDS (“VIDEO STANDARDS”) AND/OR (ii) DECODE AVC, VC-1, AND MPEG-4 PART 2 VIDEO THAT WAS ENCODED
BY A CONSUMER ENGAGED IN A PERSONAL AND NON-COMMERCIAL ACTIVITY AND/OR WAS
OBTAINED FROM A VIDEO PROVIDER LICENSED TO PROVIDE SUCH VIDEO. NO LICENSE IS
GRANTED OR SHALL BE IMPLIED FOR ANY OTHER USE. ADDITIONAL INFORMATION MAY BE
OBTAINED FROM MPEG LA, L.L.C. SEE WWW.MPEGLA.COM

c. Malware protection. Microsoft cares about protecting your device from malware. The software may turn on malware
protection if other protection is not installed or has expired. To do so, other antimalware software will be disabled or
may have to be removed.

d. Limited rights versions. If the software version you acquired is marked or otherwise intended for a specific or limited
use, then you may only use it as specified. You may use other programs with the software as long as the other programs
directly support the manufacturer’s specific use for the device, or provide system utilities, resource management, or anti-
virus or similar protection.

(i) Academic. For academic use, you must be a student, faculty or staff of an educational institution at the time of
purchase.

(ii) Evaluation. For evaluation (or text or demonstration) use, you may not sell the software, use it in a live
operating environment, or use it after the evaluation period. Notwithstanding anything to the contrary in
this Agreement, evaluation software is provided "AS IS".

(iii) NFR. You may not sell software marked as “NFR” or "Not for Resale".

13. Entire Agreement. This agreement (together with the printed paper license terms or the terms accompanying any software
supplements, updates, and services that are provided by the manufacturer or installer, or Microsoft, and that you use), and the terms
contained in web links listed in this agreement, are the entire agreement for the software and any such supplements, updates, and
services (unless the manufacturer or installer, or Microsoft, provides other terms with such supplements, updates, or services). You
can review this agreement after your software is running by going to (aka.ms/terms) or going to Settings - System - About within
this software. You can also review the terms at any of the links in this agreement by typing the URLs into a browser address bar, and
you agree to do so. You agree that you will read the terms before using the software or services, including any linked terms. You
understand that by using the software and services, you ratify this agreement and the linked terms. There are also informational links
in this agreement. The links containing notices and binding terms are:

- Windows 10 Privacy Statement (aka.ms/privacy)
- Microsoft Services Agreement (aka.ms/msa)
- Adobe Flash Player License Terms (aka.ms/adobeflashs)
Rockwell Automation Support

Use the following resources to access support information.

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<td>Direct Dial Codes</td>
<td>Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.</td>
<td><a href="http://www.rockwellautomation.com/global/support/direct-dial.page">http://www.rockwellautomation.com/global/support/direct-dial.page</a></td>
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www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

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

Publication 1608M-UM002B-EN-P - March 2018
Supercedes Publication 1608M-UM002A - September 2013

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