DISTRIBUTED POWER CONTROL AND MONITORING SYSTEM

INSTALLATION & OPERATION GUIDE
G1-SERIES
There are few products that Carling Technologies hasn’t turned “ON” and fewer industries that haven’t turned to Carling for solutions. With ISO and TS registered manufacturing facilities and technical sales offices worldwide, Carling ranks among the world’s largest manufacturers of circuit breakers, switches, power distribution units, digital switching systems and electronic controls.

**COMPETITIVE ADVANTAGES**
- Vertical Integration
- Reliable & On-Time Delivery
- Excellent Customer Service
- Innovative & Eco-Friendly Products

**GLOBAL LOCATIONS:**
- Carling Technologies World Headquarters
  Hartford, CT, USA
  ISO 9001:2008
  ISO/TS 16949:2009
- Carling Technologies Brownsville, TX, USA
  ISO 9001:2008
  ISO/TS 16949:2009
- Maceptron
  Phoenix, AZ, USA
- Carling Technologies Hong Kong
  ISO 9001:2008
  ISO/TS 16949:2009
- Carling Technologies Shenzhen, China
  ISO 9001:2008
  ISO/TS 16949:2009
- Carling Technologies Jupiter, FL, USA

**STRATEGIC MARKETS SERVED:**
- On/Off Highway
- Marine
- Telecom/Datacom
- Military
- Renewable Energy

**SWITCHES & CONTROLS**
- Rocker
- Toggle
- Pushbutton
- Rotary

**CIRCUIT PROTECTION**
- Hydraulic-Magnetic
- Thermal
- GFCI / ELCI

**CUSTOM SOLUTIONS**
- PDU’s
- Keypads
- Control Modules

**MULTIPLEXED POWER SYSTEMS**
- HMI Devices & I/O Modules
- Programmable Displays
- Data Communication Interfaces
- Electrical Systems Monitoring

**OTHER SERVED INDUSTRIES:**
- Medical
- Industrial Control
- Audio / Visual
- Commercial Food
- HVAC
- Floor Care
- Generators
- Small Appliances
- Security Systems
- Test & Measurement

**WORLDWIDE NUMBERS:**
- 2000+ EMPLOYEES
- 150+ ENGINEERS
- 70+ DISTRIBUTORS
- 50+ REP FIRMS
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OctoPlex® System Overview

The Carling Technologies® OctoPlex® system puts the user in complete control of all AC and DC loads within the vessel. Utilizing an NMEA 2000® CAN bus network, system reliability and safety are achieved through a redundant architecture that eliminates single point failures. The OctoPlex system offers significant weight reduction in wiring and reduced installation complexity, while also allowing for the monitoring and control of common NMEA 2000 marine devices, such as compass, GPS, tank level adapters and more. Field-replaceable AC and DC circuit breakers can be controlled remotely through the NMEA 2000 network, allowing panels to be placed in remote locations, thereby eliminating the need for traditional large electrical panels.

Through the use of a Multi-Function Display, Carling Technologies has created a fully configurable and/or customizable user interface. Acting as the main human interface of the system, the Multi-Function Display brings the system functions, status reports and alarms directly to the user.

The OctoPlex suite of products also includes the Network Power Supply (NPS), Battery Monitor, System Interface Unit Monitor (SIU), AC Monitor, AC Distribution Units (8, 16 positions) & DC Distribution Units (8 & 16 positions).

Certifications

CE Approved
IEC 60533 Electrical and Electronic Installations in Ships
IEC 60945 Maritime Navigation and Radio communications Equipment and Systems

NMEA 2000® Approved
Certified, Category B

Lloyd's Type Approved
Test Specification #1, ENV2 Certificate No. 10/00021
The purpose of the OctoPlex® Installation Guide is to educate the system users and/or installers on the components that create the OctoPlex system. Its primary purpose is not only to educate, but also act as a troubleshooting guide that will aid in making sure that the system is operating to its full potential as designed or intended.

The OctoPlex Installation Guide serves as a reference guide only. For more information contact Carling Technologies® at sales@carlingtech.com or visit www.carlingtech.com.

A periodic check of all mounting hardware and connections is recommended. The OctoPlex products are not ignition protected devices and shall not be installed in areas with combustible fumes.

Disclaimer: With respect to the use or application of the OctoPlex System and/or its components, Carling Technologies Inc.’s liability to the installer or user shall be limited to direct economic damage or loss, provided in any and all circumstances, the guidelines herein are strictly followed. NOTWITHSTANDING THE FOREGOING IN NO EVENT SHALL CARLING TECHNOLOGIES, INC. BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THIS PRODUCT. Some states do not allow the exclusion on incidental or consequential damages, so the above limitation may not apply to customers in those states.

All illustrations contained in this Installation and Operation Guide are for reference purposes only. Nothing contained in this Guide shall replace or modify the requirements of any Industry Standard applicable to wire or other protection, including without limitation, those of the American Boat and Yacht Council (ABYC); the National Electric Code (NEC); and/or the National Fire Protection Association (NFPA). Failure to install the OctoPlex System or any components thereof in compliance with any such Industry Standard may limit the warranties made by Carling Technologies, Inc. See warranty information for further details.

www.carlingtech.com/octoplex-warranty

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NMEA 2000 and the NMEA logo are registered trademarks of the National Marine Electronics Association.
Lloyd’s Type Approved logo is a registered trademark of Lloyd’s Register Group Service Limited, 2016.
Installation Guide Outline

- Multi-Function Display A1415-CE
- 8 Circuit AC Power Distribution Unit A2000-08-[-]-CE
- 16 Circuit AC Power Distribution Unit A2000-16-[-]-CE
- 8 Circuit DC Power Distribution Unit A1650-CE
- 16 Circuit DC Power Distribution Unit A1655-CE
- Network Power Supply A2205-[-]-CE
- Battery Monitor A1680-CE
- AC Power Monitor A1770-CE
- System Interface Unit Monitor (SIU) A1470-CE

Battery Monitor
Measures and reports 12 and/or 24 voltage, single current and up to four battery temperatures. Configurable alarm thresholds for voltage, current and temperature can be annunciacted via the Multi-Function Display.

AC Power Distribution Unit 8 Position
Provides AC circuit protection, remote actuation and status monitoring for up to eight positions (single or double pole breakers).

AC Power Distribution Unit 16 Position
Provides AC circuit protection, remote actuation and status monitoring for up to sixteen positions (single, double or three-pole breakers).

AC Power Monitor
Measures and reports status of up to four AC lines including voltage, current and frequency. It can be used in 110V, 220V, three phase and 240V European applications.
2 **DC Power Distribution Unit 8 Position**
Provides DC circuit protection and remote control for up to eight DC circuits. Each circuit has a fully configurable trip profile.

3 **Multi-Function Display**
A configurable Multi-Function Display that provides an extremely simple interface for system control and monitoring.

5 **DC Power Distribution Unit 16 Position**
Provides DC circuit protection and remote control for up to sixteen DC circuits. Each circuit has a fully configurable trip profile.

6 **System Interface Unit Monitor (SIU)**
Monitors and reports the status for up to 34 discrete DC inputs. Also suitable for reporting status of bilge float switches, hatch/door open/closed, dimming, etc.

4 **Network Power Supply**
Provides regulated power to the dual NMEA 2000 network.

**Remote Capabilities**
Multi-Function Display (A1415-[ ]-CE) - Overview, Configuration

MULTI-FUNCTION DISPLAY
A1415-[ ]-CE: 6.5 INCH

The OctoPlex® A1415-CE Multi-Function Display allows the users to control and monitor the OctoPlex system. The heart of the Touch Screen Display is a 500 Mhz single board computer running Windows CE 5.0. The single board computer is used to interface with the dual CAN bus network, to process user input and to display system status. The Multi-Function Display is well suited for use in high ambient light environments.

In addition to the dual CAN bus interface, supplementary connections are provided for an external audible alarm, external LCD backlight control and an external reset input. The configuration of the A1415-CE Touch Screen Display is accomplished using the OctoPlex Network Configuration (ONC) utility. The Touch Screen Display comes with a convenient mounting bracket as well as a cover to keep the LCD area protected when not in use.

**Product Highlights:**
- Fanless
- Included mounting bracket
- 6.5" TFT LCD with LED Backlight:
  - Widescreen 5:3 Aspect Ratio
  - 800 x 480 pixels

**Configuration**

The configuration of the OctoPlex MFD is accomplished via the Octoplex Network Configuration (ONC) utility. This Windows-based program will provide the tools for building and/or editing pages, buttons, monitors, etc. in order to achieve the visual architecture you desire. Please consult the ONC User’s Guide for a full description of ONC’s capabilities and operation.

**Memory Card Access**

Touch Screen configuration information is maintained on a CompactFlash memory card located inside the unit. Physical access to the memory card is available through the access plate on the bottom of the unit. Access to the files located on the memory card may also be made through the USB port (if available) located on the lower right front of the unit. Microsoft ActiveSync (XP) or Mobile Computing (Vista) may be used to copy/delete files to/from a PC and the memory card. The following table lists the required and typical optional files utilized by the Touch Screen

*Manufacturer reserves the right to change product specification without prior notice. Please refer to our website for the latest details.*
Software Files

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NK.nbo</td>
<td>Touch Screen binary image file</td>
</tr>
<tr>
<td>Octflash.bin</td>
<td>Touch Screen variable definition file</td>
</tr>
<tr>
<td>Scp.ini</td>
<td>Touch Screen initialization file</td>
</tr>
<tr>
<td>Octoplexdata.dat</td>
<td>Touch Screen Configuration file</td>
</tr>
<tr>
<td>MANIFEST.TXT</td>
<td>Bootloader Instructions (Deleted after initial boot)</td>
</tr>
<tr>
<td>PFSN.TXT</td>
<td>TS Serial number (Deleted after initial boot)</td>
</tr>
<tr>
<td>Version 1. xx.xx</td>
<td>TS binary image Version file (optional)</td>
</tr>
<tr>
<td>Fuel Xfer disclaimer.bmp</td>
<td>Vendor specific fuel transfer disclaimer (optional)</td>
</tr>
</tbody>
</table>

Touch Screen page layout is maintained on the octoplexdata.dat file. Therefore any modifications other than button text changes will require the use of ONC and the replacement of the octoplexdata.dat file. If the octoplexdata.dat file is updated/replaced, the Touch Screen must be rebooted before the changes will take effect. Each touch screen must be updated independently. Octoplexdata.dat file information IS NOT propagated to other Touch Screens as is the case with Button Text changes. Depending on the model of the Touch Screen rebooting may be accomplished by one of the following procedures.

1. Reset button located just above the USB port, if available.
2. Disconnect/reconnect both (at the same time) CAN interface cables located on the back of the Touch Screen.
4. Remove ALL inputs (1 AC and 2 DC) to Network Power Supply by powering down the ships AC and DC systems.

Standard Screen Layouts:

AC Power Distribution Unit

The AC Distribution Power Unit screen shows the AC Breaker Label and the current state of the AC Breakers. State of the breaker options include: ON, OFF, Trip, Group Control (ON or OFF), Load Shedding (ON or OFF) or Locked Status (Locked ON or Locked OFF). The user can also scroll forward or backwards to select a specific AC Distribution Power Unit (Example AC Panel #3). See AC Power Distribution Unit section for additional information.

DC Power Distribution Unit

The DC Distribution Power Unit screen shows the DC Breaker Label and the current state of the DC Breakers. State of the breaker options include: ON, OFF, Trip, Local Override, ECB Error, or Locked Status (Locked ON or Locked OFF). See DC Power Distribution Unit section for additional information.

Network Power Supply

The NPS screen shows Status of the input power, Source of power (AC, DC1 DC2), CAN A and CAN B status, CAN A and CAN B Voltage and Current readings, and the internal box temperature. See Network Power Supply section for additional information.

The indicated temperature will turn red when the measured temperature inside the NPS goes above 50˚C (122˚F). In most cases a reported temperature of up to 55˚C is normal. If the reported temperature goes above 55˚C for a sustained period of time, service may be required.

Battery Monitor

The Battery Monitor screen shows the status (voltage, current, temperature & state of charge) of the battery banks being monitored. Specific configuration and installation of the battery monitor is defined by the boat builder. See Battery Monitor section for additional information.
AC Power Monitor

The AC Power Monitor page shows the status (voltage, current and frequency) of all AC line inputs. Specific configuration and installation of AC monitors are defined by the boat builder. See AC Power Monitor section for additional information.

**NOTE**

The indicated temperature will turn red when the measured temperature inside the AC Monitor goes above 60°C (140°F) for a sustained period of time indicating service may be required.

System Interface Unit Monitor (SIU)

The SIU screen shows the 34 Discrete I/O indicators that are being monitored by the SIU. These indicators cannot be acknowledged by the user; up to Qty. 10 also appear on the bottom of most pages. See System Interface Unit Monitor section for additional information.

**NOTE**

These pages can vary between installations, as format is determined and/or customizable by the boat builder or owner. The screenshots shown are standard layout pages.

Breaker Configuration:

AC and DC circuit breaker settings can be changed directly from the Touch Screen Display(s). This can be done by pressing the “Config” button on the display and then pressing the button for the circuit breaker to be configured.

AC Breaker Configuration

The configurable parameters are divided into Basic and Advanced levels. Each of these levels can be password protected with passwords created in the ONC application. The following section illustrates the parameters of each level, brief descriptions, and their valid ranges.

**NOTE**

Configuration of an AC circuit breaker can be enabled or disabled by ONC or by adjusting the parameter in the Advanced Configuration section. If configuration is disabled the parameter will be displayed, but adjustment will not be allowed. To re-enable configuration, adjust the Configuration Allowed parameter in the Advanced Configuration section.

AC Breaker Configuration: Basic Level Parameters

**Default State**

This parameter defines the state in which a circuit breaker should be set to upon power up. Available options OFF, ON, or LAST KNOWN STATE.

**Default Lock State**

This parameter specifies whether a circuit breaker should be locked or unlocked upon power up. Available options UNLOCKED, LOCKED.
AC Breaker Configuration: Advanced Level Parameters

User Configuration Allowed
This parameter specifies whether circuit breaker parameters can be configured from the flat panel configuration interface. Available options NO, YES. ONC has full configuration capability whether this parameter is enabled or disabled.

ECB (DC Breaker) Configuration

The configurable parameters are divided into Basic and Advanced levels. Each of these levels can be password protected with passwords created in the ONC application. The following section illustrates the parameters of each level, brief descriptions, and their valid ranges.

User Configuration Allowed

This parameter specifies whether circuit breaker parameters can be configured from the flat panel configuration interface. Available options NO, YES. ONC has full configuration capability whether this parameter is enabled or disabled.

NOTE
Configuration of an ECB can be enabled or disabled by ONC or by adjusting the parameter in the Advanced Configuration section. If configuration is disabled the parameter will be displayed, but adjustment will not be allowed. To re-enable configuration, adjust the Configuration Allowed parameter in the Advanced Configuration section.

ECB Configuration: Basic Level Parameters

Default State
This parameter defines the state in which an ECB should be set to upon power up. Available options OFF, ON, or LAST KNOWN STATE.

Default Lock State
This parameter specifies whether an ECB should be locked or unlocked upon power up. Available options UNLOCKED, LOCKED.

Current Rating
This parameter defines the maximum current rating for an ECB. Exceeding this current will initiate a trip. Available options ECBs 1-8: 0-30 Amps; ECBs 9-16: 0-15 Amps.

NOTE
Setting Current Rating to 0 Amps will cause an immediate trip if the ECB when turned ON.

Default Dim Value
This parameter specifies the Dim value that an ECB should use upon power up. Available options 25-100%.

NOTE
This Dim value will only be applied if Dimming is enabled for the ECB (see Advanced Configuration Parameters on the next page).
ECB Configuration: Advanced Level Parameters

Factory Max Current Rating
This parameter specifies the maximum value that the Current Rating (Basic Level parameter) can be set to. This value should be determined by the maximum nominal current for the wire gauge of the circuit and the load requirements.
Available options ECBs 1-8: 0-30 Amps; ECBs 9-16: 0-15 Amps.

Trip Delay
This parameter specifies the delay, in milliseconds, between detection of an over current condition and the tripping of the ECB. Available options 0-750 milliseconds in 50 millisecond intervals.

In-Rush Delay
This parameter specifies the delay, in milliseconds, between an ECB turning ON and the activation of the over current detection logic. This allows for a brief period of current in-rush, preventing the circuit from inadvertently tripping when energized. Available options 0-1500 milliseconds in 100 millisecond intervals.

Dimming Enabled
This parameter specifies whether dim values other than 100% can be applied to an ECB.
Available options NO, YES.

User Configuration Allowed
This parameter specifies whether ECB parameters can be configured from the flat panel configuration interface. Available options NO, YES.

Installation
The Multi-Function Display was designed to be installed in an environmentally protected, non-explosive area of the vessel. Take precautions to mount the display in an area that will be away from direct exposure to the weather and combustible fumes. Multi-Function Displays should be installed such that the removable oval shaped panel on the bottom of the unit is accessible. Access to this panel is required for configuration purposes on models that do not have a bezel accessible USB connection.

CAN Connections
Two male Micro-C connectors are provided on the back of the Multi-Function Display (MFD) for connection to the primary (J1) and secondary (J2) CAN bus via drop cables. One female Micro-C connector (J3) is provided for connection to the audible alarm and auto/remote backlight ON/OFF control. The alarm output provides 12 VDC, 50mA max.

NOTE
- ONC has full configuration capability whether the "User Configuration Allowed" parameter is enabled or disabled.
- All breaker settings (default state, trip settings, etc.) are stored within their respective breaker box. It is irrelevant which display is used to make any changes or updates to breaker settings.
- In most configurations, all spare breakers will be given a button on the display pages. If the spare is used at a later time, the text of the button can be changed, as well as the breaker settings so that the displays will reflect the use of the spares.
- It is possible for the configuration settings to be password protected. There are two levels to the configuration pages, Basic and Advanced. The passwords for these pages could be different or the same. If a password is required, the user will be prompted after pressing the "Config" and breaker buttons. The password protection is enabled and set by the boat builder and/or Carling Technologies, Inc.

Use the shortest drop length possible when connecting the Multi-Function Display to the CAN backbone. NMEA 2000 spec is maximum 6 meters for drop cables. Do not connect standard drop cables to J3. Carling Technologies recommends the use of a Piezo Buzzer for the audible alarm.
Power Connector Pin Out

<table>
<thead>
<tr>
<th>Pin for J3</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1...</td>
<td>12V (normally open)</td>
</tr>
<tr>
<td>2...</td>
<td>GND (normally open)</td>
</tr>
<tr>
<td>3...</td>
<td>External Reset</td>
</tr>
<tr>
<td>4...</td>
<td>Back Light Switch</td>
</tr>
<tr>
<td>5...</td>
<td>Common</td>
</tr>
</tbody>
</table>

NOTE

RECOMMENDED: Mallory Sonalert
www.mallory-sonalert.com
Part #: SC628EJR

Operation

Function

The display is used for control and monitoring of the OctoPlex system and its components. It provides an interface for controlling the state of AC and DC breakers and displaying their status, along with features for monitoring System Input Unit (SIU) signals, Battery Monitor data, and AC Power Monitor data and status. Additional controls are provided to gain access to configuration pages for: Switch/Breaker (Lockout, Status, Groups), ECD Diming (DC Only), Touchscreen Dimming, Display Power Save/Backlight Off, Alarm, Clean Screen.

Standard Pages

Standard display pages are accessed from the HOME Page. The HOME Page is defined as the page that is initially displayed when the system is powered-up.

Home Page

On the HOME page of the display is a banner, which indicates the status of the system. Typically found across the bottom of the page the following are messages that may appear in this area:

System Normal
No alerts or tripped breakers.

Breaker Tripped
Circuit breaker tripped - a path of red should lead to the page with the tripped breaker. The Touch Screen may be configured such that when the “Breaker Tripped” message is touched the display will take the user directly to the breaker that has tripped.

Battery Alert
The battery monitor is indicating an abnormal voltage or temperature.

NOTE

The configuration of the Home Page and Sub-pages can vary between installations as the format is determined by the boat builder and selected OctoPlex Options.

Basic Touchscreen Navigation

The display interface is designed to be user intuitive and easy to navigate. Hot buttons are clearly marked to provide the user required control & status. Switches and breakers are defined with rounded sides and traditional breaker graphics with pre-defined color schemes.
### Switch / Breaker Button Indicators

OctoPlex Switch/Breaker Buttons are displayed as indicators with a pre-defined color scheme. Touching a Breaker button will change the state of the load.

<table>
<thead>
<tr>
<th>Color Code Guide</th>
<th>Breaker Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOAD A</strong></td>
<td>ECB Not Active; Unavailable</td>
<td>This is an ECB that is currently not active. The distribution panel is most likely not receiving any DC power or the distribution panel's main breaker is in the OFF position (DC Only).</td>
</tr>
<tr>
<td><strong>LOAD B</strong></td>
<td>ECB Active; OFF</td>
<td>This is an ECB that is active, but currently in the OFF position. Pressing the button will turn the ECB ON (DC Only).</td>
</tr>
<tr>
<td><strong>LOAD C</strong></td>
<td>ECB Active; ON</td>
<td>This is an ECB which is active and currently in the ON position. Pressing the button will turn the ECB OFF (DC Only).</td>
</tr>
<tr>
<td><strong>LOAD D</strong></td>
<td>ECB Active; TRIPPED</td>
<td>This is an ECB which is active and currently in the ON position. The blue text indicates that the breaker is turned ON but there is little or no current being drawn (DC Only).</td>
</tr>
<tr>
<td><strong>LOAD E</strong></td>
<td>ECB Active; Locked OFF</td>
<td>This is an ECB that is active, but has been tripped by an over-current situation. Pressing the button will bring will reset the breaker, and then turn the breaker back ON with an additional press (DC Only).</td>
</tr>
<tr>
<td><strong>LOAD F</strong></td>
<td>ECB Active; Locked ON</td>
<td>This is an ECB that is active, but has been tripped by an over-current situation. Pressing the button will bring will reset the breaker, and then turn the breaker back ON with an additional press (DC Only).</td>
</tr>
<tr>
<td><strong>LOAD G</strong></td>
<td>ECB Active; Group OFF</td>
<td>This is an ECB that is in an Error State. Use the Config function for the button to gain access to the breaker status page which will indicate the actual error reason (DC Only).</td>
</tr>
<tr>
<td><strong>LOAD 1</strong></td>
<td>AC Breaker, Not Active</td>
<td>This is an AC Breaker which is currently not active. The distribution panel is most likely not receiving any AC power or the distribution panel's main breaker is in the OFF position.</td>
</tr>
<tr>
<td><strong>LOAD 2</strong></td>
<td>AC Breaker, Active, OFF</td>
<td>This is an AC Breaker which is active, but currently in the OFF position. Pressing the button will turn the breaker ON.</td>
</tr>
<tr>
<td><strong>LOAD 3</strong></td>
<td>AC Breaker, Active, ON</td>
<td>This is an AC Breaker which is active and currently in the ON position. Pressing the button will turn the AC Breaker OFF.</td>
</tr>
<tr>
<td><strong>LOAD 4</strong></td>
<td>AC Breaker, Active, Tripped</td>
<td>This is an AC Breaker which is active, but has been tripped by an over-current situation. Pressing the button will reset the AC Breaker, which can then be turned back ON with an additional press.</td>
</tr>
<tr>
<td><strong>LOAD 5</strong></td>
<td>Active; Locked OFF</td>
<td>This is an AC or DC breaker (ECB) that has been locked in the OFF position. The 'unlock' button can be used to unlock this breaker.</td>
</tr>
<tr>
<td><strong>LOAD 6</strong></td>
<td>Active; Locked ON</td>
<td>This is an AC or DC breaker (ECB) that has been locked in the ON position. The 'unlock' button can be used to unlock this breaker.</td>
</tr>
</tbody>
</table>
**Status Indicators**

Status Indicators are indicators that appear on the bottom of the screen or on selected pages. These are NOT buttons that the user can acknowledge; they are status indications from the System Interface Unit Monitor (SIU) that are transmitted on the OctoPlex® system.

<table>
<thead>
<tr>
<th>Status Indicator</th>
<th>Breaker Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Inactive Indicator" /></td>
<td>Inactive</td>
<td>This is a system status indication that is currently inactive.</td>
</tr>
<tr>
<td><img src="image" alt="Active; OFF Indicator" /></td>
<td>Active; OFF</td>
<td>This is a system status indication that is currently active, but is not ON or in an alert condition.</td>
</tr>
<tr>
<td><img src="image" alt="Active; ON Indicator" /></td>
<td>Active; ON</td>
<td>This is a system status indication that is currently active, and is ON.</td>
</tr>
<tr>
<td><img src="image" alt="Active; ALERT Indicator" /></td>
<td>Active; ALERT</td>
<td>This is a system status indication that is currently active, and is in an alert condition.</td>
</tr>
</tbody>
</table>

The display on the right is commonly found at the bottom of each page in the Touchscreen. In this situation, STATUS 1 is inactive, STATUS 2 is active but ‘off’, STATUS 3 is active and ‘on’. All others are active and ‘off’.

**General Button Indicators**

<table>
<thead>
<tr>
<th>Color Code Guide</th>
<th>Breaker Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="LOCK" /></td>
<td>Lock</td>
<td>This button is used to lock breakers in either the ON or OFF position. Press once to put the display in &quot;LOCK&quot; mode, then press any breakers to be locked. Press again to place the display back into a normal mode of operation. Locked breakers will have a yellow border.</td>
</tr>
<tr>
<td><img src="image" alt="UNLOCK" /></td>
<td>Unlock</td>
<td>This button is used to unlock breakers. Press once to put the display in &quot;UNLOCK&quot; mode, then press any breakers to be unlocked. Press again to place the display back into a normal mode of operation. Locked breakers will have a yellow border.</td>
</tr>
<tr>
<td><img src="image" alt="DIM" /></td>
<td>Dim</td>
<td>This button is used to dim DC breakers from the Touchscreen (if enabled). Press the DIM button, then press the breaker to be dimmed. A '+' and '-' button will be displayed allowing the breaker to be dimmed up or down.</td>
</tr>
<tr>
<td><img src="image" alt="CONFIG" /></td>
<td>Configuration</td>
<td>This button allows a user to view and/or change (if enabled) the settings of an AC or DC breaker. Pressing the button, and then pressing a breaker button will display the breakers settings. A password may be required.</td>
</tr>
<tr>
<td><img src="image" alt="CLEAN" /></td>
<td>ECB Active; Locked OFF</td>
<td>Pressing this button will cause the Touchscreen to ignore “touches” for approximately 10 sec to allow the screen to be cleaned without inadvertently turning breakers OFF or ON.</td>
</tr>
<tr>
<td><img src="image" alt="DIAG" /></td>
<td>ECB Active; Locked ON</td>
<td>Pressing this button will select a page which provides diagnostic tools for basic troubleshooting of the network.</td>
</tr>
<tr>
<td><img src="image" alt="TOGGLE BACKLIGHT" /></td>
<td>ECB Active; Group OFF</td>
<td>Pressing this button will turn the backlight OFF in the Touchscreen. Touching any part of the screen will turn the backlight ON.</td>
</tr>
<tr>
<td><img src="image" alt="SCREEN DIM" /></td>
<td>AC Breaker, Not Active</td>
<td>Pressing this button will decrease the brightness of the screen for night time viewing</td>
</tr>
<tr>
<td><img src="image" alt="SCREEN BRIGHT" /></td>
<td>AC Breaker, Active, OFF</td>
<td>Pressing this button will increase the brightness of the screen for day time viewing.</td>
</tr>
</tbody>
</table>
Diagnostics

Preconfigured systems ship with a button typically labeled “System Diagnostics”, which will launch the System Diagnostics page when touched. This System Diagnostics page contains six buttons for individual system diagnostics.

Accessible areas within the System Diagnostics menu include:

- Network Diagnostics
- Touch Screen Diagnostics
- Run Time Setup
- Software Info
- Password Management

Network Diagnostics

This diagnostic feature will list all devices that the flat panel has established communications with. The following information is supplied for each such device:

- Device Serial Number
- Primary Bus Address
- Secondary Bus Address
- Type of Device
- Device Manufacturer

The Primary and Secondary Bus Addresses will contain one of the following values:

- **Uninitialized**: communication has not been established with the respective device on the particular bus.
- **Inactive**: communication was established with the respective device on the particular bus, but communications have since ceased.
- **Active**: communication has been established and is currently active

The active Bus is identified by an “**” character. It is not unusual for different devices to be active on different Busses.

Pressing **SYSTEM REFRESH** will request information from every device on the network causing very high network bandwidth utilization for a short period of time. You may need to press REFRESH, several times after a **SYSTEM REFRESH** request to get all entries to display due to network traffic and device response times.
Multi-Function Display (A1415-[ ]-CE) - Operation

Touch Screen Diagnostics
The Touch Screen Diagnostics page provides a way to measure the response accuracy of the touch screen. A small circle labeled with screen coordinates will be drawn wherever a touch is reported.

Run-Time Stats
This diagnostics provides information about the current performance of the Touch Screen Display, including:

- **Run-Time** – elapsed time since boot in Days::Hours::Minutes::Seconds format. This data will rollover after 49 days of run time.
- **Memory Load** – percentage of available memory currently allocated by the Touch Screen Display operating system and application. This value will typically be within a range of 15% to 25% depending on the size of the network and its configuration.

Values higher than 30% may indicate a potential issue with memory utilization.

System Alerts
This diagnostic will list the 50 most recent system alert events, including breaker trips, battery tolerance alarms, etc. Each alert supplies a brief description of the alarm and a time-stamp.

Comm Timeouts are a diagnostic alert, and do not necessarily indicate an issue.

The time-stamp is generated based on the time elapsed from the last touch screen power-up.
Multi-Function Display (A1415-[ ]-CE) - Operation

Software Information
This diagnostic screen will display the following information:

- Touch Screen Display application software version
- ONC file version number
- Screen coordinates (width & height) in pixels

Password Management
This screen will allow you to edit the Basic and Advanced passwords on a Touch Screen Display. You will need to supply the current password (if any) in order to complete the changes.

If required, and a password has already been issued, please contact the boat manufacturer for assistance.

Vessel Status / Monitoring
When a System Interface Unit Monitor (SIU) is included in the installation, indicators may be incorporated into the touch screen configuration to display status of the inputs being monitored. Generally, a red indicator will indicate an “off” or “inactive” state and green will indicate an “on” or “active” state.

This page can vary between installations, as format is determined and/or customizable by the boat builder or owner.

Bilge Monitoring / Control
This page displays the current status of the bilge as well as control of the bilge pumps. Typical layouts include indications, which will show if a bilge pump is running, a float switch is receiving power or whether a high water alarm is being activated.

Builders may choose to control the bilge pumps outside of the OctoPlex system. In this case, the monitoring functions could still exist if connected to the System Interface Unit, but the control functions would not be included within this page.
Multi-Function Display (A1415-[ ]-CE) - Operation

**Tank Level Monitoring**

When Tank Level Adapters/Monitors are included in the installation this page will show their status/levels.

The OctoPlex system has the capability to only display the data which is transmitted from the installers NMEA2000 certified tank level adapter. Please consult either the boat manufacturer or component manufacturer should any issues present themselves with regards to tank level monitoring.

**DC Circuit Breaker Dimming**

The Touch Screen Display provides a mechanism for adjusting the Dim value of an ECB, if enabled. In order to gain access to Dimming commands, the page containing the target ECBs control button must contain an OctoPlex Option Bar with the “Dim” option enabled. If so, the option bar will contain a “Dim” button.

Pressing the “Dim” button will activate Dim Mode. Pressing an ECB will select it as the target for the Dim operation. If dimming is enabled for the target ECB, the button’s text will change to the ECB’s current Dim value. In addition, the current Dim value will appear within the OctoPlex Option Bar, flanked by “-“ and “+” buttons. Pressing these increment and decrement buttons will adjust the Dim value accordingly. The button’s text will change in response to any dimming modifications made. Once completed, press the Dim button again to exit Dim Mode. The button text will revert to its original text and all button presses will execute their normal functionality (circuit breaker toggling, etc.).

**ECB Error (DC Only)**

An ECB has detected an error condition. Detailed status may be viewed by using the option bar “Config” button on the page that the ECB reporting the error is on. Selecting the Breaker Status option will provide you with the current ECB status.

The table below describes the status reported on the breaker status page.

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tripped</td>
<td>The ECB has tripped from an circuit overload</td>
</tr>
<tr>
<td>Open Load</td>
<td>The ECB is on but the circuit is not drawing current</td>
</tr>
<tr>
<td>Short Load</td>
<td>The ECB tripped based on a detected short circuit</td>
</tr>
<tr>
<td>Fuse Blown</td>
<td>The ECB slot fuse has opened</td>
</tr>
<tr>
<td>Fuse Failed</td>
<td>Fuse failed to open</td>
</tr>
<tr>
<td>Access Error</td>
<td>Internal ECB address error</td>
</tr>
<tr>
<td>Communication Error</td>
<td>ECB has lost communication with the DC processor</td>
</tr>
<tr>
<td>Abnormal High</td>
<td>ECB is OFF but voltage is present at the output</td>
</tr>
<tr>
<td>Abnormal Low</td>
<td>Reserved for future use.</td>
</tr>
<tr>
<td>Disable</td>
<td>Internal ECB A/D Error</td>
</tr>
</tbody>
</table>

Once the cause for the ECB error has been ascertained, you may need to cycle the main breaker in the DC box that has the ECB error, or cycle the DC bus power to clear the condition. Refer to the DC Box ECB diagnostic section for troubleshooting ECB error messages and possible corrective actions.
Display Dimming

The brightness of the display can be adjusted using these buttons typically found on the main page.

Alarm

There are two types of alarms available:
- Global: Alarm condition is detected and sounded on all Touch Screens on the network.
- Local: Alarm is detected and sounded only on the Touch Screen and page where a specific condition/activity has been activated. Example: Custom Fuel Transfer page.

The alarm can be set to respond to the following conditions:
- Tripped breaker
- Battery values out of tolerance
- Reversed AC polarity
- Configured SIU inputs

When a Global alarm has been activated, touching any button on any page/screen on any Touch Screen will turn it off throughout the system. A Local alarm can only be silenced by touching a reset button on the page/screen that alarm function is configured for.

Clean

This button, if included, will provide a period of time where the Touch Screen is inactive so that it can be cleaned without turning breakers off or on.

Display Menu/Button Configuration

If any button is pressed and held (for approximately 3 seconds) a page with the current button title/text will appear. This allows the user to change the text of any button. This is generally used when a spare location is utilized or load wiring is changed. Button text changes are automatically propagated to other Touch Screens on the network.

A button on a page cannot be moved to another page via the Touch Screen interface. Buttons can only be moved between pages with the ONC utility and requires an octoplexdata.dat file update.
## Maintenance

The Multi-Function Display requires no maintenance. If the touch screen requires cleaning, use a soft damp cloth and wipe the display gently while utilizing the Clean Button under the Commands & Settings menu. Do not rub aggressively as this may scratch the touch screen area. Any service or repair issues should be handled by a factory authorized technician.

> **CAUTION!**

Do not spray any cleaning solvents directly onto the display area.

---

## General Specifications

### Electrical

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Voltage</td>
<td>9-16 Volts DC, 15 VDC nominal</td>
</tr>
<tr>
<td>Load Equivalence Number</td>
<td>14</td>
</tr>
</tbody>
</table>

### Mechanical

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>7.75” x 7.75” x 2.83” (196.85 x 196.85 x 71.88 mm)</td>
</tr>
<tr>
<td>CAN Bus connectors</td>
<td>Two (2) Micro-C Male</td>
</tr>
<tr>
<td>J3 Alarm Output Connection</td>
<td>Micro-C Female</td>
</tr>
<tr>
<td>Mounting</td>
<td>4 x #6 -32 Pan Head Screws</td>
</tr>
</tbody>
</table>

### Environmental

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-10°C to +60°C</td>
</tr>
<tr>
<td>Weight</td>
<td>3 lbs (1.6 kg)</td>
</tr>
</tbody>
</table>

### Certifications

- Category B
- NMEA 2000
- CE
- IEC 60533 Electrical and Electronic Installations in Ships
- IEC 60945 Maritime Navigation and Radio communication Equipment and Systems
- Lloyd’s Register
  - Lloyd’s Type Approved, Test Specification #1, ENV2
  - Certificate Number: 10/00021
**Dimensional Specifications:** in. [mm]

**6.5 Inch - Multi-Function Display**

**A3415-[ ]-CE**

- **USB Access**
- **Sealed Reset**
- **Snap On Protective Cover**
- **Panel Seal Gasket**
- **Rear Mounting Bracket** (Panel Thickness from .06” to 1.50”)

**Flash Card Access**

**J3 Alarm Output / Backlight Control**
Mates with MICRO-C Male Connector

**J1, J2 - CAN Interface (2x)**
Mates with MICRO-C Female Connector

**Panel Cutout**

- 7.16”
- 5.40”

**Dimensions:**

- 7.75” in. (19.70 mm)
- 5.75” in. (14.60 mm)
- 2.83” in. (71.00 mm)
- 2.10” in. (53.00 mm)
- 1.75” in. (44.50 mm)
- 6.0” min. clearance, (Cable Bend Radius)

4x #6 - 32 Pan Head Mounting Hardware. Length determined by panel thickness.
The AC Power Distribution units provide the boat builder with up to 8 or 16 remotely controlled hydraulic-magnetic circuit breakers in one package that can be mounted virtually anywhere in the vessel. AC Circuit breakers are available from 1 to 100 amps and are remotely controlled via external solenoids. Each breaker can also be manually actuated. The AC units utilize a 16 bit microprocessor that controls the on/off function of each circuit breaker and provides interfacing to a dual CAN bus network. The AC unit enclosures are made from white, high strength, injection molded plastic that will provide years of protection in any environment.

### Configuration

Configuration of an OctoPlex® AC Unit and its associated functions can be performed running ONC on a computer with a CAN interface or a capably configure MFD. Configuration from within ONC provides access to all configurable aspects of an AC Box. Consult the ONC User’s Guide for complete details on adjusting configurable parameters. The Flat Panel’s interface to AC Box configuration is a limited subset of parameters to provide on-the-fly adjustments. AC box configuration settings are initially loaded and controlled with the ONC utility and contained in Box Configuration Files (BCF). The following parameters may be modified directly from the MFD:

### ONC Analyzer Configuration Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default State</td>
<td>ON, OFF, Last State</td>
<td>Circuit breaker state on network power up</td>
</tr>
<tr>
<td>Default Lock State</td>
<td>ON or OFF</td>
<td>Lock state on network power up</td>
</tr>
<tr>
<td>Default to Last State</td>
<td>ON or OFF</td>
<td>Last known state on network power up</td>
</tr>
<tr>
<td>Configuration Allowed</td>
<td>YES or NO</td>
<td>Allow user to modify Circuit Breaker via Multi-Function Display</td>
</tr>
<tr>
<td>Alarm on Trip</td>
<td>YES or NO</td>
<td>Audible alarm when breaker trips</td>
</tr>
</tbody>
</table>

*Manufacturer reserves the right to change product specification without prior notice. Please refer to our website for the latest details.

### Product Highlights (8 & 16 Position Unit):

- 100 Amps Maximum Capacity
- Remote Actuation of Breakers
- Dual CAN BUS Communication
- Three Phase Power Capability

---

When “Default to Last State” is set to “ON,” it overrides the “Default State” setting.
AC Power Distribution Unit (A2000) - Configuration

Part Numbers

<table>
<thead>
<tr>
<th>Part Number 1</th>
<th>Description</th>
<th>Number of Positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2000-X-1-CE</td>
<td>AC Power Distribution Unit - 120V (1 Buss Bar)</td>
<td>X</td>
</tr>
<tr>
<td>A2000-X-3-CE</td>
<td>AC Power Distribution Unit - 120/208V (3 Buss Bars)</td>
<td>X</td>
</tr>
<tr>
<td>A2000-X-4-CE</td>
<td>AC Power Distribution Unit - 240V Single Pole</td>
<td>X</td>
</tr>
<tr>
<td>A2000-X-5-CE</td>
<td>AC Power Distribution Unit - 240V Double Pole</td>
<td>X</td>
</tr>
</tbody>
</table>

Notes:
1. "X" designates the number of breaker positions available for that voltage configuration; see Number of Positions Column

Breaker Slot / Offset Load Circuit Relationship

The number of available circuit breakers in an AC Distribution Unit for loads will vary depending on the AC input power type 120V or 230V (Euro Single Phase), 240V or three Phase.

Single Pole breakers: 120V and 230V Euro loads require a single breaker slot.
Double Pole breakers: 240V loads requires two physical breaker slots.
Three Pole breakers: 120/208V loads requires three physical breaker slots.

The AC Distribution Unit may contain different combinations of breaker; therefore, the total number of supported load circuits in a given unit will vary depending on the load type mix;

<table>
<thead>
<tr>
<th>AC Unit Type</th>
<th>120V / 230V Single Pole</th>
<th>240 Double Pole</th>
<th>3-Phase Three Pole 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Position</td>
<td>8</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>16 Position</td>
<td>16</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>

Notes:
1. Three (3) Phase breakers start with position 5, allowing for a total of 15 physical slots

The Panel Breaker numbers, as identified on the panel cover, start with one at the top. The main breaker (when used) will occupy slots one through three depending on the main breaker configuration, single, double or triple pole.

<table>
<thead>
<tr>
<th>AC Breaker Type</th>
<th>Main Breaker Slots Used</th>
<th>Load Breaker Slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Pole</td>
<td>1</td>
<td>Begins with Slot 4</td>
</tr>
<tr>
<td>Double Pole</td>
<td>2</td>
<td>Begins with Slot 4</td>
</tr>
<tr>
<td>Three Pole</td>
<td>3</td>
<td>Begins with Slot 5</td>
</tr>
</tbody>
</table>

The highest AC Breaker Rating (amps) should be installed in lowest breaker position (i.e. Position 1, 2, etc.) to ensure proper load distribution. For example: Breaker Positions 1-2 has 100A breaker installed; breaker position 4 has 70A breaker installed; etc.
Breaker Control by Discrete I/O Function

Analog input signals to the System Interface Unit Monitor (SIU) can trigger a Discrete I/O function in the AC processor, which can be used to control the behavior of a Circuit Breaker. Sixteen Discrete I/O’s per AC Unit can be programmed. One Discrete I/O can control multiple breakers up to the unit limit. Discrete I/O functions are configured using ONC.

<table>
<thead>
<tr>
<th>Discrete I/O</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn On</td>
<td>Turn AC Breaker ON</td>
</tr>
<tr>
<td>Turn Off</td>
<td>Turn AC Breaker OFF</td>
</tr>
<tr>
<td>Off &amp; Lock</td>
<td>Turn AC Breaker OFF and Lock in OFF position</td>
</tr>
</tbody>
</table>

AC Breaker Assignment Considerations

Installations that include remote control of breakers via N2kView must be aware of the relationship and offsets between the N2kView Configuration and the OctoPlex AC breaker position.

<table>
<thead>
<tr>
<th>Panel Breaker #</th>
<th>N2kView Switch</th>
<th>ONC 1ØBox</th>
<th>ONC 3ØBox</th>
<th>Line 1ØBox</th>
<th>Line 3ØBox</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>A</td>
<td>A</td>
<td>Main 3Ø - 1 Ø or Double Pole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>B</td>
<td>B</td>
<td>Main 3Ø - 1 Ø if Double Pole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>NU</td>
<td>B</td>
<td>Main 3Ø - NU-1Ø SP and DP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Load 2 -1Ø Load 1-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Load 3 -1Ø Load 2-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>Load 4 -1Ø Load 3-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>5</td>
<td>B</td>
<td>Load 5 -1Ø Load 4-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>6</td>
<td>B</td>
<td>Load 6 -1Ø Load 5-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td>7</td>
<td>C</td>
<td>Load 7 -1Ø Load 6-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8</td>
<td>8</td>
<td>A</td>
<td>Load 8 -1Ø Load 7-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>9</td>
<td>9</td>
<td>B</td>
<td>Load 9 -1Ø Load 8-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>10</td>
<td>C</td>
<td>Load 10 -1Ø Load 9-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>11</td>
<td>11</td>
<td>B</td>
<td>Load 11 -1Ø Load 10-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>12</td>
<td>12</td>
<td>A</td>
<td>Load 12 -1Ø Load 11-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>13</td>
<td>13</td>
<td>B</td>
<td>Load 13 -1Ø Load 12-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>14</td>
<td>14</td>
<td>A</td>
<td>Load 14 -1Ø Load 13-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>15</td>
<td>15</td>
<td>B</td>
<td>Load 15 -1Ø Load 14-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>16</td>
<td>16</td>
<td>A</td>
<td>Load 16 -1Ø Load 15-3Ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>17</td>
<td>17</td>
<td></td>
<td>Main Breaker</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
AC Main Circuit Breaker Installed - Unit Configurations

There are three distinct AC Distribution Box configurations depending on the type of line input; each requires different hardware options depending on the input line configuration. This configuration must be determined prior to ordering the AC Boxes.

1. Single Phase (1Ø) 120 or Euro 230 VAC
2. Single/Split Phase (1Ø) 120/240 VAC
3. Three Phase (3Ø) 120/208 VAC

For 120 and Euro 230 VAC single phase configurations the Line Bus Bars (A & B) are jumpered together at the factory using a bus bar jumper.

For 120/240 VAC split phase the Line Bus Bars are not tied together at the factory, allowing two legs of 120 VAC to be brought into the box for single or double pole circuit breaker installation.

AC No Main Circuit Breaker Installed - Unit Configurations

Single Phase Dual Line 120/240VAC: Line Bus Bars 1 and 2 are not tied together at the factory, allowing two legs of 120/240VAC to be brought into the unit for single or double pole circuit breaker installation. Breaker position 1 is line 1, breaker position 2 is line 2, and then they alternate. For 120/208 VAC three phase a third Line Bus Bar (C) is added and up to 15 single pole breaker positions are available for loads.

Installation

The AC Power Distribution Unit is designed to be installed in an environmentally protected, non-explosive area of the vessel. Take precautions to mount the unit in an area that will be away from direct exposure to water, weather and combustible fumes.

Mounting

These units should be mounted in a location that is accessible for manual/override control and serviceability. These units must be mounted in vertical position only. Installations in horizontal position (flat) with breakers facing up or down can compromise the accuracy of the AC circuit breaker function.
AC Main Connections
Depending on configuration, connection points are provided for single 120VAC, Single 240VAC (Euro), dual 120/240VAC or three phase (120/208VAC) AC line inputs. Bus bars are provided for AC neutral (White or Blue) and grounding (Green or Green-Yellow) conductors. Main feed wires entering the panel are secured to prevent strain using a screw down “clamp” provided at the opening on the outside of the panel.

Lethal voltages are present inside the AC unit. Verify that all AC power is shut off or disconnected before working inside the unit. **Required Torque** for each AC breaker terminal screw is 35 inch-lbs. This torque requirement must be applied to all circuit breaker terminal screws, no exceptions. Failure to properly torque each connection may result in damage to the AC Unit or vessel.

The installer is responsible for verifying that the wire gauge used for the main power feed is appropriately sized for the loads being fed from the AC unit. The unit is designed to accept up to #1 gauge wire for the main power feed. All personnel performing installation or maintenance work on the AC Unit will need to have a calibrated torque screwdriver in order to verify proper installation of the circuit breakers and associated connections.

AC Branch Circuit Connections
Branch circuit wires enter the AC Power Distribution Unit through the openings at the bottom of the panel. Line conductors are connected to their respective circuit breaker. Neutral and grounding conductors are connected to bus bars provided. Branch wires entering the panel are secured to prevent strain using a screw down “clamp” provided inside of the panel. Circuit breakers are in sequential order from top to bottom. “Tie bars” connecting circuit breaker handles for double and triple pole breakers must be used.

CAN Connections
Two male Micro-C connectors are provided at the bottom left side of the 8 Position or at the top left side of the 13/19 Position unit for connection to the primary and secondary CAN bus via drop cables.

Use the shortest drop length possible when connecting the AC Unit to the CAN backbone. NMEA 2000 spec is maximum 6 meters for drop cables.

Operation
Depending on the AC Unit power configuration, 120VAC, Single 240VAC (Euro), dual 120/240VAC or three phase (120/208VAC), there up to three LED’s visible through the cover of the AC Power Distribution Unit. This power indication is derived from the Line input and does NOT reflect the state of the main breaker, if so equipped. As long as AC power is present, the AC Unit will be recognized by the Multi- Function Display (MFD). When AC power is not present, you will not be able to control the AC circuit breakers.
Manual Operation

All AC Circuit Breakers can be controlled directly from the AC Power Distribution Unit (bypassing control from the Multi-Function Display(s)). Follow the instructions below to manually control an AC Circuit Breaker:

**Step #1:**
Remove the cover to the AC Power Distribution Unit by unscrewing the four screws located at each corner of the unit.

**Step #2:**
Operate the toggle lever for the desired circuit breaker. Replace the cover when done.

CAUTION!
When manually controlling AC circuit breakers, any time you turn one to the "OFF" position, the system will consider this a tripped breaker and activate the audible alarm if configured to do so. The system sees this as a trip because the system did not command the breaker "OFF".

WARNING!
Lethal voltages are present inside the AC Unit. Verify that all AC power is shut off or disconnected before working inside the unit. When a circuit breaker is turned off manually, it can still be controlled via the Multi-Function Display (MFD). This could present a hazard when performing maintenance on a circuit. It is good practice to "lock" a breaker in the "OFF" position from the Multi-Function Display (MFD) when performing any required maintenance on a circuit. Refer to page 11 for Locking Function.

Maintenance

The AC Unit was designed to require minimal, if any, maintenance. The only field serviceable parts in the AC Unit are the Circuit Breakers and Solenoids.

Breaker Replacement

The AC circuit breakers are not interchangeable like the breakers in the DC Units. If an AC breaker value/rating needs to be changed, the AC Power Distribution Unit will need to be disassembled. Below are the steps required for replacing an AC breaker:

WARNING!
Lethal voltages are present inside the AC Unit. Verify that all AC power is shut off or disconnected before working inside the unit.
### AC Power Distribution Unit (A2000) - Operation

**Step #1:**
Turn off the main power feeding the AC Power Distribution Unit at the source. Turn all breakers to OFF position. Do not remove the front panel if the LED’s are lit (indicating that AC power is being provided to the panel).

**Step #2:**
All Remote Actuators (solenoids) need to be disconnected and removed by loosening the screws to the right of the circuit breaker handle, and disconnecting the wires to the left.

**Step #3:**
Turn the main AC breaker to the OFF position, if configured. With all Remote Actuators removed, the five large thumb screws can be loosened and four small Phillips head screws removed allowing the cover to be opened.

**Step #4:**
Remove each solenoid by turning the screw counter-clockwise and disconnecting the plastic connector at the end of the wire lead. Once each screw is loosened, lift the solenoid in the upright position from the screw side and pull from the box. Be careful when pulling the solenoid away as there are tabs at the back end of each, which hold it in place within the sub-panel cover.

**Step #5:**
Once the cover is removed, buses for the ground, neutral, and lines, as well as all AC breakers can be accessed.

**Step #6:**
Once any required changes are made, the AC Power Distribution Box can be reassembled by reconnecting the ground wire to the cover, replacing and securing the cover with the four screws, and re-installing all Remote Actuators (making sure that connectors line up properly with their corresponding circuit breaker) and tie bars as required.

---

**WARNING!**
Required Torque for each AC breaker terminal screw is 35 inch-lbs. This torque requirement must be applied to all circuit breaker terminal screws, no exceptions. Failure to properly torque each connection may result in damage to the AC Unit or vessel.

**CAUTION!**
All personnel performing installation or maintenance work on the AC Unit will need to have a calibrated torque screwdriver in order to verify proper installation of the circuit breakers and associated connections.
General Specifications

Electrical
Operating Voltage, Power Input
(Single Phase) 120VAC; Euro 230VAC
(Double Phase) 120/240VAC
(Three Phase) 120/208VAC
Max Current, Power Input 100 Amps
CAN Bus Operating Voltage 9 VDC – 16 VDC, 15 VDC Nominal
Load Equivalence Number 2

Environmental
Radiated, RF Field Immunity IEC-61000-4-3
Electrical Fast IEC 61000-4-4
Transient/Burst Immunity IEC 61000-4-5
Voltage Surge Immunity IEC 61000-4-6
Conducted, Immunity IEC 61000-4-11
Conducted Emissions IEC 60945
Voltage Variation Immunity IEC 61000-4-11
Conducted LF Immunity IEC 61000-4-16
ESD Immunity IEC-61000-4-2
Insulation Resistance IEC-60092-504
Operating Temperature -20°C to +55°C
Storage Temperature -20°C to +55°C
Vibration IEC-60068-2-6 Test Fc
Temperature Cycle IEC 60945
Humidity IEC-60068-2-30 Test Db
Corrosion IEC 60945

Mechanical
8 Position Dimensions 14.46” X 15.76” X 5.04”
16 Position Dimensions 20.50” X 15.76” X 5.04”
CAN Bus Connectors Two (2) Micro-C Male
8 Position Mounting 8 each
19 Position Mounting 10 each
Orientation Vertical Position (not flat)

Certifications
NMEA 2000 Category B
Lloyd’s Register Lloyd’s Type Approved, Test Specification #1, Env 2
CE IEC 60533 Electrical and Electronic Installations in Ships
IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems

Weight with breakers A2000-08-[ ]-CE: 16.5 lbs. (7.5 kg)
A2000-16-[ ]-CE: 20 lbs. (9.1 kg)
**Dimensional Specifications:** in. [mm]

8 Circuit DC Power Distribution Unit

*A2000-08-[]-CE*

- **Power Input:**
  - 15.22” Square
  - 10.95”

- **Load Wire Exit Locations**
  - 4.85”
  - 5.04” MAX.

- **J1 CAN Bus A**
  - (MICRO-C Male)
  - 5.48”
  - 13.46”

- **J2 CAN Bus B**
  - (MICRO-C Male)
  - 14.00”
  - 14.46”

- **CAN Interface**
  - 7.75”
  - 11.50”

- **Dimensions:**
  - 1.50”
  - 15.76”
  - 14.00”
  - 15.00”

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Dimensional Specifications: in. [mm]

13 Circuit DC Power Distribution Unit
A2000-16-[]-CE

J1 CAN Bus A (MICRO-C Male)
J2 CAN Bus B (MICRO-C Male)
The eight and sixteen DC Power Distribution units are multiprocessor based design rated for up to 100 Amps max. The Electronic Circuit Breakers (ECBs) can be configured to provide protection for DC loads up to 30 Amps.

These units contain two host processors for communicating with ECBs and also CAN networks.

**Product Highlights (8 Position Unit):**
- Eight ECB's rated at up to 30 Amps
- Dual CAN BUS Communication

**Product Highlights (16 Position Unit):**
- Eight ECB's rated at up to 30 Amps
- Eight ECB's rated at up to 15 Amps
- Dual CAN BUS Communication

**Configuration**

Configuration of an OctoPlex DC Box and its associated ECBs can be performed either from ONC or from a capably configured flat panel. Configuration from within ONC provides access to all configurable aspects of a DC Box and its' ECBs. Consult the ONC User's Guide for complete details on adjusting configurable parameters. The Touch Screen's interface to DC Box configuration is a limited subset of parameters to provide on-the-fly adjustments of the most used configuration settings. DC box configuration settings are initially loaded with the ONC utility.

The following ECB parameters may be modified directly from the Touch Screen Display's ECB configuration page.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default State</td>
<td>ON or OFF</td>
<td>ECB state on device up</td>
</tr>
<tr>
<td>Default Lock State</td>
<td>ON or OFF</td>
<td>Lock state on device power up</td>
</tr>
<tr>
<td>Current Setting</td>
<td>0 - 15/30A</td>
<td>ECB selected load rating</td>
</tr>
<tr>
<td>Default Dim %</td>
<td>0 - 100%</td>
<td>% of DIM on power up</td>
</tr>
</tbody>
</table>

The following ECB parameters may be modified directly from the Touch Screen Display's ECB advanced configuration page.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Delay</td>
<td>0 - 750ms</td>
<td>Trip delay</td>
</tr>
<tr>
<td>Inrush Delay</td>
<td>0 - 1500ms</td>
<td>Inrush delay</td>
</tr>
<tr>
<td>Factory Current Rating</td>
<td>0 - 15/30A</td>
<td>Max allowed ECB setting</td>
</tr>
<tr>
<td>Dimming Allowed</td>
<td>YES or NO</td>
<td>Enable / Disable</td>
</tr>
<tr>
<td>Configuration Allowed</td>
<td>YES or NO</td>
<td>Configuration via touchscreen</td>
</tr>
</tbody>
</table>

*NOTE

The Factory Current Rating is the maximum allowed ECB trip setting as determined by the boat builder and/or installation (ie, load requirements / wire gauge)

*Manufacturer reserves the right to change product specification without prior notice. Please refer to our website for the latest details.*
Default (Power Up) Behavior:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default State</td>
<td>ON or OFF</td>
<td>ECB state on device up</td>
</tr>
<tr>
<td>Default Lock State</td>
<td>ON or OFF</td>
<td>Lock state on device power up</td>
</tr>
<tr>
<td>Current Setting</td>
<td>0 - 15/30A</td>
<td>ECB selected load rating</td>
</tr>
<tr>
<td>Default Dim %</td>
<td>0 - 100%</td>
<td>% of DIM on power up</td>
</tr>
<tr>
<td>Time Delay</td>
<td>0 - 750ms</td>
<td>Trip delay</td>
</tr>
<tr>
<td>Inrush Delay</td>
<td>0 - 1500ms</td>
<td>Inrush delay</td>
</tr>
<tr>
<td>Factory Current Rating</td>
<td>0 - 15/30A</td>
<td>Max allowed ECB setting</td>
</tr>
<tr>
<td>Dimming Allowed</td>
<td>YES or NO</td>
<td>Enable / Disable</td>
</tr>
<tr>
<td>Configuration Allowed</td>
<td>YES or NO</td>
<td>Configuration via Multi-Function Display</td>
</tr>
</tbody>
</table>

The Factory Current Rating is the maximum allowed ECB trip setting as determined by the boat builder and/or installation (example: load requirements / wire gauge)

CAUTION!

Inrush & Trip Delays
Inrush Delays are commonly used for devices with high inrush loads during startup such as pumps. The configured setting (in milliseconds) is the time period that the load current is allowed to exceed the programmed current limit. Inrush Delay is typically used with loads that are powered ON/OFF via the ECB.

Trip Delay is associated with loads that are powered ON/OFF via a mechanical switch inline after the ECB (ECB is always ON and supplies power to the switch). The configured setting (in milliseconds) is the time period that the load current is allowed to exceed the programmed current limit.

Automatic ECB Control by Flash Function
The Flash Function allows control of an ECB to be periodic. Common uses of this function include controlling a Fog Horn, automatically turning off a Head Fan or light after a set period of time, etc. Three parameters dictate the behavior of the circuit and are set via the ONC utility and maintained in the BCF file. A maximum of 15 flash table entries may be defined.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash On Time</td>
<td>Duration of time the circuit is ON</td>
</tr>
<tr>
<td>Flash Off Time</td>
<td>Duration of time the circuit is OFF</td>
</tr>
<tr>
<td>Number of Cycles</td>
<td>Number of times to repeat the cycle 0 - 255, 0 = forever</td>
</tr>
</tbody>
</table>
**Automatic ECB Control by Discrete I/O Function**

When a System Interface Unit Monitor (SIU) is part of the installation, input signals to the SIU, it can be configured to control the behavior of the ECB’s. 16 Discrete I/O’s per DC Unit (both 8 and 16 positions) can be programmed. One Discrete I/O can control multiple ECB’s up to the unit limit. The Discrete I/O state is maintained independent of any ECB state. Therefore, if an ECB is being controlled from multiple input signals (DIO’s) an “out of state” situation is possible when input signals are switched. Example: two wall switches are controlling the same light (ECB) depending on the state of the signal a second touch of the switch may be required to obtain the desired action.

<table>
<thead>
<tr>
<th>Discrete I/O</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always Turn On</td>
<td>Turn ECB on</td>
</tr>
<tr>
<td>Always Turn Off</td>
<td>Turn ECB off</td>
</tr>
<tr>
<td>Toggle ON/OFF</td>
<td>Toggle ECB state</td>
</tr>
<tr>
<td>Brighten</td>
<td>Increase light intensity (voltage increases in 5% increments per button actuation)</td>
</tr>
<tr>
<td>DIM</td>
<td>Decrease light intensity (voltage decreases in 5% increments per button actuation)</td>
</tr>
<tr>
<td>Flash</td>
<td>Refers button actuation to specific flash table assigned to that button</td>
</tr>
<tr>
<td>Unlock</td>
<td>Unlocks ECB (state does not change)</td>
</tr>
<tr>
<td>One Button Smooth High-to-Low</td>
<td>Single press changes ECB state. Press and hold wall switch to turn ON; hold for High to Low voltage decrease (5% increments). Continuing to hold will reset to 100% intensity and repeat.</td>
</tr>
<tr>
<td>One Button Smooth Low-to-High</td>
<td>Single press changes ECB state. Press and hold wall switch to turn ON; hold for Low to High voltage increase (5% increments). Continuing to hold will reset to 5% intensity and repeat.</td>
</tr>
<tr>
<td>Smooth Scroll</td>
<td>Momentary touch turns ECB ON only; continuing to hold scrolls UP and DOWN (last known state is retained).</td>
</tr>
<tr>
<td>One Button Smooth Scroll</td>
<td>Momentary touch changes ECB state; continuing to hold scrolls UP and DOWN (last known state is retained).</td>
</tr>
<tr>
<td>Discrete Momentary</td>
<td>Turn ECB ON as long as signal is present (Momentary ON/OFF Button only)</td>
</tr>
</tbody>
</table>

A DC Electronic Circuit Breaker (ECB – 16) provides power to an incandescent lamp. The lamp is controlled via a momentary wall switch tied to an SIU input. The system is configured to allow this particular SIU input to send a message to the ECB for on/off and dim.

1. The wall switch is pressed for On/Off or pressed and held for On/Dim.
2. The SIU input receives a ground signal when the wall switch is depressed.
3. The SIU converts the analog ground signal to an NMEA 2000 PGN message which is broadcast over the network.
4. A DC Unit configured to listen for the SIU Output Pin message receives the PGN and triggers a configured internal Discrete I/O (DIO) function to control the ECB/Circuit.
5. Multi-Function Display receives the ECB status change and updates the breaker button accordingly.
6. Pulse Width Modulation (Dimming Function) can also be used to control fan speeds and multi speed devices.

**LED Configuration & Control**

LED lighting control (On/Off/Dimming) is supported by both the OctoPlex Multi-Function Display and/or analog switches when properly wired and interfaced to a configured OctoPlex SIU.

---

**CAUTION!**

The ECB being used as a dimming module will provide an active high output at full battery voltage to the LED control module. Verify that the LED control module can accept this type of input prior to use. When an ECB is configured to provide a PWM output (dimming) the PWM frequency is 100Hz.
Installation
The DC Power Distribution Unit is designed to be installed in an environmentally protected, non-explosive area of the vessel. Take precautions to mount the unit in an area that will be away from direct exposure to water, weather and combustible fumes.

Mounting
These units should be mounted in a location that is accessible for manual/override control and serviceability.

Power Input Connections
Input studs are provided for DC positive feed and negative return wires. A DC negative bus bar is provided for negative branch circuit wires. The negative bus bar is connected to the DC negative return stud.

When tightening power lug use wrench to secure backing nut and torque main nut to 105 in/lbs.

<table>
<thead>
<tr>
<th>Wire Gauge</th>
<th>Contact Type</th>
<th>Deutsch Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 to 18</td>
<td>Stamped/formed</td>
<td>1060-16-0122</td>
</tr>
<tr>
<td>12 to 14</td>
<td>Solid</td>
<td>0460-204-12141</td>
</tr>
<tr>
<td>12 to 14</td>
<td>Stamped/formed</td>
<td>1060-12-0166</td>
</tr>
<tr>
<td>10</td>
<td>Stamped/formed</td>
<td>1060-12-0222</td>
</tr>
</tbody>
</table>

Power Output Connections
The mating connectors required to interface the loads to the DC Unit are: Deutsch HDP26-18-8PN. Two connectors are required for 16 position panels. One connector is required for 8 position Unit. Connectors can accommodate 10 to 16 AWG wire depending on the terminal selected.

<table>
<thead>
<tr>
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<th>Deutsch Part Number</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>10</td>
<td>Stamped/formed</td>
<td>1060-12-0222</td>
</tr>
</tbody>
</table>

The recommended crimp tool for the solid contact is HDT-48-00. Refer to www.laddinc.com/product/?sku=HDT-48-00 for proper use and instructions on using this tool. The recommended crimp tool for the stamped contacts is, Deutsch DTT-12-00. Refer to www.laddinc.com/product/?sku=DTT-12-00 for proper use and instruction on using this tool.

Depending on the contact type selected, any gauge wire from 10 to 16 can be used to connect the loads to the DC Unit. Verify that the wire gauge, as well as, the ECB setting selected is appropriate for the load including a safety factor.
DC Power Distribution Unit (A1650 & A1655) - Installation, Operation

Power Connector Pin Out

<table>
<thead>
<tr>
<th>Deutsch HDP26-18-8PN</th>
<th>8-Position Panel</th>
<th>16-Position Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1-G</td>
<td>Breaker 1</td>
<td>J2-F</td>
</tr>
<tr>
<td>J1-F</td>
<td>Breaker 2</td>
<td>J2-A</td>
</tr>
<tr>
<td>J1-A</td>
<td>Breaker 3</td>
<td>J2-E</td>
</tr>
<tr>
<td>J1-E</td>
<td>Breaker 4</td>
<td>J2-D</td>
</tr>
<tr>
<td>J1-D</td>
<td>Breaker 5</td>
<td>J2-C</td>
</tr>
<tr>
<td>J1-C</td>
<td>Breaker 6</td>
<td>J2-B</td>
</tr>
<tr>
<td>J1-B</td>
<td>Breaker 7</td>
<td>J2-H</td>
</tr>
<tr>
<td>J1-H</td>
<td>Breaker 8</td>
<td>J2-G</td>
</tr>
</tbody>
</table>

* Please note the difference between J1 & J2 connections

WARNING!

Back feeding power into the DC Unit through the power output connectors can occur if external power is applied to an output load pin. This condition will be flagged as an ECB Abnormal High error and must be corrected. In this situation power will be live in the Unit even if the main breaker inside the unit is turned OFF. Once the cause for the back feed is resolved, the DC Unit will need to be reset to allow the affected ECB to come back on line.

CAN Connections

Two male Micro-C connectors are provided on the front of the DC Power Distribution Unit for connection to the primary and secondary CAN bus via drop cables.

NOTE

Use the shortest drop length possible when connecting the DC Unit to the CAN backbone. NMEA 2000 spec is maximum 6 meters for drop cables.

Operation

There are three LED’s visible through the cover of the DC Power Distribution Unit. The left and right LED’s indicate that DC power is available on the primary and secondary CAN network. The middle LED indicates that the unit is receiving main external DC power. If the DC Power Distribution unit is not receiving power, the Touch Screen Display(s) will not be able to control the ECB’s.

ECB Operation

Each ECB inside of the DC Power Distribution unit has two LED’s, one red and one green. The status of each ECB can be determined by which LED is illuminated or blinking as indicated below:

<table>
<thead>
<tr>
<th>LED Indications</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steady Green</td>
<td>ECB is On with a load</td>
</tr>
<tr>
<td>Blinking Green</td>
<td>ECB is On with no load</td>
</tr>
<tr>
<td>Steady Red</td>
<td>ECB is tripped</td>
</tr>
<tr>
<td>Blinking Red</td>
<td>ECB detected error</td>
</tr>
<tr>
<td>Steady Red, Steady Green</td>
<td>ECB error Refer to ECB Status Below</td>
</tr>
<tr>
<td>No Lights</td>
<td>ECB is Off</td>
</tr>
</tbody>
</table>

Any other indication represents a faulty condition, requiring the ECB to be replaced.
ECB Status

ECB Status can be viewed on the Multi-Function Display via Breaker Status Hot Button. The following table provides a list of status messages reported by each ECB.

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tripped</td>
<td>The ECB has tripped from an circuit overload</td>
</tr>
<tr>
<td>Open Load</td>
<td>The ECB is on but the circuit is not drawing current</td>
</tr>
<tr>
<td>Short Load</td>
<td>The ECB tripped based on a detected short circuit</td>
</tr>
<tr>
<td>Fuse Blown</td>
<td>The ECB slot fuse has opened</td>
</tr>
<tr>
<td>Fuse Failed</td>
<td>Fuse failed to open</td>
</tr>
<tr>
<td>Access Error</td>
<td>Internal ECB address error</td>
</tr>
<tr>
<td>Communication Error</td>
<td>ECB has lost communication with the DC processor</td>
</tr>
<tr>
<td>Abnormal High</td>
<td>ECB is OFF but voltage is present at the output</td>
</tr>
<tr>
<td>Abnormal Low</td>
<td>Reserved for future use.</td>
</tr>
<tr>
<td>Disable</td>
<td>Internal ECB A/D Error</td>
</tr>
<tr>
<td>ECB Model</td>
<td>Current ECB hardware configuration</td>
</tr>
<tr>
<td>ECB Version</td>
<td>Current ECB software version</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detected errors require that the power to the DC Unit be cycled in order to clear the error. This can be done via the main breaker inside the DC Unit or by cycling the DC power feeding the DC Unit. A shorted load indication may result from an abnormal low voltage being fed to the DC Unit power input. Each ECB is protected by a fuse, either 15 or 30 amps, depending on the position of the ECB. 1-8 are 30A and 9-16 are 15A. See Fuse Replacement section for details. Abnormal High (back feed) occurs when the ECB is in the OFF state but detects voltage on its output. Common causes are a failed external blocking diode (bilge pump etc) or wiring issue.</td>
</tr>
</tbody>
</table>

Manual Operation / Overrides

All ECB’s can be controlled directly from the DC Power Distribution Unit (overriding/bypassing network control from the Multi-Function Display(s)). If it’s installed upright (all connectors on the bottom), the main breaker is in the lower left corner of the Unit. Follow the instructions below for using the DC Power Distribution Unit in override mode:

**NOTE**
Switch / Breaker buttons will appear as Active, with the words “Local Override”.

**Step #1:**
Remove cover to DC Power Distribution Unit.

**Step #2:**
Place the toggle switch located on the board along the left side of the panel to the up position. A Red LED will light up indicating that the panel is in local or “override” mode.
Manual Operation / Overrides (continued)

Step #3:
Individual toggles (either 8 or 16) are located in between the two rows of ECB’s. They are in sequential order with 1 being on the left and 8 or 16 being on the right. Toggles should be in the up position to turn an ECB on and down to turn an ECB off.

Step #4:
To return the DC Power Distribution Unit to its normal mode so that ECB’s can be controlled via the Multi-Function Display(s), place the toggle located on the board along the right side of the panel in the down position. The red LED will go out and a green LED will light indicating the DC Unit is now in remote mode and can be controlled by the Multi-Function Display.

Maintenance

The DC Unit was designed to require minimal maintenance. The only field serviceable parts in the DC Unit are the ECBs and the fuses. It is recommended that all connections are checked on a regular basis.

ECB Replacement

With the cover removed, the inside of the DC Power Distribution Unit can be accessed. If it’s installed upright (all connectors on the bottom), the main breaker is in the lower left corner of the unit. This traditional breaker (100A) will disconnect all power to the unit. To remove or replace an ECB follow the below instructions:

The power input stud will still have DC power.

WARNING!

Step #1:
Remove cover to DC Power Distribution Unit.

Step #2:
Turn off the Main Breaker (lower left corner of the unit) to the DC Power Distribution Unit.

Verify that the middle LED (power present) is OFF before proceeding or damage to the unit may occur.

WARNING!
ECB Replacement (continued)

Step #3:
Pull the tab away from the base of the ECB while pulling the ECB away from the board it is mounted to. The tabs securing the ECB’s are at the base of each ECB towards the outside of the unit. (On the top row of ECB’s the tab is on top, on the bottom row of ECB’s the tab is on the bottom.)

Step #4:
Install an ECB into the DC Power Distribution Unit by simply pushing the ECB into the board by lining up the pins with the connector on the ECB. A soft “click” will be heard when the ECB is properly “locked” into position.

Step #5:
Turn the main breaker to the unit back to the on position.
Re-install cover.

Fuse Replacement
With the cover removed, the inside of the DC Power Distribution Unit can be accessed. If it’s installed upright (all connectors on the bottom), the main breaker is in the lower left corner of the unit. This traditional breaker (100A) will disconnect all power to the unit. Follow instructions below for Backup Fuse Replacement.

The power input stud will still have DC power.

Step #1:
Turn off the Main Breaker (lower left corner of the unit) to the DC Power Distribution Unit.
Verify that the middle LED (power present) is OFF before proceeding or damage to the unit may occur.
Fuse Replacement (continued)

Step #2:
Loosen the thumbscrews on the small board between the two rows of ECB’s which contain the manual override toggle switches. (It may be easier to access the screws if ECB’s are removed from the unit. Follow “ECB Replacement” steps on page 25 for ECB Removal.)

Step #3:
When all of the screws are loosened, lift and pull the board away from the vertically mounted board located on the right-hand side of the unit. The board with the switches should come loose and allow access to the backup fuses.

Step #4:
In 16-position units, the left 8 ECB positions (#1-8) are protected by a 30A fuse, while the remaining 8 (#9-16) are protected by a 15A fuse. In 8-position units, all ECB’s are protected by 30A fuses. Fuses can simply be pulled out and replaced with the same type (ATO automotive fuses) and value.

Step #5:
After proper fuses are installed, replace the board with the toggles by lining up the pins on the board along the side of the unit with the connector on the vertically mounted board on the right side of the unit. After the pins are lined up and the board is inserted properly the thumbscrews can be re-tightened and the ECB’s can be replaced. Replace any ECB’s, which were removed in the process.

Step #6:
Turn the main breaker to the unit back to the ON position. The red and green LED’s should no longer be lit at the same time for the ECB position with the replaced fuse.

If the red and green LED’s continue to illuminate after replacing the backup fuse using the above procedure, the ECB is faulty and should be replaced.
## General Specifications

### Electrical
- **Power Input (DC Voltage)**: 10 VDC – 32VDC
- **Power Input (Max Current)**: 100 Amps
- **CAN Bus Output Voltage**: 9 VDC – 16 VDC, 15 VDC Nominal
- **Load Equivalence Number (LEN)**: 1

### Mechanical
- **Dimensions**: 10.81” x 12.62” x 4.93”
- **CAN Bus Connectors**: Two (2) Micro-C Male
- **CAN A Bus LED Indicator**: Green
- **CAN B Bus LED Indicator**: Green
- **MAIN Power Indicator**: Green
- **Input Power Connection**: 5/16-18” Stud
- **Main Power Return Connection**: 5/16-18” Thread
- **Load Power Return Bus Bar (Removable)**: 8 each 10-32 screws
- **Mounting**: 4 each 4x0.31 for 1/4” mounting hardware
- **Orientation**: N/A

### Certifications
- **NMEA 2000**: Category B
- **Lloyd’s Register**: Lloyd’s Type Approved, Test Specification #1, Env 2
- **CE**: IEC 60533 Electrical and Electronic Installations in Ships

### Environmental
- **Radiated, RF Field Immunity**: IEC-61000-4-3
- **Electrical Fast Transient/Burst Immunity**: IEC 61000-4-4
- **Voltage Surge Immunity**: IEC 61000-4-5
- **Conducted, Immunity**: IEC 61000-4-6
- **Conducted Emissions**: IEC 60945
- **Voltage Variation Immunity**: IEC 61000-4-11
- **Conducted LF Immunity**: IEC 61000-4-16
- **ESD Immunity**: IEC-61000-4-2
- **Insulation Resistance**: IEC-60092-504
- **Operating Temperature**: -40°C to +55°C
- **Storage Temperature**: -40°C to +55°C
- **Vibration**: IEC-60068-2-6 Test Fc
- **Temperature Cycle**: IEC 60945
- **Humidity**: IEC-60068-2-30 Test Db
- **Corrosion**: IEC 60945
- **Weight with breakers**: A1650: 5.5 lbs. (2.49 kg)  
  A1655: 8.25 lbs. (3.74 kg)
**Dimensional Specifications:** in. [mm]

**8 Circuit DC Power Distribution Unit**  
**A1650**

- **Status Indicators**
- **Main Power Return**  
  5/16-18 Thread
- **Load Power Return**  
  Bus Bar (Removable)
- **4x #10-32 Screws**
- **8 Loads**  
  Up to 30A Max
- **CAN BUS A**  
  (micro-c male)
- **CAN BUS B**  
  (micro-c male)
- **Main DC Power Input**  
  5/16-18 Stud

**Dimensions:**
- 9.50 [241.30]
- 8.75 [222.25]
- 7.75 [196.85]
- 4.93 [241.30]
- 4.40 [241.30]
- 0.38 [9.65]
- 9.44 [239.77]
- 7.50 [190.50]
- 11.00 [279.4]
**Dimensional Specifications:** in. [mm]

16 Circuit DC Power Distribution Unit

**A1655**

- **CAN BUS B** (micro-c male)
- **CAN BUS A** (micro-c male)
- **Main DC Power Input**
  - 5/16-18 Stud
- **Status Indicators**
- **Load Power Return**
  - Bus Bar (Removable)
  - 5/16-18 Thread
- **Main Power Return**
  - 5/16-18 Thread
- **8x #10-32 Screws**
- **8 Loads**
  - Up to 30A Max Each
  - Up to 15A Max Each

**Dimensions:**

- 12.63 [320.80]
- 11.88 [301.75]
- 10.90 [276.86]
- 4.93 [241.30]
- 4.40 [241.30]
- 9.44 [239.77]
- 7.50 [190.50]
- 11.00 [279.4]
The Network Power Supply (NPS) provides regulated +15 VDC to the OctoPlex dual CAN network system. The power supply utilizes one AC and two DC power inputs for redundancy.

Product Highlights:
- 120 VAC Input Power (Carling P/N A2205-1-CE)
- 230VAC Input Power (Carling P/N A2205-2-CE)
- +24V DC Input Power
- Dual CAN Bus Connection/Communications
- 7.5 amp Thermal breakers for each 15 volt output
- Network Health LED Status Indicators

### Table 1:

<table>
<thead>
<tr>
<th>LED Indicator</th>
<th>Color</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAN Bus A</td>
<td>Green</td>
<td>CAN Bus On</td>
</tr>
<tr>
<td></td>
<td>No Indication</td>
<td>CAN Bus Off</td>
</tr>
<tr>
<td>Service</td>
<td>Red</td>
<td>Needs Service</td>
</tr>
<tr>
<td></td>
<td>No Indication</td>
<td>Normal Operation</td>
</tr>
<tr>
<td>CAN Bus B</td>
<td>Green</td>
<td>CAN Bus On</td>
</tr>
<tr>
<td></td>
<td>No Indication</td>
<td>CAN Bus Off</td>
</tr>
</tbody>
</table>

**Installation**

The Network Power Supply should be installed in a location that allows access to the thermal circuit breakers installed on the connector side of the unit. At least one (1) power input (AC or DC) must be present for the NPS to operate. Depending on network complexity, one (1) or more Network Power Supplies can be installed. See Diagrams for Typical Single or Multiple NPS installations.

---

This is the only OctoPlex® component, which uses Mini/Thick cable and Mini-C connectors (other components use Micro-C connectors). The drops used for this component should have a Male Mini-C connection on both ends.

*Manufacturer reserves the right to change product specification without prior notice. Please refer to our website for the latest details.*
The required number of Network Power Supplies will be determined by the length of the backbone and the sum of the devices powered on the network. If multiple power sources are required, V+ (NET-S) must be broken (on both Buses) between the sources. The SHIELD (drain) must be connected at only ONE power supply.
### Pin Out Connections

<table>
<thead>
<tr>
<th>Connector</th>
<th>Pin</th>
<th>Connection</th>
<th>View</th>
<th>Mating Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1 / J2</td>
<td>1</td>
<td>Shield</td>
<td><img src="#" alt="Diagram" /></td>
<td>Device Net Mini-C Male</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Power Output</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Power Return</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>CAN HI</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>CAN LOW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J3</td>
<td>1</td>
<td>AC Neutral</td>
<td><img src="#" alt="Diagram" /></td>
<td>DT06-4S</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>AC Ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>AC Ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>AC Line</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J4 / J5</td>
<td>1</td>
<td>DC Power Input</td>
<td><img src="#" alt="Diagram" /></td>
<td>DT06-2S</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>DC Power Return</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Two female Mini-C connectors are provided for connection to the primary and secondary CAN Bus via drop cables.

### Maintenance

The Network Power Supply requires no maintenance. Any service or repair issues should be handled by a factory authorized technician.

### General Specifications

#### Electrical

- **AC Voltage Input**
  - A2205-1-CE: 90-126VAC; 56Hz - 63Hz
  - A2205-2: 220-264VAC; 47Hz-53Hz

- **AC Input Current (Max)**
  - 2 Amps

- **DC Voltage Input**
  - 18VDC – 36VDC

- **DC Input Current (Max)**
  - 6 Amps

- **CAN Bus Output Voltage**
  - +15 VDC (± 0.5)

#### Mechanical

- **Dimensions**
  - 7.80” X 8.84” X 3.85”

- **CAN Bus Connectors**
  - Two (2) Mini Female

- **AC Power Input Connector**
  - Deutsch P/N DT06-4S

- **DC Power Input Connector**
  - Two (2) Deutsch P/N DT06-2S

- **Mounting**
  - 4 each 4 x 0.16 #6 hardware

- **Orientation**
  - N/A

#### Certifications

- **NMEA 2000**
- **Lloyd’s Register**
  - Category B
  - Lloyd’s Type Approved, Test Specification #1, Env 2
- **CE**

- **IEC 60533** Electrical and Electronic Installations in Ships
- **IEC 60945** Maritime Navigation and Radio Communication Equipment and Systems

#### Environmental

- **Radiated, RF Field Immunity**
  - IEC-61000-4-3

- **Electrical Fast Transient/Burst Immunity**
  - IEC 61000-4-4

- **Voltage Surge Immunity**
  - IEC 61000-4-5

- **Conducted, Immunity**
  - IEC 61000-4-6

- **Conducted Emissions**
  - IEC 60945

- **Voltage Variation Immunity**
  - IEC 61000-4-11

- **Conducted LF Immunity**
  - IEC 61000-4-16

- **ESD Immunity**
  - IEC-61000-4-2

- **Insulation Resistance**
  - IEC-60092-504

- **Operating Temperature**
  - -40°C to +70°C

- **Storage Temperature**
  - -40°C to +85°C

- **Vibration**
  - IEC-60068-2-6 Test Fc

- **Temperature Cycle**
  - IEC 60945

- **Humidity**
  - IEC-60068-2-30 Test Db

- **Corrosion**
  - IEC 60945

- **Weight**
  - 6.0 lbs (2.72 kg) Max
**Dimensional Specifications: in. [mm]**

**Network Power Supply**

*A2205-[-] CE*

- **Power Label**
  - 8.84 [224.53]
  - 8.00 [203.20]
- **Identification Plate**
  - 7.80 [198.12]
  - 6.10 [154.94]
- **0.16 Wide Slot for #6 Screw**
- **7 1/2 A Circuit Breaker**

- **NETWORK POWER SUPPLY**
  - Width: 3.85 [97.79]
The Battery Monitor is capable of measuring one (1) Current, two (2) DC Voltages, and up to four (4) individual battery temperatures. The Battery Monitor Cable Harness (P/N A2225-[]), see Table 1 and 2) enables the monitor to connect to the batteries. The Battery Shunt 200 Amp, 50mV (P/N MS91587-2), is needed to measure the current that is installed on the high side of the installation. The Battery Monitor is NMEA 2000® certified, allowing the user to view all DC information over an NMEA 2000 network.

**Product Highlights:**
- Capable of Monitoring the following:
  - Current Measurement
  - Two (2) DC Voltage Measurements
  - Four (4) Temperature Measurements
- Configurable Alerts/Alarms
- Single CAN BUS Communication

**Installation**

The Battery Monitor was designed to be installed in a protected, non-explosive area of the vessel. Take precautions to install the Battery Monitor in an area that will be away from direct exposure to the weather and combustible fumes.

**CAN Connections**

One male Micro-C connectors is provided on the top of the Battery Monitor for connection to the primary CAN bus via drop cable.

*Manufacturer reserves the right to change product specification without prior notice. Please refer to our website for the latest details.*
Typical Installation Diagram

When no High Side Shunt is used, tie the orange, green and blue wires directly to the V1+ side of the battery.

Installer must follow applicable industry standards i.e. ABYC/CE for properly wiring and utilizing external protective devices i.e. fuses as required.

NOTE

Mount Temperature Sensors (Part of A2225-[]) to Battery stud or adhere directly to battery

CAUTION!

When no High Side Shunt is used, tie the orange, green and blue wires directly to the V1+ side of the battery. Installer must follow applicable industry standards i.e. ABYC/CE for properly wiring and utilizing external protective devices i.e. fuses as required.

Battery Monitor Harness Cable

Table 1:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2225-4</td>
<td>Battery Monitor Cable Harness - 4’</td>
</tr>
<tr>
<td>A2225-6</td>
<td>Battery Monitor Cable Harness - 6’</td>
</tr>
<tr>
<td>A2225-8</td>
<td>Battery Monitor Cable Harness - 8’</td>
</tr>
<tr>
<td>A2225-14</td>
<td>Battery Monitor Cable Harness - 14’</td>
</tr>
<tr>
<td>A2225-16</td>
<td>Battery Monitor Cable Harness - 16’</td>
</tr>
<tr>
<td>MS91587-2</td>
<td>Battery Shunt 200Amp, 50mV</td>
</tr>
</tbody>
</table>

Table 2:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Connection</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Temperature Sensor 1 Signal</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Shunt High</td>
<td>Orange</td>
</tr>
<tr>
<td>3</td>
<td>Temperature Sensor 2 Signal</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Temperature Sensor 1 Ground</td>
<td>Black</td>
</tr>
<tr>
<td>5</td>
<td>Ground</td>
<td>Black</td>
</tr>
<tr>
<td>6</td>
<td>Shunt Low</td>
<td>Green</td>
</tr>
<tr>
<td>7</td>
<td>Temperature Sensor 3 Signal</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Temperature Sensor 3 Ground</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Temperature Sensor 2 Ground</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Battery V2+ 12-30VDC</td>
<td>Red</td>
</tr>
<tr>
<td>12</td>
<td>Temperature Sensor 4 Signal</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Temperature Sensor 4 Ground</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Not Used</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Not Used</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Not Unused</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Battery V1+ 12-30VDC (Must be connected to power monitor)</td>
<td>Blue</td>
</tr>
</tbody>
</table>
Operation
The Battery Monitor has one (1) configurable parameter; the maximum current value of the high side shunt being used. This parameter is a factory setting. The voltage drop across the high side shunt should not exceed 50 mV for the configured current. For example, if the maximum shunt value selected is 200 amps, then the voltage drop across the high side shunt at 200 Amps should not exceed 50 mV DC.

Maintenance
The Battery Monitor requires no maintenance. Any service or repair issues should be handled by a factory authorized technician.

General Specifications

**Electrical**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Input</td>
<td>12 VDC – 30VDC, 100 mA max (Blue Wire)</td>
</tr>
<tr>
<td>DC Voltage Input</td>
<td>12 VDC – 30VDC (Red Wire)</td>
</tr>
<tr>
<td>Shunt Voltage</td>
<td>50 mVDC (Orange/Green Wires)</td>
</tr>
<tr>
<td>CAN Bus Voltage</td>
<td>+15 VDC (± 0.5)</td>
</tr>
<tr>
<td>Load Equivalence Number</td>
<td>1</td>
</tr>
</tbody>
</table>

**Mechanical**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>5.50&quot; X 2.43&quot; X 2.43&quot;</td>
</tr>
<tr>
<td>CAN Bus Connectors</td>
<td>One (1) Micro-C Male</td>
</tr>
<tr>
<td>Mounting</td>
<td>4 each 4 x 0.16 #6 hardware</td>
</tr>
<tr>
<td>Orientation</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Certifications**

<table>
<thead>
<tr>
<th>Certification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMEA 2000</td>
<td>Category B</td>
</tr>
<tr>
<td>Lloyd’s Register</td>
<td>Lloyd’s Type Approved, Test Specification #1, Env 2</td>
</tr>
<tr>
<td>CE</td>
<td>IEC 60533 Electrical and Electronic Installations in Ships IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems</td>
</tr>
</tbody>
</table>

**Environmental**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiated, RF Field Immunity</td>
<td>IEC-61000-4-3</td>
</tr>
<tr>
<td>Electrical Fast</td>
<td>IEC 61000-4-4</td>
</tr>
<tr>
<td>Transient/Burst Immunity</td>
<td>IEC 61000-4-5</td>
</tr>
<tr>
<td>Voltage Surge Immunity</td>
<td>IEC 61000-4-5</td>
</tr>
<tr>
<td>Conducted, Immunity</td>
<td>IEC 61000-4-6</td>
</tr>
<tr>
<td>Conducted Emissions</td>
<td>IEC 60945</td>
</tr>
<tr>
<td>Voltage Variation Immunity</td>
<td>IEC 61000-4-11</td>
</tr>
<tr>
<td>Conducted LF Immunity</td>
<td>IEC 61000-4-16</td>
</tr>
<tr>
<td>ESD Immunity</td>
<td>IEC-61000-4-2</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>IEC-60092-504</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40°C to +70°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Temperature Sensor Range</td>
<td>-20°C to +70°C</td>
</tr>
<tr>
<td>Vibration</td>
<td>IEC-60068-2-6 Test Fc</td>
</tr>
<tr>
<td>Temperature Cycle</td>
<td>IEC 60945</td>
</tr>
<tr>
<td>Humidity</td>
<td>IEC-60068-2-30 Test Db</td>
</tr>
<tr>
<td>Corrosion</td>
<td>IEC 60945</td>
</tr>
<tr>
<td>Weight</td>
<td>0.75 lbs (0.34 kg) nominal</td>
</tr>
</tbody>
</table>
**Dimensional Specifications:** in [mm]

**Battery Monitor**

*A1680-CE*

![Dimensional Specifications Diagram]

- **Shunt**
  
  *Source: www.deltecco.com/MKB-DC.html*
AC POWER MONITOR
A1770-CE

The AC Monitor measures the voltage, current and frequency of up to four (4) Single phase single Line AC inputs, two (2) Single Phase Dual Line AC inputs, or one (1) Three phase Three Line AC input. The AC Monitor utilizes dual CAN connections for redundancy.

**Product Highlights:**
- Capable of Monitoring the following:
  - Four (4) Single Phase Single Line AC Input
  - Two (2) Single Phase Dual Line AC Inputs
  - One (1) Three Phase Three Line AC Input
- Dual CAN BUS Communication

**Installation**
Depending on the type and number of AC power sources being monitored, the AC Power Monitor requires from one (1) to four (4) Deutsch DT06-4S connectors (Table 1). It is also recommended that 16 AWG wire is used for the connections to the AC sources (Table 2).

<table>
<thead>
<tr>
<th>Deutsch DT06-4S Connector Pins</th>
<th>Wire Gauge</th>
<th>Contact Type</th>
<th>Deutsch Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. AC Line</td>
<td>16 to 20</td>
<td>Solid</td>
<td>0462-201-16141</td>
</tr>
<tr>
<td>2. AC Neutral</td>
<td>14 to 18</td>
<td>Stamped/Formed</td>
<td>1062-16-0122</td>
</tr>
<tr>
<td>3. AC Current Transformer Input #1</td>
<td>14 to 18</td>
<td>Stamped/Formed</td>
<td>1062-16-0144</td>
</tr>
<tr>
<td>4. AC Current Transformer Input #2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Manufacturer reserves the right to change product specification without prior notice. Please refer to our website for the latest details.*
AC Power Monitor Installation #1
Single 120 VAC/230 VAC (Euro)

AC Power Monitor Installation #2
Dual 120/240VAC
AC Power Monitor Installation #3
Three Phase VAC (120/208VAC)

CAN Connections
Two male Micro-C connectors are provided the right side of the AC Monitor for connection to the primary and secondary CAN bus via drop cables.

Operation
There are three (3) LED’s that are visible through the cover of the AC Power Monitor. The left and right LED's indicate that there is a primary and secondary network connection. The center LED displays the AC Input Power Status (i.e. whether the AC Power monitor is receiving power from the input connectors). The Multi-Function Display shows the AC voltage (RMS), current and frequency of up to four (4) line inputs; if one or more inputs are not used, that value shall be displayed as zero. The internal temperature of the unit is also displayed.

NOTE
Use the shortest drop length possible when connecting the AC Monitor to the CAN backbone. NMEA 2000 spec is maximum 6 meters for drop cables.
## Maintenance

The AC Monitor requires no maintenance. Any service or repair issues should be handled by a factory authorized technician.

### General Specifications

#### Electrical

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC Voltage Input</td>
<td>90VAC – 264VAC</td>
</tr>
<tr>
<td>Operating Frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>CAN Bus Voltage</td>
<td>+15 VDC (± 0.5)</td>
</tr>
<tr>
<td>Load Equivalence Number</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Mechanical

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>7.52” X 8.51” X 2.67”</td>
</tr>
<tr>
<td>CAN Bus Connectors</td>
<td>Two (2) Micro-C Male</td>
</tr>
<tr>
<td>Mounting</td>
<td>4 each 4 x 0.16 #6 hardware</td>
</tr>
<tr>
<td>Orientation</td>
<td>N/A</td>
</tr>
</tbody>
</table>

#### Certifications

<table>
<thead>
<tr>
<th>Certification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMEA 2000</td>
<td>Category B</td>
</tr>
<tr>
<td>Lloyd’s Register</td>
<td>Lloyd’s Type Approved, Test Specification #1, Env 2</td>
</tr>
<tr>
<td>CE</td>
<td>IEC 60533 Electrical and Electronic Installations in Ships</td>
</tr>
<tr>
<td></td>
<td>IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems</td>
</tr>
</tbody>
</table>

#### Environmental

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiated, RF Field Immunity</td>
<td>IEC-61000-4-3</td>
</tr>
<tr>
<td>Electrical Fast</td>
<td>IEC 61000-4-4</td>
</tr>
<tr>
<td>Transient/Burst Immunity</td>
<td></td>
</tr>
<tr>
<td>Voltage Surge Immunity</td>
<td>IEC 61000-4-5</td>
</tr>
<tr>
<td>Conducted, Immunity</td>
<td>IEC 61000-4-6</td>
</tr>
<tr>
<td>Conducted Emissions</td>
<td>IEC 60945</td>
</tr>
<tr>
<td>Voltage Variation Immunity</td>
<td>IEC 61000-4-11</td>
</tr>
<tr>
<td>Conducted LF Immunity</td>
<td>IEC 61000-4-16</td>
</tr>
<tr>
<td>ESD Immunity</td>
<td>IEC-61000-4-2</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>IEC-60092-504</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40°C to +70°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Vibration</td>
<td>IEC-60068-2-6 Test Fc</td>
</tr>
<tr>
<td>Temperature Cycle</td>
<td>IEC 60945</td>
</tr>
<tr>
<td>Humidity</td>
<td>IEC-60068-2-30 Test Db</td>
</tr>
<tr>
<td>Corrosion</td>
<td>IEC 60945</td>
</tr>
<tr>
<td>Weight</td>
<td>3.6 lbs (1.64 kg) nominal</td>
</tr>
</tbody>
</table>
**Dimensional Specifications: in. [mm]**

**AC Power Monitor**
**A1770-CE**

For complete detail, please visit the following link: [www.crmagnetics.com/Assets/ProductPDFs/CR8400%20Series.pdf](http://www.crmagnetics.com/Assets/ProductPDFs/CR8400%20Series.pdf)
The System Interface Unit Monitor (SIU) allows the user to interface with up to 34 digital signals (DC discrete inputs) to the OctoPlex® system for status and monitoring purposes. The SIU can be configured to perform Discrete I/O Functions, in conjunction with the AC and DC Distribution units.

**Product Highlights:**
- 34 digital Signal Interface
- Discrete I/O Functions
  - Control AC Breakers
  - Control DC Breakers
  - DC Light Dimming Control
  - Time Interval On/Off
- Active high and active low states
- Can activate alarms

**Configuration**

**Signal Input**
Each SIU input signal can be configured to perform a function based on the input level. When an input goes to the “Active” state, the configured function will be performed. The table below describes the “Active” states that any SIU input can be configured for:

| Low Input   | Configured function will be Active when the input Signal is to ground (VDC –ve) |
| High Input  | Configured function will be Active when the input signal is above 8 VDC (VDC +ve) |
| Both        | Configured functions will be Active when either a high or low input is detected |

* Note: Both (either) State is the Default setting
* Note: Pins 39 & 40 can only be set to Both

*Manufacturer reserves the right to change product specification without prior notice. Please refer to our website for the latest details.*
Output Message

The SIU broadcasts a NMEA 2000 PGN to the OctoPlex network when the SIU receives a state change on a configured input. This information can be received and processed by any NMEA 2000 device designed to process the Binary Switch Bank Status PGN. All OctoPlex AC, DC and Multi-function Display devices allow processing of SIU signals through Discrete I/O handlers. Each Output Message has a “Normal State” and an “Abnormal State” associated with it. For example, an input could be set up such that the “Normal State” is low and the “Abnormal State” is high. When the input goes high, the Multi-function Display could be configured to provide an indication to the user that a change in the device state has been detected. In some configurations it is required to “Arm” the State/Alarm. For example, a pump inline Flow Sensor, with no flow (pump off) the sensor would be in the Normally Open/Abnormal State. The Alarm would only be activated if the sensor goes Open (Abnormal State), while the pump is running. In this example, the SIU is configured to Arm the Alarm with appropriate Signal State Stimulus.

<table>
<thead>
<tr>
<th>Signal State Stimulus</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>State to Active</td>
<td>Set Alarm state Off when Signal goes Active</td>
</tr>
<tr>
<td>State to Inactive</td>
<td>Set Alarm state On when Signal goes Inactive</td>
</tr>
</tbody>
</table>

Signal Examples

<table>
<thead>
<tr>
<th>Input</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Water Alarm</td>
<td>NO</td>
<td>Normal OFF, Circuit closes Abnormal ON - Alarm on State to Active</td>
</tr>
<tr>
<td>Float Switch Power</td>
<td>NC</td>
<td>Normal ON, Circuit Opens Abnormal OFF - Alarm on State to Inactive</td>
</tr>
<tr>
<td>Engine Temperature Alarm</td>
<td>NO</td>
<td>Normal OFF, Circuit Closes Abnormal ON - Alarm on State to Active</td>
</tr>
<tr>
<td>Water Flow Alarm</td>
<td>NC</td>
<td>Normal OFF (Closed when Pump On), Circuit Opens Abnormal ON - Alarm on State Inactive</td>
</tr>
<tr>
<td>Light Switch</td>
<td>NO</td>
<td>Normal Off, Circuit Closes Abnormal ON - trigger DIO for ECB control while ON maintained</td>
</tr>
<tr>
<td>Tank Empty</td>
<td>NO</td>
<td>Trigger a Discrete I/O to Turn OFF the associated pump breaker(s)</td>
</tr>
<tr>
<td>Holding Tank Full</td>
<td>NO</td>
<td>Trigger a Discrete I/O to Turn OFF head flush breaker(s)</td>
</tr>
</tbody>
</table>

Application Example:

Use of Blocking Diodes

In applications where a load, controlled by an Electronic Circuit Breaker (ECB), within a DC Power Distribution Unit, can also be turned on by a float switch or another switch outside of the OctoPlex system, a blocking diode must be placed between the ECB output and the load it is controlling. Failure to install the blocking diode will result in hardware malfunction in situations where the float switch is turning the load/pump ON while the ECB for the load is OFF (ECB error of Abnormal High/Back feed). This may be applicable for sump pumps as well.
Blocking Diodes Example:

+12/24 VDC

DC Panel/ECB

Blocking Diode required for Bilge Pumps, which can be powered by sources in addition to ECB.

+12/24 VDC

Float Switch

Ground

Float Switch Power - NC, Active High

High Water Alarm

Bilge Pump

Bilge Pump ON

CAN Bus A

CAN Bus B

Part Number | Diodes per Unit | Notes
---|---|---
A1935 | 2 | Standard Unit
A1945 | 4 | Special Order
A1940 | 10 | Special Order

**NOTE**

Blocking diodes to prevent back feed of power to the ECB are available from Carling and are rated at 15 Amps, 32 VDC.

**Installation**

The SIU is designed to be installed in a protected, non-explosive area of the vessel. Take precautions to install the SIU in an area that will be away from direct exposure to the weather and combustible fumes.

**Connections**

The terminals available for use in the Deutsch DRC16-40S connectors are:

<table>
<thead>
<tr>
<th>Wire Gauge</th>
<th>Contact Type</th>
<th>Deutsch Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 to 18</td>
<td>Solid</td>
<td>0462-201-16141</td>
</tr>
<tr>
<td>14 to 18</td>
<td>Stamped/Formed</td>
<td>1062-16-0122</td>
</tr>
<tr>
<td>14 to 18</td>
<td>Stamped/Formed</td>
<td>1062-16-0144</td>
</tr>
</tbody>
</table>

**CAUTION!**

Recommended wire gauge is 16. Limit wire length to 50 feet. Deutsch recommends a torque of 25 to 28 in/lbs be applied to the center mounting screw during assembly.
Connections (continued)

The SIU can be powered using one power input pin; the SIU allows for up to three (3) different power input pins for redundancy purposes:

<table>
<thead>
<tr>
<th>Connector Pin Number</th>
<th>+ 12 VDC (5A Fuse)</th>
<th>+ 24 VDC (5A Fuse)</th>
<th>DC Return</th>
<th>Discrete Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3</td>
<td>YES</td>
<td>YES</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>8, 9, 10</td>
<td>N/A</td>
<td>N/A</td>
<td>YES</td>
<td>N/A</td>
</tr>
<tr>
<td>4-7, 11-40</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>YES</td>
</tr>
</tbody>
</table>

CAN Connections

Two male Micro-C connectors are provided to the right side of the System Interface Unit Monitor for connection to the primary and secondary CAN bus via drop cables.

**NOTE**

Use the shortest drop length possible when connecting the System Interface Unit Monitor to the CAN backbone. NMEA 2000 spec is maximum 6 meters for drop cables.

Maintenance

The System Interface Unit Monitor was designed to require no maintenance. Any service or repair issues should be handled by a factory authorized technician.
General Specifications

**Electrical**
- Power Input: 10 VDC – 32 VDC
- Power Consumption: 100 mA Max (at 28 VDC)
- DC Signal Input: Ground; 12 VDC; 24 VDC for each input
- CAN Bus Voltage: +15 VDC (± 0.5)
- Load Equivalence Number: 1

**Environmental**
- Radiated, RF Field Immunity: IEC-61000-4-3
- Electrical Fast: IEC 61000-4-4
- Transient/Burst Immunity: IEC 61000-4-5
- Voltage Surge Immunity: IEC 61000-4-6
- Conducted, Immunity: IEC 60945
- Conducted Emissions: IEC 60945
- Voltage Variation Immunity: IEC 61000-4-11
- Conducted LF Immunity: IEC-61000-4-2
- ESD Immunity: IEC-61000-4-2
- Insulation Resistance: IEC-60092-504
- Operating Temperature: -40°C to +70°C
- Storage Temperature: -40°C to +85°C
- Vibration: IEC-60068-2-6 Test Fc
- Temperature Cycle: IEC 60945
- Humidity: IEC-60068-2-30 Test Db
- Corrosion: IEC 60945
- Weight: 1.6 lbs (0.73 kg) nominal

**Certifications**
- Category B
- Lloyd’s Type Approved, Test Specification #1, Env 2
- IEC 60533 Electrical and Electronic Installations in Ships
- IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems
- NMEA 2000
- Lloyd’s Register
- CE

**Mechanical**
- Dimensions: 5.89” X 4.74” X 2.95”
- CAN Bus Connectors: Two (2) Micro-C Male
- Mounting: 4 each 4 x 0.16 #6 hardware
- Orientation: N/A

**Dimensional Specifications:** in [mm]

*System Interface Unit Monitor (SIU)*

*A1470-CE*

<table>
<thead>
<tr>
<th>Connector, Signal / Power Input, 40 Pin, Deutsch PN DRC 10-40P</th>
<th>Mounting Surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.265 [6.731]</td>
<td>0.16 [4.06]</td>
</tr>
<tr>
<td>5.89 [149.60]</td>
<td>4.64 [117.85]</td>
</tr>
<tr>
<td>5.36 [136.14]</td>
<td></td>
</tr>
<tr>
<td>0.51 [12.95]</td>
<td>2.32 [58.92]</td>
</tr>
<tr>
<td>3.73 [94.74]</td>
<td>2.95 [74.93]</td>
</tr>
<tr>
<td>4.74 [120.39]</td>
<td></td>
</tr>
</tbody>
</table>
NMEA 2000®
NETWORK INSTALLATION GUIDE

Installing an NMEA 2000® network consists of inter-connecting NMEA 2000 electronic devices using plug-and-play cables and connectors. The following pages provide a brief description of how to setup a NMEA 2000 network using five basic steps:

1. Cable and Connector Network Basics
2. Installing Terminators
3. Supplying Power
4. Grounding the Network
5. Checking the Network

Please note that this installation guide contains a brief description of the basic concepts of installing an NMEA 2000 network and Carling Technologies suggests that you consult a trained professional for any installation. You can learn more about installing NMEA 2000 networks by contacting the National Marine Electronics Association (NMEA) at www.nmea.org and consulting the following documents:

- NMEA 2000 Standard for Serial-Data Networking of Marine Electronic Devices
- NMEA Installation Standards

Cable and Connector Network Basics

Network Topology

The NMEA 2000 cable system uses a trunk (sometimes referred to as the backbone) and drop line topology as shown in Figure 1.

The NMEA 2000 cable system includes five wires within a single waterproof cable: two signal wires, power and ground wires, and a drain wire. The drain wire shields the signal, power, and ground wires from external Radio Frequency Interference (RFI) and helps reduce RFI emission from the cable. You can connect devices using one of three cable options:

**Mini** - This is commonly used for the trunk line on the network because of its greater current carrying capacity (8 amps) as opposed to Micro cable (4 amps). Mini cable has an outside diameter in the range from 0.41 to 0.49 inches. Its maximum installed bend radius is 7x the cable diameter. You can also use this type of cable for drop lines.

**Mid** - This is commonly used for smaller networks as either the network trunk line or as drop lines. Mid cable and connectors are rated to 4 amps just like the Micro cable, however the larger diameter power conductors within the Mid cable provides for less voltage drop over Micro cable, especially for long runs. The diameter of the Mid cable is 0.33 inches.

**Micro** - This cable type is typically used as the drop line connecting devices to the main trunk line with an outside diameter in the range from 0.24 to 0.28 inches. Micro cable has a smaller diameter and is more flexible than mini cable with an installation bend radius of 7x the cable diameter. Smaller networks can use this type of cable for both the trunk and drop lines.
You construct the trunk line using double-ended cordsets connected between tees or taps. One end of the cordset has a male connector with male pins while the other end of the cordset has a female connector and female receptacles. The connectors are keyed so they can only connect to each other in one way. As an alternative to double-ended cordsets, you can make your own trunk line using bulk cable and field-attachable connectors. If you decide to add equipment later, you can simply disconnect a cordset from a tee, add another tee directly to the existing tee, re-connect the cordset and add the new component to the system using a drop cable. Alternatively, you could cut the trunk line, add two field-attachable connectors and insert a new tee. Trunk lines can also be run up to watertight bulkheads and connected to a waterproof bulkhead feed-thru connector to maintain the integrity of watertight compartments.

To drop off the trunk line, you connect a device using a tee connector. Daisy chaining of devices is not allowed, as it is a requirement to be able to remove a component from the network without affecting any other device. This allows you to remove a device for servicing while the rest of the network remains operational. Multi port units are also available where instruments tend to be clustered, around the helm for example.

**Maximum Cable Distance**

The cable distance between any two points (a point being an electronic product or terminator) must not exceed 250 meters (820 feet) for a system based on the Mini or Mid trunk cable or 100 meters (328 feet) for a system based on a Micro trunk cable.

For most cases, the maximum distance should be measured between termination resistors. However, if the distance from a trunk line tee to the farthest device connected to the trunk line is greater than the distance from the tee to the nearest terminating resistor (TR), then you MUST include the drop line length as part of the cable length in your maximum cable distance calculation. Figure 2 shows an example where both 5 meter drops must be included in the maximum cable distance since the drops are longer than the distance from the tee to termination resistor.

**Cumulative Drop Line Length**

The cumulative drop line length refers to the sum of all drop lines, Mini, Mid or Micro cable in the cabling system. This sum cannot exceed 78 meters (256 feet). Figure 3 shows an example using four drop tees and two multiport drops to attach 11 devices to the trunk line. The cumulative drop line length is 37 meters (122 feet) and no single device is more than 6 meters (20 feet) from the trunk line.
Maximum Drop Line Length
The maximum cable distance from any device on a branching drop line to the trunk line is 6 meters (20 feet).

Maximum Number of Devices
A maximum of 50 physical devices shall be connected to the network, and the disconnection of any device shall not interrupt any other device on the network.

NMEA 2000 Cable
The Mini, Mid and Micro cables contain five wires: One twisted pair (red and black) for network power, one twisted pair (blue and white) for signal and a drain wire (bare).

The following table shows the color, name, and usage for each wire contained within the cable.

<table>
<thead>
<tr>
<th>Color</th>
<th>Name</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>NET-H</td>
<td>Signal</td>
</tr>
<tr>
<td>Blue</td>
<td>NET-L</td>
<td>Signal</td>
</tr>
<tr>
<td>Bare</td>
<td>SHIELD</td>
<td>Drain</td>
</tr>
<tr>
<td>Black</td>
<td>NET-C</td>
<td>Ground</td>
</tr>
<tr>
<td>Red</td>
<td>NET-S</td>
<td>Power</td>
</tr>
</tbody>
</table>

NMEA 2000 Connectors
Connectors attach cables to devices or other components of the NMEA 2000 cable system. This allows the network to be completely “plug-and-play”. Connections can be made with pre-molded cordsets or with field-attachable connectors. The following diagram shows the pins found within Mini connector and the Micro and Mid connector and the corresponding wire colors for those pins.

Installing Terminators
Termination resistors are attached to each end of the trunk cable to reduce reflections of the communication signals on the network. If you do not use termination resistors as described, the network will not operate properly. Termination resistors are typically connected directly to the last tee on the trunk line although they can be connected to a cordset extending from the last tee on a trunk line. Inline terminators are also available and they are used to terminate the network at the last product.

Supplying Power
(OctoPlex Powered by Network Power Supply)

End-Powered Network
End-powered networks are typically seen on smaller vessels with only a few NMEA 2000 devices. Figure 4 shows an end-powered network.

Middle-Powered Network
A middle-powered network is typically found on larger vessels and is any network where the power is connected to the network at some location other than at the end. This network consists of two legs, one leg extending in each direction from the power insertion point. Figure 5 shows a middle-powered network.
Maximum Power Supply Voltage Drop

NMEA 2000 network is designed to work properly as long as there is no more than a 1.5 volt difference in the power supply voltage between any two devices on the network. Therefore, you should perform an estimate of the voltage drop across a network using the following equation:

\[
\text{Voltage Drop} = 0.1 \times \text{Network Loads} \times \text{Network Length} \times \text{Cable Resistance}/100
\]

Where: Network Loads is sum of Load Equivalent Numbers (LEN) for all devices (see device nameplate) Network Length is in meters Cable resistance is in ohms/100 meters

Power supply voltage drop estimates resulting in less than 1.5 volts across the entire network require no further analysis. Likewise, estimates ranging between 1.5 and 3.0 volts require no further analysis as long as a mid-powered network is used. Occasionally, estimated power supply voltage drops will occur outside these limits and will require further consideration through detailed calculations by certified technicians.

Checking Your Network

Verify that the network has been correctly designed and installed by reviewing the following checklist:

- Number of devices does not exceed 50
- Maximum Mini cable distance between any two devices does not exceed 200 meters (656 feet)
- Maximum Micro/Mid cable distance between any two devices does not exceed 100 meters (328 feet)
- Maximum cumulative drop line length does not exceed 78 meters (256 feet)
- No drop should be greater than 6 meters (20 feet)
- Termination resistors are installed on both ends of the trunk
- The network is grounded at a single location
- The SHIELD wire is connected to a single point, the supply ground

If you are having difficulties with the network make sure to check the following most common network problems:

- More or less than two terminating resistors
- Loose connections, make sure that all connectors are securely fastened
- Excessive trunk line length-especially with Micro cable
- Excessive drop line cable length
- Improper shield and ground connection at the power supply
- Shorts and opens in field-attachable connectors
- Failure to perform power distribution calculations for new installations and when adding new devices
- Using a typical device current rather than maximum current for power distribution calculations

In order to insure the proper installation and configuration of an NMEA 2000 network, it is a good idea to have available at least one N2KMeter. The N2KMeter* greatly simplifies network diagnostics and can detect many fault conditions including:

- Opens and shorts
- Incorrect topology
- Bad nodes & Bad termination
- Improper shield connection
- Intermittent problems
- Excessive scan rate
- Common mode voltage

Note: The NMEA 2000 Network Installation Guide is a copy-righted document from the Maretron 2010 Product Catalog and has been approved by Maretron for use in the OctoPlex Installation & Operation Guide

* See Maretron 2010 Product Catalog for N2KMeter information. www.maretron.com
The OctoPlex® System can be reset by removing power from all OctoPlex components. Tank Adapters receive their power directly from the network. These components can be reset by pulling out the breakers in the Network Power Supply to remove power from the bus. All other components receive their power from sources other than the network/bus. These components (DC Power Distribution Units, AC power Distribution Units, Battery Monitors, System Interface Unit Monitors, AC Power Monitor, Network Power Supply, Multi Function Displays) must have their power disabled by removing fuses or turning off the main breakers installed by the boat builder which supply their power.

### MULTI-FUNCTION DISPLAY

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Possible Causes</th>
<th>Tests / Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Function Display is blank</td>
<td>Multi-Function Display backlight is OFF</td>
<td>Touching any part of the display will “wake” the Multi-Function Display up.</td>
</tr>
<tr>
<td></td>
<td>No AC or DC power reaching Multi-Function Display</td>
<td>Check to see if the fuse that is installed for the AC and/or DC source of the Network Power Supply is blown. Confirm that the boat’s main breakers for AC and/or DC power are turned ON.</td>
</tr>
<tr>
<td></td>
<td>Network Power Supply thermal breakers are OFF or tripped</td>
<td>If the circuit breakers on the Network Power Supply are out then they are OFF or tripped. Push the breakers in to repower the network. If the breakers trip there is a problem which is overloading the Network Power Supply.</td>
</tr>
<tr>
<td></td>
<td>Bad drop cable</td>
<td>If the cable is confirmed to be bad, replace it. Bad cables are often a result of wire ties forcing the cables into tight bends.</td>
</tr>
<tr>
<td>Multi-Function Display operation/ refresh rate is very slow</td>
<td>Communication problem</td>
<td>Reset the system by turning off all AC and DC power to the Power Supply, SIU, Battery Monitor, and DC Units. Cycle power on Multi-Function Display.</td>
</tr>
<tr>
<td>Multi-Function Display has locked up, does not respond when “touched”</td>
<td>1. High network traffic&lt;br&gt;2. Software malfunction&lt;br&gt;3. Multi-Function Display hardware failure</td>
<td>Reboot Touch Screen via reset button, removing network power or by disconnect/reconnecting CAN cables on the back of the unit simultaneously. Determine reason for high traffic rate. Replace Multi-Function Display.</td>
</tr>
<tr>
<td>Pages on the Multi-Function Display do not show any or correct data</td>
<td>Data source device is offline or not connected. Configuration file error.</td>
<td>Check device for power at the drop and connection to the network. Correct configuration file.</td>
</tr>
<tr>
<td>Multi-Function Display is rebooting by itself</td>
<td>Multi-Function Display power is cycling</td>
<td>Check network Power Supply and AC and DC sources.</td>
</tr>
<tr>
<td>Button for circuit breaker is white with a red ring</td>
<td>ECB is in an error state. Check ECB status for cause/reason</td>
<td>Use the config control on the TS page where the button is defined to access the ECB status display for the reason description.</td>
</tr>
<tr>
<td>No Audible Alarm (this was a repeat of previous above tests/results)</td>
<td>OK as is</td>
<td>OK as is</td>
</tr>
<tr>
<td>Cannot increase current rating for ECB via Touch Screen</td>
<td>ECB locations maximum current rating has been reached</td>
<td>ECB locations 1-8 can accommodate up to 30 Amps, locations 9-16 can accommodate up to 15 Amps. It is possible that the factory maximum current rating is lower than the 30 or 15 Amp limit. If the wiring is known to be capable of accommodating a higher current load, the factory current rating can be changed by an authorized field service engineer allowing the rating for the ECB to be increased.</td>
</tr>
</tbody>
</table>

If the unit displays nothing or incorrect/invalid data, verify the instance number is correct.
# AC POWER DISTRIBUTION UNIT

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Possible Causes</th>
<th>Tests / Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Function Display indicate AC breakers are inactive</td>
<td>Main breakers in AC Unit are turned OFF</td>
<td>If the main breaker within an AC Unit is OFF, all of the branch breakers in the unit will be inactive. Once the main breaker in the unit is turned ON (either manually or via the Multi-Function Display), the branch breakers will become active and controllable.</td>
</tr>
<tr>
<td></td>
<td>Fuse on AC processor board blown</td>
<td>Fuse may require replacement.</td>
</tr>
<tr>
<td></td>
<td>Faulty processor board in AC Unit</td>
<td>Processor board may require replacement. If it is an AC problem, solenoids should be checked for shorts between leads (proper resistance is ~78 Ohms for single and ~39 for double), which could damage AC processor board.</td>
</tr>
<tr>
<td>AC Distribution Unit Load Buttons do not respond to touch</td>
<td>AC power to the distribution unit is not present.</td>
<td>Check shore and/or genset input. Power Present lights on the upper right corner of unit will be ON if power is present.</td>
</tr>
<tr>
<td></td>
<td>Solenoid not firing.</td>
<td>Measure resistance at plug ~70 Ohms. Swap Solenoids if bad</td>
</tr>
<tr>
<td></td>
<td>Breaker trip Coil.</td>
<td>Swap breaker</td>
</tr>
<tr>
<td></td>
<td>Processor board faulty.</td>
<td>Swap processor board</td>
</tr>
<tr>
<td>AC breakers do not appear to control circuits</td>
<td>Solenoid misfire / Faulty solenoid</td>
<td>It is possible that an AC breaker did not turn completely on when solenoid was activated. Attempt to turn the AC breaker on again, if AC breaker repeatedly trips or does not turn on when activated, check solenoid for problems. Wiring to solenoid could be faulty or fasteners holding solenoid in place could be faulty. Resistance between leads of solenoid should be ~78 Ohms for single, and ~39 for double solenoids.</td>
</tr>
<tr>
<td>AC breakers trip immediately when turned on regardless of load</td>
<td>Solenoid not firing completely or breaker stiff</td>
<td>Check all solenoid connectors on the AC box in question to confirm their proper location.</td>
</tr>
<tr>
<td></td>
<td>Improper Touchscreen configuration</td>
<td>Refer to ONC Operation Manual.</td>
</tr>
</tbody>
</table>

## NETWORK POWER SUPPLY

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Possible Causes</th>
<th>Tests / Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Power Supply Service Light</td>
<td>Input voltage is out of range Low or High</td>
<td>Check voltages at the input plug. Remove/replace the top Deutsch connector (AC input)</td>
</tr>
<tr>
<td></td>
<td>Internal input to output out of range</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internal failure detected.</td>
<td>Call service center.</td>
</tr>
</tbody>
</table>

**NOTE**

If the unit displays nothing or incorrect/invalid data, verify the instance number is correct.
### DC POWER DISTRIBUTION UNIT

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Possible Causes</th>
<th>Tests / Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Function Display indicate DC breakers are inactive</td>
<td>No DC power reaching DC Unit</td>
<td>If no DC power is reaching the DC Unit, the breakers can not be turned on from the Multi-Function Display and will be displayed as inactive. Check to ensure that the boat’s main DC breakers are ON. There is also a main breaker within the DC Unit, if it is OFF, all of the branch breakers in the unit will be inactive. Once the main breaker in the unit is turned ON (must be done manually), the branch breakers will become active and controllable.</td>
</tr>
<tr>
<td>Improper Multi-Function Display configuration</td>
<td></td>
<td>Refer to ONC Operation Manual.</td>
</tr>
<tr>
<td>Faulty processor board in DC Unit</td>
<td></td>
<td>Try removing ECB’s from unit and replacing with known working ECB’s to eliminate the possibility of a bad ECB causing a communication problem.</td>
</tr>
<tr>
<td>DC Breakers trip immediately when turned on regardless of load.</td>
<td>ECB current rating too low</td>
<td>Check the configuration of the ECB to confirm that the current rating is properly set. Adjust if necessary.</td>
</tr>
<tr>
<td></td>
<td>Faulty ECB Short Circuit in external wiring</td>
<td>Attempt swapping out the suspect ECB with a known good ECB. If the problem is resolved, the ECB is faulty and needs to be replaced. Remove round Deutsch plugs at bottom of box &amp; reset breaker if fault disappears check circuit for short.</td>
</tr>
<tr>
<td>DC Distribution Unit Phantom Breaker tips</td>
<td>Low input power voltage to unit &lt; 9VDC</td>
<td>Check Input voltage at power input lug to DC Unit.</td>
</tr>
<tr>
<td>DC Load Device low voltage/slow behavior</td>
<td>ECB may have dimming applied</td>
<td>Check output voltage at pin Check TS ECB button for present settings of Default Dimming value and dimming allowed.</td>
</tr>
</tbody>
</table>

### BATTERY MONITOR

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Possible Causes</th>
<th>Tests / Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery Monitor displays no data or incorrect data</td>
<td>No DC power reaching Battery monitor</td>
<td>The Battery Monitor requires DC power to operate. Check to see that battery monitor is connected/wired properly. The blue wire must be connected to 12/24VDC. The black wire must be connected to Ground</td>
</tr>
<tr>
<td></td>
<td>Bad drop cable</td>
<td>If the cable is confirmed to be bad, replace it. Bad cables are often a result of wire tires forcing the cables into tight bends.</td>
</tr>
<tr>
<td></td>
<td>Improper wiring of Battery Monitor</td>
<td>Refer to Battery Monitor setup.</td>
</tr>
</tbody>
</table>

---

**NOTE**

If the unit displays nothing or incorrect/invalid data, verify the instance number is correct.
### AC POWER MONITOR

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Possible Causes</th>
<th>Tests / Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC Monitor displays no data or incorrect data</td>
<td>No AC power reaching AC monitor</td>
<td>The AC Monitor requires an AC voltage for the line 1/J3 connector. It does not receive power from the network. Check this connector to see that an AC voltage is being supplied.</td>
</tr>
<tr>
<td></td>
<td>Bad drop cable</td>
<td>Use the suspected component with only one drop cable connected at a time. If one of the cables appears to be bad, attempt using the good cable on the other connector to confirm that the cable is the problem and not one of the component's connectors. If the cable is confirmed to be bad, replace it. Bad cables are often a result of wire tires forcing the cables into tight bends.</td>
</tr>
<tr>
<td></td>
<td>Improper wiring of AC Monitor or Current Transformers</td>
<td>Refer to Multi-Function Display setup.</td>
</tr>
</tbody>
</table>

**NOTE** If the unit displays nothing or incorrect/invalid data, verify the instance number is correct.
# NMEA 2000® Parameter Group Numbers

<table>
<thead>
<tr>
<th>PGN Type</th>
<th>PGN #</th>
<th>PGN Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol PGNs</td>
<td>059392</td>
<td>ISO Acknowledge</td>
</tr>
<tr>
<td></td>
<td>059904</td>
<td>ISO Request</td>
</tr>
<tr>
<td></td>
<td>060928</td>
<td>ISO Address Claim</td>
</tr>
<tr>
<td></td>
<td>056240</td>
<td>ISO Address Command</td>
</tr>
<tr>
<td></td>
<td>126208</td>
<td>NMEA Request/Command/Acknowledge</td>
</tr>
<tr>
<td>Response PGNs</td>
<td>126464</td>
<td>PGN List (Transmit/Receive)</td>
</tr>
<tr>
<td></td>
<td>126996</td>
<td>Product Information</td>
</tr>
<tr>
<td></td>
<td>126998</td>
<td>Configuration Information</td>
</tr>
<tr>
<td></td>
<td>127508</td>
<td>Battery Status (Battery Monitor only)*</td>
</tr>
<tr>
<td>Periodic PGNs</td>
<td>127501</td>
<td>Binary Switch Bank Status **</td>
</tr>
<tr>
<td>Proprietary PGNs</td>
<td>61184</td>
<td>Addressable Single Frame</td>
</tr>
<tr>
<td></td>
<td>65300</td>
<td>Global Single Frame</td>
</tr>
<tr>
<td></td>
<td>126720</td>
<td>Addressable Fast Packet</td>
</tr>
<tr>
<td></td>
<td>130921</td>
<td>Global Fast Packet</td>
</tr>
<tr>
<td></td>
<td>65301</td>
<td>Global Single Frame (AC Monitor only)</td>
</tr>
</tbody>
</table>

* multiple device and data instances per unit for the Battery Monitor  
** multiple device and data instances per unit for the System Interface Unit Monitor
## Switch / Breaker Button Indicators

OctoPlex Switch/Breaker Buttons are displayed as indicators with a pre-defined color scheme. Touching a Breaker button will change the state of the load.

<table>
<thead>
<tr>
<th>Color Code Guide</th>
<th>Breaker Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOAD A</td>
<td>ECB Not Active;</td>
<td>This is an ECB that is currently not active. The distribution panel is most</td>
</tr>
<tr>
<td></td>
<td>Unavailable</td>
<td>likely not receiving any DC power or the distribution panel’s main breaker is</td>
</tr>
<tr>
<td></td>
<td></td>
<td>in the OFF position (DC Only).</td>
</tr>
<tr>
<td>LOAD B</td>
<td>ECB Active; OFF</td>
<td>This is an ECB that is active, but currently in the OFF position. Pressing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the button will turn the ECB ON (DC Only).</td>
</tr>
<tr>
<td>LOAD C</td>
<td>ECB Active; ON</td>
<td>This is an ECB which is active and currently in the ON position. Pressing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the button will turn the ECB OFF (DC Only).</td>
</tr>
<tr>
<td>LOAD D</td>
<td>ECB Active; TRIPPED</td>
<td>This is an ECB which is active and currently in the ON position. The blue</td>
</tr>
<tr>
<td></td>
<td></td>
<td>text indicates that the breaker is turned ON but there is little or no current</td>
</tr>
<tr>
<td></td>
<td></td>
<td>being drawn (DC Only).</td>
</tr>
<tr>
<td>LOAD E</td>
<td>ECB Active; Locked OFF</td>
<td>This is an ECB that is active, but has been tripped by an over-current</td>
</tr>
<tr>
<td></td>
<td></td>
<td>situation. Pressing the button will bring will reset the breaker, and then</td>
</tr>
<tr>
<td></td>
<td></td>
<td>turn the breaker back ON with an additional press (DC Only).</td>
</tr>
<tr>
<td>LOAD F</td>
<td>ECB Active; Locked ON</td>
<td>This is an ECB that is active, but has been tripped by an over-current</td>
</tr>
<tr>
<td></td>
<td></td>
<td>situation. Pressing the button will bring will reset the breaker, and then</td>
</tr>
<tr>
<td></td>
<td></td>
<td>turn the breaker back ON with an additional press (DC Only).</td>
</tr>
<tr>
<td>LOAD G</td>
<td>ECB Active; Group OFF</td>
<td>This is an ECB that is in an Error State. Use the Config function for the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>button to gain access to the breaker status page which will indicate the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>actual error reason (DC Only).</td>
</tr>
<tr>
<td>LOAD 1</td>
<td>AC Breaker, Not Active</td>
<td>This is an AC Breaker which is currently not active. The distribution panel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>is most likely not receiving any AC power or the distribution panel’s main</td>
</tr>
<tr>
<td></td>
<td></td>
<td>breaker is in the OFF position.</td>
</tr>
<tr>
<td>LOAD 2</td>
<td>AC Breaker, Active, OFF</td>
<td>This is an AC Breaker which is active, but currently in the OFF position.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pressing the button will turn the breaker ON.</td>
</tr>
<tr>
<td>LOAD 3</td>
<td>AC Breaker, Active, ON</td>
<td>This is an AC Breaker which is active and currently in the ON position.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pressing the button will turn the AC Breaker OFF.</td>
</tr>
<tr>
<td>LOAD 4</td>
<td>AC Breaker, Active,</td>
<td>This is an AC Breaker which is active, but has been tripped by an over-current</td>
</tr>
<tr>
<td></td>
<td>Tripped</td>
<td>situation. Pressing the button will reset the AC Breaker, which can then be</td>
</tr>
<tr>
<td></td>
<td></td>
<td>turned back ON with an additional press.</td>
</tr>
<tr>
<td>LOAD 5</td>
<td>Active; Locked OFF</td>
<td>This is an AC or DC breaker (ECB) that has been locked in the OFF position.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The ‘unlock’ button can be used to unlock this breaker.</td>
</tr>
<tr>
<td>LOAD 6</td>
<td>Active; Locked ON</td>
<td>This is an AC or DC breaker (ECB) that has been locked in the ON position.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The ‘unlock’ button can be used to unlock this breaker.</td>
</tr>
</tbody>
</table>
Status Indicators

Status Indicators are indicators that appear on the bottom of the screen or on selected pages. These are NOT buttons that the user can acknowledge; they are status indications from the System Interface Unit Monitor (SIU) that are transmitted on the OctoPlex® system.

<table>
<thead>
<tr>
<th>Color Code Guide</th>
<th>Breaker Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Status Indicator" /></td>
<td>Inactive</td>
<td>This is a system status indication that is currently inactive.</td>
</tr>
<tr>
<td><img src="image" alt="Status Indicator" /></td>
<td>Active; OFF</td>
<td>This is a system status indication that is currently active, but is not ON or in an alert condition.</td>
</tr>
<tr>
<td><img src="image" alt="Status Indicator" /></td>
<td>Active; ON</td>
<td>This is a system status indication that is currently active, and is ON.</td>
</tr>
<tr>
<td><img src="image" alt="Status Indicator" /></td>
<td>Active; ALERT</td>
<td>This is a system status indication that is currently active, and is in an alert condition.</td>
</tr>
</tbody>
</table>

The display on the right is commonly found at the bottom of each page in the Touchscreen. In this situation, STATUS 1 is inactive, STATUS 2 is active but ‘off’, STATUS 3 is active and ‘on’. All others are active and ‘off’.

General Button Indicators

<table>
<thead>
<tr>
<th>Color Code Guide</th>
<th>Breaker Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="LOCK" /></td>
<td>Lock</td>
<td>This button is used to lock breakers in either the ON or OFF position. Press once to put the display in “LOCK” mode, then press any breakers to be locked. Press again to place the display back into a normal mode of operation. Locked breakers will have a yellow border.</td>
</tr>
<tr>
<td><img src="image" alt="UNLOCK" /></td>
<td>Unlock</td>
<td>This button is used to unlock breakers. Press once to put the display in “UNLOCK” mode, then press any breakers to be unlocked. Press again to place the display back into a normal mode of operation. Locked breakers will have a yellow border.</td>
</tr>
<tr>
<td><img src="image" alt="DIM" /></td>
<td>Dim</td>
<td>This button is used to dim DC breakers from the Touchscreen (if enabled). Press the DIM button, then press the breaker to be dimmed. A ‘+’ and ‘-’ button will be displayed allowing the breaker to be dimmed up or down.</td>
</tr>
<tr>
<td><img src="image" alt="CONFIG" /></td>
<td>Configuration</td>
<td>This button allows a user to view and/or change (if enabled) the settings of an AC or DC breaker. Pressing the button, and then pressing a breaker button will display the breaker settings. A password may be required.</td>
</tr>
<tr>
<td><img src="image" alt="CLEAN" /></td>
<td>ECB Active; Locked OFF</td>
<td>Pressing this button will cause the Touchscreen to ignore “touches” for approximately 10 sec to allow the screen to be cleaned without inadvertently turning breakers OFF or ON.</td>
</tr>
<tr>
<td><img src="image" alt="DIAG" /></td>
<td>ECB Active; Locked ON</td>
<td>Pressing this button will select a page which provides diagnostic tools for basic troubleshooting of the network.</td>
</tr>
<tr>
<td><img src="image" alt="TOGGLE BACKLIGHT" /></td>
<td>ECB Active; Group OFF</td>
<td>Pressing this button will turn the backlight OFF in the Touchscreen. Touching any part of the screen will turn the backlight ON.</td>
</tr>
<tr>
<td><img src="image" alt="SCREEN DIM" /></td>
<td>AC Breaker, Not Active</td>
<td>Pressing this button will decrease the brightness of the screen for night time viewing</td>
</tr>
<tr>
<td><img src="image" alt="SCREEN BRIGHT" /></td>
<td>AC Breaker, Active, OFF</td>
<td>Pressing this button will increase the brightness of the screen for day time viewing.</td>
</tr>
</tbody>
</table>