DC POWER DISTRIBUTION UNIT
A3650: 8 POSITION / A3655: 16 POSITION

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 Unit and its associated ECBs can be performed via G2 Analyzer configuration software. G2 Analyzer provides access to all configurable aspects of a DC Unit and its ECBs.

*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 G2 Analyzer utility. 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.

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>
<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>

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.
Power Connector Pin Out

<table>
<thead>
<tr>
<th>8-Position Panel</th>
<th>16-Position Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1-G Breaker 1</td>
<td>J2-F Breaker 9</td>
</tr>
<tr>
<td>J1-F Breaker 2</td>
<td>J2-A Breaker 10</td>
</tr>
<tr>
<td>J1-A Breaker 3</td>
<td>J2-E Breaker 11</td>
</tr>
<tr>
<td>J1-E Breaker 4</td>
<td>J2-D Breaker 12</td>
</tr>
<tr>
<td>J1-D Breaker 5</td>
<td>J2-C Breaker 13</td>
</tr>
<tr>
<td>J1-C Breaker 6</td>
<td>J2-B Breaker 14</td>
</tr>
<tr>
<td>J1-B Breaker 7</td>
<td>J2-H Breaker 15</td>
</tr>
<tr>
<td>J1-H Breaker 8</td>
<td>J2-G Breaker 16</td>
</tr>
</tbody>
</table>

* Please note the difference between J1 & J2 connections

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.

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.

NOTE

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>

CAUTION!

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.

ECB Error

In the event that a breaker indicator shows an “error” or a “tripped” condition, a more detailed description of this breaker status may be viewed as follows:

- Press the Breaker Status button in the lower right corner of the page (1). This will show a sub-page called “Switch/Breaker Status” (see screenshot).

- Press the breaker object in question (2) followed by the Get Status button (3). This will show a dialog box with a more detailed description of the breaker status, in addition to all of the available configuration parameters.

Standard DC Power Distribution Unit Screen Layouts

The DC Power Distribution Unit screen shows the DC Breaker Label and the current state of the DC Breakers. State of the breaker options include: ON, OFF, Trip, Group Control (ON or OFF), or Locked Status (Locked ON or Locked OFF). The user can also scroll forward or backwards to select a specific DC Distribution Power Unit (Example DC Panel #1).
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.

**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.

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.](image)

**WARNING!**

**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.](image)

**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.
Fuse Replacement (continued)

**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.

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**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
- **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 +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

**A3650**

- **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

- **9.50 [241.30]**
- **8.75 [222.25]**
- **7.75 [196.85]**
- **0.38 [9.65]**
- **4.40 [241.30]**
- **4.93 [241.30]**
- **4.60 [241.30]**
- **7.50 [190.50]**
- **9.44 [239.77]**
- **11.00 [279.4]**

*Images of the DC Power Distribution Unit showing various dimensions and features.*
Dimensional Specifications: in. [mm]

16 Circuit DC Power Distribution Unit
A3655

DC Power Distribution Unit (A3650 & A3655) - Dimensional Specifications

8 Loads
Up to 30A
Max Each

8 Loads
Up to 15A
Max Each

Main DC Power Input
5/16-18 Stud

Load Power Return
Bus Bar (Removable)

Main Power Return
5/16-18 Thread

4x Ø.31 for
1/4 MTG. Hardware

Status Indicators

CAN BUS A
(micro-c male)

CAN BUS B
(micro-c male)

8x #10-32 Screws

10.90 [276.86]
11.88 [301.75]
12.63 [320.80]

4.93 [241.30]
4.40 [241.30]

11.00 [279.4]
7.50 [190.50]
9.44 [239.77]

1.56