INSTRUCTION MANUAL

FOR

DGC-2020HD

DIGITAL GENSET CONTROLLER

Operation

Basler Electric®

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Preface

This instruction manual provides information about the operation of the 0BDGC-2020HD Digital Genset Controller. To accomplish this, the following information is provided:

- Controls and indicators
- Operating modes
- Metering
- Alarms
- Troubleshooting

Conventions Used in this Manual

Important safety and procedural information is emphasized and presented in this manual through Warning, Caution, and Note boxes. Each type is illustrated and defined as follows.

Warning!

Warning boxes call attention to conditions or actions that may cause personal injury or death.

Caution

Caution boxes call attention to operating conditions that may lead to equipment or property damage.

Note

Note boxes emphasize important information pertaining to Digital Genset Controller installation or operation.

DGC-2020HD Instruction Manual Catalog

Available instruction manuals for the 0BDGC-2020HD are listed in Table 1.

Table 1. Instruction Manuals

Part Number	Description
9469300993	Quick Start
9469300994	Installation
9469300995	Configuration
9469300996	Operation (this manual)
9469300997	Accessories
9469300998	Modbus® Protocol

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Warning!

READ THIS MANUAL. Read this manual before installing, operating, or maintaining the 0BDGC-2020HD. Note all warnings, cautions, and notes in this manual as well as on the product. Keep this manual with the product for reference. Only qualified personnel should install, operate, or service this system. Failure to follow warning and cautionary labels may result in personal injury or property damage. Exercise caution at all times.

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It is not the intention of this manual to cover all details and variations in equipment, nor does this manual provide data for every possible contingency regarding installation or operation. The availability and design of all features and options are subject to modification without notice. Over time, improvements and revisions may be made to this publication. Before performing any of the following procedures, contact Basler Electric for the latest revision of this manual.

The English-language version of this manual serves as the only approved manual version.

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Contents

Controls and Indicators

DGC-2020HD controls and indicators are located on the front panel and are intended for local control and monitoring of DGC-2020HD operation. Front-panel controls consist of sealed membrane pushbuttons and an optional touch screen. Front-panel indicators consist of LED indicators and a backlit LCD (liquid crystal display).

DGC-2020HD controls and indicators are illustrated in Figure 1. Lettered locators in Figure 1 correspond to the control and indicator descriptions of Table 1.

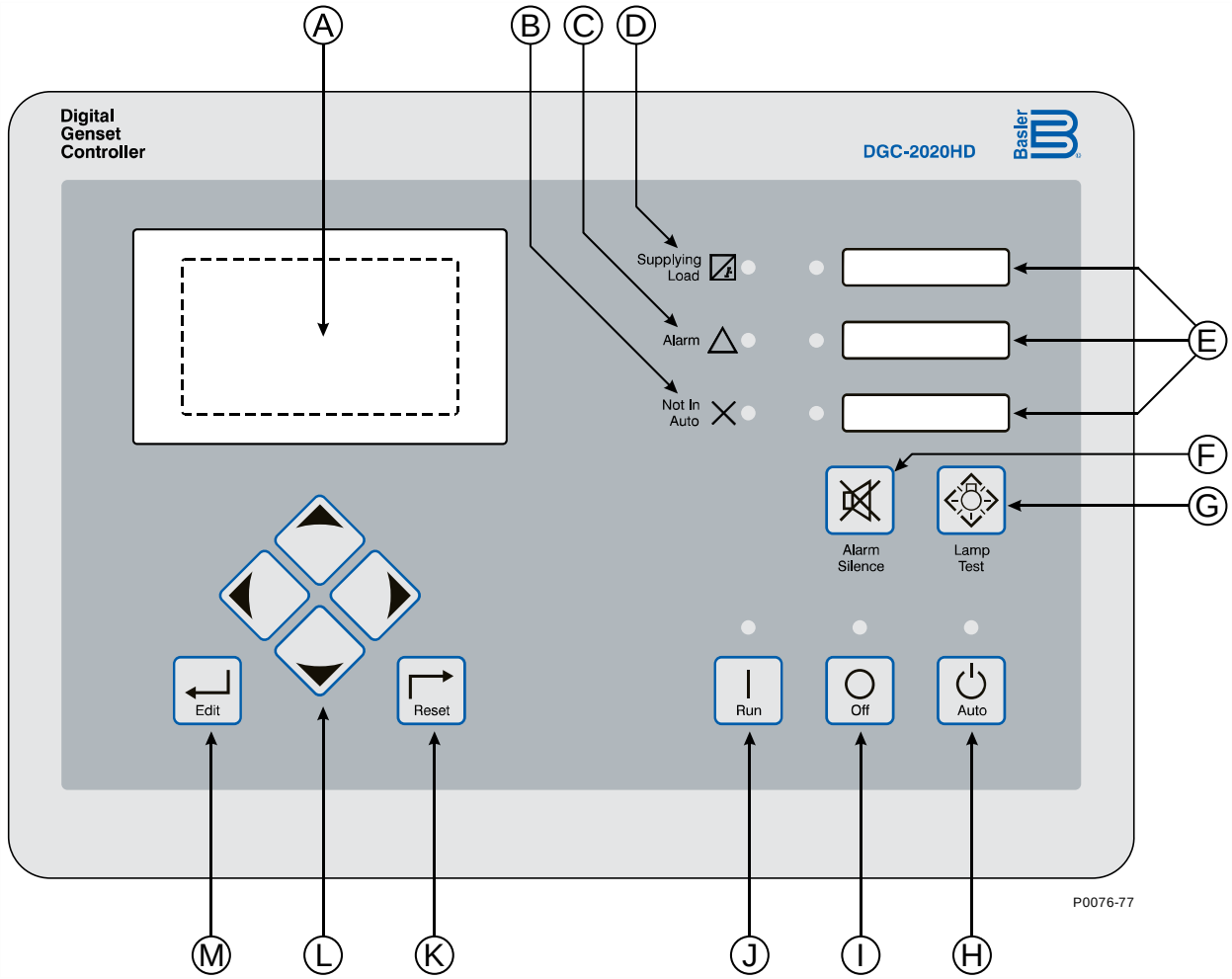


Figure 1. Front-Panel Controls and Indicators

Table 1. Front-Panel Control and Indicator Descriptions

Locator	Description
A	Depending on the style selected, the DGC-2020HD comes equipped with either a default monochrome LCD or an optional color touch screen LCD. *Default LCD (style xNxxxxxxx).* The backlit, 64 by 128 pixel LCD serves as the local information source for metering, alarms, pre-alarms, and protective functions. Display operation is maintained down to –40°F (–40°C). *Color Touch Screen LCD (style xTxxxxxxx).* The backlit, 272 by 480 pixel color LCD serves as the local information source for metering, alarms, pre-alarms, and protective functions. Touch screen capability provides convenient navigation through metering and settings. Display operation is maintained down to –4°F (–20°C).

Locator	Description
B	*Not in Auto Indicator.* This red LED lights when the DGC-2020HD is not operating in Auto mode.
C	*Alarm Indicator.* This red LED lights continuously during alarm conditions and flashes during pre-alarm conditions.
D	*Supplying Load Indicator.* This green LED lights when the generator current is greater than emergency power supply (EPS) threshold current.
E	*Programmable Indicators.* These red LEDs light when the corresponding logic element is set true. Logic element PROGLED 1 controls the upper LED, PROGLED2 controls the middle LED, and PROGLED3 controls the lower LED. A card is provided for labeling the programmable indicators. See *Programmable Indicator Configuration* below.
F	*Alarm Silence Pushbutton.* Pressing this button opens the relay output programmed as the horn output.
G	*Lamp Test Pushbutton.* Pressing this button tests the DGC-2020HD indicators by exercising all LCD pixels and lighting all LEDs.
H	*Auto Pushbutton and Mode Indicator.* Pressing the Auto button places the DGC-2020HD in Auto mode. The green Auto mode LED lights when Auto mode is active.
I	*Off Pushbutton and Mode Indicator.* Pressing this button places the DGC-2020HD in Off mode. The red Off mode LED lights when the DGC-2020HD is in Off mode. This button also resets the Breaker Management Pre-Alarms and all MTU ECU Alarms.
J	*Run Pushbutton and Mode Indicator.* Pressing this button places the DGC-2020HD in Run mode. The green Run mode LED lights when Run mode is active.
K	*Reset Pushbutton.* This button is pressed to cancel a settings editing session and discard any settings changes. When pressed momentarily, this button resets the Breaker Management Pre-Alarms and all MTU ECU Alarms. This button is also used to reset the Maintenance Interval when pressed for 10 seconds while viewing the front-panel Overview screen.
L	*Arrow Pushbuttons.* These four buttons are used to navigate through the front-panel display menus and modify settings. The left and right arrow buttons are used to navigate through the menu levels. The right arrow button is pressed to move downward through the menu levels and the left arrow button is pressed to move upward through the menu levels. Within a level, the up and down arrow buttons are used to move among items within the menu level. Pressing the down arrow button moves to items lower in the list. Pressing the up arrow button moves to items higher in the list. During a settings editing session, the up and down arrow buttons are used to raise and lower the value of the selected setting. The right and left arrow buttons move to different digits.
M	*Edit Pushbutton.* Pressing this button starts an editing session and enables changes to DGC-2020HD settings. At the conclusion of an editing session, the Edit pushbutton is pressed again to save the setting changes.

Programmable Indicator Configuration

Up to three LED indicators may be programmed to suit the needs of a particular application. A replaceable card (Figure 2) is provided that can be labeled to match the function of each programmable indicator.

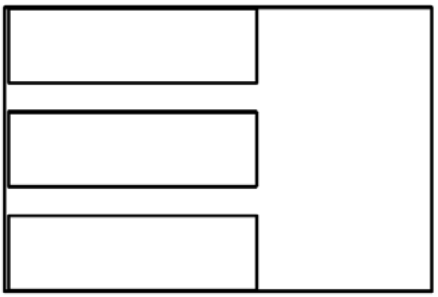


Figure 2. Programmable Indicator Label Card

Information about configuring DGC-2020HD logic to control the programmable indicators can be found in the BESTlogic™*Plus* chapter.

To label the programmable indicators, perform the following steps.

1. Print the label text on readily-available address label sheets. The label card accommodates adhesive-backed labels measuring 0.5 by 1.75 inches. Avery part number 18167 is suitable for this purpose.
2. Remove all control power from the DGC-2020HD.
3. Remove the fasteners from the four mounting studs on the DGC-2020HD and separate it from the mounting panel or optional escutcheon plate. Disconnect the nine terminal block connectors; the Start, Run, and Pre relays; and the Ethernet (copper or fiber), USB, and DB-9 connectors.
4. Lay the front panel face-down on a suitable work surface.
5. Grasp the tab of the label card and pull free. The label card tab is located on the rear of the DGC-2020HD, see Figure 3. When facing the back of the panel, the label card tab is on the left.
6. Apply the labels created in step 1 to the label cards. The rectangle outlines on the label card serve as guides for attaching the labels.
7. After applying the new labels, insert the label card into the slot. Ensure that the label card is oriented properly by viewing the custom labels through the label windows of the front panel.
8. Move the DGC-2020HD adjacent to the mounting panel or optional escutcheon plate and reconnect the cables removed in step 3.
9. Secure the DGC-2020HD to the mounting panel or optional escutcheon plate with the fasteners removed in step 3. The torque applied to the mounting hardware should not exceed 20 inch-pounds or 2.2 newton meters.
10. If desired, verify the function of the programmed indicators before returning the DGC-2020HD to service.

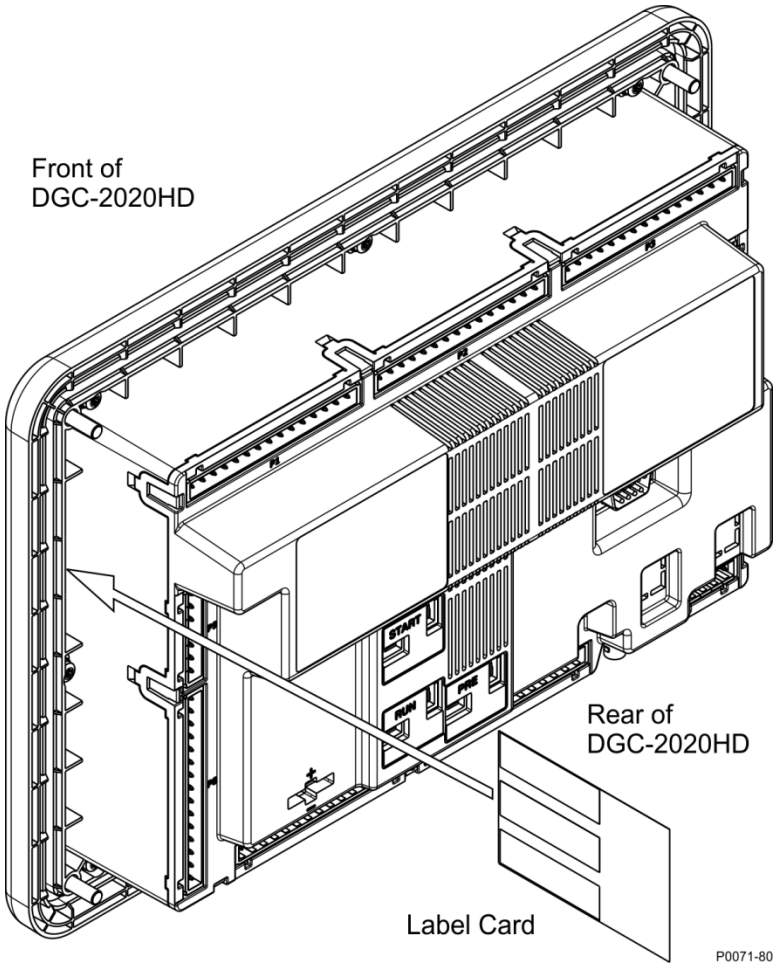


Figure 3. Label Card Slot Location

Touch Screen Operation

DGC-2020HDs with the color touch screen display option (style xTxxxxxxx) provide a convenient means of navigating through menus and settings by allowing direct interaction with what is displayed. All operations that can be performed using the touch screen can also be performed using the pushbuttons. However, critical settings must be initiated using the pushbuttons to prevent accidental operation with the touch screen.

Touch screen controls are illustrated in Figure 4. Lettered locators in Figure 4 correspond to the control descriptions of Table 2.

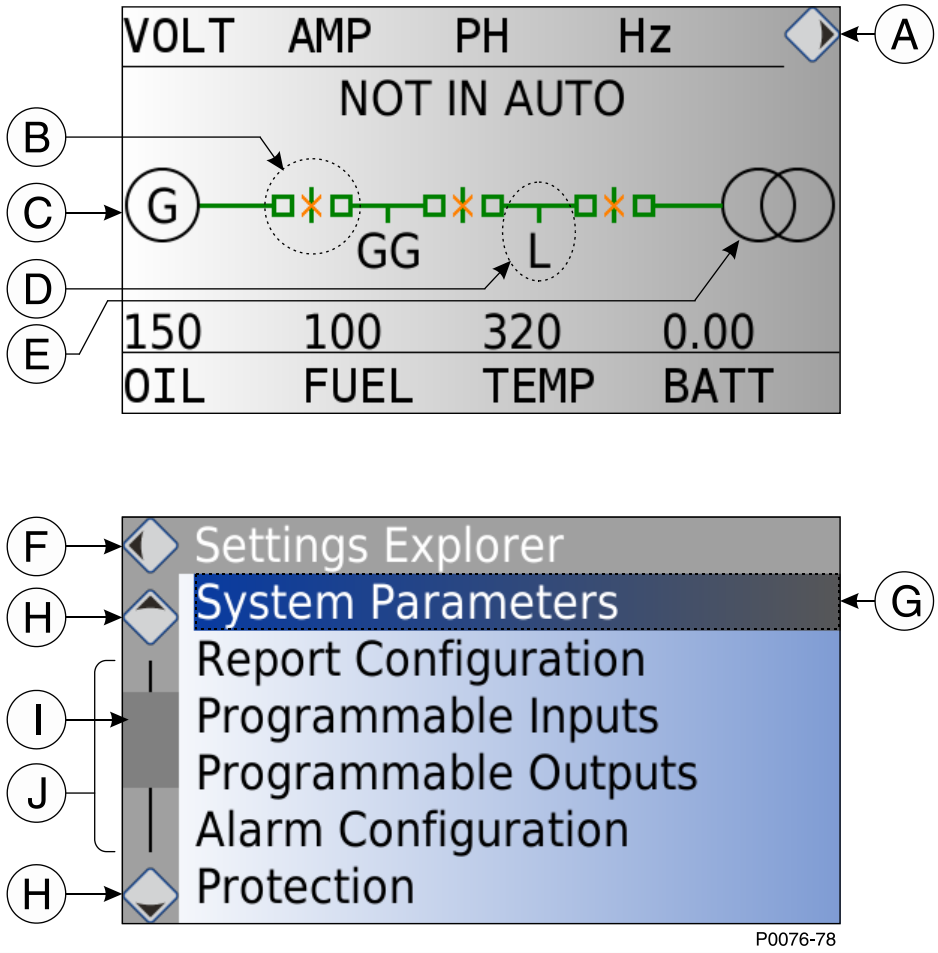


Figure 4. Touch Screen Controls

Table 2. Touch Screen Control Descriptions

Locator	Description
A	*Enter button*. This button, found only on the overview screen, enters the Main Menu.
B	Breaker control. To send an open or close request to a breaker in the system, follow these steps: 1. Touch the corresponding breaker in the diagram. 2. Press the up or down arrow keys to scroll the options. 3. Press Edit to send the selected breaker command request.
C	*Generator metering*. Touch the generator in the diagram to view metered voltage, current, frequency, kW, kvar, and power factor values of the local generator.
D	*Bus metering*. Touch a bus in the diagram to view metered voltage, current, frequency, kW, kvar, and power factor values of the corresponding bus in the system.
E	*Mains metering*. Touch the mains in the diagram to view metered voltage, current, frequency, kW, kvar, and power factor values of the mains bus.
F	*Back button*. Touch the Back button to return to the previous menu.
G	*Menu Option*. Touch a menu option to enter its submenu. If the option is an editable value, adjust it using the arrow pushbuttons, and press the Edit pushbutton to accept the change.
H	*Up and Down Arrows.* Touching the Up arrow scrolls the menu options toward the top of the list and touching the Down arrow scrolls the menu options toward the bottom of the list.

Locator	Description
I	*Scroll box*. This represents the range of options in the list that are currently being displayed. The scroll box has no touch commands.
J	*Scroll bar*. Scroll bars represent the entire list of options for the current menu screen. Touching a point in the white portion of the scroll bar will display the menu options at that position in the list.

Disabling the Touch Screen

Touch screen controls may be disabled with a setting in BESTCOMS*Plus*, front-panel pushbuttons, or automatically. To disable touch screen controls using the front-panel pushbuttons, press and hold Lamp Test then press Edit. Touch screen controls are disabled automatically if the touch screen detects a press for longer than 60 seconds.

Display Operation and Navigation

The front-panel display is used to locally make settings changes and display metering values. Refer to locators K, L, and M in Table 1 for information on changing settings through the front panel and navigating through the screens.

Login and Permissions

When attempting to change a protected setting, the DGC-2020HD displays the Login Required screen. To log in, use the arrow keys to navigate the on-screen keyboard. Press the Edit key to select each character. Once the user name has been entered, use the arrow keys to highlight the checkmark box and press the Edit key. Repeat this process to enter the password. If the user name and password are correct, you will be logged in. To log out, press the Reset key while viewing one of the menu screens. The Reset key cannot be used to log out while on the Overview screen because the Reset key has special functions. See *Overview Screen* for more information.

If communication access is active through the modem, USB port, or Ethernet port, the front-panel displays “REMOTE COMMS”. If the remote user is logged in to BESTCOMS*Plus*® with Control security access or higher, the front panel can only be used for viewing metering data and settings information. Remote security access must be ended before modifying settings through the front panel.

Changing a Setting

To change a setting, navigate to the setting and press the Edit key. If you are not already logged in, you will be prompted for your user name and password. Use the up or down arrow keys to raise or lower the value. Use the right or left arrow keys to select different digits. Press the Edit key again when finished.

Sleep Mode

Sleep mode de-energizes the LCD backlight when no pushbutton activity is detected for the duration of the LCD Backlight Timeout delay. Front-panel LEDs remain lit during sleep mode. In units with the default monochrome LCD, the LCD heater is turned off during sleep mode. To enter sleep mode, the DGC-2020HD must be operating in OFF mode or Auto mode with the engine not running. Normal display operation resumes when any pushbutton is pressed or the genset is started remotely via the ATS input. Sleep mode is not entered while an alarm is active. Sleep mode can be permanently disabled through BESTCOMS*Plus*® or the front panel.

Overview Screen

The overview screen is the uppermost screen in the menu structure and is displayed by default. It displays metering information as well as a one-line diagram of the system’s breaker configuration.

System Configuration One-Line Diagram

A one-line diagram of the system breaker configuration is displayed on the front panel. This diagram changes in real time to reflect the current state of the breakers.

The one-line diagram appears on both the front-panel Overview and Summary screens.
Figure 5, illustrates the different configurations of the one-line diagram.

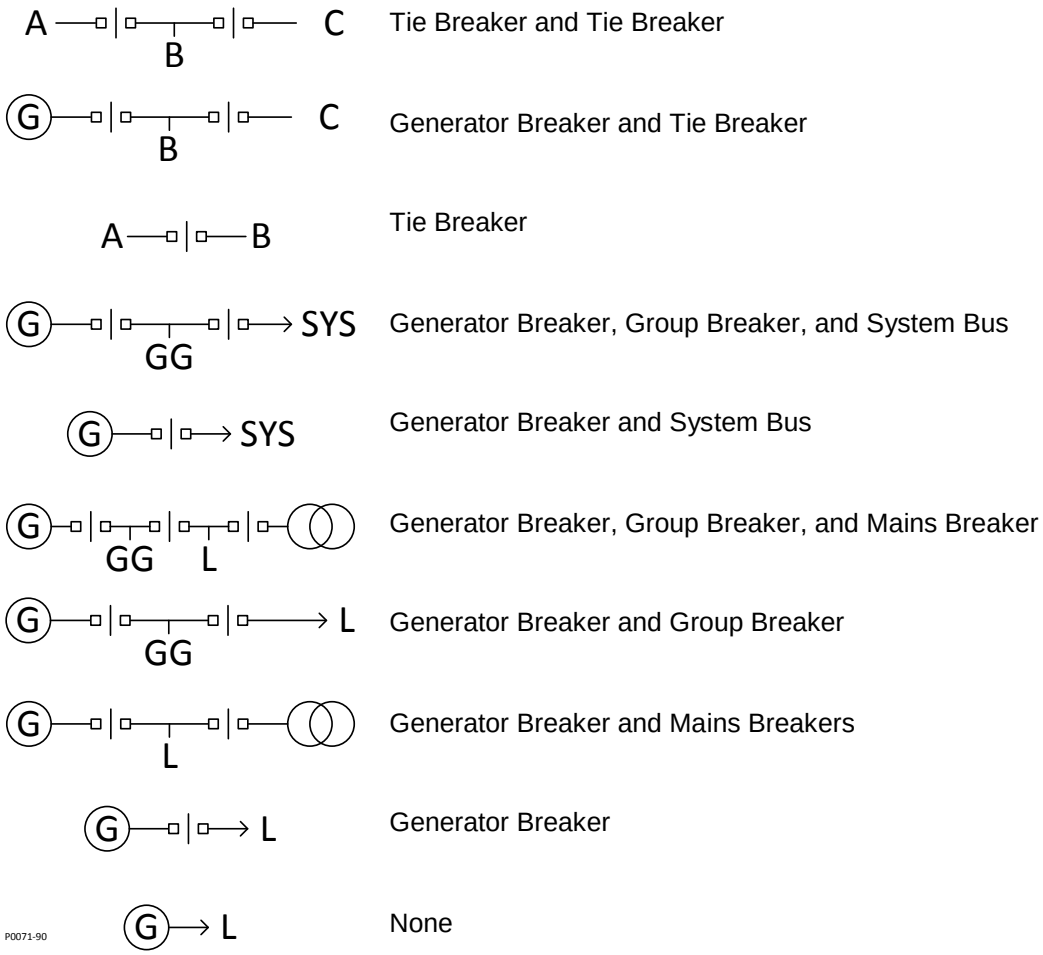


Figure 5. System Configuration One-Line Diagrams

The diagrams in Figure 5 show all breakers in the open position and all buses in a dead/unstable state. Breaker and bus states in the diagram change in real time to reflect the actual breaker and bus status. When a breaker is open, the line between the contacts is vertical and when the breaker is closed, the line is horizontal. A stable bus is indicated by a filled rectangle and a bus in any state other than stable is indicated by an unfilled rectangle. On the optional touch screen, a dead bus is indicated by a green colored line segment and an energized (failed or stable) is indicated by a red colored line segment. See Figure 6 for the different breaker and bus states.

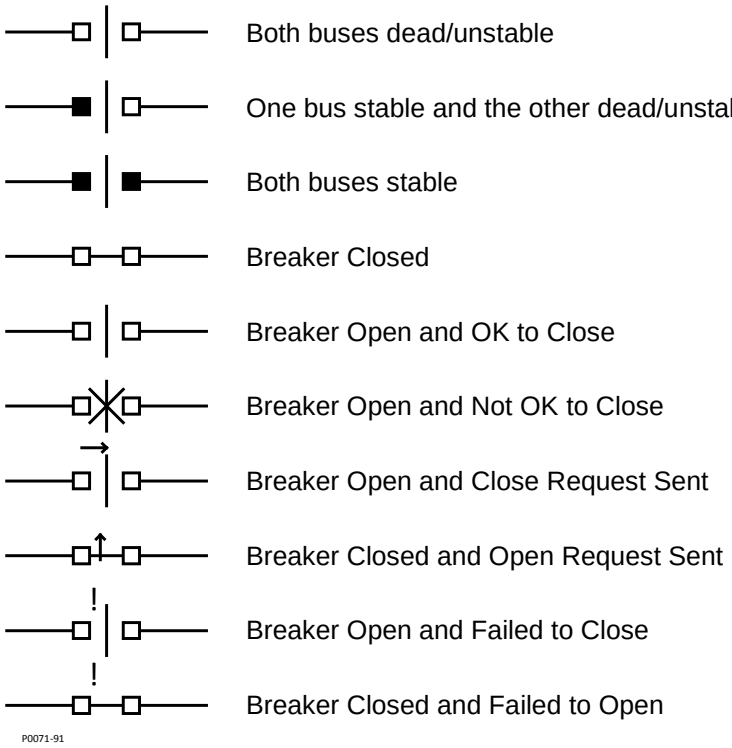


Figure 6. One-Line Diagram Breaker and Bus States

Front-Panel Shortcuts

Front-panel shortcuts allow the user to intuitively view metered bus values and issue breaker commands by simply selecting components in the one-line diagram.

While viewing the overview screen, press Edit to enable a cursor in the system configuration one-line diagram. Moving the cursor, by using the left and right arrow keys, selects different components in the system diagram. A component selected by the cursor is displayed with inverted colors to differentiate it from the rest.

Select a bus in the diagram with the cursor and press Edit to view metered voltage, current, frequency, kW, kvar, and power factor values of the corresponding bus in the system.

To send an open or close request to a breaker in the system, move the cursor to the corresponding breaker in the diagram and press Edit. Press the up or down arrow keys to scroll the options. Press Edit again to send the selected breaker command request.

The system configuration one-line diagram which is displayed on the overview screen is determined by the System Type setting selection. For details on configuring the system type, see the *Device Configuration* chapter in the *Configuration* manual.

If no pushbutton activity is detected for 15 minutes, the DGC-2020HD displays the top overview screen.

Reset Key Functions

Pressing the Reset key while viewing the Overview screen will reset certain active indications. The list of indications that can be reset includes the following:

- Breaker Open Fail or Breaker Close Fail pre-alarms
- Synchronizer Fail pre-alarm
- 78 Vector Shift or 81 Frequency trip status for 78 or 81 elements configured on the Gen Bus
- Bus protection trip status for any protection element configured on Bus 1 or Bus 2
- Weak Battery pre-alarm status
- AVR or GOV Analog Bias Output Out-of-Range status
- ARP Ping Fail pre-alarm

- Alarms and faults from MTU MDEC, MTU ECU7/ECU7, and MTU Smart Connect ECUs
- Maintenance Due pre-alarm (hold Reset key for 10 seconds)

Scrolled Metering

BESTCOMS*Plus*® Navigation Path: Settings Explorer, General Settings, Front Panel HMI
Front Panel Navigation Path: Settings > General Settings > Front Panel HMI

When scrolled metering is enabled, user-selected metering values are displayed on the overview screen. Any number of the available values can be displayed. Up to nine values are displayed on the screen at one time. After the scroll time delay has elapsed, the next set of values is displayed and so on.

When scrolled metering is disabled, only the following parameters are displayed on the overview screen:

- VOLT∗
- AMP∗
- PH∗
- Hz
- OIL
- FUEL/DEF†
- TEMP/RUN HRS
- BATT/RUN HRS

∗ When scrolled metering is disabled, individual phase information can be automatically toggled at a rate set by the Phase Toggle Delay setting on the Front Panel HMI screen. When the Phase Toggle Delay is set to zero, information for each phase is obtained by pressing the up or down arrow keys on the front panel. When it is set to a number other than zero, the display will toggle through the phases automatically at the rate specified by the Phase Toggle Delay Setting. The overview screen automatically alternates the display of TEMP/BATT and RUN HRS.

† The overview screen automatically alternates the display of FUEL level and DEF level when all of the following conditions are true:

- A Selective Catalytic Reduction (SCR) with Diesel Exhaust Fluid (DEF) exhaust after-treatment system is implemented
- Display Fuel Level Below threshold is set to a value less than 100%
- Fuel level is below the Display Fuel Level Below threshold

If DEF levels are not received from the engine ECU, FUEL level is displayed continuously regardless of the Display Fuel Level Below setting. For more information on the Display Fuel Level Below setting, see *Display Setup* below.

To select the scrolling values, navigate to Settings > General Settings > Front Panel HMI Screen and edit the Scrolled Item Selection. The following parameters may be placed in the scrolling overview:

Adjusted Reserve Available
Analog Expansion Module 1: Inputs: AEM1 In1
Analog Expansion Module 1: Inputs: AEM1 In2
Analog Expansion Module 1: Inputs: AEM1 In3
Analog Expansion Module 1: Inputs: AEM1 In4
Analog Expansion Module 1: Inputs: AEM1 In5
Analog Expansion Module 1: Inputs: AEM1 In6
Analog Expansion Module 1: Inputs: AEM1 In7
Analog Expansion Module 1: Inputs: AEM1 In8
Analog Expansion Module 1: Resistance Temperature Detectors (RTD): AEM1 RTD1
Analog Expansion Module 1: Resistance Temperature Detectors (RTD): AEM1 RTD2
Analog Expansion Module 1: Resistance Temperature Detectors (RTD): AEM1 RTD3
Analog Expansion Module 1: Resistance Temperature Detectors (RTD): AEM1 RTD4
Analog Expansion Module 1: Resistance Temperature Detectors (RTD): AEM1 RTD5
Analog Expansion Module 1: Resistance Temperature Detectors (RTD): AEM1 RTD6
Analog Expansion Module 1: Resistance Temperature Detectors (RTD): AEM1 RTD7
Analog Expansion Module 1: Resistance Temperature Detectors (RTD): AEM1 RTD8
Analog Expansion Module 1: Thermocouples: AEM1 TC1
Analog Expansion Module 1: Thermocouples: AEM1 TC2
Analog Expansion Module 2: Inputs: AEM2 In1
Analog Expansion Module 2: Inputs: AEM2 In2
Analog Expansion Module 2: Inputs: AEM2 In3

Analog Expansion Module 2: Inputs: AEM2 In4
Analog Expansion Module 2: Inputs: AEM2 In5
Analog Expansion Module 2: Inputs: AEM2 In6
Analog Expansion Module 2: Inputs: AEM2 In7
Analog Expansion Module 2: Inputs: AEM2 In8
Analog Expansion Module 2: Resistance Temperature Detectors (RTD): AEM2 RTD1
Analog Expansion Module 2: Resistance Temperature Detectors (RTD): AEM2 RTD2
Analog Expansion Module 2: Resistance Temperature Detectors (RTD): AEM2 RTD3
Analog Expansion Module 2: Resistance Temperature Detectors (RTD): AEM2 RTD4
Analog Expansion Module 2: Resistance Temperature Detectors (RTD): AEM2 RTD5
Analog Expansion Module 2: Resistance Temperature Detectors (RTD): AEM2 RTD6
Analog Expansion Module 2: Resistance Temperature Detectors (RTD): AEM2 RTD7
Analog Expansion Module 2: Resistance Temperature Detectors (RTD): AEM2 RTD8
Analog Expansion Module 2: Thermocouples: AEM2 TC1
Analog Expansion Module 2: Thermocouples: AEM2 TC2
Analog Expansion Module 3: Inputs: AEM3 In1
Analog Expansion Module 3: Inputs: AEM3 In2
Analog Expansion Module 3: Inputs: AEM3 In3
Analog Expansion Module 3: Inputs: AEM3 In4
Analog Expansion Module 3: Inputs: AEM3 In5
Analog Expansion Module 3: Inputs: AEM3 In6
Analog Expansion Module 3: Inputs: AEM3 In7
Analog Expansion Module 3: Inputs: AEM3 In8
Analog Expansion Module 3: Resistance Temperature Detectors (RTD): AEM3 RTD1
Analog Expansion Module 3: Resistance Temperature Detectors (RTD): AEM3 RTD2
Analog Expansion Module 3: Resistance Temperature Detectors (RTD): AEM3 RTD3
Analog Expansion Module 3: Resistance Temperature Detectors (RTD): AEM3 RTD4
Analog Expansion Module 3: Resistance Temperature Detectors (RTD): AEM3 RTD5
Analog Expansion Module 3: Resistance Temperature Detectors (RTD): AEM3 RTD6
Analog Expansion Module 3: Resistance Temperature Detectors (RTD): AEM3 RTD7
Analog Expansion Module 3: Resistance Temperature Detectors (RTD): AEM3 RTD8
Analog Expansion Module 3: Thermocouples: AEM3 TC1
Analog Expansion Module 3: Thermocouples: AEM3 TC2
Analog Expansion Module 4: Inputs: AEM4 In1
Analog Expansion Module 4: Inputs: AEM4 In2
Analog Expansion Module 4: Inputs: AEM4 In3
Analog Expansion Module 4: Inputs: AEM4 In4
Analog Expansion Module 4: Inputs: AEM4 In5
Analog Expansion Module 4: Inputs: AEM4 In6
Analog Expansion Module 4: Inputs: AEM4 In7
Analog Expansion Module 4: Inputs: AEM4 In8
Analog Expansion Module 4: Resistance Temperature Detectors (RTD): AEM4 RTD1
Analog Expansion Module 4: Resistance Temperature Detectors (RTD): AEM4 RTD2
Analog Expansion Module 4: Resistance Temperature Detectors (RTD): AEM4 RTD3
Analog Expansion Module 4: Resistance Temperature Detectors (RTD): AEM4 RTD4
Analog Expansion Module 4: Resistance Temperature Detectors (RTD): AEM4 RTD5
Analog Expansion Module 4: Resistance Temperature Detectors (RTD): AEM4 RTD6
Analog Expansion Module 4: Resistance Temperature Detectors (RTD): AEM4 RTD7
Analog Expansion Module 4: Resistance Temperature Detectors (RTD): AEM4 RTD8
Analog Expansion Module 4: Thermocouples: AEM4 TC1
Analog Expansion Module 4: Thermocouples: AEM4 TC2
Analog Inputs: Analog In 1
Analog Inputs: Analog In 2
Analog Inputs: Analog In 3
Analog Inputs: Analog In 4
Analog Outputs: AVR Output
Analog Outputs: GOV Output
Analog Outputs: LS Output
Base Load Level
Battery Voltage
Boost Pressure
Bus 1 Current: 3i0
Bus 1 Current: Average
Bus 1 Current: I1
Bus 1 Current: I2
Bus 1 Current: Phase A Current
Bus 1 Current: Phase B Current
Bus 1 Current: Phase C Current
Bus 1 Current: Ground
Bus 1 Dead
Bus 1 Failed
Bus 1 Forward Rotation
Bus 1 Frequency: Frequency
Bus 1 Frequency: Max ROCOF
Bus 1 Frequency: ROCOF

Bus 1 Power: Max Vector Shift
Bus 1 Power: Negative Var Hours Total
Bus 1 Power: Negative Watt Hours Total
Bus 1 Power: Phase A Complex Power
Bus 1 Power: Phase A Power Factor
Bus 1 Power: Phase A Vars
Bus 1 Power: Phase A Watts
Bus 1 Power: Phase B Complex Power
Bus 1 Power: Phase B Power Factor
Bus 1 Power: Phase B Vars
Bus 1 Power: Phase B Watts
Bus 1 Power: Phase C Complex Power
Bus 1 Power: Phase C Power Factor
Bus 1 Power: Phase C Vars
Bus 1 Power: Phase C Watts
Bus 1 Power: Positive Var Hours Total
Bus 1 Power: Positive Watt Hours Total
Bus 1 Power: Power Factor Lead/Lag
Bus 1 Power: Total Complex Power
Bus 1 Power: Total Power Factor
Bus 1 Power: Total Vars
Bus 1 Power: Total Watts
Bus 1 Power: Volt-Ampere Hours Total
Bus 1 Reverse Rotation
Bus 1 Stable
Bus 1 Voltage: Average Voltage L-L
Bus 1 Voltage: Average Voltage L-N
Bus 1 Voltage: Connection
Bus 1 Voltage: V2
Bus 1 Voltage: Voltage Phase A
Bus 1 Voltage: Voltage Phase A To Phase B
Bus 1 Voltage: Voltage Phase B
Bus 1 Voltage: Voltage Phase B To Phase C
Bus 1 Voltage: Voltage Phase C
Bus 1 Voltage: Voltage Phase C To Phase A
Bus 2 Current: 3i0
Bus 2 Current: Average
Bus 2 Current: I1
Bus 2 Current: I2
Bus 2 Current: Phase A Current
Bus 2 Current: Phase B Current
Bus 2 Current: Phase C Current
Bus 2 Current: Ground
Bus 2 Dead
Bus 2 Failed
Bus 2 Forward Rotation
Bus 2 Frequency: Frequency
Bus 2 Frequency: Max ROCOF
Bus 2 Frequency: ROCOF
Bus 2 Power: Max Vector Shift
Bus 2 Power: Negative Var Hours Total
Bus 2 Power: Negative Watt Hours Total
Bus 2 Power: Phase A Complex Power
Bus 2 Power: Phase A Power Factor
Bus 2 Power: Phase A Vars
Bus 2 Power: Phase A Watts
Bus 2 Power: Phase B Complex Power
Bus 2 Power: Phase B Power Factor
Bus 2 Power: Phase B Vars
Bus 2 Power: Phase B Watts
Bus 2 Power: Phase C Complex Power
Bus 2 Power: Phase C Power Factor
Bus 2 Power: Phase C Vars
Bus 2 Power: Phase C Watts
Bus 2 Power: Positive Var Hours Total
Bus 2 Power: Positive Watt Hours Total
Bus 2 Power: Power Factor Lead/Lag
Bus 2 Power: Total Complex Power
Bus 2 Power: Total Power Factor
Bus 2 Power: Total Vars
Bus 2 Power: Total Watts
Bus 2 Power: Volt-Ampere Hours Total
Bus 2 Reverse Rotation
Bus 2 Stable
Bus 2 Voltage: Average Voltage L-L
Bus 2 Voltage: Average Voltage L-N
Bus 2 Voltage: Connection
Bus 2 Voltage: V2
Bus 2 Voltage: Voltage Phase A
Bus 2 Voltage: Voltage Phase A To Phase B
Bus 2 Voltage: Voltage Phase B
Bus 2 Voltage: Voltage Phase B To Phase C
Bus 2 Voltage: Voltage Phase C
Bus 2 Voltage: Voltage Phase C To Phase A
Charge Air Temperature
Contact Expansion Module 1: CEM1 Input 1
Contact Expansion Module 1: CEM1 Input 2
Contact Expansion Module 1: CEM1 Input 3
Contact Expansion Module 1: CEM1 Input 4
Contact Expansion Module 1: CEM1 Input 5
Contact Expansion Module 1: CEM1 Input 6
Contact Expansion Module 1: CEM1 Input 7
Contact Expansion Module 1: CEM1 Input 8
Contact Expansion Module 1: CEM1 Input 9
Contact Expansion Module 1: CEM1 Input 10
Contact Expansion Module 2: CEM2 Input 1
Contact Expansion Module 2: CEM2 Input 2
Contact Expansion Module 2: CEM2 Input 3
Contact Expansion Module 2: CEM2 Input 4
Contact Expansion Module 2: CEM2 Input 5

Contact Expansion Module 2: CEM2 Input 6
Contact Expansion Module 2: CEM2 Input 7
Contact Expansion Module 2: CEM2 Input 8
Contact Expansion Module 2: CEM2 Input 9
Contact Expansion Module 2: CEM2 Input 10
Contact Expansion Module 3: CEM3 Input 1
Contact Expansion Module 3: CEM3 Input 2
Contact Expansion Module 3: CEM3 Input 3
Contact Expansion Module 3: CEM3 Input 4
Contact Expansion Module 3: CEM3 Input 5
Contact Expansion Module 3: CEM3 Input 6
Contact Expansion Module 3: CEM3 Input 7
Contact Expansion Module 3: CEM3 Input 8
Contact Expansion Module 3: CEM3 Input 9
Contact Expansion Module 3: CEM3 Input 10
Contact Expansion Module 4: CEM4 Input 1
Contact Expansion Module 4: CEM4 Input 2
Contact Expansion Module 4: CEM4 Input 3
Contact Expansion Module 4: CEM4 Input 4
Contact Expansion Module 4: CEM4 Input 5
Contact Expansion Module 4: CEM4 Input 6
Contact Expansion Module 4: CEM4 Input 7
Contact Expansion Module 4: CEM4 Input 8
Contact Expansion Module 4: CEM4 Input 9
Contact Expansion Module 4: CEM4 Input 10
Contact Inputs: Input 1
Contact Inputs: Input 2
Contact Inputs: Input 3
Contact Inputs: Input 4
Contact Inputs: Input 5
Contact Inputs: Input 6
Contact Inputs: Input 7
Contact Inputs: Input 8
Contact Inputs: Input 9
Contact Inputs: Input 10
Contact Inputs: Input 11
Contact Inputs: Input 12
Contact Inputs: Input 13
Contact Inputs: Input 14
Contact Inputs: Input 15
Contact Inputs: Input 16
Contact Outputs: Output 1
Contact Outputs: Output 2
Contact Outputs: Output 3
Contact Outputs: Output 4
Contact Outputs: Output 5
Contact Outputs: Output 6
Contact Outputs: Output 7
Contact Outputs: Output 8
Contact Outputs: Output 9
Contact Outputs: Output 10
Contact Outputs: Output 11
Contact Outputs: Output 12
Contact Outputs: Prestart
Contact Outputs: Run
Contact Outputs: Start
Coolant Level Settings
Coolant Pressure
Coolant Temperature
Device ID
Diesel Exhaust Fuel Tank Level 1
Diesel Exhaust Fuel Tank Level 2
Differential: Iop 2nd A
Differential: Iop 2nd B
Differential: Iop 2nd C
Differential: Iop 5th A
Differential: Iop 5th B
Differential: Iop 5th C
Differential: Iop A
Differential: Iop B
Differential: Iop C
Differential: Iop N
Differential: Ir A
Differential: Ir B
Differential: Ir C
DPF Outlet Gas Temperature
Engine Intercooler Temperature
Engine Load
Engine Oil Temperature
Engine Percent Load
Engine Speed (Rpm)
Fuel Level
Fuel Pressure
Fuel Rate
Fuel Temperature
Gen Current: 3i0
Gen Current: Average
Gen Current: Ground Current
Gen Current: I1
Gen Current: I2
Gen Current: Phase A Current
Gen Current: Phase B Current
Gen Current: Phase C Current
Gen Current: Ground
Gen Dead
Gen Failed
Gen Forward Rotation
Gen Frequency: Frequency
Gen Frequency: Max ROCOF
Gen Frequency: ROCOF

Gen Power: Max Vector Shift
Gen Power: Negative Var Hours Total
Gen Power: Negative Watt Hours Total
Gen Power: Phase A Complex Power
Gen Power: Phase A Power Factor
Gen Power: Phase A Vars
Gen Power: Phase A Watts
Gen Power: Phase B Complex Power
Gen Power: Phase B Power Factor
Gen Power: Phase B Vars
Gen Power: Phase B Watts
Gen Power: Phase C Complex Power
Gen Power: Phase C Power Factor
Gen Power: Phase C Vars
Gen Power: Phase C Watts
Gen Power: Positive Var Hours Total
Gen Power: Positive Watt Hours Total
Gen Power: Power Factor Lead/Lag
Gen Power: Total Complex Power
Gen Power: Total Power Factor
Gen Power: Total Vars
Gen Power: Total Watts
Gen Power: Volt-Ampere Hours Total
Gen Reverse Rotation
Gen Stable
Gen Voltage: Average Voltage L-L
Gen Voltage: Average Voltage L-N
Gen Voltage: Connection
Gen Voltage: V2
Gen Voltage: Voltage Phase A
Gen Voltage: Voltage Phase A To Phase B
Gen Voltage: Voltage Phase B
Gen Voltage: Voltage Phase B To Phase C
Gen Voltage: Voltage Phase C
Gen Voltage: Voltage Phase C To Phase A
Generated kvar
Generated kW
Injector Metering Rail Pressure
Intake Manifold Temperature
kvar Error
kvar PID
kvar Ramp Status
kvar Setpoint
kW Error
kW Load Percent
kW PID
kW Ramp Status
Load Share Active
Logic Control Relays: LCR 1-64
LS Input
Mains Base Load
Mains Total System kW Load
Next To Start
Next To Stop
Number of Units
Number of Units in Active Segment
Number of Units Online
Oil Pressure
PF Mode
PF Setpoint
Ramped Var Demand
Ramped Watt Demand
Rated kvar
Rated kW
Real Time Clock: Date
Real Time Clock: Time
Reserve Available
Speed Bias Output
Speed Error
Speed PID
Speed Source
System Load Bus: Frequency
System Load Bus: Total PF
System Load Bus: Total var
System Load Bus: Total Watt
System Load Bus: Average Current
System Load Bus: Average Voltage
System Generated kvar
System Generated kW
System Generated kW Percent
System Group Bus: Frequency
System Group Bus: Total PF
System Group Bus: Total var
System Group Bus: Total Watt
System Group Bus: Average Current
System Group Bus: Average Voltage
System Mains Bus: Frequency
System Mains Bus: Total PF
System Mains Bus: Total var
System Mains Bus: Total Watt
System Mains Bus: Average Current
System Mains Bus: Average Voltage
System Manager
System Online kvar Capacity
System Online kW Capacity
System Total kW Capacity
Total Fuel Used
Total Run Time
Var Demand
Var Mode

Volt Error
Volt PID
Voltage Bias Output
Watt Demand

Main Menu

Pressing the right arrow key while viewing the Overview screen opens the Main Menu screen. The Main Menu screen options consist of Metering, Settings, and Summary. Metering screens primarily display specific metering information. Settings screens primarily contain settings for configuring the DGC-2020HD. The Summary screen consists of a one-line diagram of the system configuration, mains fail transfer status, bus metering, and breaker command options.

Summary Screen

A one-line diagram, located at the top of the Summary screen, indicates system configuration and real time breaker status. This one-line diagram is essentially the same as the one described in Overview Screen above, except this diagram does not contain the shortcuts.

Mains fail transfer status is displayed just below the diagram. Mains fail transfer timers can be viewed by selecting Mains fail transfer status (top line) and pressing the right arrow key. Press the left arrow key to return to the Summary screen. See the *Metering* chapter for details.

Metering of voltage, current, frequency, power, and power factor for the generator bus is displayed. Only metered voltage and frequency for Bus 1 and Bus 2 are displayed.

Breakers in the system are listed at the bottom of the Summary screen. To send an open or close request to a breaker in the system, move the cursor to the desired breaker in the list and press Edit. Press the up or down arrow keys to scroll the options. Press Edit again to send the selected breaker command request. Breaker abbreviations are defined below:

- GB = Generator Breaker
- GGB = Generator Group Breaker
- MB = Mains Breaker
- TB = Tie Breaker
- TB2 = Tie Breaker 2

Front-Panel Display Structure

The display structure of the Main Menu screens is provided below.

Metering

- **Engine**
  - Oil Pressure
  - Coolant Temperature
  - Battery Voltage
  - Engine Speed
  - Speed Source
  - Fuel Level
  - Engine Load
  - Coolant Level
  - Total Run Time
  - Hours to Maintenance
  - DEF Tank 1 Level (Visible when ECU Type is Standard, Volvo Penta, MTU SMC, MTU ADEC, GM/Doosan, Cummins, MTU SMC)
  - DEF Tank 2 Level (Visible when ECU Type is Standard, Volvo Penta, MTU SMC, MTU ADEC, GM/Doosan, Cummins, MTU SMC)
- **Gen**
  - Voltage
  - Current
  - Frequency
  - Power
  - Energy
  - Vector Shift

- **Bus 1**
  - Voltage
  - Current
  - Frequency
  - Power
  - Energy
    Vector Shift
- **Bus 2**
  - Voltage
  - Current
  - Frequency
  - Power
  - Energy
  - Vector Shift
- **Synchronization**
- **Differential**
  - Phase A
  - Phase B
  - Phase C
  - Phase Neutral
- **Active Setpoints**
  - Var Mode
  - PF Mode
  - Baseload Level
  - kvar Setpoint
  - PF Setpoint
  - Voltage Trim
  - Speed Trim
  - Operating Mode
  - VRM AVR Setpoint
  - VRM FCR Setpoint
- **Run Statistics**
  - Cumulative
  - Session
- **Status**
  - Status
  - VRM Control Status
  - Bus Condition
  - IO Module Connected
  - Run Request
  - Mains Power Control
- **Inputs**
  - Contact Inputs
  - Analog Input Values
  - Remote Contact Inputs
  - Remote Analog Input Values
  - Logic Control Relays
  - Remote System Manager Inputs
  - Broadcast Logic
  - Modbus Virtual Switches
- **Outputs**
  - Contact Outputs
  - Analog Outputs
  - Configurable Elements
  - Remote Contact Outputs
  - Remote Analog Outputs
- **Configurable Protection**
  - Configurable Protection 1 to Configurable Protection 32

- **Alarms**
- **Pre-Alarms**
- **Event Log**
  - Show Log
  - Reset
- **J1939 ECU**
  - J1939 Data (Visible when CAN Bus 2 ECU Support is enabled.)
  - J1939 Engine Config (Visible when CAN Bus 2 ECU Support is enabled.)
  - DTC Active Data (Visible when CAN Bus 2 ECU and DTC Support are enabled.)
  - DTC Previous Data (Visible when CAN Bus 2 ECU and DTC Support are enabled.)
- **MTU**
  - MTU Fault Codes (Visible when selected ECU type is MTU MDEC, MTU ADEC, MTU ECU7/8, and MTU Smart Connect.)
    MTU Status (Visible when selected ECU type is MTU MDEC, MTU ADEC, MTU ECU7/8, and MTU Smart Connect.)
- **System Status**
  - System Breaker Status
  - System Mains Bus
  - System Group Bus
  - System Load Bus
  - Breaker Power Sum
  - Broadcast Logic
- **Real Time Clock**
- **Gen Network Status**
  - Units
  - Act Seg Units
  - Units Online
  - Sys Online kW Cap
  - Sys Online kvar Cap
  - Sys Generated kW
  - Sys Generated kW Percent
  - Sys Generated kvar
  - Sys Total kW Cap
  - ID1 to ID32
- **Gen Sequencing**
  - Mode
  - Next to Start
  - Next Start UID
  - Next to Stop
  - Next Stop UID
  - Start Timer 1
  - Start Timer 2
  - Stop Timer
  - Seq Mode
  - Sequence ID
  - Unit ID
  - Active Seg ID
  - Sys Manager
  - Sys Man UID
  - Start TD 1
  - Start TD 2
  - Stop TD
- **Load Shedding**
  - Sys Total Seq Reserve
  - Sys Online Reserve
  - Priority to Shed
  - Shed Delay
  - Shed Fast Delay

  - Priority to Add
  - Add Delay
  - Demand Start
  - Load 1 to 64
- **Reports**
  - Sequence of Events
  - Security Log
- **Diagnostics**
  - Control
  - Load Share Line
  - AEM-2020
  - CEM-2020
  - VRM
  - Mains Power
  - VRM Control

Settings

- **General Settings**
  - Front Panel HMI
  - Device Information
  - Access Control
  - Clock Setup
  - Display Units
- **Communication**
  - Ethernet
  - Ethernet 2 (Visible when redundant Ethernet is disabled.)
  - Redundant Ethernet
  - CAN Bus 1 (I/O) Setup
  - CAN Bus 2 (ECU) Setup
  - Modem Setup
  - RS485 Setup
  - RS232 Setup
  - Modbus Setup
  - Email Setup
- **System Parameters**
  - System Settings
  - Group Settings
  - Rated Data
  - Sensing Transformers
  - Remote Module Setup
  - Crank Settings
  - Auto Restart
  - Exercise Timer
  - Relay Control
  - Auto Config Detect
  - Engine Statistics
  - Seven Day Timer
- **Report Configuration**
  - Data Log
  - Trending
  - Sequence of Events Setup
  - Configurable Log Params
- **Programmable Inputs**
  - Contact Inputs
  - Analog Inputs
  - Programmable Functions
  - Remote Contact Inputs

- Remote Analog Inputs
- Remote RTD Inputs
- Remote Thermocouple Inputs
- Remote Sys Manager Inputs

- **Programmable Outputs**
  - Output Contacts
  - Configurable Elements
  - Remote Contact Outputs
  - Remote Analog Outputs
- **Alarm Configuration**
  - Horn Configuration
  - Pre-Alarms
  - Alarms
  - Sender Fail
  - Prog Alarms
- **Protection**
  - Settings Group 0
  - Settings Group 1
  - Settings Group 2
  - Settings Group 3
  - Configurable Protection
  - Field Protection
- **Breaker Management**
  - Breaker Management
  - Breaker Hardware
  - Bus Condition
  - Synchronizer
  - Breaker Power Sum
- **Bias Control**
  - AVR Bias Control
  - GOV Bias Control
  - Mains Power Control
- **VRM Control Settings**
  - Field Rated Data
  - Startup
  - AVR
  - FCR
  - Limiters
  - Auto Tracking
- **Multigen Management**
  - AVR Output
  - GOV Output
  - LS (Load Share) Output
  - Demand Start/Stop
  - Sequencing
  - Network Configuration
  - Load Shedding
- **Logic**
  - Logic Timers (1-8)
  - Logic Timers (9-16)
  - Logic Timers (17-14)
  - Logic Timers (25-32)
  - Logic Counters
  - Logic Input Counters
  - Broadcast Logic

Summary

- System Configuration One-Line Diagram

- Mains Fail St (Status)
  - Mains Fail St (Status)
  - Transfer Delay
  - Max Transfer Time
  - Return Delay
  - Return Timer
  - Max Parallel Time
  - Open Transition Delay
- Gen VLL
- Gen Hz
- Gen Aac
- kW
- kvar
- PF (Power Factor)
- PF Lead/Lag
- Bus1 VLL
- Bus1 Hz
- Bus2 VLL (optional)
- Bus2 Hz (optional)
- GB Command (Visible when Generator Breaker control is enabled.)
  - Open, Close, or None
- GGB Command (Visible when Generator Group Breaker control is enabled.)
  - Open, Close, or None
- MB Command (Visible when Mains Breaker control is enabled.)
  - Open, Close, or None
- TB Command (Visible when Tie Breaker control is enabled.)
  - Open, Close, or None
- TB2 Command (Visible when Tie Breaker 2 control is enabled.)
  - Open, Close, or None

Operating Modes

Three operating modes provide the versatility to meet the application's needs. The DGC-2020HD operates in Off, Run, or Auto mode. These operating modes are described in the following paragraphs.

Off

In Off mode, the DGC-2020HD will not start under any circumstance. It cannot be started automatically. Programmable logic functions normally in this mode.

Run

In Run (manual) mode, the DGC-2020HD runs and cannot be shut off automatically. The breaker can be opened or closed through programmable logic inputs. Programmable logic functions normally in this mode.

Auto

In Auto mode, the DGC-2020HD may be started automatically or "self-start" from an automatic starting feature described in the following paragraphs. If the DGC-2020HD is not in Auto mode, the self-starting modes will have no effect. The self-starting modes are independent, meaning that if any self-starting mode indicates that the unit should run, it will run. It will not shut down unless all self-starting modes indicate that the unit should not be running. The status of run requests for the self-starting modes can be viewed in BESTCOMS*Plus*® or through the front panel under Metering > Status.

ATS Contact Input

The ATS (automatic transfer switch) programmable function has an input mapped to it through BESTCOMS*Plus*. The unit will start and run when this contact is closed, and will stop when the contact is open.

Modbus® / BESTCOMS*Plus*® Run Request

The unit runs when a manually-initiated request is received over communication lines. This type of request can be initiated with the Start and Stop controls on the BESTCOMS*Plus* Control Panel screen. See the latest version of the *Instruction Manual for DGC-2020HD Digital Genset Controller Modbus® Protocol* (Basler Publication 9469300998) for a listing of generator control registers.

Generator Exerciser

The unit starts at the designated time and runs for the specified duration. The breaker will be closed if "Run with Load" is checked in the generator exerciser settings.

Mains Fail Transfer Functionality

If mains fail transfer is enabled, the unit runs when any phase of the utility is dead or unstable, and will not stop until all phases of the utility are stable and the load has been transitioned to the utility.

Run with Load Logic Element

When the Run with Load logic element start input is energized, the unit starts and closes its breaker. When the Run with Load logic element stop input is energized, the unit opens its breaker and stops.

Interoperability of the Run with Load Logic Element and the Demand Start/Stop Function

These two functions can be used together; they are not independent of each other. Either one can start or stop the system, but they can share functionality in that one can stop the system even if the other one started it. Thus, if a machine was started by pulsing the run with load start, it could be stopped by demand start/stop. This can be useful in a scenario where it may be desired to start a number of generators all at the same time but sequence some off if the load does not require them. Run with load start could be pulsed on all the units causing them to start and close their breakers, then demand start/stop and sequencing could cycle them on and off as the load requirements change.

In order for Run with Load and Sequencing to operate reliably, it is recommended that the inputs to the Run with Load logic element be pulsed rather than held constant. For example, if a unit was started by sequencing, a pulse on the Run with Load Stop will shut down the unit. However, if the Run with Load Stop is held constant, sequencing could never start a unit because the sequencing starts would be immediately negated by Run with Load stops. Similarly, if a Run with Load Start is applied and held constant, sequencing cannot shut down the unit. Any stops generated by sequencing would immediately be negated by the Run with Load Start.

Interoperability of Run with Load, Demand Start/Stop, and Group Functions

Stop requests generated by the Run with Load and Demand Start/Stop functions override start requests generated by Group Start functions. Any stop request generated by a group start function overrides a Demand start request.

In order for Run with Load, Sequencing, and Group functions to operate reliably, it is recommended that the inputs to the Run with Load logic element be pulsed rather than held constant. For example, if a unit was started by sequencing, a pulse on the Run with Load Stop will shut down the unit. However, if the Run with Load Stop is held constant, the sequencing and group functions could never start a unit because the start requests would be immediately negated by the constant Run with Load stop request. Similarly, if a Run with Load Start is applied and held constant, the sequencing and group functions cannot shut down the unit. Any stop requests would immediately be negated by the constant Run with Load start request.

Engine Run Logic Element

When the engine run logic element start input is energized, the unit starts. When the engine run logic element stop input is energized, the unit opens its breaker if needed, cools down, and then stops.

Demand Start Run Request

Generator sequencing must be enabled in order for Demand Start/Stop to function. If system load is above a set level and the corresponding start level timeout has been exceeded, a corresponding start request is issued. If system load is below the delayed stop level and the stop timeout has been exceeded, a stop request is issued. See the *Multiple Generator Management* chapter in the *Configuration* manual for more information.

Logic Group Start Request

Units may be started by energizing inputs on two logic elements: Islanded Group Request and Mains Parallel Group Request. The Group Stop logic element is used to generate a stop request for both of these logic group start functions. See the *BESTlogicPlus* chapter in the *Configuration* manual for details.

Peak Shave Group Start Request

Once the power imported from mains reaches a predetermined level, and the start mode is Group Start, generators are automatically started to pick up the load. The Demand Start/Stop function brings additional generators online and offline as the system load changes.

Peak Shave Local Start Request

Once the power imported from mains reaches a predetermined level, and the start mode is Single Generator, the local generator is automatically started to pick up the load. The local generator is the

directly controlled generator from the DGC-2020HD. This mode is applicable only for DGC-2020HDs with direct Mains sensing and Mains breaker control.

Mains Fail Group Start Request

If mains fail transfer is enabled and the start mode is Group Start, the generator group runs when any phase of the utility is dead or unstable, and will not stop until all phases of the utility are stable and the load has been transitioned to the utility.

Load Takeover Group Start Request

If a Load Takeover is initiated through logic and the start mode is Group Start, the generator group is started and load is transferred from the utility. See the *Breaker Management* chapter in the *Configuration* manual for more information on Load Takeover.

Note

In order for a generator to respond to Logic Group Start Requests, Peak Shave Group Start Requests, Main Fail Group Start Requests, or Load Takeover Group Start Requests, it must be in AUTO mode, the System Type must be configured as Segmented Bus System, and Sequencing and Demand Start/Stop must both be enabled.

Operating States

The DGC-2020HD goes through the operating states listed in Table 3 when starting and stopping the generator.

Table 3. Operating States

State	Description
Reset	The first state after a DGC-2020HD power up. Not running and not able to run until system initialization is complete.
Ready	The engine is not running. The DGC-2020HD is ready to run. This is the normal state of the DGC-2020HD in OFF mode, and in AUTO mode when the engine is not running, or in the process of starting or stopping.
Cranking	The DGC-2020HD is cranking the engine as part of the start sequence.
Resting	The DGC-2020HD is resting (not cranking) the starter between crank cycles as part of the start sequence.
Running	The engine is running.
Alarm	The engine is not running and is in the Alarm state. The engine cannot be run until the alarm is cleared by pressing the OFF button on the front panel. If the engine was running when the alarm state was entered, the unit will shut down.
Prestart	The DGC-2020HD is in a pre-start state for engine pre-heat or pre-lube purposes in anticipation of an engine start.
Cooling	The engine is running to allow cooldown in anticipation of an engine shutdown.
Connecting	The engine is not running. The DGC-2020HD is attempting to connect to the engine ECU to read data or establish communications for control. This state precedes an engine startup as part of the start sequence.
Disconnect	The engine is not running and possibly spinning down after completion of a run session. The DGC-2020HD removes KEY ON from the ECU after a run session is complete. This allows the engine to spin down prior to reconnecting to the ECU to read data after the engine has stopped.

State	Description
Pulsing	The engine is not running. The DGC-2020HD is attempting to connect to the ECU to read data from it.
Unloading	When the DGC-2020HD is part of a multiple-unit, load-sharing system or is operating in parallel with utility power, the engine is running, but kW output is being reduced in anticipation of cooldown and subsequent shutdown.

Operating Mode Control

Controls for selecting an operating mode are located on the front panel and within BESTCOMS*Plus*.

Refer to the *Controls and Indicators* chapter for more information.

Tie Breaker Configuration

When the DGC-2020HD is configured as a tie breaker controller it does not control a genset. Thus, the standard operating modes described above do not apply. Special operating modes for tie breaker controllers are described below.

Off Mode

In this mode, the controller does not issue breaker close requests, but breaker open requests may still be issued. Transitioning to Off mode does not automatically open the breaker if it is already closed. Manually opening the breaker after entering Off mode may be used as a means to open the breaker and prevent it from being closed again.

Run Mode

In run mode, the breaker can be manually opened or closed. Open or close requests must come from an external source and not from an automatic function internal to the DGC-2020HD. Open or close requests must initiated by sources such as front panel controls, Modbus communication, contact inputs through logic, and remote requests from other DGC-2020HD controllers. The breaker open and close buttons on the BESTCOMS*Plus* control screen are present but disabled.

Auto Mode

Auto mode allows all breaker open and close requests. The DGC-2020HD must be in Auto mode to issue internal generator group start requests. This includes requests issued during mains fail transfer, load takeover transfer, and peak shaving. This applies only if the DGC-2020HD controls the mains breaker in the system, as this is the only mode in which mains fail, load takeover, and peak shaving operate. Open and close breaker buttons on the BESTCOMS*Plus* control screen are active in Auto mode.

Note

The peak shaving function, which normally issues group start and breaker close requests, is still capable of operating even if the tie breaker is not in Auto mode. The user must manually start the generators and parallel them to the mains. When not in Auto mode, the controller prevents only automatic start requests and group breaker close requests for automatically paralleling the generators to the mains.

Metering

The DGC-2020HD provides comprehensive metering of internal and system conditions. These capabilities include extensive parameter metering, status indication, and reporting.

Metering Explorer

DGC-2020HD metering is accessed through the metering explorer menu on the front panel display or the BESTCOMS*Plus*® metering explorer.

Front Panel

On the front panel, the metering explorer is accessed through the Metering branch of the menu. Refer to the *Controls and Indicators* chapter for more information.

BESTCOMS*Plus*®

In BESTCOMS*Plus,* the metering explorer is located in the upper left portion of the application window.

Metering Screen Docking

A docking feature within the metering explorer allows arrangement and docking of multiple metering screens. Clicking and dragging a metering screen tab displays a blue, transparent square, several arrow boxes, and a tab box. These docking elements are illustrated in Figure 7 and described in Table 4.

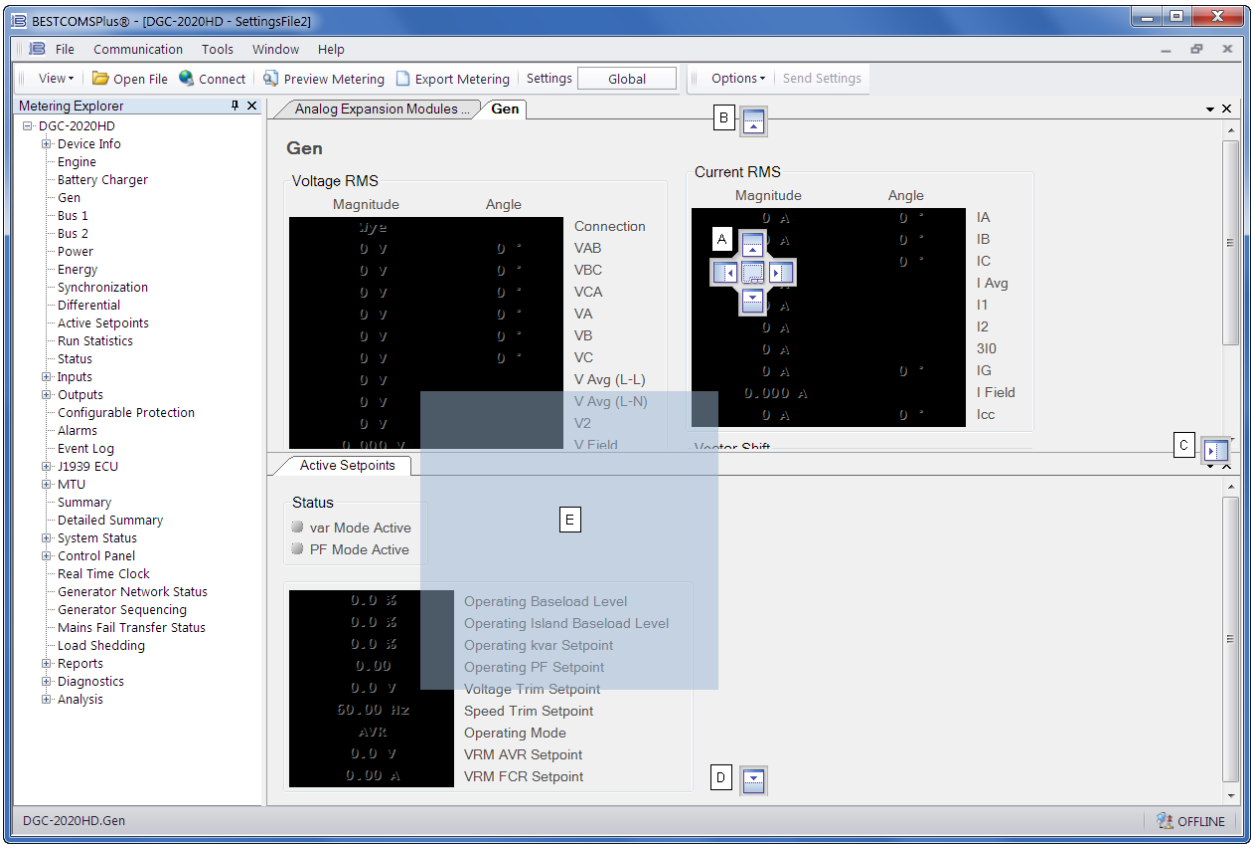
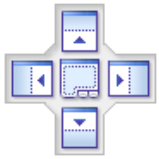


Figure 7. Metering Screen Docking Options

Table 4. Descriptions of Call-outs in Figure 7.

Call-Out	Symbol	Description
A		Holding the left mouse button down on a metering tab and dragging it to one of the four arrow boxes will place the metering tab inside the selected window on the location selected. To place the metering tab as a tab inside the selected window, drop it on the tabs button in the center of the arrow buttons.
B		Holding the left mouse button down on a metering tab and dragging it to this arrow box will place it across the top of the screen. Click on the (thumbtack) to dock it on the top bar. To display a screen that is docked, simply use the mouse to hover the pointer over the tab on the top bar.
C		Holding the left mouse button down on a metering tab and dragging it to this arrow box will place it across the side of the screen. Click on the (thumbtack) to dock it on the side bar. To display a screen that is docked, simply use the mouse to hover the pointer over the tab on the side bar.
D		Holding the left mouse button down on a metering tab and dragging it to this arrow box will place it across the bottom of the screen. Click on the (thumbtack) to dock it on the bottom bar. To display a screen that is docked, simply use the mouse to hover the pointer over the tab on the bottom bar.
E		Holding the left mouse button down on a metering tab and dragging it anywhere other than an arrow box will place it as a floating metering screen. This floating screen can later be closed by clicking on the in the upper right corner. It can also be dragged to one of the arrow boxes used for docking.

BESTspace™

BESTspace provides the ability to manage customized workspaces. Refer to the *BESTCOMSPlus* chapter for more information on BESTspace.

Engine

BESTCOMS*Plus* Navigation Path: Metering Explorer, Engine
Front Panel Navigation Path: Metering > Engine

The *Engine* metering screen (Figure 8) provides information and metering of engine components. Under certain circumstances, parameters may indicate one of the following codes: NA (not applicable), NC (not connected), NS (not sent), or SF (sender fail). See the *Communication* chapter in the *Configuration* manual for their descriptions.

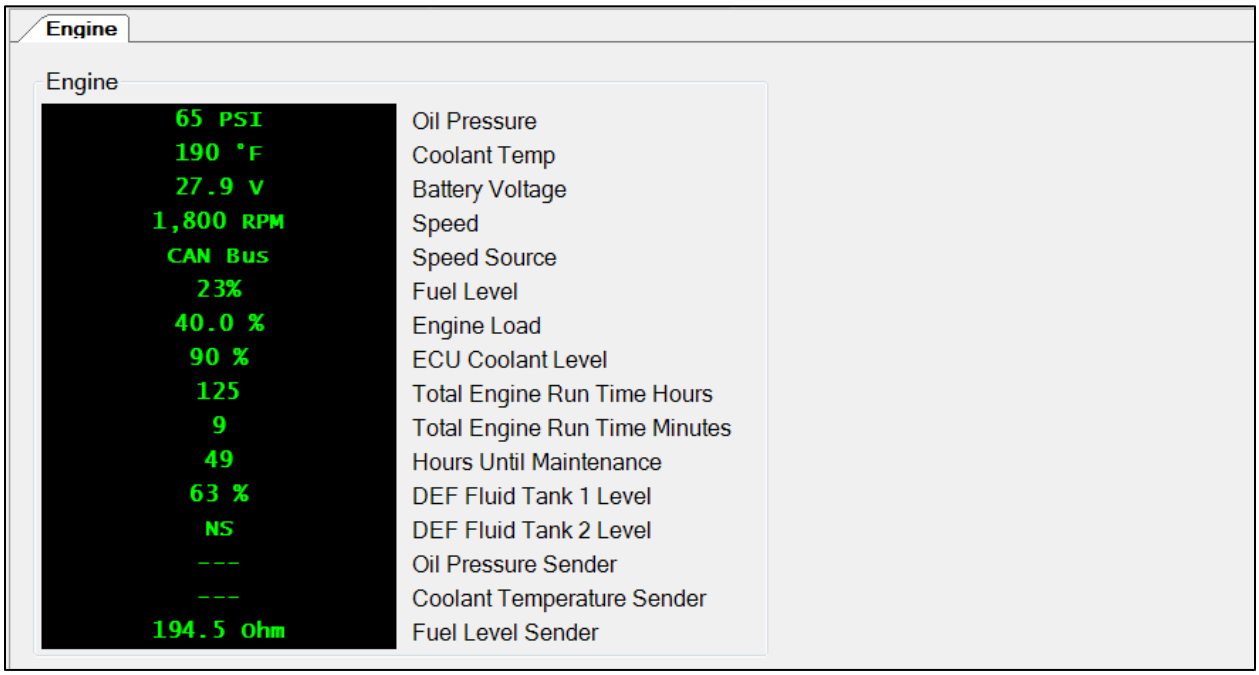


Figure 8. Metering Explorer, Engine Screen

Battery Charger 1 and 2

BESTCOMS*Plus* Navigation Path: Metering Explorer, Battery Charger
Front Panel Navigation Path: Metering > Battery Charger

Metering, status, and active pre-alarms of the battery charger(s) are displayed on this screen. See Figure 10.

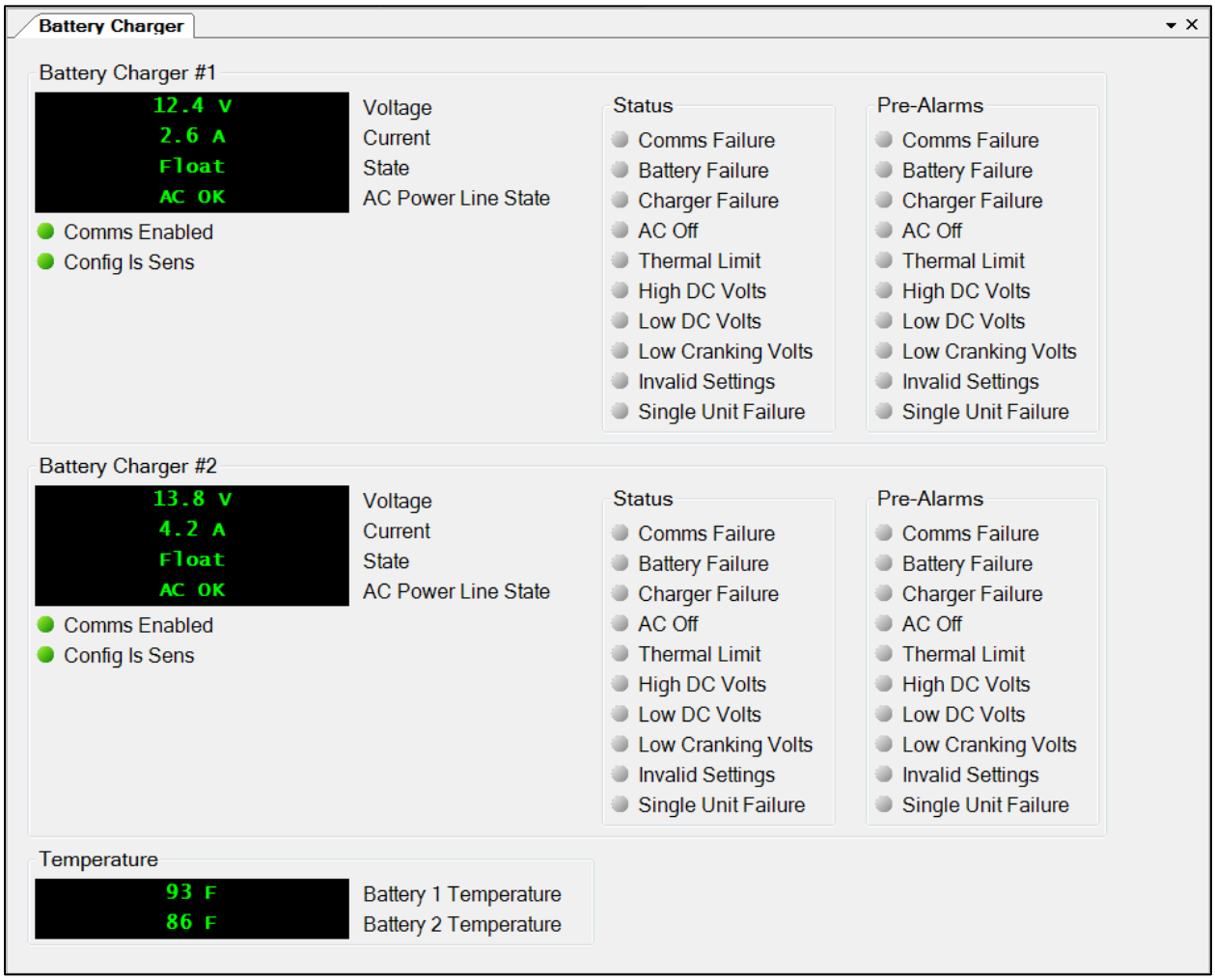


Figure 9. Metering Explorer, Battery Charger Screen

Generator

BESTCOMS*Plus* Navigation Path: Metering Explorer, Generator
Front Panel Navigation Path: Metering > Gen

Metering of the voltage, current, angle, frequency, and vector shift of the generator is displayed on this screen. See Figure 10.

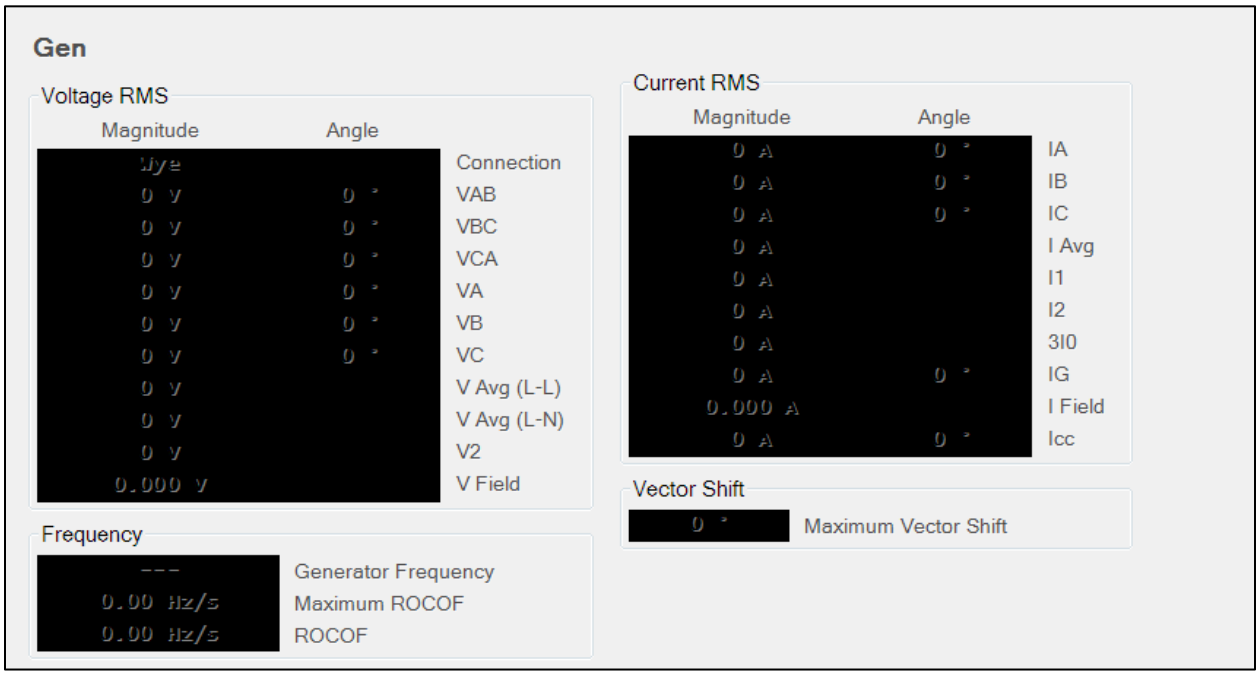


Figure 10. Metering Explorer, Generator Screen

Bus 1 and Optional Bus 2

BESTCOMS*Plus* Navigation Path: Metering Explorer, Bus 1 or Bus 2
Front Panel Navigation Path: Metering > Bus 1 or Bus 2

Metering of the voltage, current, angle, frequency, and vector shift of Bus 1 and optional Bus 2 is displayed on these screens. See Figure 11.

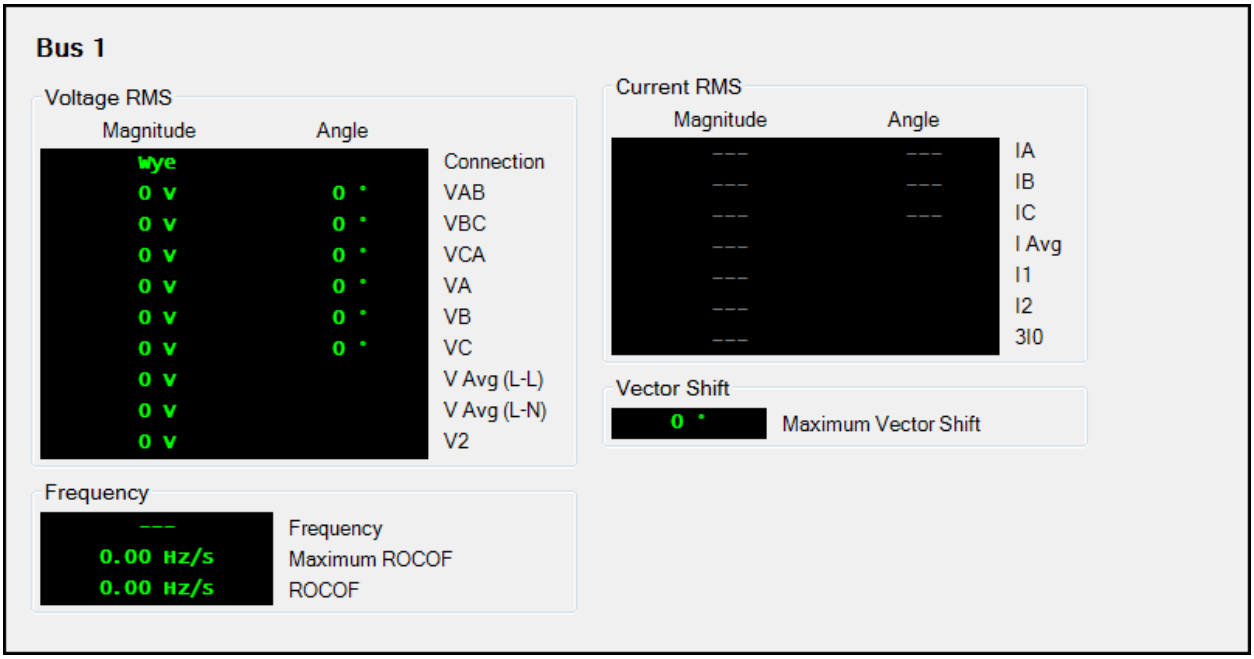


Figure 11. Metering Explorer, Bus 1 and Bus 2 (Optional) Screens

Power

BESTCOMS*Plus* Navigation Path: Metering Explorer, Power
Front Panel Navigation Path: Metering > Gen / Bus 1 / Bus 2 > Power

This screen provides metering of real power, apparent power, reactive power and power factor of the generator, bus 1, and optional bus 2. See Figure 12.

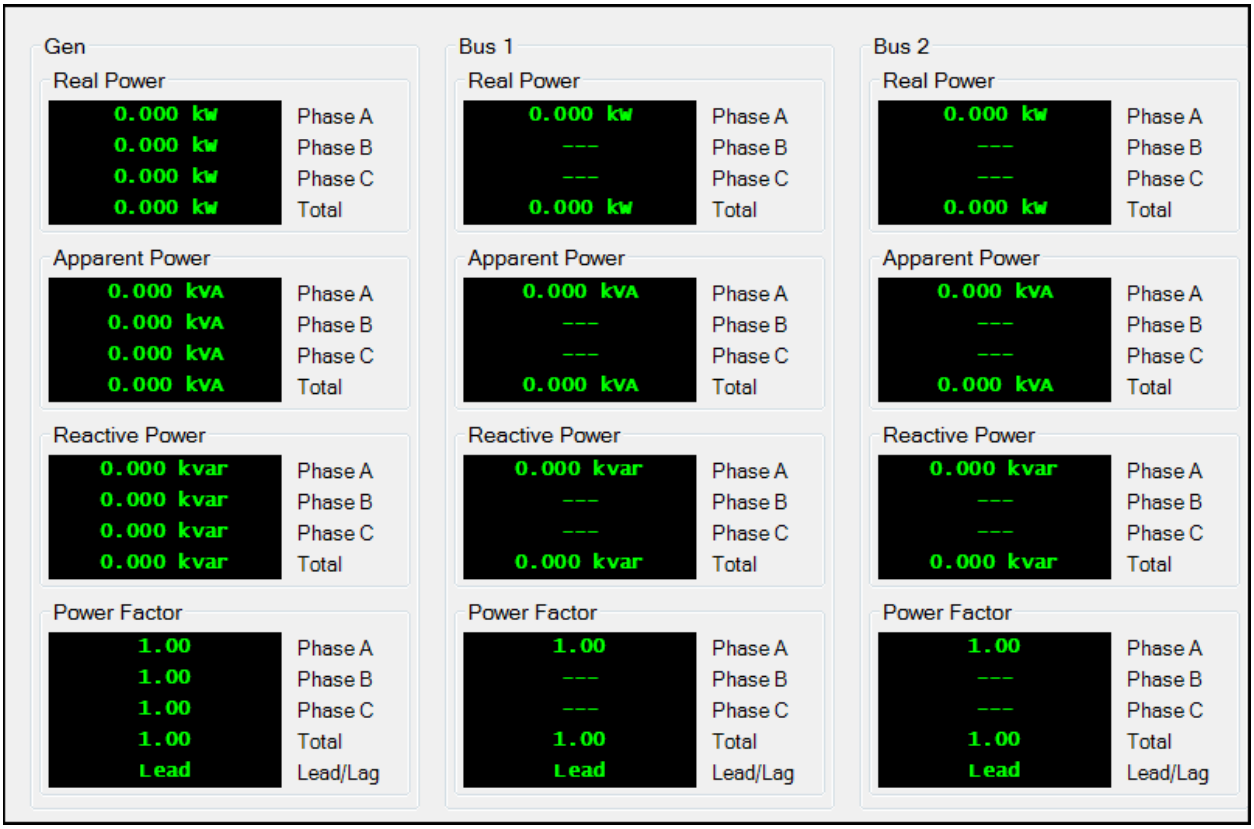


Figure 12. Metering Explorer, Power Screen

Energy

BESTCOMS*Plus* Navigation Path: Metering Explorer, Energy
Front Panel Navigation Path: Metering > Gen / Bus 1 / Bus 2 > Energy

This screen (Figure 13) provides metering of total positive and negative watthours, total positive and negative var hours, and total VA hours for the generator, bus 1, and optional bus 2.

The Edit button provides options to upload total watthour and total var hour values to the DGC-2020HD.

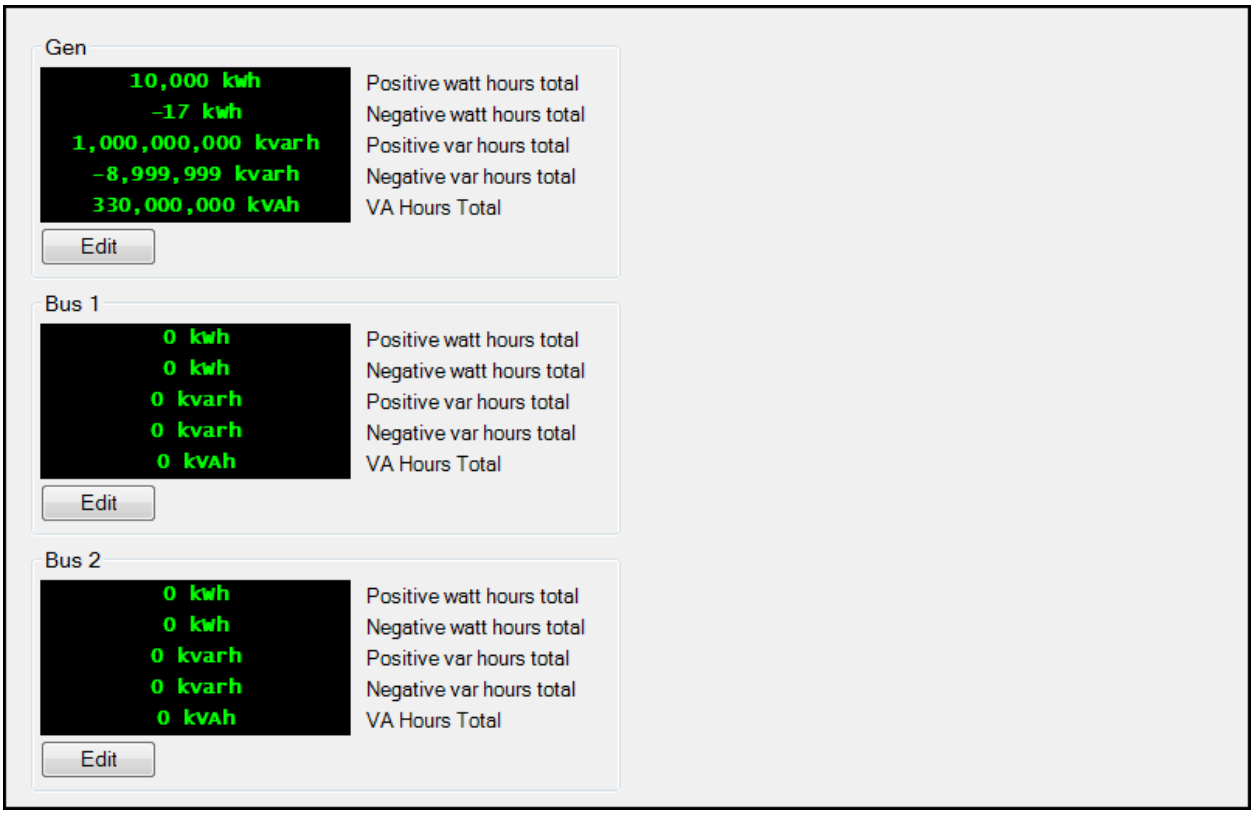


Figure 13. Metering Explorer, Energy Screen

Synchronization

BESTCOMS*Plus* Navigation Path: Metering Explorer, Synchronization
Front Panel Navigation Path: Metering > Synchronization

Slip frequency, slip angle, and the voltage difference between the current synchronization source and destination are displayed on the Synchronization screen (Figure 14) in BESTCOMS*Plus*.

Figure 14. Metering Explorer, Synchronization Screen

The Synchronization screen is automatically displayed on the front panel while the synchronizer is active. See Figure 15.

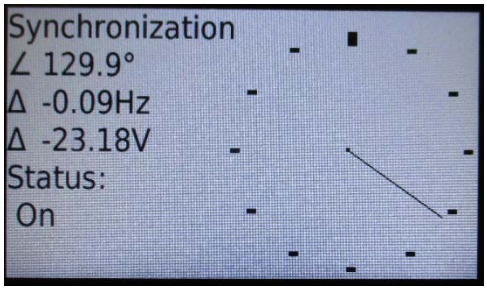


Figure 15. Front Panel Synchronization Screen

Differential

BESTCOMS*Plus* Navigation Path: Metering Explorer, Differential
Front Panel Navigation Path: Metering > Differential

Metered and calculated values for circuit 1, circuit 2, operating current, restraint current, 2nd harmonic, and 5th harmonic are displayed for phases A, B, and C. Operating current is displayed for neutral. See Figure 16.

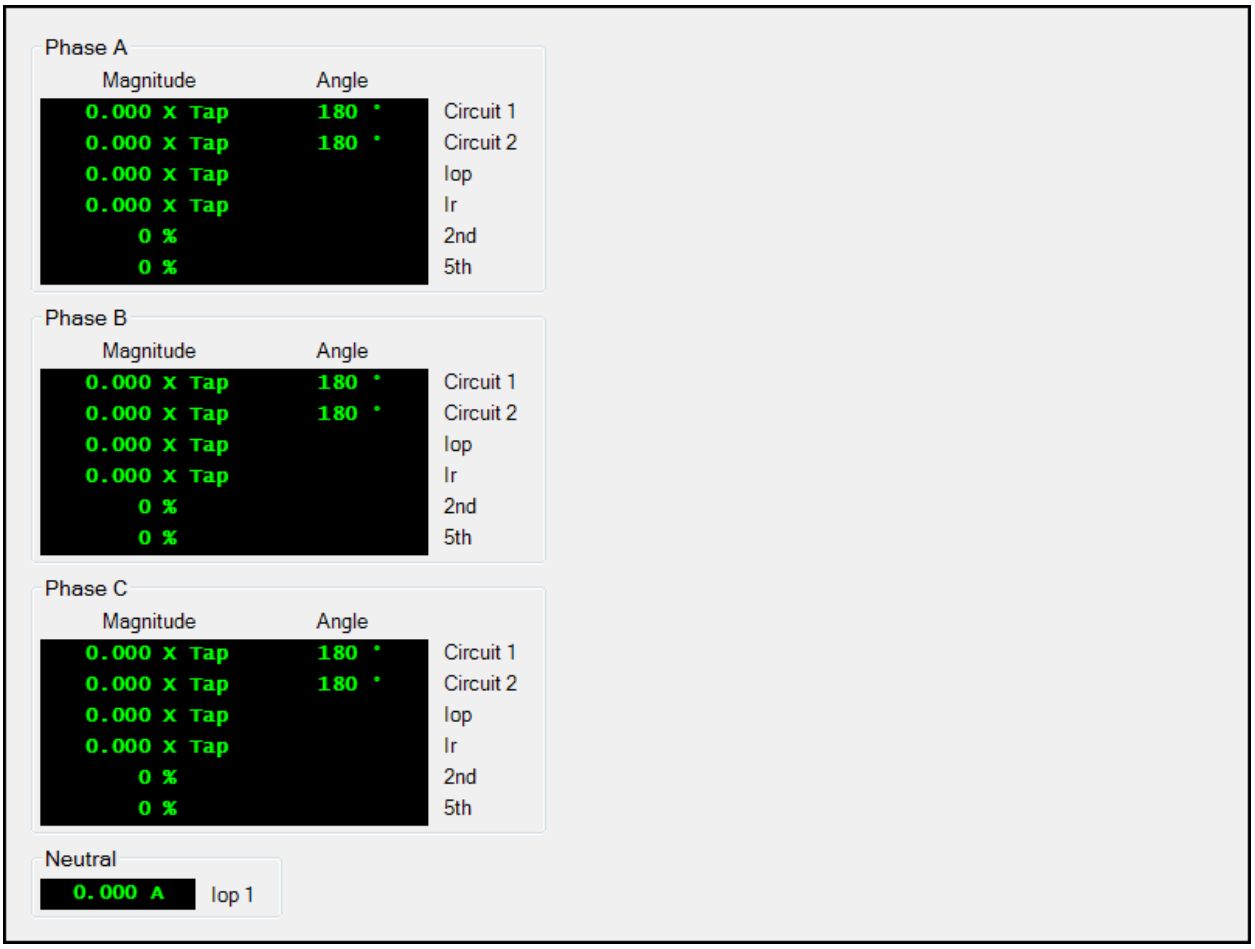


Figure 16. Metering Explorer, Differential Screen

Active Setpoints

BESTCOMS*Plus* Navigation Path: Metering Explorer, Active Setpoints
Front Panel Navigation Path: Metering > Active Setpoints

Active setpoints, active control mode, and active baseload levels are displayed on this screen. See Figure 17.

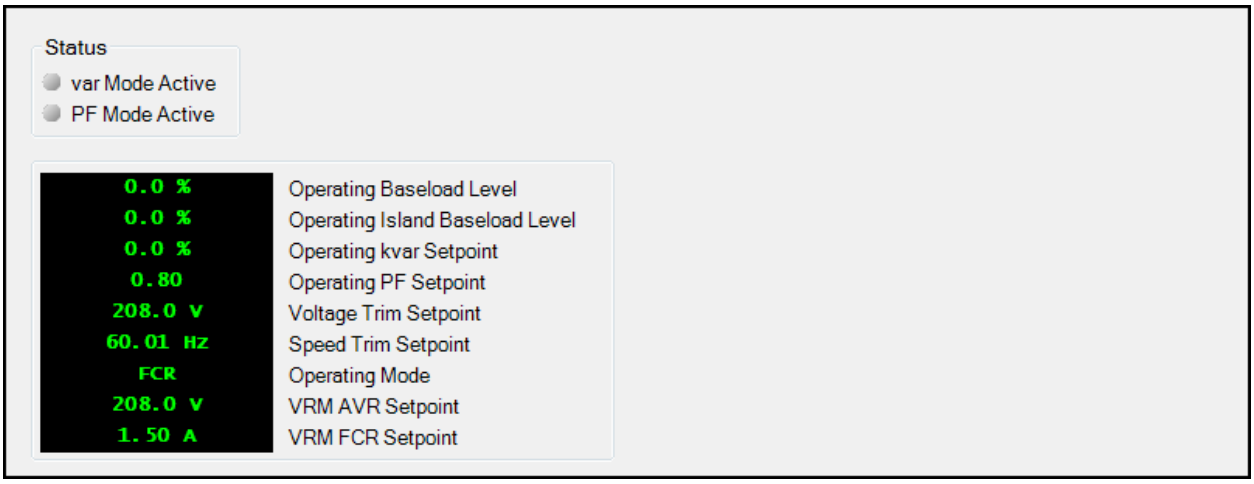


Figure 17. Metering Explorer, Active Setpoints

Run Statistics

BESTCOMS*Plus* Navigation Path: Metering Explorer, Run Statistics
Front Panel Navigation Path: Metering > Run Statistics

This screen provides Cumulative Run Statistics, Session Run Statistics, and Commission Date. See Figure 18.

The Cumulative Run Statistics are tracked from the first time the genset was started. The Session Run Statistics are tracked from the last time the genset was started until the following shutdown. Up to 25 sets of session run statistics can be stored. Use the arrow buttons to navigate through them.

The Commission Date, Number of Starts, Hours Until Maintenance, Total kWh, Total Engine Run Time, Loaded Run Time, and Unloaded Run time can be changed by clicking the *Edit Cumulative Run Statistics* button. This is helpful when installing the DGC-2020HD into a pre-existing system. This allows the current statistics of the genset to be transferred into the DGC-2020HD for uninterrupted tracking.

The Hours Until Maintenance pre-alarm is configured on the Pre-Alarms screen in the Settings Explorer. The Hours Until Maintenance field displays “OFF” when the Maintenance Interval pre-alarm is disabled. Clicking *Reset Maintenance Interval* resets the Hours Until Maintenance to the value set for the Maintenance Interval pre-alarm on the Pre-Alarms screen in the Settings Explorer.

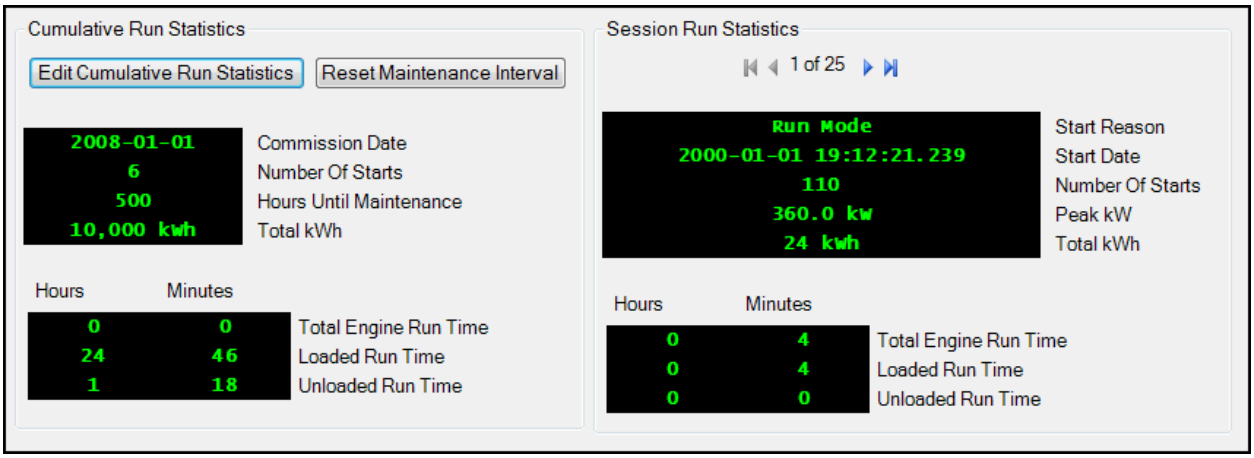


Figure 18. Metering Explorer, Run Statistics Screen

Status Indication

BESTCOMS*Plus* Navigation Path: Metering Explorer, Status
Front Panel Navigation Path: Metering > Status > Status

This screen indicates status of breakers, modes, switches, and I/O connection status. The status is TRUE when the corresponding indicator is lit. See Figure 19 and Figure 20. Status indications differ depending on system configuration.

Figure 19. Metering Explorer, Status Screen (Generator and Group Breaker Control)

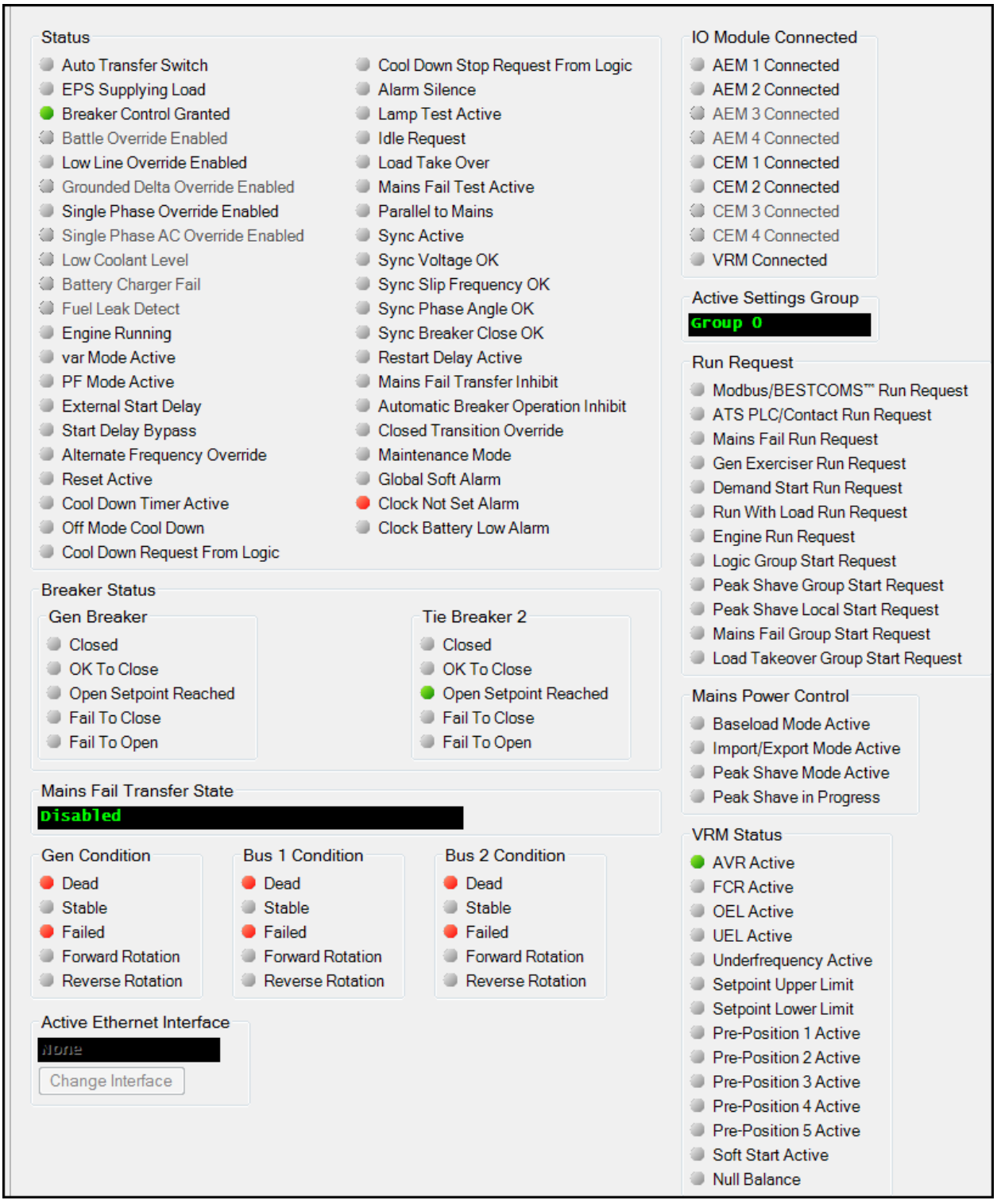


Figure 20. Metering Explorer, Status Screen (Generator and Tie Breaker Control)

Inputs

Contact Inputs

BESTCOMS*Plus* Navigation Path: Metering Explorer, Inputs, Contact Inputs
Front Panel Navigation Path: Metering > Status > Inputs > Contact Inputs

This screen indicates the status of contact inputs, contact input alarms, and contact input pre-alarms. The status is TRUE when the corresponding indicator is lit. See Figure 21.

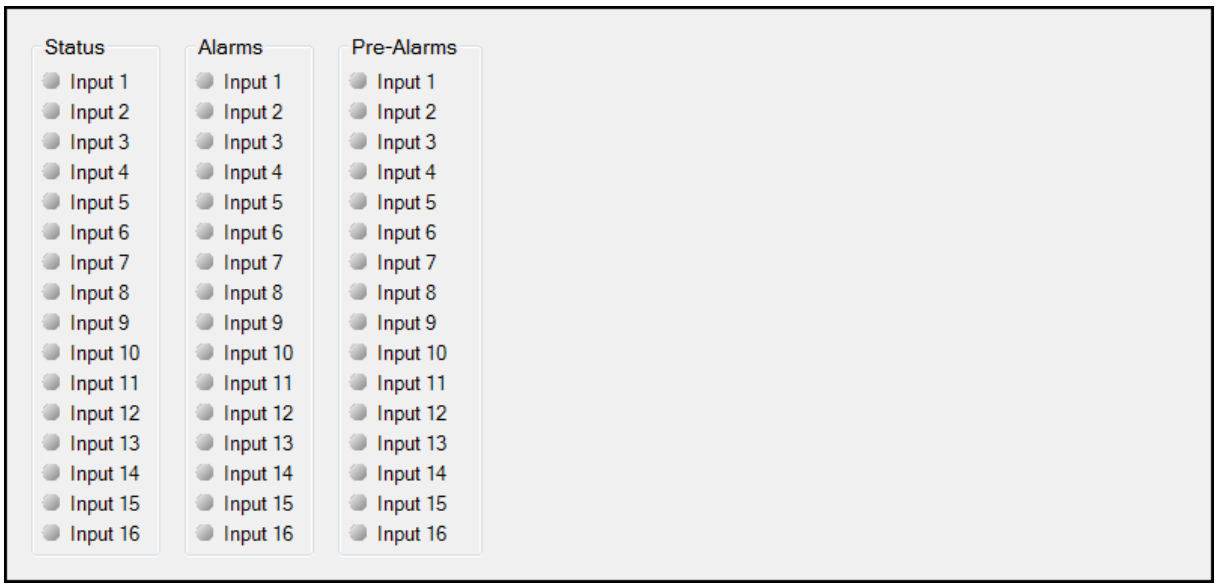


Figure 21. Metering Explorer, Inputs, Contact Inputs Screen

Analog Inputs

BESTCOMS*Plus* Navigation Path: Metering Explorer, Inputs, Analog Inputs
Front Panel Navigation Path: Metering > Status > Inputs > Analog Input Values

Scaled analog input value and threshold status are displayed for each analog input on this screen See Figure 22.

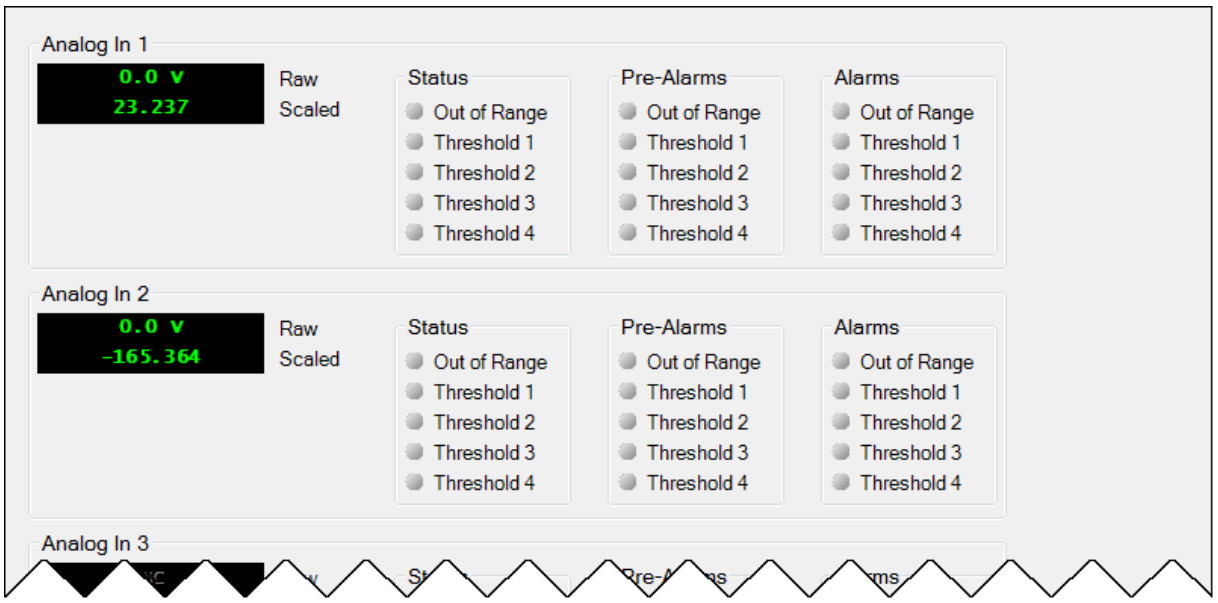


Figure 22. Metering Explorer, Inputs, Analog Inputs Screen

Remote Contact Inputs

BESTCOMS*Plus* Navigation Path: Metering Explorer, Remote Contact Inputs > CEM # Inputs
Front Panel Navigation Path: Metering > Status > Inputs > Remote Contact Inputs > CEM-2020 #

There are four remote contact input screens, one for each possible CEM-2020 (Contact Expansion Module). When CEM-2020s are connected, the status of the remote contact inputs, configurable remote

contact input alarms, and remote contact input pre-alarms are shown on these screens. The status is TRUE when the input indicator is lit. See Figure 23.

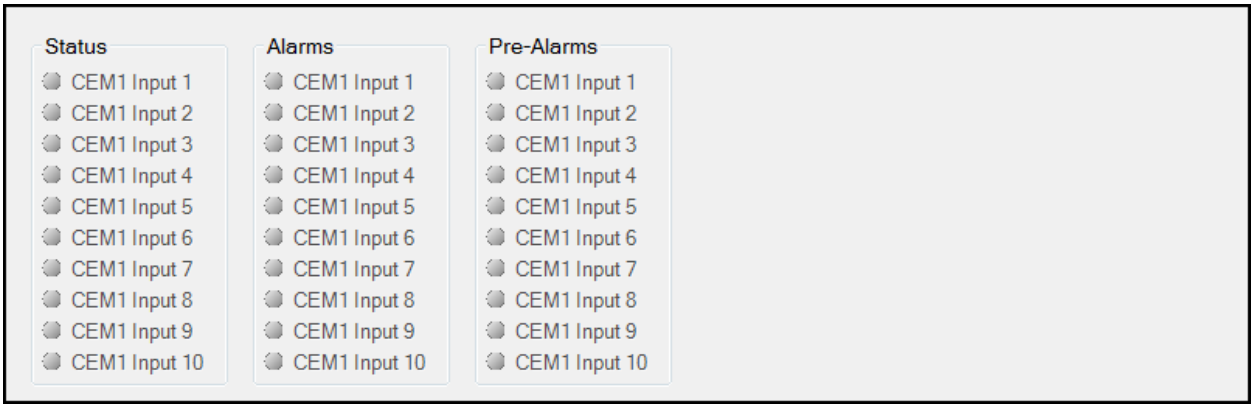


Figure 23. Metering Explorer, Inputs, Remote Contact Inputs, CEM 1 Inputs Screen

Remote Analog Inputs

The following screens show the scaled or raw analog input values and the status of each threshold for the analog inputs, RTD inputs, and thermocouple inputs of each connected AEM-2020. A status, pre-alarm, or alarm threshold is true when the corresponding indicator is lit.

Remote Analog Inputs

BESTCOMS*Plus* Navigation Path: Metering Explorer, Inputs, Remote Analog Inputs, AEM # Inputs, AEM # Analog Inputs

Front Panel Navigation Path: Metering > Status > Inputs > Remote Analog Input Values > AEM-2020 # > Scaled Analog Inputs / Raw Analog Inputs

Figure 24 illustrates the BESTCOMS*Plus* Remote Analog Inputs screen.

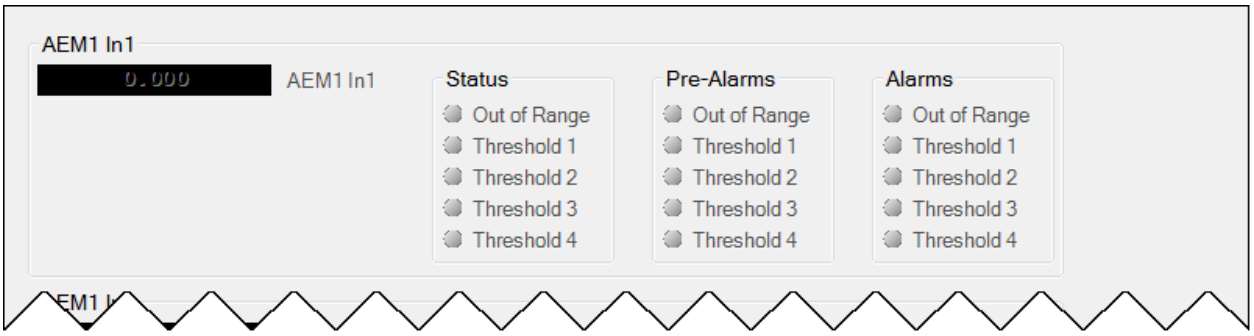


Figure 24. Metering Explorer, Inputs, Remote Analog Inputs, AEM 1 Inputs, AEM 1 Analog Inputs Screen

RTD Inputs

BESTCOMS*Plus* Navigation Path: Metering Explorer, Inputs, Remote Analog Inputs, AEM # Inputs, AEM # RTD Inputs

Front Panel Navigation Path: Metering > Status > Inputs > Remote Analog Input Values > AEM-2020 # > RTD Input Temperatures / Raw RTD Inputs

Figure 25 illustrates the BESTCOMS*Plus* RTD Inputs screen.

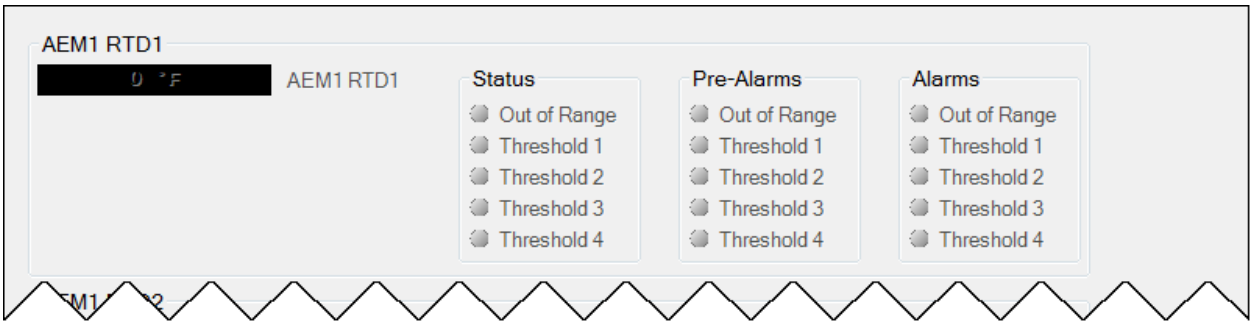


Figure 25. Metering Explorer, Inputs, Remote Analog Inputs, AEM 1 Inputs, AEM 1 RTD Inputs Screen

Thermocouple Inputs

BESTCOMS*Plus* Navigation Path: Metering Explorer, Inputs, Remote Analog Inputs, AEM # Inputs, AEM # Thermocouple Inputs

Front Panel Navigation Path: Metering > Status > Inputs > Remote Analog Input Values > AEM-2020 # > ThermoInput Temperatures / Raw Thermocouple Inputs

Figure 26 illustrates the BESTCOMS*Plus* Thermocouple Inputs screen.

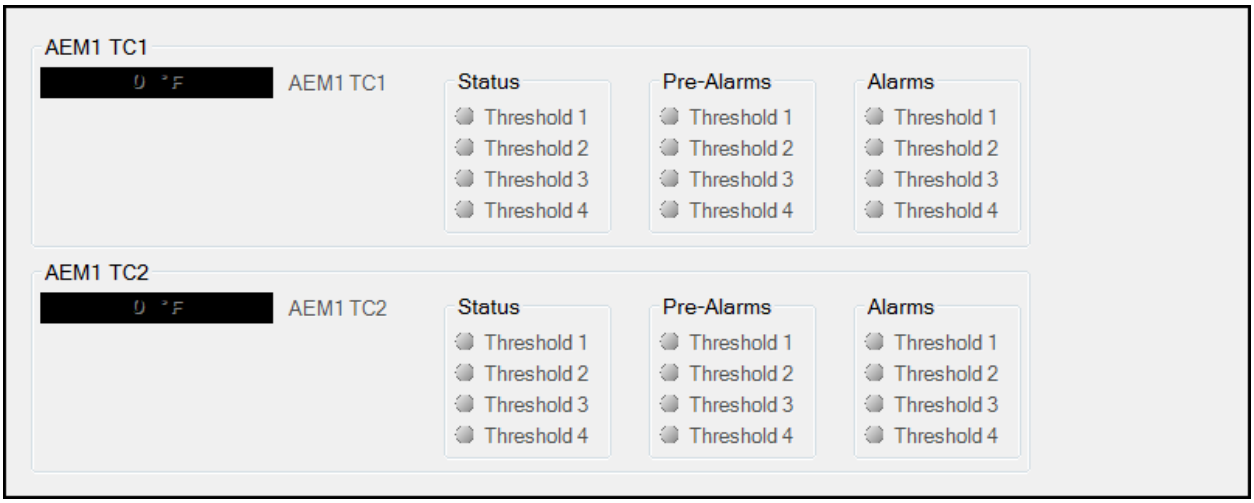


Figure 26. Metering Explorer, Inputs, Remote Analog Inputs, AEM 1 Inputs, AEM 1 Thermocouple Inputs

Input Values

BESTCOMS*Plus* Navigation Path: Metering Explorer, Inputs, Remote Analog Inputs, AEM # Inputs, AEM # Input Values

Front Panel Navigation Path: Metering > Status > Inputs > Remote Analog Input Values > AEM-2020 #

Figure 27 illustrates the BESTCOMS*Plus* Input Values screen.

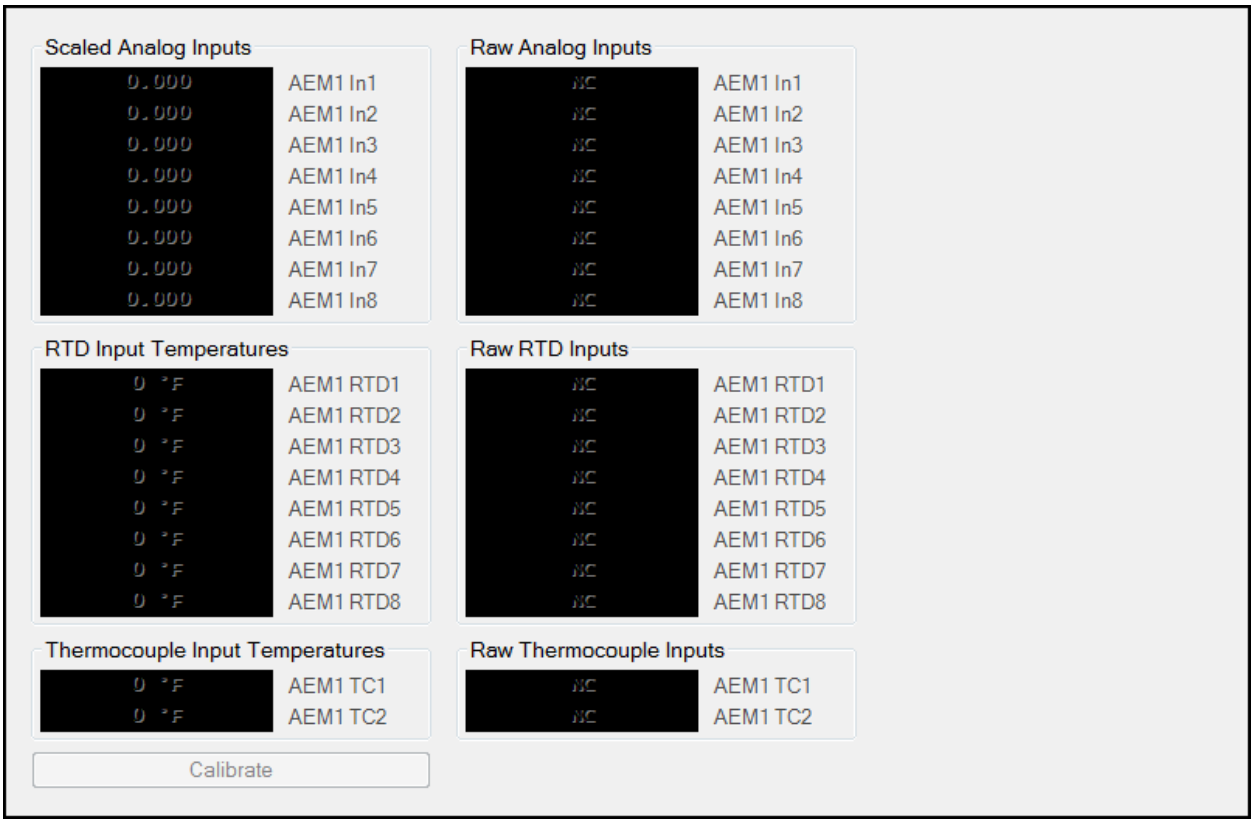


Figure 27. Metering Explorer, Inputs, Remote Analog Inputs, AEM 1 Inputs, AEM 1 Input Values

Voltage Regulation Module

The following screens show the scaled or raw input values and the status of each threshold for the VRM-2020 RTD inputs. A status, pre-alarm, or alarm threshold is true when the corresponding indicator is lit.

VRM RTD Inputs

BESTCOMS*Plus* Navigation Path: Metering Explorer, Inputs, Voltage Regulation Module, VRM RTD Inputs

Front Panel Navigation Path: Metering > Status > Inputs > Remote Analog Input Values > VRM > RTD Input Temperatures / Raw RTD Inputs

Figure 28 illustrates the BESTCOMS*Plus* VRM RTD Inputs screen.

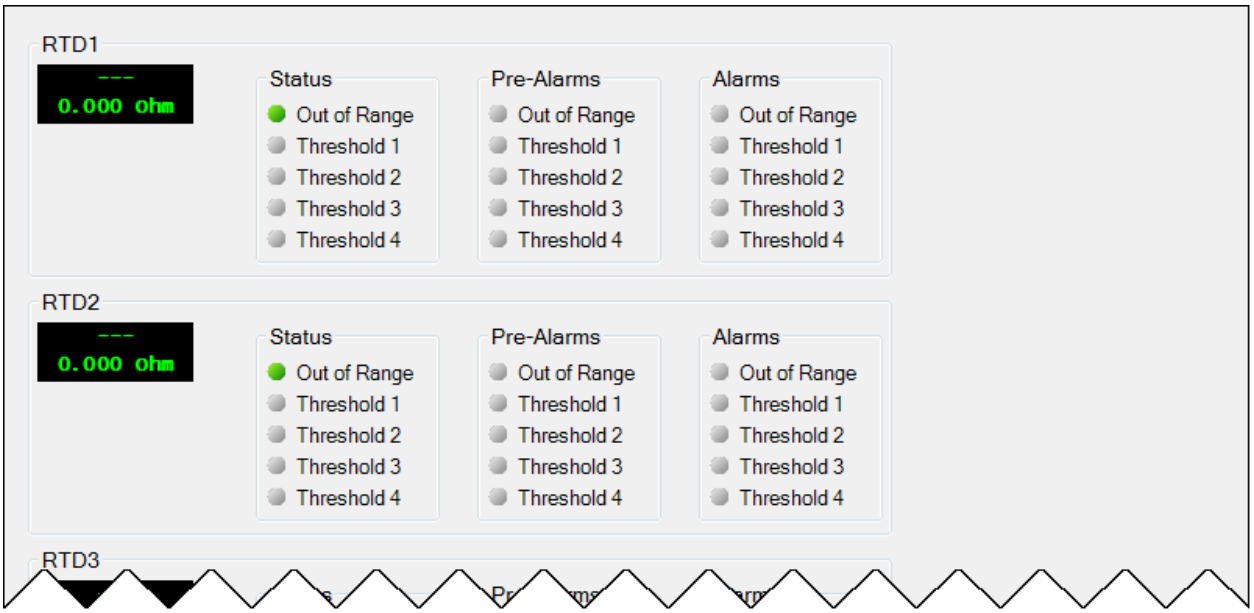


Figure 28. Metering Explorer, Inputs, Voltage Regulation Module, VRM RTD Inputs

VRM RTD Input Values

BESTCOMS*Plus* Navigation Path: Metering Explorer, Inputs, Voltage Regulation Module, VRM RTD Input Values

Front Panel Navigation Path: Metering > Status > Inputs > Remote Analog Input Values > VRM > RTD Input Temperatures / Raw RTD Inputs

Figure 29 illustrates the BESTCOMS*Plus* VRM RTD Input Values screen and Figure 30 illustrates the VRM-2020 RTD calibration screen.

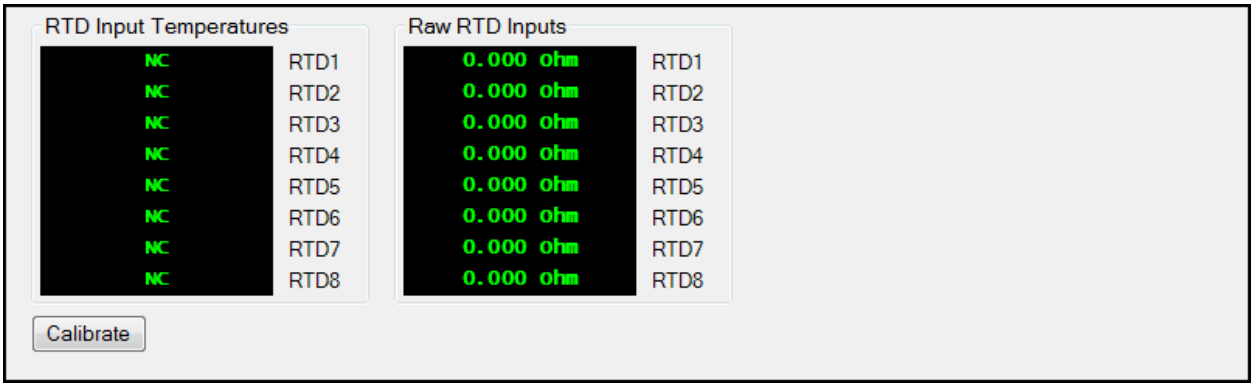


Figure 29. Metering Explorer, Inputs, Voltage Regulation Module, VRM RTD Input Values

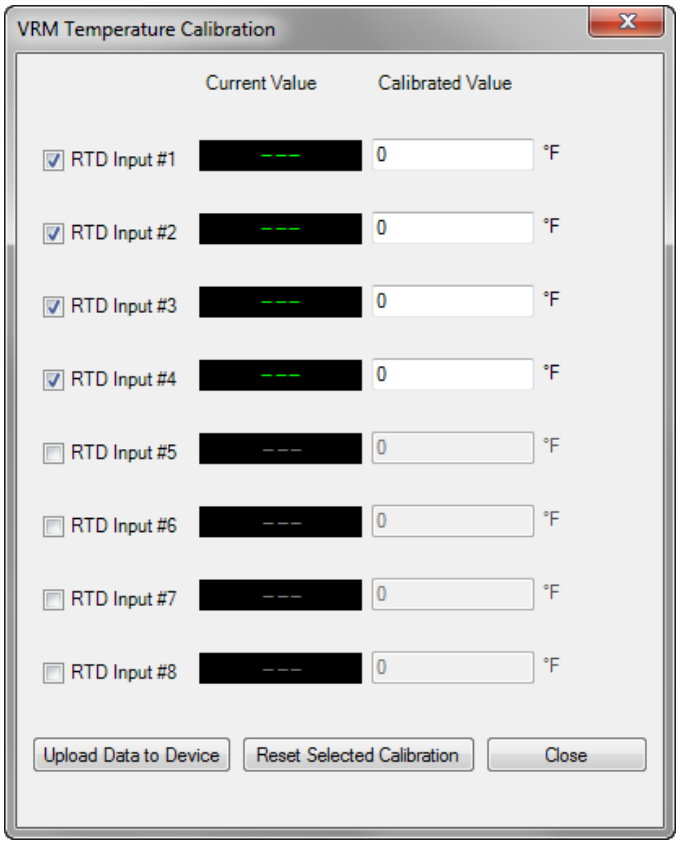


Figure 30. VRM-2020 RTD Calibration Screen

Logic Control Relays

BESTCOMS*Plus* Navigation Path: Metering Explorer, Inputs, Logic Control Relays
Front Panel Navigation Path: Metering > Status > Logic Control Relays

This screen displays the status of the 64 logic control relays. A logic control relay input is true when the corresponding indicator is lit. See Figure 31.

Figure 31. Metering Explorer, Inputs, Logic Control Relays Screen

Remote System Manager Inputs

BESTCOMS*Plus* Navigation Path: Metering Explorer, Inputs, Remote System Manager Inputs
Front Panel Navigation Path: Metering > Inputs > Remote Sys Manager Inputs

This screen (Figure 32) displays the voltage or current level of the broadcasted var, PF, or kW control setpoint source.

Figure 32. Metering Explorer, Inputs, Remote System Manager Inputs Screen

Broadcast Logic

BESTCOMS*Plus* Navigation Path: Metering Explorer, Inputs, Broadcast Logic
Front Panel Navigation Path: Metering > Inputs > Broadcast Logic

This screen (Figure 33) displays the status of each BCASTLOGIC# element. See the BESTlogic™*Plus* chapter for more information about BCASTLOGIC# elements.

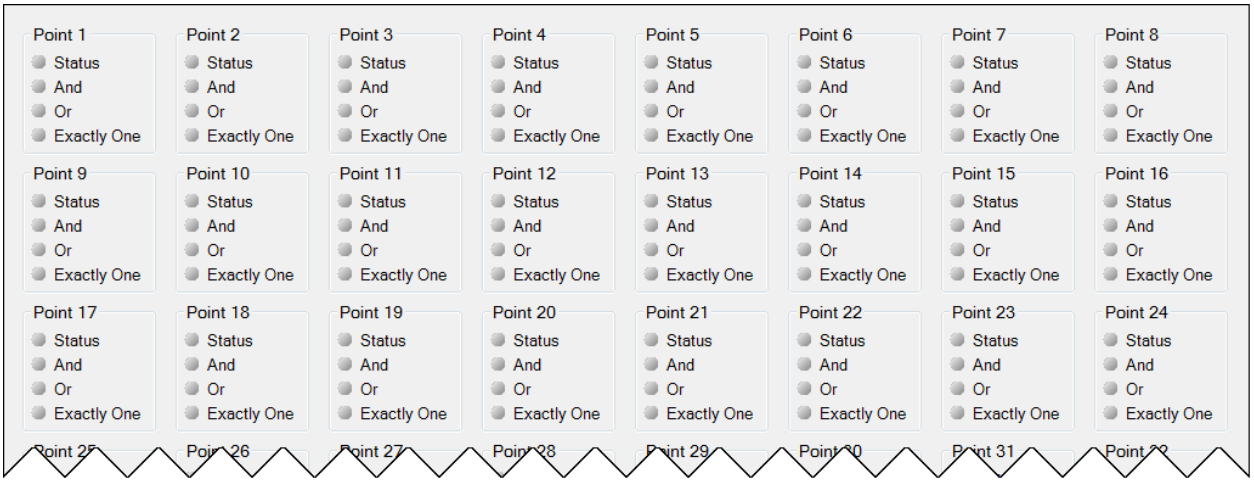


Figure 33. Metering Explorer, Inputs, Broadcast Logic Screen

Modbus Switches

BESTCOMS*Plus* Navigation Path: Metering Explorer, Inputs, Modbus Switches
Front Panel Navigation Path: Metering > Inputs > Modbus Switches

The status of each Modbus switch is displayed on this screen (Figure 34).

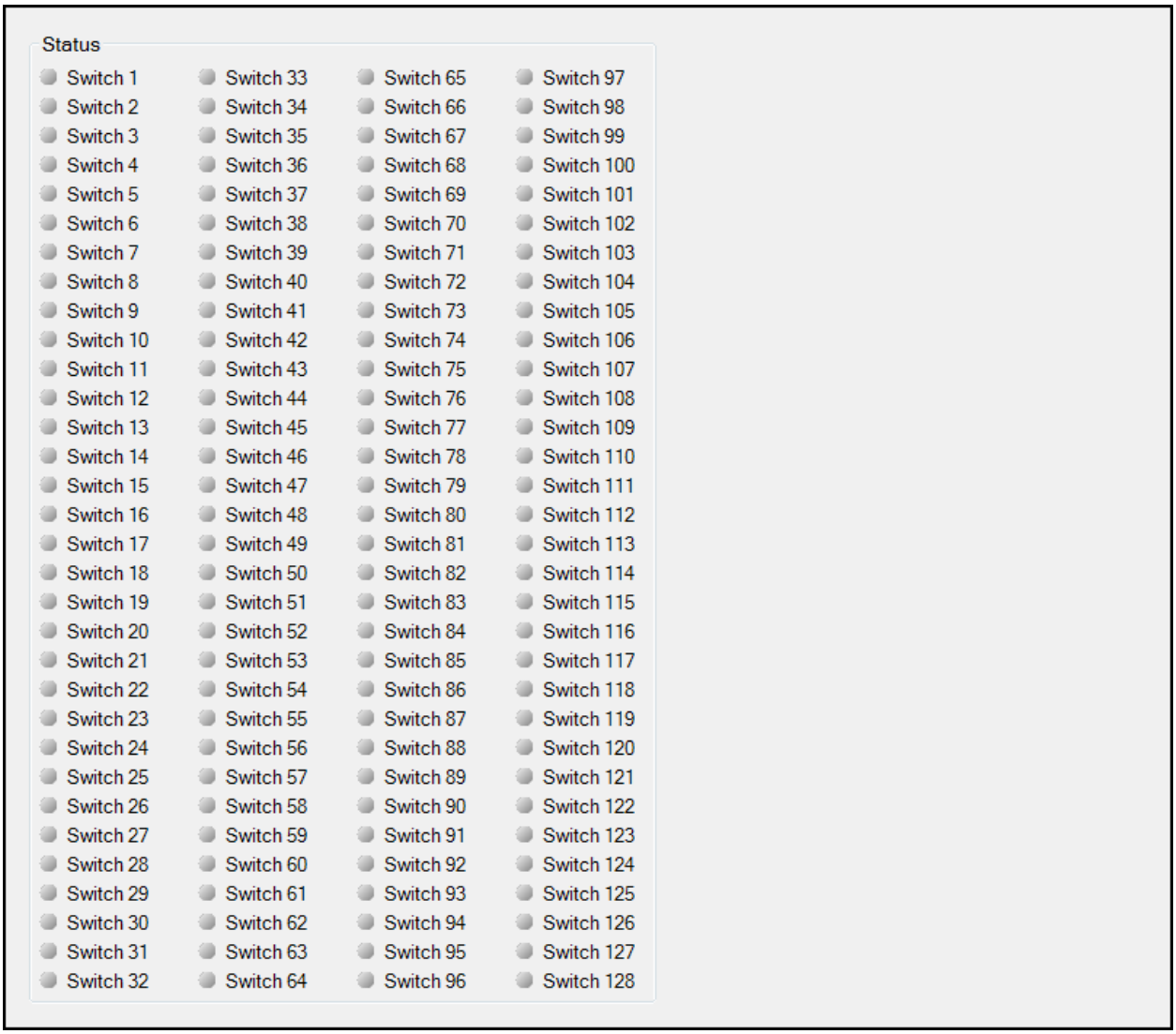


Figure 34. Metering Explorer, Inputs, Modbus Switches Screen

Outputs

Contact Outputs

BESTCOMS*Plus* Navigation Path: Metering Explorer, Outputs, Contact Outputs
Front Panel Navigation Path: Metering > Status > Outputs > Contact Outputs

This screen indicates the status of the twelve contact outputs and the Start, Run, and Pre-start outputs. The status is TRUE when the corresponding indicator is lit. See Figure 35.

Figure 35. Metering Explorer, Outputs, Contact Outputs Screen

Analog Outputs

BESTCOMS*Plus* Navigation Path: Metering Explorer, Outputs > Analog Outputs
Front Panel Navigation Path: Metering > Status > Outputs > AVR Output / GOV Output / LS Output

Scaled and raw analog values of the AVR, GOV, and LS outputs are displayed on this screen. An output whose value is outside of the specified range is annunciated by the corresponding Status, Pre-alarm, or Alarm indicator. See Figure 36.

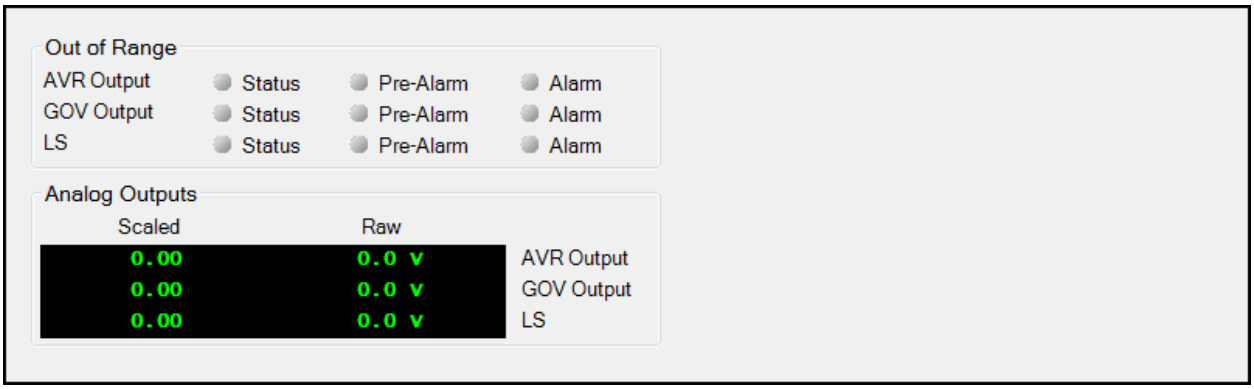


Figure 36. Metering Explorer, Outputs, Analog Outputs Screen

Configurable Elements

BESTCOMS*Plus* Navigation Path: Metering Explorer, Outputs, Configurable Elements
Front Panel Navigation Path: Metering > Status > Configurable Elements

This screen indicates the status of the eight configurable elements. The status is true when the corresponding indicator is lit. See Figure 37.

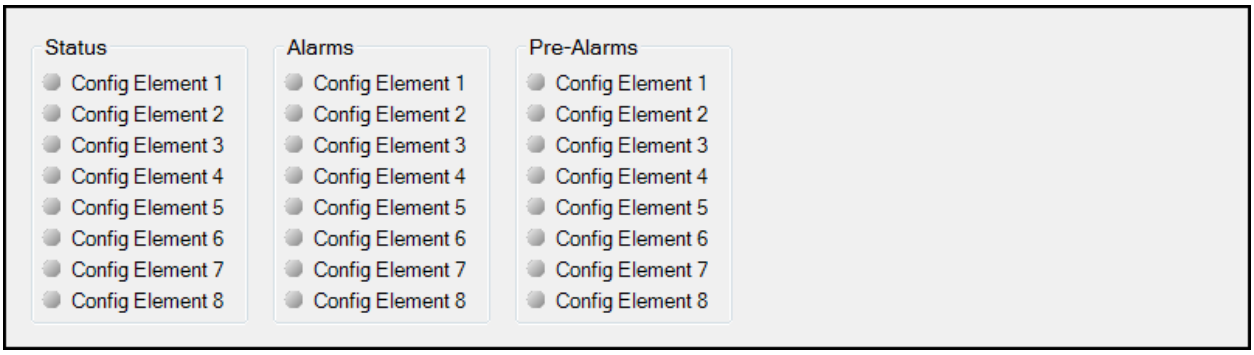


Figure 37. Metering Explorer, Outputs, Configurable Elements Screen

Remote Contact Outputs

BESTCOMS*Plus* Navigation Path: Metering Explorer, Outputs, Remote Contact Outputs, CEM # Outputs
Front Panel Navigation Path: Metering > Status > Outputs > Remote Contact Outputs > CEM -2020 #

There are four remote contact output screens, one for each possible CEM-2020 (Contact Expansion Module). When CEM-2020s are connected, the status of the remote contact outputs is shown on these screens. The status is TRUE when the input indicator is lit. See Figure 38.

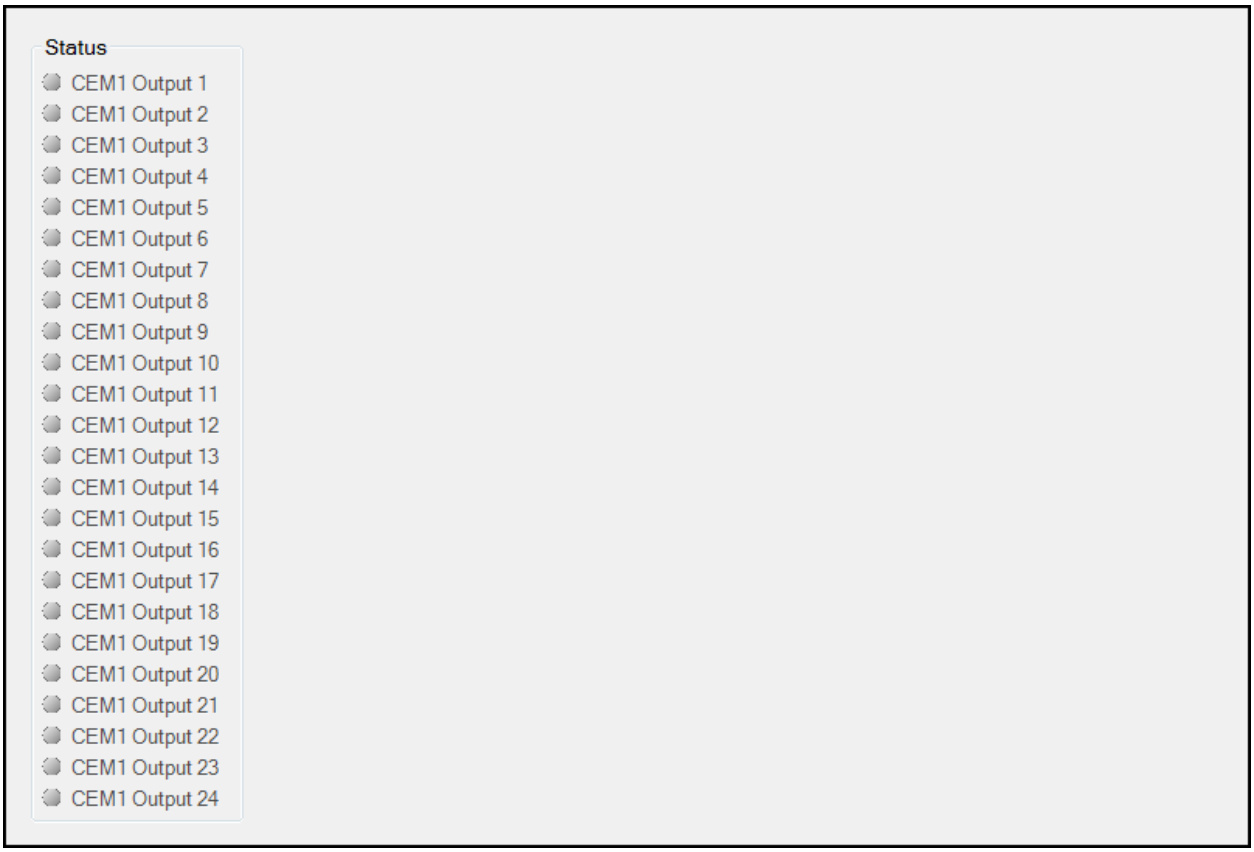


Figure 38. Metering Explorer, Outputs, Remote Contact Outputs, CEM 1 Outputs Screen

Remote Analog Outputs

BESTCOMS*Plus* Navigation Path: Metering Explorer, Outputs, Remote Analog Outputs, AEM # Analog Outputs
Front Panel Navigation Path: Metering > Status > Outputs > Remote Analog Outputs > AEM -2020 #

There are four remote analog output screens, one for each possible AEM-2020 (Analog Expansion Module). Each of these screens displays the scaled and raw values of the four remote analog outputs of

one AEM-2020. An output whose value is outside of the specified range is annunciated by the corresponding Status, Pre-alarm, or Alarm indicator. The status is TRUE when the output indicator is lit. See Figure 39.

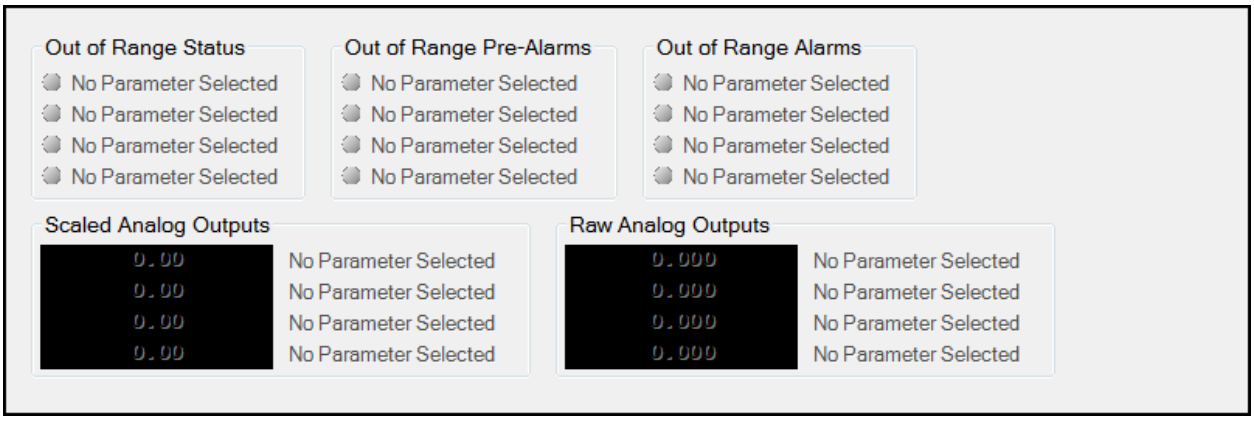


Figure 39. Metering Explorer, Outputs, Remote Analog Outputs, AEM 1 Analog Outputs Screen

Configurable Protection

BESTCOMS*Plus* Navigation Path: Metering Explorer, Configurable Protection
Front Panel Navigation Path: Metering > Status > Configurable Protection > Configurable Protection #

This screen displays threshold status for each configurable protection element. A lit indicator denotes that a value has exceeded its threshold. See Figure 40.

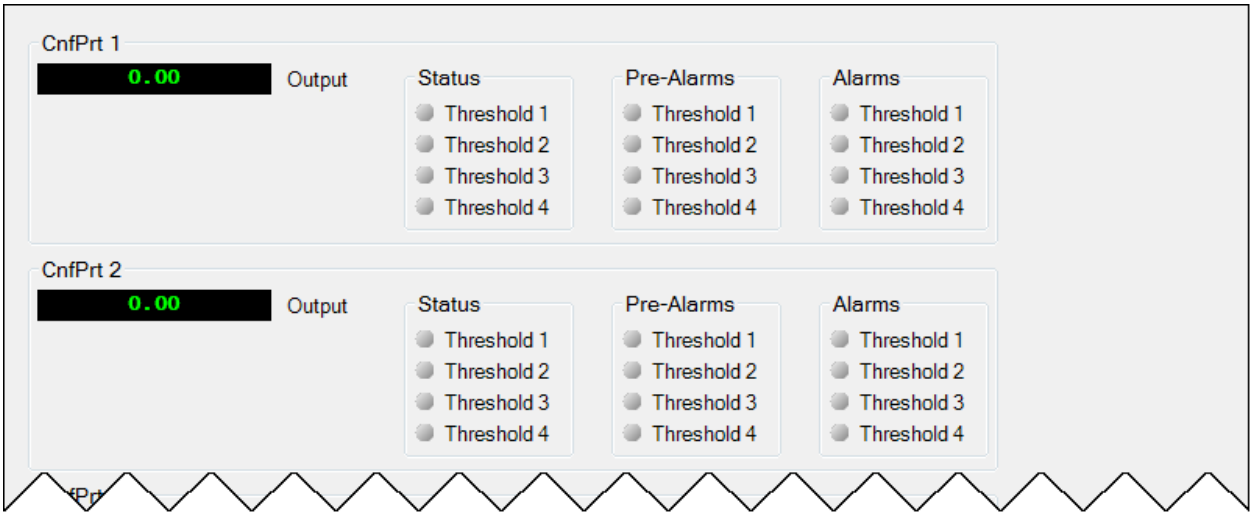


Figure 40. Metering Explorer, Configurable Protection Screen

Alarms

BESTCOMS*Plus* Navigation Path: Metering Explorer, Alarms
Front Panel Navigation Path: Metering > Status > Alarms/Prealarms

This screen (Figure 41) displays active alarms, pre-alarms, and global soft alarms. Alarms, pre-alarms, and global soft alarms are reset when the DGC-2020HD is set to Off mode. Certain pre-alarms pertaining to system breakers can be reset by pressing the Reset key on the front panel. See the *Reporting and Alarms* chapter for details.

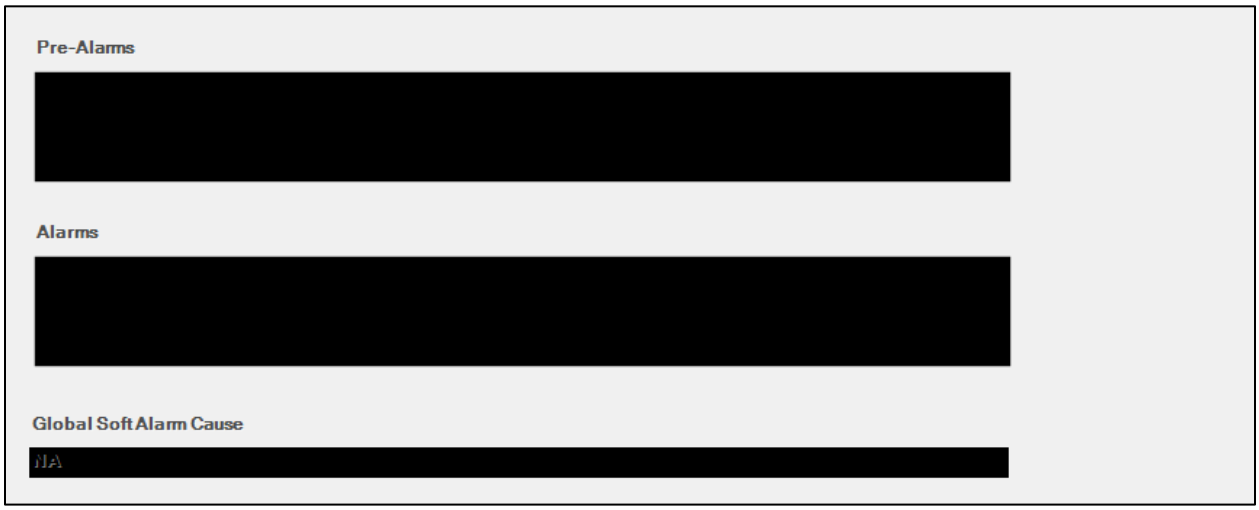


Figure 41. Metering Explorer, Alarms

The front panel Alarms and Pre-Alarms screens are shown in Figure 42.

Figure 42. Front Panel Alarms and Pre-Alarms Screens

J1939 ECU

ECU Data

BESTCOMS*Plus* Navigation Path: Metering Explorer, J1939 ECU, ECU Data
Front Panel Navigation Path: Metering > J1939 ECU > J1939 Data

The ECU Data metering screen (Figure 43) provides information and metering of engine components. Under certain circumstances, parameters may indicate one of the following codes: NA (not applicable), NC (not connected), NS (not sent), or SF (sender fail). See the *Communication* chapter for their descriptions.

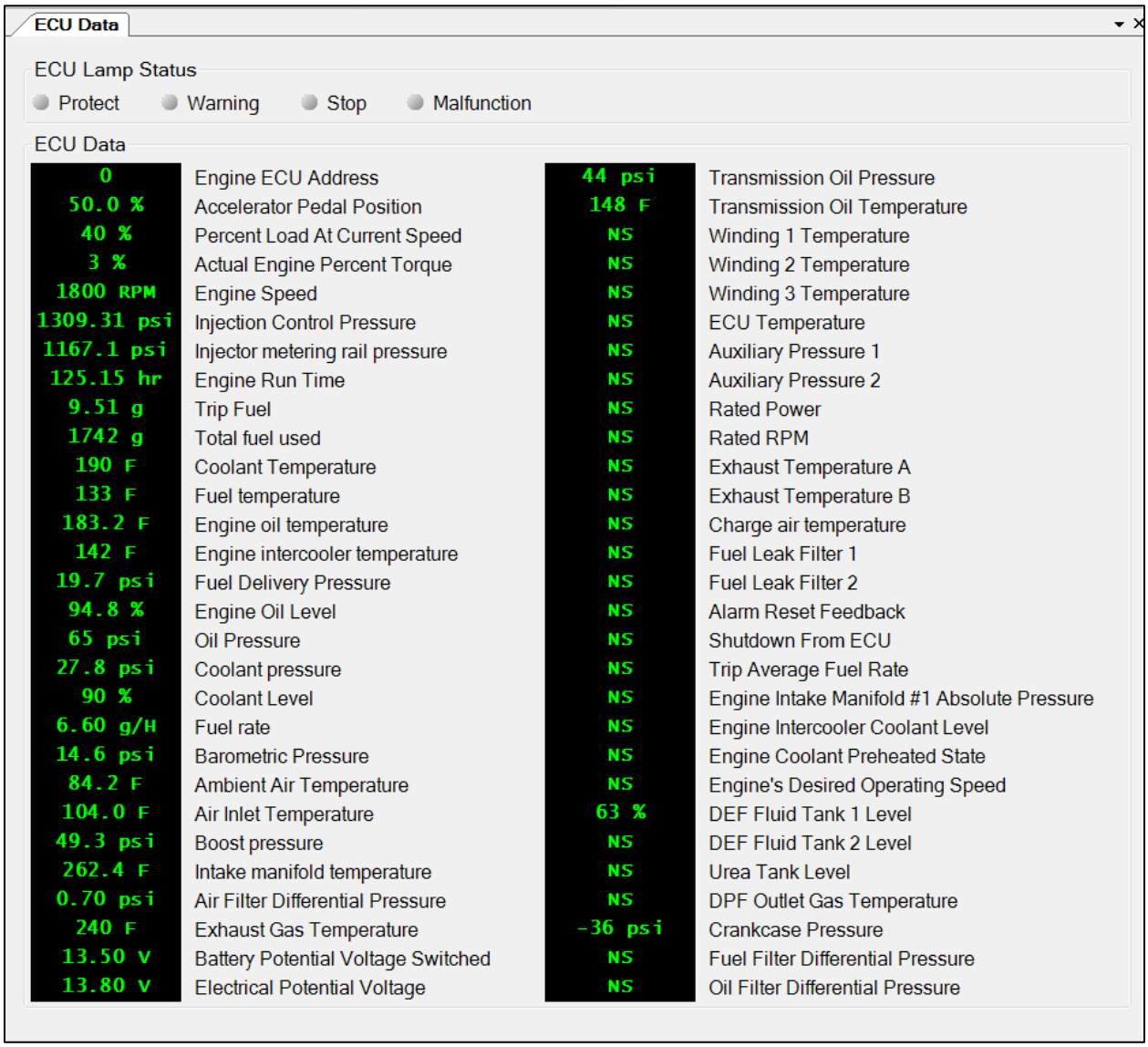


Figure 43. Metering Explorer, J1939 ECU, ECU Data Screen

Isuzu Status

BESTCOMS*Plus* Navigation Path: Metering Explorer, J1939 ECU, Isuzu Status
Front Panel Navigation Path: Metering > J1939 ECU > J1939 Data

The Isuzu Status metering screen (Figure 44) provides Isuzu engine parameters that may be useful for exhaust system troubleshooting.

Figure 44. Metering Explorer, J1939 ECU, Isuzu Status

Engine Configuration

BESTCOMS*Plus* Navigation Path: Metering Explorer, J1939 ECU, Engine Configuration
Front Panel Navigation Path: Metering > J1939 ECU > J1939 Engine Config

This screen (Figure 45) provides information and metering of engine parameters. Under certain circumstances, parameters may indicate one of the following codes: NA (not applicable), NC (not connected), NS (not sent), or SF (sender fail). See the *Communication* chapter for their descriptions.

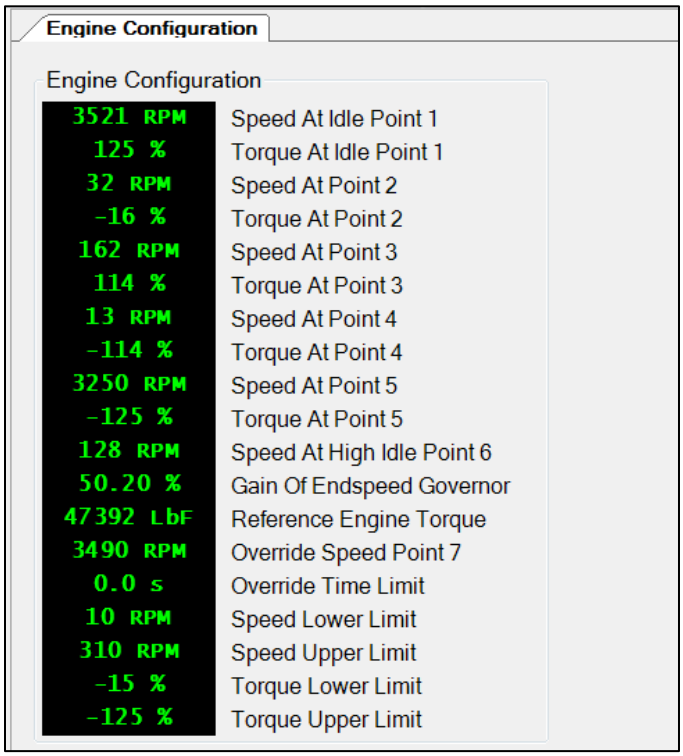


Figure 45. Metering Explorer, J1939 ECU, Engine Configuration Screen

MTU

MTU Alarms

BESTCOMS*Plus* Navigation Path: Metering Explorer, MTU, MTU Alarms
Front Panel Navigation Path: Metering > MTU > MTU Alarms

On the MTU Alarms screen (Figure 46), MTU fault codes are displayed in a scrolling window. MTU alarms and MTU pre-alarms are also reported on this screen. The status is true when the corresponding LED is red.

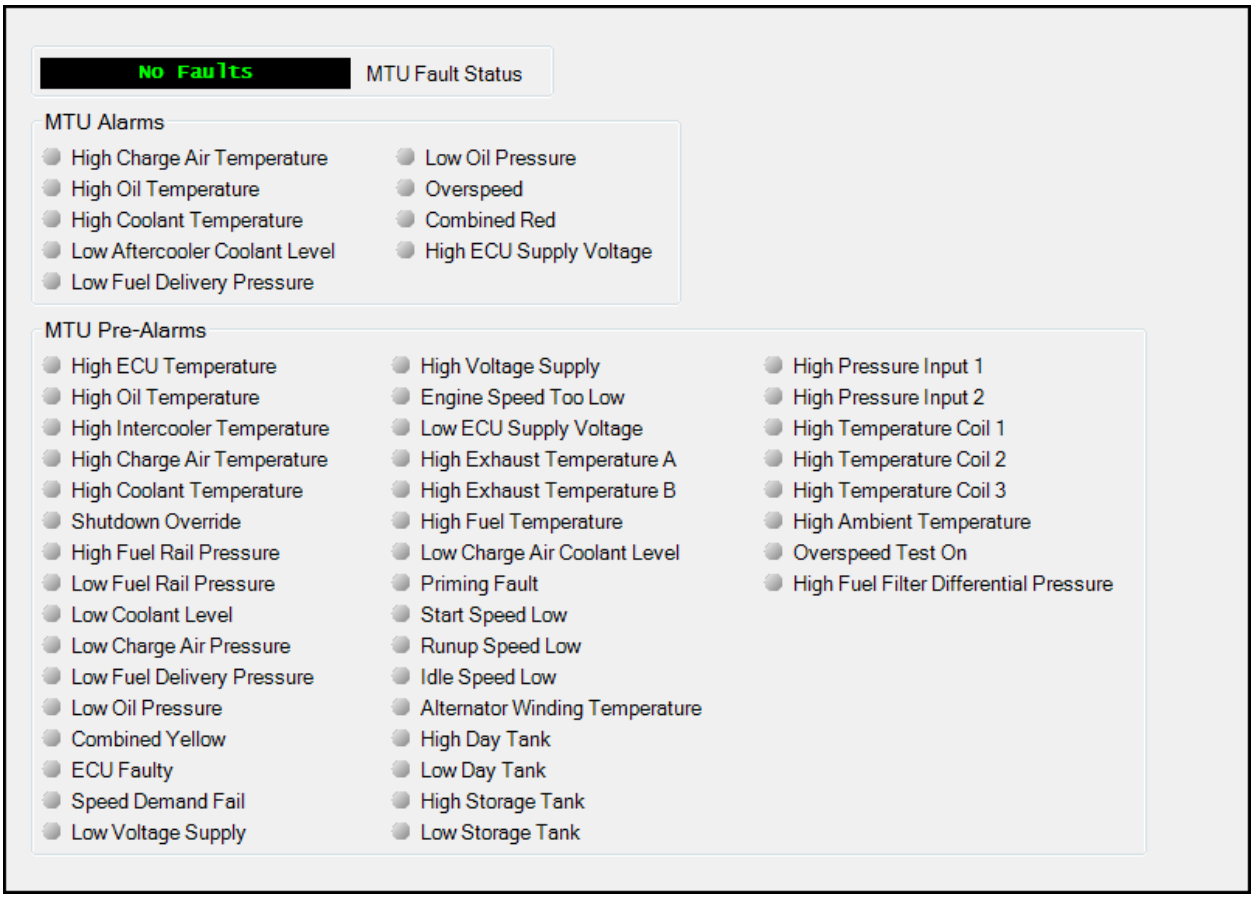


Figure 46. Metering Explorer, MTU, MTU Alarms Screen

MTU Fault Codes

BESTCOMS*Plus* Navigation Path: Metering Explorer, MTU, MTU Engine Status
Front Panel Navigation Path: Metering > MTU > MTU Fault Codes

MTU fault codes can be viewed and downloaded on this screen (Figure 47).

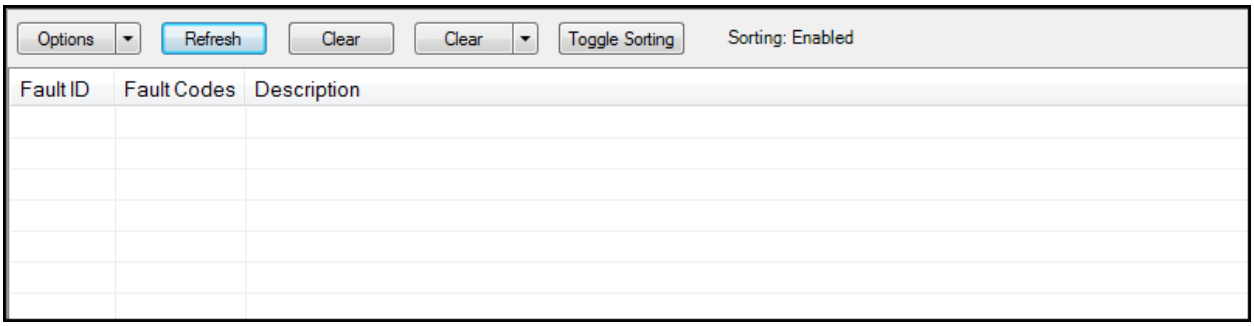


Figure 47. Metering Explorer, MTU, MTU Fault Codes Screen

MTU Status

BESTCOMS*Plus* Navigation Path: Metering Explorer, MTU, MTU Status
Front Panel Navigation Path: Metering > MTU > MTU Status

Information and metering of engine components is provided by the *MTU Status* metering screen. Refer to Figure 48. Under certain circumstances, parameters may indicate one of the following codes: NA (not applicable), NC (not connected), NS (not sent), or SF (sender fail). See the *Communication* chapter in the *Configuration* manual for their descriptions.

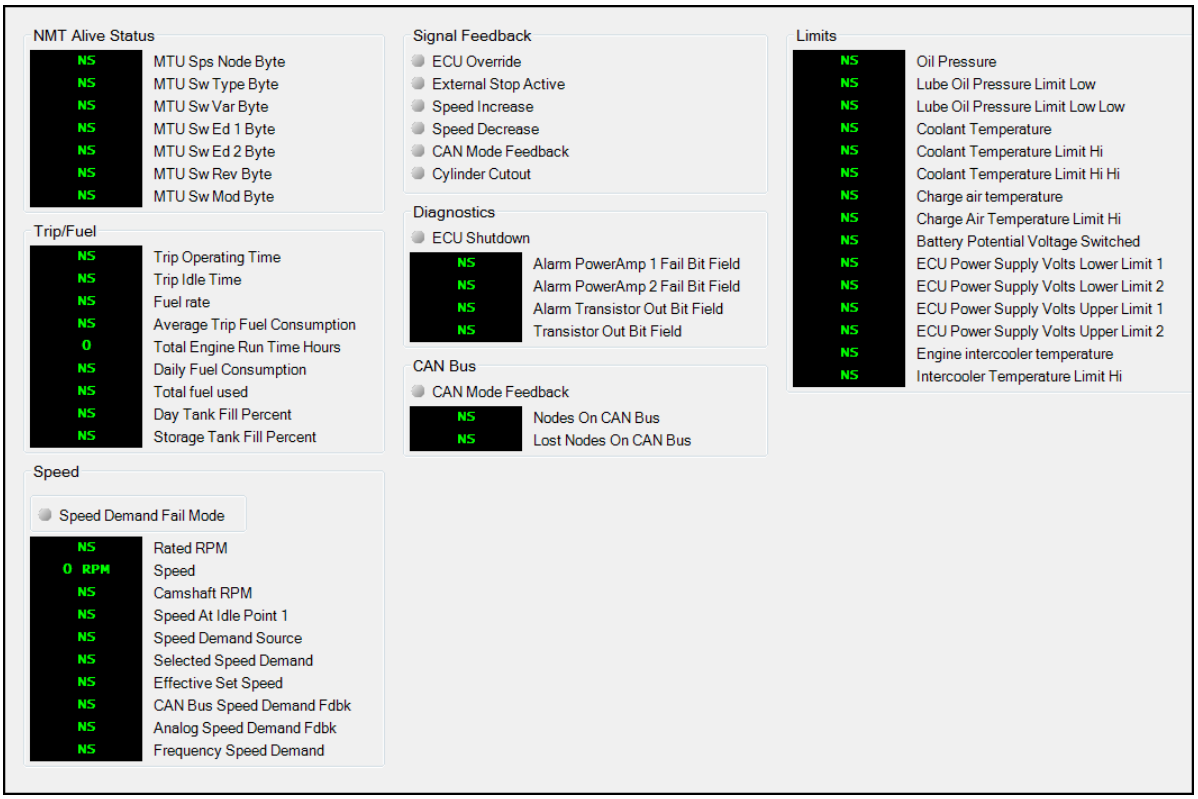


Figure 48. Metering Explorer, MTU, MTU Status Screen

MTU Engine Status

BESTCOMS*Plus* Navigation Path: Metering Explorer, MTU, MTU Engine Status
Front Panel Navigation Path: Metering > MTU > MTU Engine Status

The *MTU Engine Status* metering screen (Figure 49) provides information and metering of engine components. Under certain circumstances, parameters may indicate one of the following codes: NA (not applicable), NC (not connected), NS (not sent), or SF (sender fail). See the *Communication* chapter in the *Configuration* manual for their descriptions.

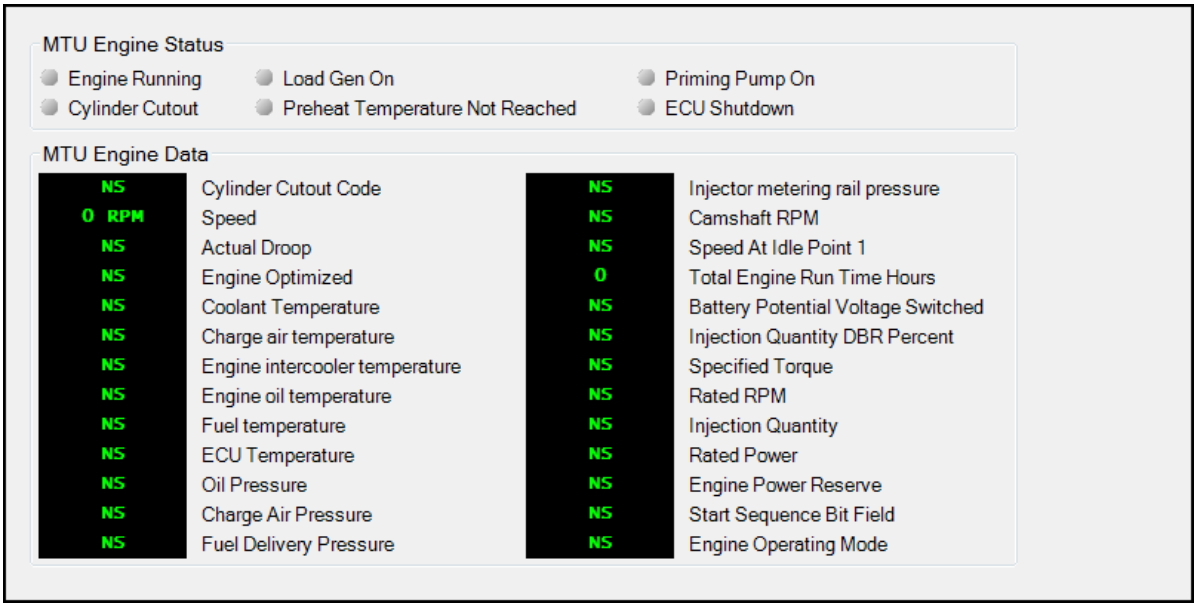


Figure 49. Metering Explorer, MTU, MTU Engine Status Screen

Summary

BESTCOMS*Plus* Navigation Path: Metering Explorer, Summary
Front Panel Navigation Path: Summary

Pertinent bus and engine metering is displayed on the Summary screen (Figure 50) in BESTCOMS*Plus*.

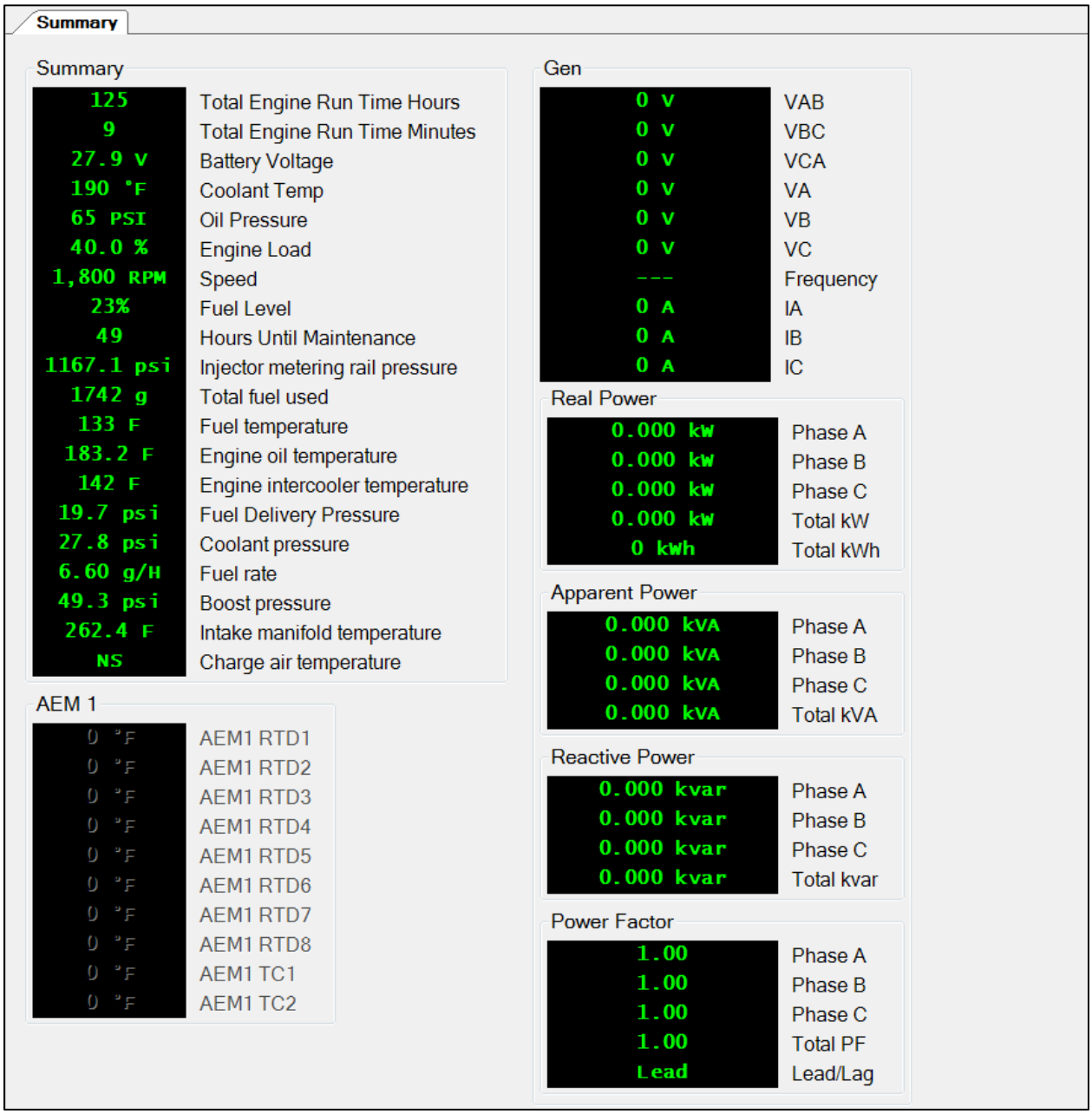


Figure 50. Metering Explorer, Summary Screen

The front panel Summary screen is shown in Figure 51.

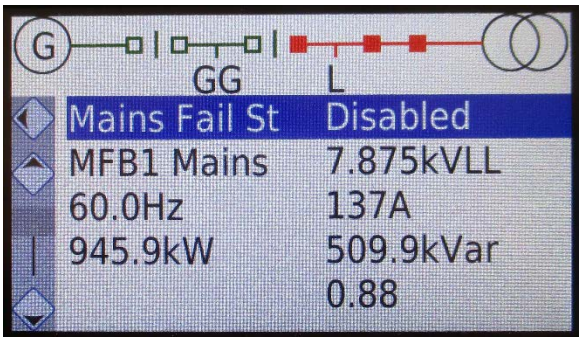


Figure 51. Front Panel Summary Screen

Detailed Summary

BESTCOMS*Plus* Navigation Path: Metering Explorer, Detailed Summary
Front Panel Navigation Path: Not available through the front panel

Comprehensive bus and engine metering is displayed on the *Detailed Summary* screen (Figure 52).

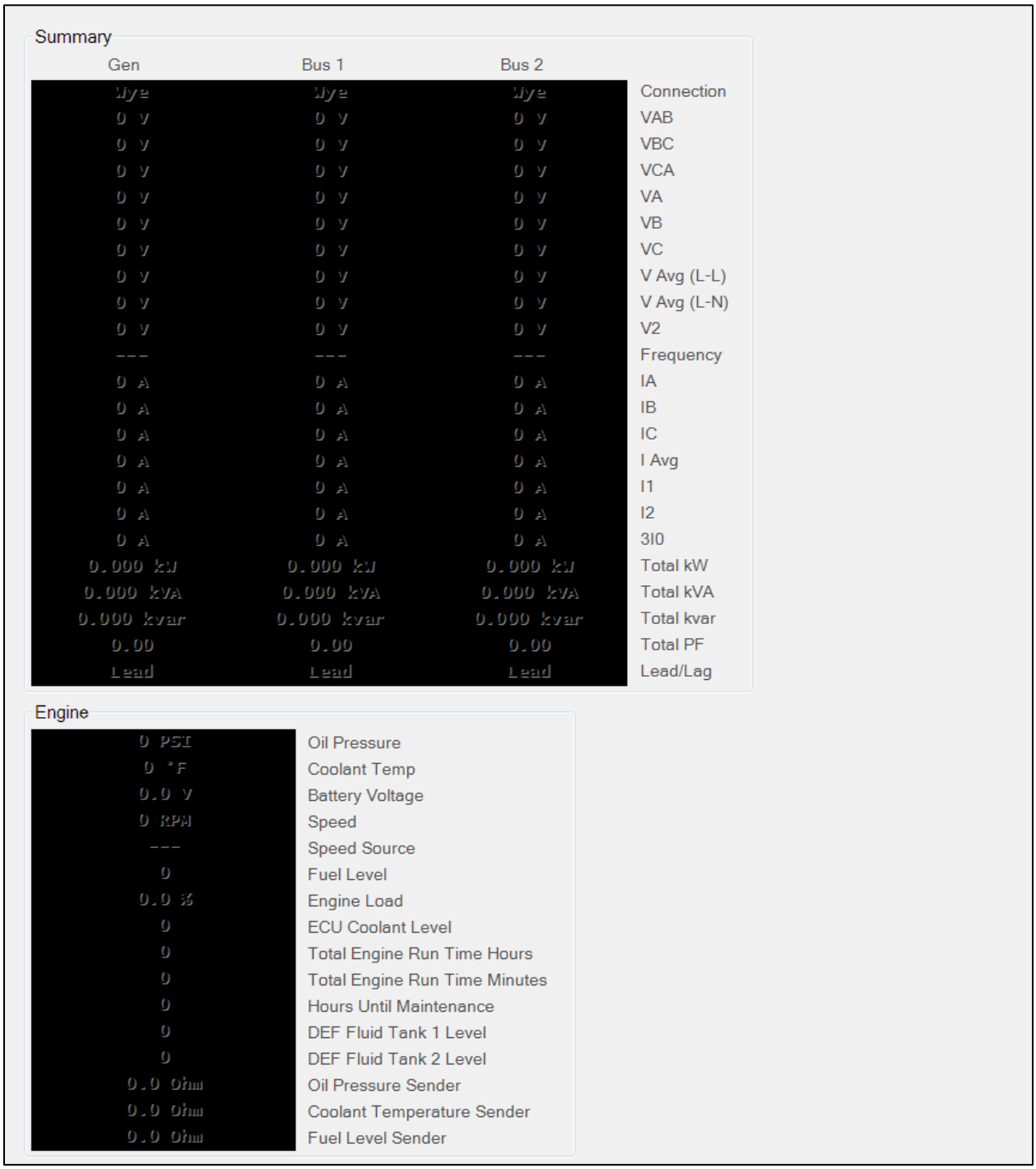


Figure 52. Metering Explorer, Detailed Summary Screen

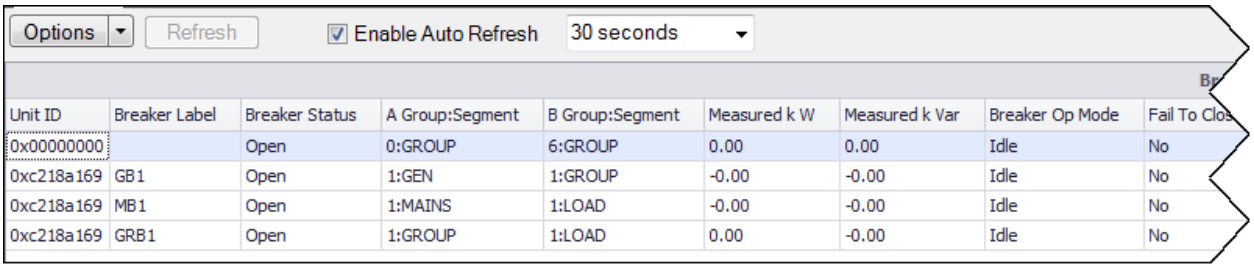
System Status

System status metering provides a tabular view of the system component's parameters. The generator view shows all generators in the system and important metering values for each. The breaker view shows all the breakers in the system and each side's parameters used for the segmentation systems. The bus view displays the different bus segments in the system. This dynamically changes as breakers are opened and closed. Each of these views is only available if the view is valid for the current system configuration.

Breaker

BESTCOMS*Plus* Navigation Path: Metering Explorer, System Status, Breaker
Front Panel Navigation Path: Not available through front panel

Every breaker in the system has a separate line entry in the table, including units which are not on the local breaker's active segment. Units of measure are stated in the table header, rather than after the actual value. The value on the left-hand side of the colon indicates the generator group number. The value on the right-hand side of the colon indicates the bus segment name. See Figure 53.



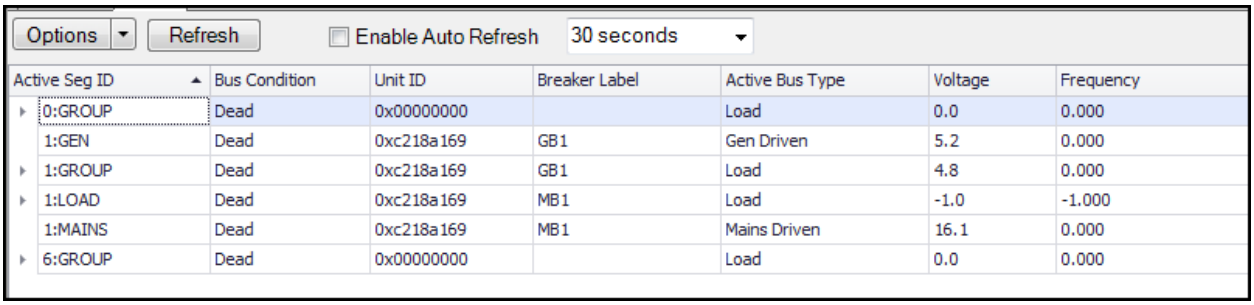
Unit ID	Breaker Label	Breaker Status	A Group:Segment	B Group:Segment	Measured k W	Measured k Var	Breaker Op Mode	Fail To Clos
0x00000000		Open	0:GROUP	6:GROUP	0.00	0.00	Idle	No
0xc218a169	GB1	Open	1:GEN	1:GROUP	-0.00	-0.00	Idle	No
0xc218a169	MB1	Open	1:MAINS	1:LOAD	-0.00	-0.00	Idle	No
0xc218a169	GRB1	Open	1:GROUP	1:LOAD	0.00	-0.00	Idle	No

Figure 53. Metering Explorer, System Status, Breaker Screen

Bus

BESTCOMS*Plus* Navigation Path: Metering Explorer, System Status, Bus
Front Panel Navigation Path: Not available through front panel

Every bus segment in the system has a separate entry in the table. As breakers open and close, joining and separating buses, the entries in the table change accordingly. Units of measure are stated in the headers, rather than after the actual value. The value on the left-hand side of the colon indicates the generator group number. The value on the right-hand side of the colon indicates the bus segment name. See Figure 54.



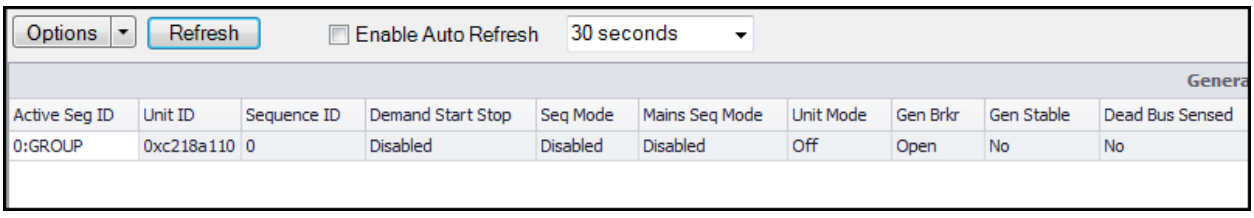
Active Seg ID	Bus Condition	Unit ID	Breaker Label	Active Bus Type	Voltage	Frequency
0:GROUP	Dead	0x00000000		Load	0.0	0.000
1:GEN	Dead	0xc218a169	GB1	Gen Driven	5.2	0.000
1:GROUP	Dead	0xc218a169	GB1	Load	4.8	0.000
1:LOAD	Dead	0xc218a169	MB1	Load	-1.0	-1.000
1:MAINS	Dead	0xc218a169	MB1	Mains Driven	16.1	0.000
6:GROUP	Dead	0x00000000		Load	0.0	0.000

Figure 54. Metering Explorer, System Status, Bus Screen

Generator

BESTCOMS*Plus* Navigation Path: Metering Explorer, System Status, Generator
Front Panel Navigation Path: Not available through front panel

Every generator in the system has a separate line entry in the table, including units which are not on the local generator's active segment. Units of measure are stated in the table header, rather than after the actual value. See Figure 55.



Active Seg ID	Unit ID	Sequence ID	Demand Start Stop	Seq Mode	Mains Seq Mode	Unit Mode	Gen Brkr	Gen Stable	Dead Bus Sensed
0:GROUP	0xc218a110	0	Disabled	Disabled	Disabled	Off	Open	No	No

Figure 55. Metering Explorer, System Status, Generator Screen

Broadcast Logic

BESTCOMS*Plus* Navigation Path: Metering Explorer, System Status, Broadcast Logic
Front Panel Navigation Path: Metering > System Status > Broadcast Logic

This screen provides the status of all broadcast logic points for all DGC-2020HDs in the network. A value of 1 indicates a true broadcast logic point input and a value of 0 indicates a false broadcast logic point input. See Figure 56.

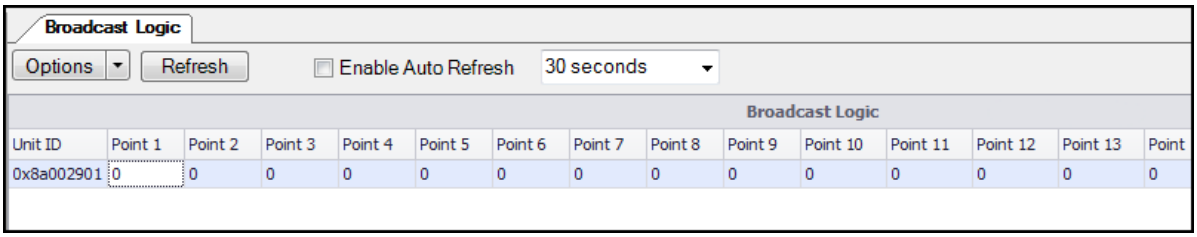


Figure 56. Metering Explorer, System Status, Broadcast Logic Screen

System Breaker Status

BESTCOMS*Plus* Navigation Path: Metering Explorer, System Status, System Breaker Status
Front Panel Navigation Path: Metering > System Status > System Breaker Status

The System Breaker Status screen (Figure 57) provides an overall system breakers summary.

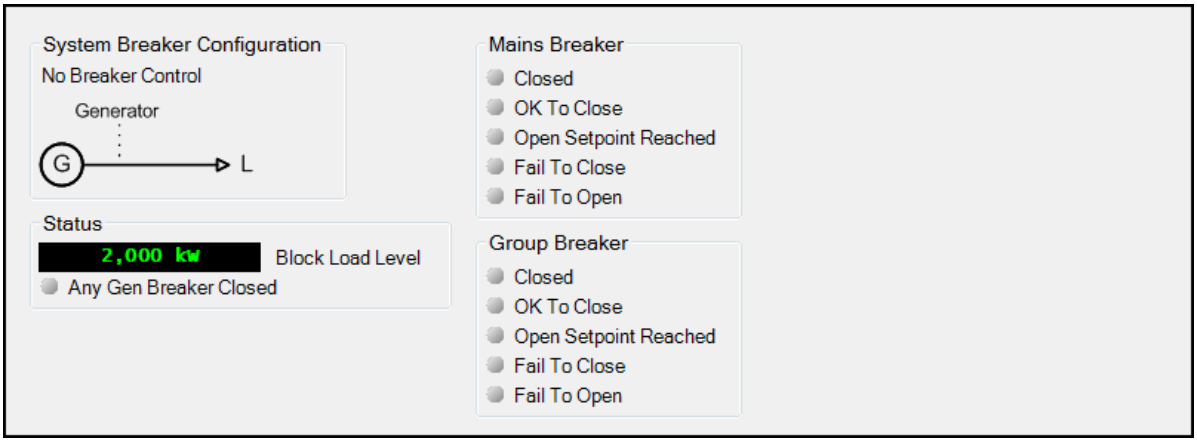


Figure 57. Metering Explorer, System Status, System Breaker Status Screen

System Mains Bus

BESTCOMS*Plus* Navigation Path: Metering Explorer, System Status, System Mains Bus
Front Panel Navigation Path: Metering > System Status > System Mains Bus

The System Mains Bus screen (Figure 58) provides an overall mains bus summary.

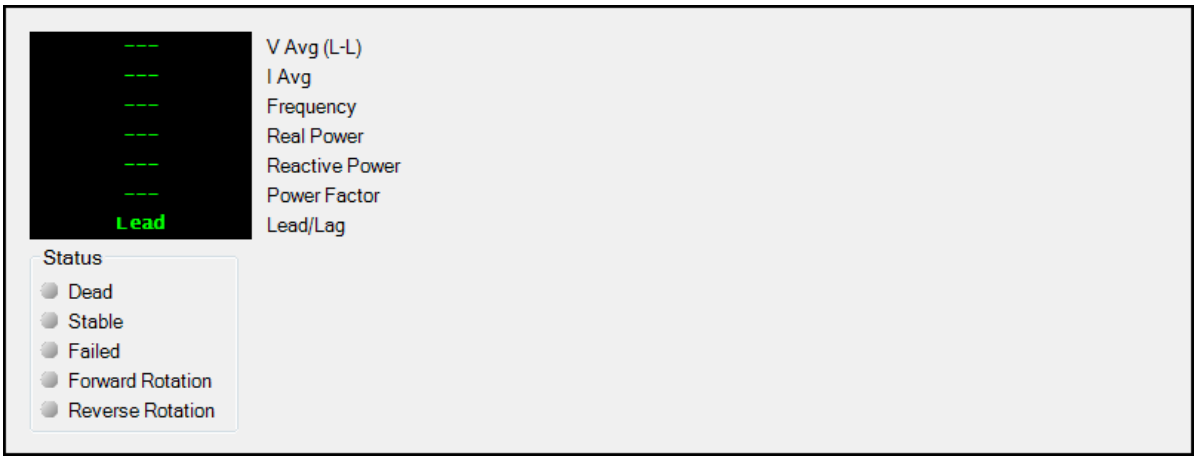


Figure 58. Metering Explorer, System Status, System Mains Bus Screen

System Group Bus

BESTCOMS*Plus* Navigation Path: Metering Explorer, System Status, System Group Bus
Front Panel Navigation Path: Metering > System Status > System Group Bus

The System Group Bus screen (Figure 59) provides an overall group bus summary.

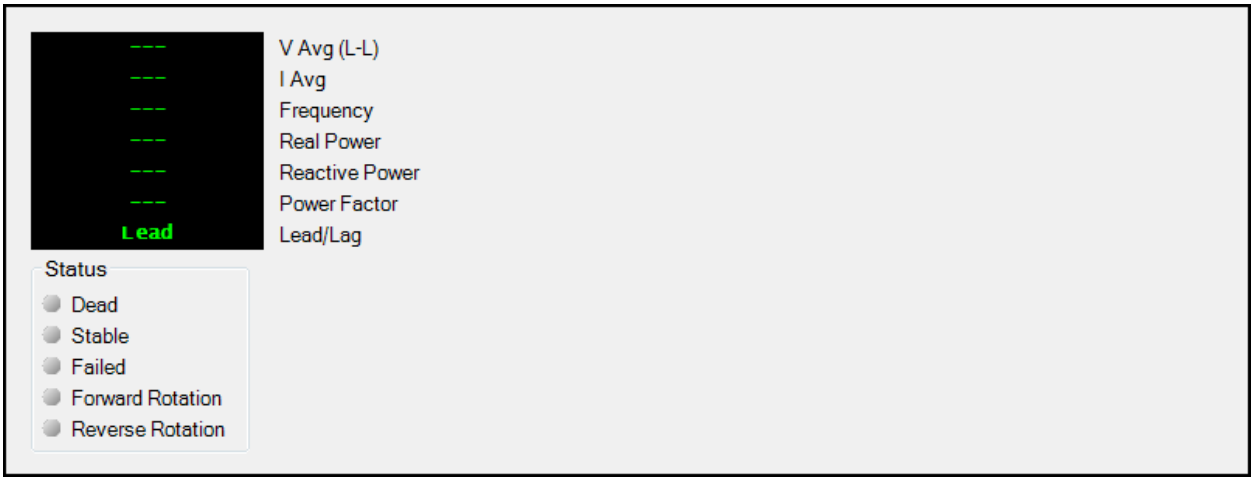


Figure 59. Metering Explorer, System Status, System Group Bus Screen

System Load Bus

BESTCOMS*Plus* Navigation Path: Metering Explorer, System Status, System Load Bus
Front Panel Navigation Path: Metering > System Status > System Load Bus

The System Load Bus screen (Figure 60) provides an overall load bus summary.

Figure 60. Metering Explorer, System Status, System Load Bus Screen

Breaker Power Sum

BESTCOMS*Plus* Navigation Path: Metering Explorer, System Status, Breaker Power Sum
Front Panel Navigation Path: Metering > System Status > Breaker Power Sum

The Breaker Power Sum screen (Figure 61) provides cumulative power measurements across specified breakers.

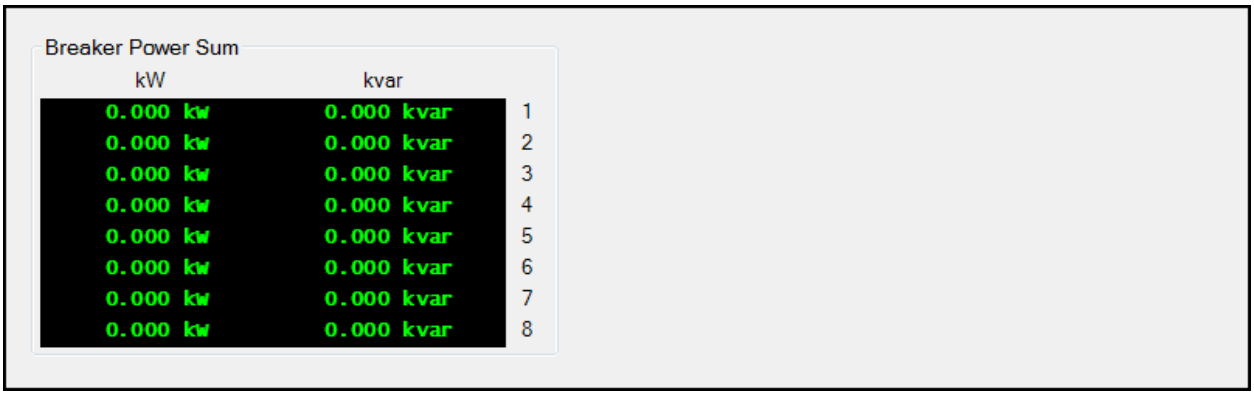


Figure 61. Metering Explorer, System Status, Breaker Power Sum Screen

Control Panel

Control Panel

BESTCOMS*Plus* Navigation Path: Metering Explorer, Control Panel, Control Panel
Front Panel Navigation Path: Not available through front panel

Controls for stopping/starting the engine, opening/closing breakers, and opening/closing switches are accessed using BESTCOMS*Plus* through the *Metering Explorer*, *Control Panel* screen. This set of controls is especially useful when commissioning the DGC-2020HD. The PC or laptop running BESTCOMS*Plus* must be connected to the DGC-2020HD via the USB, Ethernet, or Modem (see the *Communication* chapter for details). Using the Metering Explorer in BESTCOMS*Plus,* open the *Control Panel* screen. Refer to Figure 62.

Emergency Stop

The user has control to stop the generator in case of emergency by clicking on the *Emergency Stop* button.

Engine Control

The engine can be started and stopped by clicking on the *Start* and *Stop* buttons. This function requires a connection to a properly configured ECU via J1939 (CAN).

Run, Auto, Off

The operating mode can be set to Run, Auto, or Off.

Generator, Mains, Group, and Tie Breakers

Controls for opening and closing the system breakers are provided. The breaker is open when the corresponding indicator is green and closed when it is red. These controls are available only for configured breakers.

Switches 1 through 6

Each of these switches can be opened or closed by clicking on the *Open* or *Close* buttons. The switch is closed when the corresponding indicator is lit. These buttons control the virtual inputs found in

BESTlogic*Plus* Programmable Logic. The number of the switch corresponds to the number of the virtual input it controls. See the *BESTlogicPlus* chapter for more information.

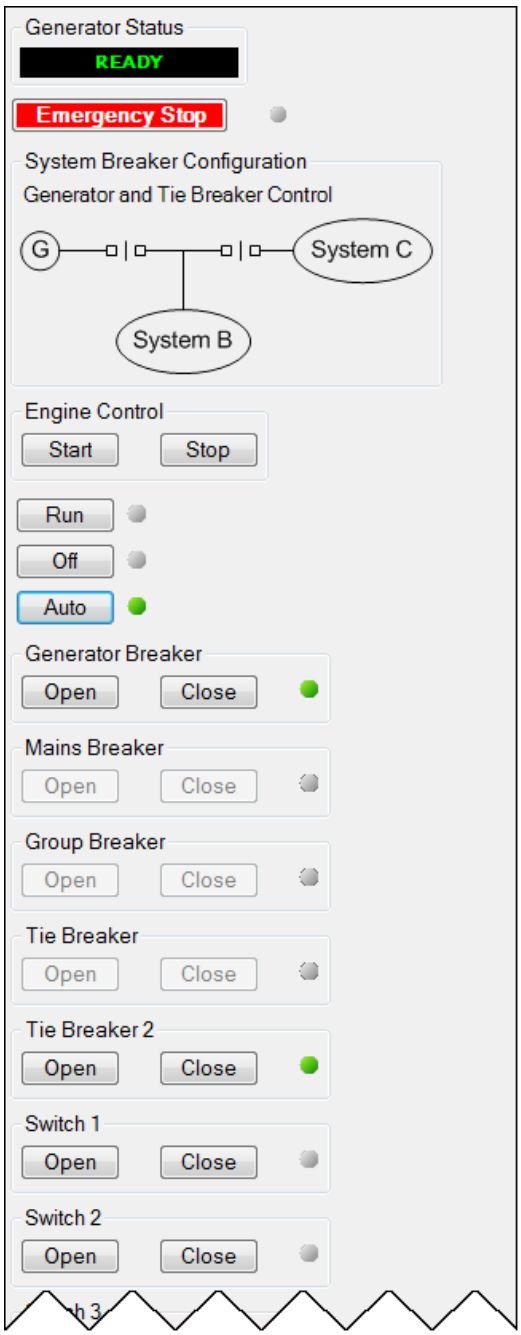


Figure 62. Metering Explorer, Control Panel Screen

Control Panel VRM

BESTCOMS*Plus* Navigation Path: Metering Explorer, Control Panel, Control Panel VRM
Front Panel Navigation Path: Not available through front panel

The Control Panel VRM (Figure 63) provides options for changing operating modes, selecting setpoint pre-positions, and fine tuning setpoints. The setpoints for AVR and FCR are displayed, as well as function status.

Start/Stop Mode

Two indicators show the start/stop mode of the VRM-2020. When a mode is active, its corresponding indicator changes from gray to green. To select the VRM-2020 Start status, click the Start button. Click the Stop button to select VRM-2020 Stop status.

Operating Mode

AVR and FCR Mode status is reported by two indicators. When a mode is active, its corresponding indicator changes from gray to green. AVR mode is selected by clicking the AVR button and FCR mode is selected by clicking the FCR button.

Setpoint Pre-position

A control button and indicator are provided for the five setpoint pre-positions. Clicking the Set 1 button adjusts the excitation setpoint to the Pre-position 1 value and changes the Pre-position 1 indicator to green. Pre-positions 2 through 5 are selected by clicking the Set 2 through Set 5 buttons respectively.

Setpoints

Two status fields display the active setpoints for AVR mode and FCR mode. These active setpoints, displayed with yellow characters, are not to be confused with metered analog values which are displayed with green characters throughout BESTCOMS*Plus*. For details on operating setpoint settings, see the *Regulation* chapter.

Setpoint Fine Adjust

Clicking the Raise button increases the active operating setpoint. Clicking the Lower button decreases the active operating setpoint. The raise and lower buttons create an internal 100 mx pulse directed to the raise or lower commands of the active operating mode. The amount of adjustment depends on the configured adjust rate setting of the active operating mode.

Setpoint Return

Clicking the Return button returns the active operating setpoint to the initial Setpoint value. For details on operating setpoint settings, see the *VRM-2020* chapter.

Setpoint Limits

The Upper indicator changes from gray to red when the active operating setpoint reaches the Max setpoint value. The Lower indicator changes from gray to red when the active operating setpoint reaches the Min setpoint value. For details on operating setpoint settings, see the *Regulation* chapter.

Status

Indicators are provided to display the status of the following VRM-2020 functions.

- OEL: This indicator changes from gray to green when the OEL is active.
- UEL: This indicator changes from gray to green when the UEL is active.
- Underfrequency Active: This indicator changes from gray to green when the underfrequency or V/Hz limiter is active.
- Soft Start: The Soft Start indicator changes from gray to green during startup when the soft start function is active.
- Null Balance: The Null Balance indicator changes from gray to green when the setpoint of the inactive operating mode (AVR or FCR) matches the setpoint of the active mode.

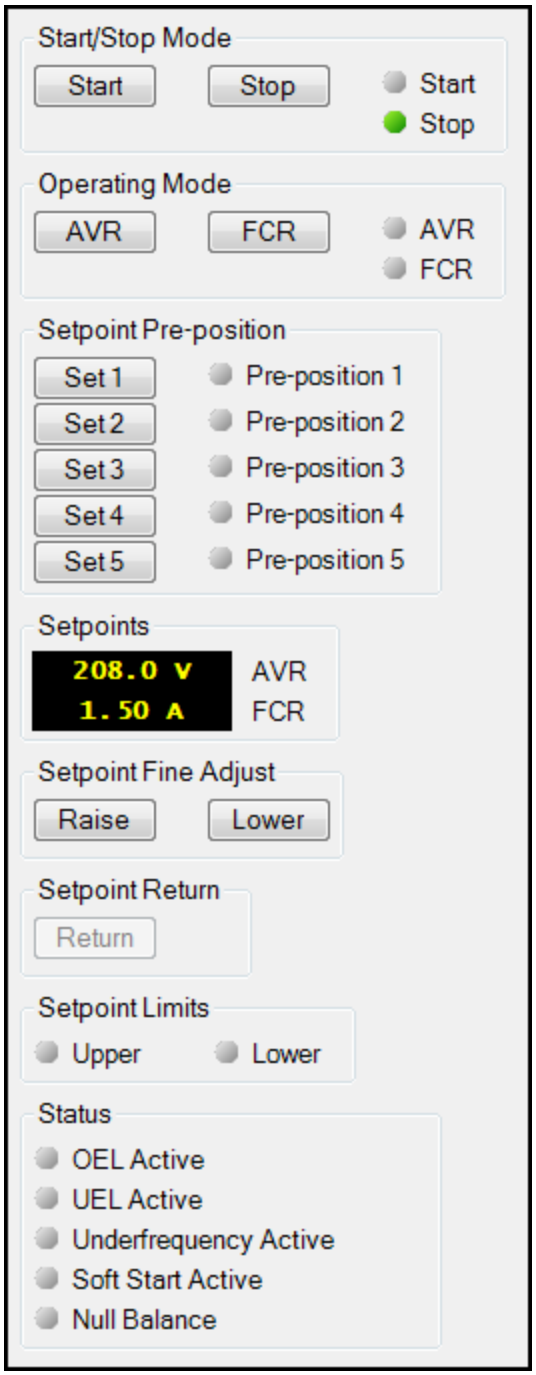


Figure 63. Control Panel VRM

Generator Network Status

BESTCOMS*Plus* Navigation Path: Metering Explorer, Generator Network Status
Front Panel Navigation Path: Metering > Gen Network Status

The *Generator Network Status* metering screen is illustrated in Figure 64.

The status of the generator network is available from each DGC-2020HD when the generator is part of a multi-machine network. The System Type setting (found under the BESTCOMS*Plus*® *Settings Explorer, System Parameters, System Settings*) configures the machine to be part of a multi-machine network. When *System Type* is set to Multiple Generator or Segmented Bus System, the machine is configured for participation in a multiple machine system.

Generator network status is found on the front panel under *Metering, Gen Network Status*.

- Number of Units indicates the number of units in the generator network. The sequencing IDs of all machines on the network, in no particular order, are listed as ID1:, ID2:, etc.
- Number of Units (Active Segment) indicates the number of units on the locally connected system segment.
- Number of Units Online indicates the number of generators that are online. A generator is considered to be online when it is running, its generator breaker is closed, and it is participating in load sharing and communications within the network of generators.
- Active Segment ID indicates the group and segment numbers for the local unit. The number to the left of the colon is the group number and to the right is the segment number.
- System Online kW Capacity is the total real power capacity of all the generators currently online.
- System Online kvar Capacity is the total reactive power capacity of all the generators currently online.
- System Generated kW is the total real power generated by all the generators currently online.
- System Generated kW Percent is the percentage of System Total kW Capacity currently being generated.
- System Generated kvar is the total reactive power currently generated by all the generators currently online.
- System Total kW Capacity indicates the sum of rated power of all generators in the network.

The Number of Units parameter displays zero when the DGC-2020HD is not communicating with other DGC-2020HDs on the network.

All of these parameters except for Active Segment ID are available to the Configurable Protection function and may be useful for implementing load sharing schemes. Refer to the *Configurable Protection* chapter in the *Configuration* manual for more information.

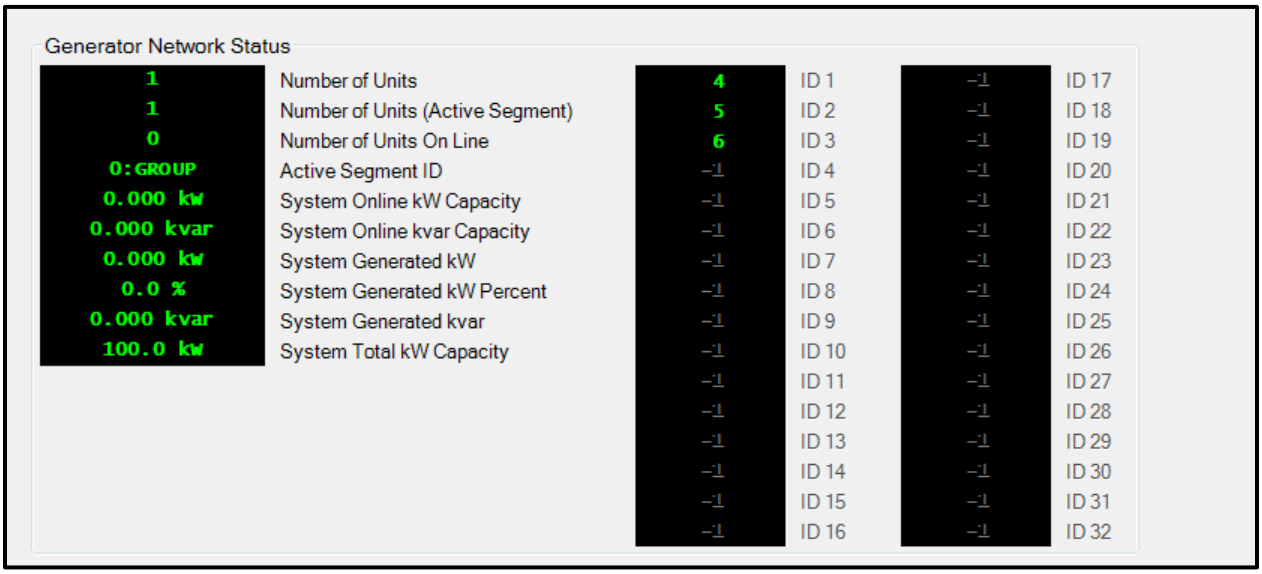


Figure 64. Metering Explorer, Generator Network Status Screen

Generator Sequencing

BESTCOMS*Plus* Navigation Path: Metering Explorer, Generator Sequencing
Front Panel Navigation Path: Metering > Gen Sequencing

This screen (Figure 65) provides generator sequencing information such as, the next unit to start/stop, power demand, start/stop thresholds, and spinning reserve thresholds.

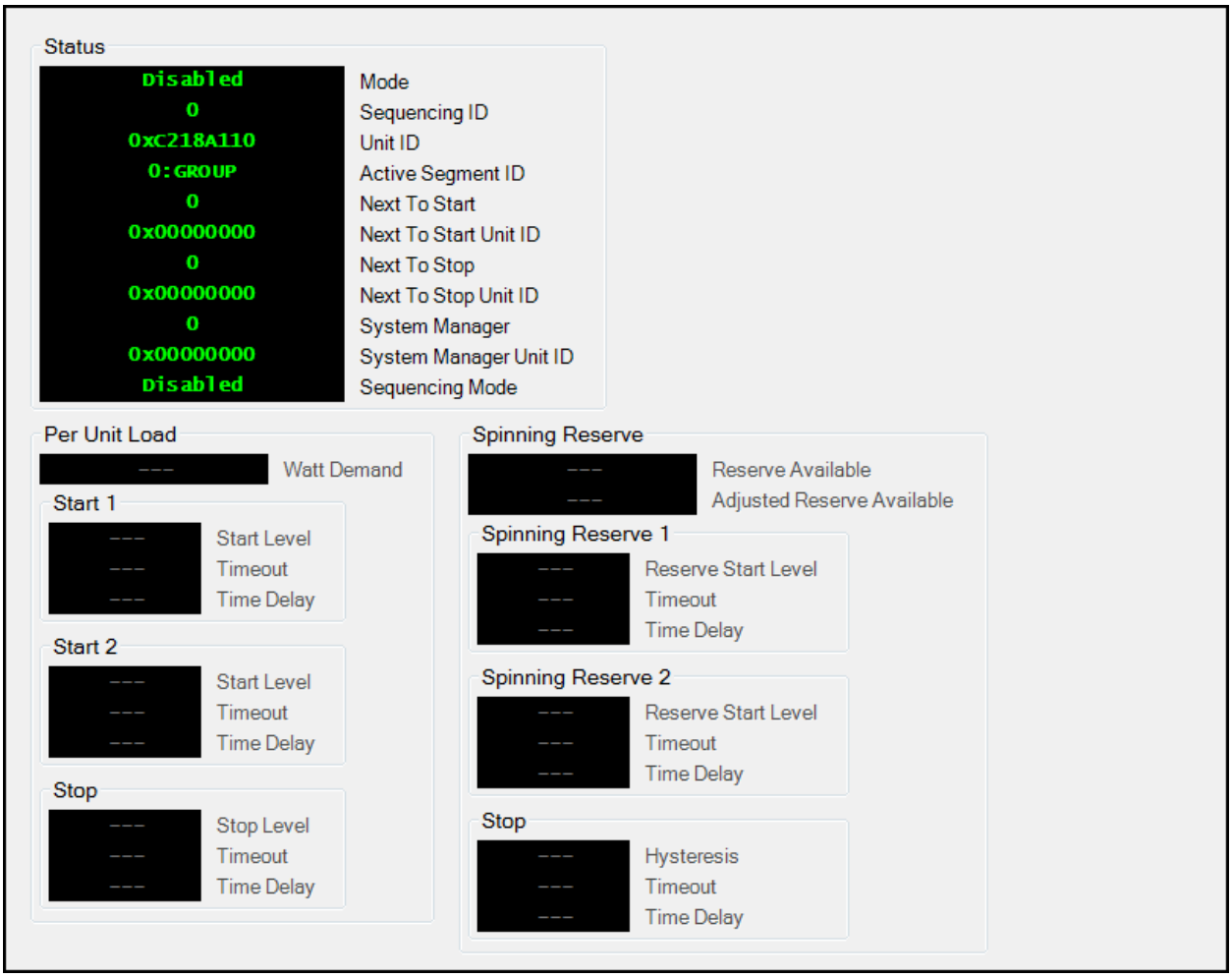


Figure 65. Metering Explorer, Generator Sequencing Screen

Mains Fail Transfer Status

BESTCOMS*Plus* Navigation Path: Metering Explorer, Mains Fail Transfer Status
Front Panel Navigation Path: Summary > Press right arrow button on top selection.

The Mains Fail Transfer Status screen (Figure 66) displays the Mains Fail Transfer State, any timers relevant to the mains fail transfer process, and bus conditions. These parameters are listed below.

The different mains fail transfer states are:

- *Power From Mains:* Power is being supplied to the load from the mains bus.
- *Transfer Timer Active:* Transfer Delay timer is actively counting.
- *Transferring to Gens:* Load is being transferred to the generator bus.
- *Power From Gens:* Power is being supplied to the load from the generator bus.
- *Return Timer Active:* Return Delay timer is actively counting.
- *Transferring to Mains:* Load is being transferred to the mains bus.
- *Disabled:* DGC-2020HD is in the Off or Run operating mode or in the alarm state.

Transfer Delay, Return Delay, Max Parallel Time, Max Transfer Time, Open Transition Delay, and Return Timer indicate the amount of time remaining in the delay or timer.

Gen Condition, Bus 1 Condition, and Bus 2 Condition indicate whether the bus is dead or stable.

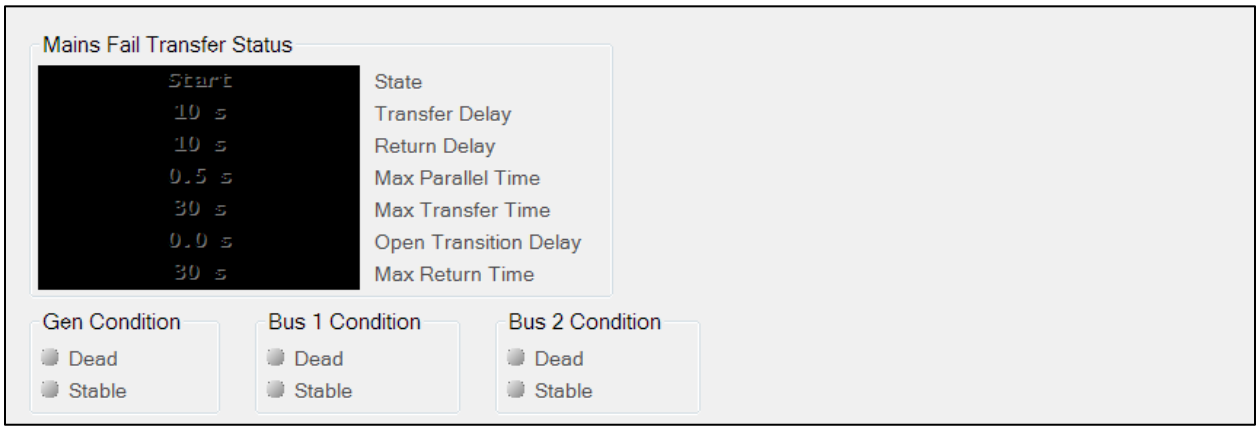


Figure 66. Metering Explorer, Mains Fail Transfer Status

Load Shedding

BESTCOMS*Plus* Navigation Path: Metering Explorer, Load Shedding
Front Panel Navigation Path: Metering > Load Shedding

The Load Shedding screen (Figure 67) displays reserve power, priority to shed/add, delay timers, and enabled priority loads.

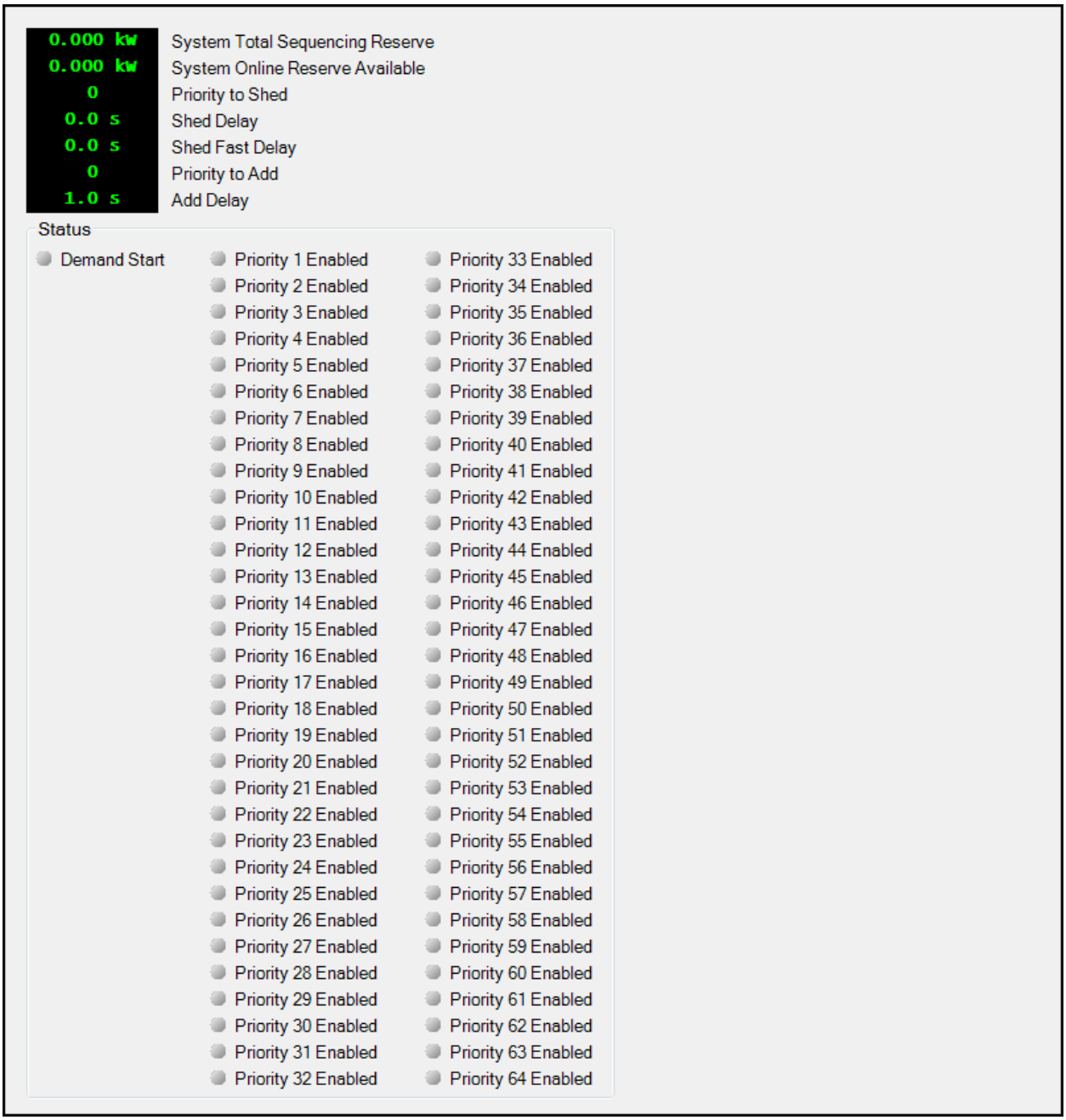


Figure 67. Metering Explorer, Load Shedding

Diagnostics

Diagnostics screens provide metering for kW and var control, load share, and mains power parameters.

Control

BESTCOMS*Plus* Navigation Path: Metering Explorer, Diagnostics, Control
Front Panel Navigation Path: Metering > Diagnostics > Control

Figure 68 illustrates the BESTCOMS*Plus* Control screen.

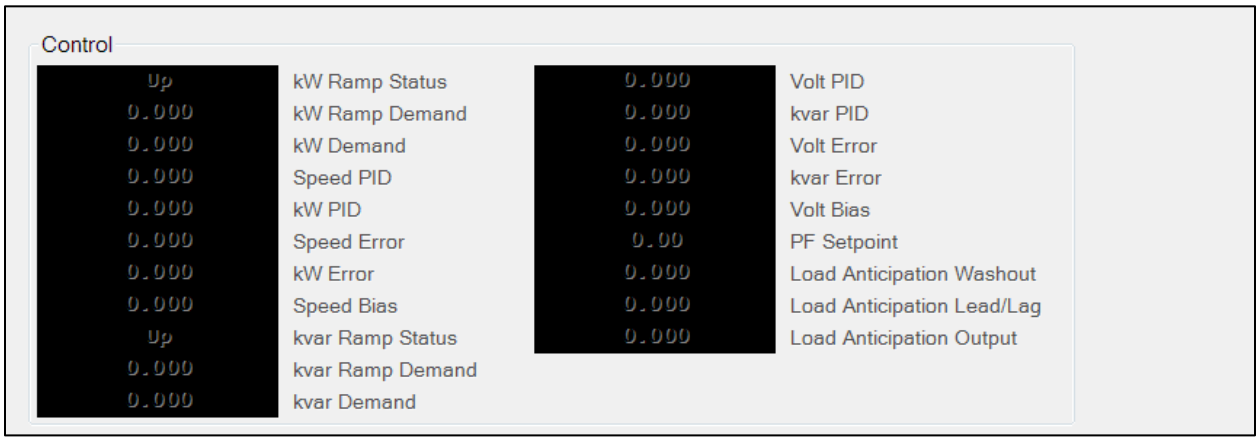


Figure 68. Metering Explorer, Diagnostics, Control Screen

Load Share

BESTCOMS*Plus* Navigation Path: Metering Explorer, Diagnostics, Load Share
Front Panel Navigation Path: Metering > Diagnostics > Load Share Line

Figure 69 illustrates the BESTCOMS*Plus* Load Share screen.

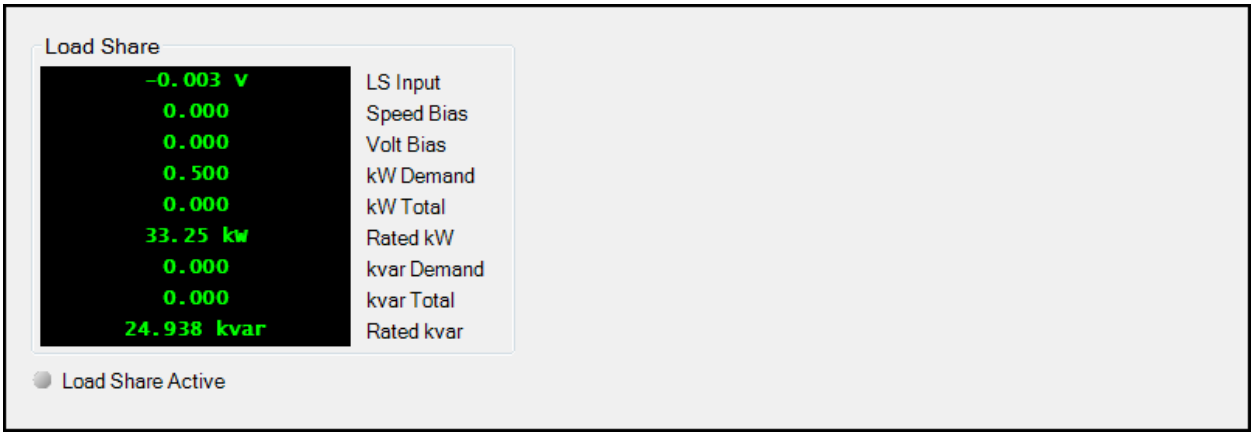


Figure 69. Metering Explorer, Diagnostics, Load Share Screen

Mains Power

BESTCOMS*Plus* Navigation Path: Metering Explorer, Diagnostics, Mains Power
Front Panel Navigation Path: Metering > Diagnostics > Mains Power

Figure 70 illustrates the BESTCOMS*Plus* Mains Power screen.

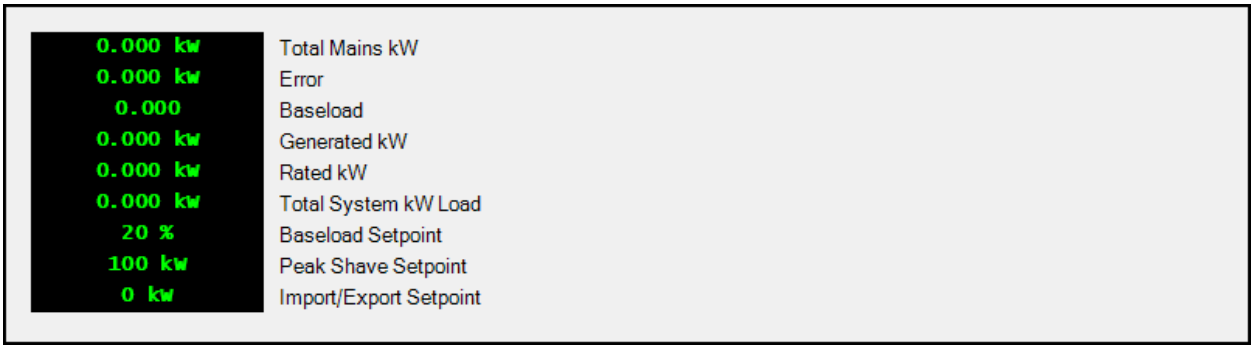


Figure 70. Metering Explorer, Diagnostics, Mains Power

VRM Control

BESTCOMS*Plus* Navigation Path: Metering Explorer, Diagnostics, VRM Control
Front Panel Navigation Path: Metering > Diagnostics > VRM Control

Figure 71 illustrates the BESTCOMS*Plus* VRM Control screen.

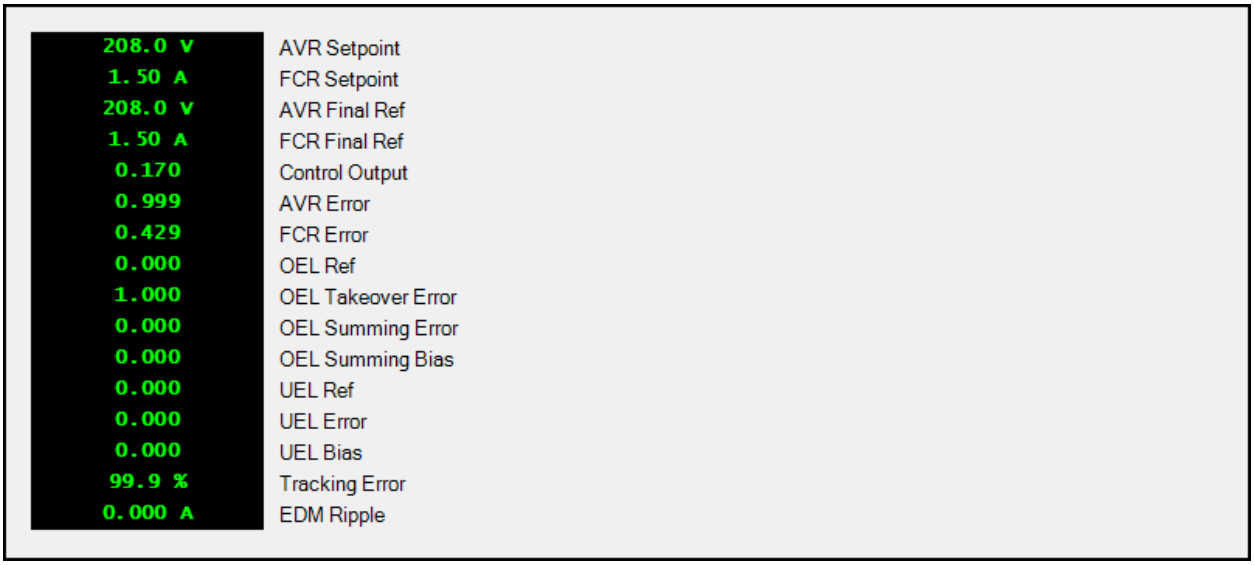


Figure 71. Metering Explorer, Diagnostics, VRM Control

Analysis

BESTCOMS*Plus* Navigation Path: Metering Explorer, Analysis
Front Panel Navigation Path: Not available through the front panel

Oscillography of nearly all genset parameters can be monitored in real time using the Analysis screen (Figure 72).

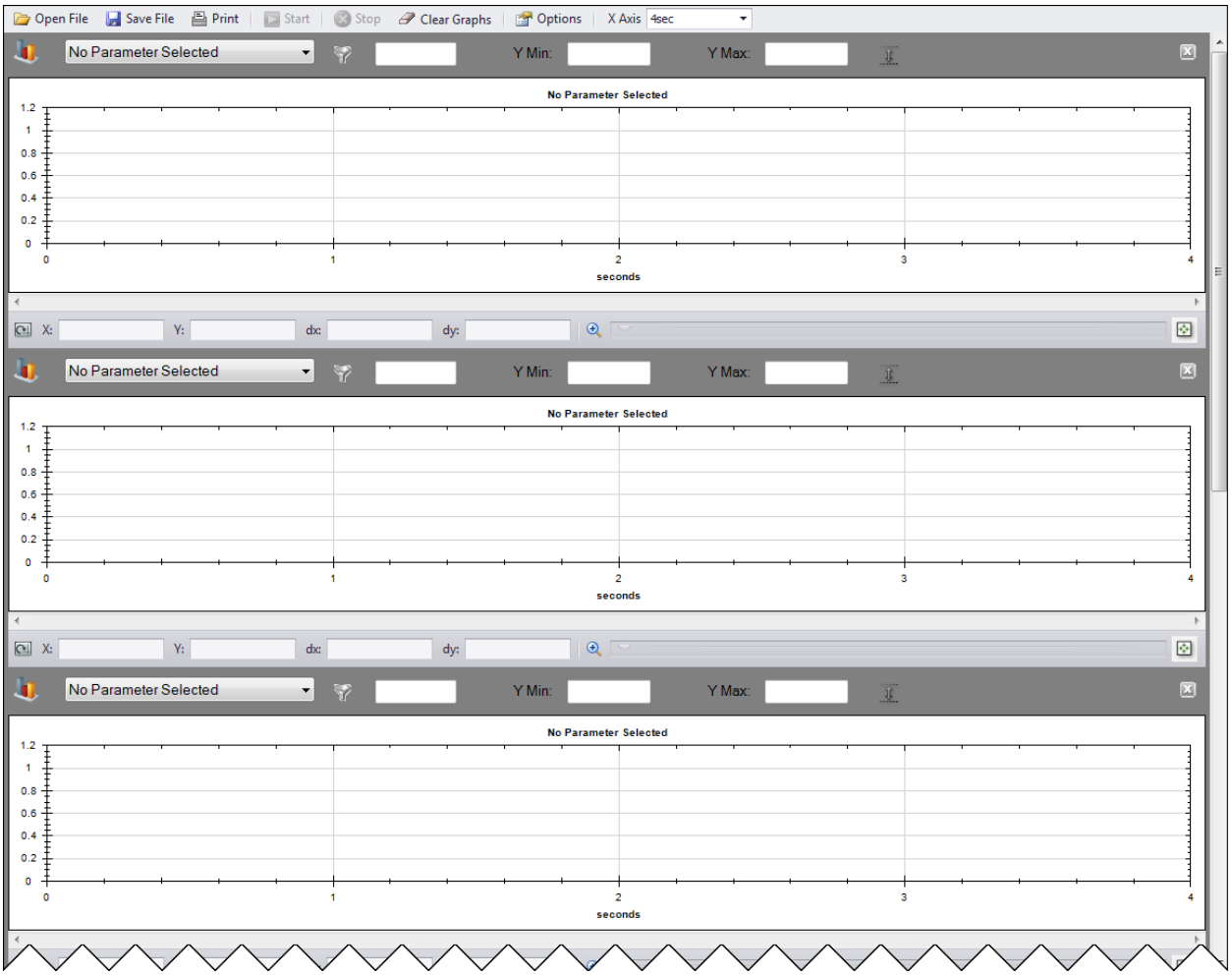


Figure 72. Metering Explorer, Analysis

Analysis Configuration

BESTCOMS*Plus* Navigation Path: Metering Explorer, Analysis, Analysis Configuration
Front Panel Navigation Path: Not available through the front panel

This screen (Figure 73) provides an easy method for selecting the parameters to be monitored. Each row represents a system parameter and each column represents a graph (up to six). For example, to monitor Analog Input 1 in the top graph, enable the radio button where the Analog Input 1 row intersects the Parameter 1 column.

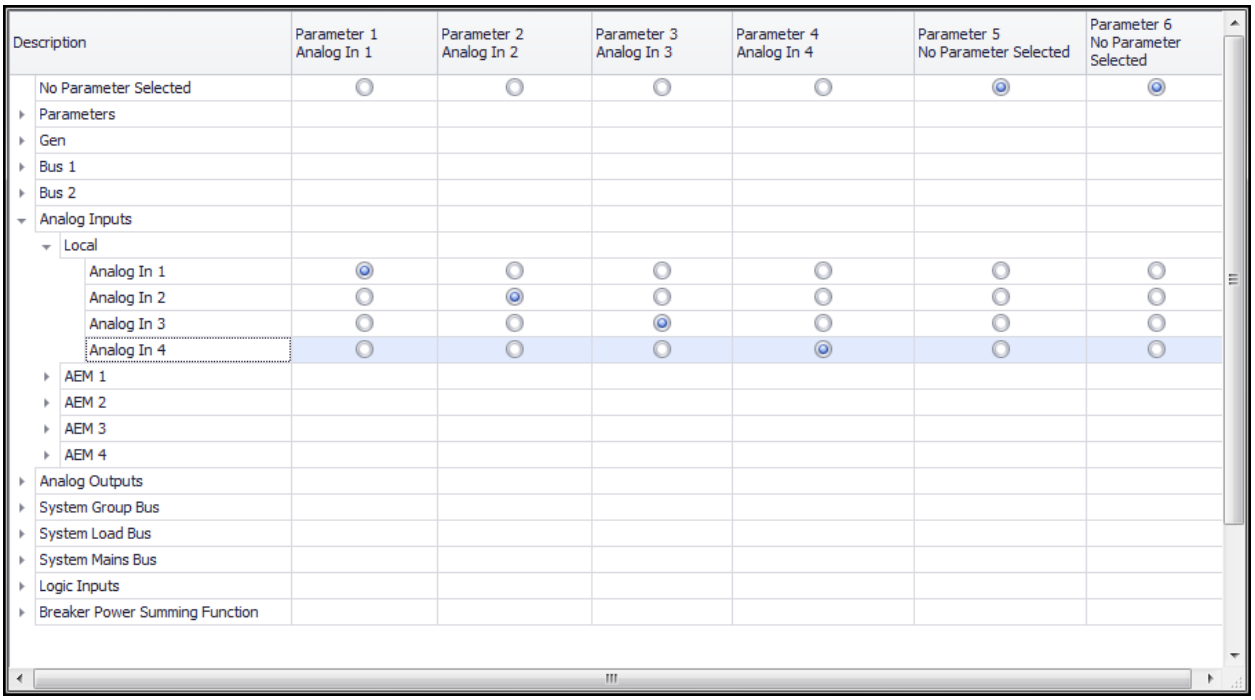


Figure 73. Metering Explorer, Analysis, Analysis Configuration Screen

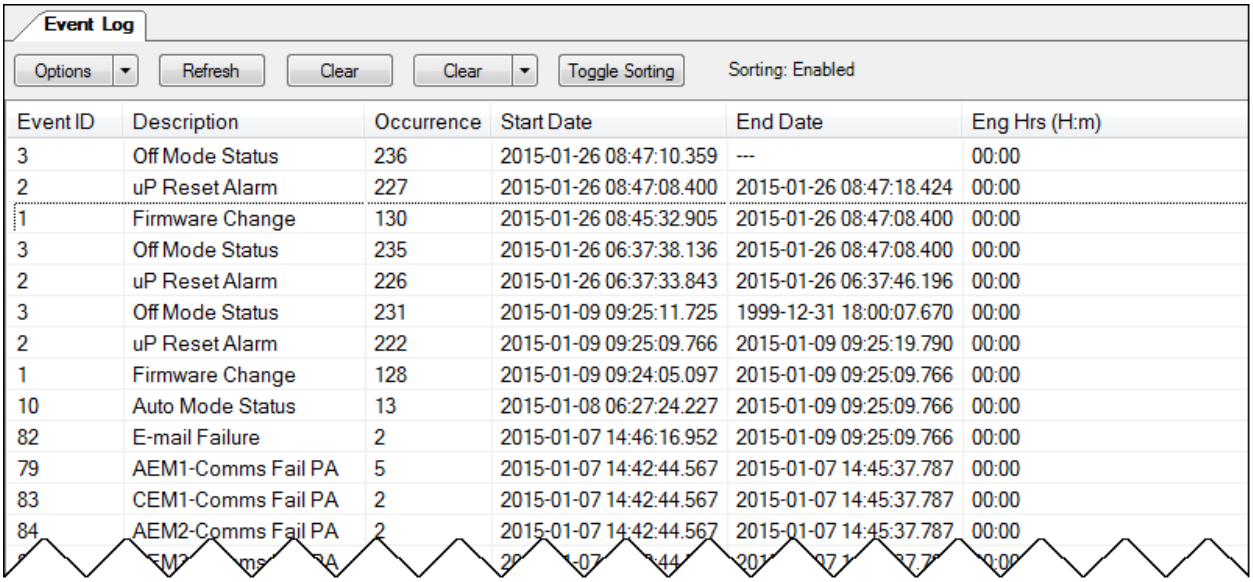
Reporting and Alarms

DGC-2020HD reporting and alarm functions include event logging, sequence-of-events recording (SER), data logging (oscillography), trending, and differential reporting. Alarm configuration is described in the *Configuration* manual.

Event Logging

An event log contains history of system events in nonvolatile memory. The DGC-2020HD retains records for 128 unique types of events. Each record tracks the number of times that event has occurred and records a time stamp of the first and last occurrences. Detailed information for the last 30 occurrences of an event is retained, which consists of time, date, and engine hours. When the event record limit has been reached and an event occurs whose type is not already recorded, the event record with the longest period since the last occurrence is overwritten by the new event record.

An event log can be downloaded into BESTCOMS*Plus*® for viewing and storage. Use the Options button to save the entire event log to a file, to copy the list to the Windows® clipboard, or to print the event log. Clicking the Refresh button performs a fresh download of the list from the DGC-2020HD. The Clear button provides the option of clearing selected or all event logs. Refer to Figure 74.



Event ID	Description	Occurrence	Start Date	End Date	Eng Hrs (H:m)
3	Off Mode Status	236	2015-01-26 08:47:10.359	---	00:00
2	uP Reset Alarm	227	2015-01-26 08:47:08.400	2015-01-26 08:47:18.424	00:00
1	Firmware Change	130	2015-01-26 08:45:32.905	2015-01-26 08:47:08.400	00:00
3	Off Mode Status	235	2015-01-26 06:37:38.136	2015-01-26 08:47:08.400	00:00
2	uP Reset Alarm	226	2015-01-26 06:37:33.843	2015-01-26 06:37:46.196	00:00
3	Off Mode Status	231	2015-01-09 09:25:11.725	1999-12-31 18:00:07.670	00:00
2	uP Reset Alarm	222	2015-01-09 09:25:09.766	2015-01-09 09:25:19.790	00:00
1	Firmware Change	128	2015-01-09 09:24:05.097	2015-01-09 09:25:09.766	00:00
10	Auto Mode Status	13	2015-01-08 06:27:24.227	2015-01-09 09:25:09.766	00:00
82	E-mail Failure	2	2015-01-07 14:46:16.952	2015-01-09 09:25:09.766	00:00
79	AEM1-Comms Fail PA	5	2015-01-07 14:42:44.567	2015-01-07 14:45:37.787	00:00
83	CEM1-Comms Fail PA	2	2015-01-07 14:42:44.567	2015-01-07 14:45:37.787	00:00
84	AEM2-Comms Fail PA	2	2015-01-07 14:42:44.567	2015-01-07 14:45:37.787	00:00

Figure 74. Metering Explorer, Event Log Screen

The event log may also be viewed on the front panel display by navigating to Metering, Reports, Data Log. Use the Up/Down keys to highlight an event and press the Right key to view the summary of that event record. A summary contains the description, date, time, and engine hours of the first and last occurrences of the event. To view details of specific event occurrences, use the Down key to highlight DETAILS and press the Right key. Occurrence number can be changed by pressing the Edit key, Up/Down keys to select #, and pressing the Edit key again to exit.

For a list of all possible event strings (as shown in the event log) refer to the *Event List* chapter.

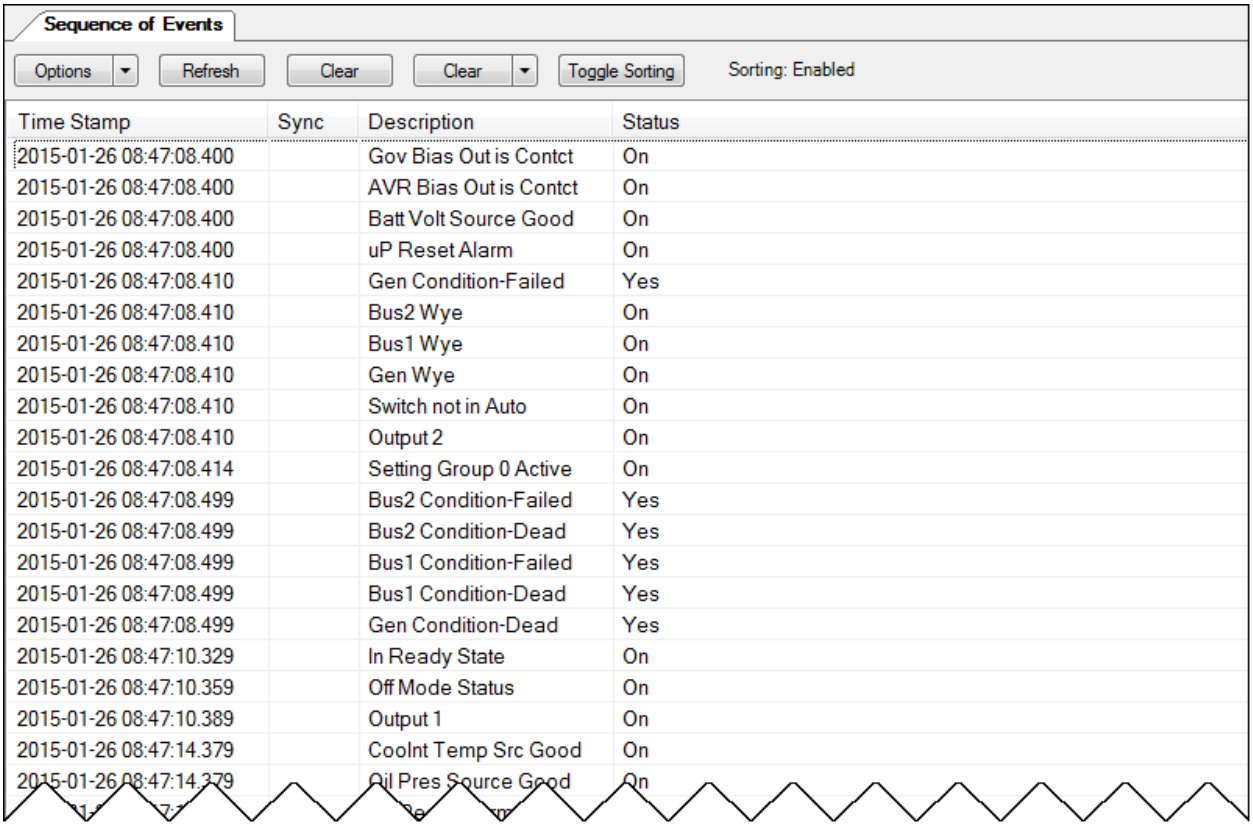
Sequence of Events

BESTCOMS*Plus*® Navigation Path: Metering Explorer, Reports, Sequence of Events
Front Panel Navigation Path: Metering > Reports > Sequence of Events

A sequence of events recorder monitors the internal and external status of the DGC-2020HD. Events are scanned at five millisecond intervals with 2,048 events stored per record. All changes of state that occur during each scan are time- and date-stamped. Sequence of events reports are available through

BESTCOMS*Plus*. Any one of over 400 monitored data/status points can trigger the DGC-2020HD to record a sequence of events.

A sequence of events can be downloaded into BESTCOMS*Plus* for viewing and storage. Use the Options button to save the entire sequence of events to a file, to save the list to the Windows® clipboard, or to print the sequence of events. Clicking the Refresh button performs a fresh download of the list from the DGC-2020HD. The Clear button provides the option of clearing selected or all event logs. Refer to Figure 75.



Time Stamp	Sync	Description	Status
2015-01-26 08:47:08.400		Gov Bias Out is Contct	On
2015-01-26 08:47:08.400		AVR Bias Out is Contct	On
2015-01-26 08:47:08.400		Batt Volt Source Good	On
2015-01-26 08:47:08.400		uP Reset Alarm	On
2015-01-26 08:47:08.410		Gen Condition-Failed	Yes
2015-01-26 08:47:08.410		Bus2 Wye	On
2015-01-26 08:47:08.410		Bus1 Wye	On
2015-01-26 08:47:08.410		Gen Wye	On
2015-01-26 08:47:08.410		Switch not in Auto	On
2015-01-26 08:47:08.410		Output 2	On
2015-01-26 08:47:08.414		Setting Group 0 Active	On
2015-01-26 08:47:08.499		Bus2 Condition-Failed	Yes
2015-01-26 08:47:08.499		Bus2 Condition-Dead	Yes
2015-01-26 08:47:08.499		Bus1 Condition-Failed	Yes
2015-01-26 08:47:08.499		Bus1 Condition-Dead	Yes
2015-01-26 08:47:08.499		Gen Condition-Dead	Yes
2015-01-26 08:47:10.329		In Ready State	On
2015-01-26 08:47:10.359		Off Mode Status	On
2015-01-26 08:47:10.389		Output 1	On
2015-01-26 08:47:14.379		CoolInt Temp Src Good	On
2015-01-26 08:47:14.379		Oil Pres Source Good	On

Figure 75. Metering Explorer, Reports, Sequence of Events

Setup

BESTCOMS*Plus*® Navigation Path: Settings Explorer, Report Configuration, Sequence of Events Setup
Front Panel Navigation Path: Settings > Report Configuration > Sequence of Events Setup

All events which are recorded in a sequence of events log are listed on this BESTCOMS*Plus* screen (Figure 76). Events with a check mark are recorded in the sequence of events, unchecked events are not recorded. This allows for filtering of undesired events from being stored in the sequence of events log.

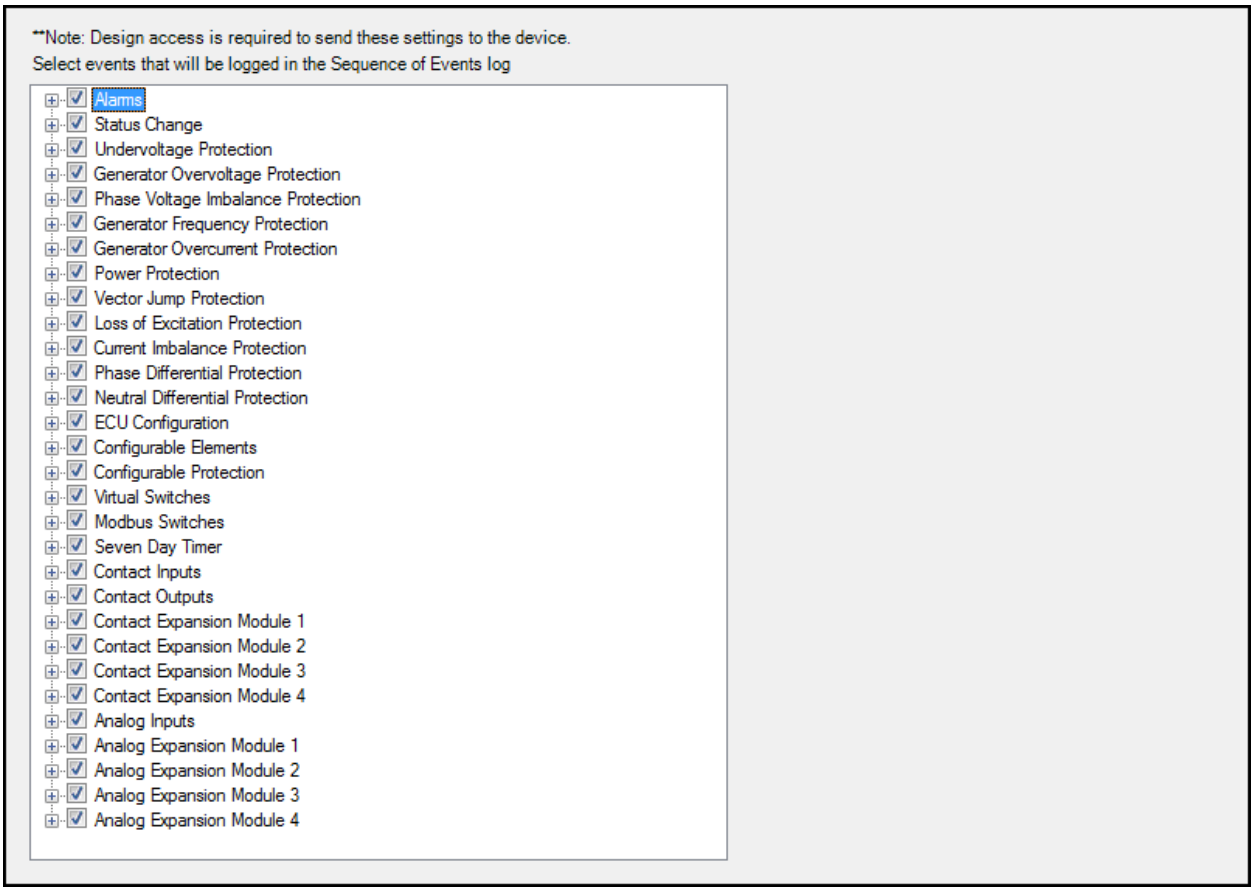


Figure 76. Settings Explorer, Report Configuration, Sequence of Events Setup

Data Logging

BESTCOMS*Plus*® Navigation Path: Settings Explorer, Report Configuration, Data Log Setup
Front Panel Navigation Path: Settings > Report Configuration > Datalog

The data logging function of the DGC-2020HD can record up to 6 oscillography records. DGC-2020HD oscillography records use the IEEE Standard Common Format for Transient Data Exchange (COMTRADE). Each record is time- and date-stamped. After 6 records have been recorded, the DGC-2020HD begins recording the next record over the oldest record. Because oscillography records are stored in nonvolatile memory, interruptions in DGC-2020HD control power will not affect the integrity of the records. Data log settings are configured in BESTCOMS*Plus* and illustrated in Figure 77. Settings are listed in Table 5.

Setup

When oscillography is enabled, each record can consist of up to six user-selectable parameters with up to 1,200 data points recorded for each parameter.

A pre-trigger-points setting enables a user-defined number of data points recorded prior to the event trigger to be included in a data log. The value of this setting affects the duration of the recorded pre-trigger points, the recorded post-trigger points, and the duration of the post-trigger points. A sample interval setting establishes the sample rate of the data points recorded. The value of this setting affects the pre- and post-trigger duration values and the total recording duration for a data log

Data logging is triggered by the BESTlogic™*Plus* DATALOGTRIGGER element. When this element receives a TRUE input, the data logger function begins recording.

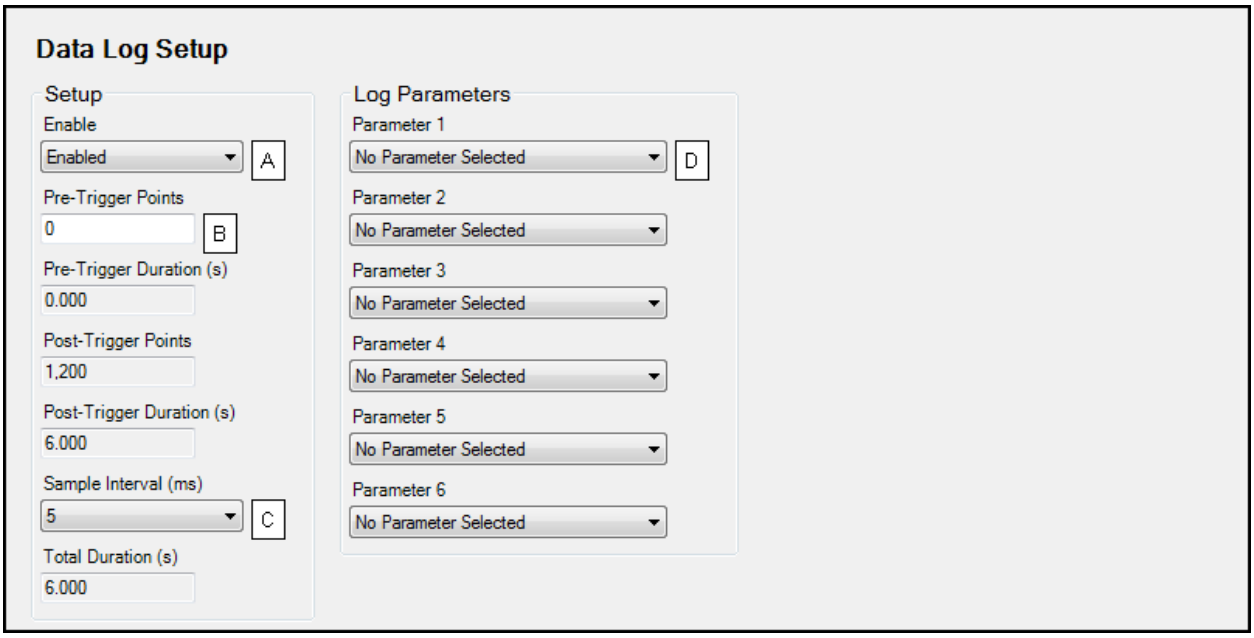


Figure 77. Settings Explorer, Report Configuration, Data Log Setup

Table 5. Settings for Data Log Setup

Locator	Setting	Range	Increment	Unit
A	Enable	Disabled or Enabled	n/a	n/a
B	Pre-Trigger Points	0 to 1,199	1	points
C	Sample Interval	5 to 12,500	5	n/a
D	Parameter 1 to 6	*	n/a	n/a

* Selectable parameters are listed in the *Configurable Protection* chapter in the *Configuration* manual.

Trending

BESTCOMS*Plus*® Navigation Path: Settings Explorer, Report Configuration, Trending
Front Panel Navigation Path: Settings > Report Configuration > Trending

The trend log records the activity of DGC-2020HD parameters over an extended period of time. When enabled, up to six selectable parameters can be monitored over a user-defined duration ranging from 1 to 720 hours. Trend log settings are illustrated in Figure 78.

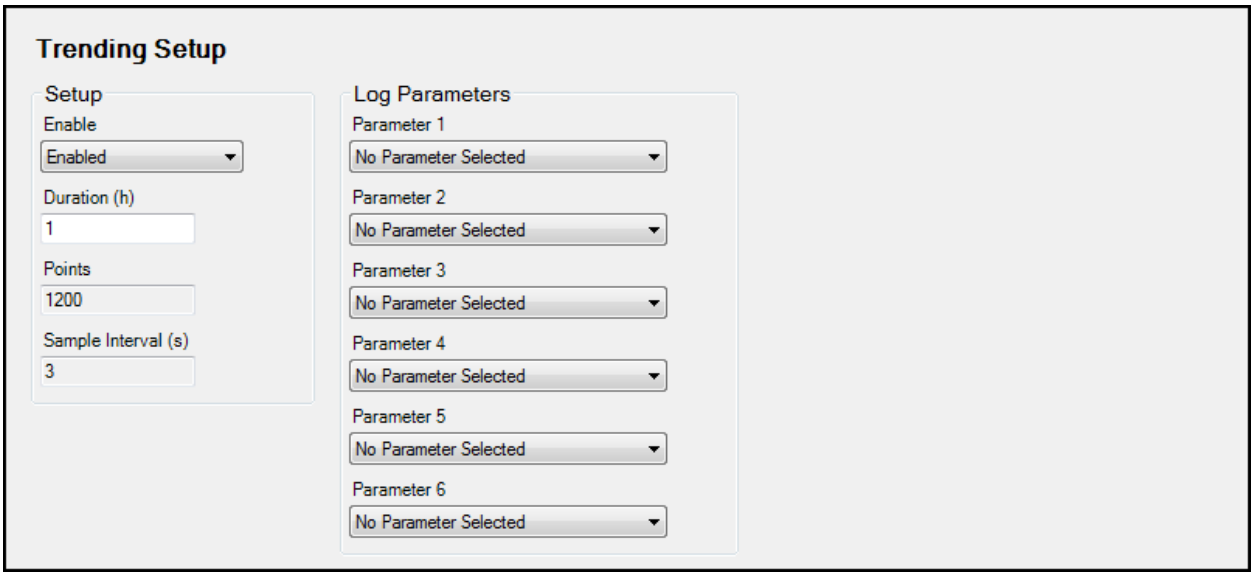


Figure 78. Settings Explorer, Report Configuration, Trending Setup

Differential Reporting

A DGC-2020HD equipped with optional Enhanced Plus Differential protection (Style: xNDxxNxEx) records information about its phase current differential (87G) status and creates a differential report. Only one report is stored in nonvolatile memory. When a new report is generated, the DGC-2020HD discards the old report and replaces it with the new one.

To view differential reports using BESTCOMS*Plus,* use the Metering Explorer to open the Reports, Differential Report screen shown in Figure 79.

From this screen, the latest differential report can be downloaded into BESTCOMS*Plus* then saved to a file or printed. A new report can be triggered from this screen as well.

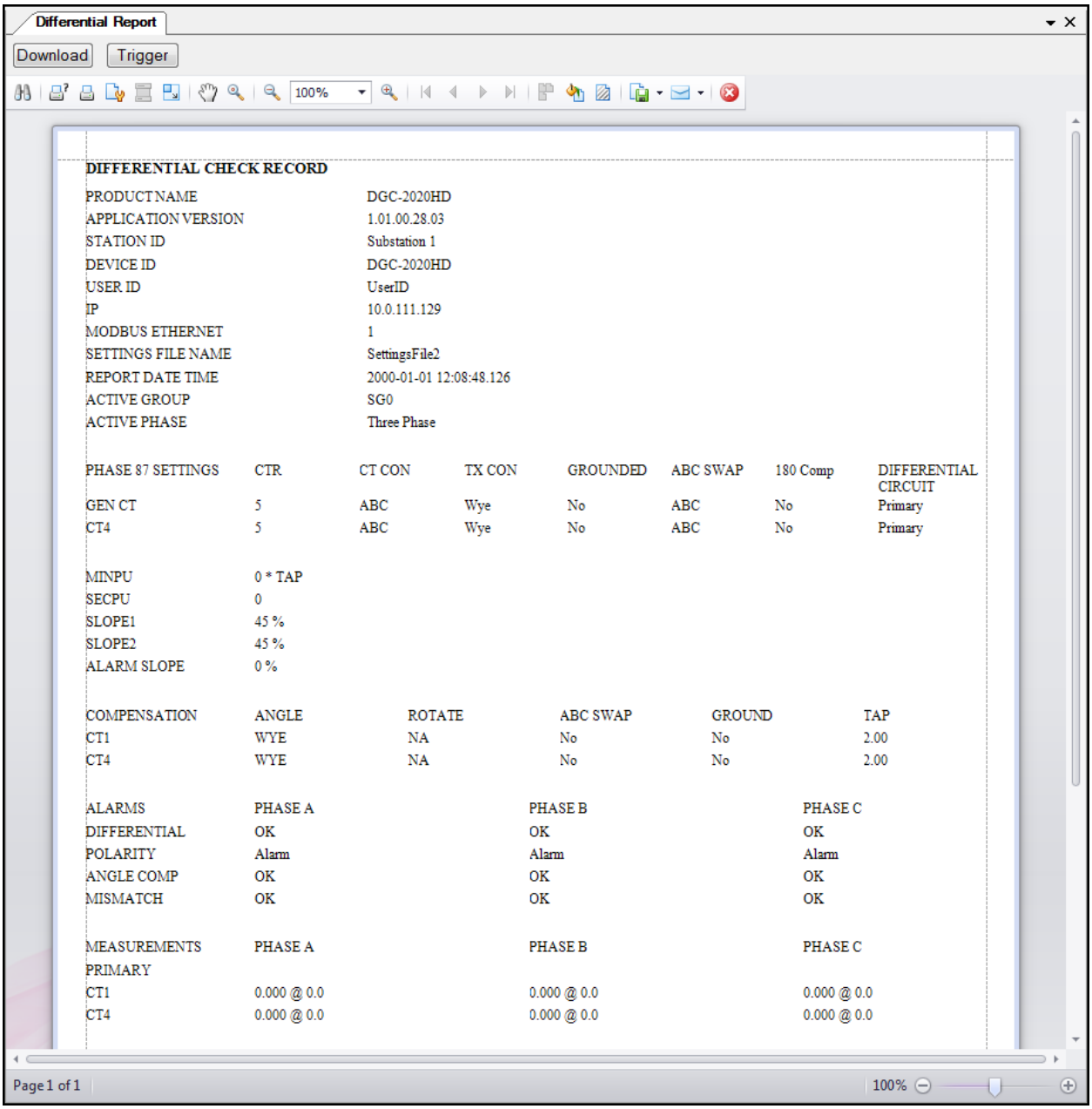


Figure 79. Metering Explorer, Reports, Differential Report

Annunciation

DGC-2020HDs monitor ECU data, protection functions, engine senders, contact inputs, analog inputs and outputs, configurable elements, and some programmable functions. When a monitored parameter exceeds its threshold, the status is annunciated in one of three types: alarm, pre-alarm, and status only. An alarm configuration setting determines the type of annunciation that is used. The annunciation types are described in the following paragraphs.

Alarm

When an alarm condition exists, the following actions are taken by the DGC-2020HD:

- Stop the engine by opening the fuel contact output.
- Replace the front panel Overview screen with the Active Alarms screen.

- Light the front panel Alarm LED.
- Close the horn output if enabled and programmed.
- Light LEDs and sound horn on the optional remote display panel. If an active alarm is not annunciated by the remote display panel, the Switch Not In Auto LED lights and the horn sounds.
- Record the alarm into the event log and sequence of events log.

In addition to the standard alarm, three soft alarms are available: alarm with unload, alarm with Cooldown, alarm with unload and Cooldown. To avoid abrupt shutdowns, soft alarms perform a partial or complete normal shutdown.

Alarm with Unload

The unit first unloads by ramping down the kW output until the power level is below the Breaker Open Setpoint value. The breaker opens and the unit shuts down. An alarm condition occurs as described above.

Alarm with Cooldown

The unit first enters the Cooldown state by first opening the breaker then the unit cools down for the specified duration. Then an alarm occurs as described above.

Alarm with Unload and Cooldown

The unit first unloads by ramping down the kW output until the power level is below the Breaker Open Setpoint value. The breaker opens and the unit enters the Cooldown state for the duration of the No Load Cool Down Time setting. Then an alarm occurs as described above.

Pre-alarm

When only pre-alarms are active, the front panel Overview screen is alternated with the Active Pre-Alarms screen in one-second intervals, the horn output toggles in one-second intervals, and the engine continues to run.

Status only

If Status Only is selected, the corresponding input is set true in BESTlogic*Plus* only. The status is always available to BESTlogic*Plus* Programmable Logic regardless of the Alarm Configuration setting.

Retrieving and Resetting Alarms

Retrieving Alarm Information

Alarms can be viewed on the front panel display and through BESTCOMS*Plus*.

Front Panel Display

The lists of active alarms and pre-alarms can be viewed by navigating to Metering > Status > Alarms *or* Pre-alarms. These lists are scrollable by using the Up and Down pushbuttons.

BESTCOMSPlus®

Status of each active alarm and pre-alarm is displayed on the Alarms screen (Figure 80). This screen is found in the Metering Explorer. Active pre-alarms are listed in the upper panel, alarms are listed in the lower panel.

Figure 80. Metering Explorer, Alarms

Resetting Alarms and Pre-Alarms

Most pre-alarms automatically reset when the alarm condition no longer exists.

Pressing the Reset key while viewing the Overview screen will reset certain active indications. The list of indications that can be reset includes the following:

- Breaker Open Fail or Breaker Close Fail pre-alarms
- Synchronizer Fail pre-alarm
- 78 Vector Shift or 81 Frequency trip status for 78 or 81 elements configured on the Gen Bus
- Bus protection trip status for any protection element configured on Bus 1 or Bus 2
- Weak Battery pre-alarm status
- AVR or GOV Analog Bias Output Out-of-Range status
- ARP Ping Fail pre-alarm
- Alarms and faults from MTU MDEC, MTU ECU7/ECU7, and MTU Smart Connect ECUs
- Maintenance Due pre-alarm (hold Reset key for 10 seconds)

Pre-alarms that do not automatically reset are listed below:

- 81 ROC DF/DT Rate of Change of Frequency
- 78 Vector Shift
- Breaker Close Fail
- Breaker Open Fail
- Synchronizer Fail
- Weak Battery

These pre-alarms are reset by navigating to the Overview screen on the front-panel display and pressing the Reset pushbutton or pulsing the Reset logic element in BESTlogic*Plus.*

Alarms do not automatically reset. Manually reset alarms by pressing the Off pushbutton.

Horn

The audible horn can be silenced by pressing the Alarm Silence pushbutton. This does not reset the alarm or pre-alarm causing the horn to annunciate.

Maintenance Interval

To reset the maintenance interval pre-alarm through the front panel, navigate to the Settings > System Parameters > System Settings > Reset Maintenance Timer screen. Operator, Settings, or OEM access level is required to reset the maintenance interval pre-alarm.

Another way to reset the maintenance interval pre-alarm from the front panel is to hold the Reset pushbutton for 10 seconds while the Overview screen is displayed.

To reset the maintenance interval pre-alarm by using BESTCOMS*Plus*, use the Metering Explorer to open the Run Statistics screen and click on the Reset Maintenance Interval button.

MTU Fault Codes

A DGC-2020HD connected to a genset equipped with an MTU engine ECU tracks and displays the active fault codes issued by the MTU engine ECU. Active MTU fault codes can be viewed through BESTCOMS*Plus*® by using the Metering Explorer to expand the MTU tree or through the front panel display by navigating to Metering > Status > MTU Fault Codes.

Each fault code is displayed with a fault description and the fault number. If the DGC-2020HD does not have descriptive information about a fault number that was received, the fault description will display as “NO TEXT AVAILABLE”. Fault codes displayed by the DGC-2020HD are listed in Table 6.

Table 6. MTU Fault Codes

Fault Code Number	String	Description
3	HI T FUEL	Fuel temperature too high (limit 1).
4	SS T FUEL	Fuel temperature too high (limit 2).
5	HI T CHRG AIR	Charge air temperature too high (limit 1).
6	SS T CHRG AIR	Air temperature too high (limit 2).
9	HI T INTERCOOLER	Coolant temperature of intercooler too high (limit 1).
10	SS T INTERCOOLER	Coolant temperature of intercooler too high (limit 2)
15	LO P LUBE OIL	Pressure of lube oil too low (limit 1).
16	SS P LUBE OIL	Pressure of lube oil too low (limit 2).
19	HI T EXHAUST A	Exhaust gas temperature (A-side) too high (limit 1).
20	SS T EXHAUST A	Exhaust gas temperature (A-side) too high (limit 2).
21	HIT T EXHAUST B	Exhaust gas temperature (B-side) too high (limit 1).
22	SS T EXHAUST B	Exhaust gas temperature (B-side) too high (limit 2).
23	LO COOLANT LEVEL	Coolant level too low (limit 1).
24	SS COOLANT LEVEL	Coolant level too low (limit 2).
25	HI P DIFF LUBE OIL	Differential pressure of oil filter too high (limit 1).
26	SS P DIFF LUBE OIL	Differential pressure of oil filter too high (limit 2).
27	HI LEVEL LEAKAGE FUEL	Level of leakage fuel too high (limit 1).
29	HI ETC IDLE SPD TOO HI	Idle speed of one of the switchable chargers too high.
30	SS ENGINE OVERSPEED	Engine overspeed (limit 2).
31	HI ETC1 OVERSPEED	Speed of basic charger too high (limit 1).
32	SS ETC1 OVERSPEED	Speed of basic charger too high (limit 2).
33	L1 P FUELFLT DIF	Differential pressure of fuel filter too high (limit 1).
36	HI ETC2 OVERSPEED	Speed of 1st switchable charger too high (limit 1).
37	SS ETC2 OVERSPEED	Speed of 1st switchable charger too high (limit 2).
38	AL ETC SPEED DEVIATION	Speed deviation between basic turbo charger and one of the switchable chargers.
39	AL ETC2 CUTIN FAIL	Switching of charger ETC2 failed.
44	LO LEVEL INTRCLR	Coolant level of intercooler too low (limit 1).
45	FAULT L2 LEVEL INTRCLR	Coolant level of intercooler too low (limit 2).
51	HI T LUBE OIL	Lube oil temperature too high (limit 1).
52	SS T LUBE OIL	Lube oil temperature too high (limit 2).
53	HI T INTAKE AIR	Air intake temperature high (Limit 1).
54	HIHI T INTAKE AIR	Air intake temperature high (Limit 2).
57	LO P COOLANT	Coolant pressure too low (limit 1).
58	SS P COOLANT	Coolant pressure too low (limit 2).
59	SS T COOLANT L3	Coolant temperature too high/too low (limit 3).
60	SS T COOLANT L4	Coolant temperature too high/too low (limit 4).

Fault Code Number	String	Description
61	HI P ADCRANK CS L1	Crankcase pressure too high (Limit 1) - Abnormal continuous rise.
62	HI P ADCRANK CS L2	Crankcase pressure too high (Limit 2) - Abnormal continuous rise.
63	HI P CRANKCASE	Crankcase pressure too high (limit 1) - Abrupt rise.
64	SS P CRANK CASE	Crankcase pressure too high (limit 2) - Abrupt rise.
65	LO P FUEL	Fuel supply pressure too low (limit 1).
66	SS P FUEL	Fuel supply pressure too low (limit 2).
67	HI T COOLANT	Coolant temperature too high (limit 1).
68	SS T COOLANT	Coolant temperature too high (limit 2).
69	L1 T EXTERN 1	Limit 1, out of range.
70	L2 T EXTERN 1	Limit 2, out of range.
71	L1 T EXTERN 2	Limit 1, out of range.
72	L2 T EXTERN 2	Limit 2, out of range.
73	L1 P EXTERN 1	Limit 1, out of range.
74	L2 P EXTERN 1	Limit 2, out of range.
75	L1 P EXTERN 2	Limit 1, out of range.
76	L2 P EXTERN 2	Limit 2, out of range.
77	LIM EXT CLNT LEV	Binary signal 1 Plant active.
78	LIM INTERCLR LEV	Binary signal 2 Plant active.
79	L BIN EXTERN 3	Binary signal 3 Plant active.
80	L BIN EXTERN 4	Binary signal 4 Plant active.
81	AL RAIL LEAKAGE	Rail pressure gradient too low for Start or too high for Stop.
82	HI P FUEL COMON RAIL	Rail pressure > setpoint value.
83	LO P FUEL COMMON RAIL	Rail pressure < setpoint value.
85	HI T UMBLASSEN	‘Umblasen’ temperature too high (limit 1).
86	SS T UMBLASSEN	‘Umblasen’ temperature too high (limit 2).
89	SS SPEED TOO LOW	Engine is being stalled. The engine speed of the normally operating engine dropped below the limit from parameter 2.2500.027 Limit Engine Speed Low without any stop request. For safety reason the engine is stopped when this event occurs.
90	SS IDLE SPEED LOW	Idle speed not reached.
91	SS RELEASE SPEED LO	Acceleration speed not reached.
92	SS STARTER SPEED LO	Starter speed not reached.
93	SS PREHT TMP	Preheat temperature too low (limit 2).
94	LO PREHT TMP	Preheat temperature too low (limit 1).
95	AL PRELUBE FAULT	Prelubrication fault.
99	DUMMY FAULT	Dummy fault - this is not a real fault, but is used on some ECUs to test the fault reporting mechanism.
100	EDM NOT VALID	Checksum fault EDM.
101	IDM NOT VALID	Checksum fault IDM.
102	INVLD FUEL CNS 1	Fuel consumption counter detect.
103	INVLD FUEL CNS 2	Consumption monitoring 2 not valid.
104	ENG HRS INVALID 1	Engine Hours Counter defect.
105	ENG HRS INVALID 2	Checksum fault.
106	ERR REC1 INVALID	Checksum fault.
107	ERR REC2 INVALID	Checksum fault.
118	LO ECU SUPPLY VOLTS	Power supply voltage too low (limit 1).
119	LOLO ECU SUPPLY VOLTS	Power supply voltage too low (limit 2).
120	HI ECU SUPPLY VOLTS	Power supply voltage too high (limit 1).

Fault Code Number	String	Description
121	HIHI ECU SUPPLY VOLTS	Power supply voltage too high (limit 2).
122	HI T ECU	Temperature of electronic too high (limit 1).
134	15v POSECU DEFCT	Internal electronic fault.
136	15V NEGECU DEFCT	Internal electronic fault.
137	L1 5V BUFFR TEST	Pressure-sensor fault, pressure-sensor wiring, or internal electronic fault.
138	SENSOR PWR DEFCT	Pressure-sensor fault, pressure-sensor wiring, or internal electronic fault.
139	L1 TE BUFFR TEST	Internal electronic fault.
140	TE BUF ECU DEFCT	Internal electronic fault.
141	AL POWER TOO HIGH	AL power too high.
142	MCR EXCEEDED 1 HR STR	AL MCR exceeded 1 hour.
143	BANK1 ECU DEFECT	Internal electronic fault.
144	BANK2 ECU DEFECT	Internal electronic fault.
145	15V GOODECU DFCT	Internal electronic fault.
147	AD TST1ECU DEFCT	Internal electronic fault.
149	AD TST2ECU DEFCT	Internal electronic fault.
151	AD TST3ECU DEFCT	Internal electronic fault.
170	MI MODULE FAIL	Module in maintenance indicator defect.
171	MI NOT ACTIVE	WI not active anymore.
172	TBO EXPIRED	TBO expired.
173	MODL WRITE LIMIT	EEPROM write limit reached.
176	AL LIFE DATA NA	No (fitting) LifeData-Backup-System is available within a delay time after ECU Reset.
177	AL LIFE DATA INCPLT	If the ADEC has to restore the LifeData from the backup-system and at least one checksum is wrong after the upload or the upload is incomplete, then this failure is set.
180	AL CAN1 NODE LOST	Connection to a node on CAN 1 lost.
181	AL CAN2 NODE LOST	Connection to a node on CAN 2 lost.
182	AL CAN WRONG PARAMS	Incorrect CAN parameter values have been entered.
183	AL CAN NO PU DATA	A CAN mode is selected which the communication is initialized aided of the PU data module. However, required PU data module is not present or is not valid.
184	AL CAN PUDATA ERR	During attempt to copy a received PU data module to Flash module, a program error occurred.
185	CAN LESS MAILBXS	CAN less mailboxes.
186	AL CAN1 BUS OFF	CAN controller 1 is in “Bus Off” state.
187	AL CAN1 ERR PASSV	CAN controller 1 has signaled a warning.
188	AL CAN2 BUS OFF	CAN controller 2 is in “Bus Off” state.
189	AL CAN2 ERROR PASSV	CAN controller 2 has signaled a warning.
190	AL EMU PARAM NO SUPPORT	EMU parameters are not supported.
198	AL COMB ALM YEL	Combined Yellow Alarm - a yellow alarm is a warning and does generally not result in engine shutdown.
201	SD T COOLANT	Coolant temperature-sensor defect.
202	SD T FUEL	Fuel temperature-sensor defect.
203	SD T CHARGE AIR	Charge air temperature-sensor defect.
205	SD T CLNT INTERC	Intercooler coolant temperature-sensor defect.
206	SD T EXHAUST A	Exhaust gas temperature-sensor on A-side defect.
207	SD T EXHAUST B	Exhaust gas temperature-sensor on B-side defect.
208	SD P CHARGE AIR	Charge air pressure-sensor defect.
211	SD P LUBE OIL	Lube oil pressure-sensor defect.

Fault Code Number	String	Description
212	SD P COOLANT	Coolant pressure-sensor defect.
213	SD P COOLANT INTRCOOLR	Intercooler coolant pressure-sensor defect.
214	SD P CRANKCASE	Crankcase pressure-sensor defect.
215	SD P HD	Rail pressure-sensor defect.
216	SD T LUBE OIL	Lube oil temperature-sensor defect.
219	SD T INTAKE AIR	Intake air temperature-sensor defect.
220	SD COOLANT LEVEL	Sensor for coolant level defect.
221	SD P DIFF LUBE OIL	Sensor for differential pressure of lube oil defect.
222	SL LVL LKG FUEL	Sensor for leakage level of fuel defect.
223	SD LVL INTERCLR	Sensor for coolant level of intercooler defect.
227	SD PRE FILT P LUBE OIL	Pressure sensor for lube oil before filter defect.
228	SD P FL PRE FILTR	Sensor defect on the fuel pre-filter pressure sensor.
229	AL SD CAM STOP	Sensor of Camshaft defect and sensor of crankshaft defect before.
230	SD CRANKSHFT SPD	Sensor defect on crankshaft.
231	SD CAMSHAFT SPD	Sensor defect on camshaft.
232	SD CHARGER1 SPEED	Speed-sensor of basic charger defect.
233	SD CHARGER2 SPEED	Speed-sensor of switching charger defect.
239	SD P DIFF FUEL	Sensor defect in the fuel filter differential pressure sensor.
240	SD P FUEL	Fuel pressure-sensor defect.
241	SD T UMBLASSEN	Temperature-sensor of recirculated charge air defect.
242	SD T COOLANT R	Redundant coolant temperature-sensor defect.
244	SD P LUBE OIL R	Redundant pressure sensor for lube oil defect.
245	SD POWER SUPPLY	Internal ECU error.
246	SD T ELECTRONIC	Internal ECU fault.
249	SD CAN STOP	Missing data CAN.
250	SD CAN SPD DEMND	Missing data CAN.
251	SD CAN UP DOWN	Missing data CAN.
252	SD CAN NOTCH POS	Missing data CAN.
253	SD CAN OVERRIDE	Missing data CAN.
254	SD CAN TST OVRSP	Missing data CAN.
255	SD CAN ENGAGE SIG	Missing data CAN.
256	SD CAN CYL CUTOUT	Missing data CAN.
257	SD CAN LOCAL	Missing data CAN.
258	SD CAN RCS ENGAGE	Missing data CAN.
259	SD CAN RCS CYL CT	Missing data CAN.
260	SD 15V POS SPPLY	Internal ECU fault.
261	15V POS SPPLY	Internal ECU fault.
262	SD 5V BUFFR TEST	Internal ECU fault.
263	SD TE BUFFR TEST	Internal ECU fault.
264	SD BANK 1 TEST	Internal ECU fault.
265	SD BANK 2 TEST	Internal ECU fault.
266	SD SPD DEMAND AN	Analog speed demand defect.
267	SD SPDMTEST BNCH	Short circuit, cable breakage.
268	SD SPINUT	Analog spinning value defect.
269	SD LOAD ANLG FLT	Filtered analog load pulse signal not available.
270	SD FREQUENCY INPUT	Frequency input defect.

Fault Code Number	String	Description
271	SD T EXTERN 1	Missing data CAN.
272	SD T EXTERN 2	Missing data CAN.
273	SD P EXTERN 1	Missing data CAN.
274	SD P EXTERN 2	Missing data CAN.
275	SD EXT CLNT LVL	Missing data CAN.
276	SD INTERCLER LVL	Missing data CAN.
277	SD BIN EXT3	Missing data CAN.
278	SD BIN EXT4	Missing data CAN.
279	SD CANRES TRIPFL	Missing data CAN.
280	SD CAN ALRM RST	Missing data CAN.
281	SD ADTEST1 SPPLY	Internal ECU fault.
282	SD ADTEST 2 SPPLY	Internal ECU fault.
283	SD ADTEST3 SPPLY	Internal ECU fault.
284	SD CAN LAMP TEST	Missing data CAN.
285	SD CAN IDLE RQ SR	Missing data CAN.
286	SD CAN IDLE REQ	Missing data CAN.
287	SD CAN IDLE REQ	Missing data CAN.
288	SD CAN TRBOSW LCK	Missing data CAN.
301	TIMING CYLNDR A1	Error in timing of injector cylinder A1: timing value too low/high.
302	TIMING CYLNDR A2	Error in timing of injector cylinder A2: timing value too low/high.
303	TIMING CYLNDR A3	Error in timing of injector cylinder A3: timing value too low/high.
304	TIMING CYLNDR A4	Error in timing of injector cylinder A4: timing value too low/high.
305	TIMING CYLNDR A5	Error in timing of injector cylinder A5: timing value too low/high.
306	TIMING CYLNDR A6	Error in timing of injector cylinder A6: timing value too low/high.
307	TIMING CYLNDR A7	Error in timing of injector cylinder A7: timing value too low/high.
308	TIMING CYLNDR A8	Error in timing of injector cylinder A8: timing value too low/high.
309	TIMING CYLNDR A9	Error in timing of injector cylinder A9: timing value too low/high.
310	TIMING CYLNDR A10	Error in timing of injector cylinder A10: timing value too low/high.
311	TIMING CYLNDR B1	Error in timing of injector cylinder B1: timing value too low/high.
312	TIMING CYLNDR B2	Error in timing of injector cylinder B2: timing value too low/high.
313	TIMING CYLNDR B3	Error in timing of injector cylinder B3: timing value too low/high.
314	TIMING CYLNDR B4	Error in timing of injector cylinder B4: timing value too low/high.
315	TIMING CYLNDR B5	Error in timing of injector cylinder B5: timing value too low/high.
316	TIMING CYLNDR B6	Error in timing of injector cylinder B6: timing value too low/high.
317	TIMING CYLNDR B7	Error in timing of injector cylinder B7: timing value too low/high.
318	TIMING CYLNDR B8	Error in timing of injector cylinder B8: timing value too low/high.
319	TIMING CYLNDR B9	Error in timing of injector cylinder B9: timing value too low/high.
320	TIMING CYLNDR B10	Error in timing of injector cylinder B10: timing value too low/high.
321	WIRING CYLNDR A1	Short circuit in injector cable of cylinder A1.
322	WIRING CYLNDR A2	Short circuit in injector cable of cylinder A2.
323	WIRING CYLNDR A3	Short circuit in injector cable of cylinder A3.
324	WIRING CYLNDR A4	Short circuit in injector cable of cylinder A4.
325	WIRING CYLNDR A5	Short circuit in injector cable of cylinder A5.
326	WIRING CYLNDR A6	Short circuit in injector cable of cylinder A6.
327	WIRING CYLNDR A7	Short circuit in injector cable of cylinder A7.
328	WIRING CYLNDR A8	Short circuit in injector cable of cylinder A8.
329	WIRING CYLNDR A9	Short circuit in injector cable of cylinder A9.

Fault Code Number	String	Description
330	WIRING CYLNDR A10	Short circuit in injector cable of cylinder A10.
331	WIRING CYLNDR B1	Short circuit in injector cable of cylinder B1.
332	WIRING CYLNDR B2	Short circuit in injector cable of cylinder B2.
333	WIRING CYLNDR B3	Short circuit in injector cable of cylinder B3.
334	WIRING CYLNDR B4	Short circuit in injector cable of cylinder B4.
335	WIRING CYLNDR B5	Short circuit in injector cable of cylinder B5.
336	WIRING CYLNDR B6	Short circuit in injector cable of cylinder B6.
337	WIRING CYLNDR B7	Short circuit in injector cable of cylinder B7.
338	WIRING CYLNDR B8	Short circuit in injector cable of cylinder B8.
339	WIRING CYLNDR B9	Short circuit in injector cable of cylinder B9.
340	WIRING CYLNDR B10	Short circuit in injector cable of cylinder B10.
341	OPN LD CYLNDR A1	Open load in injector cable of cylinder A1.
342	OPN LD CYLNDR A2	Open load in injector cable of cylinder A2.
343	OPN LD CYLNDR A3	Open load in injector cable of cylinder A3.
344	OPN LD CYLNDR A4	Open load in injector cable of cylinder A4.
345	OPN LD CYLNDR A5	Open load in injector cable of cylinder A5.
346	OPN LD CYLNDR A6	Open load in injector cable of cylinder A6.
347	OPN LD CYLNDR A7	Open load in injector cable of cylinder A7.
348	OPN LD CYLNDR A8	Open load in injector cable of cylinder A8.
349	OPN LD CYLNDR A9	Open load in injector cable of cylinder A9.
350	OPN LD CYLNDR A10	Open load in injector cable of cylinder A10.
351	OPN LD CYLNDR B1	Open load in injector cable of cylinder B1.
352	OPN LD CYLNDR B2	Open load in injector cable of cylinder B2.
353	OPN LD CYLNDR B3	Open load in injector cable of cylinder B3.
354	OPN LD CYLNDR B4	Open load in injector cable of cylinder B4.
355	OPN LD CYLNDR B5	Open load in injector cable of cylinder B5.
356	OPN LD CYLNDR B6	Open load in injector cable of cylinder B6.
357	OPN LD CYLNDR B7	Open load in injector cable of cylinder B7.
358	OPN LD CYLNDR B8	Open load in injector cable of cylinder B8.
359	OPN LD CYLNDR B9	Open load in injector cable of cylinder B9.
360	OPN LD CYLNDR B10	Open load in injector cable of cylinder B10.
361	AL POWER STAGE LOW	Internal error of electronic.
362	AL POWER STAGE HIGH	Internal error of electronic.
363	AL STOP POWER STAGE	Internal error of electronic.
364	AL STOP POWER STAGE 2	Internal error of electronic.
365	AL MV WIRING GND	Cable line error.
371	AL WIRING TO 1	Short circuit or open load on transistor output 1 (TO 1).
372	AL WIRING TO 2	Short circuit or open load on transistor output 2 (TO 2).
373	AL WIRING TO 3	Short circuit or open load on transistor output 3 (TO 3).
374	AL WIRING TO 4	Short circuit or open load on transistor output 4 (TO 4).
381	AL WIRING TOP 1	Short circuit or open load on transistor output plant 1 (TOP 1).
382	AL WIRING TOP 2	Short circuit or open load on transistor output plant 2 (TOP 2).
383	AL WIRING TOP 3	Short circuit or open load on transistor output plant 3 (TOP 3).
384	AL WIRING TOP 4	Short circuit or open load on transistor output plant 4 (TOP 4).
385	AL WIRING TOP 5	Short circuit or open load on transistor output plant 5 (TOP 5).
386	AL WIRING TOP 6	Short circuit or open load on transistor output plant 6 (TOP 6).
390	AL MCR EXCEEDED	DBR/MCR Function: MCR (Maximum Continuous Rating) in exceeded.

Fault Code Number	String	Description
392	HI T COOLNT R	Redundant coolant temperature too high (limit 1).
393	SS T COOLNT R	Redundant coolant temperature too high (limit 2).
394	LO P LUBE OIL R	Redundant pressure of lube oil too low (limit 1).
395	SS P LUBE OIL R	Redundant pressure of lube oil too low (limit 2).
396	TD T COOLANT	Maximum deviation of T-Coolant sensors.
397	TD P LUBE OIL	Maximum deviation of P-Oil sensors.
399	AL INTERFACE ECU	Interface ECU.
400	AL OPN LD DIGIN 1	Open load on digital input 1.
401	AL OPN LD DIGIN 2	Open load on digital input 2.
402	AL OPN LD DIGIN 3	Open load on digital input 3.
403	AL OPN LD DIGIN 4	Open load on digital input 4.
404	AL OPN LD DIGIN 5	Open load on digital input 5.
405	AL OPN LD DIGIN 6	Open load on digital input 6.
406	AL OPN LD DIGIN 7	Open load on digital input 7.
407	AL OPN LD DIGIN 8	Open load on digital input 8.
408	AL OPN LD E STOP	Open load on input for emergency stop.
410	LO U PDU	Power driver voltage (injectors) too low (limit 1).
411	LOLO U PDU	Power driver voltage (injectors) too low (limit 2).
412	HI U PDU	Power driver voltage (injectors) too high (limit 1).
413	HIHI U PDU	Power driver voltage (injectors) too high (limit 2).
414	HI L WATER FUEL PREFILT	Water level of fuel prefilter too high (limit 1).
415	LO P COOLANT INTRCOOLR	Coolant pressure of InterCooler too low (limit 1).
416	SS P COOLANT INTRCOOLR	Coolant pressure of InterCooler too low (limit 2).
417	SD L WATER FUEL PREFILT	Water level-sensor of fuel prefilter defect.
418	SD INTAKE AIR B	Sensor defect of the Intake Air B temperature sensor.
419	SD PRE_ENG T COOL	Sensor defect in the Coolant Temperature Sensor before engine coolant intake.
420	AL L1 AUX 1	Input of Aux 1 injured limit 1.
421	AL L2 AUX 1	Input of Aux 1 injured limit 2.
422	SD T CHRG AIR B	Sensor defect in the Charge Air B Temperature Sensor.
423	LO P COOLANT DIFF	Low Coolant Differential Pressure.
424	AL L1 AUX 2	Auxiliary 2 Alarm Level 1 Alarm.
425	AL L2 AUX 2	Auxiliary 2 Alarm Level 2 Alarm.
426	SD AIR MASS A	Sensor defect in Air Mass Sensor A.
427	SD AIR MASS B	Sensor defect in Air Mass Sensor B.
428	AL L1 T AUX 1	Temperature input of Aux 1 injured limit 1.
429	HI P COOLANT	High Coolant Pressure.
430	LO PRE ENG P COOLNT	Low Pre-Engine Coolant Pressure (Limit 1).
431	SS PRE ENG P COOLNT	Low Pre-Engine Coolant Pressure (Limit 2).
432	AL L1 T AUX2	Auxiliary Temperature 2 Level 1 Alarm.
433	AL L2 T AUX2	Auxiliary Temperature 2 Level 2 Alarm.
434	HI PRE ENG T COOLNT	High Pre-Engine Coolant Temperature (Limit 1).
435	SS PRE ENG T COOLNT	High Pre-Engine Coolant Temperature (Limit 2).
436	AL L1 P AUX 2	Auxiliary Pressure 2 Level 1 Alarm.
437	AL L2 P AUX 2	Auxiliary Pressure 2 Level 2 Alarm.
438	LO P FUEL RAIL 2 STR	Low pressure on fuel rail 2.

Fault Code Number	String	Description
439	HI P FUEL RAIL 2 STR	Hi pressure on fuel rail 2.
440	AL L1 P AUX 1	Pressure input of Aux 1 injured limit 1.
441	AL RAIL 2 LEAKAGE STR	Alarm fuel rail 2 leak detected.
442	AL L2 P AUX 1	Pressure input of Aux 1 injured limit 2.
443	HI P CHG MIX DIFF	High Charge Mix Differential Pressure.
444	SD U PDU	Sensor defect of Injector Power driver unit.
445	SD P AMBIENT AIR	Ambient air pressure-sensor defect.
446	SD P HD2	Sensor Defect In HD 2 Pressure Sensor.
447	HIHI P CHG MIX DIFF	Charge Mixture Differential Pressure High (Limit 2).
448	HI P CHARGE AIR	Pressure of charge air too high (limit 1).
449	SS P CHARGE AIR	Pressure of charge air too high (limit 2).
450	SD IDLE END TRQ IN	Input of Idle/End-Torque defect
451	HI T CHARGE MIX	High Charge Mixture Temperature (Limit 1).
452	HI HI T CHARGE MIX	High Charge Mixture Temperature (Limit 2).
453	LO T CHARGE MIX	Low Charge Mixture Temperature.
454	SS PWR RED ACT	Power Reduction is activated.
455	AL L1 AUX1 PLANT	Input of Aux 1 (plant) injured limit 1.
456	AL L2 AUX1 PLANT	Input of Aux 1 (plant) injured limit 2.
457	LO T INTAKE AIR	Low Intake Air Temperature (Limit 1).
458	LO LO T INTAKE AIR	Low Intake Air Temperature (Limit 2).
459	SD P CLNT B ENG	Sensor Defect In the Coolant Before Engine Pressure Sensor.
460	HI T EXHAUST EMU	Exhaust gas temperature of EMU too high (limit 1).
461	LO T EXHAUST EMU	Exhaust gas temperature of EMU too low (limit 1).
462	HI T COOLANT EMU	Coolant temperature of EMU injured limit 1.
463	SD AUX 2	Sensor defect on Aux 2.
464	SD P AUX 1	Analog input for pressure Aux 1 defect.
465	SD P AUX 2	Sensor Defect in the Auxiliary 2 Pressure Sensor.
466	SD T AUX 2	Sensor Defect in the Auxiliary 2 Temperature Sensor.
467	AL L2 T AUX 1	Temperature input of Aux 1 injured limit 2.
468	SD T AUX 1	Analog input for Temperature Aux 1 defect.
469	SD AUX 1	Analog input for Aux 1 defect.
470	SD T ECU	ECU temperature-sensor defect.
471	SD COIL CURRENT	Coil Current sensor defect.
472	AL STOP SD	Engine stop, because critical channel has sensor defect.
473	AL WIRING PWM CM2	Open load or short circuit on channel PWM CM2.
474	AL WIRING FREQ OUT	Open load or short circuit on frequency output (FO) channel.
475	AL CR TRIG ENG ST	Released in case of an engine stop in order to trigger the crash recorder.
476	AL CRASH REC ERR	Initial error of crash recorder.
477	WRT MISTK BIN VAL	Binary Data Write Error.
478	AL COMB ALM YEL	Combined Alarm YELLOW (Plant).
479	AL COMB ALM RED	Combined Alarm RED (Plant).
480	AL EXT ENG PROT	External Engine Protection function active.
481	SD COIL CURRENT 2	Sensor Defect In Coil Current 2 Sensor.
482	SD T EXHAUST C	Sensor Defect In Exhaust System C Temperature Sensor.
483	SD T EXHAUST D	Sensor Defect In Exhaust System D Temperature Sensor.
484	HI T EXHAUST C	High Exhaust C Temperature (Limit 1).
485	SS T EXHAUST C	High Exhaust C Temperature (Limit 2).

Fault Code Number	String	Description
486	HI T EXHAUST D	High Exhaust D Temperature.
487	SS T EXHAUST D	Shutdown due to High Exhaust D Temperature.
488	HI ETC 3 OVERSPD	High Turbo Charger ETC 3 Overspeed (Limit 1).
489	SS ETC 3 OVERSPD	High Turbo Charger ETC 3 Overspeed (Limit 2).
490	HI ETC 4 OVERSPD	High Turbo Charger ETC 4 Overspeed (Limit 1).
491	SS ETC 4 OVERSPD	High Turbo Charger ETC 4 Overspeed (Limit 2).
492	HI ETC 4 CUTIN FAIL	High Turbo Charger ETC 4 Cut In Failure (Limit 1).
493	HI ETC 3 CUTIN FAIL	High Turbo Charger ETC 3 Cut In Failure (Limit 2).
494	SD THROTL A FDBK	Sensor Defect In Throttle A Feedback Sensor.
495	SD THROTL B FDBK	Sensor Defect In Throttle B Feedback Sensor.
496	SD P CHARGE MIX A	Sensor Defect In Charge Mix A Pressure Sensor.
497	SD P CHARGE MIX B	Sensor Defect In Charge Mix B Pressure Sensor.
498	SD P CHRG MIX DIFF	Sensor Defect In Charge Mix Differential Pressure Sensor.
499	SD P CHARGE MIX	Sensor Defect In Charge Mix Pressure Sensor.
500	AL WIRING POM STARTER 1	A wiring fault has been detected in the connection of starter 1 of POM.
501	AL WIRING POM STARTER 2	A wiring fault has been detected in the connection of starter 2 of POM.
502	AL OPEN LD POM ALTRNATR	An open load on POM's alternator output has been detected.
503	AL BATT NOT CHARGING	Battery is not being charged by alternator.
504	AL CAN POM NODE LOST	POM is missing on CAN bus.
505	AL NEW POM FOUND	New POM found.
506	AL LOW STARTER VOLTS	Battery voltage is too low for starting.
507	AL POM ERROR	A general POM error has been detected.
508	AL WRONG POM ID	POM sends a different identification number (ID) than expected.
509	AL CHECK POM FUSE	Check POM fuse.
510	AL OVERRIDE APPLIED	Override applied.
511	HIHI P CHG MIX A	Hi Charge Air Mix A Pressure (Limit 2).
512	HIHI P CHG MIX B	Hi Charge Air Mix B Pressure (Limit 2).
513	SD P COOLNT DIFF	Sensor Defect In Coolant Differential Pressure Sensor.
514	WRITE ERR FLASH	Write Error Occurred when writing data to Flash Memory.
515	STARTER NOT ENGAGED	Starter of POM could not be engaged.
516	OILNIVEAU CAL ERR	Remote Oil Level Watchman Calibration Error.
517	SD CHG MX PR THRT	Sensor Defect In Charge Pre-Throttle Mix Pressure Sensor.
518	SD THROT BYPASS FDBK	Sensor Defect In Throttle Feedback Bypass Sensor.
519	OIL LVL CAL ERROR	Oil Level Calibration Error.
520	SD P IN AIR AFT FLT A	Sensor Defect In Intake Air After Filter A Pressure Sensor.
521	SD P OIL MID VAL	Lube Oil Pressure Middle Value (Limit 2).
522	SD P IN AIR AFT FLT B	Sensor Defect In Intake Air After Filter B Pressure Sensor.
523	SD T COOL RED MIDVL	Coolant Temperature Mid value (Limit 2).
524	SS ENG OVRSPD MIDVL	Engine Speed Middle Value too high (Limit 2).
525	SD P LUBE OIL R2	Sensor Defect In Lube Oil Pressure (R2) Sensor.
526	SD T COOL OIL R2	Sensor Defect In Oil Coolant Temperature (R2) Sensor.
527	TD ENG SPD SNS DEV	Engine Speed Sensor Deviation.
528	SD ENG SPD SENSR 3	Sensor Defect in Engine Speed Third Sensor.
529	SS T COOL RED 2	Coolant Temperature Red 2 Alarm (Limit 2).

Fault Code Number	String	Description
530	SS P LUBE OIL RED 2	Lube Oil Pressure Red 2 Alarm (Limit 2).
531	AL WIRING PWM CM1	PWM CM1 Wiring Issue.
532	AL WIRING PWM1	PWM 1 Wiring Issue.
533	AL WIRING PWM2	PWM 2 Wiring Issue.
534	HIHI POWER DIFF	Power Difference High (Limit 2).
535	LOLO POWER DIFF	Power Difference Low (Limit 2).
536	AL WIRING PWM1 CM1	PWM CM1 Wiring Issue.
537	SD P VNTRI DLTA SD A	Sensor Defect In Venturi Side A Delta Pressure Sensor.
538	SD P VNTRI DLTA SD B	Sensor Defect In Venturi Side B Delta Pressure Sensor.
539	SD P EGR VNTRI STATIC	Sensor Defect In EGR Venturi Static Pressure Sensor.
540	SD T EGR	Sensor Defect In EGR Temperature Sensor.
541	AL L1 T EGR	EGR Temperature (Limit 1) Alarm.
542	AL L2 T EGR	EGR Temperature (Limit 2) Alarm.
543	MULTIPLE FDH SLAVES	There is more than one device which is configured as Backup for FDH-Functionality.
544	CONFIGURATION CHANGED	Gets active in case of changing system configuration e.g. by changing ECU- or SAM-Device. Remains until undo procedure or data is transferred by a valid maintenance case. Is cancelled automatically.
545	AL L1 P EXT PLNT1	External Plant 1 Pressure Alarm (Limit 1).
546	AL L1 P EXT PLNT2	External Plant 2 Pressure Alarm (Limit 1).
547	AL L1 T EXT PLNT1	External Plant 1 Temperature Alarm (Limit 1).
548	AL L1 T EXT PLNT2	External Plant 2 Temperature Alarm (Limit 1).
549	AL PWR CUTOFF DET	Power Cutoff Detected.
550	SS ENG OVRSP RED2	Engine Overspeed Red2 (Limit 1) Alarm.
551	SS ENG OVRSPD CAMSFT	Engine Overspeed Camshaft (Limit 1) Alarm.
552	AL GAS CTRL CHK FLT	Gas Control Check Fault Alarm.
553	AL AUX DEVICES FLT	Auxiliary Devices Alarm.
554	AL IGNITION FAULT	Ignition Fault Alarm.
555	AL CALL FIELD SERVICE	Gets active in case of completing a maintenance-case which manipulates Engine-Parameters. Remains also after switching on-off ECU until a valid release code is entered via Display- and Button-Control of SAM-Device. Release Code is available via Internet by a special procedure.
556	AL GAS VALVE FLT	Gas Valve Fault Alarm.
557	AL ENG SPD COLL. FLT	Engine Speed Collapse Fault Alarm.
558	AL WIRING PWM CM2	PWM CM2 Wiring Issue.
559	AL MIX THRT A FLT	Throttle A Mixture Fault Alarm.
560	AL MIX THRT B FLT	Throttle B Mixture Fault Alarm.
561	AL LIM EXT PLNT BIN1	External Plant Bin 1Limit Alarm.
562	AL LIM EXT PLNT BIN2	External Plant Bin 1Limit Alarm.
563	AL LIM EXT PLNT BIN3	External Plant Bin 1Limit Alarm.
564	AL LIM EXT PLNT BIN4	External Plant Bin 1Limit Alarm.
565	L1 P AFTER AIR FLT A	Intake A Air Pressure After Filter (Limit 1).
566	L2 P AFTER AIR FLT A	Intake A Air Pressure After Filter (Limit 2).
567	L1 P AFTER AIR FLT B	Intake B Air Pressure After Filter (Limit 1).
568	L2 P AFTER AIR FLT B	Intake B Air Pressure After Filter (Limit 2).
569	AL SAM MSG DATA FLT	SAM Module Missing Data Fault.
570	L1 CAN MAX TIMG RETRD	Maximum Timing Retard from CAN (Limit 1).
571	L2 CAN MAX TIMG RETRD	Maximum Timing Retard from CAN (Limit 2).

Fault Code Number	String	Description
572	L3 CAN MAX TIMG RETRD	Maximum Timing Retard from CAN (Limit 3).
573	SD P DIFF STR VS VRD	Sensor Defect in Pressure Differential Sensor Pitot Tube vs. Pressure.
574	SD M AIR EGR BEF CLR	Sensor Defect In Air Mass Sensor before EGR Cooler.
575	SD M INTAKE AIR	Sensor Defect In Intake Air Mass Sensor.
576	AL ESCM OVERRIDE STR	Exceeding of the corrected current MCR - odr DBR/MCR value.
577	SD T LUBE OIL PAN	Sensor Defect In Oil Pan Lube Oil Temperature Sensor.
578	AL L1 T LUBOIL PAN	Lube Oil Pan Temperature (Limit 1).
579	AL MD CANRQ IDLE SPD	MD Idle Speed Request over Can Bus.
580	AL CAN SPD LIMIT	MD Speed Limitation From Can Bus.
581	AL PWM CM3	PWM CM3 Alarm.
582	AL EMERG STOP FL	Emergency Stop Failed Alarm.
583	AL BRKR CLOSED	Circuit Breaker Closed Alarm.
584	AL CAN STRTCLR FL	Start Clearance from Can Bus Fail Alarm.
585	AS MOTORSTRT BL	Engine Start Blocked Alarm.
586	LO P OIL REFILL PMP	Refill Pump Lower Oil Pressure.
587	AL WIRING PWM CM4	PWM CM4 Wiring Issue.
588	SD P OIL REFILL PUMP	Sensor Defect In Refill Pump Oil Pressure Sensor.
589	SD T EGR SIDE B	Side B EGR Temperature Alarm.
590	SD P DLTA EXHAUST A	Sensor Defect In Exhaust A Pressure Delta Sensor.
591	SD P EGRB VNTRI STATC	Sensor Defect In Side B EGR Venturi Static Pressure Sensor.
592	AS P DLTA EXH B	Sensor Defect In Exhaust B Pressure Delta Sensor.
593	SD OIL T J1939	Sensor Defect in Lube Oil Pan Temperature Sensor.
594	AL L1 PRV 1 DEFECT STR	Yellow alarm pressure relief valve first rail.
595	AL L2 PRV 1 DEFECT STR	Red alarm pressure relief valve first rail.
596	DEVELOP PR SET	Develop PR Set Alarm.
597	AL WIRING PWM CM5	PWM CM5 Wiring Issue.
598	AL L1 PRV 2 DEFECT STR	Yellow alarm pressure relief valve second rail.
599	AL L2 PRV 2 DEFECT STR	Red alarm pressure relief valve second rail.
600	SD T EXG A+B	Sensor Defect In Exhaust A Plus B Temperature Sensor.
601	SD ETC1 + EC2	Turbo Charger Speed Sensors 1 and 2 Faulty.
602	AK CAB ENG STRT LOCK	Engine Start Lock from Can Alarm.
603	SD AIR HUMIDITY	Sensor Defect In Air Humidity Sensor.
604	AL HUT CHGSPD MAX	HUT Speed Change Maximum Limit Alarm.
605	AL HUT DEV TOO HI	HUT DEV too high limit alarm.
606	AL DBL NODES LOST 1+2	Nodes Lost on Can1 and Can2 Alarm.
607	AL MD CAN STOP	MD Can Stop Alarm.
608	AL WIRING PWM CM6	PWM CM6 Wiring Issue.
609	AL WIRING PWM CM7	PWM CM7 Wiring Issue.
610	AL WIRING SUCK RESTRCT 1 STR	Open load or short circuit on PWM HP fuel control block channel.
611	AL WIRING SUCK RESTRCT 2 STR	Open load or short circuit on PWM HP fuel control block channel 2.
612	AL WIRING PRESS CTRL VLV 1 STR	Open load or short circuit on PWM pressure regulating valve channel.
613	AL WIRING PRESS CTRL VLV 2 STR	Open load or short circuit on PWM pressure regulating valve channel 2.
614	L1 P FUEL SEC FLTDIFF	Secondary Filter Fuel Pressure Limit 1 Alarm.
615	AL EIL PROTECTION STR	Alarm for Protection Module in response to faulty or manipulated EIL.

Fault Code Number	String	Description
616	AL EIL ERROR STR	EIL Error.
617	LO ACTUAL HU VAL	HU Actual Value Low (Limit 1).
618	LOLO ACTUAL HU VAL	HU Actual Value Low (Limit 2).
619	HI ACTUAL HU VAL	HU Actual Value High (Limit 1).
620	HIHI ACTUAL HU VAL	HU Actual Value High (Limit 2).
621	LO NOX VALUE	NOX Value Low (Limit 1).
622	LOLO NOX VALUE	NOX Value Low (Limit 2).
623	HI NOX VALUE	NOX Value High (Limit 1).
624	HIHI NOX VALUE	NOX Value High (Limit 2).
625	SD P FUEL ADD SEC FLT	Sensor Defect in Pressure Sensor that meters Fuel Pressure Before supplemental Filter.
626	AL WIRING PWM CM8	PWM CM8 Wiring Issue.
627	AL WIRING PWM CM9	PWM CM9 Wiring Issue.
628	AL WIRING PWM CM10	PWM CM10 Wiring Issue.
629	EGR THOTTLE A DFCT	EGR Throttle EGR Defect.
630	EGR THOTTLE B DFCT	EGR Throttle EGR Defect.
631	AL BYPASS THROT DFCT	Bypass Throttle Defect.
632	AL DISPNS THRTL DFCT	Dispenser Throttle Defect.
633	SD P AMBAIR HDT2800	Sensor Defect in Ambient HD2800 Air Pressure Sensor.
634	SD T AMBAIR HDT2800	Sensor Defect in Ambient HD2800 Air Temperature Sensor.
635	SD H AMBAIR HDT2800	Sensor Defect in Ambient HD2800 Air Humidity Sensor.
636	SD OIL LVL J1939	Sensor Defect in J1939 Lube Oil Level Sensor.
637	SD OIL T J1939	Sensor Defect in J1939 Lube Oil Temperature Sensor.
638	AL WIRING PWM SIG1	PWM SIG1 Wiring Issue.
639	AL WIRING PWM SIG2	PWM SIG2 Wiring Issue.
640	SD SM NOX O2 FACTR	Sensor Defect In Smart NOX Oxidation Factor Sensor.
641	AS SYS WATCHDG RST	System Restart by Watchdog Detected.
642	SD ELCT ENG PWR AI2	Sensor Defect In Engine Power AI2 Electronic Sensor.
643	SP P FUEL BOF	Sensor Defect in BOF Fuel Pressure Sensor.
644	AL L1 P FUEL BOF	BOF Fuel Pressure Limit 1.
645	AL L2 P FUEL BOF	BOF Fuel Pressure Limit 2.
646	AL KNOCK INTNSTY	Knock Intensity Too High.
647	SD P EXH LAMBDA	Sensor Defect in Exhaust Lambda Pressure Sensor.
648	SD P CHRG AIR B	Sensor Defect In Charge Air B Pressure Sensor.
649	AL REQ ANGL THRT A	Throttle A Angle Alarm.
650	AL REQ ANGL THRT B	Throttle B Angle Alarm.
651	AL PREHT ERROR	Preheating Error Alarm.
652	AL GET COM LOST	GET Communications Lost.
653	AL IX92X COMM LOST	IC92X Communications Lost.
654	AL FSERIES COMM LOST	F Series Communications Lost.
655	AL TECJET COMM LOST	TECJET Communications Lost.
656	AL PROACT A COMM LST	PROACT A Communications Lost.
657	AL PROACT B COMM LST	PROACT B Communications Lost.
658	AL NOXA COMM LOST	NOX A Communications Lost.
659	AL NOXB COMM LOST	NOX B Communications Lost.
660	AL PHYTRNA COM LST	PHYTRON A Communications Lost.
661	AL PHYTRNB COM LST	PHYTRON B Communications Lost.

Fault Code Number	String	Description
662	SD SMRT NOX HTR	Sensor Defect in Smart NOX Heater Element Sensor.
663	SD SMRT NOX CONC.	Sensor Defect in Smart NOX Concentration Sensor.
664	AL OIL REFILL ERR	Oil Refill Error.
665	AL GET YELLOW	GET Yellow Alarm.
666	AL IC92X YELLOW	IC92X Yellow Alarm.
667	AL FSERIES YELLOW	F Series Yellow Alarm.
668	AL TECJET YELLOW	TECJET Yellow Alarm.
669	AL PROACTA YELLOW	PROACT A Yellow Alarm.
670	AL PROACTB YELLOW	PROACT B Yellow Alarm.
671	AL NOXA YELLOW	NOX A Yellow Alarm.
672	AL NOXB YELLOW	NOX B Yellow Alarm.
673	AL PHYA YELLOW	PHYTRON A Yellow Alarm.
674	AL PHYB YELLOW	PHYTRON B Yellow Alarm.
675	AL GET RED	GET Red Alarm.
676	AL IC92X RED	IC92X Red Alarm.
677	AL FSERIES RED	F Series Red Alarm.
678	AL TECJET RED	TECJET Red Alarm.
679	AL PROACTA RED	PROACT A Red Alarm.
680	AL PROACTB RED	PROACT B Red Alarm.
681	AL NOXA RED	NOX A Red Alarm.
682	AL NOXB RED	NOX B Red Alarm.
683	AL PHYA RED	PHYTRON A Red Alarm.
684	AL PHYB RED	PHYTRON B Red Alarm.
685	AL LUBE OIL MIN	Lube Oil Minimum.
686	AL LUBE OIL MAX	Lube Oil Maximum.
687	AL LUBEOIL LVL SW	Lube Oil Level Switch is Faulty.
688	LO OIL REFILL	Low Oil Refill.
689	HI OIL REFILL	High Oil Refill.
690	AL LUBEOIL LVL LO	Lube Oil Level Low.
691	HI LUBEOIL LVL REFILL	Lube Oil Refill Level High.
692	AL ECU PWR OFF ON REQ STR	ECU configuration changed, switch power off/on.
693	AL MB VALVE ERR	MB Valve Error.
694	SD T GAS	Sensor Defect in Gas Temperature Sensor.
695	AL EGR FAILURE	EGR Failure Alarm.
696	AL SMARTCONCT USB ERR STR	Alarm configuration parameter.
697	AL SMARTCONCT RS485 ERR STR	Alarm configuration parameter.
698	AL SD STOP BUTTON STR	Channel signals open load or internal error.
700	AL SD START BUTTON STR	Channel signals open load.
701	AL SD UP BUTTON STR	Channel signals open load.
702	AL SD DN BUTTON STR	Channel signals open load or internal error.
703	AL SD EXT SPEED DMD SW STR	Channel signals open load.
704	AL SD SPEED DMD INCREASE STR	Channel signals open load or internal error.
705	AL SD BINARY SPD DMD LMT STR	Channel signals open load or internal error.

Fault Code Number	String	Description
706	AL SD DROOP 2 SWITCH STR	Channel signals open load or internal error.
707	AL SD FREQUENCY SWITCH STR	Channel signals open load or internal error.
709	AL SD OVERRIDE BUTTON STR	Channel signals open load or internal error.
710	AL SD ALARM RESET STR	Channel signals open load or internal error.
711	AL SD CYLINDER CUTOUT STR	Channel signals open load or internal error.
712	AL SD RQST BIN OUT TST STR	Channel signals open load or internal error.
713	AL SD EXT ENGINE PROTECTN STR	Channel signals open load or internal error.
714	AL SD PRELUBE SIGNAL STR	Channel signals open load.
715	AL SD EXT INC IDLE BIN STR	Channel signals open load.
716	AL SD EXT INC IDLE BIN BRK STR	Channel signals open load.
717	AL SD RQST PLANT DBR STR	Channel signals open load.
718	INTK AIR THRTL DFCT	Intake Air Throttle Defect.
719	AL T GAS L1	Gas Temperature Limit Alarm (Limit 1).
720	AL T GAS L2	Gas Temperature Limit Alarm (Limit 2).
721	AL T GAS L3	Gas Temperature Limit Alarm (Limit 3).
722	AL T GAS L4	Gas Temperature Limit Alarm (Limit 4).
723	SD T EXH BEF DOC A	Sensor Defect Exhaust Temperature Sensor before DOC.
724	SD T EXH BEF DPF A	Sensor Defect Exhaust Temperature Sensor before DPF.
725	SD T EXH AFTR DPF A	Sensor Defect Exhaust Temperature Sensor after DPF
726	SD P DELTA EXH DPF A	Sensor Defect in DPF Exhaust Pressure Delta Sensor.
727	L1 DELTA T_NT INTRCLR	NT Intercooler NT Temperature (Limit 1) Alarm.
728	L2 DELTA T_NT INTRCLR	NT Intercooler NT Temperature (Limit 2) Alarm.
729	L1 T EXH BEF DOC	Exhaust Temperature Before DOC (Limit 1) Alarm.
730	L2 T EXH BEF DOC	Exhaust Temperature Before DOC (Limit 2) Alarm.
731	L2 T EXH BEF DOC	Exhaust Temperature Before DPF (Limit 1) Alarm.
732	L2 T EXH BEF DPF	Exhaust Temperature Before DPF (Limit 2) Alarm.
733	L1 T EXH AFTR DPF	Exhaust Temperature After DPF (Limit 1) Alarm.
734	L2 T EXH AFTR DPF	Exhaust Temperature After DPF (Limit 2) Alarm.
735	L1 P_DPF DIFF	DPF Exhaust Pressure Difference Alarm (Limit 1) Alarm.
736	L2 P_DPF DIFF	DPF Exhaust Pressure Difference Alarm (Limit 2) Alarm.
737	L1 P_DPF NORM DIFF	DPF Normal Difference Pressure (Limit 1) Alarm.
738	L2 P_DPF NORM DIFF	DPF Normal Difference Pressure (Limit 2) Alarm.
739	L3 P_DPF NORM DIFF	DPF Normal Difference Pressure (Limit 3) Alarm.
740	L4 P_DPF NORM DIFF	DPF Normal Difference Pressure (Limit 4) Alarm.
741	DPF RIGOROUS TM ABORT	DPF Rigorous TM Aborted Alarm.
742	DPF PER RIGOROUS TM	DPF Periodic Rigorous TM Alarm.
743	DPF RIG TM SUPPR	DPF Rigorous TM Suppressed Alarm.
744	DPF FLASH READ ERR	DPF Flash Memory Read Error Alarm.
745	AL EMISSN FLT	Emission Fault Alarm.
746	AL EMISSN FLT2	Emission Fault 2 Alarm.

Fault Code Number	String	Description
747	SD P INTK AIRFLT DIFF	Sensor Defect in the Intake Air Filter Differential Pressure Sensor.
748	SD T EXH BEF SCR F1	Sensor Defect in Exhaust Temperature Sensor Before SCR Filter 1.
749	SD T EXH BEF SCR F2	Sensor Defect in Exhaust Temperature Sensor Before SCR Filter 2.
750	SD T EXH AFTR SCR F1	Sensor Defect in Exhaust Temperature Sensor Before SCR Filter 1.
751	SD T EXH AFTR SCR F2	Sensor Defect in Exhaust Temperature Sensor Before SCR Filter 2.
752	SD DEF TANK LVL	Sensor Defect in DEF Tank Level Sensor.
753	SD T RM TANK	Sensor Defect in RM Tank Temperature Sensor.
754	SD BOSCH LSU LMBDA SNS	Sensor Defect In Bosch LSU Lambda Sensor.
755	SELCTD MODE NOT VLD	Selected Mode Not Valid Alarm.
756	NO VLD MODE SW SGNL	No Valid Mode Switch Alarm.
757	AL LIM T COOL LT FAN	Coolant LT Fan Limit (Limit 1) Alarm.
758	DEF NOZZLE DAMG	DEF Nozzle Damage Alarm.
759	L1 T FUEL B ENGINE	Fuel Temperature Before Engine too high (Limit 1) Alarm.
760	L2 T FUEL B ENGINE	Fuel Temperature Before Engine too high (Limit 2) Alarm.
761	SD T FUEL B ENGINE	Sensor Defect In Sensor metering Fuel Temperature Before Engine Alarm.
762	AL SMRT CNCT LOST	Smart Connect Lost Alarm.
763	AL OL ASO FLP FDBK B	OL ASO Flap B Feedback Alarm.
764	ASO FLP B CLSD A FL	ASO Flap B Closed A Failed Alarm.
765	AL OL ASO FLP FDBK A	OL ASO Flap A Feedback Alarm.
766	ASO FLP A CLSD B FL	ASO Flap A Closed B Failed Alarm.
767	ASP FLAPS CLOSED	ASO Flaps Closed Alarm.
768	ST T EXH V HPTURBN A1	Sensor Defect In Exhaust V HP Turbine A1 Temperature Sensor.
769	SD T EXH AFTR ENG	Sensor Defect In Exhaust Temperature After Engine Sensor.
770	SD T SEA WATER PUMP	Sensor Defect In Sea Water After Pump Temperature Sensor.
771	SD T FUEL B	Sensor Defect In Fuel Temperature B Sensor.
772	SD LVL OIL REFILL TNK	Sensor Defect In Refill Tank Oil Level Sensor.
773	SD P FUEL RTN PATH	Sensor Defect In Return Path Fuel Pressure Sensor.
774	SD P FUEL BEFR ENG	Sensor Defect In Fuel Pressure Before Engine Sensor.
775	SD P SCHM AFT LVL PMP	Sensor Defect In After Level Pump Oil Pressure Sensor.
776	SD P SCHM AT HPPUMP A	Sensor Defect In Oil Pressure at HP Pump A Sensor.
777	SD P SCHM AT HPPUMP B	Sensor Defect In Oil Pressure at HP Pump B Sensor.
778	ASO FLPS OPN FL TO CLS	ASO Flaps Open, Failed to Close Alarm.
779	WRONG NOX SNSR E1	NOX Sensor E1 Wrong Position Alarm.
780	WRONG NOX SNSR E2	NOX Sensor E2 Wrong Position Alarm.
781	WRONG NOX SNSR E3	NOX Sensor E3 Wrong Position Alarm.
782	SD P LUBOIL ETC A	Turbo Charger A Lube Oil Pressure Too High.
783	SD T EXH BEFR SCR F3	Sensor Defect In Before SCR Exhaust Temperature Sensor.
784	SD T EXH AFTR SCR F3	Sensor Defect In After SCR Exhaust Temperature Sensor.
785	L1 P OIL BEF HD PMP A	Oil Pressure Before HD PUMP A (Limit 1) Alarm.
786	L1 P OIL BEF HD PMP B	Oil Pressure Before HD PUMP B (Limit 1) Alarm.
787	L1 P OILNIV PUMP	Oil Pressure in Oil Niveaux Pump (Limit 1) Alarm.
788	ETC SPD FL DETECT	Turbo Charger Speed Failure Detected.
789	WRONG POS TMP SNS E1	Temperature Sensor E1 Wrong Position Alarm.
790	WRONG POS TMP SNS E2	Temperature Sensor E2 Wrong Position Alarm.
791	WRONG POS TMP SNS E3	Temperature Sensor E3 Wrong Position Alarm.
792	L1 P CHARGE AIR B	Charge Air B Pressure (Limit 1) Alarm.
793	L2 P CHARGE AIR B	Charge Air B Pressure (Limit 2) Alarm.

Fault Code Number	String	Description
794	L1 P FL BEFR ENGN	Fuel Pressure Before Engine (Level 1) Alarm.
795	L1 P FUEL RTN	Fuel Pressure in Return Path (Limit 1) Alarm.
796	HI T CHARGE AIR B	High Charge Air B Temperature (Limit 1) Alarm.
797	HIHI T CHRG AIR B	High Charge Air B Temperature (Limit 2) Alarm.
798	L1T EXH BEF HPTRBN A1	Exhaust Temperature Before HP Turbine A1 (Limit 1) Alarm.
799	L2T EXH BEF HPTRBN A1	Exhaust Temperature Before HP Turbine A1 (Limit 2) Alarm.
800	L1 T EXH AFTR ENGINE	Exhaust Temperature After Engine (Limit 1) Alarm.
801	L1T RAW WATR AFTR PMP	Raw Water After Pump Temperature (Limit 1) Alarm.
802	L1T FUEL BEFR ENGINE	Fuel Temperature Before Engine (Limit 1) Alarm.
803	HI T FUEL B	High Fuel B Temperature (Limit 1) Alarm.
804	SS T FUEL B	High Fuel B Temperature (Limit 2) Alarm.
805	LO OIL LVL REFILL	Refill Oil Level Low Alarm.
806	SD CHARGR 3 SPD	Sensor Defect In Turbo Charger 3 Speed Sensor.
807	SD CHARGR 4 SPD	Sensor Defect In Turbo Charger 4 Speed Sensor.
808	SD CHARGR 5 SPD	Sensor Defect In Turbo Charger 5 Speed Sensor.
809	SD F1 NOX BEFOR SCR	Sensor Defect In F1 NOX Before SCR sensor.
810	NO COMS F1NOX BF SCR	Communications Lost with F1 NOX Before SCR sensor.
811	SD F1 NOX AFTR SCR	Sensor Defect In F1 NOX After SCR sensor.
812	NO COMS F1NOX AF SCR	F1 NOX After SCR Communications lost alarm.
813	SD F2 NOX BEFOR SCR	Sensor Defect In F2 NOX Before SCR sensor.
814	NO COMS F2NOX BF SCR	F2 NOX Before SCR Communications lost alarm.
815	SD F2 NOX AFTR SCR	Sensor Defect In F2 NOX After SCR sensor.
816	NO COMS F2NOX AF SCR	F2 NOX After SCR Communications lost alarm.
817	SD F3 NOX BEFOR SCR	Sensor Defect In F3 NOX Before SCR sensor.
818	NO COMS F3NOX BF SCR	F3 NOX Before SCR Communications lost alarm.
819	SD F3 NOX AFTR SCR	Sensor Defect In F3 NOX After SCR sensor.
820	NO COMS F3NOX AF SCR	F3 NOX After SCR Communications lost alarm.
821	HI ETC1 IDLE SPEED	Turbo Charger 1 Speed at Idle Too High.
822	HI ETC2 IDLE SPEED	Turbo Charger 2 Speed at Idle Too High.
823	HI ETC3 IDLE SPEED	Turbo Charger 3 Speed at Idle Too High.
824	HI ETC4 IDLE SPEED	Turbo Charger 4 Speed at Idle Too High.
825	HI ETC5 IDLE SPEED	Turbo Charger 5 Speed at Idle Too High.
826	AL ETC1 SPD DEVTN	Turbo Charger 1 Speed Deviation.
827	AL ETC2 SPD DEVTN	Turbo Charger 2 Speed Deviation.
828	AL ETC3 SPD DEVTN	Turbo Charger 3 Speed Deviation.
829	AL ETC4 SPD DEVTN	Turbo Charger 4 Speed Deviation.
830	AL ETC5 SPD DEVTN	Turbo Charger 5 Speed Deviation.
831	AL ETC JOB ROTATN	Turbo Charger Job Rotation Alarm.
832	EIL DIFF ENG NUMBR	EIL Different Engine Number Alarm.
833	AL EMISSION WRN	Emission Warning Alarm.
834	AL GAS PATH WRN	Gas Path Warning Alarm.
835	AL GAST PATH FLT	Gas Path Fault Alarm.
836	AL SPEED DMD FAIL	Speed Demand Failure Alarm.
837	BYPASS VLV DEFCET	Bypass Valve Defect Alarm.
838	AL ASH VOLUME	Ash Volume Alarm.
839	ECU NT CLS ECO FLAP A	ASO Flap A not closed by ECU Alarm.
840	ECU NT CLS ECO FLAP B	ASO Flap B not closed by ECU Alarm.

Fault Code Number	String	Description
841	SD P GASLN COM RL	Sensor Defect in Gasoline Common Rail Pressure Sensor.
842	AL ACT FL VLV POS L1	ACT Fuel Valve Position (Limit 1) Alarm.
843	SD T CHRG AIR BEF EGR	Sensor Defect in Charge Air Before EGR Temperature Sensor.
844	HI T CHRG AIR BEF EGR	Charge Air Before EGR High Temperature (Limit 1) Alarm.
845	HIHI T CHRGAIR BF EGR	Charge Air Before EGR High Temperature (Limit 2) Alarm.
846	HI T CHRG AIR DIFF AB	Charge Air Differential AB High Temperature (Limit 1) Alarm.
847	HIHI T CHRG AIR DF AB	Charge Air Differential AB High Temperature (Limit 2) Alarm.
848	AL REL HUMIDTY L1	Relative Humidity (Limit 1) Alarm.
849	AL IBT FUNCT ACTV	IBT Function Active Alarm.
850	SD ALIVE FIP	Sensor Defect in ALIVE FIP sensor.
851	AL EXT STRT HD HI	External Start and HD Too High Alarm.
852	MAX BLNK SH TM EXP	Max Blank Shot Time Expired Alarm.
853	HSB1 COMMS LOST	HSB1 Communications Lost Alarm.
854	HSB1 ACUTATR DEFCT	HSB1 Actuator Defect Alarm.
855	BYPASS THR2 DEFCT	Bypass Throttle 2 Defect Alarm.
856	SD P LUBOIL ETC B	Sensor Defect In Turbo Charger Oil Pressure Sensor.
857	NOX ATO1 SENSR DEFCT	NOX ATO 1 Sensor Defect Alarm.
858	L1 P LUBOIL ETC B	Turbo Charger B Oil Pressure Low (Limit 1).
859	HSB2 COMMS LOST	HSB2 Communications Lost Alarm.
860	HSB2 ACUTATR DEFCT	HSB2 Actuator Defect Alarm.
861	DEF IN PIPE S_ACT SYS	DEF in DEF Pipe in ACT system Alarm.
862	DEF TNK HT SNS_ACT SD	DEF Tank ACT Sensor Defect.
863	HSB3 COMMS LOST	HSB3 Communications Lost Alarm.
864	HSB3 ACUTATR DEFCT	HSB3 Actuator Defect Alarm.
865	HSB4 COMMS LOST	HSB4 Communications Lost Alarm.
866	HSB4 ACUTATR DEFCT	HSB4 Actuator Defect Alarm.
867	L1 P LUBOIL ETC A	Turbo Charger A Oil Pressure Low (Limit 1).
868	L2 P LUBOIL ETC A	Turbo Charger A Oil Pressure Low (Limit 2).
869	L2 P LUBOIL ETC B	Turbo Charger B Oil Pressure Low (Limit 2).
870	AL MB VLV DEFCT 2	MB Valve Defect 2 Alarm.
871	NOX ATO1 COMS LOST	NOX ATO 1 Communications Lost Alarm.
872	EGR A REF LEARN FAIL	EGR Reference Learning Algorithm Failure Alarm.
873	DEF TNK LVL EMPTY	DEF Tank Level Empty Alarm.
874	SCR FAIL	SCR Failure Alarm.
875	ADBLUE TANK LOW	ADBLUE (DEF) Tank Level Low Alarm.
876	EGR B REF LEARN FAIL	EGR B Reference Learning Algorithm Failure Alarm.
877	BYP A REF LEARN FAIL	Bypass A Reference Learning Algorithm Failure Alarm.
878	BYPASS B FAST LRN FL	Bypass B Fast Learn Algorithm Failure Alarm.
879	DISPNSR REF LRN FL	Dispenser Reference Learn Algorithm Failure Alarm.
880	INTAKEAIR REF LRN FL	Intake Air Reference Learn Algorithm Failure Alarm.
881	AL UREA QLTY RELEASE	Urea Quality Release Alarm.
882	SCR F1 SU REVLTN RNG	SCR F1 SU Revolution Range Alarm.
883	SCR F2 SU REVLTN RNG	SCR F2 SU Revolution Range Alarm.
884	SCR F1 SU ADBLUE QNTY	SCR F1 SU ADBLUE Quantity.
885	SCR F2 SU ADBLUE QNTY	SCR F2 SU ADBLUE Quantity.
886	SCR ADBLUE PRESSR	SCR ADBLUE Pressure Alarm.
887	SCR SU PRIME REQUEST	SCR SU Priming Request Alarm.

Fault Code Number	String	Description
888	SCR SU ADBLUE PRESSR	SCR SU ADBLUE Pressure Alarm.
889	SD T LUBEOIL ETC	Sensor Defect In Turbo Charger Oil Temperature Sensor.
890	L2 T LUBEOIL ETC	Lube Oil Temperature Too High (Limit 2).
891	AL TURNING ACTIVATED	Turning Activation Alarm.
892	FLO1 SPPLYUNT1 COM LS	Lost Communications with Air Flow 1 Supply Unit 1.
893	FLO1 SPPLYUNT2 COM LS	Lost Communications with Air Flow 1 Supply Unit 2.
894	FLO2 SPPLYUNT1 COM LS	Lost Communications with Air Flow 2 Supply Unit 1.
895	FLO2 SPPLYUNT2 COM LS	Lost Communications with Air Flow 2 Supply Unit 2.
896	FLO3 SPPLYUNT1 COM LS	Lost Communications with Air Flow 3 Supply Unit 1.
897	FLO3 SPPLYUNT2 COM LS	Lost Communications with Air Flow 3 Supply Unit 2.
898	TRICAN COMMS LOST	Communications Lost on TRICAN network.
899	OLT COMMS LOST	Communications to OLT Lost.
900	SCRF3 SU REV RNG	SCR F3 SU Revolution Range Alarm.
901	SCRF3 SU ADBLUE QTY	SCR F3 SU Adblue Quantity Low.
902	HI TCOOL CYL HEAD	High Cylinder Head Coolant Temperature (Limit 1).
903	SD TCOOL CYL HEAD	Sensor Defect in Cylinder Head Coolant Temperature Sensor.
904	SS TCOOL CYL HEAD	High Cylinder Head Coolant Temperature (Limit 2).
905	ADBLUE EXP CNS FL	ADBLUE Expected Consumption Failure Alarm.
906	ADBLUE BALANCE FL	ADBLUE Balance Failed Alarm.
907	NOX RAW EMISSN FL	NOX Raw Gas Emission Failed Alarm.
908	APPRCH NOX DOS STP FL	Approach NOX Dosing Stop Failed Alarm.
909	SCR TEXH BTW FLOWS FL	Exhaust Temperature Between SCR Flows Failed Alarm.
910	EXP TEXH BFR SCR FL	Expected Exhaust Temperature Before SCR Failure Alarm.
911	EXP TEXH AFT SCR FL	Expected Exhaust Temperature After SCR Failure Alarm.
912	SCR F1 TEXH BFR GRDNT	SCR F1 Exhaust Temperature Before Gradient Alarm.
913	SCR F2 TEXH BFR GRDNT	SCR F2 Exhaust Temperature Before Gradient Alarm.
914	SCR F3 TEXH BFR GRDNT	SCR F3 Exhaust Temperature Before Gradient Alarm.
915	SCR F1 TEXH AFT GRDNT	SCR F1 Exhaust Temperature After Gradient Alarm.
916	SCR F2 TEXH AFT GRDNT	SCR F2 Exhaust Temperature After Gradient Alarm.
917	SCR F3 TEXH AFT GRDNT	SCR F3 Exhaust Temperature After Gradient Alarm.
918	L1 T LUBEOIL ETC	Turbo Charger Lube Oil Temperature High (Limit 1).
919	ENERGY CNTR DEFCT	Energy Counter Defect Alarm.
920	L1 TEXH BFR SCRF1	Exhaust Temperature Before SCR F1 (Limit 1) Alarm.
921	L2 TEXH BFR SCRF1	Exhaust Temperature Before SCR F1 (Limit 2) Alarm.
922	L1 TEXH AFT SCRF1	Exhaust Temperature After SCR F1 (Limit 1) Alarm.
923	L2 TEXH AFT SCRF1	Exhaust Temperature After SCR F1 (Limit 2) Alarm.
924	L1 TEXH BFR SCRF2	Exhaust Temperature Before SCR F2 (Limit 1) Alarm.
925	L2 TEXH BFR SCRF2	Exhaust Temperature Before SCR F2 (Limit 2) Alarm.
926	L1 TEXH AFT SCRF2	Exhaust Temperature After SCR F2 (Limit 1) Alarm.
927	L2 TEXH AFT SCRF2	Exhaust Temperature After SCR F2 (Limit 2) Alarm.
928	L1 TEXH BFR SCRF3	Exhaust Temperature Before SCR F3 (Limit 1) Alarm.
929	L2 TEXH BFR SCRF3	Exhaust Temperature Before SCR F3 (Limit 2) Alarm.
930	L1 TEXH AFT SCRF3	Exhaust Temperature After SCR F3 (Limit 1) Alarm.
931	L2 TEXH AFT SCRF3	Exhaust Temperature After SCR F3 (Limit 2) Alarm.
932	AL MIC5 YELLOW	MIC 5 Yellow Alarm.
933	AL MIC5 RED	MIC 5 Red Alarm.
934	AL MIC5 COMM LOST	MIC 5 Comms Lost Alarm.

Fault Code Number	String	Description
935	LO F1 TEXH BFR SCR	F1 Exhaust Temperature before SCR Too Low Alarm.
936	LO F2 TEXH BFR SCR	F2 Exhaust Temperature before SCR Too Low Alarm.
937	LO F3 TEXH BFR SCR	F3 Exhaust Temperature before SCR Too Low Alarm.
938	LO F1 TEXH AFT SCR	F1 Exhaust Temperature after SCR Too Low Alarm.
939	LO F2 TEXH AFT SCR	F2 Exhaust Temperature after SCR Too Low Alarm.
940	LO F3 TEXH AFT SCR	F3 Exhaust Temperature after SCR Too Low Alarm.
941	LO SCR OPRATING T	SCR Operating Temperature Too Low Alarm.
942	CATLY CONV LO F1	Catalytic Conversion Too Low F1 Alarm.
943	CATLY CONV LO F2	Catalytic Conversion Too Low F2 Alarm.
944	CATLY CONV LO F3	Catalytic Conversion Too Low F3 Alarm.
945	L1 L VOLTAGE ASO	Low ASO Voltage (Limit 1) Alarm.
946	L2 L VOLTAGE ASO	Low ASO Voltage (Limit 2) Alarm.
947	INVALD LSI CHANL CFG	Invalid LSI Channel Configuration Alarm.
948	AL ESI ACTIVATED	ESI Activated Alarm.
949	SD VOLTAGE ASO	Sensor Defect in ASO Voltage Sensor.
950	SCR SU FLT S EXST F1	SCR SU Fault S F1 Exists alarm.
951	ETC0 CUTIN FAIL	Turbo Charger 0 Cut In Failure.
952	ETC1 CUTIN FAIL	Turbo Charger 1 Cut In Failure.
953	LAMBDA VALUE INVALID	Lambda Value Invalid Alarm.
954	NOX VALUE INVALID	NOX Value Invalid Alarm.
955	THRML MANGMT ACTV	Thermal Management Active Alarm.
956	P5 CNTVAR LIM MN ACTV	P5 Control Variable Minimum Limit Active Alarm.
957	P5 CV MAX BOI MN ACT	P5 Control Variable Max BOI Minimum Active Alarm.
958	LMDA CTLVR LMT MN ACT	Lambda Control Variable Minimum Limit Active Alarm.
959	LMDA CV MX BOI MN ACT	Lambda Control Variable Max BOI Minimum Active Alarm.
960	NOXP5 MN BOI MX ACTV	NOX P5 Minimum BOI Maximum Active.
961	NOXP5 MX BOI MN ACTV	NOX P5 Maximum BOI Minimum Active.
962	GPS LMDA CV MAX ACTV	GPS Lambda Control Variable Maximum Active Alarm.
963	GPS P5 CV MAX ACTV	GPS P5 Control Variable Maximum Active Alarm.
964	GPS P5 CV MIN ACTV	GPS P5 Control Variable Minimum Active Alarm.
965	SCR SU FLT S EXIST F2	SCR SU Fault S F2 Exists Alarm.
966	SCR SU FLT S EXIST F3	SCR SU Fault S F3 Exists Alarm.
967	SCR SU PRIM REQ F1	SCR SU Priming Request F1 Alarm.
968	SCR SU PRIM REQ F2	SCR SU Priming Request F2 Alarm.
969	SCR SU PRIM REQ F3	SCR SU Priming Request F3 Alarm.
970	SD P EXHAUST	Sensor Defect in Exhaust Pressure Sensor.
971	COLD ENGINE ALARM	Cold Engine Alarm.
972	MIC5 SINGATURE DIFF	MIC5 Signature Difference Alarm.
973	AL CHECKSUM IIG	IIG Check Sum Alarm.
974	AL CAN3 BUS OFF	Can3 Bus Off Alarm.
975	CAN3 ERR PASSIVE	Can3 Error Passive Alarm.
976	AL CAN4 BUS OFF	Can4 Bus Off Alarm.
977	CAN4 ERR PASSIVE	Can4 Error Passive Alarm.
978	HI ETC5 OVERSPEED	Turbo Charger 5 Overspeed (Limit 1).
979	SS ETC5 OVERSPEED	Turbo Charger 5 Overspeed (Limit 2).
980	ADBLUE TEMP HI F1	ADBLUE (DEF) Temperature Too High F1 Alarm.
981	ADBLUE TEMP HI F2	ADBLUE (DEF) Temperature Too High F2 Alarm.

Fault Code Number	String	Description
982	ADBLUE TEMP HI F3	ADBLUE (DEF) Temperature Too High F3 Alarm.
983	STOP ON TRIG CRSHRECR	Stop on Crash Recorder Trigger Alarm.
984	NOX ATO2 SNSR DEFCT	NOX ATO2 Sensor Defect Alarm.
985	NOX ATO2 SNS COM LOST	NOX ATO 2 Communications Lost Alarm.
1000	SD LVL DEF TNK B	Sensor Defect In DEF Tank B Level Sensor.
1001	SD LVL COOL WTR	Sensor Defect In Coolant Water Level Sensor.
1002	SD LVL HYD OIL	Sensor Defect In Hydraulic Oil Level Sensor.
1003	L1 LVL COOL WTR	Coolant Water Level (Limit 1) Alarm.
1004	L2 LVL COOL WTR	Coolant Water Level (Limit 2) Alarm.
1005	L1 LVL HYD OIL	Hydraulic Oil Level (Limit 1) Alarm.
1006	L2 LVL HYD OIL	Hydraulic Oil Level (Limit 2) Alarm.
1007	L1 LVL LUBEOIL J1939	J1939 Lube Oil Level (Limit 1) Alarm.
1008	L2 LVL LUBEOIL J1939	J1939 Lube Oil Level (Limit 2) Alarm.
1009	SD P FLTR MONITR	Sensor Defect In Fuel Filter Pressure Sensor.
1010	L1 P FLTR MONITR	Fuel Filter Pressure (Limit 1) Alarm.
1011	DEF TANK LVL LO	DEF Tank Level Low Alarm.
1012	MIC5 PARM DNLOAD ACTV	MIC5 Parameter Download Active Alarm.
1013	HI DELTA NOX AB	HI Delta NOX A-B (Limit 1) Alarm.
1014	HIHI DLTA NOX AB	HI Delta NOX A-B (Limit 2) Alarm.
1015	TTL BKDN NOX SNRS	NOX Sensors Total Breakdown alarm.
1016	REDUND LOSS NOX SNRS	NOX Sensors Redundancy Loss Alarm.
1017	HI DELTA P5 FOR NOX	High Delta P5 for NOX Alarm.
1018	F1 DEF CONSUMPT ERROR	F1 DEF Consumption Error Alarm.
1019	F1 DEF BALANCE ERROR	F1 DEF Balance Error Alarm.
1020	F1 RAW GAS EMSN ERROR	F1 Raw Gas Emission Error Alarm.
1021	F1 NOX ANNHRG ERROR	F1 NOX Approaching Error Condition Alarm.
1022	TEX BEF SCR BET F1&F2	Exhaust Temperature Before SCR Between F1 and F2 Alarm.
1023	TEX AFT SCR BET F1&F2	Exhaust Temperature After SCR Between F1 and F2 Alarm.
1024	LOLO P FUEL COMM RL A	Fuel Common Rail A Low Fuel Pressure (Limit 2) Alarm.
1025	LOLO P FUEL COMM RL B	Fuel Common Rail B Low Fuel Pressure (Limit 2) Alarm.
1026	IAP COMMS LOST	IAP Communications Lost Alarm.
1027	ENGN COLD ACTIV	Engine Cold Active Alarm.
1028	F1EXP TEX BFR SCR ERR	F1 Expected Exhaust Temperature Before SCR Error Alarm.
1029	IAP MISSNG ENERG DATA	IAP Missing Energization Data Error.
1030	LO P CRANK CASE	Low Crankcase Pressure (Limit 1) Alarm.
1031	LOLO P CRK CASE	Low Crankcase Pressure (Limit 2) Alarm.
1032	INJ DRIFT LMT1 CYL A1	Cylinder A1 Injector Drift Limit 1 Alarm.
1033	INJ DRIFT LMT1 CYL A2	Cylinder A2 Injector Drift Limit 1 Alarm.
1034	INJ DRIFT LMT1 CYL A3	Cylinder A3 Injector Drift Limit 1 Alarm.
1035	INJ DRIFT LMT1 CYL A4	Cylinder A4 Injector Drift Limit 1 Alarm.
1036	INJ DRIFT LMT1 CYL A5	Cylinder A5 Injector Drift Limit 1 Alarm.
1037	INJ DRIFT LMT1 CYL A6	Cylinder A6 Injector Drift Limit 1 Alarm.
1038	INJ DRIFT LMT1 CYL A7	Cylinder A7 Injector Drift Limit 1 Alarm.
1039	INJ DRIFT LMT1 CYL A8	Cylinder A8 Injector Drift Limit 1 Alarm.
1040	INJ DRIFT LMT1 CYL A9	Cylinder A9 Injector Drift Limit 1 Alarm.
1041	INJ DRFT LMT1 CYL A10	Cylinder A10 Injector Drift Limit 1 Alarm.
1042	INJ DRIFT LMT1 CYL B1	Cylinder B1 Injector Drift Limit 1 Alarm.

Fault Code Number	String	Description
1043	INJ DRIFT LMT1 CYL B2	Cylinder B2 Injector Drift Limit 1 Alarm.
1044	INJ DRIFT LMT1 CYL B3	Cylinder B3 Injector Drift Limit 1 Alarm.
1045	INJ DRIFT LMT1 CYL B4	Cylinder B4 Injector Drift Limit 1 Alarm.
1046	INJ DRIFT LMT1 CYL B5	Cylinder B5 Injector Drift Limit 1 Alarm.
1047	INJ DRIFT LMT1 CYL B6	Cylinder B6 Injector Drift Limit 1 Alarm.
1048	INJ DRIFT LMT1 CYL B7	Cylinder B7 Injector Drift Limit 1 Alarm.
1049	INJ DRIFT LMT1 CYL B8	Cylinder B8 Injector Drift Limit 1 Alarm.
1050	INJ DRIFT LMT1 CYL B9	Cylinder B9 Injector Drift Limit 1 Alarm.
1051	INJ DRFT LMT1 CYL B10	Cylinder B10 Injector Drift Limit 1 Alarm.
1052	INJ DRIFT LMT2 CYL A1	Cylinder A1 Injector Drift Limit 2 Alarm.
1053	INJ DRIFT LMT2 CYL A2	Cylinder A2 Injector Drift Limit 2 Alarm.
1054	INJ DRIFT LMT2 CYL A3	Cylinder A3 Injector Drift Limit 2 Alarm.
1055	INJ DRIFT LMT2 CYL A4	Cylinder A4 Injector Drift Limit 2 Alarm.
1056	INJ DRIFT LMT2 CYL A5	Cylinder A5 Injector Drift Limit 2 Alarm.
1057	INJ DRIFT LMT2 CYL A6	Cylinder A6 Injector Drift Limit 2 Alarm.
1058	INJ DRIFT LMT2 CYL A7	Cylinder A7 Injector Drift Limit 2 Alarm.
1059	INJ DRIFT LMT2 CYL A8	Cylinder A8 Injector Drift Limit 2 Alarm.
1060	INJ DRIFT LMT2 CYL A9	Cylinder A9 Injector Drift Limit 2 Alarm.
1061	INJ DRFT LMT2 CYL A10	Cylinder A10 Injector Drift Limit 2 Alarm.
1062	INJ DRIFT LMT2 CYL B1	Cylinder B1 Injector Drift Limit 2 Alarm
1063	INJ DRIFT LMT2 CYL B2	Cylinder B2 Injector Drift Limit 2 Alarm.
1064	INJ DRIFT LMT2 CYL B3	Cylinder B3 Injector Drift Limit 2 Alarm.
1065	INJ DRIFT LMT2 CYL B4	Cylinder B4 Injector Drift Limit 2 Alarm.
1066	INJ DRIFT LMT2 CYL B5	Cylinder B5 Injector Drift Limit 2 Alarm.
1067	INJ DRIFT LMT2 CYL B6	Cylinder B6 Injector Drift Limit 2 Alarm.
1068	INJ DRIFT LMT2 CYL B7	Cylinder B7 Injector Drift Limit 2 Alarm.
1069	INJ DRIFT LMT2 CYL B8	Cylinder B8 Injector Drift Limit 2 Alarm.
1070	INJ DRIFT LMT2 CYL B9	Cylinder B9 Injector Drift Limit 2 Alarm.
1071	INJ DRFT LMT2 CYL B10	Cylinder B10 Injector Drift Limit 2 Alarm.
1072	F1EXP TEX AFT SCR ERR	F1 Expected Exhaust Temperature After SCR Error Alarm.
1073	F1GRD TEX BFR SCR ERR	F1 Exhaust Temperature Gradient Before SCR Error Alarm.
1074	F1GRD TEX AFT SCR ERR	F1 Exhaust Temperature Gradient After SCR Error Alarm.
1075	F1 T DEF TOO HI	F1 DEF Temperature Too High Alarm.
1076	LO F1 TEXH BFR SCR	F1 Exhaust Temperature before SCR Too Low Alarm.
1077	LO F1 TEXH AFT SCR	F1 Exhaust Temperature after SCR Too Low Alarm.
1078	F2 DEF CONSMPT ERR	F2 DEF Consumption Error Alarm.
1079	F2 DEF BALNC ERR	F2 DEF Balance Error Alarm.
1080	F2 RAW GAS EMISN ERR	F2 Raw Gas Emission Error Alarm.
1081	F2 NOX ANNHRG ERROR	F2 NOX Approaching Error Condition Alarm.
1082	F2EXP TEX BFR SCR ERR	F2 Expected Exhaust Temperature Before SCR Error Alarm.
1083	F2EXP TEX AFT SCR ERR	F2 Expected Exhaust Temperature After SCR Error Alarm.
1084	F2GRD TEX BFR SCR ERR	F2 Exhaust Temperature Gradient Before SCR Error Alarm.
1085	F2GRD TEX AFT SCR ERR	F2 Exhaust Temperature Gradient After SCR Error Alarm.
1086	F2 T DEF TOO HI	F2 DEF Temperature Too High Alarm.
1087	LO F2 TEXH BFR SCR	F2 Exhaust Temperature before SCR Too Low Alarm.
1088	LO F2 TEXH AFT SCR	F2 Exhaust Temperature after SCR Too Low Alarm.

Diagnostic Trouble Codes

DGC-2020HD controllers obtain diagnostic engine information from a compatible engine control unit (ECU). The DGC-2020HD receives an unsolicited message of a currently active diagnostic trouble code (DTC). Previously active DTCs are available upon request. Active and previously active DTCs can be cleared on request.

Active and previously active DTCs can be viewed through BESTCOMS*Plus*® by using the Metering Explorer to expand the J1939 ECU tree or through the front panel display by navigating to Metering, J1939 Active DTC.

There are 16 configurable DGC detection elements that can be utilized for handling of proprietary DTCs that may not be stored in the DGC-2020HD. For more information, refer to the *Configurable J1939 Diagnostics Trouble Code (DTC) Detection* chapter in the *Configuration* manual.

Table 7 lists the diagnostic information that the DGC-2020HD obtains over the CAN interface.

Table 7. Diagnostic Information Obtained Over the CAN Interface

Parameter	Transmission Repetition Rate
Active diagnostic trouble code	1 s
Lamp status	1 s
Previously active diagnostic trouble code	On request
Request to clear active DTCs	On request
Request to clear previously active DTCs	On request

DTCs are reported in coded diagnostic information that includes the Suspect Parameter Number (SPN), Failure Mode Identifier (FMI), and Occurrence Count (OC). All parameters have an SPN and are used to display or identify the items for which diagnostics are being reported. The FMI defines the type of failure detected in the subsystem identified by an SPN. The reported problem may not be an electrical failure but a subsystem condition needing to be reported to an operator or technician. The OC contains the number of times that a fault has gone from active to previously active.

Certain DTCs are recognized as a predetermined pair by the DGC-2020HD and a single string is displayed as listed in Table 8. If the SPN and FMI are not recognized as a predetermined pair by the DGC-2020HD, the strings for both the SPN and FMI are displayed. For example, the DGC-2020HD receives SPN 29 and FMI 13. SPN 29 is in Table 8 but FMI 13 is not. The text for SPN 29, FMI # is displayed as "ACCEL PEDAL 2 POSITN". The pound sign (#) indicates that Table 101 should be checked for the FMI string. FMI 13 is found in Table 9 and the text is displayed as "OUT OF CALIBRATION". If an SPN or FMI are not found in either Table 8 or 9, "NO TEXT AVAILABLE" is displayed.

Table 8. DTCs Displayed by the DGC-2020HD

SPN	FMI	String Displayed	Description
27	#	EGR1 VALVE POSITN	EGR1 Valve Position
28	3	Throttle Volt HI	Throttle Voltage High
28	4	Throttle Volt LO	Throttle Voltage Low
28	14	Throttle Volt OOR	Throttle Input Voltage Out of Range
29	#	ACCEL PEDAL 2 POSITN	Accelerator Pedal 2 Position
29	3	Throttle Volt HI	Throttle Voltage High
29	4	Throttle Volt LO	Throttle Voltage Low
29	14	Throttle Volt OOR	Throttle Input Voltage Out of Range
51	#	ENG THROTTLE POSITN	Engine Throttle Position
52	15	INTERCOOLER TEMP HI	Engine Intercooler Temperature is above the HIGH threshold
52	#	ENG INTCLR TEMP	Engine Intercooler Temperature
69	#	2 SPEED AXLE SWITCH	Two Speed Axle Switch
70	#	PARKING BRAKE SWITCH	Parking Brake Switch

SPN	FMI	String Displayed	Description
84	#	VEHICLE SPEED	Vehicle Speed Signal
91	#	ACCEL POSITION	Accelerator Position
91	3	Thr Pos Sns Volt HI	Throttle Position Sensor Input Voltage (High)
91	4	Thr Pos Sns Volt LO	Throttle Position Sensor Input Voltage (Low)
91	14	Thr Pos Sns Volt OOR	Throttle Voltage (Out of Range)
94	1	FUEL DELIV PRS LO LO	Engine Fuel Delivery Pressure is below the LOW LOW threshold
94	3	Fuel Pmp Prs Volt HI	Fuel Pump Pressure Input Voltage (High)
94	4	Fuel Pmp Prs Volt LO	Fuel Pump Pressure Input Voltage (Low)
94	17	Fuel Pressure LO	Fuel Supply Pressure (Low Least Severe)
94	#	FUEL DELV P	Fuel Delivery Pressure
95	#	FUEL FLT DF PRS	Fuel Filter Differential Pressure
96	#	FUEL LEVEL	Fuel Level
97	3	Water In Fl Volt HI	Water In Fuel Signal Voltage High
97	4	Water In Fl Volt LO	Water In Fuel Signal Voltage Low
97	16	Water in Fuel	Water In Fuel Detected
97	#	Water In Fuel	Water In Fuel Detected
98	#	ENG OIL LEVEL	Engine Oil Level
99	#	OIL FILTER DIFF PRESS	Oil Filter Differential Pressure
100	1	ENG OIL PRESS LO LO	Engine Oil Pressure is below the LOW LOW threshold
100	3	Oil Prs Snsr Volt HI	Oil Pressure Sensor Input Voltage (High)
100	4	Oil Prs Snsr Volt LO	Oil Pressure Sensor Input Voltage (Low)
100	17	ENG OIL PRESS LO	Engine Oil Pressure is below the LOW threshold
100	18	Oil Prs Snsr Volt MLO	Oil Pressure Sensor Input Voltage (Moderately Low)
100	31	Oil Pressure INVLD	Oil Pressure (Invalid)
100	#	ENG OIL PRESS	Caption used on front panel for Display of J1939 Parameter
101	#	CRANKCASE PRESSURE	Crankcase Pressure
102	#	INTK MNFLD1 PRESSURE	Intake Manifold 1 Pressure
102	2	Manifld Air Prs INVD	Manifold Air Pressure Invalid
102	3	Mnfld AirP SnsVlt HI	Manifold Air Pressure Sensor Input Voltage High
102	4	Mnfld AirP SnsVlt LO	Manifold Air Pressure Sensor Input Voltage Low
103	0	Trbo Overspd Severe	Turbo Overspeed (Most Severe)
103	2	Trbo Speed MisMatch	Turbo Speed (Mismatch)
103	5	Trbo Spd Sns Curr LO	Turbo Speed Sensor Current (Low)
103	6	Trbo Spd Sns Curr HI	Turbo Speed Sensor Current (High)
103	8	Trbo Speed INVLD	Turbo Speed (Invalid)
103	31	Trbo Speed MISSING	Turbo Speed (Missing)
103	#	TURBO CH1 SPEED	Turbo Speed
104	#	TRBO CH OIL PRESS	Turbocharger Oil Pressure
105	0	EGR Mixed Air Tmp HI	Exhaust Gas Recirculation Mixed Air High (Least Severe)
105	3	EGR Air Temp Vlt HI	Exhaust Gas Recirculation Mixed Air Temp Voltage (High)
105	4	EGR Air Temp Vlt LO	Exhaust Gas Recirculation Mixed Air Temp Voltage (Low)
105	15	EGR Mixed Air Tmp HI	Exhaust Gas Recirculation Mixed Air High (Least Severe)
105	16	EGR MxdAir Tmp MHI	Exhaust Gas Recirculation Mixed Air Temp (Moderately High)
105	#	INTAK MNFLD TMP	Intake Manifold Temperature
106	#	INTAKE AIR PRESSR	Intake Air Pressure
107	0	Air Filt Restricted	Air Filter Restriction (High)
107	#	AIR FLTR DIF PRS	Air Filter Differential Pressure
108	2	Barometrc Prs INVLD	Barometric Pressure (Invalid)
108	31	Barometrc Prs ERR	Barometric Pressure (Error)
108	#	BAROMETRIC PRESS	Barometric Pressure

SPN	FMI	String Displayed	Description
109	1	ENG COOLNT PRS LO LO	Engine Coolant Pressure is below the LOW LOW threshold
109	17	ENG COOLANT PRS LO	Engine Coolant Pressure is below the LOW threshold
109	#	COOLANT PRESS	Caption used on front panel for Display of J1939 Parameter
110	0	ENG COOLNT TMP HI HI	Engine Coolant Temperature is above the HIGH HIGH threshold
110	3	Cool Tmp Sns Volt HI	Coolant Temp Sensor Input Voltage (High)
110	4	Cool Tmp Sns Volt LO	Coolant Temp Sensor Input Voltage (Low)
110	15	ENG COOLANT TEMP HI	Engine Coolant Temperature is above the HIGH threshold
110	16	Cool Temp MHI	Coolant Temp Sensor Input (Moderately High)
110	17	Cool Temp LO	Coolant Temp Sensor Input (Low Least Severe)
110	#	COOLANT TMP	Engine Coolant Temperature
111	1	Coolnt Lvl LO	Coolant Level (Low)
111	17	ENG COOLANT LVL LO	Engine Coolant Level is below the LOW threshold
111	#	COOLANT LEVEL	Coolant Level
157	3	Fuel Rail Prs Vlt HI	Fuel Rail Pressure Input Voltage (High)
157	4	Fuel Rail Prs Vlt LO	Fuel Rail Pressure Input Voltage (Low)
157	10	Fuel Rail Prs LOSS	Fuel Rail Pressure Loss Detected
157	17	Fuel Rl Prs NOT DEV	Fuel Rail Pressure Not Developed
157	#	INJ RAIL PRS	Fuel Injection Rail Pressure
158	0	KSW BATT VOLTS HI HI	Key Switch Battery Potential is above the HIGH HIGH threshold
158	1	KSW BATT VOLTS LO LO	Key Switch Battery Potential is below the LOW LOW threshold
158	15	KSW BATT VOLTS HI	Key Switch Battery Potential is above the HIGH threshold
158	17	KSW BATT VOLTS LO	Key Switch Battery Potential is below the LOW threshold
158	#	KEY SW BATT VOLTAGE	Key Switch Battery Potential
161	#	TR INPUT SHAFT SPD	Transmission Input Shaft Speed
168	#	LOW BATT VOLT	Low Battery Voltage string used in event log and/or Alarm and Pre-alarm annunciation
171	#	AMB AIR TEMP	Ambient Air Temperature
172	#	AIR INLET TEMP	Air Inlet Temperature
173	#	EXHAUST GAS TEMP	Exhaust Gas Temperature
174	0	Fuel Temp EXT HI	Fuel Temp (Extremely High)
174	3	Fuel Tmp Sns Volt HI	Fuel Temp Sensor Input Voltage (High)
174	4	Fuel Tmp Sns Volt LO	Fuel Temp Sensor Input Voltage (Low)
174	16	Fuel Temp MHI	Fuel Temp (Moderately High)
174	#	FUEL TEMP	Fuel Temperature
175	#	ENG OIL TEMP	Engine Oil Temperature
176	#	TRBO CH OIL TEMP	Turbo Charger Oil Temperature
188	17	SPEED AT IDLE LO	Metering string for ECU trouble code metering indicates Engine Idle speed is below the LOW threshold
188	#	IDLE SPEED	Idle Speed parameter
189	#	Rated Speed	Engine Rated Speed
189	0	Engine Spd DERATE	Engine Speed Derate
190	0	Engine OvrSpd EXTRM	Engine Overspeed (Extreme)
190	1	ENGINE SPEED LOW	Engine speed is below the LOW threshold
190	16	Engine OvrSpd MODRT	Engine Overspeed (Moderate)
190	17	SPEED AT IDLE LO	Engine Idle speed is below the LOW threshold
190	#	ENGINE SPEED	Caption used on front panel for Display of J1939 Parameter
191	#	TR OUTPUT SHAFT SPD	Transmission Output Shaft Speed
237	2	VIN Data MisMatch	Vehicle Identification Number Data Mismatch with other controllers
247	#	ENGINE HOURS	Engine Run Time in Hours
250	#	TOTAL FUEL USED	Total Fuel Usage

SPN	FMI	String Displayed	Description
354	#	RELATIVE HUMIDITY	Relative Humidity
412	0	EGR Temp EXT HI	Exhaust Gas Recirculation Temp (Extremely High)
412	3	EGR Temp In Vlt HI	Exhaust Gas Recirculation Temp Input Voltage (High)
412	4	EGR Temp In Vlt LO	Exhaust Gas Recirculation Temp Input Voltage (Low)
412	16	EGR Temp MHI	Exhaust Gas Recirculation Temp (Moderately High)
441	#	AUX TEMP 1	Auxiliary Temperature 1
442	#	AUX TEMP 2	Auxiliary Temperature 2
443	#	BATTERY VOLT 2	Battery Voltage 2
444	#	AUX PRESSURE2	Auxiliary Pressure 2
515	#	DESIRED SPEED	Engine Desired Speed (rpm)
520	#	RETARDER % TORQUE	Retarder % Torque
523	#	TRANS CURRNT GEAR	Transmission Current Gear
524	#	TRANS SELECTD GEAR	Transmission Selected Gear
558	#	ACCEL PEDAL IDLE SW	Accelerator Pedal Idle Switch
559	#	ACCEL PEDAL KICKDN SW	Accelerator Pedal Kickdown Switch
563	#	ABS ACTIVE	Antilock Brake System (ABS) active
573	#	TRQCNV LOCKUP ENGAGD	Transmission Torque Converter Lockup Engaged
574	#	TR SHIFT IN PROGRESS	Transmission Shift in Process
596	#	CRUISE CNTL ENABLE SW	Cruise Control Enable Switch
597	#	BRAKE SWITCH	Brake Switch
598	#	CLUTCH SWITCH	Clutch Switch
599	#	CRUISE CNTL SET SW	Cruise Control Set Switch
600	#	CRUISE CNTL COAST SW	Cruise Control Coast (Decelerate) Switch
601	#	CRUISE CNTL RESUME SW	Cruise Control Resume Switch
602	#	CRUISE CNTL ACCEL SW	Cruise Control Accelerate Switch
609	#	CONTROLLER #2	Controller Number 2
611	#	SYS DIAGNST CODE 1	System Diagnostic Code 1
611	0	Loss of Voltage Sensing	Loss of Voltage Sensing from Voltage Regulator over CAN Bus
611	3	Inj Short to PWR	Injector Wiring Shorted to Power
611	4	Inj Short to GND	Injector Wiring Shorted to Ground
612	14	EDM Fault	Exciter Diode Monitor Fault Status from Voltage Regulator over CAN Bus
620	#	5 VOLT SUPPLY	5 Volt Supply
623	#	RED STOP LAMP	Red Stop Lamp
624	#	DIAGNOSTIC LAMP	Diagnostic Lamp
625	#	PROP COMM NETWK 1	Proprietary Communications Network 1
627	1	Inj Spply Vlt Problm	Injector Supply Voltage Problem
627	13	ECU ERROR	ECU Error
627	16	ECU Power Volt HI	ECU Power High Voltage
627	18	ECU Power Volt LO	ECU Power Low Voltage
628	#	PROGRAM MEMORY	Program Memory
629	#	CONTROLLER #1	Controller 1
630	#	ECU INTERNAL ERROR	ECU Internal Error
630	#	ECU INTERNAL ERROR	ECU Internal Error
632	#	Fuel Shutoff 1	Engine Fuel Shutoff 1 Control
632	5	Fuel Shutoff Open/Short	Fuel shutoff is shorted or open
632	7	Fuel Pressure Low	Fuel pressure is low
632	12	Fuel Shutoff Malfunctn	Fuel shutoff is shorted or open
636	#	ENG POSITION SENSOR	Engine Position Sensor
636	2	Pump Pos Sns Noisy	Pump Position Sensor Input Noise
636	5	Pump Pos Sns Curr LO	Pump Position Sensor Current (Low)

SPN	FMI	String Displayed	Description
636	6	Pump Pos Sns Curr HI	Pump Position Sensor Current (High)
636	8	Pump Pos Sns In MSNG	Pump Position Sensor Input Missing
636	10	Pump Pos Sns In ERR	Pump Position Sensor Input Pattern Error
637	2	Crank Pos Sns Noisy	Crank Position Input Noise
637	5	Crank Pos Sns Curr LO	Crank Position Sensor Current (Low)
637	6	Crank Pos Sns Curr HI	Crank Position Sensor Current (High)
637	7	Crnk/Pmp Pos Tmg OOS	Crank/Pump Position Timing Moderately Out of Sync
637	8	Crank Pos Sns MSNG	Crank Position Missing
637	10	Crank Pos Sns In ERR	Crank Position Input Pattern Error
639	#	J1939 NETWORK 1	J1939 Network number 1, Primary Vehicle Network
641	4	Trbo Actuator ERR	Turbo Actuator Error
641	12	ECU/Trbo Comm ERR	ECU/Turbo Communication Error
641	13	TrboAct Lrnd Val ERR	Turbo Actuator Learned Value Error
641	16	Trbo Act Temp MHI	Turbo Actuator Temp (Moderately High)
645	#	J1939 NETWORK 1	Tachometer Signal
651	#	CYLINDER 1 INJECTOR	Cylinder #1 Injector
651	2	Cyl 1 EUI PN INVLD	Cylinder #1 EUI Part Number (Invalid)
651	5	Cyl 1 EUI Ckt OPEN	Cylinder #1 EUI Circuit (Open)
651	6	Cyl 1 EUI Ckt SHORT	Cylinder #1 EUI Circuit (Shorted)
651	7	Cyl 1 EUI Ckt MECH FL	Cylinder #1 EUI Circuit (Mechanical Failure)
651	13	Cyl 1 EUI QR INVLD	Cylinder #1 EUI Circuit QR Code (Invalid)
652	#	CYLINDER 2 INJECTOR	Cylinder #2 Injector
652	2	Cyl 2 EUI PN INVLD	Cylinder #2 EUI Part Number (Invalid)
652	5	Cyl 2 EUI Ckt OPEN	Cylinder #2 EUI Circuit (Open)
652	6	Cyl 2 EUI Ckt SHORT	Cylinder #2 EUI Circuit (Shorted)
652	7	Cyl 2 EUI Ckt MECH FL	Cylinder #2 EUI Circuit (Mechanical Failure)
652	13	Cyl 2 EUI QR INVLD	Cylinder #2 EUI Circuit QR Code (Invalid)
653	#	CYLINDER 3 INJECTOR	Cylinder #3 Injector
653	2	Cyl 3 EUI PN INVLD	Cylinder #3 EUI Part Number (Invalid)
653	5	Cyl 3 EUI Ckt OPEN	Cylinder #3 EUI Circuit (Open)
653	6	Cyl 3 EUI Ckt SHORT	Cylinder #3 EUI Circuit (Shorted)
653	7	Cyl 3 EUI Ckt MECH FL	Cylinder #3 EUI Circuit (Mechanical Failure)
653	13	Cyl 3 EUI QR INVLD	Cylinder #3 EUI Circuit QR Code (Invalid)
654	#	CYLINDER 4 INJECTOR	Cylinder #4 Injector
654	2	Cyl 4 EUI PN INVLD	Cylinder #4 EUI Part Number (Invalid)
654	5	Cyl 4 EUI Ckt OPEN	Cylinder #4 EUI Circuit (Open)
654	6	Cyl 4 EUI Ckt SHORT	Cylinder #4 EUI Circuit (Shorted)
654	7	Cyl 4 EUI Ckt MECH FL	Cylinder #4 EUI Circuit (Mechanical Failure)
654	13	Cyl 4 EUI QR INVLD	Cylinder #4 EUI Circuit QR Code (Invalid)
655	#	CYLINDER 5 INJECTOR	Cylinder #5 Injector
655	2	Cyl 5 EUI PN INVLD	Cylinder #5 EUI Part Number (Invalid)
655	5	Cyl 5 EUI Ckt OPEN	Cylinder #5 EUI Circuit (Open)
655	6	Cyl 5 EUI Ckt SHORT	Cylinder #5 EUI Circuit (Shorted)
655	7	Cyl 5 EUI Ckt MECH FL	Cylinder #5 EUI Circuit (Mechanical Failure)
655	13	Cyl 5 EUI QR INVLD	Cylinder #5 EUI Circuit QR Code (Invalid)
656	#	CYLINDER 6 INJECTOR	Cylinder #6 Injector
656	2	Cyl 6 EUI PN INVLD	Cylinder #6 EUI Part Number (Invalid)
656	5	Cyl 6 EUI Ckt OPEN	Cylinder #6 EUI Circuit (Open)
656	6	Cyl 6 EUI Ckt SHORT	Cylinder #6 EUI Circuit (Shorted)
656	7	Cyl 6 EUI Ckt MECH FL	Cylinder #6 EUI Circuit (Mechanical Failure)
656	13	Cyl 6 EUI QR INVLD	Cylinder #6 EUI Circuit QR Code (Invalid)

SPN	FMI	String Displayed	Description
657	#	CYLINDER 7 INJECTOR	Cylinder 7 Injector
658	#	CYLINDER 8 INJECTOR	Cylinder 8 Injector
659	#	CYLINDER 9 INJECTOR	Cylinder 9 Injector
660	#	CYLINDER 10 INJECTOR	Cylinder 10 Injector
661	#	CYLINDER 11 INJECTOR	Cylinder 11 Injector
662	#	CYLINDER 12 INJECTOR	Cylinder 12 Injector
663	#	CYLINDER 13 INJECTOR	Cylinder 13 Injector
664	#	CYLINDER 14 INJECTOR	Cylinder 14 Injector
665	#	CYLINDER 15 INJECTOR	Cylinder 15 Injector
666	#	CYLINDER 16 INJECTOR	Cylinder 16 Injector
667	#	CYLINDER 17 INJECTOR	Cylinder 17Injector
668	#	CYLINDER 18 INJECTOR	Cylinder 18 Injector
669	#	CYLINDER 19 INJECTOR	Cylinder 19 Injector
670	#	CYLINDER 20 INJECTOR	Cylinder 20 Injector
671	#	CYLINDER 21 INJECTOR	Cylinder 21 Injector
672	#	CYLINDER 22 INJECTOR	Cylinder 22 Injector
673	#	CYLINDER 23 INJECTOR	Cylinder 23 Injector
674	#	CYLINDER 24 INJECTOR	Cylinder 24 Injector
675	#	ENG GLOW PLUG LAMP	Glow Plug Lamp
676	#	ENG GLOW PLUG RELAY	Engine Glow Plug Relay
677	#	ENGINE START RELAY	Engine Start Relay
697	#	AUX PWM DRIVER 1	Auxiliary PWM Driver 1
698	#	AUX PWM DRIVER 2	Auxiliary PWM Driver 2
699	#	AUX PWM DRIVER 3	Auxiliary PWM Driver 3
700	#	AUX PWM DRIVER 4	Auxiliary PWM Driver 4
701	#	AUX I/O 1	Auxiliary I/O 1
702	#	AUX I/O 2	Auxiliary I/O 2
703	#	AUX I/O 3	Auxiliary I/O 3
704	#	AUX I/O 4	Auxiliary I/O 4
705	#	AUX I/O 5	Auxiliary I/O 5
706	#	AUX I/O 6	Auxiliary I/O 6
707	#	AUX I/O 7	Auxiliary I/O 7
708	#	AUX I/O 8	Auxiliary I/O 8
709	#	AUX I/O 9	Auxiliary I/O 9
710	#	AUX I/O 10	Auxiliary I/O 10
711	#	AUX I/O 11	Auxiliary I/O 11
712	#	AUX I/O 12	Auxiliary I/O 12
713	#	AUX I/O 13	Auxiliary I/O 13
714	#	AUX I/O 14	Auxiliary I/O 14
715	#	AUX I/O 15	Auxiliary I/O 15
716	#	AUX I/O 16	Auxiliary I/O 16
723	#	SPEED SENSOR #2	Engine Speed Sensor #2
724	#	O2 SENSOR	O2 Sensor
729	#	INTAKE HEATER #1	Intake Air Heater #1
730	#	INTAKE HEATER #2	Intake Air Heater #2
731	#	KNOCK SENSOR #1	Knock Sensor 1
855	#	Heater Circuit 2	UEGO Heater Circuit #02
870	#	HEATER REGEN SYSTM	Heater Regeneration System
898	2	REQ SPD DATA ERRATIC	Speed Demand Data is erratic
898	9	Spd/Trq Msg INVLD	Vehicle Speed/Torque Message Invalid
898	#	ENGINE REQSTED SPEED	Engine Requested Speed

SPN	FMI	String Displayed	Description
904	#	FRONT AXLE SPEED	Front Axle Speed
920	#	AUDIBLE ALARM	Audible Alarm
923	#	PWM OUTPUT	Engine PWM Output
924	#	AUX OUT #1	Auxiliary Output 1
925	#	AUX OUT #2	Auxiliary Output 2
926	#	AUX OUT #3	Auxiliary Output 3
966	31	ENGINE TST MD SW ON	Engine Test Mode Switch On
970	2	Aux Eng SD SW INVLD	Auxiliary Engine Shutdown Switch (Invalid)
970	31	Aux Eng SD SW ACTV	Auxiliary Engine Shutdown Switch Active
971	31	Eng Derate SW ACTV	External Engine Derate Switch Active
973	#	ENG RETARDR SELECTN	Engine Retarder Selection
974	#	REMOTE ACCEL PEDAL	Remote Accelerator Pedal
975	#	FAN SPEED	Engine Fan Speed
977	#	Fan Drive State	Fan Drive State
986	#	REQSTD FAN SPEED	Requested Fan Speed
1004	#	TRIP VEH IDLE FL USED	Trip Vehicle Idle Fuel Used
1005	#	TRIP CRUISE FL USED	Trip Cruise Fuel Used
1015	#	TRIP AVG LOAD FACTOR	Trip Average Load Factor
1072	#	ENG BRAKE OUTPUT 1	Engine Brake Output 1
1072	#	ENG COMPR BRK OUTPUT1	Engine (Compression) Brake Output 1
1073	#	ENG COMPR BRK OUTPUT2	Engine (Compression) Brake Output 2
1074	#	ENG EXHAUST BRAKE OUT	Engine Exhaust Brake Output
1075	5	Fuel TR Pump Curr LO	Fuel Transfer Pump Current (Low)
1075	6	Fuel TR Pump Curr HI	Fuel Transfer Pump Current (High)
1075	12	Fuel TR Pump ERR	Fuel Transfer Pump (Error)
1079	#	SENSOR SUPPLY VOLTS 1	Sensor Supply Voltage 1
1080	#	SENSOR SUPPLY VOLTS 2	Sensor Supply Voltage 2
1080	3	Snsr Supp 1 Volt LO	Sensor Supply 1 Voltage (Low)
1080	4	Snsr Supp 1 Volt HI	Sensor Supply 1 Voltage (High)
1081	#	ENG WAIT TO START LMP	Engine Wait to Start Lamp
1083	#	AUX I/O 1	Auxiliary I/O 1
1109	#	EPS SHUTDN APPROACHG	Indication that Engine Protective System Shutdown Is Approaching
1109	31	Eng Shutdown WARNING	Engine Shutdown Warning
1110	31	Eng Prot Shutdown	Engine Protection Shutdown
1127	#	TURBOCHG1 BOOST PRS	Turbo Charger 1 Boost Pressure
1128	#	TURBOCHG2 BOOST PRS	Turbo Charger 2 Boost Pressure
1129	#	TURBOCHG3 BOOST PRS	Turbo Charger 3 Boost Pressure
1130	#	TURBOCHG4 BOOST PRS	Turbo Charger 4 Boost Pressure
1131	#	INTK MNFLD2 TEMP	Intake Manifold 2 Temperature
1132	#	INTK MNFLD3 TEMP	Intake Manifold 3 Temperature
1133	#	INTK MNFLD4 TEMP	Intake Manifold 4 Temperature
1136	0	ECU Temp EXT HI	ECU Temperature (Extremely High)
1136	15	ENG ECU TEMP HI	ECU Temperature has exceeded the HIGH level
1136	16	ECU Temp MHI	ECU Temperature (Moderately High)
1136	#	ECU TEMP	Caption used on front panel for Display of J1939 Parameter
1168	#	TRBO CH2 OIL PRESS	Turbo Charger 2 Oil Pressure
1169	#	TURBO CH2 SPEED	Turbo 2 Speed
1170	#	TURBO CH3 SPEED	Turbo 3 Speed
1171	#	TURBO CH4 SPEED	Turbo 4 Speed
1172	3	Trbo Cmp Tmp Volt HI	Turbo Compressor Inlet Temp Input Voltage (High)

SPN	FMI	String Displayed	Description
1172	4	Trbo Cmp Tmp Volt LO	Turbo Compressor Inlet Temp Input Voltage (Low)
1172	16	Trbo Cmp In Tmp MHI	Turbo Compressor Inlet Temp (Moderately High)
1180	0	Trbo Trbn Tmp EXT HI	Turbo Turbine Inlet Temp (Extremely High)
1180	16	Trbo Trbn In Tmp MHI	Turbo Turbine Inlet Temp (Moderately High)
1184	#	TURBOCHG1 OUTLET TEMP	Turbo Charger 1 Outlet Temperature
1185	#	TURBOCHG2 OUTLET TEMP	Turbo Charger 2 Outlet Temperature
1186	#	TURBOCHG3 OUTLET TEMP	Turbo Charger 3 Outlet Temperature
1187	#	TURBOCHG4 OUTLET TEMP	Turbo Charger 4 Outlet Temperature
1188	#	TRBO WST GT ACT1 POS	Turbo Waste Gate Actuator 1 Position
1189	#	TRBO WST GT ACT2 POS	Turbo Waste Gate Actuator 2 Position
1192	#	TRBO WSTGT ACT AIR PR	Engine Turbocharger Waste gate Actuator Control Air Pressure
1203	#	INTRCOOLER COOLNT PRS	Intercooler Coolant Pressure
1204	#	Electrical Load	Electrical Load
1208	#	PRE_FLT OIL PRESSR	Oil Pressure Before Oil Filter
1213	#	MALFUNC LAMP	Malfunction Indicator Lamp (MIL) status that is broadcast by ECU as part of Diagnostic Trouble Code information
1227	#	TEST LIMIT MAX	Test Limit Maximum
1231	#	J1939 NETWORK 2	J1939 Network number 2
1235	#	J1939 NETWORK 3	J1939 Network number 3
1237	31	AL OVERRIDE ON	Alarm Override is ON
1237	#	ENG SHUTDN ORIDE SW	Engine Shutdown Override Switch
1239	#	FUEL LEAKAGE1	Fuel Leakage 1 Parameter
1240	#	FUEL LEAKAGE2	Fuel Leakage 2 Parameter
1247	#	Engine Power	Engine Power
1268	#	IGNITION COIL 1	Engine Ignition Coil 1
1269	#	IGNITION COIL 2	Engine Ignition Coil 2
1270	#	IGNITION COIL 3	Engine Ignition Coil 3
1271	#	IGNITION COIL 4	Engine Ignition Coil 4
1272	#	IGNITION COIL 5	Engine Ignition Coil 5
1273	#	IGNITION COIL 6	Engine Ignition Coil 6
1274	#	IGNITION COIL 7	Engine Ignition Coil 7
1275	#	IGNITION COIL 8	Engine Ignition Coil 8
1276	#	IGNITION COIL 9	Engine Ignition Coil 9
1277	#	IGNITION COIL 10	Engine Ignition Coil 10
1278	#	IGNITION COIL 11	Engine Ignition Coil 11
1279	#	IGNITION COIL 12	Engine Ignition Coil 12
1280	#	IGNITION COIL 13	Engine Ignition Coil 13
1281	#	IGNITION COIL 14	Engine Ignition Coil 14
1282	#	IGNITION COIL 15	Engine Ignition Coil 15
1283	#	IGNITION COIL 16	Engine Ignition Coil 16
1284	#	IGNITION COIL 17	Engine Ignition Coil 17
1285	#	IGNITION COIL 18	Engine Ignition Coil 18
1286	#	IGNITION COIL 19	Engine Ignition Coil 19
1287	#	IGNITION COIL 20	Engine Ignition Coil 20
1288	#	IGNITION COIL 21	Engine Ignition Coil 21
1289	#	IGNITION COIL 22	Engine Ignition Coil 22
1290	#	IGNITION COIL 23	Engine Ignition Coil 23
1291	#	IGNITION COIL 24	Engine Ignition Coil 24
1321	#	STARTER LKOUT RLY DRV	Engine Starter Solenoid Lockout Relay Driver Circuit
1322	#	MULTI CYL MISFIRE	Misfire detected on multiple engine cylinders
1323	#	MISFIRE CYLINDER 1	Misfire detected on a single engine cylinder
1324	#	MISFIRE CYLINDER 2	Misfire detected on a single engine cylinder

SPN	FMI	String Displayed	Description
1325	#	MISFIRE CYLINDER 3	Misfire detected on a single engine cylinder
1326	#	MISFIRE CYLINDER 4	Misfire detected on a single engine cylinder
1327	#	MISFIRE CYLINDER 5	Misfire detected on a single engine cylinder
1328	#	MISFIRE CYLINDER 6	Misfire detected on a single engine cylinder
1329	#	MISFIRE CYLINDER 7	Misfire detected on a single engine cylinder
1330	#	MISFIRE CYLINDER 8	Misfire detected on a single engine cylinder
1331	#	MISFIRE CYLINDER 9	Misfire detected on a single engine cylinder
1332	#	MISFIRE CYLINDER 10	Misfire detected on a single engine cylinder
1333	#	MISFIRE CYLINDER 11	Misfire detected on a single engine cylinder
1334	#	MISFIRE CYLINDER 12	Misfire detected on a single engine cylinder
1335	#	MISFIRE CYLINDER 13	Misfire detected on a single engine cylinder
1336	#	MISFIRE CYLINDER 14	Misfire detected on a single engine cylinder
1337	#	MISFIRE CYLINDER 15	Misfire detected on a single engine cylinder
1338	#	MISFIRE CYLINDER 16	Misfire detected on a single engine cylinder
1339	#	MISFIRE CYLINDER 17	Misfire detected on a single engine cylinder
1340	#	MISFIRE CYLINDER 18	Misfire detected on a single engine cylinder
1341	#	MISFIRE CYLINDER 19	Misfire detected on a single engine cylinder
1342	#	MISFIRE CYLINDER 20	Misfire detected on a single engine cylinder
1343	#	MISFIRE CYLINDER 21	Misfire detected on a single engine cylinder
1344	#	MISFIRE CYLINDER 22	Misfire detected on a single engine cylinder
1345	#	MISFIRE CYLINDER 23	Misfire detected on a single engine cylinder
1346	#	MISFIRE CYLINDER 24	Misfire detected on a single engine cylinder
1347	#	FUEL PUMP ASSY #1	Fuel Pump Pressurizing Assembly #1
1347	3	Pump Ctrl Vlv Curr HI	Pump Control Valve Current (High)
1347	5	Pmp Ctrl Vlv C MSMCH	Pump Control Valve Current (Mismatch)
1347	7	Fuel Rl Prs Ctrl ERR	Fuel Rail Pressure Control (Error)
1348	#	FUEL PUMP ASSY #2	Fuel Pump Pressurizing Assembly #2
1349	#	INJ RAIL PRS2	Injection Metering Rail 2 Pressure
1350	#	TIME SINCE LST SERVC	Time Since Last Service
1352	#	Knock Lvl Cyl 1	Engine Cylinder 1 Knock Level
1353	#	Knock Lvl Cyl 2	Engine Cylinder 2 Knock Level
1354	#	Knock Lvl Cyl 3	Engine Cylinder 3 Knock Level
1355	#	Knock Lvl Cyl 4	Engine Cylinder 4 Knock Level
1356	#	Knock Lvl Cyl 5	Engine Cylinder 5 Knock Level
1357	#	Knock Lvl Cyl 6	Engine Cylinder 6 Knock Level
1358	#	Knock Lvl Cyl 7	Engine Cylinder 7 Knock Level
1359	#	Knock Lvl Cyl 8	Engine Cylinder 8 Knock Level
1380	#	OIL RESVR LEVEL	Oil Reservoir Level
1384	#	J1939 COMANDED SHUTDN	J1939 Commanded Shutdown
1385	#	AUX TEMP 1	Aux Temperature 1
1386	#	AUX TEMP 2	Aux Temperature 2
1387	#	AUX PRESSURE1	Auxiliary Pressure 1
1388	#	AUX PRESSURE2	Auxiliary Pressure 2
1390	#	FUEL VALVE1 INLET PRS	Fuel Valve 1 Inlet Pressure
1391	#	Fuel Valve 1 Diff Prs	Engine Fuel Valve 1 Differential Pressure
1442	#	Fuel Valve1 Positn	Engine Fuel Valve 1 Position
1485	#	ECU MAIN RELAY	ECM Main Relay
1557	#	Fan 2 Drive State	Fan 2 Drive State
1569	#	Engine Torque Derate	Engine Torque Derate
1569	31	Fuel Derate	Fuel Derate
1623	#	TACOGRPH OUT SHFT SPD	Tachograph Output Shaft Speed

SPN	FMI	String Displayed	Description
1624	#	TACOGRPH VEHICLE SPD	Tachograph Vehicle Speed
1633	#	CRUISE CNTL PAUSE SW	Cruise Control Pause Switch
1634	#	CALIB VERIFICATN NMBR	Calibration Verification Number
1636	#	INTK MNFD1 TMP HI RES	Intake Manifold 1 Air Temperature (High Resolution)
1638	#	HYDRAULIC TEMP	Hydraulic Temperature
1639	#	Fan Speed	Fan Speed
1639	1	Fan Speed Zero	Fan Speed Detected (Zero)
1639	16	Fan Speed HI	Fan Speed Detected (High)
1639	18	Fan Speed LO	Fan Speed Detected (Low)
1675	#	Starter Mode	Engine Starter Mode
1692	#	INTKMNFLD1 DESIRD PR	Engine Intake Manifold Desired Absolute Pressure
1695	#	EGO SNSR FUEL CORRCTN	Exhaust Gas Oxygen Sensor Fueling Correction
1716	#	RETRDR SEL NON ENGINE	Retarder Selection non-engine
1761	#	DEF 1 TANK LEVEL %	Diesel Exhaust Fluid 1 Tank Level
1908	#	AUX VLV0 STATE CMD	Aux Valve 0 State Command
2000	13	Security Violation	Security Violation
2005	9	TSC CAN Msg NT RCV	TSC CAN Message Not Received
2030	9	AC Clutch Msg NT RCV	A/C Clutch Status CAN Message Not Received
2071	9	Tr Oil Can Msg NT RCV	Trans. Oil, Tier Size, Vehicle Speed CAN Message Not Received
2433	#	EXH GAS TMP RT MNFLD	Right Manifold Exhaust Gas Temperature
2434	#	EXH GAS TMP LFT MNFLD	Left Manifold Exhaust Gas Temperature
2436	#	GEN AVG FREQUENCY	Generator Average AC Frequency
2452	#	Gen Total Power	Generator Total Real Power
2602	#	HYDRAULIC OIL LVL	Hydraulic Oil Level
2629	0	TRBO 1 OUT TMP HI HI	Turbocharger 1 outlet pressure is above the HIGH HIGH threshold
2629	15	TURBO 1 OUT TMP HI	Turbocharger 1 outlet pressure is above the HIGH threshold
2630	0	EGR FrAir Tmp EXT HI	Exhaust Gas Recirculation Fresh Air Temp (Extremely High)
2630	3	EGR FrAir Tmp Vlt HI	Exhaust Gas Recirculation Fresh Air Temp Input Voltage (High)
2630	4	EGR FrAir Tmp Vlt LO	Exhaust Gas Recirculation Fresh Air Temp Input Voltage (Low)
2630	15	EGR FrAir Tmp HI	Exhaust Gas Recirculation Fresh Air Temp (High Least Severe)
2630	16	EGR FrAir Tmp MHI	Exhaust Gas Recirculation Fresh Air Temp (Moderately High)
2634	#	POWER RELAY	Main Power Relay
2646	#	AUX OUT #4	Auxiliary Output 4
2647	#	AUX OUT #5	Auxiliary Output 5
2659	2	EGR Flo/Tmp MISMATCH	Exhaust Gas Recirculation Flow/Temp Mismatch
2659	15	EGR Flo Rt High	Exhaust Gas Recirculation Flow Rate (High Least Severe)
2659	17	EGR Flo Rt LO	Exhaust Gas Recirculation Flow Rate (Low Least Severe)
2790	16	Trbo Cmp Out Tmp HI	Turbo Compressor Outlet Temp (Moderately High)
2791	#	EGR VALVE CONTROL	EGR Valve Control
2791	2	EGR Vlv Pos Invld	Exhaust Gas Recirculation Valve Position Invalid
2791	3	EGRVlv Pos In Vlt HI	Exhaust Gas Recirculation Valve Position Input Voltage (High)
2791	4	EGRVlv Pos In Vlt LO	Exhaust Gas Recirculation Valve Position Input Voltage (Low)
2791	13	EGR Vlv Control ERR	Exhaust Gas Recirculation Valve Control Error
2791	31	EGR Valve Cal ERR	Exhaust Gas Recirculation Valve Calibration Error
2795	7	Trbo Act Pos MSMATCH	Turbo Actuator Position Mismatch
2797	#	INJECTOR GROUP 1	Engine Injector Group 1
2798	#	INJECTOR GROUP 2	Engine Injector Group 2
2899	#	START ENABL DEV 1 CFG	Engine Start Enable Device 1 Configuration
2980	#	Fuel Pressure	Fuel Pressure
3031	#	DEF TEMP	DEF Temperature

SPN	FMI	String Displayed	Description
3050	#	CATALYST SYSTM MONITR	Catalyst 1 System Monitor
3056	#	EGO SENSOR MONITOR 1	Exhaust Gas Oxygen Sensor 1 Monitor
3057	#	EGO SENSOR MONITOR 2	Exhaust Gas Oxygen Sensor 2 Monitor
3217	#	AFTR TRT 1 INTK O2	Aftertreatment 1 Intake O2
3218	#	AFT1 INTK SNSPWR IN RG	Aftertreatment 1 Intake Gas Sensor Power In Range
3219	#	AFT1 INTK SNSR AT TMP	Aftertreatment 1 Intake Gas Sensor at Temperature
3220	#	AFT1 INTK NOX STBL	Aftertreatment 1 Intake NOx Reading Stable
3221	#	AFT1 INTK WR O2 STBL	Aftertreatment 1 Intake Wide-Range Percent O2 Reading Stable
3222	#	AFT1 INTK SNS HTR FMI	Aftertreatment 1 Intake Gas Sensor Heater Preliminary FMI
3224	#	AFT1 INTK NOXSNSR FMI	Aftertreatment 1 Intake NOx Sensor Preliminary FMI
3225	#	AFT1 INTK O2 SNSR FMI	Aftertreatment 1 Intake O2 Sensor Preliminary FMI
3226	#	AFT 1 OUTLET NOX	Aftertreatment 1 Outlet Nox
3227	#	Aft 1 Out Oxygn %	Aftertreatment 1 Outlet Percent O2
3232	#	AFT1 OUT SNS HTR FMI	Aftertreatment 1 Outlet Gas Sensor Heater Preliminary FMI
3234	#	AFT1 OUT NOX SNSR FMI	Aftertreatment 1 Outlet NOx Sensor Preliminary FMI
3242	#	AFT1 DPF IN TEMP	Aftertreatment 1 DPF Intake Temperature
3246	#	AFT1 DPF OUT TEMP	Aftertreatment 1 DPF Outlet Temperature
3250	#	DPF INTRMED GAS TEMP	Aftertreatment 1 Diesel Particulate Filter Intermediate Gas Temperature
3251	#	AFT1 DPF DIFF PRESSR	Aftertreatment 1 DPF Differential Pressure
3256	#	AFTR TRT 2 INTK O2	Aftertreatment 2 Intake Percent O2
3257	#	AFT2 INTK SNSPWR IN RG	Aftertreatment 2 Intake Gas Sensor Power In Range
3260	#	AFT2 INTK WR O2 STBL	Aftertreatment 2 Intake Wide-Range Percent O2 Reading Stable
3261	#	AFT2 INTK SNS HTR FMI	Aftertreatment 2 Intake Gas Sensor Heater Preliminary FMI
3264	#	AFT2 INTK O2 SNSR FMI	Aftertreatment 2 Intake O2 Sensor Preliminary FMI
3271	#	AFT2 OUT SNS HTR FMI	Aftertreatment 2 Outlet Gas Sensor Heater Preliminary FMI
3361	#	AFT1 CTLYST DOSE UNIT	Aftertreatment 1 SCR Catalyst Dosing Unit
3363	#	AFT1 SCR TANK HTR	Aftertreatment 1 SCR Tank Heater
3464	#	THROTTLE ACT 1 CNTL	Throttle Actuator 1 Control
3465	#	THROTTLE ACT 2 CNTL	Throttle Actuator 2 Control
3468	#	FUEL TEMP 2	Fuel Temperature 2
3485	#	AFT1 SUPPLY AIR PRESS	Aftertreatment 1 Supply Air Pressure
3509	#	SENSOR SUPPLY VOLTS 1	Sensor Supply Voltage 1
3510	#	SENSOR SUPPLY VOLTS 2	Sensor Supply Voltage 2
3511	#	SNSR SUPPLY VOLT 3	Sensor Supply Voltage 3
3512	#	SNSR SUPPLY VOLT 4	Sensor Supply Voltage 4
3513	#	SNSR SUPPLY VOLT 5	Sensor Supply Voltage 5
3514	#	SNSR SUPPLY VOLT 6	Sensor Supply Voltage 6
3515	#	DEF TEMP	String for Diagnostic Trouble Code Indicating DEF Temperature
3516	#	DEF CONCENTRATION	Aftertreatment 1 SCR Catalyst Reagent Concentration
3517	#	DEF TANK 2 LVL %	Diesel Exhaust Fluid Tank 2 Level %
3520	#	DEF QUALITY	Aftertreatment 1 SCR Catalyst Reagent Properties Preliminary FMI
3563	#	INTK MNFLD1 PRESSURE	Intake Manifold 1 Pressure
3597	#	ECU SUPPLY VOLTAGE 1	ECU Power Supply Voltage 1
3598	#	ECU SUPPLY VOLTAGE 2	ECU Power Supply Voltage 2
3599	#	ECU SUPPLY VOLTAGE 3	ECU Power Supply Voltage 3
3601	#	FUEL VLV LK TEST CTL	Engine Fuel Shutoff Valve Leak Test Control
3605	#	COOLANT PUMP CTL	Coolant Pump Control
3607	#	Engine Shutdown	Engine Emergency (Immediate) Shutdown Indication
3609	#	DPF INTAKE PRESSR 1	DPF Intake Pressure 1

SPN	FMI	String Displayed	Description
3610	#	DPF OUTLET PRESSR 1	DPF Outlet Pressure 1
3611	#	DPF INTAKE PRESSR 2	DPF Intake Pressure 2
3612	#	DPF OUTLET PRESSR 2	DPF Outlet Pressure 2
3668	#	INTRCR CLNT LVL	Intercooler Coolant Level
3673	#	THROTTLE POSITION 2	Engine Trhottle 2 Position
3703	#	DPF RGN INH DUE TO SW	DPF Regeneration Inhibited Due to Inhibit Switch
3719	0	DPF SOOT LVL EXT HI	Diesel Particulate Filter (DPF) Soot Level High - Most Severe Level
3719	15	DPF SOOT LVL HI	Diesel Particulate Filter (DPF) Soot Level High - Least Severe Level
3719	16	DPF SOOT LVL MOD HI	Diesel Particulate Filter (DPF) Soot Level High - Moderately Severe Level
3822	#	EGR1 VLV 2 POSITION	Engine Exhaust Gas Recirculation 1 Valve 2 Position
3826	#	DEF AVG CONSUMPTION	DEF Average Consumption
3828	#	DEF CURRNT CONSUMPTN	DEF Current Consumption
3938	#	Governing Bias	Generator Governing Bias
4096	#	NOx HI DEF EMPTY	NOx Limits Exceeded Due to Diesel Exhaust Fluid Empty
4213	#	ENG CRNK WITHOUT_FUEL	Engine is or was cranking without Fuel
4332	#	DEF SYSTEM STATE	DEF System State
4334	#	DEF ABSOLUTE PRESSR	DEF Absolute Pressure
4335	#	DEF DOSING AIR ABS PR	DEF Dosing Air Assist Absolute Pressure
4336	#	AFT1 DOSE AIR ASSTVLV	Aftertreatment 1 SCR Dosing Air Assist Valve
4348	#	AFT1 REQ DOSING QTY	Aftertreatment 1 Requested Dosing Reagent Quantity
4354	#	AFT1 DEF LINE HTR	Aftertreatment 1 SCR Catalyst Reagent Line Heater 1
4360	#	AFTTRT1 INTK GAS TMP	Aftertreatment 1 Catalyst Intake Gas Temperature
4363	#	AFTTRT1 OUT GAS TMP	Aftertreatment 1 Catalyst Outlet Gas Temperature
4364	#	SCR CNVRSN EFFICIENCY	SCR Conversion Efficiency
4375	#	AFTTRT1 PUMP DRV %	Aftertreatment 1 Catalyst Pump Drive Percentage
4401	#	AFT2 REQ DOSING QTY	Aftertreatment 2 Requested Dosing Reagent Quantity
4413	#	AFTTRT2 INTK GAS TMP	Aftertreatment 2 Catalyst Intake Gas Temperature
4415	#	AFTTRT2 OUT GAS TMP	Aftertreatment 2 Catalyst Outlet Gas Temperature
4441	#	AFTTRT2 PUMP DRV %	Aftertreatment 2 Catalyst Pump Drive Percentage
4490	#	SPECIFIC HUMIDITY	Specific Humidity
4755	#	AFT1 CTLYST DIFF PRS	Aftertreatment 1 Gas Oxidation Catalyst Differential Pressure
4765	#	AFTTRT1 INTK GAS TMP	Aftertreatment 1 Catalyst Intake Gas Temperature
4794	#	AFT1 CTLYST SYS MSSNG	Aftertreatment 1 SCR Catalyst System Missing
4809	#	AFT1 DEF WARM IN TMP	Aftertreatment 1 Warm Up Diesel Oxidation Catalyst Inlet Temperature
4810	#	AFT1 DEF WARM OUT TMP	Aftertreatment 1 Warm Up Diesel Oxidation Catalyst Outlet Temperature
4990	#	BATT CHARGER	Battery Charger
5078	#	Amber Warning	Engine Amber Warning Lamp Command
5246	#	SCR INDUCMT SEVERITY	Selective Catalytic Reduction (SCR) Exhaust System Inducement Severity Level
5264	#	EGR2 VALVE 1 CONTROL	Engine Exhaust Gas Recirculation 2 Valve 1 Control
5422	#	CHG AIR B PRESSURE	Charge Air B Pressure
5571	#	FUEL RTN PRESSURE	Fuel Return Path Pressure
10029	0	Purge Timeout Error	Purge did not complete within the maximum allowed time
516098	#	Knock Sensr 2	Knock Sensor 2
516131	#	Propane/Gas Lockoff	Propane/Natural Gas Lockoff
520555	#	UEGO INRC	Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
520556	#	EXH Gas Sensr 2	Exhaust Gas Sensor 2

SPN	FMI	String Displayed	Description
520700	#	TSC1 Message	Torque/Speed Control 1 Message - Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
520707	#	Diag Tool Can Netwk 1	Diagnostic Tool CAN Bus Network #1 - Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
520708	#	OHECS Message	Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
520709	#	GTACP Message	Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
520710	#	GC2 Message	Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
520711	#	EBC1 Message	Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
520712	#	ACS Message	Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
520713	#	Inter ECU Comm Msg	Inter-ECU Communications Message - Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
520714	#	CCVS Message	Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
520837	1	STARTER SPEED LO LO	Starter Speed is below the LOW LOW threshold - Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
520838	1	RUN UP SPEED LO LO	Run Up Speed is below the LOW LOW threshold - Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
522192	12	MTU ENGINE BAD	Component failure of the MTU engine control ECU - Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
523212	#	ENGPRT CAN MSG	CAN Bus Message - Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
523216	#	PREHTENCMD CAN MSG	CAN Bus Message - Manufacturer Assignable SPN – Contact Engine Manufacturer for details.
523218	#	RxCCVS CAN MSG	CAN Bus Message - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523222	#	TC01 CAN MSG	CAN Bus Message - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523238	#	SWTOUT CAN MSG	CAN Bus Message - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523239	#	DECV1 CAN MSG	CAN Bus Message - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523240	#	FUNMODCTL CAN MSG	CAN Bus Message - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523350	#	CYL BANK 1 INJECTORS	Cylinder Bank 1 Injectors - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523351	#	CYL BANK 1 INJECTORS	Cylinder Bank 1 Injectors - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523352	#	CYL BANK 2 INJECTORS	Cylinder Bank 2 Injectors - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523353	#	CYL BANK 2 INJECTORS	Cylinder Bank 2 Injectors - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523354	#	ECU ERROR	ECU Error - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523355	#	ECU ERROR	ECU Error - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523370	#	RAIL PRESSURE	Rail Pressure - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523420	#	ECU ERROR	ECU Error - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523450	#	MULTI STATE SWITCH 1	Multi State Switch 1 - Manufacturer Assignable SPN – Contact Engine Manufacturer for details

SPN	FMI	String Displayed	Description
523451	#	MULTI STATE SWITCH 2	Multi State Switch 2 - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523452	#	MULTI STATE SWITCH 3	Multi State Switch 3 - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523470	#	RAIL PRESSURE LMT VLV	Rail Pressure Limit Valve - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523490	#	ECU ERROR	ECU Error - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523500	#	CAN MSG TIMEOUT	Can Message Timeout - Manufacturer Assignable SPN – Contact Engine Manufacturer for details has occurred
523550	#	ECU ERROR	ECU Error - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523561	#	INJECTN PERIOD CYL 1	Cylinder 1 Injection Peri - Manufacturer Assignable SPN – Contact Engine Manufacturer for details od
523562	#	INJECTN PERIOD CYL 2	Cylinder 2 Injection Period - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523563	#	INJECTN PERIOD CYL 3	Cylinder 3 Injection Period - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523564	#	INJECTN PERIOD CYL 4	Cylinder 4 Injection Period - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523565	#	INJECTN PERIOD CYL 5	Cylinder 5 Injection Period - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523566	#	INJECTN PERIOD CYL 6	Cylinder 6 Injection Period - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523567	#	INJECTN PERIOD CYL 7	Cylinder 7 Injection Period - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523568	#	INJECTN PERIOD CYL 8	Cylinder 8 Injection Period - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523600	#	ECU ERROR	ECU Error - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523601	#	ECU ERROR	ECU Error - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523602	#	FAN SPEED	Engine Fan Speed - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523604	#	RXENGTMP CAN MSG	Engine Temperature CAN Bus Message Receive - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523605	#	TSC1-AE MSG MISSING	CAN Message Missing - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523606	#	TSC1-AR MSG MISSING	CAN Message Missing - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523607	#	TSC1-DE MSG MISSING	CAN Message Missing - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523608	#	TSC1-DR MSG MISSING	CAN Message Missing - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523609	#	TSC1-PE MSG MISSING	CAN Message Missing - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523610	#	TSC1-VE MSG MISSING	CAN Message Missing - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523611	#	TSC1-VR MSG MISSING	CAN Message Missing - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523612	#	ECU ERROR	ECU Error - Manufacturer Assignable SPN – Contact Engine Manufacturer for details
523613	#	RAIL PRESSURE	Fuel Injection Rail Press - Manufacturer Assignable SPN – Contact Engine Manufacturer for details ure
523615	#	METERING UNIT VALVE	Metering Unit Valve - Manufacturer Assignable SPN – Contact Engine Manufacturer for details

SPN	FMI	String Displayed	Description
523617	#	ECU ERROR	ECU Error - Manufacturer Assignable SPN – Contact Engine Manufacturer for details

Table 9. DTCs Displayed by the DGC-2020HD (FMI Strings)

FMI	String Displayed	Description
0	DATA HI MOST SEVERE	Data is higher than expected at the most severe level
1	DATA LO MOST SEVERE	Data is lower than expected at the most severe level
2	DATA ERRATIC OR BAD	Data is erratic, intermittent, or incorrect
3	VOLTS HI OR SHORTED	Measured voltage is higher than expected or shorted to a high source
4	VOLTS LO OR SHORTED	Measured voltage is lower than expected or shorted to a low source
5	CURRENT LO OR OPEN	Measured current is lower than expected or the circuit is open
6	CURRENT HI OR SHORTED	Measured current is higher than expected or shorted
7	MECHANICAL SYSTM ERR	Mechanical system error
8	FREQ OR PWM ERROR	Error in frequency, pulse width or period of any frequency or PWM signal is outside its predetermined limits.
9	ABNORMAL UPDATE RATE	Update rate of parameter is abnormal.
10	DATA RT OF CHG ERR	Rate of change of data is abnormal.
11	FAILURE CAUSE UNKNOWN	String indicating failure cause is unknown.
12	BAD INTELLIGNT DEVICE	Engine ECU is reporting that an intelligent device or component failure has been detected.
13	OUT OF CALIBRATION	Device or parameter is out of calibration.
14	CONSULT ENG MFG DATA	User should consult engine manufacturer's data.
15	DATA HI LST SEVERE	Data is higher than expected at the least severe level.
16	DATA HI MODERATE SVR	Data is higher than expected at a moderately severe level.
17	DATA LO LST SEVERE	Data is lower than expected at the least severe level.
18	DATA LO MODERATE SVR	Data is lower than expected at a moderately severe level.
19	NETWORK DATA ERR	String Indicating Network Data contained an error indication.
20	DATA DRIFTED HI	Data has drifted to a value higher than the maximum valid value.
21	DATA DRIFTED LO	Data has drifted to a value lower than the minimum valid value.
22	FMI RESERVED BY SAE	This FMI is reserved by the Society of Automotive Engineers.
23	FMI RESERVED BY SAE	This FMI is reserved by the Society of Automotive Engineers.
24	FMI RESERVED BY SAE	This FMI is reserved by the Society of Automotive Engineers.
25	FMI RESERVED BY SAE	This FMI is reserved by the Society of Automotive Engineers.
26	FMI RESERVED BY SAE	This FMI is reserved by the Society of Automotive Engineers.
27	FMI RESERVED BY SAE	This FMI is reserved by the Society of Automotive Engineers.
28	FMI RESERVED BY SAE	This FMI is reserved by the Society of Automotive Engineers.
29	FMI RESERVED BY SAE	This FMI is reserved by the Society of Automotive Engineers.
30	FMI RESERVED BY SAE	This FMI is reserved by the Society of Automotive Engineers.
31	CONDTN EXST OR FMI NA	If the SPN refers to a parameter with status of ON or OFF, an FMI of 31 indicates ON. If the SPN refers to a parameter with a numeric value, an FMI of 31 indicates that there is no FMI to describe the parameter's condition.

Event List

Table 10 lists all possible event strings (as shown in the event log).

For information about event logging, refer to the *Reporting and Alarms* chapter.

Table 10. Event List

Event String	Event Description	Event Type
1Phase AC Override	Single-phase AC override	Status Only
1Phase Override Global	Single-phase override global	Status Only
27P-1 UndVolt Alarm	Undervoltage Trip	Alarm
27P-1 UndVolt Prealarm	Undervoltage Trip	Pre-Alarm
27P-2 UndVolt Alarm	Undervoltage Trip	Alarm
27P-2 UndVolt Prealarm	Undervoltage Trip	Pre-Alarm
27P-3 UndVolt Alarm	Undervoltage Trip	Alarm
27P-3 UndVolt Prealarm	Undervoltage Trip	Pre-Alarm
27P-4 UndVolt Alarm	Undervoltage Trip	Alarm
27P-4 UndVolt Prealarm	Undervoltage Trip	Pre-Alarm
27P-5 UndVolt Alarm	Undervoltage Trip	Alarm
27P-5 UndVolt Prealarm	Undervoltage Trip	Pre-Alarm
27P-6 UndVolt Alarm	Undervoltage Trip	Alarm
27P-6 UndVolt Prealarm	Undervoltage Trip	Pre-Alarm
32-1 kW Ovrld Alarm	kW overload trip	Alarm
32-1 kW Ovrld Prealarm	kW overload trip	Pre-Alarm
32-1 Rvs Pwr Alarm	Reverse power trip	Alarm
32-1 Rvs Pwr Prealarm	Reverse power trip	Pre-Alarm
32-2 kW Ovrld Alarm	kW overload trip	Alarm
32-2 kW Ovrld Prealarm	kW overload trip	Pre-Alarm
32-2 Rvs Pwr Alarm	Reverse power trip	Alarm
32-2 Rvs Pwr Prealarm	Reverse power trip	Pre-Alarm
32-3 kW Ovrld Alarm	kW overload trip	Alarm
32-3 kW Ovrld Prealarm	kW overload trip	Pre-Alarm
32-3 Rvs Pwr Alarm	Reverse power trip	Alarm
32-3 Rvs Pwr Prealarm	Reverse power trip	Pre-Alarm
32-4 kW Ovrld Alarm	kW overload trip	Alarm
32-4 kW Ovrld Prealarm	kW overload trip	Pre-Alarm
32-4 Rvs Pwr Alarm	Reverse power trip	Alarm
32-4 Rvs Pwr Prealarm	Reverse power trip	Pre-Alarm
32-5 kW Ovrld Alarm	kW overload trip	Alarm
32-5 kW Ovrld Prealarm	kW overload trip	Pre-Alarm
32-5 Rvs Pwr Alarm	Reverse power trip	Alarm
32-5 Rvs Pwr Prealarm	Reverse power trip	Pre-Alarm
32-6 kW Ovrld Alarm	kW overload trip	Alarm
32-6 kW Ovrld Prealarm	kW overload trip	Pre-Alarm
32-6 Rvs Pwr Alarm	reverse power trip	Alarm

Event String	Event Description	Event Type
32-6 Rvs Pwr Prealarm	Reverse power trip	Pre-Alarm
40Q-1 Exc Loss Alarm	Loss of excitation trip	Alarm
40Q-1 Exc Loss Prealarm	Loss of excitation Trip	Pre-Alarm
40Q-2 Exc Loss Alarm	Loss of excitation trip	Alarm
40Q-2 Exc Loss Prealarm	Loss of excitation trip	Pre-Alarm
46-1 Cur Phs Imbal Alarm	Phase current imbalance trip	Alarm
46-1 Cur Phs Imbal Alarm	Phase current imbalance trip	Alarm
46-1 Cur Phs Imbal Prealarm	Phase current imbalance trip	Pre-Alarm
46-1 Cur Phs Imbal Prealarm	Phase current imbalance trip	Pre-Alarm
46-2 Cur Phs Imbal Alarm	Phase current imbalance trip	Alarm
46-2 Cur Phs Imbal Alarm	Phase current imbalance trip	Alarm
46-2 Cur Phs Imbal Prealarm	Phase current imbalance trip	Pre-Alarm
46-2 Cur Phs Imbal Prealarm	Phase current imbalance trip	Pre-Alarm
46-3 Cur Phs Imbal Alarm	Phase current imbalance trip	Alarm
46-3 Cur Phs Imbal Alarm	Phase current imbalance trip	Alarm
46-3 Cur Phs Imbal Prealarm	Phase current imbalance trip	Pre-Alarm
46-3 Cur Phs Imbal Prealarm	Phase current imbalance trip	Pre-Alarm
46-4 Cur Phs Imbal Alarm	Phase current imbalance trip	Alarm
46-4 Cur Phs Imbal Alarm	Phase current imbalance trip	Alarm
46-4 Cur Phs Imbal Prealarm	Phase current imbalance trip	Pre-Alarm
46-4 Cur Phs Imbal Prealarm	Phase current imbalance trip	Pre-Alarm
46-5 Cur Phs Imbal Alarm	Phase current imbalance trip	Alarm
46-5 Cur Phs Imbal Alarm	Phase current imbalance trip	Alarm
46-5 Cur Phs Imbal Prealarm	Phase current imbalance trip	Pre-Alarm
46-5 Cur Phs Imbal Prealarm	Phase current imbalance trip	Pre-Alarm
46-6 Cur Phs Imbal Alarm	Phase current imbalance trip	Alarm
46-6 Cur Phs Imbal Alarm	Phase current imbalance trip	Alarm
46-6 Cur Phs Imbal Prealarm	Phase current imbalance trip	Pre-Alarm
46-6 Cur Phs Imbal Prealarm	Phase current imbalance trip	Pre-Alarm
47-1 Volt Phs Imbal Alarm	Phase voltage imbalance trip	Alarm
47-1 Volt Phs Imbal Prealarm	Phase voltage imbalance trip	Pre-Alarm
47-2 Volt Phs Imbal Alarm	Phase voltage imbalance trip	Alarm
47-2 Volt Phs Imbal Prealarm	Phase voltage imbalance trip	Pre-Alarm
47-3 Volt Phs Imbal Alarm	Phase voltage imbalance trip	Alarm
47-3 Volt Phs Imbal Prealarm	Phase voltage imbalance trip	Pre-Alarm
47-4 Volt Phs Imbal Alarm	Phase voltage imbalance trip	Alarm
47-4 Volt Phs Imbal Prealarm	Phase voltage imbalance trip	Pre-Alarm
47-5 Volt Phs Imbal Alarm	Phase voltage imbalance trip	Alarm
47-5 Volt Phs Imbal Prealarm	Phase voltage imbalance trip	Pre-Alarm
47-6 Volt Phs Imbal Alarm	Phase voltage imbalance trip	Alarm
47-6 Volt Phs Imbal Prealarm	Phase voltage imbalance trip	Pre-Alarm
51-1 OvrCurr Alarm	Overcurrent trip	Alarm

Event String	Event Description	Event Type
51-1 OvrCurr Prealarm	Overcurrent trip	Pre-Alarm
51-2 OvrCurr Alarm	Overcurrent trip	Alarm
51-2 OvrCurr Prealarm	Overcurrent trip	Pre-Alarm
51-3 OvrCurr Alarm	Overcurrent trip	Alarm
51-3 OvrCurr Prealarm	Overcurrent trip	Pre-Alarm
51-4 OvrCurr Alarm	Overcurrent trip	Alarm
51-4 OvrCurr Prealarm	Overcurrent trip	Pre-Alarm
51-5 OvrCurr Alarm	Overcurrent trip	Alarm
51-5 OvrCurr Prealarm	Overcurrent trip	Pre-Alarm
51-6 OvrCurr Alarm	Overcurrent trip	Alarm
51-6 OvrCurr Prealarm	Overcurrent trip	Pre-Alarm
59P-1 OvrVolt Alarm	Overvoltage trip	Alarm
59P-1 OvrVolt Prealarm	Overvoltage trip	Pre-Alarm
59P-2 OvrVolt Alarm	Overvoltage trip	Alarm
59P-2 OvrVolt Prealarm	Overvoltage trip	Pre-Alarm
59P-3 OvrVolt Alarm	Overvoltage trip	Alarm
59P-3 OvrVolt Prealarm	Overvoltage trip	Pre-Alarm
59P-4 OvrVolt Alarm	Overvoltage trip	Alarm
59P-4 OvrVolt Prealarm	Overvoltage trip	Pre-Alarm
59P-5 OvrVolt Alarm	Overvoltage trip	Alarm
59P-5 OvrVolt Prealarm	Overvoltage trip	Pre-Alarm
59P-6 OvrVolt Alarm	Overvoltage trip	Alarm
59P-6 OvrVolt Prealarm	Overvoltage trip	Pre-Alarm
78-1 Vect Shft Alarm	Vector shift trip	Alarm
78-1 Vect Shft Prealarm	Vector shift trip	Pre-Alarm
78-2 Vect Shft Alarm	Vector shift trip	Alarm
78-2 Vect Shft Prealarm	Vector shift trip	Pre-Alarm
81-1 OvrFreq Alarm	Over frequency trip	Alarm
81-1 OvrFreq Prealarm	Over frequency trip	Pre-Alarm
81-1 ROCOF Alarm	Rate of change of frequency trip	Alarm
81-1 ROCOF Prealarm	Rate of change of frequency trip	Pre-Alarm
81-1 UndFreq Alarm	Under frequency trip	Alarm
81-1 UndFreq Prealarm	Under frequency trip	Pre-Alarm
81-2 OvrFreq Alarm	Over frequency trip	Alarm
81-2 OvrFreq Prealarm	Over frequency trip	Pre-Alarm
81-2 ROCOF Alarm	Rate of change of frequency trip	Alarm
81-2 ROCOF Prealarm	Rate of change of frequency trip	Pre-Alarm
81-2 UndFreq Alarm	Under frequency trip	Alarm
81-2 UndFreq Prealarm	Under frequency trip	Pre-Alarm
81-3 OvrFreq Alarm	Over frequency trip	Alarm
81-3 OvrFreq Prealarm	Over frequency trip	Pre-Alarm
81-3 ROCOF Alarm	Rate of change of frequency trip	Alarm

Event String	Event Description	Event Type
81-3 ROCOF Prealarm	Rate of change of frequency trip	Pre-Alarm
81-3 UndFreq Alarm	Under frequency trip	Alarm
81-3 UndFreq Prealarm	Under frequency trip	Pre-Alarm
81-4 OvrFreq Alarm	Over frequency trip	Alarm
81-4 OvrFreq Prealarm	Over frequency trip	Pre-Alarm
81-4 ROCOF Alarm	Rate of change of frequency trip	Alarm
81-4 ROCOF Prealarm	Rate of change of frequency trip	Pre-Alarm
81-4 UndFreq Alarm	Under frequency trip	Alarm
81-4 UndFreq Prealarm	Under frequency trip	Pre-Alarm
81-5 OvrFreq Alarm	Over frequency trip	Alarm
81-5 OvrFreq Prealarm	Over frequency trip	Pre-Alarm
81-5 ROCOF Alarm	Rate of change of frequency trip	Alarm
81-5 ROCOF Prealarm	Rate of change of frequency trip	Pre-Alarm
81-5 UndFreq Alarm	Under frequency trip	Alarm
81-5 UndFreq Prealarm	Under frequency trip	Pre-Alarm
81-6 OvrFreq Alarm	Over frequency trip	Alarm
81-6 OvrFreq Prealarm	Over frequency trip	Pre-Alarm
81-6 ROCOF Alarm	Rate of change of frequency trip	Alarm
81-6 ROCOF Prealarm	Rate of change of frequency trip	Pre-Alarm
81-6 UndFreq Alarm	Under frequency trip	Alarm
81-6 UndFreq Prealarm	Under frequency trip	Pre-Alarm
81-7 OvrFreq Alarm	Over frequency trip	Alarm
81-7 OvrFreq Prealarm	Over frequency trip	Pre-Alarm
81-7 ROCOF Alarm	Rate of change of frequency trip	Alarm
81-7 ROCOF Prealarm	Rate of change of frequency trip	Pre-Alarm
81-7 UndFreq Alarm	Under frequency trip	Alarm
81-7 UndFreq Prealarm	Under frequency trip	Pre-Alarm
81-8 OvrFreq Alarm	Over frequency trip	Alarm
81-8 OvrFreq Prealarm	Over frequency trip	Pre-Alarm
81-8 ROCOF Alarm	Rate of change of frequency trip	Alarm
81-8 ROCOF Prealarm	Rate of change of frequency trip	Pre-Alarm
81-8 UndFreq Alarm	Under frequency trip	Alarm
81-8 UndFreq Prealarm	Under frequency trip	Pre-Alarm
87G Diffrntial Alarm	Phase differential trip	Alarm
87G Diffrntial Prealarm	Phase differential trip	Pre-Alarm
87N N Diffrntial Alarm	Neutral differential trip	Alarm
87N N Diffrntial Prealarm	Neutral differential trip	Pre-Alarm
AEM1 Comms Fail PA	AEM-2020 1 communication failure	Pre-Alarm
AEM1 Dup AEM-2020	AEM-2020 1 duplicate AEM	Status Only
AEM1 Global Warning	AEM-2020 1 global warning	Status Only
AEM1 In1 Out Range	AEM-2020 1 Input 1 Out of Range	Alarm
AEM1 In1 Out Range	AEM-2020 1 Input 1 Out of Range	Pre-Alarm

Event String	Event Description	Event Type
AEM1 In1 T1 Alarm	AEM-2020 1 Input 1 Threshold 1	Alarm
AEM1 In1 T1 Prealarm	AEM-2020 1 Input 1 Threshold 1	Pre-Alarm
AEM1 In1 T2 Alarm	AEM-2020 1 Input 1 Threshold 2	Alarm
AEM1 In1 T2 Prealarm	AEM-2020 1 Input 1 Threshold 2	Pre-Alarm
AEM1 In1 T3 Alarm	AEM-2020 1 Input 1 Threshold 3	Alarm
AEM1 In1 T3 Prealarm	AEM-2020 1 Input 1 Threshold 3	Pre-Alarm
AEM1 In1 T4 Alarm	AEM-2020 1 Input 1 Threshold 4	Alarm
AEM1 In1 T4 Prealarm	AEM-2020 1 Input 1 Threshold 4	Pre-Alarm
AEM1 In2 Out Range	AEM-2020 1 Input 2 Out of Range	Alarm
AEM1 In2 Out Range	AEM-2020 1 Input 2 Out of Range	Pre-Alarm
AEM1 In2 T1 Alarm	AEM-2020 1 Input 2 Threshold 1	Alarm
AEM1 In2 T1 Prealarm	AEM-2020 1 Input 2 Threshold 1	Pre-Alarm
AEM1 In2 T2 Alarm	AEM-2020 1 Input 2 Threshold 2	Alarm
AEM1 In2 T2 Prealarm	AEM-2020 1 Input 2 Threshold 2	Pre-Alarm
AEM1 In2 T3 Alarm	AEM-2020 1 Input 2 Threshold 3	Alarm
AEM1 In2 T3 Prealarm	AEM-2020 1 Input 2 Threshold 3	Pre-Alarm
AEM1 In2 T4 Alarm	AEM-2020 1 Input 2 Threshold 4	Alarm
AEM1 In2 T4 Prealarm	AEM-2020 1 Input 2 Threshold 4	Pre-Alarm
AEM1 In3 Out Range	AEM-2020 1 Input 3 Out of Range	Alarm
AEM1 In3 Out Range	AEM-2020 1 Input 3 Out of Range	Pre-Alarm
AEM1 In3 T1 Alarm	AEM-2020 1 Input 3 Threshold 1	Alarm
AEM1 In3 T1 Prealarm	AEM-2020 1 Input 3 Threshold 1	Pre-Alarm
AEM1 In3 T2 Alarm	AEM-2020 1 Input 3 Threshold 2	Alarm
AEM1 In3 T2 Prealarm	AEM-2020 1 Input 3 Threshold 2	Pre-Alarm
AEM1 In3 T3 Alarm	AEM-2020 1 Input 3 Threshold 3	Alarm
AEM1 In3 T3 Prealarm	AEM-2020 1 Input 3 Threshold 3	Pre-Alarm
AEM1 In3 T4 Alarm	AEM-2020 1 Input 3 Threshold 4	Alarm
AEM1 In3 T4 Prealarm	AEM-2020 1 Input 3 Threshold 4	Pre-Alarm
AEM1 In4 Out Range	AEM-2020 1 Input 4 Out of Range	Alarm
AEM1 In4 Out Range	AEM-2020 1 Input 4 Out of Range	Pre-Alarm
AEM1 In4 T1 Alarm	AEM-2020 1 Input 4 Threshold 1	Alarm
AEM1 In4 T1 Prealarm	AEM-2020 1 Input 4 Threshold 1	Pre-Alarm
AEM1 In4 T2 Alarm	AEM-2020 1 Input 4 Threshold 2	Alarm
AEM1 In4 T2 Prealarm	AEM-2020 1 Input 4 Threshold 2	Pre-Alarm
AEM1 In4 T3 Alarm	AEM-2020 1 Input 4 Threshold 3	Alarm
AEM1 In4 T3 Prealarm	AEM-2020 1 Input 4 Threshold 3	Pre-Alarm
AEM1 In4 T4 Alarm	AEM-2020 1 Input 4 Threshold 4	Alarm
AEM1 In4 T4 Prealarm	AEM-2020 1 Input 4 Threshold 4	Pre-Alarm
AEM1 In5 Out Range	AEM-2020 1 Input 5 Out of Range	Alarm
AEM1 In5 Out Range	AEM-2020 1 Input 5 Out of Range	Pre-Alarm
AEM1 In5 T1 Alarm	AEM-2020 1 Input 5 Threshold 1	Alarm
AEM1 In5 T1 Prealarm	AEM-2020 1 Input 5 Threshold 1	Pre-Alarm

Event String	Event Description	Event Type
AEM1 In5 T2 Alarm	AEM-2020 1 Input 5 Threshold 2	Alarm
AEM1 In5 T2 Prealarm	AEM-2020 1 Input 5 Threshold 2	Pre-Alarm
AEM1 In5 T3 Alarm	AEM-2020 1 Input 5 Threshold 3	Alarm
AEM1 In5 T3 Prealarm	AEM-2020 1 Input 5 Threshold 3	Pre-Alarm
AEM1 In5 T4 Alarm	AEM-2020 1 Input 5 Threshold 4	Alarm
AEM1 In5 T4 Prealarm	AEM-2020 1 Input 5 Threshold 4	Pre-Alarm
AEM1 In6 Out Range	AEM-2020 1 Input 6 Out of Range	Alarm
AEM1 In6 Out Range	AEM-2020 1 Input 6 Out of Range	Pre-Alarm
AEM1 In6 T1 Alarm	AEM-2020 1 Input 6 Threshold 1	Alarm
AEM1 In6 T1 Prealarm	AEM-2020 1 Input 6 Threshold 1	Pre-Alarm
AEM1 In6 T2 Alarm	AEM-2020 1 Input 6 Threshold 2	Alarm
AEM1 In6 T2 Prealarm	AEM-2020 1 Input 6 Threshold 2	Pre-Alarm
AEM1 In6 T3 Alarm	AEM-2020 1 Input 6 Threshold 3	Alarm
AEM1 In6 T3 Prealarm	AEM-2020 1 Input 6 Threshold 3	Pre-Alarm
AEM1 In6 T4 Alarm	AEM-2020 1 Input 6 Threshold 4	Alarm
AEM1 In6 T4 Prealarm	AEM-2020 1 Input 6 Threshold 4	Pre-Alarm
AEM1 In7 Out Range	AEM-2020 1 Input 7 Out of Range	Alarm
AEM1 In7 Out Range	AEM-2020 1 Input 7 Out of Range	Pre-Alarm
AEM1 In7 T1 Alarm	AEM-2020 1 Input 7 Threshold 1	Alarm
AEM1 In7 T1 Prealarm	AEM-2020 1 Input 7 Threshold 1	Pre-Alarm
AEM1 In7 T2 Alarm	AEM-2020 1 Input 7 Threshold 2	Alarm
AEM1 In7 T2 Prealarm	AEM-2020 1 Input 7 Threshold 2	Pre-Alarm
AEM1 In7 T3 Alarm	AEM-2020 1 Input 7 Threshold 3	Alarm
AEM1 In7 T3 Prealarm	AEM-2020 1 Input 7 Threshold 3	Pre-Alarm
AEM1 In7 T4 Alarm	AEM-2020 1 Input 7 Threshold 4	Alarm
AEM1 In7 T4 Prealarm	AEM-2020 1 Input 7 Threshold 4	Pre-Alarm
AEM1 In8 Out Range	AEM-2020 1 Input 8 Out of Range	Alarm
AEM1 In8 Out Range	AEM-2020 1 Input 8 Out of Range	Pre-Alarm
AEM1 In8 T1 Alarm	AEM-2020 1 Input 8 Threshold 1	Alarm
AEM1 In8 T1 Prealarm	AEM-2020 1 Input 8 Threshold 1	Pre-Alarm
AEM1 In8 T2 Alarm	AEM-2020 1 Input 8 Threshold 2	Alarm
AEM1 In8 T2 Prealarm	AEM-2020 1 Input 8 Threshold 2	Pre-Alarm
AEM1 In8 T3 Alarm	AEM-2020 1 Input 8 Threshold 3	Alarm
AEM1 In8 T3 Prealarm	AEM-2020 1 Input 8 Threshold 3	Pre-Alarm
AEM1 In8 T4 Alarm	AEM-2020 1 Input 8 Threshold 4	Alarm
AEM1 In8 T4 Prealarm	AEM-2020 1 Input 8 Threshold 4	Pre-Alarm
AEM1 Not Configrd PA	AEM-2020 1 not configured	Pre-Alarm
AEM1 Out1 Out Range A	AEM-2020 1 Output 1 Out of Range	Alarm
AEM1 Out1 Out Range PA	AEM-2020 1 Output 1 Out of Range	Pre-Alarm
AEM1 Out2 Out Range A	AEM-2020 1 Output 2 Out of Range	Alarm
AEM1 Out2 Out Range PA	AEM-2020 1 Output 2 Out of Range	Pre-Alarm
AEM1 Out3 Out Range A	AEM-2020 1 Output 3 Out of Range	Alarm

Event String	Event Description	Event Type
AEM1 Out3 Out Range PA	AEM-2020 1 Output 3 Out of Range	Pre-Alarm
AEM1 Out4 Out Range A	AEM-2020 1 Output 4 Out of Range	Alarm
AEM1 Out4 Out Range PA	AEM-2020 1 Output 4 Out of Range	Pre-Alarm
AEM1 RTD1 Out Range	AEM-2020 1 RTD 1 Out of Range	Alarm
AEM1 RTD1 Out Range	AEM-2020 1 RTD 1 Out of Range	Pre-Alarm
AEM1 RTD1 T1 Alarm	AEM-2020 1 RTD 1 Threshold 1	Alarm
AEM1 RTD1 T1 Prealarm	AEM-2020 1 RTD 1 Threshold 1	Pre-Alarm
AEM1 RTD1 T2 Alarm	AEM-2020 1 RTD 1 Threshold 2	Alarm
AEM1 RTD1 T2 Prealarm	AEM-2020 1 RTD 1 Threshold 2	Pre-Alarm
AEM1 RTD1 T3 Alarm	AEM-2020 1 RTD 1 Threshold 3	Alarm
AEM1 RTD1 T3 Prealarm	AEM-2020 1 RTD 1 Threshold 3	Pre-Alarm
AEM1 RTD1 T4 Alarm	AEM-2020 1 RTD 1 Threshold 4	Alarm
AEM1 RTD1 T4 Prealarm	AEM-2020 1 RTD 1 Threshold 4	Pre-Alarm
AEM1 RTD2 Out Range	AEM-2020 1 RTD 2 Out of Range	Alarm
AEM1 RTD2 Out Range	AEM-2020 1 RTD 2 Out of Range	Pre-Alarm
AEM1 RTD2 T1 Alarm	AEM-2020 1 RTD 2 Threshold 1	Alarm
AEM1 RTD2 T1 Prealarm	AEM-2020 1 RTD 2 Threshold 1	Pre-Alarm
AEM1 RTD2 T2 Alarm	AEM-2020 1 RTD 2 Threshold 2	Alarm
AEM1 RTD2 T2 Prealarm	AEM-2020 1 RTD 2 Threshold 2	Pre-Alarm
AEM1 RTD2 T3 Alarm	AEM-2020 1 RTD 2 Threshold 3	Alarm
AEM1 RTD2 T3 Prealarm	AEM-2020 1 RTD 2 Threshold 3	Pre-Alarm
AEM1 RTD2 T4 Alarm	AEM-2020 1 RTD 2 Threshold 4	Alarm
AEM1 RTD2 T4 Prealarm	AEM-2020 1 RTD 2 Threshold 4	Pre-Alarm
AEM1 RTD3 Out Range	AEM-2020 1 RTD 3 Out of Range	Alarm
AEM1 RTD3 Out Range	AEM-2020 1 RTD 3 Out of Range	Pre-Alarm
AEM1 RTD3 T1 Alarm	AEM-2020 1 RTD 3 Threshold 1	Alarm
AEM1 RTD3 T1 Prealarm	AEM-2020 1 RTD 3 Threshold 1	Pre-Alarm
AEM1 RTD3 T2 Alarm	AEM-2020 1 RTD 3 Threshold 2	Alarm
AEM1 RTD3 T2 Prealarm	AEM-2020 1 RTD 3 Threshold 2	Pre-Alarm
AEM1 RTD3 T3 Alarm	AEM-2020 1 RTD 3 Threshold 3	Alarm
AEM1 RTD3 T3 Prealarm	AEM-2020 1 RTD 3 Threshold 3	Pre-Alarm
AEM1 RTD3 T4 Alarm	AEM-2020 1 RTD 3 Threshold 4	Alarm
AEM1 RTD3 T4 Prealarm	AEM-2020 1 RTD 3 Threshold 4	Pre-Alarm
AEM1 RTD4 Out Range	AEM-2020 1 RTD 4 Out of Range	Alarm
AEM1 RTD4 Out Range	AEM-2020 1 RTD 4 Out of Range	Pre-Alarm
AEM1 RTD4 T1 Alarm	AEM-2020 1 RTD 4 Threshold 1	Alarm
AEM1 RTD4 T1 Prealarm	AEM-2020 1 RTD 4 Threshold 1	Pre-Alarm
AEM1 RTD4 T2 Alarm	AEM-2020 1 RTD 4 Threshold 2	Alarm
AEM1 RTD4 T2 Prealarm	AEM-2020 1 RTD 4 Threshold 2	Pre-Alarm
AEM1 RTD4 T3 Alarm	AEM-2020 1 RTD 4 Threshold 3	Alarm
AEM1 RTD4 T3 Prealarm	AEM-2020 1 RTD 4 Threshold 3	Pre-Alarm
AEM1 RTD4 T4 Alarm	AEM-2020 1 RTD 4 Threshold 4	Alarm

Event String	Event Description	Event Type
AEM1 RTD4 T4 Prealarm	AEM-2020 1 RTD 4 Threshold 4	Pre-Alarm
AEM1 RTD5 Out Range	AEM-2020 1 RTD 5 Out of Range	Alarm
AEM1 RTD5 Out Range	AEM-2020 1 RTD 5 Out of Range	Pre-Alarm
AEM1 RTD5 T1 Alarm	AEM-2020 1 RTD 5 Threshold 1	Alarm
AEM1 RTD5 T1 Prealarm	AEM-2020 1 RTD 5 Threshold 1	Pre-Alarm
AEM1 RTD5 T2 Alarm	AEM-2020 1 RTD 5 Threshold 2	Alarm
AEM1 RTD5 T2 Prealarm	AEM-2020 1 RTD 5 Threshold 2	Pre-Alarm
AEM1 RTD5 T3 Alarm	AEM-2020 1 RTD 5 Threshold 3	Alarm
AEM1 RTD5 T3 Prealarm	AEM-2020 1 RTD 5 Threshold 3	Pre-Alarm
AEM1 RTD5 T4 Alarm	AEM-2020 1 RTD 5 Threshold 4	Alarm
AEM1 RTD5 T4 Prealarm	AEM-2020 1 RTD 5 Threshold 4	Pre-Alarm
AEM1 RTD6 Out Range	AEM-2020 1 RTD 6 Out of Range	Alarm
AEM1 RTD6 Out Range	AEM-2020 1 RTD 6 Out of Range	Pre-Alarm
AEM1 RTD6 T1 Alarm	AEM-2020 1 RTD 6 Threshold 1	Alarm
AEM1 RTD6 T1 Prealarm	AEM-2020 1 RTD 6 Threshold 1	Pre-Alarm
AEM1 RTD6 T2 Alarm	AEM-2020 1 RTD 6 Threshold 2	Alarm
AEM1 RTD6 T2 Prealarm	AEM-2020 1 RTD 6 Threshold 2	Pre-Alarm
AEM1 RTD6 T3 Alarm	AEM-2020 1 RTD 6 Threshold 3	Alarm
AEM1 RTD6 T3 Prealarm	AEM-2020 1 RTD 6 Threshold 3	Pre-Alarm
AEM1 RTD6 T4 Alarm	AEM-2020 1 RTD 6 Threshold 4	Alarm
AEM1 RTD6 T4 Prealarm	AEM-2020 1 RTD 6 Threshold 4	Pre-Alarm
AEM1 RTD7 Out Range	AEM-2020 1 RTD 7 Out of Range	Alarm
AEM1 RTD7 Out Range	AEM-2020 1 RTD 7 Out of Range	Pre-Alarm
AEM1 RTD7 T1 Alarm	AEM-2020 1 RTD 7 Threshold 1	Alarm
AEM1 RTD7 T1 Prealarm	AEM-2020 1 RTD 7 Threshold 1	Pre-Alarm
AEM1 RTD7 T2 Alarm	AEM-2020 1 RTD 7 Threshold 2	Alarm
AEM1 RTD7 T2 Prealarm	AEM-2020 1 RTD 7 Threshold 2	Pre-Alarm
AEM1 RTD7 T3 Alarm	AEM-2020 1 RTD 7 Threshold 3	Alarm
AEM1 RTD7 T3 Prealarm	AEM-2020 1 RTD 7 Threshold 3	Pre-Alarm
AEM1 RTD7 T4 Alarm	AEM-2020 1 RTD 7 Threshold 4	Alarm
AEM1 RTD7 T4 Prealarm	AEM-2020 1 RTD 7 Threshold 4	Pre-Alarm
AEM1 RTD8 Out Range	AEM-2020 1 RTD 8 Out of Range	Alarm
AEM1 RTD8 Out Range	AEM-2020 1 RTD 8 Out of Range	Pre-Alarm
AEM1 RTD8 T1 Alarm	AEM-2020 1 RTD 8 Threshold 1	Alarm
AEM1 RTD8 T1 Prealarm	AEM-2020 1 RTD 8 Threshold 1	Pre-Alarm
AEM1 RTD8 T2 Alarm	AEM-2020 1 RTD 8 Threshold 2	Alarm
AEM1 RTD8 T2 Prealarm	AEM-2020 1 RTD 8 Threshold 2	Pre-Alarm
AEM1 RTD8 T3 Alarm	AEM-2020 1 RTD 8 Threshold 3	Alarm
AEM1 RTD8 T3 Prealarm	AEM-2020 1 RTD 8 Threshold 3	Pre-Alarm
AEM1 RTD8 T4 Alarm	AEM-2020 1 RTD 8 Threshold 4	Alarm
AEM1 RTD8 T4 Prealarm	AEM-2020 1 RTD 8 Threshold 4	Pre-Alarm
AEM1 TC1 T1 Alarm	AEM-2020 1 Thermocouple 1 Threshold 1	Alarm

Event String	Event Description	Event Type
AEM1 TC1 T1 Prealarm	AEM-2020 1 Thermocouple 1 Threshold 1	Pre-Alarm
AEM1 TC1 T2 Alarm	AEM-2020 1 Thermocouple 1 Threshold 2	Alarm
AEM1 TC1 T2 Prealarm	AEM-2020 1 Thermocouple 1 Threshold 2	Pre-Alarm
AEM1 TC1 T3 Alarm	AEM-2020 1 Thermocouple 1 Threshold 3	Alarm
AEM1 TC1 T3 Prealarm	AEM-2020 1 Thermocouple 1 Threshold 3	Pre-Alarm
AEM1 TC1 T4 Alarm	AEM-2020 1 Thermocouple 1 Threshold 4	Alarm
AEM1 TC1 T4 Prealarm	AEM-2020 1 Thermocouple 1 Threshold 4	Pre-Alarm
AEM1 TC2 T1 Alarm	AEM-2020 1 Thermocouple 2 Threshold 1	Alarm
AEM1 TC2 T1 Prealarm	AEM-2020 1 Thermocouple 2 Threshold 1	Pre-Alarm
AEM1 TC2 T2 Alarm	AEM-2020 1 Thermocouple 2 Threshold 2	Alarm
AEM1 TC2 T2 Prealarm	AEM-2020 1 Thermocouple 2 Threshold 2	Pre-Alarm
AEM1 TC2 T3 Alarm	AEM-2020 1 Thermocouple 2 Threshold 3	Alarm
AEM1 TC2 T3 Prealarm	AEM-2020 1 Thermocouple 2 Threshold 3	Pre-Alarm
AEM1 TC2 T4 Alarm	AEM-2020 1 Thermocouple 2 Threshold 4	Alarm
AEM1 TC2 T4 Prealarm	AEM-2020 1 Thermocouple 2 Threshold 4	Pre-Alarm
AEM2 Comms Fail PA	AEM-2020 2 communication failure	Pre-Alarm
AEM2 Dup AEM-2020	AEM-2020 2 duplicate AEM	Status Only
AEM2 Global Warning	AEM-2020 2 global warning	Status Only
AEM2 In1 Out Range	AEM-2020 2 Input 1 Out of Range	Alarm
AEM2 In1 Out Range	AEM-2020 2 Input 1 Out of Range	Pre-Alarm
AEM2 In1 T1 Alarm	AEM-2020 2 Input 1 Threshold 1	Alarm
AEM2 In1 T1 Prealarm	AEM-2020 2 Input 1 Threshold 1	Pre-Alarm
AEM2 In1 T2 Alarm	AEM-2020 2 Input 1 Threshold 2	Alarm
AEM2 In1 T2 Prealarm	AEM-2020 2 Input 1 Threshold 2	Pre-Alarm
AEM2 In1 T3 Alarm	AEM-2020 2 Input 1 Threshold 3	Alarm
AEM2 In1 T3 Prealarm	AEM-2020 2 Input 1 Threshold 3	Pre-Alarm
AEM2 In1 T4 Alarm	AEM-2020 2 Input 1 Threshold 4	Alarm
AEM2 In1 T4 Prealarm	AEM-2020 2 Input 1 Threshold 4	Pre-Alarm
AEM2 In2 Out Range	AEM-2020 2 Input 2 Out of Range	Alarm
AEM2 In2 Out Range	AEM-2020 2 Input 2 Out of Range	Pre-Alarm
AEM2 In2 T1 Alarm	AEM-2020 2 Input 2 Threshold 1	Alarm
AEM2 In2 T1 Prealarm	AEM-2020 2 Input 2 Threshold 1	Pre-Alarm
AEM2 In2 T2 Alarm	AEM-2020 2 Input 2 Threshold 2	Alarm
AEM2 In2 T2 Prealarm	AEM-2020 2 Input 2 Threshold 2	Pre-Alarm
AEM2 In2 T3 Alarm	AEM-2020 2 Input 2 Threshold 3	Alarm
AEM2 In2 T3 Prealarm	AEM-2020 2 Input 2 Threshold 3	Pre-Alarm
AEM2 In2 T4 Alarm	AEM-2020 2 Input 2 Threshold 4	Alarm
AEM2 In2 T4 Prealarm	AEM-2020 2 Input 2 Threshold 4	Pre-Alarm
AEM2 In3 Out Range	AEM-2020 2 Input 3 Out of Range	Alarm
AEM2 In3 Out Range	AEM-2020 2 Input 3 Out of Range	Pre-Alarm
AEM2 In3 T1 Alarm	AEM-2020 2 Input 3 Threshold 1	Alarm
AEM2 In3 T1 Prealarm	AEM-2020 2 Input 3 Threshold 1	Pre-Alarm

Event String	Event Description	Event Type
AEM2 In3 T2 Alarm	AEM-2020 2 Input 3 Threshold 2	Alarm
AEM2 In3 T2 Prealarm	AEM-2020 2 Input 3 Threshold 2	Pre-Alarm
AEM2 In3 T3 Alarm	AEM-2020 2 Input 3 Threshold 3	Alarm
AEM2 In3 T3 Prealarm	AEM-2020 2 Input 3 Threshold 3	Pre-Alarm
AEM2 In3 T4 Alarm	AEM-2020 2 Input 3 Threshold 4	Alarm
AEM2 In3 T4 Prealarm	AEM-2020 2 Input 3 Threshold 4	Pre-Alarm
AEM2 In4 Out Range	AEM-2020 2 Input 4 Out of Range	Alarm
AEM2 In4 Out Range	AEM-2020 2 Input 4 Out of Range	Pre-Alarm
AEM2 In4 T1 Alarm	AEM-2020 2 Input 4 Threshold 1	Alarm
AEM2 In4 T1 Prealarm	AEM-2020 2 Input 4 Threshold 1	Pre-Alarm
AEM2 In4 T2 Alarm	AEM-2020 2 Input 4 Threshold 2	Alarm
AEM2 In4 T2 Prealarm	AEM-2020 2 Input 4 Threshold 2	Pre-Alarm
AEM2 In4 T3 Alarm	AEM-2020 2 Input 4 Threshold 3	Alarm
AEM2 In4 T3 Prealarm	AEM-2020 2 Input 4 Threshold 3	Pre-Alarm
AEM2 In4 T4 Alarm	AEM-2020 2 Input 4 Threshold 4	Alarm
AEM2 In4 T4 Prealarm	AEM-2020 2 Input 4 Threshold 4	Pre-Alarm
AEM2 In5 Out Range	AEM-2020 2 Input 5 Out of Range	Alarm
AEM2 In5 Out Range	AEM-2020 2 Input 5 Out of Range	Pre-Alarm
AEM2 In5 T1 Alarm	AEM-2020 2 Input 5 Threshold 1	Alarm
AEM2 In5 T1 Prealarm	AEM-2020 2 Input 5 Threshold 1	Pre-Alarm
AEM2 In5 T2 Alarm	AEM-2020 2 Input 5 Threshold 2	Alarm
AEM2 In5 T2 Prealarm	AEM-2020 2 Input 5 Threshold 2	Pre-Alarm
AEM2 In5 T3 Alarm	AEM-2020 2 Input 5 Threshold 3	Alarm
AEM2 In5 T3 Prealarm	AEM-2020 2 Input 5 Threshold 3	Pre-Alarm
AEM2 In5 T4 Alarm	AEM-2020 2 Input 5 Threshold 4	Alarm
AEM2 In5 T4 Prealarm	AEM-2020 2 Input 5 Threshold 4	Pre-Alarm
AEM2 In6 Out Range	AEM-2020 2 Input 6 Out of Range	Alarm
AEM2 In6 Out Range	AEM-2020 2 Input 6 Out of Range	Pre-Alarm
AEM2 In6 T1 Alarm	AEM-2020 2 Input 6 Threshold 1	Alarm
AEM2 In6 T1 Prealarm	AEM-2020 2 Input 6 Threshold 1	Pre-Alarm
AEM2 In6 T2 Alarm	AEM-2020 2 Input 6 Threshold 2	Alarm
AEM2 In6 T2 Prealarm	AEM-2020 2 Input 6 Threshold 2	Pre-Alarm
AEM2 In6 T3 Alarm	AEM-2020 2 Input 6 Threshold 3	Alarm
AEM2 In6 T3 Prealarm	AEM-2020 2 Input 6 Threshold 3	Pre-Alarm
AEM2 In6 T4 Alarm	AEM-2020 2 Input 6 Threshold 4	Alarm
AEM2 In6 T4 Prealarm	AEM-2020 2 Input 6 Threshold 4	Pre-Alarm
AEM2 In7 Out Range	AEM-2020 2 Input 7 Out of Range	Alarm
AEM2 In7 Out Range	AEM-2020 2 Input 7 Out of Range	Pre-Alarm
AEM2 In7 T1 Alarm	AEM-2020 2 Input 7 Threshold 1	Alarm
AEM2 In7 T1 Prealarm	AEM-2020 2 Input 7 Threshold 1	Pre-Alarm
AEM2 In7 T2 Alarm	AEM-2020 2 Input 7 Threshold 2	Alarm
AEM2 In7 T2 Prealarm	AEM-2020 2 Input 7 Threshold 2	Pre-Alarm

Event String	Event Description	Event Type
AEM2 In7 T3 Alarm	AEM-2020 2 Input 7 Threshold 3	Alarm
AEM2 In7 T3 Prealarm	AEM-2020 2 Input 7 Threshold 3	Pre-Alarm
AEM2 In7 T4 Alarm	AEM-2020 2 Input 7 Threshold 4	Alarm
AEM2 In7 T4 Prealarm	AEM-2020 2 Input 7 Threshold 4	Pre-Alarm
AEM2 In8 Out Range	AEM-2020 2 Input 8 Out of Range	Alarm
AEM2 In8 Out Range	AEM-2020 2 Input 8 Out of Range	Pre-Alarm
AEM2 In8 T1 Alarm	AEM-2020 2 Input 8 Threshold 1	Alarm
AEM2 In8 T1 Prealarm	AEM-2020 2 Input 8 Threshold 1	Pre-Alarm
AEM2 In8 T2 Alarm	AEM-2020 2 Input 8 Threshold 2	Alarm
AEM2 In8 T2 Prealarm	AEM-2020 2 Input 8 Threshold 2	Pre-Alarm
AEM2 In8 T3 Alarm	AEM-2020 2 Input 8 Threshold 3	Alarm
AEM2 In8 T3 Prealarm	AEM-2020 2 Input 8 Threshold 3	Pre-Alarm
AEM2 In8 T4 Alarm	AEM-2020 2 Input 8 Threshold 4	Alarm
AEM2 In8 T4 Prealarm	AEM-2020 2 Input 8 Threshold 4	Pre-Alarm
AEM2 Not Configrd PA	AEM-2020 2 Not Configured	Pre-Alarm
AEM2 Out1 Out Range A	AEM-2020 2 Output 1 Out of Range	Alarm
AEM2 Out1 Out Range PA	AEM-2020 2 Output 1 Out of Range	Pre-Alarm
AEM2 Out2 Out Range A	AEM-2020 2 Output 2 Out of Range	Alarm
AEM2 Out2 Out Range PA	AEM-2020 2 Output 2 Out of Range	Pre-Alarm
AEM2 Out3 Out Range A	AEM-2020 2 Output 3 Out of Range	Alarm
AEM2 Out3 Out Range PA	AEM-2020 2 Output 3 Out of Range	Pre-Alarm
AEM2 Out4 Out Range A	AEM-2020 2 Output 4 Out of Range	Alarm
AEM2 Out4 Out Range PA	AEM-2020 2 Output 4 Out of Range	Pre-Alarm
AEM2 RTD1 Out Range	AEM-2020 2 RTD 1 Out of Range	Alarm
AEM2 RTD1 Out Range	AEM-2020 2 RTD 1 Out of Range	Pre-Alarm
AEM2 RTD1 T1 Alarm	AEM-2020 2 RTD 1 Threshold 1	Alarm
AEM2 RTD1 T1 Prealarm	AEM-2020 2 RTD 1 Threshold 1	Pre-Alarm
AEM2 RTD1 T2 Alarm	AEM-2020 2 RTD 1 Threshold 2	Alarm
AEM2 RTD1 T2 Prealarm	AEM-2020 2 RTD 1 Threshold 2	Pre-Alarm
AEM2 RTD1 T3 Alarm	AEM-2020 2 RTD 1 Threshold 3	Alarm
AEM2 RTD1 T3 Prealarm	AEM-2020 2 RTD 1 Threshold 3	Pre-Alarm
AEM2 RTD1 T4 Alarm	AEM-2020 2 RTD 1 Threshold 4	Alarm
AEM2 RTD1 T4 Prealarm	AEM-2020 2 RTD 1 Threshold 4	Pre-Alarm
AEM2 RTD2 Out Range	AEM-2020 2 RTD 2 Out of Range	Alarm
AEM2 RTD2 Out Range	AEM-2020 2 RTD 2 Out of Range	Pre-Alarm
AEM2 RTD2 T1 Alarm	AEM-2020 2 RTD 2 Threshold 1	Alarm
AEM2 RTD2 T1 Prealarm	AEM-2020 2 RTD 2 Threshold 1	Pre-Alarm
AEM2 RTD2 T2 Alarm	AEM-2020 2 RTD 2 Threshold 2	Alarm
AEM2 RTD2 T2 Prealarm	AEM-2020 2 RTD 2 Threshold 2	Pre-Alarm
AEM2 RTD2 T3 Alarm	AEM-2020 2 RTD 2 Threshold 3	Alarm
AEM2 RTD2 T3 Prealarm	AEM-2020 2 RTD 2 Threshold 3	Pre-Alarm
AEM2 RTD2 T4 Alarm	AEM-2020 2 RTD 2 Threshold 4	Alarm

Event String	Event Description	Event Type
AEM2 RTD2 T4 Prealarm	AEM-2020 2 RTD 2 Threshold 4	Pre-Alarm
AEM2 RTD3 Out Range	AEM-2020 2 RTD 3 Out of Range	Alarm
AEM2 RTD3 Out Range	AEM-2020 2 RTD 3 Out of Range	Pre-Alarm
AEM2 RTD3 T1 Alarm	AEM-2020 2 RTD 3 Threshold 1	Alarm
AEM2 RTD3 T1 Prealarm	AEM-2020 2 RTD 3 Threshold 1	Pre-Alarm
AEM2 RTD3 T2 Alarm	AEM-2020 2 RTD 3 Threshold 2	Alarm
AEM2 RTD3 T2 Prealarm	AEM-2020 2 RTD 3 Threshold 2	Pre-Alarm
AEM2 RTD3 T3 Alarm	AEM-2020 2 RTD 3 Threshold 3	Alarm
AEM2 RTD3 T3 Prealarm	AEM-2020 2 RTD 3 Threshold 3	Pre-Alarm
AEM2 RTD3 T4 Alarm	AEM-2020 2 RTD 3 Threshold 4	Alarm
AEM2 RTD3 T4 Prealarm	AEM-2020 2 RTD 3 Threshold 4	Pre-Alarm
AEM2 RTD4 Out Range	AEM-2020 2 RTD 4 Out of Range	Alarm
AEM2 RTD4 Out Range	AEM-2020 2 RTD 4 Out of Range	Pre-Alarm
AEM2 RTD4 T1 Alarm	AEM-2020 2 RTD 4 Threshold 1	Alarm
AEM2 RTD4 T1 Prealarm	AEM-2020 2 RTD 4 Threshold 1	Pre-Alarm
AEM2 RTD4 T2 Alarm	AEM-2020 2 RTD 4 Threshold 2	Alarm
AEM2 RTD4 T2 Prealarm	AEM-2020 2 RTD 4 Threshold 2	Pre-Alarm
AEM2 RTD4 T3 Alarm	AEM-2020 2 RTD 4 Threshold 3	Alarm
AEM2 RTD4 T3 Prealarm	AEM-2020 2 RTD 4 Threshold 3	Pre-Alarm
AEM2 RTD4 T4 Alarm	AEM-2020 2 RTD 4 Threshold 4	Alarm
AEM2 RTD4 T4 Prealarm	AEM-2020 2 RTD 4 Threshold 4	Pre-Alarm
AEM2 RTD5 Out Range	AEM-2020 2 RTD 5 Out of Range	Alarm
AEM2 RTD5 Out Range	AEM-2020 2 RTD 5 Out of Range	Pre-Alarm
AEM2 RTD5 T1 Alarm	AEM-2020 2 RTD 5 Threshold 1	Alarm
AEM2 RTD5 T1 Prealarm	AEM-2020 2 RTD 5 Threshold 1	Pre-Alarm
AEM2 RTD5 T2 Alarm	AEM-2020 2 RTD 5 Threshold 2	Alarm
AEM2 RTD5 T2 Prealarm	AEM-2020 2 RTD 5 Threshold 2	Pre-Alarm
AEM2 RTD5 T3 Alarm	AEM-2020 2 RTD 5 Threshold 3	Alarm
AEM2 RTD5 T3 Prealarm	AEM-2020 2 RTD 5 Threshold 3	Pre-Alarm
AEM2 RTD5 T4 Alarm	AEM-2020 2 RTD 5 Threshold 4	Alarm
AEM2 RTD5 T4 Prealarm	AEM-2020 2 RTD 5 Threshold 4	Pre-Alarm
AEM2 RTD6 Out Range	AEM-2020 2 RTD 6 Out of Range	Alarm
AEM2 RTD6 Out Range	AEM-2020 2 RTD 6 Out of Range	Pre-Alarm
AEM2 RTD6 T1 Alarm	AEM-2020 2 RTD 6 Threshold 1	Alarm
AEM2 RTD6 T1 Prealarm	AEM-2020 2 RTD 6 Threshold 1	Pre-Alarm
AEM2 RTD6 T2 Alarm	AEM-2020 2 RTD 6 Threshold 2	Alarm
AEM2 RTD6 T2 Prealarm	AEM-2020 2 RTD 6 Threshold 2	Pre-Alarm
AEM2 RTD6 T3 Alarm	AEM-2020 2 RTD 6 Threshold 3	Alarm
AEM2 RTD6 T3 Prealarm	AEM-2020 2 RTD 6 Threshold 3	Pre-Alarm
AEM2 RTD6 T4 Alarm	AEM-2020 2 RTD 6 Threshold 4	Alarm
AEM2 RTD6 T4 Prealarm	AEM-2020 2 RTD 6 Threshold 4	Pre-Alarm
AEM2 RTD7 Out Range	AEM-2020 2 RTD 7 Out of Range	Alarm

Event String	Event Description	Event Type
AEM2 RTD7 Out Range	AEM-2020 2 RTD 7 Out of Range	Pre-Alarm
AEM2 RTD7 T1 Alarm	AEM-2020 2 RTD 7 Threshold 1	Alarm
AEM2 RTD7 T1 Prealarm	AEM-2020 2 RTD 7 Threshold 1	Pre-Alarm
AEM2 RTD7 T2 Alarm	AEM-2020 2 RTD 7 Threshold 2	Alarm
AEM2 RTD7 T2 Prealarm	AEM-2020 2 RTD 7 Threshold 2	Pre-Alarm
AEM2 RTD7 T3 Alarm	AEM-2020 2 RTD 7 Threshold 3	Alarm
AEM2 RTD7 T3 Prealarm	AEM-2020 2 RTD 7 Threshold 3	Pre-Alarm
AEM2 RTD7 T4 Alarm	AEM-2020 2 RTD 7 Threshold 4	Alarm
AEM2 RTD7 T4 Prealarm	AEM-2020 2 RTD 7 Threshold 4	Pre-Alarm
AEM2 RTD8 Out Range	AEM-2020 2 RTD 8 Out of Range	Alarm
AEM2 RTD8 Out Range	AEM-2020 2 RTD 8 Out of Range	Pre-Alarm
AEM2 RTD8 T1 Alarm	AEM-2020 2 RTD 8 Threshold 1	Alarm
AEM2 RTD8 T1 Prealarm	AEM-2020 2 RTD 8 Threshold 1	Pre-Alarm
AEM2 RTD8 T2 Alarm	AEM-2020 2 RTD 8 Threshold 2	Alarm
AEM2 RTD8 T2 Prealarm	AEM-2020 2 RTD 8 Threshold 2	Pre-Alarm
AEM2 RTD8 T3 Alarm	AEM-2020 2 RTD 8 Threshold 3	Alarm
AEM2 RTD8 T3 Prealarm	AEM-2020 2 RTD 8 Threshold 3	Pre-Alarm
AEM2 RTD8 T4 Alarm	AEM-2020 2 RTD 8 Threshold 4	Alarm
AEM2 RTD8 T4 Prealarm	AEM-2020 2 RTD 8 Threshold 4	Pre-Alarm
AEM2 TC1 T1 Alarm	AEM-2020 2 Thermocouple 1 Threshold 1	Alarm
AEM2 TC1 T1 Prealarm	AEM-2020 2 Thermocouple 1 Threshold 1	Pre-Alarm
AEM2 TC1 T2 Alarm	AEM-2020 2 Thermocouple 1 Threshold 2	Alarm
AEM2 TC1 T2 Prealarm	AEM-2020 2 Thermocouple 1 Threshold 2	Pre-Alarm
AEM2 TC1 T3 Alarm	AEM-2020 2 Thermocouple 1 Threshold 3	Alarm
AEM2 TC1 T3 Prealarm	AEM-2020 2 Thermocouple 1 Threshold 3	Pre-Alarm
AEM2 TC1 T4 Alarm	AEM-2020 2 Thermocouple 1 Threshold 4	Alarm
AEM2 TC1 T4 Prealarm	AEM-2020 2 Thermocouple 1 Threshold 4	Pre-Alarm
AEM2 TC2 T1 Alarm	AEM-2020 2 Thermocouple 2 Threshold 1	Alarm
AEM2 TC2 T1 Prealarm	AEM-2020 2 Thermocouple 2 Threshold 1	Pre-Alarm
AEM2 TC2 T2 Alarm	AEM-2020 2 Thermocouple 2 Threshold 2	Alarm
AEM2 TC2 T2 Prealarm	AEM-2020 2 Thermocouple 2 Threshold 2	Pre-Alarm
AEM2 TC2 T3 Alarm	AEM-2020 2 Thermocouple 2 Threshold 3	Alarm
AEM2 TC2 T3 Prealarm	AEM-2020 2 Thermocouple 2 Threshold 3	Pre-Alarm
AEM2 TC2 T4 Alarm	AEM-2020 2 Thermocouple 2 Threshold 4	Alarm
AEM2 TC2 T4 Prealarm	AEM-2020 2 Thermocouple 2 Threshold 4	Pre-Alarm
AEM3 Comms Fail PA	AEM-2020 3 communication failure	Pre-Alarm
AEM3 Dup AEM-2020	AEM-2020 3 duplicate AEM	Status Only
AEM3 Global Warning	AEM-2020 3 global warning	Status Only
AEM3 In1 Out Range	AEM-2020 3 Input 1 Out of Range	Alarm
AEM3 In1 Out Range	AEM-2020 3 Input 1 Out of Range	Pre-Alarm
AEM3 In1 T1 Alarm	AEM-2020 3 Input 1 Threshold 1	Alarm
AEM3 In1 T1 Prealarm	AEM-2020 3 Input 1 Threshold 1	Pre-Alarm

Event String	Event Description	Event Type
AEM3 In1 T2 Alarm	AEM-2020 3 Input 1 Threshold 2	Alarm
AEM3 In1 T2 Prealarm	AEM-2020 3 Input 1 Threshold 2	Pre-Alarm
AEM3 In1 T3 Alarm	AEM-2020 3 Input 1 Threshold 3	Alarm
AEM3 In1 T3 Prealarm	AEM-2020 3 Input 1 Threshold 3	Pre-Alarm
AEM3 In1 T4 Alarm	AEM-2020 3 Input 1 Threshold 4	Alarm
AEM3 In1 T4 Prealarm	AEM-2020 3 Input 1 Threshold 4	Pre-Alarm
AEM3 In2 Out Range	AEM-2020 3 Input 2 Out of Range	Alarm
AEM3 In2 Out Range	AEM-2020 3 Input 2 Out of Range	Pre-Alarm
AEM3 In2 T1 Alarm	AEM-2020 3 Input 2 Threshold 1	Alarm
AEM3 In2 T1 Prealarm	AEM-2020 3 Input 2 Threshold 1	Pre-Alarm
AEM3 In2 T2 Alarm	AEM-2020 3 Input 2 Threshold 2	Alarm
AEM3 In2 T2 Prealarm	AEM-2020 3 Input 2 Threshold 2	Pre-Alarm
AEM3 In2 T3 Alarm	AEM-2020 3 Input 2 Threshold 3	Alarm
AEM3 In2 T3 Prealarm	AEM-2020 3 Input 2 Threshold 3	Pre-Alarm
AEM3 In2 T4 Alarm	AEM-2020 3 Input 2 Threshold 4	Alarm
AEM3 In2 T4 Prealarm	AEM-2020 3 Input 2 Threshold 4	Pre-Alarm
AEM3 In3 Out Range	AEM-2020 3 Input 3 Out of Range	Alarm
AEM3 In3 Out Range	AEM-2020 3 Input 3 Out of Range	Pre-Alarm
AEM3 In3 T1 Alarm	AEM-2020 3 Input 3 Threshold 1	Alarm
AEM3 In3 T1 Prealarm	AEM-2020 3 Input 3 Threshold 1	Pre-Alarm
AEM3 In3 T2 Alarm	AEM-2020 3 Input 3 Threshold 2	Alarm
AEM3 In3 T2 Prealarm	AEM-2020 3 Input 3 Threshold 2	Pre-Alarm
AEM3 In3 T3 Alarm	AEM-2020 3 Input 3 Threshold 3	Alarm
AEM3 In3 T3 Prealarm	AEM-2020 3 Input 3 Threshold 3	Pre-Alarm
AEM3 In3 T4 Alarm	AEM-2020 3 Input 3 Threshold 4	Alarm
AEM3 In3 T4 Prealarm	AEM-2020 3 Input 3 Threshold 4	Pre-Alarm
AEM3 In4 Out Range	AEM-2020 3 Input 4 Out of Range	Alarm
AEM3 In4 Out Range	AEM-2020 3 Input 4 Out of Range	Pre-Alarm
AEM3 In4 T1 Alarm	AEM-2020 3 Input 4 Threshold 1	Alarm
AEM3 In4 T1 Prealarm	AEM-2020 3 Input 4 Threshold 1	Pre-Alarm
AEM3 In4 T2 Alarm	AEM-2020 3 Input 4 Threshold 2	Alarm
AEM3 In4 T2 Prealarm	AEM-2020 3 Input 4 Threshold 2	Pre-Alarm
AEM3 In4 T3 Alarm	AEM-2020 3 Input 4 Threshold 3	Alarm
AEM3 In4 T3 Prealarm	AEM-2020 3 Input 4 Threshold 3	Pre-Alarm
AEM3 In4 T4 Alarm	AEM-2020 3 Input 4 Threshold 4	Alarm
AEM3 In4 T4 Prealarm	AEM-2020 3 Input 4 Threshold 4	Pre-Alarm
AEM3 In5 Out Range	AEM-2020 3 Input 5 Out of Range	Alarm
AEM3 In5 Out Range	AEM-2020 3 Input 5 Out of Range	Pre-Alarm
AEM3 In5 T1 Alarm	AEM-2020 3 Input 5 Threshold 1	Alarm
AEM3 In5 T1 Prealarm	AEM-2020 3 Input 5 Threshold 1	Pre-Alarm
AEM3 In5 T2 Alarm	AEM-2020 3 Input 5 Threshold 2	Alarm
AEM3 In5 T2 Prealarm	AEM-2020 3 Input 5 Threshold 2	Pre-Alarm

Event String	Event Description	Event Type
AEM3 In5 T3 Alarm	AEM-2020 3 Input 5 Threshold 3	Alarm
AEM3 In5 T3 Prealarm	AEM-2020 3 Input 5 Threshold 3	Pre-Alarm
AEM3 In5 T4 Alarm	AEM-2020 3 Input 5 Threshold 4	Alarm
AEM3 In5 T4 Prealarm	AEM-2020 3 Input 5 Threshold 4	Pre-Alarm
AEM3 In6 Out Range	AEM-2020 3 Input 6 Out of Range	Alarm
AEM3 In6 Out Range	AEM-2020 3 Input 6 Out of Range	Pre-Alarm
AEM3 In6 T1 Alarm	AEM-2020 3 Input 6 Threshold 1	Alarm
AEM3 In6 T1 Prealarm	AEM-2020 3 Input 6 Threshold 1	Pre-Alarm
AEM3 In6 T2 Alarm	AEM-2020 3 Input 6 Threshold 2	Alarm
AEM3 In6 T2 Prealarm	AEM-2020 3 Input 6 Threshold 2	Pre-Alarm
AEM3 In6 T3 Alarm	AEM-2020 3 Input 6 Threshold 3	Alarm
AEM3 In6 T3 Prealarm	AEM-2020 3 Input 6 Threshold 3	Pre-Alarm
AEM3 In6 T4 Alarm	AEM-2020 3 Input 6 Threshold 4	Alarm
AEM3 In6 T4 Prealarm	AEM-2020 3 Input 6 Threshold 4	Pre-Alarm
AEM3 In7 Out Range	AEM-2020 3 Input 7 Out of Range	Alarm
AEM3 In7 Out Range	AEM-2020 3 Input 7 Out of Range	Pre-Alarm
AEM3 In7 T1 Alarm	AEM-2020 3 Input 7 Threshold 1	Alarm
AEM3 In7 T1 Prealarm	AEM-2020 3 Input 7 Threshold 1	Pre-Alarm
AEM3 In7 T2 Alarm	AEM-2020 3 Input 7 Threshold 2	Alarm
AEM3 In7 T2 Prealarm	AEM-2020 3 Input 7 Threshold 2	Pre-Alarm
AEM3 In7 T3 Alarm	AEM-2020 3 Input 7 Threshold 3	Alarm
AEM3 In7 T3 Prealarm	AEM-2020 3 Input 7 Threshold 3	Pre-Alarm
AEM3 In7 T4 Alarm	AEM-2020 3 Input 7 Threshold 4	Alarm
AEM3 In7 T4 Prealarm	AEM-2020 3 Input 7 Threshold 4	Pre-Alarm
AEM3 In8 Out Range	AEM-2020 3 Input 8 Out of Range	Alarm
AEM3 In8 Out Range	AEM-2020 3 Input 8 Out of Range	Pre-Alarm
AEM3 In8 T1 Alarm	AEM-2020 3 Input 8 Threshold 1	Alarm
AEM3 In8 T1 Prealarm	AEM-2020 3 Input 8 Threshold 1	Pre-Alarm
AEM3 In8 T2 Alarm	AEM-2020 3 Input 8 Threshold 2	Alarm
AEM3 In8 T2 Prealarm	AEM-2020 3 Input 8 Threshold 2	Pre-Alarm
AEM3 In8 T3 Alarm	AEM-2020 3 Input 8 Threshold 3	Alarm
AEM3 In8 T3 Prealarm	AEM-2020 3 Input 8 Threshold 3	Pre-Alarm
AEM3 In8 T4 Alarm	AEM-2020 3 Input 8 Threshold 4	Alarm
AEM3 In8 T4 Prealarm	AEM-2020 3 Input 8 Threshold 4	Pre-Alarm
AEM3 Not Configrd PA	AEM-2020 3 not configured	Pre-Alarm
AEM3 Out1 Out Range A	AEM-2020 3 Output 1 Out of Range	Alarm
AEM3 Out1 Out Range PA	AEM-2020 3 Output 1 Out of Range	Pre-Alarm
AEM3 Out2 Out Range A	AEM-2020 3 Output 2 Out of Range	Alarm
AEM3 Out2 Out Range PA	AEM-2020 3 Output 2 Out of Range	Pre-Alarm
AEM3 Out3 Out Range A	AEM-2020 3 Output 3 Out of Range	Alarm
AEM3 Out3 Out Range PA	AEM-2020 3 Output 3 Out of Range	Pre-Alarm
AEM3 Out4 Out Range A	AEM-2020 3 Output 4 Out of Range	Alarm

Event String	Event Description	Event Type
AEM3 Out4 Out Range PA	AEM-2020 3 Output 4 Out of Range	Pre-Alarm
AEM3 RTD1 Out Range	AEM-2020 3 RTD 1 Out of Range	Alarm
AEM3 RTD1 Out Range	AEM-2020 3 RTD 1 Out of Range	Pre-Alarm
AEM3 RTD1 T1 Alarm	AEM-2020 3 RTD 1 Threshold 1	Alarm
AEM3 RTD1 T1 Prealarm	AEM-2020 3 RTD 1 Threshold 1	Pre-Alarm
AEM3 RTD1 T2 Alarm	AEM-2020 3 RTD 1 Threshold 2	Alarm
AEM3 RTD1 T2 Prealarm	AEM-2020 3 RTD 1 Threshold 2	Pre-Alarm
AEM3 RTD1 T3 Alarm	AEM-2020 3 RTD 1 Threshold 3	Alarm
AEM3 RTD1 T3 Prealarm	AEM-2020 3 RTD 1 Threshold 3	Pre-Alarm
AEM3 RTD1 T4 Alarm	AEM-2020 3 RTD 1 Threshold 4	Alarm
AEM3 RTD1 T4 Prealarm	AEM-2020 3 RTD 1 Threshold 4	Pre-Alarm
AEM3 RTD2 Out Range	AEM-2020 3 RTD 2 Out of Range	Alarm
AEM3 RTD2 Out Range	AEM-2020 3 RTD 2 Out of Range	Pre-Alarm
AEM3 RTD2 T1 Alarm	AEM-2020 3 RTD 2 Threshold 1	Alarm
AEM3 RTD2 T1 Prealarm	AEM-2020 3 RTD 2 Threshold 1	Pre-Alarm
AEM3 RTD2 T2 Alarm	AEM-2020 3 RTD 2 Threshold 2	Alarm
AEM3 RTD2 T2 Prealarm	AEM-2020 3 RTD 2 Threshold 2	Pre-Alarm
AEM3 RTD2 T3 Alarm	AEM-2020 3 RTD 2 Threshold 3	Alarm
AEM3 RTD2 T3 Prealarm	AEM-2020 3 RTD 2 Threshold 3	Pre-Alarm
AEM3 RTD2 T4 Alarm	AEM-2020 3 RTD 2 Threshold 4	Alarm
AEM3 RTD2 T4 Prealarm	AEM-2020 3 RTD 2 Threshold 4	Pre-Alarm
AEM3 RTD3 Out Range	AEM-2020 3 RTD 3 Out of Range	Alarm
AEM3 RTD3 Out Range	AEM-2020 3 RTD 3 Out of Range	Pre-Alarm
AEM3 RTD3 T1 Alarm	AEM-2020 3 RTD 3 Threshold 1	Alarm
AEM3 RTD3 T1 Prealarm	AEM-2020 3 RTD 3 Threshold 1	Pre-Alarm
AEM3 RTD3 T2 Alarm	AEM-2020 3 RTD 3 Threshold 2	Alarm
AEM3 RTD3 T2 Prealarm	AEM-2020 3 RTD 3 Threshold 2	Pre-Alarm
AEM3 RTD3 T3 Alarm	AEM-2020 3 RTD 3 Threshold 3	Alarm
AEM3 RTD3 T3 Prealarm	AEM-2020 3 RTD 3 Threshold 3	Pre-Alarm
AEM3 RTD3 T4 Alarm	AEM-2020 3 RTD 3 Threshold 4	Alarm
AEM3 RTD3 T4 Prealarm	AEM-2020 3 RTD 3 Threshold 4	Pre-Alarm
AEM3 RTD4 Out Range	AEM-2020 3 RTD 4 Out of Range	Alarm
AEM3 RTD4 Out Range	AEM-2020 3 RTD 4 Out of Range	Pre-Alarm
AEM3 RTD4 T1 Alarm	AEM-2020 3 RTD 4 Threshold 1	Alarm
AEM3 RTD4 T1 Prealarm	AEM-2020 3 RTD 4 Threshold 1	Pre-Alarm
AEM3 RTD4 T2 Alarm	AEM-2020 3 RTD 4 Threshold 2	Alarm
AEM3 RTD4 T2 Prealarm	AEM-2020 3 RTD 4 Threshold 2	Pre-Alarm
AEM3 RTD4 T3 Alarm	AEM-2020 3 RTD 4 Threshold 3	Alarm
AEM3 RTD4 T3 Prealarm	AEM-2020 3 RTD 4 Threshold 3	Pre-Alarm
AEM3 RTD4 T4 Alarm	AEM-2020 3 RTD 4 Threshold 4	Alarm
AEM3 RTD4 T4 Prealarm	AEM-2020 3 RTD 4 Threshold 4	Pre-Alarm
AEM3 RTD5 Out Range	AEM-2020 3 RTD 5 Out of Range	Alarm

Event String	Event Description	Event Type
AEM3 RTD5 Out Range	AEM-2020 3 RTD 5 Out of Range	Pre-Alarm
AEM3 RTD5 T1 Alarm	AEM-2020 3 RTD 5 Threshold 1	Alarm
AEM3 RTD5 T1 Prealarm	AEM-2020 3 RTD 5 Threshold 1	Pre-Alarm
AEM3 RTD5 T2 Alarm	AEM-2020 3 RTD 5 Threshold 2	Alarm
AEM3 RTD5 T2 Prealarm	AEM-2020 3 RTD 5 Threshold 2	Pre-Alarm
AEM3 RTD5 T3 Alarm	AEM-2020 3 RTD 5 Threshold 3	Alarm
AEM3 RTD5 T3 Prealarm	AEM-2020 3 RTD 5 Threshold 3	Pre-Alarm
AEM3 RTD5 T4 Alarm	AEM-2020 3 RTD 5 Threshold 4	Alarm
AEM3 RTD5 T4 Prealarm	AEM-2020 3 RTD 5 Threshold 4	Pre-Alarm
AEM3 RTD6 Out Range	AEM-2020 3 RTD 6 Out of Range	Alarm
AEM3 RTD6 Out Range	AEM-2020 3 RTD 6 Out of Range	Pre-Alarm
AEM3 RTD6 T1 Alarm	AEM-2020 3 RTD 6 Threshold 1	Alarm
AEM3 RTD6 T1 Prealarm	AEM-2020 3 RTD 6 Threshold 1	Pre-Alarm
AEM3 RTD6 T2 Alarm	AEM-2020 3 RTD 6 Threshold 2	Alarm
AEM3 RTD6 T2 Prealarm	AEM-2020 3 RTD 6 Threshold 2	Pre-Alarm
AEM3 RTD6 T3 Alarm	AEM-2020 3 RTD 6 Threshold 3	Alarm
AEM3 RTD6 T3 Prealarm	AEM-2020 3 RTD 6 Threshold 3	Pre-Alarm
AEM3 RTD6 T4 Alarm	AEM-2020 3 RTD 6 Threshold 4	Alarm
AEM3 RTD6 T4 Prealarm	AEM-2020 3 RTD 6 Threshold 4	Pre-Alarm
AEM3 RTD7 Out Range	AEM-2020 3 RTD 7 Out of Range	Alarm
AEM3 RTD7 Out Range	AEM-2020 3 RTD 7 Out of Range	Pre-Alarm
AEM3 RTD7 T1 Alarm	AEM-2020 3 RTD 7 Threshold 1	Alarm
AEM3 RTD7 T1 Prealarm	AEM-2020 3 RTD 7 Threshold 1	Pre-Alarm
AEM3 RTD7 T2 Alarm	AEM-2020 3 RTD 7 Threshold 2	Alarm
AEM3 RTD7 T2 Prealarm	AEM-2020 3 RTD 7 Threshold 2	Pre-Alarm
AEM3 RTD7 T3 Alarm	AEM-2020 3 RTD 7 Threshold 3	Alarm
AEM3 RTD7 T3 Prealarm	AEM-2020 3 RTD 7 Threshold 3	Pre-Alarm
AEM3 RTD7 T4 Alarm	AEM-2020 3 RTD 7 Threshold 4	Alarm
AEM3 RTD7 T4 Prealarm	AEM-2020 3 RTD 7 Threshold 4	Pre-Alarm
AEM3 RTD8 Out Range	AEM-2020 3 RTD 8 Out of Range	Alarm
AEM3 RTD8 Out Range	AEM-2020 3 RTD 8 Out of Range	Pre-Alarm
AEM3 RTD8 T1 Alarm	AEM-2020 3 RTD 8 Threshold 1	Alarm
AEM3 RTD8 T1 Prealarm	AEM-2020 3 RTD 8 Threshold 1	Pre-Alarm
AEM3 RTD8 T2 Alarm	AEM-2020 3 RTD 8 Threshold 2	Alarm
AEM3 RTD8 T2 Prealarm	AEM-2020 3 RTD 8 Threshold 2	Pre-Alarm
AEM3 RTD8 T3 Alarm	AEM-2020 3 RTD 8 Threshold 3	Alarm
AEM3 RTD8 T3 Prealarm	AEM-2020 3 RTD 8 Threshold 3	Pre-Alarm
AEM3 RTD8 T4 Alarm	AEM-2020 3 RTD 8 Threshold 4	Alarm
AEM3 RTD8 T4 Prealarm	AEM-2020 3 RTD 8 Threshold 4	Pre-Alarm
AEM3 TC1 T1 Alarm	AEM-2020 3 Thermocouple 1 Threshold 1	Alarm
AEM3 TC1 T1 Prealarm	AEM-2020 3 Thermocouple 1 Threshold 1	Pre-Alarm
AEM3 TC1 T2 Alarm	AEM-2020 3 Thermocouple 1 Threshold 2	Alarm

Event String	Event Description	Event Type
AEM3 TC1 T2 Prealarm	AEM-2020 3 Thermocouple 1 Threshold 2	Pre-Alarm
AEM3 TC1 T3 Alarm	AEM-2020 3 Thermocouple 1 Threshold 3	Alarm
AEM3 TC1 T3 Prealarm	AEM-2020 3 Thermocouple 1 Threshold 3	Pre-Alarm
AEM3 TC1 T4 Alarm	AEM-2020 3 Thermocouple 1 Threshold 4	Alarm
AEM3 TC1 T4 Prealarm	AEM-2020 3 Thermocouple 1 Threshold 4	Pre-Alarm
AEM3 TC2 T1 Alarm	AEM-2020 3 Thermocouple 2 Threshold 1	Alarm
AEM3 TC2 T1 Prealarm	AEM-2020 3 Thermocouple 2 Threshold 1	Pre-Alarm
AEM3 TC2 T2 Alarm	AEM-2020 3 Thermocouple 2 Threshold 2	Alarm
AEM3 TC2 T2 Prealarm	AEM-2020 3 Thermocouple 2 Threshold 2	Pre-Alarm
AEM3 TC2 T3 Alarm	AEM-2020 3 Thermocouple 2 Threshold 3	Alarm
AEM3 TC2 T3 Prealarm	AEM-2020 3 Thermocouple 2 Threshold 3	Pre-Alarm
AEM3 TC2 T4 Alarm	AEM-2020 3 Thermocouple 2 Threshold 4	Alarm
AEM3 TC2 T4 Prealarm	AEM-2020 3 Thermocouple 2 Threshold 4	Pre-Alarm
AEM4 Comms Fail PA	AEM-2020 4 communication failure	Pre-Alarm
AEM4 Dup AEM-2020	AEM-2020 4 duplicate AEM	Status Only
AEM4 Global Warning	AEM-2020 4 global warning	Status Only
AEM4 In1 Out Range	AEM-2020 4 Input 1 Out of Range	Alarm
AEM4 In1 Out Range	AEM-2020 4 Input 1 Out of Range	Pre-Alarm
AEM4 In1 T1 Alarm	AEM-2020 4 Input 1 Threshold 1	Alarm
AEM4 In1 T1 Prealarm	AEM-2020 4 Input 1 Threshold 1	Pre-Alarm
AEM4 In1 T2 Alarm	AEM-2020 4 Input 1 Threshold 2	Alarm
AEM4 In1 T2 Prealarm	AEM-2020 4 Input 1 Threshold 2	Pre-Alarm
AEM4 In1 T3 Alarm	AEM-2020 4 Input 1 Threshold 3	Alarm
AEM4 In1 T3 Prealarm	AEM-2020 4 Input 1 Threshold 3	Pre-Alarm
AEM4 In1 T4 Alarm	AEM-2020 4 Input 1 Threshold 4	Alarm
AEM4 In1 T4 Prealarm	AEM-2020 4 Input 1 Threshold 4	Pre-Alarm
AEM4 In2 Out Range	AEM-2020 4 Input 2 Out of Range	Alarm
AEM4 In2 Out Range	AEM-2020 4 Input 2 Out of Range	Pre-Alarm
AEM4 In2 T1 Alarm	AEM-2020 4 Input 2 Threshold 1	Alarm
AEM4 In2 T1 Prealarm	AEM-2020 4 Input 2 Threshold 1	Pre-Alarm
AEM4 In2 T2 Alarm	AEM-2020 4 Input 2 Threshold 2	Alarm
AEM4 In2 T2 Prealarm	AEM-2020 4 Input 2 Threshold 2	Pre-Alarm
AEM4 In2 T3 Alarm	AEM-2020 4 Input 2 Threshold 3	Alarm
AEM4 In2 T3 Prealarm	AEM-2020 4 Input 2 Threshold 3	Pre-Alarm
AEM4 In2 T4 Alarm	AEM-2020 4 Input 2 Threshold 4	Alarm
AEM4 In2 T4 Prealarm	AEM-2020 4 Input 2 Threshold 4	Pre-Alarm
AEM4 In3 Out Range	AEM-2020 4 Input 3 Out of Range	Alarm
AEM4 In3 Out Range	AEM-2020 4 Input 3 Out of Range	Pre-Alarm
AEM4 In3 T1 Alarm	AEM-2020 4 Input 3 Threshold 1	Alarm
AEM4 In3 T1 Prealarm	AEM-2020 4 Input 3 Threshold 1	Pre-Alarm
AEM4 In3 T2 Alarm	AEM-2020 4 Input 3 Threshold 2	Alarm
AEM4 In3 T2 Prealarm	AEM-2020 4 Input 3 Threshold 2	Pre-Alarm

Event String	Event Description	Event Type
AEM4 In3 T3 Alarm	AEM-2020 4 Input 3 Threshold 3	Alarm
AEM4 In3 T3 Prealarm	AEM-2020 4 Input 3 Threshold 3	Pre-Alarm
AEM4 In3 T4 Alarm	AEM-2020 4 Input 3 Threshold 4	Alarm
AEM4 In3 T4 Prealarm	AEM-2020 4 Input 3 Threshold 4	Pre-Alarm
AEM4 In4 Out Range	AEM-2020 4 Input 4 Out of Range	Alarm
AEM4 In4 Out Range	AEM-2020 4 Input 4 Out of Range	Pre-Alarm
AEM4 In4 T1 Alarm	AEM-2020 4 Input 4 Threshold 1	Alarm
AEM4 In4 T1 Prealarm	AEM-2020 4 Input 4 Threshold 1	Pre-Alarm
AEM4 In4 T2 Alarm	AEM-2020 4 Input 4 Threshold 2	Alarm
AEM4 In4 T2 Prealarm	AEM-2020 4 Input 4 Threshold 2	Pre-Alarm
AEM4 In4 T3 Alarm	AEM-2020 4 Input 4 Threshold 3	Alarm
AEM4 In4 T3 Prealarm	AEM-2020 4 Input 4 Threshold 3	Pre-Alarm
AEM4 In4 T4 Alarm	AEM-2020 4 Input 4 Threshold 4	Alarm
AEM4 In4 T4 Prealarm	AEM-2020 4 Input 4 Threshold 4	Pre-Alarm
AEM4 In5 Out Range	AEM-2020 4 Input 5 Out of Range	Alarm
AEM4 In5 Out Range	AEM-2020 4 Input 5 Out of Range	Pre-Alarm
AEM4 In5 T1 Alarm	AEM-2020 4 Input 5 Threshold 1	Alarm
AEM4 In5 T1 Prealarm	AEM-2020 4 Input 5 Threshold 1	Pre-Alarm
AEM4 In5 T2 Alarm	AEM-2020 4 Input 5 Threshold 2	Alarm
AEM4 In5 T2 Prealarm	AEM-2020 4 Input 5 Threshold 2	Pre-Alarm
AEM4 In5 T3 Alarm	AEM-2020 4 Input 5 Threshold 3	Alarm
AEM4 In5 T3 Prealarm	AEM-2020 4 Input 5 Threshold 3	Pre-Alarm
AEM4 In5 T4 Alarm	AEM-2020 4 Input 5 Threshold 4	Alarm
AEM4 In5 T4 Prealarm	AEM-2020 4 Input 5 Threshold 4	Pre-Alarm
AEM4 In6 Out Range	AEM-2020 4 Input 6 Out of Range	Alarm
AEM4 In6 Out Range	AEM-2020 4 Input 6 Out of Range	Pre-Alarm
AEM4 In6 T1 Alarm	AEM-2020 4 Input 6 Threshold 1	Alarm
AEM4 In6 T1 Prealarm	AEM-2020 4 Input 6 Threshold 1	Pre-Alarm
AEM4 In6 T2 Alarm	AEM-2020 4 Input 6 Threshold 2	Alarm
AEM4 In6 T2 Prealarm	AEM-2020 4 Input 6 Threshold 2	Pre-Alarm
AEM4 In6 T3 Alarm	AEM-2020 4 Input 6 Threshold 3	Alarm
AEM4 In6 T3 Prealarm	AEM-2020 4 Input 6 Threshold 3	Pre-Alarm
AEM4 In6 T4 Alarm	AEM-2020 4 Input 6 Threshold 4	Alarm
AEM4 In6 T4 Prealarm	AEM-2020 4 Input 6 Threshold 4	Pre-Alarm
AEM4 In7 Out Range	AEM-2020 4 Input 7 Out of Range	Alarm
AEM4 In7 Out Range	AEM-2020 4 Input 7 Out of Range	Pre-Alarm
AEM4 In7 T1 Alarm	AEM-2020 4 Input 7 Threshold 1	Alarm
AEM4 In7 T1 Prealarm	AEM-2020 4 Input 7 Threshold 1	Pre-Alarm
AEM4 In7 T2 Alarm	AEM-2020 4 Input 7 Threshold 2	Alarm
AEM4 In7 T2 Prealarm	AEM-2020 4 Input 7 Threshold 2	Pre-Alarm
AEM4 In7 T3 Alarm	AEM-2020 4 Input 7 Threshold 3	Alarm
AEM4 In7 T3 Prealarm	AEM-2020 4 Input 7 Threshold 3	Pre-Alarm

Event String	Event Description	Event Type
AEM4 In7 T4 Alarm	AEM-2020 4 Input 7 Threshold 4	Alarm
AEM4 In7 T4 Prealarm	AEM-2020 4 Input 7 Threshold 4	Pre-Alarm
AEM4 In8 Out Range	AEM-2020 4 Input 8 Out of Range	Alarm
AEM4 In8 Out Range	AEM-2020 4 Input 8 Out of Range	Pre-Alarm
AEM4 In8 T1 Alarm	AEM-2020 4 Input 8 Threshold 1	Alarm
AEM4 In8 T1 Prealarm	AEM-2020 4 Input 8 Threshold 1	Pre-Alarm
AEM4 In8 T2 Alarm	AEM-2020 4 Input 8 Threshold 2	Alarm
AEM4 In8 T2 Prealarm	AEM-2020 4 Input 8 Threshold 2	Pre-Alarm
AEM4 In8 T3 Alarm	AEM-2020 4 Input 8 Threshold 3	Alarm
AEM4 In8 T3 Prealarm	AEM-2020 4 Input 8 Threshold 3	Pre-Alarm
AEM4 In8 T4 Alarm	AEM-2020 4 Input 8 Threshold 4	Alarm
AEM4 In8 T4 Prealarm	AEM-2020 4 Input 8 Threshold 4	Pre-Alarm
AEM4 Not Configrd PA	AEM-2020 4 not configured	Pre-Alarm
AEM4 Out1 Out Range A	AEM-2020 4 Output 1 Out of Range	Alarm
AEM4 Out1 Out Range PA	AEM-2020 4 Output 1 Out of Range	Pre-Alarm
AEM4 Out2 Out Range A	AEM-2020 4 Output 2 Out of Range	Alarm
AEM4 Out2 Out Range PA	AEM-2020 4 Output 2 Out of Range	Pre-Alarm
AEM4 Out3 Out Range A	AEM-2020 4 Output 3 Out of Range	Alarm
AEM4 Out3 Out Range PA	AEM-2020 4 Output 3 Out of Range	Pre-Alarm
AEM4 Out4 Out Range A	AEM-2020 4 Output 4 Out of Range	Alarm
AEM4 Out4 Out Range PA	AEM-2020 4 Output 4 Out of Range	Pre-Alarm
AEM4 RTD1 Out Range	AEM-2020 4 RTD 1 Out of Range	Alarm
AEM4 RTD1 Out Range	AEM-2020 4 RTD 1 Out of Range	Pre-Alarm
AEM4 RTD1 T1 Alarm	AEM-2020 4 RTD 1 Threshold 1	Alarm
AEM4 RTD1 T1 Prealarm	AEM-2020 4 RTD 1 Threshold 1	Pre-Alarm
AEM4 RTD1 T2 Alarm	AEM-2020 4 RTD 1 Threshold 2	Alarm
AEM4 RTD1 T2 Prealarm	AEM-2020 4 RTD 1 Threshold 2	Pre-Alarm
AEM4 RTD1 T3 Alarm	AEM-2020 4 RTD 1 Threshold 3	Alarm
AEM4 RTD1 T3 Prealarm	AEM-2020 4 RTD 1 Threshold 3	Pre-Alarm
AEM4 RTD1 T4 Alarm	AEM-2020 4 RTD 1 Threshold 4	Alarm
AEM4 RTD1 T4 Prealarm	AEM-2020 4 RTD 1 Threshold 4	Pre-Alarm
AEM4 RTD2 Out Range	AEM-2020 4 RTD 2 Out of Range	Alarm
AEM4 RTD2 Out Range	AEM-2020 4 RTD 2 Out of Range	Pre-Alarm
AEM4 RTD2 T1 Alarm	AEM-2020 4 RTD 2 Threshold 1	Alarm
AEM4 RTD2 T1 Prealarm	AEM-2020 4 RTD 2 Threshold 1	Pre-Alarm
AEM4 RTD2 T2 Alarm	AEM-2020 4 RTD 2 Threshold 2	Alarm
AEM4 RTD2 T2 Prealarm	AEM-2020 4 RTD 2 Threshold 2	Pre-Alarm
AEM4 RTD2 T3 Alarm	AEM-2020 4 RTD 2 Threshold 3	Alarm
AEM4 RTD2 T3 Prealarm	AEM-2020 4 RTD 2 Threshold 3	Pre-Alarm
AEM4 RTD2 T4 Alarm	AEM-2020 4 RTD 2 Threshold 4	Alarm
AEM4 RTD2 T4 Prealarm	AEM-2020 4 RTD 2 Threshold 4	Pre-Alarm
AEM4 RTD3 Out Range	AEM-2020 4 RTD 3 Out of Range	Alarm

Event String	Event Description	Event Type
AEM4 RTD3 Out Range	AEM-2020 4 RTD 3 Out of Range	Pre-Alarm
AEM4 RTD3 T1 Alarm	AEM-2020 4 RTD 3 Threshold 1	Alarm
AEM4 RTD3 T1 Prealarm	AEM-2020 4 RTD 3 Threshold 1	Pre-Alarm
AEM4 RTD3 T2 Alarm	AEM-2020 4 RTD 3 Threshold 2	Alarm
AEM4 RTD3 T2 Prealarm	AEM-2020 4 RTD 3 Threshold 2	Pre-Alarm
AEM4 RTD3 T3 Alarm	AEM-2020 4 RTD 3 Threshold 3	Alarm
AEM4 RTD3 T3 Prealarm	AEM-2020 4 RTD 3 Threshold 3	Pre-Alarm
AEM4 RTD3 T4 Alarm	AEM-2020 4 RTD 3 Threshold 4	Alarm
AEM4 RTD3 T4 Prealarm	AEM-2020 4 RTD 3 Threshold 4	Pre-Alarm
AEM4 RTD4 Out Range	AEM-2020 4 RTD 4 Out of Range	Alarm
AEM4 RTD4 Out Range	AEM-2020 4 RTD 4 Out of Range	Pre-Alarm
AEM4 RTD4 T1 Alarm	AEM-2020 4 RTD 4 Threshold 1	Alarm
AEM4 RTD4 T1 Prealarm	AEM-2020 4 RTD 4 Threshold 1	Pre-Alarm
AEM4 RTD4 T2 Alarm	AEM-2020 4 RTD 4 Threshold 2	Alarm
AEM4 RTD4 T2 Prealarm	AEM-2020 4 RTD 4 Threshold 2	Pre-Alarm
AEM4 RTD4 T3 Alarm	AEM-2020 4 RTD 4 Threshold 3	Alarm
AEM4 RTD4 T3 Prealarm	AEM-2020 4 RTD 4 Threshold 3	Pre-Alarm
AEM4 RTD4 T4 Alarm	AEM-2020 4 RTD 4 Threshold 4	Alarm
AEM4 RTD4 T4 Prealarm	AEM-2020 4 RTD 4 Threshold 4	Pre-Alarm
AEM4 RTD5 Out Range	AEM-2020 4 RTD 5 Out of Range	Alarm
AEM4 RTD5 Out Range	AEM-2020 4 RTD 5 Out of Range	Pre-Alarm
AEM4 RTD5 T1 Alarm	AEM-2020 4 RTD 5 Threshold 1	Alarm
AEM4 RTD5 T1 Prealarm	AEM-2020 4 RTD 5 Threshold 1	Pre-Alarm
AEM4 RTD5 T2 Alarm	AEM-2020 4 RTD 5 Threshold 2	Alarm
AEM4 RTD5 T2 Prealarm	AEM-2020 4 RTD 5 Threshold 2	Pre-Alarm
AEM4 RTD5 T3 Alarm	AEM-2020 4 RTD 5 Threshold 3	Alarm
AEM4 RTD5 T3 Prealarm	AEM-2020 4 RTD 5 Threshold 3	Pre-Alarm
AEM4 RTD5 T4 Alarm	AEM-2020 4 RTD 5 Threshold 4	Alarm
AEM4 RTD5 T4 Prealarm	AEM-2020 4 RTD 5 Threshold 4	Pre-Alarm
AEM4 RTD6 Out Range	AEM-2020 4 RTD 6 Out of Range	Alarm
AEM4 RTD6 Out Range	AEM-2020 4 RTD 6 Out of Range	Pre-Alarm
AEM4 RTD6 T1 Alarm	AEM-2020 4 RTD 6 Threshold 1	Alarm
AEM4 RTD6 T1 Prealarm	AEM-2020 4 RTD 6 Threshold 1	Pre-Alarm
AEM4 RTD6 T2 Alarm	AEM-2020 4 RTD 6 Threshold 2	Alarm
AEM4 RTD6 T2 Prealarm	AEM-2020 4 RTD 6 Threshold 2	Pre-Alarm
AEM4 RTD6 T3 Alarm	AEM-2020 4 RTD 6 Threshold 3	Alarm
AEM4 RTD6 T3 Prealarm	AEM-2020 4 RTD 6 Threshold 3	Pre-Alarm
AEM4 RTD6 T4 Alarm	AEM-2020 4 RTD 6 Threshold 4	Alarm
AEM4 RTD6 T4 Prealarm	AEM-2020 4 RTD 6 Threshold 4	Pre-Alarm
AEM4 RTD7 Out Range	AEM-2020 4 RTD 7 Out of Range	Alarm
AEM4 RTD7 Out Range	AEM-2020 4 RTD 7 Out of Range	Pre-Alarm
AEM4 RTD7 T1 Alarm	AEM-2020 4 RTD 7 Threshold 1	Alarm

Event String	Event Description	Event Type
AEM4 RTD7 T1 Prealarm	AEM-2020 4 RTD 7 Threshold 1	Pre-Alarm
AEM4 RTD7 T2 Alarm	AEM-2020 4 RTD 7 Threshold 2	Alarm
AEM4 RTD7 T2 Prealarm	AEM-2020 4 RTD 7 Threshold 2	Pre-Alarm
AEM4 RTD7 T3 Alarm	AEM-2020 4 RTD 7 Threshold 3	Alarm
AEM4 RTD7 T3 Prealarm	AEM-2020 4 RTD 7 Threshold 3	Pre-Alarm
AEM4 RTD7 T4 Alarm	AEM-2020 4 RTD 7 Threshold 4	Alarm
AEM4 RTD7 T4 Prealarm	AEM-2020 4 RTD 7 Threshold 4	Pre-Alarm
AEM4 RTD8 Out Range	AEM-2020 4 RTD 8 Out of Range	Alarm
AEM4 RTD8 Out Range	AEM-2020 4 RTD 8 Out of Range	Pre-Alarm
AEM4 RTD8 T1 Alarm	AEM-2020 4 RTD 8 Threshold 1	Alarm
AEM4 RTD8 T1 Prealarm	AEM-2020 4 RTD 8 Threshold 1	Pre-Alarm
AEM4 RTD8 T2 Alarm	AEM-2020 4 RTD 8 Threshold 2	Alarm
AEM4 RTD8 T2 Prealarm	AEM-2020 4 RTD 8 Threshold 2	Pre-Alarm
AEM4 RTD8 T3 Alarm	AEM-2020 4 RTD 8 Threshold 3	Alarm
AEM4 RTD8 T3 Prealarm	AEM-2020 4 RTD 8 Threshold 3	Pre-Alarm
AEM4 RTD8 T4 Alarm	AEM-2020 4 RTD 8 Threshold 4	Alarm
AEM4 RTD8 T4 Prealarm	AEM-2020 4 RTD 8 Threshold 4	Pre-Alarm
AEM4 TC1 T1 Alarm	AEM-2020 4 Thermocouple 1 Threshold 1	Alarm
AEM4 TC1 T1 Prealarm	AEM-2020 4 Thermocouple 1 Threshold 1	Pre-Alarm
AEM4 TC1 T2 Alarm	AEM-2020 4 Thermocouple 1 Threshold 2	Alarm
AEM4 TC1 T2 Prealarm	AEM-2020 4 Thermocouple 1 Threshold 2	Pre-Alarm
AEM4 TC1 T3 Alarm	AEM-2020 4 Thermocouple 1 Threshold 3	Alarm
AEM4 TC1 T3 Prealarm	AEM-2020 4 Thermocouple 1 Threshold 3	Pre-Alarm
AEM4 TC1 T4 Alarm	AEM-2020 4 Thermocouple 1 Threshold 4	Alarm
AEM4 TC1 T4 Prealarm	AEM-2020 4 Thermocouple 1 Threshold 4	Pre-Alarm
AEM4 TC2 T1 Alarm	AEM-2020 4 Thermocouple 2 Threshold 1	Alarm
AEM4 TC2 T1 Prealarm	AEM-2020 4 Thermocouple 2 Threshold 1	Pre-Alarm
AEM4 TC2 T2 Alarm	AEM-2020 4 Thermocouple 2 Threshold 2	Alarm
AEM4 TC2 T2 Prealarm	AEM-2020 4 Thermocouple 2 Threshold 2	Pre-Alarm
AEM4 TC2 T3 Alarm	AEM-2020 4 Thermocouple 2 Threshold 3	Alarm
AEM4 TC2 T3 Prealarm	AEM-2020 4 Thermocouple 2 Threshold 3	Pre-Alarm
AEM4 TC2 T4 Alarm	AEM-2020 4 Thermocouple 2 Threshold 4	Alarm
AEM4 TC2 T4 Prealarm	AEM-2020 4 Thermocouple 2 Threshold 4	Pre-Alarm
Alt Wire Tmp Hi PA	Alternator wiring temperature high	Pre-Alarm
Analog In 1 Out Range	Analog Input 1 Out of Range	Alarm
Analog In 1 Out Range	Analog Input 1 Out of Range	Pre-Alarm
Analog In 1 T1 Alarm	Analog Input 1 Threshold 1	Alarm
Analog In 1 T1 Prealarm	Analog Input 1 Threshold 1	Pre-Alarm
Analog In 1 T2 Alarm	Analog Input 1 Threshold 2	Alarm
Analog In 1 T2 Prealarm	Analog Input 1 Threshold 2	Pre-Alarm
Analog In 1 T3 Alarm	Analog Input 1 Threshold 3	Alarm
Analog In 1 T3 Prealarm	Analog Input 1 Threshold 3	Pre-Alarm

Event String	Event Description	Event Type
Analog In 1 T4 Alarm	Analog Input 1 Threshold 4	Alarm
Analog In 1 T4 Prealarm	Analog Input 1 Threshold 4	Pre-Alarm
Analog In 2 Out Range	Analog Input 2 Out of Range	Alarm
Analog In 2 Out Range	Analog Input 2 Out of Range	Pre-Alarm
Analog In 2 T1 Alarm	Analog Input 2 Threshold 1	Alarm
Analog In 2 T1 Prealarm	Analog Input 2 Threshold 1	Pre-Alarm
Analog In 2 T2 Alarm	Analog Input 2 Threshold 2	Alarm
Analog In 2 T2 Prealarm	Analog Input 2 Threshold 2	Pre-Alarm
Analog In 2 T3 Alarm	Analog Input 2 Threshold 3	Alarm
Analog In 2 T3 Prealarm	Analog Input 2 Threshold 3	Pre-Alarm
Analog In 2 T4 Alarm	Analog Input 2 Threshold 4	Alarm
Analog In 2 T4 Prealarm	Analog Input 2 Threshold 4	Pre-Alarm
Analog In 3 Out Range	Analog Input 3 Out of Range	Alarm
Analog In 3 Out Range	Analog Input 3 Out of Range	Pre-Alarm
Analog In 3 T1 Alarm	Analog Input 3 Threshold 1	Alarm
Analog In 3 T1 Prealarm	Analog Input 3 Threshold 1	Pre-Alarm
Analog In 3 T2 Alarm	Analog Input 3 Threshold 2	Alarm
Analog In 3 T2 Prealarm	Analog Input 3 Threshold 2	Pre-Alarm
Analog In 3 T3 Alarm	Analog Input 3 Threshold 3	Alarm
Analog In 3 T3 Prealarm	Analog Input 3 Threshold 3	Pre-Alarm
Analog In 3 T4 Alarm	Analog Input 3 Threshold 4	Alarm
Analog In 3 T4 Prealarm	Analog Input 3 Threshold 4	Pre-Alarm
Analog In 4 Out Range	Analog Input 4 Out of Range	Alarm
Analog In 4 Out Range	Analog Input 4 Out of Range	Pre-Alarm
Analog In 4 T1 Alarm	Analog Input 4 Threshold 1	Alarm
Analog In 4 T1 Prealarm	Analog Input 4 Threshold 1	Pre-Alarm
Analog In 4 T2 Alarm	Analog Input 4 Threshold 2	Alarm
Analog In 4 T2 Prealarm	Analog Input 4 Threshold 2	Pre-Alarm
Analog In 4 T3 Alarm	Analog Input 4 Threshold 3	Alarm
Analog In 4 T3 Prealarm	Analog Input 4 Threshold 3	Pre-Alarm
Analog In 4 T4 Alarm	Analog Input 4 Threshold 4	Alarm
Analog In 4 T4 Prealarm	Analog Input 4 Threshold 4	Pre-Alarm
Arp Ping Fail	Network Failure - a unit specified in the ARP Ping Settings is not detected	Pre-Alarm
ATS Input	Automatic transfer switch input	Status Only
Auto Mode Status	Auto mode status	Status Only
Auto Restart Fail Alarm	Auto restart fail	Alarm
Auto Restart In Prgrss	Auto restart in progress	Status Only
AVR Output-Out Of Range Alarm	AVR Output: out of range	Alarm
AVR Output-Out of Range Prealarm	AVR Output: out of range	Pre-Alarm
Batt Chargr Fail-Alarm	Battery charger failure	Alarm

Event String	Event Description	Event Type
Batt Chargr Fail-Prealarm	Battery charger failure	Pre-Alarm
Batt Over Volt PreAlm	Battery overvoltage	Pre-Alarm
BattChg1-AC Off PA	Battery charger 1 AC off	Pre-Alarm
BattChg1-Battery Failure PA	Battery charger 1 battery failure	Pre-Alarm
BattChg1-Charger Fail PA	Battery charger 1 charger failure	Pre-Alarm
BattChg1-Comms Fail PA	Battery charger 1 communications failure	Pre-Alarm
BattChg1-Hi DC Volts PA	Battery charger 1 high output voltage	Pre-Alarm
BattChg1-Invalid Settings PA	Battery charger 1 invalid settings	Pre-Alarm
BattChg1-Lo Cranking V PA	Battery charger 1 low cranking voltage	Pre-Alarm
BattChg1-Low DC Volts PA	Battery charger 1 low output voltage	Pre-Alarm
BattChg1-Single Unit Fail PA	Battery charger 1 single unit failure	Pre-Alarm
BattChg1-Thermal Limit PA	Battery charger 1 thermal limit	Pre-Alarm
BattChg2-AC Off PA	Battery charger 2 AC off	Pre-Alarm
BattChg2-Battery Failure PA	Battery charger 2 battery failure	Pre-Alarm
BattChg2-Charger Fail PA	Battery charger 2 charger failure	Pre-Alarm
BattChg2-Comms Fail PA	Battery charger 2 communications failure	Pre-Alarm
BattChg2-Hi DC Volts PA	Battery charger 2 high output voltage	Pre-Alarm
BattChg2-Invalid Settings PA	Battery charger 2 invalid settings	Pre-Alarm
BattChg2-Lo Cranking V PA	Battery charger 2 low cranking voltage	Pre-Alarm
BattChg2-Low DC Volts PA	Battery charger 2 low output voltage	Pre-Alarm
BattChg2-Single Unit Fail PA	Battery charger 2 single unit failure	Pre-Alarm
BattChg2-Thermal Limit PA	Battery charger 2 thermal limit	Pre-Alarm
Battle Override-Prealarm	Battle override	Pre-Alarm
Bus 1 Reverse Rotation	Bus 1 reverse rotation	Status Only
Bus 1 Reverse Rotation	Bus 1 reverse rotation	Pre-Alarm
Bus 2 Reverse Rotation	Bus 2 reverse rotation	Status Only
Bus 2 Reverse Rotation	Bus 2 reverse rotation	Pre-Alarm
CAN Bus Error Passive	CAN Bus error passive	Status Only
CAN Bus Off	CAN Bus off	Status Only
CEM1 Comms Fail PA	CEM-2020 1 communication failure	Pre-Alarm
CEM1 Dup CEM-2020	CEM-2020 1 duplication CEM	Status Only
CEM1 Global Warning	CEM-2020 1 global warning	Status Only
CEM1 HwMismatch PA	CEM-2020 1 hardware mismatch	Pre-Alarm
CEM1 Input 1 Alarm	CEM-2020 1 Input 1	Alarm
CEM1 Input 1 Prealarm	CEM-2020 1 Input 1	Pre-Alarm
CEM1 Input 10 Alarm	CEM-2020 1 Input 10	Alarm
CEM1 Input 10 Prealarm	CEM-2020 1 Input 10	Pre-Alarm
CEM1 Input 2 Alarm	CEM-2020 1 Input 2	Alarm
CEM1 Input 2 Prealarm	CEM-2020 1 Input 2	Pre-Alarm
CEM1 Input 3 Alarm	CEM-2020 1 Input 3	Alarm
CEM1 Input 3 Prealarm	CEM-2020 1 Input 3	Pre-Alarm
CEM1 Input 4 Alarm	CEM-2020 1 Input 4	Alarm

Event String	Event Description	Event Type
CEM1 Input 4 Prealarm	CEM-2020 1 Input 4	Pre-Alarm
CEM1 Input 5 Alarm	CEM-2020 1 Input 5	Alarm
CEM1 Input 5 Prealarm	CEM-2020 1 Input 5	Pre-Alarm
CEM1 Input 6 Alarm	CEM-2020 1 Input 6	Alarm
CEM1 Input 6 Prealarm	CEM-2020 1 Input 6	Pre-Alarm
CEM1 Input 7 Alarm	CEM-2020 1 Input 7	Alarm
CEM1 Input 7 Prealarm	CEM-2020 1 Input 7	Pre-Alarm
CEM1 Input 8 Alarm	CEM-2020 1 Input 8	Alarm
CEM1 Input 8 Prealarm	CEM-2020 1 Input 8	Pre-Alarm
CEM1 Input 9 Alarm	CEM-2020 1 Input 9	Alarm
CEM1 Input 9 Prealarm	CEM-2020 1 Input 9	Pre-Alarm
CEM1 Not Configrd PA	CEM-2020 1 not configured	Pre-Alarm
CEM2 Comms Fail PA	CEM-2020 2 communication failure	Pre-Alarm
CEM2 Dup CEM-2020	CEM-2020 2 duplication CEM	Status Only
CEM2 Global Warning	CEM-2020 2 global warning	Status Only
CEM2 HwMismatch PA	CEM-2020 2 hardware mismatch	Pre-Alarm
CEM2 Input 1 Alarm	CEM-2020 2 Input 1	Alarm
CEM2 Input 1 Prealarm	CEM-2020 2 Input 1	Pre-Alarm
CEM2 Input 10 Alarm	CEM-2020 2 Input 10	Alarm
CEM2 Input 10 Prealarm	CEM-2020 2 Input 10	Pre-Alarm
CEM2 Input 2 Alarm	CEM-2020 2 Input 2	Alarm
CEM2 Input 2 Prealarm	CEM-2020 2 Input 2	Pre-Alarm
CEM2 Input 3 Alarm	CEM-2020 2 Input 3	Alarm
CEM2 Input 3 Prealarm	CEM-2020 2 Input 3	Pre-Alarm
CEM2 Input 4 Alarm	CEM-2020 2 Input 4	Alarm
CEM2 Input 4 Prealarm	CEM-2020 2 Input 4	Pre-Alarm
CEM2 Input 5 Alarm	CEM-2020 2 Input 5	Alarm
CEM2 Input 5 Prealarm	CEM-2020 2 Input 5	Pre-Alarm
CEM2 Input 6 Alarm	CEM-2020 2 Input 6	Alarm
CEM2 Input 6 Prealarm	CEM-2020 2 Input 6	Pre-Alarm
CEM2 Input 7 Alarm	CEM-2020 2 Input 7	Alarm
CEM2 Input 7 Prealarm	CEM-2020 2 Input 7	Pre-Alarm
CEM2 Input 8 Alarm	CEM-2020 2 Input 8	Alarm
CEM2 Input 8 Prealarm	CEM-2020 2 Input 8	Pre-Alarm
CEM2 Input 9 Alarm	CEM-2020 2 Input 9	Alarm
CEM2 Input 9 Prealarm	CEM-2020 2 Input 9	Pre-Alarm
CEM2 Not Configrd PA	CEM-2020 2 not configured	Pre-Alarm
CEM3 Comms Fail PA	CEM-2020 3 communication failure	Pre-Alarm
CEM3 Dup CEM-2020	CEM-2020 3 duplication CEM	Status Only
CEM3 Global Warning	CEM-2020 3 global warning	Status Only
CEM3 HwMismatch PA	CEM-2020 3 hardware mismatch	Pre-Alarm
CEM3 Input 1 Alarm	CEM-2020 3 Input 1	Alarm

Event String	Event Description	Event Type
CEM3 Input 1 Prealarm	CEM-2020 3 Input 1	Pre-Alarm
CEM3 Input 10 Alarm	CEM-2020 3 Input 10	Alarm
CEM3 Input 10 Prealarm	CEM-2020 3 Input 10	Pre-Alarm
CEM3 Input 2 Alarm	CEM-2020 3 Input 2	Alarm
CEM3 Input 2 Prealarm	CEM-2020 3 Input 2	Pre-Alarm
CEM3 Input 3 Alarm	CEM-2020 3 Input 3	Alarm
CEM3 Input 3 Prealarm	CEM-2020 3 Input 3	Pre-Alarm
CEM3 Input 4 Alarm	CEM-2020 3 Input 4	Alarm
CEM3 Input 4 Prealarm	CEM-2020 3 Input 4	Pre-Alarm
CEM3 Input 5 Alarm	CEM-2020 3 Input 5	Alarm
CEM3 Input 5 Prealarm	CEM-2020 3 Input 5	Pre-Alarm
CEM3 Input 6 Alarm	CEM-2020 3 Input 6	Alarm
CEM3 Input 6 Prealarm	CEM-2020 3 Input 6	Pre-Alarm
CEM3 Input 7 Alarm	CEM-2020 3 Input 7	Alarm
CEM3 Input 7 Prealarm	CEM-2020 3 Input 7	Pre-Alarm
CEM3 Input 8 Alarm	CEM-2020 3 Input 8	Alarm
CEM3 Input 8 Prealarm	CEM-2020 3 Input 8	Pre-Alarm
CEM3 Input 9 Alarm	CEM-2020 3 Input 9	Alarm
CEM3 Input 9 Prealarm	CEM-2020 3 Input 9	Pre-Alarm
CEM3 Not Configrd PA	CEM-2020 3 not configured	Pre-Alarm
CEM4 Comms Fail PA	CEM-2020 4 communication failure	Pre-Alarm
CEM4 Dup CEM-2020	CEM-2020 4 duplication CEM	Status Only
CEM4 Global Warning	CEM-2020 4 global warning	Status Only
CEM4 HwMismatch PA	CEM-2020 4 hardware mismatch	Pre-Alarm
CEM4 Input 1 Alarm	CEM-2020 4 Input 1	Alarm
CEM4 Input 1 Prealarm	CEM-2020 4 Input 1	Pre-Alarm
CEM4 Input 10 Alarm	CEM-2020 4 Input 10	Alarm
CEM4 Input 10 Prealarm	CEM-2020 4 Input 10	Pre-Alarm
CEM4 Input 2 Alarm	CEM-2020 4 Input 2	Alarm
CEM4 Input 2 Prealarm	CEM-2020 4 Input 2	Pre-Alarm
CEM4 Input 3 Alarm	CEM-2020 4 Input 3	Alarm
CEM4 Input 3 Prealarm	CEM-2020 4 Input 3	Pre-Alarm
CEM4 Input 4 Alarm	CEM-2020 4 Input 4	Alarm
CEM4 Input 4 Prealarm	CEM-2020 4 Input 4	Pre-Alarm
CEM4 Input 5 Alarm	CEM-2020 4 Input 5	Alarm
CEM4 Input 5 Prealarm	CEM-2020 4 Input 5	Pre-Alarm
CEM4 Input 6 Alarm	CEM-2020 4 Input 6	Alarm
CEM4 Input 6 Prealarm	CEM-2020 4 Input 6	Pre-Alarm
CEM4 Input 7 Alarm	CEM-2020 4 Input 7	Alarm
CEM4 Input 7 Prealarm	CEM-2020 4 Input 7	Pre-Alarm
CEM4 Input 8 Alarm	CEM-2020 4 Input 8	Alarm
CEM4 Input 8 Prealarm	CEM-2020 4 Input 8	Pre-Alarm

Event String	Event Description	Event Type
CEM4 Input 9 Alarm	CEM-2020 4 Input 9	Alarm
CEM4 Input 9 Prealarm	CEM-2020 4 Input 9	Pre-Alarm
CEM4 Not Configrd PA	CEM-2020 4 not configured	Pre-Alarm
CnfPrt 01 T1 Alarm	Configurable Protection 1 Threshold 1	Alarm
CnfPrt 01 T1 Prealarm	Configurable Protection 1 Threshold 1	Pre-Alarm
CnfPrt 01 T2 Alarm	Configurable Protection 1 Threshold 2	Alarm
CnfPrt 01 T2 Prealarm	Configurable Protection 1 Threshold 2	Pre-Alarm
CnfPrt 01 T3 Alarm	Configurable Protection 1 Threshold 3	Alarm
CnfPrt 01 T3 Prealarm	Configurable Protection 1 Threshold 3	Pre-Alarm
CnfPrt 01 T4 Alarm	Configurable Protection 1 Threshold 4	Alarm
CnfPrt 01 T4 Prealarm	Configurable Protection 1 Threshold 4	Pre-Alarm
CnfPrt 02 T1 Alarm	Configurable Protection 2 Threshold 1	Alarm
CnfPrt 02 T1 Prealarm	Configurable Protection 2 Threshold 1	Pre-Alarm
CnfPrt 02 T2 Alarm	Configurable Protection 2 Threshold 2	Alarm
CnfPrt 02 T2 Prealarm	Configurable Protection 2 Threshold 2	Pre-Alarm
CnfPrt 02 T3 Alarm	Configurable Protection 2 Threshold 3	Alarm
CnfPrt 02 T3 Prealarm	Configurable Protection 2 Threshold 3	Pre-Alarm
CnfPrt 02 T4 Alarm	Configurable Protection 2 Threshold 4	Alarm
CnfPrt 02 T4 Prealarm	Configurable Protection 2 Threshold 4	Pre-Alarm
CnfPrt 03 T1 Alarm	Configurable Protection 3 Threshold 1	Alarm
CnfPrt 03 T1 Prealarm	Configurable Protection 3 Threshold 1	Pre-Alarm
CnfPrt 03 T2 Alarm	Configurable Protection 3 Threshold 2	Alarm
CnfPrt 03 T2 Prealarm	Configurable Protection 3 Threshold 2	Pre-Alarm
CnfPrt 03 T3 Alarm	Configurable Protection 3 Threshold 3	Alarm
CnfPrt 03 T3 Prealarm	Configurable Protection 3 Threshold 3	Pre-Alarm
CnfPrt 03 T4 Alarm	Configurable Protection 3 Threshold 4	Alarm
CnfPrt 03 T4 Prealarm	Configurable Protection 3 Threshold 4	Pre-Alarm
CnfPrt 04 T1 Alarm	Configurable Protection 4 Threshold 1	Alarm
CnfPrt 04 T1 Prealarm	Configurable Protection 4 Threshold 1	Pre-Alarm
CnfPrt 04 T2 Alarm	Configurable Protection 4 Threshold 2	Alarm
CnfPrt 04 T2 Prealarm	Configurable Protection 4 Threshold 2	Pre-Alarm
CnfPrt 04 T3 Alarm	Configurable Protection 4 Threshold 3	Alarm
CnfPrt 04 T3 Prealarm	Configurable Protection 4 Threshold 3	Pre-Alarm
CnfPrt 04 T4 Alarm	Configurable Protection 4 Threshold 4	Alarm
CnfPrt 04 T4 Prealarm	Configurable Protection 4 Threshold 4	Pre-Alarm
CnfPrt 05 T1 Alarm	Configurable Protection 5 Threshold 1	Alarm
CnfPrt 05 T1 Prealarm	Configurable Protection 5 Threshold 1	Pre-Alarm
CnfPrt 05 T2 Alarm	Configurable Protection 5 Threshold 2	Alarm
CnfPrt 05 T2 Prealarm	Configurable Protection 5 Threshold 2	Pre-Alarm
CnfPrt 05 T3 Alarm	configurable protection 5 threshold 3	Alarm
CnfPrt 05 T3 Prealarm	Configurable Protection 5 Threshold 3	Pre-Alarm
CnfPrt 05 T4 Alarm	Configurable Protection 5 Threshold 4	Alarm

Event String	Event Description	Event Type
CnfPrt 05 T4 Prealarm	Configurable Protection 5 Threshold 4	Pre-Alarm
CnfPrt 06 T1 Alarm	Configurable Protection 6 Threshold 1	Alarm
CnfPrt 06 T1 Prealarm	Configurable Protection 6 Threshold 1	Pre-Alarm
CnfPrt 06 T2 Alarm	Configurable Protection 6 Threshold 2	Alarm
CnfPrt 06 T2 Prealarm	Configurable Protection 6 Threshold 2	Pre-Alarm
CnfPrt 06 T3 Alarm	Configurable Protection 6 Threshold 3	Alarm
CnfPrt 06 T3 Prealarm	Configurable Protection 6 Threshold 3	Pre-Alarm
CnfPrt 06 T4 Alarm	Configurable Protection 6 Threshold 4	Alarm
CnfPrt 06 T4 Prealarm	Configurable Protection 6 Threshold 4	Pre-Alarm
CnfPrt 07 T1 Alarm	Configurable Protection 7 Threshold 1	Alarm
CnfPrt 07 T1 Prealarm	Configurable Protection 7 Threshold 1	Pre-Alarm
CnfPrt 07 T2 Alarm	Configurable Protection 7 Threshold 2	Alarm
CnfPrt 07 T2 Prealarm	Configurable Protection 7 Threshold 2	Pre-Alarm
CnfPrt 07 T3 Alarm	Configurable Protection 7 Threshold 3	Alarm
CnfPrt 07 T3 Prealarm	Configurable Protection 7 Threshold 3	Pre-Alarm
CnfPrt 07 T4 Alarm	Configurable Protection 7 Threshold 4	Alarm
CnfPrt 07 T4 Prealarm	Configurable Protection 7 Threshold 4	Pre-Alarm
CnfPrt 08 T1 Alarm	Configurable Protection 8 Threshold 1	Alarm
CnfPrt 08 T1 Prealarm	Configurable Protection 8 Threshold 1	Pre-Alarm
CnfPrt 08 T2 Alarm	Configurable Protection 8 Threshold 2	Alarm
CnfPrt 08 T2 Prealarm	Configurable Protection 8 Threshold 2	Pre-Alarm
CnfPrt 08 T3 Alarm	Configurable Protection 8 Threshold 3	Alarm
CnfPrt 08 T3 Prealarm	Configurable Protection 8 Threshold 3	Pre-Alarm
CnfPrt 08 T4 Alarm	Configurable Protection 8 Threshold 4	Alarm
CnfPrt 08 T4 Prealarm	Configurable Protection 8 Threshold 4	Pre-Alarm
CnfPrt 09 T1 Alarm	Configurable Protection 9 Threshold 1	Alarm
CnfPrt 09 T1 Prealarm	Configurable Protection 9 Threshold 1	Pre-Alarm
CnfPrt 09 T2 Alarm	Configurable Protection 9 Threshold 2	Alarm
CnfPrt 09 T2 Prealarm	Configurable Protection 9 Threshold 2	Pre-Alarm
CnfPrt 09 T3 Alarm	Configurable Protection 9 Threshold 3	Alarm
CnfPrt 09 T3 Prealarm	Configurable Protection 9 Threshold 3	Pre-Alarm
CnfPrt 09 T4 Alarm	Configurable Protection 9 Threshold 4	Alarm
CnfPrt 09 T4 Prealarm	Configurable Protection 9 Threshold 4	Pre-Alarm
CnfPrt 10 T1 Alarm	Configurable Protection 10 Threshold 1	Alarm
CnfPrt 10 T1 Prealarm	Configurable Protection 10 Threshold 1	Pre-Alarm
CnfPrt 10 T2 Alarm	Configurable Protection 10 Threshold 2	Alarm
CnfPrt 10 T2 Prealarm	Configurable Protection 10 Threshold 2	Pre-Alarm
CnfPrt 10 T3 Alarm	Configurable Protection 10 Threshold 3	Alarm
CnfPrt 10 T3 Prealarm	Configurable Protection 10 Threshold 3	Pre-Alarm
CnfPrt 10 T4 Alarm	Configurable Protection 10 Threshold 4	Alarm
CnfPrt 10 T4 Prealarm	Configurable Protection 10 Threshold 4	Pre-Alarm
CnfPrt 11 T1 Alarm	Configurable Protection 11 Threshold 1	Alarm

Event String	Event Description	Event Type
CnfPrt 11 T1 Prealarm	Configurable Protection 11 Threshold 1	Pre-Alarm
CnfPrt 11 T2 Alarm	Configurable Protection 11 Threshold 2	Alarm
CnfPrt 11 T2 Prealarm	Configurable Protection 11 Threshold 2	Pre-Alarm
CnfPrt 11 T3 Alarm	Configurable Protection 11 Threshold 3	Alarm
CnfPrt 11 T3 Prealarm	Configurable Protection 11 Threshold 3	Pre-Alarm
CnfPrt 11 T4 Alarm	Configurable Protection 11 Threshold 4	Alarm
CnfPrt 11 T4 Prealarm	Configurable Protection 11 Threshold 4	Pre-Alarm
CnfPrt 12 T1 Alarm	Configurable Protection 12 Threshold 1	Alarm
CnfPrt 12 T1 Prealarm	Configurable Protection 12 Threshold 1	Pre-Alarm
CnfPrt 12 T2 Alarm	Configurable Protection 12 Threshold 2	Alarm
CnfPrt 12 T2 Prealarm	Configurable Protection 12 Threshold 2	Pre-Alarm
CnfPrt 12 T3 Alarm	Configurable Protection 12 Threshold 3	Alarm
CnfPrt 12 T3 Prealarm	Configurable Protection 12 Threshold 3	Pre-Alarm
CnfPrt 12 T4 Alarm	Configurable Protection 12 Threshold 4	Alarm
CnfPrt 12 T4 Prealarm	Configurable Protection 12 Threshold 4	Pre-Alarm
CnfPrt 13 T1 Alarm	Configurable Protection 13 Threshold 1	Alarm
CnfPrt 13 T1 Prealarm	Configurable Protection 13 Threshold 1	Pre-Alarm
CnfPrt 13 T2 Alarm	Configurable Protection 13 Threshold 2	Alarm
CnfPrt 13 T2 Prealarm	Configurable Protection 13 Threshold 2	Pre-Alarm
CnfPrt 13 T3 Alarm	Configurable Protection 13 Threshold 3	Alarm
CnfPrt 13 T3 Prealarm	Configurable Protection 13 Threshold 3	Pre-Alarm
CnfPrt 13 T4 Alarm	Configurable Protection 13 Threshold 4	Alarm
CnfPrt 13 T4 Prealarm	Configurable Protection 13 Threshold 4	Pre-Alarm
CnfPrt 14 T1 Alarm	Configurable Protection 14 Threshold 1	Alarm
CnfPrt 14 T1 Prealarm	Configurable Protection 14 Threshold 1	Pre-Alarm
CnfPrt 14 T2 Alarm	Configurable Protection 14 Threshold 2	Alarm
CnfPrt 14 T2 Prealarm	Configurable Protection 14 Threshold 2	Pre-Alarm
CnfPrt 14 T3 Alarm	Configurable Protection 14 Threshold 3	Alarm
CnfPrt 14 T3 Prealarm	Configurable Protection 14 Threshold 3	Pre-Alarm
CnfPrt 14 T4 Alarm	Configurable Protection 14 Threshold 4	Alarm
CnfPrt 14 T4 Prealarm	Configurable Protection 14 Threshold 4	Pre-Alarm
CnfPrt 15 T1 Alarm	Configurable Protection 15 Threshold 1	Alarm
CnfPrt 15 T1 Prealarm	Configurable Protection 15 Threshold 1	Pre-Alarm
CnfPrt 15 T2 Alarm	Configurable Protection 15 Threshold 2	Alarm
CnfPrt 15 T2 Prealarm	Configurable Protection 15 Threshold 2	Pre-Alarm
CnfPrt 15 T3 Alarm	Configurable Protection 15 Threshold 3	Alarm
CnfPrt 15 T3 Prealarm	Configurable Protection 15 Threshold 3	Pre-Alarm
CnfPrt 15 T4 Alarm	Configurable Protection 15 Threshold 4	Alarm
CnfPrt 15 T4 Prealarm	Configurable Protection 15 Threshold 4	Pre-Alarm
CnfPrt 16 T1 Alarm	Configurable Protection 16 Threshold 1	Alarm
CnfPrt 16 T1 Prealarm	Configurable Protection 16 Threshold 1	Pre-Alarm
CnfPrt 16 T2 Alarm	Configurable Protection 16 Threshold 2	Alarm

Event String	Event Description	Event Type
CnfPrt 16 T2 Prealarm	Configurable Protection 16 Threshold 2	Pre-Alarm
CnfPrt 16 T3 Alarm	Configurable Protection 16 Threshold 3	Alarm
CnfPrt 16 T3 Prealarm	Configurable Protection 16 Threshold 3	Pre-Alarm
CnfPrt 16 T4 Alarm	Configurable Protection 16 Threshold 4	Alarm
CnfPrt 16 T4 Prealarm	Configurable Protection 16 Threshold 4	Pre-Alarm
CnfPrt 17 T1 Alarm	Configurable Protection 17 Threshold 1	Alarm
CnfPrt 17 T1 Prealarm	Configurable Protection 17 Threshold 1	Pre-Alarm
CnfPrt 17 T2 Alarm	Configurable Protection 17 Threshold 2	Alarm
CnfPrt 17 T2 Prealarm	Configurable Protection 17 Threshold 2	Pre-Alarm
CnfPrt 17 T3 Alarm	Configurable Protection 17 Threshold 3	Alarm
CnfPrt 17 T3 Prealarm	Configurable Protection 17 Threshold 3	Pre-Alarm
CnfPrt 17 T4 Alarm	Configurable Protection 17 Threshold 4	Alarm
CnfPrt 17 T4 Prealarm	Configurable Protection 17 Threshold 4	Pre-Alarm
CnfPrt 18 T1 Alarm	Configurable Protection 18 Threshold 1	Alarm
CnfPrt 18 T1 Prealarm	Configurable Protection 18 Threshold 1	Pre-Alarm
CnfPrt 18 T2 Alarm	Configurable Protection 18 Threshold 2	Alarm
CnfPrt 18 T2 Prealarm	Configurable Protection 18 Threshold 2	Pre-Alarm
CnfPrt 18 T3 Alarm	Configurable Protection 18 Threshold 3	Alarm
CnfPrt 18 T3 Prealarm	Configurable Protection 18 Threshold 3	Pre-Alarm
CnfPrt 18 T4 Alarm	Configurable Protection 18 Threshold 4	Alarm
CnfPrt 18 T4 Prealarm	Configurable Protection 18 Threshold 4	Pre-Alarm
CnfPrt 19 T1 Alarm	Configurable Protection 19 Threshold 1	Alarm
CnfPrt 19 T1 Prealarm	Configurable Protection 19 Threshold 1	Pre-Alarm
CnfPrt 19 T2 Alarm	Configurable Protection 19 Threshold 2	Alarm
CnfPrt 19 T2 Prealarm	Configurable Protection 19 Threshold 2	Pre-Alarm
CnfPrt 19 T3 Alarm	Configurable Protection 19 Threshold 3	Alarm
CnfPrt 19 T3 Prealarm	Configurable Protection 19 Threshold 3	Pre-Alarm
CnfPrt 19 T4 Alarm	Configurable Protection 19 Threshold 4	Alarm
CnfPrt 19 T4 Prealarm	Configurable Protection 19 Threshold 4	Pre-Alarm
CnfPrt 20 T1 Alarm	Configurable Protection 20 Threshold 1	Alarm
CnfPrt 20 T1 Prealarm	Configurable Protection 20 Threshold 1	Pre-Alarm
CnfPrt 20 T2 Alarm	Configurable Protection 20 Threshold 2	Alarm
CnfPrt 20 T2 Prealarm	Configurable Protection 20 Threshold 2	Pre-Alarm
CnfPrt 20 T3 Alarm	Configurable Protection 20 Threshold 3	Alarm
CnfPrt 20 T3 Prealarm	Configurable Protection 20 Threshold 3	Pre-Alarm
CnfPrt 20 T4 Alarm	Configurable Protection 20 Threshold 4	Alarm
CnfPrt 20 T4 Prealarm	Configurable Protection 20 Threshold 4	Pre-Alarm
CnfPrt 21 T1 Alarm	Configurable Protection 21 Threshold 1	Alarm
CnfPrt 21 T1 Prealarm	Configurable Protection 21 Threshold 1	Pre-Alarm
CnfPrt 21 T2 Alarm	Configurable Protection 21 Threshold 2	Alarm
CnfPrt 21 T2 Prealarm	Configurable Protection 21 Threshold 2	Pre-Alarm
CnfPrt 21 T3 Alarm	Configurable Protection 21 Threshold 3	Alarm

Event String	Event Description	Event Type
CnfPrt 21 T3 Prealarm	Configurable Protection 21 Threshold 3	Pre-Alarm
CnfPrt 21 T4 Alarm	Configurable Protection 21 Threshold 4	Alarm
CnfPrt 21 T4 Prealarm	Configurable Protection 21 Threshold 4	Pre-Alarm
CnfPrt 22 T1 Alarm	Configurable Protection 22 Threshold 1	Alarm
CnfPrt 22 T1 Prealarm	Configurable Protection 22 Threshold 1	Pre-Alarm
CnfPrt 22 T2 Alarm	Configurable Protection 22 Threshold 2	Alarm
CnfPrt 22 T2 Prealarm	Configurable Protection 22 Threshold 2	Pre-Alarm
CnfPrt 22 T3 Alarm	Configurable Protection 22 Threshold 3	Alarm
CnfPrt 22 T3 Prealarm	Configurable Protection 22 Threshold 3	Pre-Alarm
CnfPrt 22 T4 Alarm	Configurable Protection 22 Threshold 4	Alarm
CnfPrt 22 T4 Prealarm	Configurable Protection 22 Threshold 4	Pre-Alarm
CnfPrt 23 T1 Alarm	Configurable Protection 23 Threshold 1	Alarm
CnfPrt 23 T1 Prealarm	Configurable Protection 23 Threshold 1	Pre-Alarm
CnfPrt 23 T2 Alarm	Configurable Protection 23 Threshold 2	Alarm
CnfPrt 23 T2 Prealarm	Configurable Protection 23 Threshold 2	Pre-Alarm
CnfPrt 23 T3 Alarm	Configurable Protection 23 Threshold 3	Alarm
CnfPrt 23 T3 Prealarm	Configurable Protection 23 Threshold 3	Pre-Alarm
CnfPrt 23 T4 Alarm	Configurable Protection 23 Threshold 4	Alarm
CnfPrt 23 T4 Prealarm	Configurable Protection 23 Threshold 4	Pre-Alarm
CnfPrt 24 T1 Alarm	Configurable Protection 24 Threshold 1	Alarm
CnfPrt 24 T1 Prealarm	Configurable Protection 24 Threshold 1	Pre-Alarm
CnfPrt 24 T2 Alarm	Configurable Protection 24 Threshold 2	Alarm
CnfPrt 24 T2 Prealarm	Configurable Protection 24 Threshold 2	Pre-Alarm
CnfPrt 24 T3 Alarm	Configurable Protection 24 Threshold 3	Alarm
CnfPrt 24 T3 Prealarm	Configurable Protection 24 Threshold 3	Pre-Alarm
CnfPrt 24 T4 Alarm	Configurable Protection 24 Threshold 4	Alarm
CnfPrt 24 T4 Prealarm	Configurable Protection 24 Threshold 4	Pre-Alarm
CnfPrt 25 T1 Alarm	Configurable Protection 25 Threshold 1	Alarm
CnfPrt 25 T1 Prealarm	Configurable Protection 25 Threshold 1	Pre-Alarm
CnfPrt 25 T2 Alarm	Configurable Protection 25 Threshold 2	Alarm
CnfPrt 25 T2 Prealarm	Configurable Protection 25 Threshold 2	Pre-Alarm
CnfPrt 25 T3 Alarm	Configurable Protection 25 Threshold 3	Alarm
CnfPrt 25 T3 Prealarm	Configurable Protection 25 Threshold 3	Pre-Alarm
CnfPrt 25 T4 Alarm	Configurable Protection 25 Threshold 4	Alarm
CnfPrt 25 T4 Prealarm	Configurable Protection 25 Threshold 4	Pre-Alarm
CnfPrt 26 T1 Alarm	Configurable Protection 26 Threshold 1	Alarm
CnfPrt 26 T1 Prealarm	Configurable Protection 26 Threshold 1	Pre-Alarm
CnfPrt 26 T2 Alarm	Configurable Protection 26 Threshold 2	Alarm
CnfPrt 26 T2 Prealarm	Configurable Protection 26 Threshold 2	Pre-Alarm
CnfPrt 26 T3 Alarm	Configurable Protection 26 Threshold 3	Alarm
CnfPrt 26 T3 Prealarm	Configurable Protection 26 Threshold 3	Pre-Alarm
CnfPrt 26 T4 Alarm	Configurable Protection 26 Threshold 4	Alarm

Event String	Event Description	Event Type
CnfPrt 26 T4 Prealarm	Configurable Protection 26 Threshold 4	Pre-Alarm
CnfPrt 27 T1 Alarm	Configurable Protection 27 Threshold 1	Alarm
CnfPrt 27 T1 Prealarm	Configurable Protection 27 Threshold 1	Pre-Alarm
CnfPrt 27 T2 Alarm	Configurable Protection 27 Threshold 2	Alarm
CnfPrt 27 T2 Prealarm	Configurable Protection 27 Threshold 2	Pre-Alarm
CnfPrt 27 T3 Alarm	Configurable Protection 27 Threshold 3	Alarm
CnfPrt 27 T3 Prealarm	Configurable Protection 27 Threshold 3	Pre-Alarm
CnfPrt 27 T4 Alarm	Configurable Protection 27 Threshold 4	Alarm
CnfPrt 27 T4 Prealarm	Configurable Protection 27 Threshold 4	Pre-Alarm
CnfPrt 28 T1 Alarm	Configurable Protection 28 Threshold 1	Alarm
CnfPrt 28 T1 Prealarm	Configurable Protection 28 Threshold 1	Pre-Alarm
CnfPrt 28 T2 Alarm	Configurable Protection 28 Threshold 2	Alarm
CnfPrt 28 T2 Prealarm	Configurable Protection 28 Threshold 2	Pre-Alarm
CnfPrt 28 T3 Alarm	Configurable Protection 28 Threshold 3	Alarm
CnfPrt 28 T3 Prealarm	Configurable Protection 28 Threshold 3	Pre-Alarm
CnfPrt 28 T4 Alarm	Configurable Protection 28 Threshold 4	Alarm
CnfPrt 28 T4 Prealarm	Configurable Protection 28 Threshold 4	Pre-Alarm
CnfPrt 29 T1 Alarm	Configurable Protection 29 Threshold 1	Alarm
CnfPrt 29 T1 Prealarm	Configurable Protection 29 Threshold 1	Pre-Alarm
CnfPrt 29 T2 Alarm	Configurable Protection 29 Threshold 2	Alarm
CnfPrt 29 T2 Prealarm	Configurable Protection 29 Threshold 2	Pre-Alarm
CnfPrt 29 T3 Alarm	Configurable Protection 29 Threshold 3	Alarm
CnfPrt 29 T3 Prealarm	Configurable Protection 29 Threshold 3	Pre-Alarm
CnfPrt 29 T4 Alarm	Configurable Protection 29 Threshold 4	Alarm
CnfPrt 29 T4 Prealarm	Configurable Protection 29 Threshold 4	Pre-Alarm
CnfPrt 30 T1 Alarm	Configurable Protection 30 Threshold 1	Alarm
CnfPrt 30 T1 Prealarm	Configurable Protection 30 Threshold 1	Pre-Alarm
CnfPrt 30 T2 Alarm	Configurable Protection 30 Threshold 2	Alarm
CnfPrt 30 T2 Prealarm	Configurable Protection 30 Threshold 2	Pre-Alarm
CnfPrt 30 T3 Alarm	Configurable Protection 30 Threshold 3	Alarm
CnfPrt 30 T3 Prealarm	Configurable Protection 30 Threshold 3	Pre-Alarm
CnfPrt 30 T4 Alarm	Configurable Protection 30 Threshold 4	Alarm
CnfPrt 30 T4 Prealarm	Configurable Protection 30 Threshold 4	Pre-Alarm
CnfPrt 31 T1 Alarm	Configurable Protection 31 Threshold 1	Alarm
CnfPrt 31 T1 Prealarm	Configurable Protection 31 Threshold 1	Pre-Alarm
CnfPrt 31 T2 Alarm	Configurable Protection 31 Threshold 2	Alarm
CnfPrt 31 T2 Prealarm	Configurable Protection 31 Threshold 2	Pre-Alarm
CnfPrt 31 T3 Alarm	Configurable Protection 31 Threshold 3	Alarm
CnfPrt 31 T3 Prealarm	Configurable Protection 31 Threshold 3	Pre-Alarm
CnfPrt 31 T4 Alarm	Configurable Protection 31 Threshold 4	Alarm
CnfPrt 31 T4 Prealarm	Configurable Protection 31 Threshold 4	Pre-Alarm
CnfPrt 32 T1 Alarm	Configurable Protection 32 Threshold 1	Alarm

Event String	Event Description	Event Type
CnfPrt 32 T1 Prealarm	Configurable Protection 32 Threshold 1	Pre-Alarm
CnfPrt 32 T2 Alarm	Configurable Protection 32 Threshold 2	Alarm
CnfPrt 32 T2 Prealarm	Configurable Protection 32 Threshold 2	Pre-Alarm
CnfPrt 32 T3 Alarm	Configurable Protection 32 Threshold 3	Alarm
CnfPrt 32 T3 Prealarm	Configurable Protection 32 Threshold 3	Pre-Alarm
CnfPrt 32 T4 Alarm	Configurable Protection 32 Threshold 4	Alarm
CnfPrt 32 T4 Prealarm	Configurable Protection 32 Threshold 4	Pre-Alarm
Combined Red	Combined red alarm from an MTU engine ECU	Alarm
Combined Yellow	Combined yellow from an MTU engine ECU	Pre-Alarm
Config DTC 1 Alarm	Configurable DTC 1	Alarm
Config DTC 1 Pre-Alarm	Configurable DTC 1	Pre-Alarm
Config DTC 2 Alarm	Configurable DTC 2	Alarm
Config DTC 2 Pre-Alarm	Configurable DTC 2	Pre-Alarm
Config DTC 3 Alarm	Configurable DTC 3	Alarm
Config DTC 3 Pre-Alarm	Configurable DTC 3	Pre-Alarm
Config DTC 4 Alarm	Configurable DTC 4	Alarm
Config DTC 4 Pre-Alarm	Configurable DTC 4	Pre-Alarm
Config DTC 5 Alarm	Configurable DTC 5	Alarm
Config DTC 5 Pre-Alarm	Configurable DTC 5	Pre-Alarm
Config DTC 6 Alarm	Configurable DTC 6	Alarm
Config DTC 6 Pre-Alarm	Configurable DTC 6	Pre-Alarm
Config DTC 7 Alarm	Configurable DTC 7	Alarm
Config DTC 7 Pre-Alarm	Configurable DTC 7	Pre-Alarm
Config DTC 8 Alarm	Configurable DTC 8	Alarm
Config DTC 8 Pre-Alarm	Configurable DTC 8	Pre-Alarm
Config DTC 9 Alarm	Configurable DTC 9	Alarm
Config DTC 9 Pre-Alarm	Configurable DTC 9	Pre-Alarm
Config DTC 10 Alarm	Configurable DTC 10	Alarm
Config DTC 10 Pre-Alarm	Configurable DTC 10	Pre-Alarm
Config DTC 11 Alarm	Configurable DTC 11	Alarm
Config DTC 11 Pre-Alarm	Configurable DTC 11	Pre-Alarm
Config DTC 12 Alarm	Configurable DTC 12	Alarm
Config DTC 12 Pre-Alarm	Configurable DTC 12	Pre-Alarm
Config DTC 13 Alarm	Configurable DTC 13	Alarm
Config DTC 13 Pre-Alarm	Configurable DTC 13	Pre-Alarm
Config DTC 14 Alarm	Configurable DTC 14	Alarm
Config DTC 14 Pre-Alarm	Configurable DTC 14	Pre-Alarm
Config DTC 15 Alarm	Configurable DTC 15	Alarm
Config DTC 154 Pre-Alarm	Configurable DTC 15	Pre-Alarm
Config DTC 16 Alarm	Configurable DTC 16	Alarm
Config DTC 164 Pre-Alarm	Configurable DTC 16	Pre-Alarm
Config Element 1 Alarm	Configurable Element 1	Alarm

Event String	Event Description	Event Type
Config Element 1 Prealarm	Configurable Element 1	Pre-Alarm
Config Element 2 Alarm	Configurable Element 2	Alarm
Config Element 2 Prealarm	Configurable Element 2	Pre-Alarm
Config Element 3 Alarm	Configurable Element 3	Alarm
Config Element 3 Prealarm	Configurable Element 3	Pre-Alarm
Config Element 4 Alarm	Configurable Element 4	Alarm
Config Element 4 Prealarm	Configurable Element 4	Pre-Alarm
Config Element 5 Alarm	Configurable Element 5	Alarm
Config Element 5 Prealarm	Configurable Element 5	Pre-Alarm
Config Element 6 Alarm	Configurable Element 6	Alarm
Config Element 6 Prealarm	Configurable Element 6	Pre-Alarm
Config Element 7 Alarm	Configurable Element 7	Alarm
Config Element 7 Prealarm	Configurable Element 7	Pre-Alarm
Config Element 8 Alarm	Configurable Element 8	Alarm
Config Element 8 Prealarm	Configurable Element 8	Pre-Alarm
Coolant Level SF Alarm	Coolant level sender failure	Alarm
Coolnt Temp SF-Alarm	Coolant temperature sender failure	Alarm
Coolnt Temp SF-Prealarm	Coolant temperature sender failure	Pre-Alarm
Critical Breakers Missing	One of the defined critical breaker controllers is not communicating on the network.	Pre-Alarm
Crowbar Activated	Crowbar Activated	Alarm
Dead Bus Close Grant Fail	No unit was granted permission to close a breaker to a dead bus.	Pre-Alarm
DEF Consumptn Err PA	DEF consumption error	Pre-Alarm
DEF Fluid Low PA	Diesel exhaust fluid low	Pre-Alarm
DEF Inducement PA	Diesel exhaust fluid inducement	Pre-Alarm
DEF Inducmt O-ride PA	Diesel exhaust fluid inducement override	Pre-Alarm
DEF Low Refill DEF A	Isuzu DEF low refill DEF	Alarm
DEF Low Refill DEF PA	Isuzu DEF low refill DEF	Pre-Alarm
DEF Low Severe A	DEF low severe	Alarm
DEF Low Severe PA	Diesel exhaust fluid low severe	Pre-Alarm
DEF Presvr Inducmt PA	Diesel exhaust fluid presevere inducement	Pre-Alarm
DEF Quality Poor PA	DEF quality is poor.	Pre-Alarm
DEF Severe Inducmt A	DEF severe inducement alarm	Alarm
DEF Severe Inducmt PA	Diesel exhaust fluid severe inducement	Pre-Alarm
DEF Warning	Diesel exhaust fluid warning	Pre-Alarm
DEF Warning Level 2	Diesel exhaust fluid warning level 2	Pre-Alarm
Demand Start Stop RequestStart	Demand start/stop request: start	Status Only
Demand Start Stop RequestStop	Demand start/stop request: stop	Status Only
Diag Trbl Code A	Diagnostic trouble code	Alarm

Event String	Event Description	Event Type
Diag Trbl Code PA	Diagnostic trouble code	Pre-Alarm
Dial In Connected	Dial in connected	Status Only
Dial Out Failure	Dial out failure	Status Only
Dial Out Success	Dial out success	Status Only
ECU Faulty PA	ECU faulty	Pre-Alarm
ECU Shutdown Alarm	ECU shutdown	Alarm
EDM Alarm	EDM alarm	Alarm
EDM Pre-Alarm	EDM	Pre-Alarm
E-mail Failure	E-mail message send failed.	Status Only
E-mail Success	E-mail message was sent successfully	Status Only
Emergency stop alarm	Emergency stop	Status Only
EmergencyStop-Alarm	Emergency stop	Alarm
EPS Supplying Load	Emergency power system is supplying load	Status
Escape Mode PA	Escape Mode	Pre-Alarm
Eth1 Link Lost PA	Ethernet 1 link lost	Pre-Alarm
Eth2 Link Lost PA	Ethernet 2 link lost	Pre-Alarm
EXH System Error A	Exhaust system error	Alarm
EXH System Error PA	Exhaust system error	Pre-Alarm
Field Overvoltage Alarm	Field overvoltage condition detected	Alarm
Field Overvoltage Alarm	Field overvoltage	Alarm
Field Overvoltage Pre-Alarm	Field overvoltage condition detected	Pre-Alarm
Field Overvoltage Pre-Alarm	Field overvoltage	Pre-Alarm
Field Short Circuit Status	Field short circuit	Alarm
Firmware Change	Firmware change	Pre-Alarm
Forced Purge Req	Isuzu forced purge request	Pre-Alarm
Fuel 1 Leak	Fuel 1 leak	Pre-Alarm
Fuel 2 Leak	Fuel 2 leak	Pre-Alarm
Fuel Flt Prs Hi PA	Fuel filter pressure high	Pre-Alarm
Fuel Level SF-Alarm	Fuel level sender failure	Alarm
Fuel Level SF-Prealarm	Fuel level sender failure	Pre-Alarm
FuelLeakDetect-Alarm	Fuel leak detected	Alarm
FuelLeakDetect-Prealarm	Fuel leak detected	Pre-Alarm
Gen Below 10Hz Pre-Alarm	Gen below 10 Hz	Pre-Alarm
Gen Brkr Fail2ClosePA	Generator breaker failed to close	Status Only
Gen Brkr Fail2OpenPA	Generator breaker failed to open	Status Only
Gen Brkr Sync Fail PA	Generator breaker failed to synchronize	Status Only
Gen Reverse Rotation	Generator reverse rotation	Status Only
Gen Reverse Rotation	Generator reverse rotation	Pre-Alarm
Gentest	Generator test run session is in progress	Status Only
Gentest Loaded	Generator test run session with load is in progress.	Status Only
Global Sender Fail Alrm	Global sender fail	Alarm

Event String	Event Description	Event Type
Global Soft Alarm	Global software	Status Only
Gov Output-Out Of Range Alarm	Gov output: out of range	Alarm
Gov Output-Out of Range Prealarm	Gov output: out of range	Pre-Alarm
Group Breaker Fail2ClosePA	Group breaker failed to close	Status Only
Group Breaker Fail2OpenPA	Group breaker failed to open	Status Only
Group Breaker Sync Fail PA	Group breaker failed to synchronize	Status Only
Grp Capacity Fail	Group capacity fail	Status Only
Grp Capacity Not Reached	Group capacity not reached	Status Only
Hi Day Tank Level PA	High day tank level	Pre-Alarm
Hi ECU Volts Alarm	High ECU voltage	Pre-Alarm
Hi Exhaust A Temp PA	High exhaust A temperature	Pre-Alarm
Hi Exhaust B Temp PA	High exhaust B temperature	Pre-Alarm
Hi Fuel Temp PA	High fuel temperature	Pre-Alarm
Hi Pressure In 1 PA	High pressure in 1	Pre-Alarm
Hi Pressure In 2 PA	High pressure in 2	Pre-Alarm
Hi Supply Volts PA	High supply voltage	Pre-Alarm
High Amb Temp PA	High ambient temperature	Pre-Alarm
High Charge Air Temp A	High charge air temperature	Pre-Alarm
High Chrg Air Temp PA	High charge air temperature	Pre-Alarm
High Coil Temp 1 PA	High coil temperature 1	Pre-Alarm
High Coil Temp 2 PA	High coil temperature 2	Pre-Alarm
High Coil Temp 3 PA	High coil temperature 3	Pre-Alarm
High Coolant Temp A	High coolant temperature	Alarm
High Coolant Temp PA	High coolant temperature	Pre-Alarm
High ECU Temp PA	High ECU temperature	Pre-Alarm
High Exhaust Temp PA	High exhaust temperature	Pre-Alarm
High Fuel PreAlarm	High fuel	Pre-Alarm
High Fuel Rail Press PA	High fuel rail pressure	Pre-Alarm
High Intrcoolr Temp PA	High intercooler temperature	Pre-Alarm
High Oil Temp PA	High oil temperature	Pre-Alarm
High Oil Temperature A	High oil temperature	Pre-Alarm
High Strg Tank Lvl PA	High storage tank level	Pre-Alarm
Idle Spd Lo Pre-Alarm	Idle speed low	Pre-Alarm
In Running State	In running state	Status Only
Input 1 Alarm	Input 1	Alarm
Input 1 Prealarm	Input 1	Pre-Alarm
Input 10 Alarm	Input 10	Alarm
Input 10 Prealarm	Input 10	Pre-Alarm
Input 11 Alarm	Input 11	Alarm
Input 11 Prealarm	Input 11	Pre-Alarm
Input 12 Alarm	Input 12	Alarm

Event String	Event Description	Event Type
Input 12 Prealarm	Input 12	Pre-Alarm
Input 13 Alarm	Input 13	Alarm
Input 13 Prealarm	Input 13	Pre-Alarm
Input 14 Alarm	Input 14	Alarm
Input 14 Prealarm	Input 14	Pre-Alarm
Input 15 Alarm	Input 15	Alarm
Input 15 Prealarm	Input 15	Pre-Alarm
Input 16 Alarm	Input 16	Alarm
Input 16 Prealarm	Input 16	Pre-Alarm
Input 2 Alarm	Input 2	Alarm
Input 2 Prealarm	Input 2	Pre-Alarm
Input 3 Alarm	Input 3	Alarm
Input 3 Prealarm	Input 3	Pre-Alarm
Input 4 Alarm	Input 4	Alarm
Input 4 Prealarm	Input 4	Pre-Alarm
Input 5 Alarm	Input 5	Alarm
Input 5 Prealarm	Input 5	Pre-Alarm
Input 6 Alarm	Input 6	Alarm
Input 6 Prealarm	Input 6	Pre-Alarm
Input 7 Alarm	Input 7	Alarm
Input 7 Prealarm	Input 7	Pre-Alarm
Input 8 Alarm	Input 8	Alarm
Input 8 Prealarm	Input 8	Pre-Alarm
Input 9 Alarm	Input 9	Alarm
Input 9 Prealarm	Input 9	Pre-Alarm
Irig Sync Lost PA	IRIG sync lost	Pre-Alarm
Lo Afterclr Cool Lvl A	Low aftercooler coolant level	Status Only
Lo Chg Air Clnt Lvl PA	Low charge air coolant level	Pre-Alarm
Lo Day Tank Level PA	Low day tank level	Pre-Alarm
Lo ECU Volts PA	Low ECU voltage	Pre-Alarm
Lo Fuel Dlv Pressure A	Low fuel delivery pressure	Pre-Alarm
Lo Supply Volts PA	Low supply voltage	Pre-Alarm
Load Bus Not Stable P	Load bus not stable	Pre-Alarm
Load Share Settings Intergen Comms Fail PA	Load share settings: intergenset communications failure	Pre-Alarm
Load Take Over	Load take over	Status Only
Logic Alarm	Logic	Alarm
Logic Equal None	Logic equal none	Pre-Alarm
Logic Pre-Alarm	Logic	Pre-Alarm
Loss of ECU Comm A	Loss of ECU communications	Alarm
Loss of ECU Comm PA	Loss of ECU communications	Pre-Alarm
Loss Of Sensing Alarm	Loss of sensing	Alarm
Loss Of Sensing Pre-Alarm	Loss of sensing	Pre-Alarm

Event String	Event Description	Event Type
Low Batt Volt PreAlm	Low battery voltage	Pre-Alarm
Low Chrg Air Press PA	Low charge air pressure	Status Only
Low Coolant Level Alarm	Low coolant level	Alarm
Low Coolant Level PA	Low coolant level	Status Only
Low Coolant Level Pre-Alarm	Low coolant level	Pre-Alarm
Low Coolant Temp PA	Low coolant temperature	Pre-Alarm
Low Fuel Alarm	Low fuel	Alarm
Low Fuel Deliv Pres PA	Low fuel delivery pressure	Pre-Alarm
Low Fuel PreAlarm	Low fuel	Pre-Alarm
Low Fuel Rail Press PA	Low fuel rail pressure	Pre-Alarm
Low Line O-ride Global	Low line override global	Status Only
Low Oil Pres PreAlarm	Low oil pressure	Pre-Alarm
Low Oil Pressure Alarm	Low oil pressure	Alarm
Low Strg Tank Lvl PA	Low storage tank level	Pre-Alarm
LS Output-Out Of Range Alarm	Load share output: out of range	Alarm
LS Output-Out of Range Prealarm	Load share output: out of range	Pre-Alarm
Mains Brkr Fail2ClosePA	Mains breaker failed to close	Status Only
Mains Brkr Fail2OpenPA	Mains breaker failed to open	Status Only
Mains Brkr Sync Fail PA	Mains breaker failed to synchronize	Status Only
Mains Ctrlr Missing	Mains controller missing	Pre-Alarm
Mains Fail Return Fail P	Mains fail return fail	Pre-Alarm
Mains Fail Test Active	Mains fail test active	Status Only
Mains Fail Xfer Complt	Mains fail transfer complete	Status Only
Mains Fail Xfer Fail A	Mains fail transfer fail	Status Only
Mains Fail Xfer Fail P	Mains fail transfer fail	Status Only
Maintenance Due PA	Maintenance due	Status Only
MD Hi Coolant Temp A	Maintenance due: high coolant temperature	Pre-Alarm
MD Hi Coolant Temp PA	Maintenance due: high coolant temperature	Pre-Alarm
MD Lo Oil Pressure PA	Maintenance due: low oil pressure	Pre-Alarm
MD Low Oil Pressure A	Maintenance due: low oil pressure	Pre-Alarm
MD Overspeed Alarm	Maintenance due: overspeed	Pre-Alarm
Missing Sys Components	Missing system components	Pre-Alarm
MPU Fail Pre-Alarm	MPU failure	Status Only
Normal Shutdown	Normal shutdown	Status Only
NTP Sync Lost PA	NTP sync lost	Pre-Alarm
OEL Alarm	Overexcitation limiter	Alarm
OEL Pre-Alarm	Overexcitation limiter	Pre-Alarm
Off Mode Status	Off mode	Status Only
Oil Pressure SF-Alarm	Oil pressure sender failure	Alarm
Oil Pressure SF-Prealarm	Oil pressure sender failure	Pre-Alarm
Overcrank Alarm	Overcrank	Status Only

Event String	Event Description	Event Type
OverSpeed Alarm	Overspeed	Alarm
Ovrspd Test On PA	Overspeed test on	Pre-Alarm
Peak Shave In Progress	Peak shave in progress	Status Only
Priming Fault Pre-Alarm	Priming fault	Pre-Alarm
Prog Alarm 1 Name	Programmable Alarm 1	Alarm
Prog Alarm 10 Name	Programmable Alarm 10	Alarm
Prog Alarm 11 Name	Programmable Alarm 11	Alarm
Prog Alarm 12 Name	Programmable Alarm 12	Alarm
Prog Alarm 13 Name	Programmable Alarm 13	Alarm
Prog Alarm 14 Name	Programmable Alarm 14	Alarm
Prog Alarm 15 Name	Programmable Alarm 15	Alarm
Prog Alarm 16 Name	Programmable Alarm 16	Alarm
Prog Alarm 2 Name	Programmable Alarm 2	Alarm
Prog Alarm 3 Name	Programmable Alarm 3	Alarm
Prog Alarm 4 Name	Programmable Alarm 4	Alarm
Prog Alarm 5 Name	Programmable Alarm 5	Alarm
Prog Alarm 6 Name	Programmable Alarm 6	Alarm
Prog Alarm 7 Name	Programmable Alarm 7	Alarm
Prog Alarm 8 Name	Programmable Alarm 8	Alarm
Prog Alarm 9 Name	Programmable Alarm 9	Alarm
Prog Alarms-Input 1	Programmable Alarm Input 1	Status Only
Prog Alarms-Input 10	Programmable Alarm Input 10	Status Only
Prog Alarms-Input 11	Programmable Alarm Input 11	Status Only
Prog Alarms-Input 12	Programmable Alarm Input 12	Status Only
Prog Alarms-Input 13	Programmable Alarm Input 13	Status Only
Prog Alarms-Input 14	Programmable Alarm Input 14	Status Only
Prog Alarms-Input 15	Programmable Alarm Input 15	Status Only
Prog Alarms-Input 16	Programmable Alarm Input 16	Status Only
Prog Alarms-Input 2	Programmable Alarm Input 2	Status Only
Prog Alarms-Input 3	Programmable Alarm Input 3	Status Only
Prog Alarms-Input 4	Programmable Alarm Input 4	Status Only
Prog Alarms-Input 5	Programmable Alarm Input 5	Status Only
Prog Alarms-Input 6	Programmable Alarm Input 6	Status Only
Prog Alarms-Input 7	Programmable Alarm Input 7	Status Only
Prog Alarms-Input 8	Programmable Alarm Input 8	Status Only
Prog Alarms-Input 9	Programmable Alarm Input 9	Status Only
Protective Shutdown	Protective shutdown	Status Only
Regen Inhbtd PA	Regeneration inhibited	Pre-Alarm
Regen Reqd PA	Regeneration required	Pre-Alarm
Run Mode Status	Run mode	Status Only
Runup Spd Lo PA	Run-up speed low	Pre-Alarm
SCR Forced Purge	Isuzu SCR forced purge	Pre-Alarm

Event String	Event Description	Event Type
SCR Purge Active	Isuzu SCR purge	Pre-Alarm
Soft Unload Req	Soft unload request	Status Only
Soot Lvl Ext Hi PA	Soot level extremely high	Pre-Alarm
Soot Lvl Hi PA	Soot level high	Pre-Alarm
Soot Lvl Mod Hi PA	Soot level moderately high	Pre-Alarm
Speed Dmd Fail PA	Speed demand failure	Pre-Alarm
Speed SF Alarm	Speed sender failure	Alarm
Speed Too Low PA	Speed too low	Pre-Alarm
SS Override On PA	MDEC shutdown override	Pre-Alarm
Start Generators	Start generators	Status Only
Start Speed Low PA	Start speed low	Pre-Alarm
StopGenerators	Stop generators	Status Only
SvcTool FrcPrg Req	Isuzu service tool forced purge request	Pre-Alarm
Tie Breaker Fail2ClosePA	Tie breaker failed to close	Status Only
Tie Breaker Fail2OpenPA	Tie breaker failed to open	Status Only
Tie Breaker Sync Fail PA	Tie breaker failed to synchronize	Status Only
Torq Limit Severe PA	Torque limit severe	Pre-Alarm
Torque Limit PA	Torque limit	Pre-Alarm
UEL Alarm	UEL alarm	Alarm
UEL Pre-Alarm	UEL pre-alarm	Pre-Alarm
Unexpected Shutdown	Unexpected shutdown	Alarm
Unsuprtd Num AEM PA	Unsupported number of AEMs	Pre-Alarm
Unsuprtd Num CEM PA	Unsupported number of CEMs	Pre-Alarm
uP Reset Alarm	Microprocessor reset	Status Only
V/Hz Limit Alarm	Volts per hertz limit trip	Alarm
V/Hz Limit Pre-Alarm	Volts per hertz limit trip	Pre-Alarm
Volt Sensing SF-Alarm	Voltage sensing sender failure	Alarm
Volt Sensing SF-Prealarm	Voltage sensing sender failure	Pre-Alarm
VRM Comms Fail PA	VRM module communications failure	Pre-Alarm
VRM Global Warning	VRM-2020 global warning	Status Only
VRM RTD Input1 OutOfRange Alarm	VRM RTD Input 1 Out Of Range Trip	Alarm
VRM RTD Input1 OutOfRange Pre-Alarm	VRM RTD Input 1 Out Of Range Trip	Pre-Alarm
VRM RTD Input2 OutOfRange Alarm	VRM RTD Input 2 Out Of Range Trip	Alarm
VRM RTD Input2 OutOfRange Pre-Alarm	VRM RTD Input 2 Out Of Range Trip	Pre-Alarm
VRM RTD Input3 OutOfRange Alarm	VRM RTD Input 3 Out Of Range Trip	Alarm
VRM RTD Input3 OutOfRange Pre-Alarm	VRM RTD Input 3 Out Of Range Trip	Pre-Alarm
VRM RTD Input4 OutOfRange Alarm	VRM RTD Input 4 Out Of Range Trip	Alarm
VRM RTD Input4 OutOfRange Pre-Alarm	VRM RTD Input 4 Out Of Range Trip	Pre-Alarm

Event String	Event Description	Event Type
VRM RTD Input5 OutOfRange Alarm	VRM RTD Input 5 Out Of Range Trip	Alarm
VRM RTD Input5 OutOfRange Pre-Alarm	VRM RTD Input 5 Out Of Range Trip	Pre-Alarm
VRM RTD Input6 OutOfRange Alarm	VRM RTD Input 6 Out Of Range Trip	Alarm
VRM RTD Input6 OutOfRange Pre-Alarm	VRM RTD Input 6 Out Of Range Trip	Pre-Alarm
VRM RTD Input7 OutOfRange Alarm	VRM RTD Input 7 Out Of Range Trip	Alarm
VRM RTD Input7 OutOfRange Pre-Alarm	VRM RTD Input 7 Out Of Range Trip	Pre-Alarm
VRM RTD Input8 OutOfRange Alarm	VRM RTD Input 8 Out Of Range Trip	Alarm
VRM RTD Input8 OutOfRange Pre-Alarm	VRM RTD Input 8 Out Of Range Trip	Pre-Alarm
VRM RTD1 T1 Alarm	VRM RTD Input 1 Threshold 1 Trip	Alarm
VRM RTD1 T1 Pre-Alarm	VRM RTD Input 1 Threshold 1 Trip	Pre-Alarm
VRM RTD1 T2 Alarm	VRM RTD Input 1 Threshold 2 Trip	Alarm
VRM RTD1 T2 Pre-Alarm	VRM RTD Input 1 Threshold 2 Trip	Pre-Alarm
VRM RTD1 T3 Alarm	VRM RTD Input 1 Threshold 3 Trip	Alarm
VRM RTD1 T3 Pre-Alarm	VRM RTD Input 1 Threshold 3 Trip	Pre-Alarm
VRM RTD1 T4 Alarm	VRM RTD Input 1 Threshold 4 Trip	Alarm
VRM RTD1 T4 Pre-Alarm	VRM RTD Input 1 Threshold 4 Trip	Pre-Alarm
VRM RTD2 T1 Alarm	VRM RTD Input 2 Threshold 1 Trip	Alarm
VRM RTD2 T1 Pre-Alarm	VRM RTD Input 2 Threshold 1 Trip	Pre-Alarm
VRM RTD2 T2 Alarm	VRM RTD Input 2 Threshold 2 Trip	Alarm
VRM RTD2 T2 Pre-Alarm	VRM RTD Input 2 Threshold 2 Trip	Pre-Alarm
VRM RTD2 T3 Alarm	VRM RTD Input 2 Threshold 3 Trip	Alarm
VRM RTD2 T3 Pre-Alarm	VRM RTD Input 2 Threshold 3 Trip	Pre-Alarm
VRM RTD2 T4 Alarm	VRM RTD Input 2 Threshold 4 Trip	Alarm
VRM RTD2 T4 Pre-Alarm	VRM RTD Input 2 Threshold 4 Trip	Pre-Alarm
VRM RTD3 T1 Alarm	VRM RTD Input 3 Threshold 1 Trip	Alarm
VRM RTD3 T1 Pre-Alarm	VRM RTD Input 3 Threshold 1 Trip	Pre-Alarm
VRM RTD3 T2 Alarm	VRM RTD Input 3 Threshold 2 Trip	Alarm
VRM RTD3 T2 Pre-Alarm	VRM RTD Input 3 Threshold 2 Trip	Pre-Alarm
VRM RTD3 T3 Alarm	VRM RTD Input 3 Threshold 3 Trip	Alarm
VRM RTD3 T3 Pre-Alarm	VRM RTD Input 3 Threshold 3 Trip	Pre-Alarm
VRM RTD3 T4 Alarm	VRM RTD Input 3 Threshold 4 Trip	Alarm
VRM RTD3 T4 Pre-Alarm	VRM RTD Input 3 Threshold 4 Trip	Pre-Alarm
VRM RTD4 T1 Alarm	VRM RTD Input 4 Threshold 1 Trip	Alarm
VRM RTD4 T1 Pre-Alarm	VRM RTD Input 4 Threshold 1 Trip	Pre-Alarm
VRM RTD4 T2 Alarm	VRM RTD Input 4 Threshold 2 Trip	Alarm
VRM RTD4 T2 Pre-Alarm	VRM RTD Input 4 Threshold 2 Trip	Pre-Alarm
VRM RTD4 T3 Alarm	VRM RTD Input 4 Threshold 3 Trip	Alarm
VRM RTD4 T3 Pre-Alarm	VRM RTD Input 4 Threshold 3 Trip	Pre-Alarm

Event String	Event Description	Event Type
VRM RTD4 T4 Alarm	VRM RTD Input 4 Threshold 4 Trip	Alarm
VRM RTD4 T4 Pre-Alarm	VRM RTD Input 4 Threshold 4 Trip	Pre-Alarm
VRM RTD5 T1 Alarm	VRM RTD Input 5 Threshold 1 Trip	Alarm
VRM RTD5 T1 Pre-Alarm	VRM RTD Input 5 Threshold 1 Trip	Pre-Alarm
VRM RTD5 T2 Alarm	VRM RTD Input 5 Threshold 2 Trip	Alarm
VRM RTD5 T2 Pre-Alarm	VRM RTD Input 5 Threshold 2 Trip	Pre-Alarm
VRM RTD5 T3 Alarm	VRM RTD Input 5 Threshold 3 Trip	Alarm
VRM RTD5 T3 Pre-Alarm	VRM RTD Input 5 Threshold 3 Trip	Pre-Alarm
VRM RTD5 T4 Alarm	VRM RTD Input 5 Threshold 4 Trip	Alarm
VRM RTD5 T4 Pre-Alarm	VRM RTD Input 5 Threshold 4 Trip	Pre-Alarm
VRM RTD6 T1 Alarm	VRM RTD Input 6 Threshold 1 Trip	Alarm
VRM RTD6 T1 Pre-Alarm	VRM RTD Input 6 Threshold 1 Trip	Pre-Alarm
VRM RTD6 T2 Alarm	VRM RTD Input 6 Threshold 2 Trip	Alarm
VRM RTD6 T2 Pre-Alarm	VRM RTD Input 6 Threshold 2 Trip	Pre-Alarm
VRM RTD6 T3 Alarm	VRM RTD Input 6 Threshold 3 Trip	Alarm
VRM RTD6 T3 Pre-Alarm	VRM RTD Input 6 Threshold 3 Trip	Pre-Alarm
VRM RTD6 T4 Alarm	VRM RTD Input 6 Threshold 4 Trip	Alarm
VRM RTD6 T4 Pre-Alarm	VRM RTD Input 6 Threshold 4 Trip	Pre-Alarm
VRM RTD7 T1 Alarm	VRM RTD Input 7 Threshold 1 Trip	Alarm
VRM RTD7 T1 Pre-Alarm	VRM RTD Input 7 Threshold 1 Trip	Pre-Alarm
VRM RTD7 T2 Alarm	VRM RTD Input 7 Threshold 2 Trip	Alarm
VRM RTD7 T2 Pre-Alarm	VRM RTD Input 7 Threshold 2 Trip	Pre-Alarm
VRM RTD7 T3 Alarm	VRM RTD Input 7 Threshold 3 Trip	Alarm
VRM RTD7 T3 Pre-Alarm	VRM RTD Input 7 Threshold 3 Trip	Pre-Alarm
VRM RTD7 T4 Alarm	VRM RTD Input 7 Threshold 4 Trip	Alarm
VRM RTD7 T4 Pre-Alarm	VRM RTD Input 7 Threshold 4 Trip	Pre-Alarm
VRM RTD8 T1 Alarm	VRM RTD Input 8 Threshold 1 Trip	Alarm
VRM RTD8 T1 Pre-Alarm	VRM RTD Input 8 Threshold 1 Trip	Pre-Alarm
VRM RTD8 T2 Alarm	VRM RTD Input 8 Threshold 2 Trip	Alarm
VRM RTD8 T2 Pre-Alarm	VRM RTD Input 8 Threshold 2 Trip	Pre-Alarm
VRM RTD8 T3 Alarm	VRM RTD Input 8 Threshold 3 Trip	Alarm
VRM RTD8 T3 Pre-Alarm	VRM RTD Input 8 Threshold 3 Trip	Pre-Alarm
VRM RTD8 T4 Alarm	VRM RTD Input 8 Threshold 4 Trip	Alarm
VRM RTD8 T4 Pre-Alarm	VRM RTD Input 8 Threshold 4 Trip	Pre-Alarm
VRM uP Reset Alarm	VRM-2020 microprocessor reset	Alarm
Weak Battery PreAlm	Weak battery	Pre-Alarm
Zero Power Req	Zero power transfer request to open circuit breaker	Status Only

Troubleshooting

If you do not get the results that you expect from the DGC-2020HD, first check the programmable settings for the appropriate function. Use the following troubleshooting procedures when difficulties are encountered in the operation of your genset control system.

Communications

Ethernet Communication Does Not Work Properly

Step 1. Verify that the proper port of your computer is being used. For more information, refer to the *Communication* chapter in the *Configuration* manual.

Step 2. Verify the network configuration of the DGC-2020HD is set up properly. For more information, refer to the *Communication* chapter in the *Configuration* manual.

Step 3. Verify that all Ethernet devices comply with IEC 61000-4 series of specifications for Industrial Ethernet Devices. Commercial devices are not recommended and may result in erratic network communications.

USB Communication Does Not Work Properly

Step 1. Verify that the proper port of your computer is being used. For more information, refer to the *Communication* chapter in the *Configuration* manual.

USB Driver Did Not Install Properly on Windows® 7, 8, or 10

Step 1. If the message in Figure 81 is shown, close all programs and restart the computer.

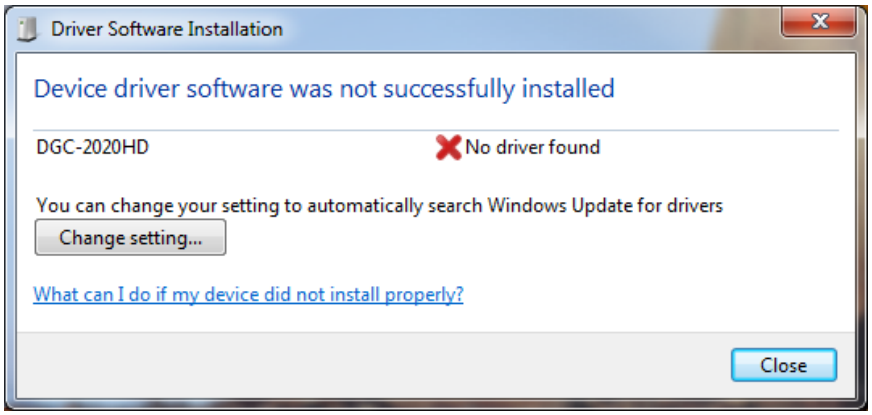


Figure 81. Driver Software Installation

Step 2. Open the Windows® Device Manger as shown in Figure 82. Right-click on DGC-2020HD (or Unknown Device) under Other Devices and select Properties.

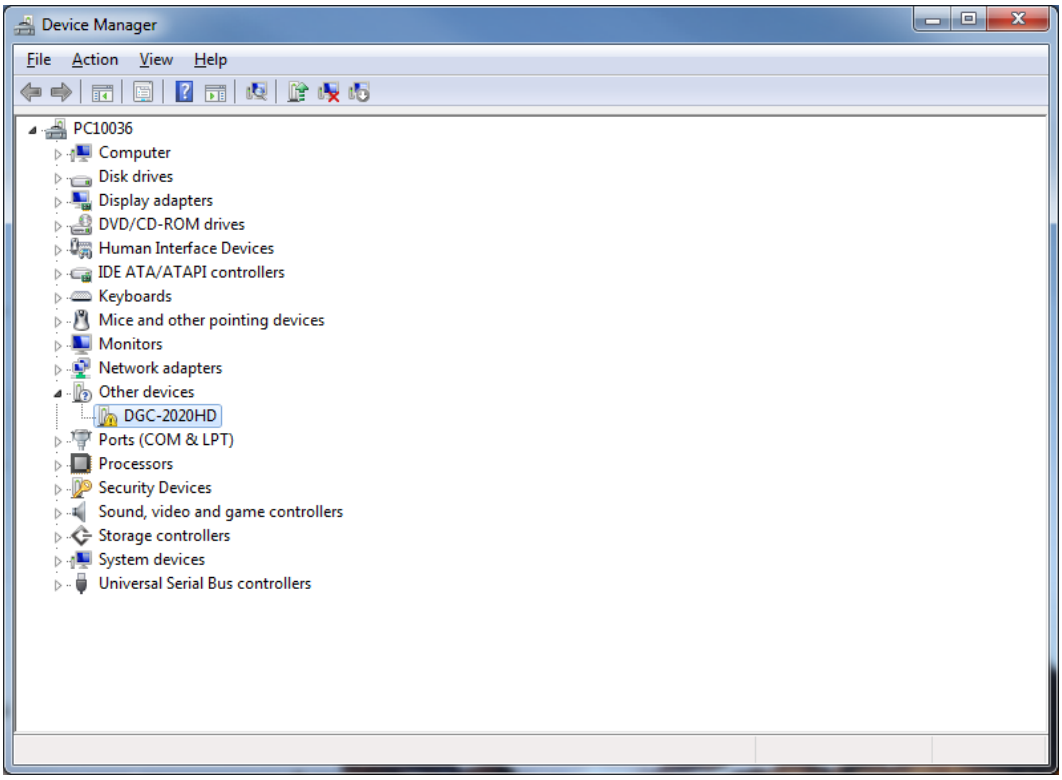


Figure 82. Device Manager

Step 3. In the Properties windows, select the Driver tab and click Update Driver. See Figure 83.

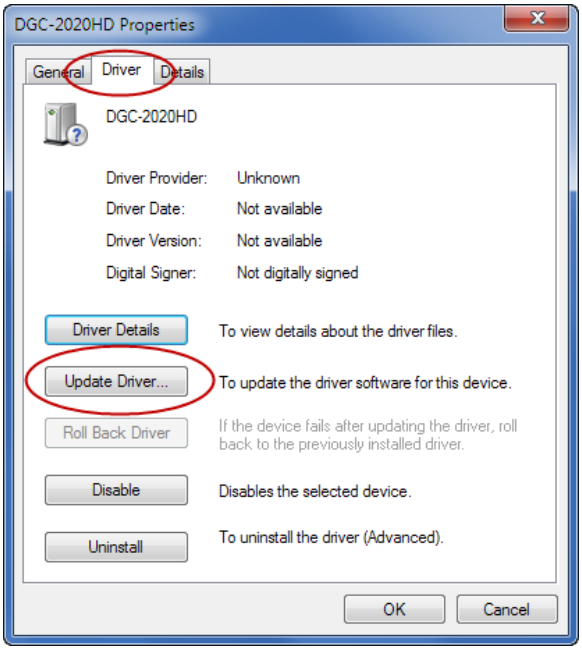


Figure 83. DGC-2020HD Properties

Step 4. Select Browse My Computer for Driver Software as shown in Figure 84.

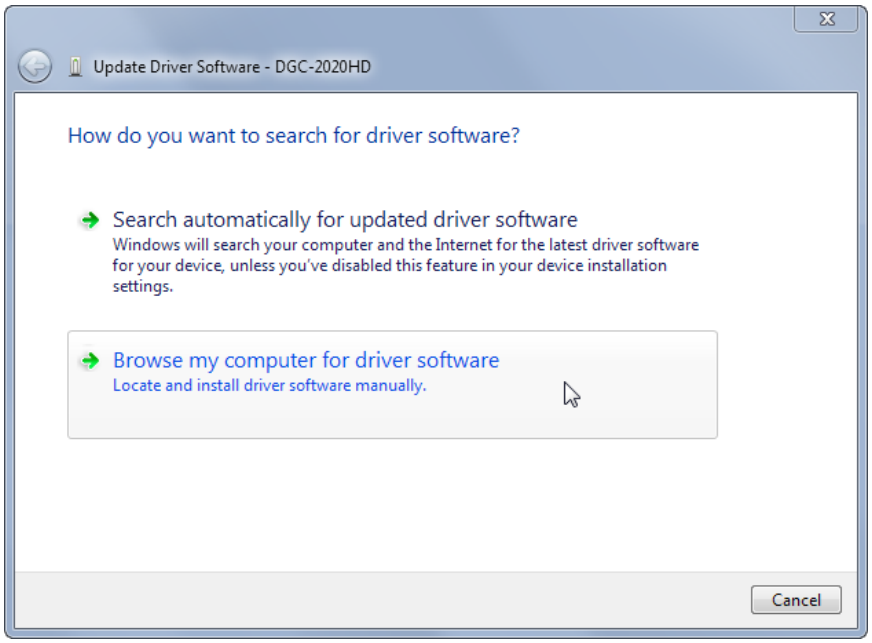


Figure 84. Update Driver Software - DGC-2020HD

Step 5. Click Browse and navigate to C:\Program Files\Basler Electric\USB Device Drivers\USBIO. Click Next. See Figure 85.

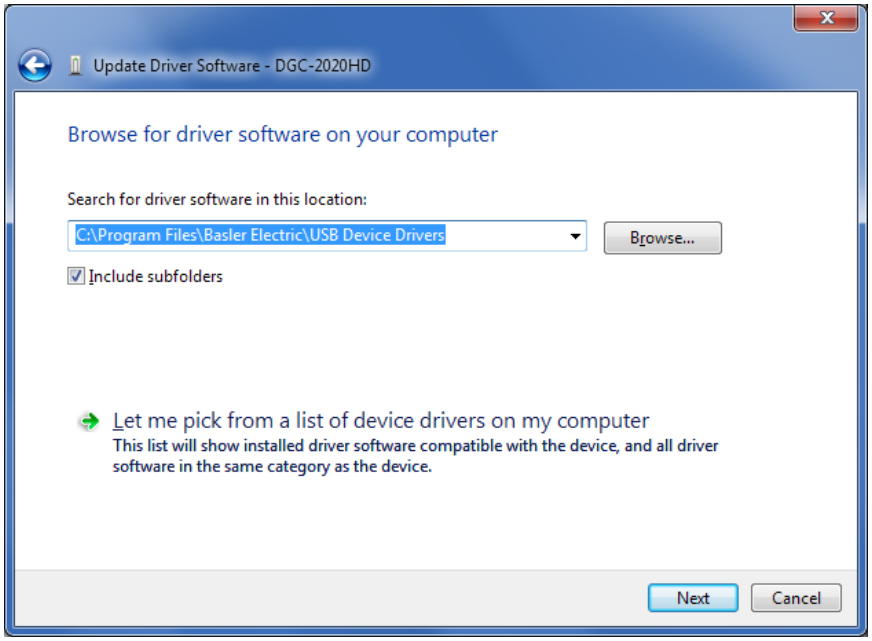


Figure 85. Update Driver Software - DGC-2020HD

Step 6. If a Windows Security window (Figure 86) appears, click Install.

Figure 86. Windows Security

Step 7. The window in Figure 87 appears if driver installation was successful.

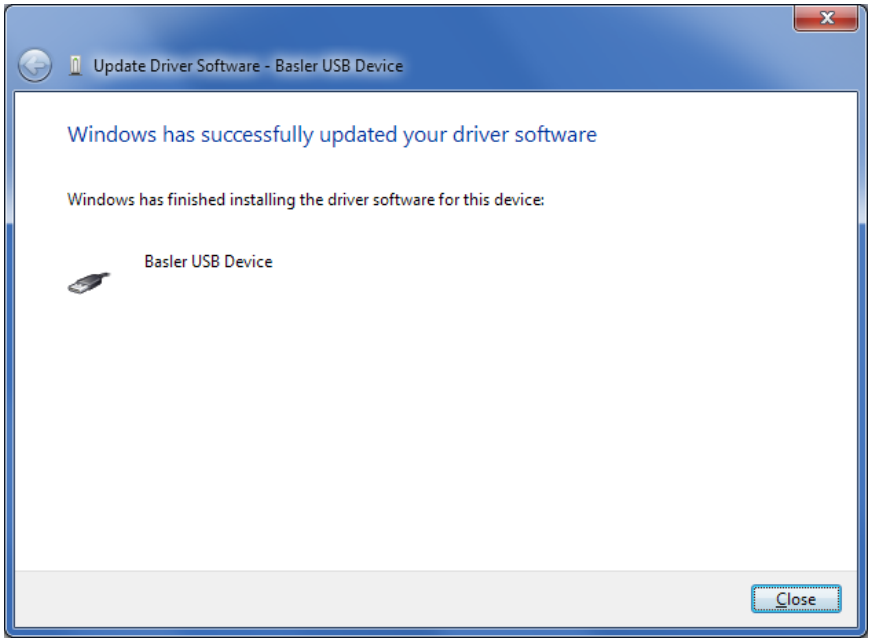


Figure 87. Driver Software Update Successful

CAN Communication Does Not Work Properly

Step 1: Verify that there is a 120-ohm termination resistor on each end of the bus section of the wiring, and that there are not any termination resistors at any node connections that are on stubs from the main bus.

Step 2: Check all CAN wiring for loose connections and verify that the CAN H and CAN L wires have not gotten switched somewhere on the network.

Step 3: Verify that the cable length of the bus section of the wiring does not exceed 40 meters (131 feet), and verify that any stubs from the main bus do not exceed 3 meters (9.8 feet) in length.

Step 4: If the engine is equipped with a Volvo or MTU ECU, verify that the ECU Configuration setting is set to match the actual ECU configuration.

RPM Control over CAN Bus Does Not Function

Step 1: Check that Engine Parameter Transmit under the CAN Bus 2 (ECU) settings is enabled.

Step 2: Check that CAN Bus RPM Request under Speed Setup is set to enabled.

Step 3: Check to determine if there are multiple ECUs on the engine. If so, consult the engine manufacturer's documentation to determine the CAN Bus 2 address of the ECU that will respond to rpm requests. Set the Engine ECU Address setting under the CAN Bus 2 (ECU)

settings to that value. The Engine ECU Address setting under the CAN Bus 2 (ECU) settings should be set to the address the Engine ECU claims on the J1939 network.

Step 4: Consult the engine manufacturer's documentation and connect to the ECU with a service tool to determine if the ECU will respond only to communications from a particular CAN Bus Address. Set the CAN Bus address under the CAN Bus 2 (ECU) settings to that value. The CAN Bus address under the CAN Bus 2 (ECU) settings is the Address the DGC claims on the J1939 network.

Inputs and Outputs

Programmable Inputs Do Not Operate as Expected

Step 1. Verify that all wiring is properly connected. Refer to the *Typical Applications* chapter in the *Installation* manual.

Step 2. Confirm that the inputs are programmed properly.

Step 3. Ensure that the input at the DGC-2020HD is actually connected to the BATT– terminal (P4-49).

Programmable Outputs Do Not Operate as Expected

Step 1. Verify that all wiring is properly connected. Refer to the *Typical Applications* chapter in the *Installation* manual.

Step 2. Confirm that the outputs are programmed properly.

Metering/Display

Incorrect Display of Battery Voltage, Coolant Temperature, Oil Pressure, or Fuel Level

Step 1. Verify that all wiring is properly connected. Refer to the *Typical Applications* chapter in the *Installation* manual.

Step 2. Confirm that the sender negative terminals are connected to the negative battery terminal and the engine-block side of the senders. Current from other devices sharing this connection can cause erroneous readings.

Step 3. If the displayed battery voltage is incorrect, ensure that the proper voltage is present between the BATT+ terminal (P4-48) and the sender negative terminals.

Step 4. Verify that the correct senders are being used.

Step 5. Use a voltmeter connected between the BATT– terminal (P4-49) and the sender negative terminals on the DGC-2020HD to verify that there is no voltage difference at any time. Any voltage differences may manifest themselves as erratic sender readings. Wiring should be corrected so that no differences exist.

Step 6: Check the sender wiring and isolate sender wiring from any of the ac wiring in the system. The sender wiring should be located away from any power ac wiring from the generator and any ignition wiring. Separate conduits should be used for sender wiring and any ac wiring.

Incorrect Display of Generator Voltage

Step 1. Verify that all wiring is properly connected. Refer to the *Typical Applications* chapter in the *Installation* manual.

Step 2. Ensure that the proper voltage is present at the DGC-2020HD voltage sensing inputs (P8-86, P8-88, P8-90, and P8-91).

Step 3. Verify that the voltage transformer ratio and sensing configuration is correct.

Step 4. Confirm that the voltage sensing transformers are correct and properly installed.

Incorrect Measurement or Display of Generator Current

Step 1. Verify that all wiring is properly connected. Refer to the *Typical Applications* chapter in the *Installation* manual.

Step 2. Ensure that the proper current is present at the DGC-2020HD current sensing inputs 1, 2, 3, 4, 5, and 6.

Step 3. Verify that the current sensing transformer ratios are correct.

Step 4. Confirm that the current sensing transformers are correct and properly installed.

Incorrect Display of Engine RPM

Step 1. Verify that all wiring is properly connected. Refer to the *Typical Applications* chapter in the *Installation* manual.

Step 2. Verify that the Flywheel Teeth setting is correct.

Step 3. Verify that the prime mover governor is operating properly.

Step 4. Verify that the measured frequency of the voltage at the MPU input (P9-106 and P9-107) is correct.

Step 5. If the MPU is shared with the governor, verify that the polarity of the MPU input to the governor matches the polarity of the MPU input to the DGC-2020HD.

DGC-2020HD Indicates Incorrect Power Factor

Check the rotation of the machine and the labeling of the A-B-C terminals. The machine must be rotating in the same phase sequence as dictated by the generator phase rotation setting for correct power factor metering. A power factor indication of 0.5 with resistive load present is a symptom of incorrect phase rotation.

LCD is Blank and all LEDs are Flashing at Approximately Two-Second Intervals

This indicates that the DGC-2020HD does not detect that valid application firmware is installed. The unit is running its boot loader program, waiting to accept a firmware upload.

Step 1. Start BESTCOMS*Plus*®. Use the top pull-down menu and select File, New, DGC-2020HD.

Step 2. Select Communications, Upload Device Files and select the device package file that contains the firmware you want to upload.

Step 3. Check the boxes for DGC-2020HD Firmware. Click the Upload button to start the upload process.

Ground Faults Detected in Ungrounded System Applications

Step 1: Verify that there is no connection from the neutral connection of the generator to the system ground.

Step 2: Perform insulation resistance tests on the system wiring to check for insulation integrity in the overall system.

Step 3: If ground faults are detected on a DGC-2020HD in an ungrounded system application, it is recommended that potential transformers be employed on the voltage sensing inputs to provide full isolation between the DGC-2020HD and monitored voltage phases.

Step 4: If potential transformers are in place, remove the connectors from the DGC-2020HD one at a time. If removal of a connector removes the ground fault, check the system wiring to that connector and out into the system to verify that connections are secure and all wiring insulation is in good condition.

Generator Breaker and Mains Breaker

Generator Breaker Will Not Close to a Dead Bus

Step 1: Review the description of how the generator breaker logic element functions contained in the GENBRK logic element description in the *BESTlogic™Plus* chapter in the *Configuration* manual.

Step 2: Review the section on breaker close requests in the *Breaker Management* chapter in the *Configuration* manual.

Step 3: Navigate to the Settings, Breaker Management, Breaker Hardware, Gen Breaker screen and set Dead Bus Closure to Enable.

Step 4: Verify that the Generator status is stable. The breaker will not close if the generator status is not stable. Check status by using the Metering Explorer in BESTCOMS*Plus* and verify that when the generator is running, the Generator Stable status LED is lit. If necessary, modify the settings on the Settings, Breaker Management, Bus Condition screen.

Step 5: Verify the bus status is Dead. Check status by using the Metering Explorer in BESTCOMS*Plus* and verify that when the generator is running, the Bus Dead status LED is lit. If necessary, modify the settings on the Settings, Breaker Management, Bus Condition screen.

Step 6: Verify the connections in BESTlogic*Plus* Programmable Logic to the generator breaker logic element. The *Status* input must be driven by an “A” or normally open contact from the generator breaker. The Open and Close command inputs on the left side of the logic block are inputs for open and close commands. These can be wired to physical inputs if it is desired to have open and close command switches. If they are wired, they must either be pulsed inputs, or some logic must be employed so that the open and close command inputs are never driven at the same time. If these are both driven at the same time, the breaker is receiving open and close commands simultaneously. The breaker will not change state if it is being commanded to open and close at the same time.

Step 7: Verify the breaker is receiving a close command. Breaker close command sources are:

- The DGC-2020HD itself when the automatic mains fail transfer (ATS) feature is enabled.
- The DGC-2020HD itself when the Run with Load logic element receives a Start pulse in the programmable logic.
- The DGC-2020HD itself when started from the Exercise Timer and the Run with Load box is checked in the Generator Exerciser settings.
- Manual Breaker Close Input Contacts applied to the Open and Close inputs on the left side of the Generator Breaker logic element in the programmable logic.

Step 8: Verify the wiring to the breaker from the DGC-2020HD. If it appears correct, you can manually close and open by modifying the programmable logic. Map some unused outputs to the Open and Close outputs from the Gen Breaker Block in the programmable logic. Map a virtual switch to the logic output that would normally be the breaker open output. Map another virtual switch to the logic output that would normally be the breaker close output. Connect with BESTCOMS*Plus*, and exercise the virtual switches using the Control panel located in the Metering Explorer. Never turn open and close on at the same time. This could damage the breaker and/or motor operator. If everything is working as expected, restore the logic to its original diagram.

Generator Breaker Does Not Open When It Should

Step 1: Review the description of how the generator breaker logic element functions contained in the GENBRK logic element description in the *BESTlogicPlus* chapter in the *Configuration* manual.

Step 2: Review the section on breaker operation requests in the *Breaker Management* chapter in the *Configuration* manual.

Step 3: Verify the connections in BESTlogic*Plus* Programmable Logic to the generator breaker logic element. The Status input must be driven by an “A” or normally open contact from the generator breaker. The Open and Close command inputs on the left side of the logic block are inputs for open and close commands. These can be wired to physical inputs if it is desired to have open

and close command switches. If they are wired, they must either be pulsed inputs, or some logic must be employed so that the open and close command inputs are never driven at the same time. If these are both driven at the same time, the breaker is receiving open and close commands simultaneously. The breaker will not change state if it is being commanded to open and close at the same time.

Step 4: Verify the breaker is receiving an open command. Breaker open command sources are:

- The DGC-2020HD itself when the automatic transfer (ATS) feature is enabled.
- The DGC-2020HD itself when the Run with Load logic element receives a Stop pulse in the programmable logic.
- The DGC-2020HD itself when shutting down the engine due to an active alarm.
- The DGC-2020HD itself when ending a run session from the Exercise Timer and the Run with Load box is checked in the Generator Exerciser settings.
- Manual Breaker Open Input Contacts applied to the Open and Close inputs on the left side of the Generator Breaker logic element in the programmable logic.

Step 5: Verify the wiring to the breaker from the DGC-2020HD. If it appears correct, you can manually close and open by modifying the programmable logic. Map some unused outputs to the Open and Close outputs from the Gen Breaker Block in the programmable logic. Map a virtual switch to the logic output that would normally be the breaker open output. Map another virtual switch to the logic output that would normally be the breaker close output. Connect with BESTCOMS*Plus*, and exercise the virtual switches using the Control panel located in the Metering Explorer. Never turn open and close on at the same time. This could damage the breaker and/or motor operator. If everything is working as expected, restore the logic to its original diagram.

Mains Breaker Does Not Open When Mains Fails

Step 1: Verify that a Mains Breaker has been configured by examining the settings on the Settings, Breaker Management, Breaker Hardware screen.

Step 2: Verify the mains breaker has been correctly included in the programmable logic.

Step 3: Verify that the Mains Fail Transfer parameter is set to Enabled on the Settings, Breaker Management, Breaker Hardware screen.

Step 4: Verify that a failure of the mains is detected by the DGC-2020HD. Check status using the Metering Explorer in BESTCOMS*Plus* and verify that the Mains Failed status LED is lit when the power on the DGC-2020HD bus voltage input is either out of voltage or frequency range. If necessary, modify the settings on the Settings, Breaker Management, Bus Condition screen to achieve correct detection.

Step 5: Verify the wiring to the breaker from the DGC-2020HD. If it appears correct, you can do a manual close and open by modifying the programmable logic. Map some unused outputs to the Open and Close outputs from the Gen Breaker Block in the programmable logic. Map a virtual switch to the logic output that would normally be the breaker close output. Map another virtual switch to the logic output that would normally be the breaker close output. Connect with BESTCOMS*Plus*, and exercise the virtual switches using the Control panel located in the Metering Explorer. Never turn open and close on at the same time. This could damage the breaker and/or motor operator. If everything is working as expected, restore the logic to its original diagram.

Mains Breaker Does Not Close After Mains Returns

Step 1: Verify that a Mains Breaker has been configured by examining the settings on the Settings, Breaker Management, Breaker Hardware screen.

Step 2: Verify the mains breaker has been correctly included in the programmable logic.

Step 3: Verify that the Mains Fail Transfer parameter is set to Enabled on the Settings, Breaker Management, Breaker Hardware screen.

Step 4: Verify that stable mains power is detected by the DGC-2020HD. Check status using the Metering Explorer in BESTCOMS*Plus* and verify that the Mains Stable status LED is lit when the power on the DGC-2020HD bus voltage input is good. If necessary, modify the settings on the Settings, Breaker Management, Bus Condition screen to achieve correct detection.

Step 5: Verify the wiring to the breaker from the DGC-2020HD. If it appears correct, you can do a manual close and open by modifying the programmable logic. Map some unused outputs to the Open and Close outputs from the Gen Breaker Block in the programmable logic. Map a virtual switch to the logic output that would normally be the breaker open output. Map another virtual switch to the logic output that would normally be the breaker close output. Connect with BESTCOMS*Plus*, and exercise the virtual switches using the Control panel located in the Metering Explorer. Never turn open and close on at the same time. This could damage the breaker and/or motor operator. If everything is working as expected, restore the logic to its original diagram.

Synchronizer

Determining if the Synchronizer is Active

Step 1: Disable the speed trim function.

Step 2: Initiate a breaker close request by one of the methods listed in the *Breaker Management* chapter in the *Configuration* manual.

Step 3: Check for raise and/or lower pulses coming from the DGC-2020HD if the governor or AVR bias control output type is contact.

Step 4: Check the governor and/or AVR bias analog outputs on the DGC-2020HD with a volt meter if the governor or AVR bias control output type is analog.

Step 5: The voltages or raise/lower pulses should be changing when the synchronizer is active. If there are no raise/lower pulses, or if the analog bias voltages do not change, the synchronizer is not active.

Synchronizer Not Active

Step 1: Check style number to verify that the DGC-2020HD has the synchronizer option. If the synchronizer option does not exist in the style number, you may contact Basler Electric and request a style number change.

Step 2: Check status using the Metering Explorer in BESTCOMS*Plus*® and verify that when the generator is running, the Generator Stable status LED is lit and the Bus Stable LED is lit. Adjust the Bus Condition Detection settings accordingly. The synchronizer will never activate if the Bus is Dead or Failed (i.e. not stable).

Step 3: Check that the DGC-2020HD is trying to initiate a breaker closure. To determine the sources of breaker close requests, refer to the *Breaker Management* chapter in the *Configuration* manual.

Synchronizer Active for a Short Time, Then Stops

Step 1: Check if a Sync Fail pre-alarm or a Breaker Close Fail pre-alarm is occurring or has occurred. The synchronizer stops acting when such a pre-alarm occurs. Press the Off button or the Reset button on the DGC-2020HD front panel to clear these pre-alarms.

Step 2: Verify that the Sync Fail Activation delay is sufficiently long to allow the synchronizer to complete the synchronization process.

Step 3: Verify that the Breaker Close Wait time is not too short causing a pre-alarm to occur before the breaker closes when a breaker close is initiated by the DGC-2020HD.

Synchronizer Does Not Lower Engine Speed Allowing Alignment of Bus and Generator

Navigate to the Settings, Programmable Outputs, Analog Output Settings, GOV Output screen and set Speed Response to Decreasing.

Synchronizer Does Not Raise Engine Speed Allowing Alignment of Bus and Generator

Using the front panel HMI, navigate to the Settings > Programmable Outputs > Analog Output Settings > GOV Output screen and change the Speed Response setting from Increasing to Decreasing.

Synchronizer Does Not Lower the Generator Voltage to Achieve Matching of Bus and Generator Voltages

Navigate to the Settings, Programmable Outputs, Analog Output Settings, AVR Output screen and set Voltage Response to Decreasing.

Synchronizer Does Not Raise Generator Voltage to Achieve Matching of Bus and Generator Voltages

Navigate to the Settings, Programmable Outputs, Analog Output Settings, AVR Output screen and change the Voltage Response setting from Increasing to Decreasing.

Speed Bias

Engine Speed Does Not Change When Speed Bias Voltage Changes

Verify that the engine speed will change when the speed bias changes. As a test, you can force a voltage on the speed bias output by setting the Min Output Voltage and Max Output Voltage to the same value by navigating to Settings, Programmable Outputs, Analog Output Settings, GOV Output. If the bias is current based, you can force a fixed current by setting the Governor Output Voltage Minimum and Maximum to the same value by navigating to Settings, Programmable Outputs, Analog Output Settings, GOV Output.

If the speed still does not change when varying the bias:

- Verify that the governor or ECU is equipped and configured to accept bias inputs.
- Check connections to verify the wiring to the governor bias is correct.
- If you have an engine with an ECU, check ECU programming to verify it is set up to accept a speed bias input.

Engine Speed Decreases When Speed Bias is Increased

Navigate to the Settings, Programmable Outputs, Analog Output Settings, GOV Output screen and set Speed Response to Decreasing.

Engine Speed Increases When Speed Bias is Decreased

Navigate to the Settings, Programmable Outputs, Analog Output Settings, GOV Output screen and set Speed Response to Decreasing.

Load Anticipation

Large Frequency Overshoot on Recovery

Kla Gain may be too high and GOV output may be saturated. See Figure 88. Navigate to Settings, Bias Control Settings, Governor Bias Control Settings and decrease Load Anticipation, Kla Gain.

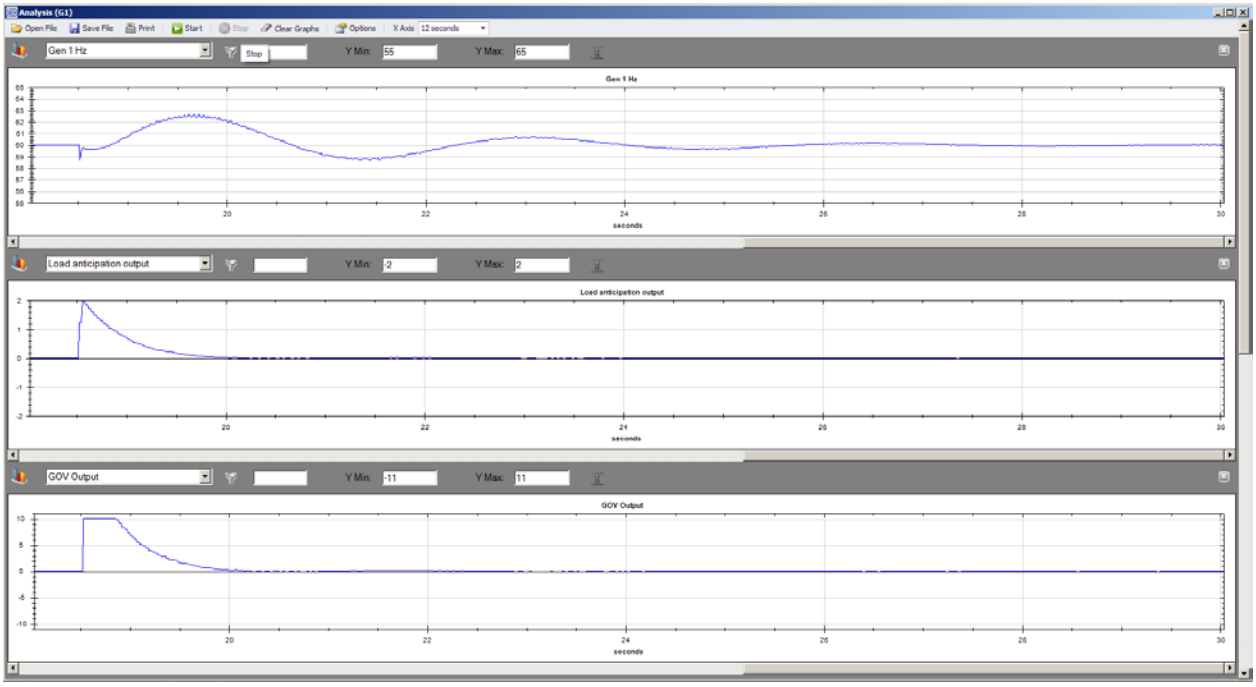


Figure 88. Kla Gain Too High, GOV Output Saturated, Frequency Overshoots on Recovery

Tla Washout Filter Constant may be too high. Load anticipation output bias is held too long and has significant magnitude after frequency reached nominal. See Figure 89. Navigate to Settings, Bias Control Settings, Governor Bias Control Settings and decrease Load Anticipation, Tla Washout Filter Constant.

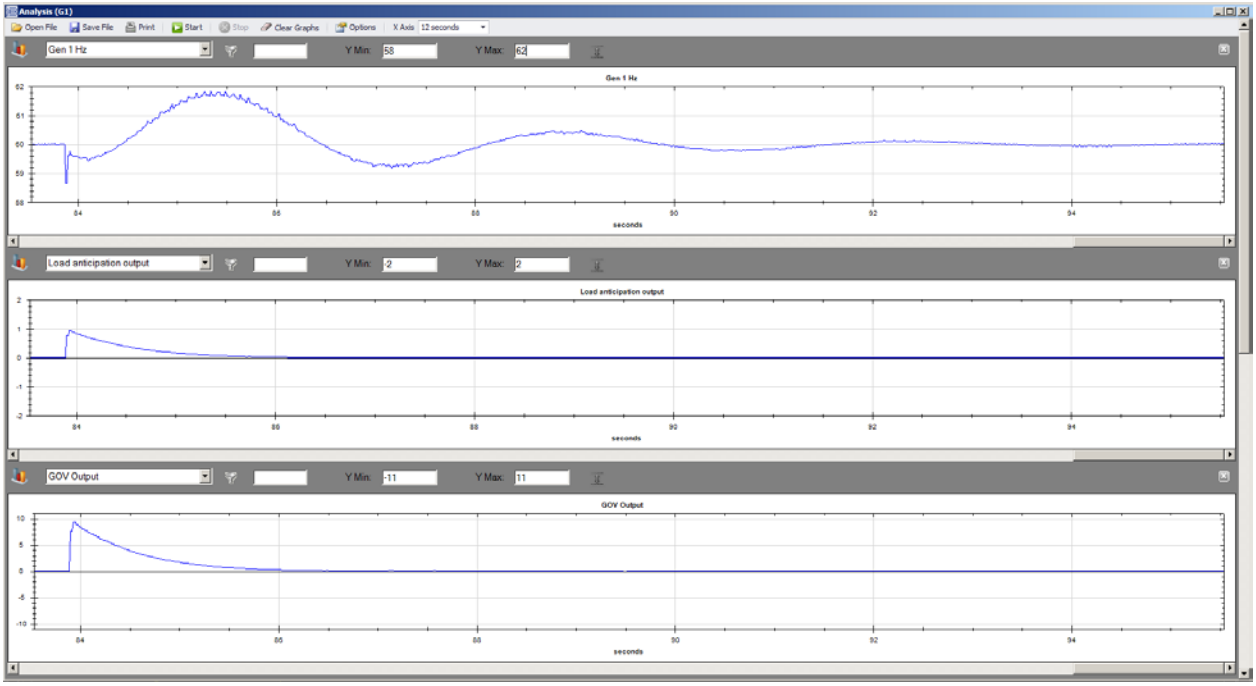


Figure 89. Tla Too High Causing Recovery Overshoot

Poor Recovery

Kla Gain may be too low. See Figure 90. Navigate to Settings, Bias Control Settings, Governor Bias Control Settings and increase Load Anticipation, Kla Gain.

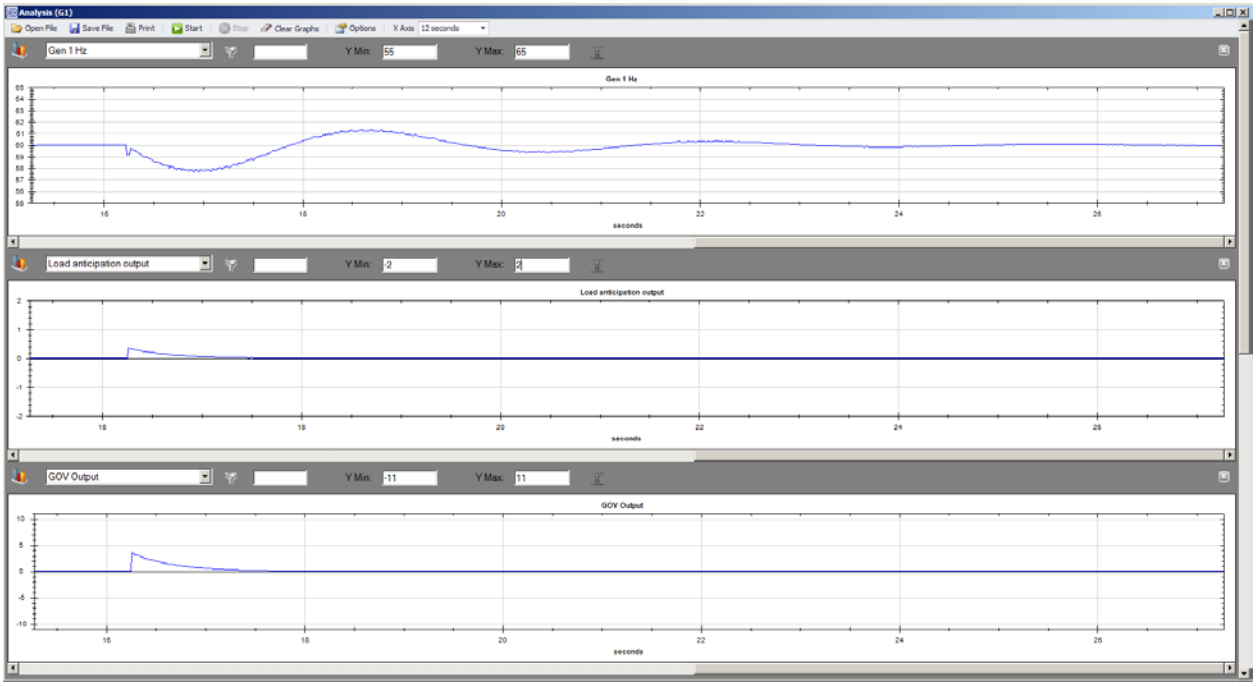


Figure 90. Kla Too Low – Frequency Recovery Improved with ~2 Hz Deviation

Tla Washout Filter Constant may be too low. GOV output decays rapidly before speed dip has finished. See Figure 91. Navigate to Settings, Bias Control Settings, Governor Bias Control Settings and increase Load Anticipation, Tla Washout Filter Constant.

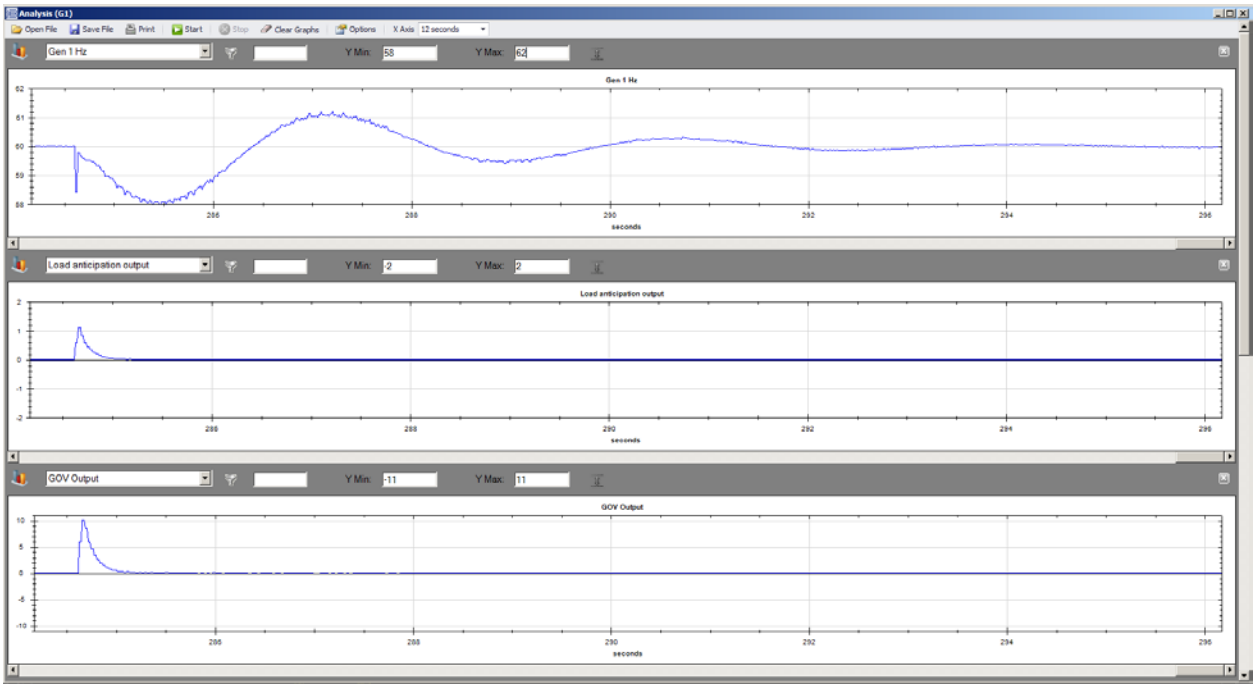


Figure 91. Tla Too Low Causing Poor Recovery

Voltage Bias

Generator Voltage Does Not Change When Voltage Bias Changes

As a test, you can force a fixed voltage on the AVR bias output by setting the Min Output Voltage and Max Output Voltage to the same value by navigating to Settings, Programmable Outputs, Analog Output

Settings, AVR Output. If the bias is current based, you can force a fixed current by setting the Min Output Current and Max Output Current to the same value by navigating to Settings, Programmable Outputs, Analog Output Settings, AVR Output.

If the voltage still does not change when varying the bias:

- Verify that the AVR is equipped and configured to accept bias inputs.
- Check connections to verify the wiring to the AVR bias is correct.
- If you have a digital voltage regulator, verify it is set up and programmed to accept a voltage bias input.

Generator Voltage Decreases When AVR Speed Bias is Increased

Navigate to the Settings, Programmable Outputs, Analog Output Settings, AVR Output screen and set Voltage Response to Decreasing.

Generator Voltage Increases When AVR Bias is Decreased

Navigate to the Settings, Programmable Outputs, Analog Output Settings, AVR Output screen and set Voltage Response to Decreasing.

Load Sharing

Generator Breaker Status is not being received by the DGC-2020HD

Step 1: Close the generator breaker. Verify that the DGC-2020HD sees the status indicating the generator breaker is closed. This is found on the front panel or in BESTCOMS*Plus*® under Metering, Status, Bus Condition, Gen.

Step 2: If the status is not correct, check the digital input status on the DGC-2020HD through which the breaker status is fed. Examine the input with BESTCOMS*Plus*® under Metering, Inputs, Contact Inputs or Metering, Inputs, Remote Contact Inputs.

Step 3: If the input status is correct, but the Gen Breaker status under Metering, Status, Bus Condition, Gen is not, check the PLC logic, and verify that the Gen Breaker fed into the DGC-2020HD is tied in logic to the Status input on the Gen Breaker logic element.

Step 4: Make any corrections and re-check that the status is received correctly.

Generator Runs at Incorrect Speed when Generator Breaker is Closed

Step 1: Verify generator breaker status is being correctly received as described in *Generator Breaker Status is not being received by the DGC-2020HD*. If the status is correct, proceed to the steps below.

Step 2: Check the range set for the DGC-2020HD Governor Bias output by examining the Min. and Max. Output voltage or current settings under Settings, Programmable Outputs, Analog Output Settings, GOV Output. Verify that this range is valid for the governor or engine specified.

Step 3: Perform the tests in *Speed Bias,* above, to verify that setting the output to different values within its range causes engine speed to vary in the desired manner.

Step 4: Measure the voltage or current on the governor analog bias signal from theDGC-2020HD. This signal is found on terminals P6-67 (GOV–) and P6-66 (GOV+). If the output is at the midpoint of its range, the generator should run at rated speed.

Step 5: Check the LS Input parameter on the Load Share Line screen found on the front panel at Metering > Diagnostics > Load Share Line. Check if the normalized value from the Load Share Line screen corresponds to the value measured at DGC-2020HD terminals P6-67 (GOV–) and P6-66 (GOV+). If the normalized value is 0.00, the output should be in the midpoint of its range. If the normalized value is 1.00, the output should be in the maximum point of its range. If the normalized value is –1.00, the output should be in the minimum point of its range. Any other values are scaled within the range. If the normalized value and the measured output do not

match up, either there are wiring errors, or some external device is driving the governor bias signal at the same time as theDGC-2020HD. Correct this conflicting situation if it exists.

Step 6: Check that the signal being measured at the DGC-2020HD terminals P6-67 (GOV–) and P6-66 (GOV+) is carried to the actual governor bias inputs on the engine governor. Measurements should be the same as they were on theDGC-2020HD. If not, correct the wiring errors.

Step 7: Check if there are any relay contacts in the path between the DGC-2020HD governor bias outputs and the engine governor's bias input. Any relay contacts that are used to switch load share lines, governor analog speed bias signals, or voltage regulator analog voltage bias signals must use a relay intended for low voltage, low current applications to preserve signal integrity. Signal relays, not power relays, must be used for this application. Verify the relay contacts are not affecting the signal.

Step 8: If speed trim is enabled, verify that the speed trim set point is at the correct value for desired operation.

Generators Do Not Share Load Equally

Step 1: Verify that load sharing is enabled in Settings, Bias Control, GOV Bias Control, kW Control.

Step 2: Verify generator breaker status is being correctly received as described in *Generator Breaker Status is not being received by the DGC-2020HD*. If the status is correct, proceed to Step 3.

Step 3: Check the Load Share Line operating voltage range by examining the Min. and Max. Voltage parameters found in BESTCOMS*Plus*® under Settings, Multigen Management, Load Share Output. The range must be the same for all machines in the load share system.

Step 4: Measure the Load Share line voltage at terminals P6-70 (LS–) and P6-69 (LS+) on theDGC-2020HD. The same voltage should be present on each DGC-2020HD. If not, correct any issues.

Step 5: Examine the LS Input on the front panel of the DGC-2020HD under Metering > Diagnostics > Load Share Line. This is the voltage read from the load share lines by the DGC-2020. Verify this voltage matches the voltage read with a voltmeter across DGC-2020HD terminals P6-70 (LS–) and P6-69 (LS+). Verify the same LS Input is present on all the machines in the load share system. If they are not equal, examine the load share line wiring and correct any issues.

Step 6: Check if there are any contacts in the load share line path between theDGC-2020HDs. Any relay contacts that are used to switch load share lines, governor analog bias signals, or voltage regulator analog voltage bias signals must use a relay intended for low voltage, low current applications to preserve signal integrity. Signal relays, not power relays, must be used for this application. Verify the relay contacts are not affecting the signal.

Step 7: If there are still issues, disconnect the load share line from the DGC-2020HD. Run a single machine with load, and verify that it loads and unloads correctly, and runs at the correct speed. Repeat for each machine.

Step 8: Re-attach load share lines to all DGC-2020HDs that are part of the load sharing system. Run the Single machine with load, and verify that it loads and unloads correctly, and runs at the correct speed. If the machine slows down when the generator breaker is closed, check the load share line voltage. It should be equal, on a normalized basis, to the normalized kW produced by the generator. As an example, if the generator is loaded to 50% capacity, the Load Share Line voltage should be at the midpoint of the range. If it is not, something is driving the load share line that should not be. The single unit should be the only device driving the load share lines.

Step 9: Disconnect the load share lines from each non-running machine and see if the speed of the running machine is correct. If a particular DGC-2020HD on a non-running machine seems to affect the performance of the running machine, that DGC-2020HD may be damaged such that the Load Share Line contacts are sticking, causing the DGC-2020HD to drive the load share line even though the generator breaker is open. Tap the relays to see if the problem clears up. If so, a faulty DGC-2020HD relay is indicated. Replace the DGC-2020HD, or wire in external

contacts to remove the DGC-2020HD from the load share system when the generator breaker is closed.

Step 10: If it appears that something is driving the load share line but it is not the DGC-2020HD on one of the non-running units, search for an external device that is driving or loading down the load share lines.

Step 11: Repeat the preceding 3 steps for each machine.

Load Sharing Works Correctly, but a Single Unit Slows Down

With all units running, load sharing works correctly, but a single unit slows down after the generator breaker is closed.

Step 1: Disconnect the load share line from the DGC-2020HD. Run the single machine with load, and verify that it loads and unloads correctly, and runs at the correct speed. Repeat for each machine.

Step 2: Re-attach load share lines to all DGC-2020HDs that are part of the load sharing system. Run the Single machine with load, and verify that it loads and unloads correctly, and runs at the correct speed. If the machine slows down when the generator breaker is closed, check the load share line voltage. It should be equal, on a normalized basis, to the normalized kW produced by the generator. As an example, if the generator is loaded to 50% capacity, the Load Share Line voltage should be at the midpoint of the range. If it is not, something is driving the load share line that should not be. The single unit should be the only device driving the load share lines.

Step 3: Disconnect the load share lines from each non-running machine and see if the speed of the running machine is correct. If a particular DGC-2020HD on a non-running machine seems to affect the performance of the running machine, that DGC-2020HD may be damaged such that the Load Share Line contacts are sticking, causing the DGC-2020HD to drive the load share line even though the generator breaker is open. Tap the relays to see if the problem clears up. If so, a faulty DGC-2020HD relay is indicated. Replace the DGC-2020HD, or wire in external contacts to remove the DGC-2020HD from the load share system when the generator breaker is closed.

Step 4: If it appears that something is driving the load share line but it is not the DGC-2020HD on one of the non-running units, search for an external device that is driving or loading down the load share lines.

Step 5: Repeat the preceding 3 steps for each machine.

Group Start and Group Stop Requests

Generator Does Not Start During an Island Group Start Request or Mains Parallel Group Start Request

Step 1: Verify that a Group Start Request is active. In the BESTCOMS*Plus* Metering Explorer, navigate to DGC-2020HD > System Status > Breaker. Examine the Group Start Req column for nonzero entries. Nonzero entries indicate active group start requests.

Step 2: Check that the generator to start is in the same Generator Group in the Group Segment Settings as the breaker generating the Group Start Request. Only generators in the same Generator Group as the Generator Group configured for the breaker issuing the Group Start Request will respond.

Step 3: Verify that the generators to be started are in Auto mode, the System Type under the System Settings is configured as Segmented Bus System, and Sequencing and Demand Start/Stop are enabled.

Step 4: Verify that the generator to be started does not have an active Run with Load Stop as this will supersede Group Start Requests and prevent the generator from starting.

Step 5: If a particular machine is expected to start, but does not, check the sequencing status and verify that the settings are properly configured. Group Start Requests for Start One or Start Demand Based may not start all units because the unit in question may not have been within the set of generators that should have started based on the sequencing criterion.

Generator Does Not Stop During a Group Stop Request

Step 1: Verify that a Group Stop Request is active. In the BESTCOMS*Plus* Metering Explorer, navigate to DGC-2020HD > System Status > Breaker. Examine the Group Stop Req column for nonzero entries. Nonzero entries indicate active group stop requests.

Step 2: Check that the generator to stop is in the same Generator Group in the Group Segment Settings as the breaker generating the Group Stop Request. Only generators in the same Generator Group as the Generator Group configured for the breaker issuing the Group Stop Request will respond.

Step 3: Verify that the generators to be stopped are in Auto mode and Sequencing and Demand Start/Stop are enabled.

Step 4: Verify that the generator to be stopped does not have an active Run with Load Start and is not running due to an applied ATS contact. Either case will supersede Group Stop Requests and prevent the generator from stopping.

DGC-2020HD Front Panel Diagnostics Screens

There are several diagnostic screens in the DGC-2020HD that can be useful for debugging load sharing issues and I/O module related issues. The following debug screens are available: Load Share Line, Control, AEM-2020, CEM-2020, VRM, Mains Power and VRM Control.

Load Share Line

This screen is useful for debugging load share related issues, and kW and var control related issues. It gives visibility into the parameters metered and controlled by the DGC-2020HD.

The Load Share Line diagnostics screen is located on the front panel at Metering > Diagnostics > Load Share Line.

The following parameters are visible on the Load Share Line diagnostics screen:

- LS Input: Voltage the DGC-2020HD sees on its load share line input. Terminals P6-70 (LS–) and P6-69 (LS+). This measurement is useful for debugging load share issues. Normally, all machines that have their generator breakers closed should measure the same voltage for LS Input. If this voltage differs, check for wiring errors, or problems with any relay contacts in the load share line wiring. Any relay contacts that are used to switch load share lines, governor analog speed bias signals, or voltage regulator analog bias signals must use a relay intended for low voltage, low current applications to preserve signal integrity. Signal relays, not power relays, must be used for this application.
- Speed Bias: This is the normalized value to which the DGC-2020HD drives the governor analog bias output. If the value is –1.0, the output will be driven to the minimum value of the governor bias output range. If the value is 1.0, the output will be driven to the maximum value of the governor bias output range. If the value is 0.000, the output will be driven to the midpoint value (i.e. half way between maximum and minimum values) of the governor bias output range. If the generator breaker is open, or if the generator breaker is closed and speed trim and kW control are disabled, the output from the DGC-2020HD will be the midpoint of the range, indicating the generator should run at rated speed. Any relay contacts that are used to switch load share lines, governor analog speed bias signals, or voltage regulator analog voltage bias signals must use a relay intended for low voltage, low current applications to preserve signal integrity. Signal relays, not power relays, must be used for this application.
- Voltage Bias: This is the normalized value to which the DGC-2020HD drives the voltage regulator analog bias output. If the value is –1.0, the output will be driven to the minimum value of the

voltage regulator bias output range. If the value is 1.0, the output will be driven to the maximum value of the voltage regulator bias output range. If the value is 0.00, the output will be driven to the midpoint value (i.e. half way between maximum and minimum values) of the voltage regulator bias output range. If the generator breaker is open, voltage trim and kvar control are disabled, so the output from the DGC-2020HD will be the midpoint of the range, indicating the voltage regulator should operate at rated voltage. Any relay contacts that are used to switch load share lines, governor analog speed bias signal, or voltage regulator analog voltage bias signals must use a relays intended for low voltage, low current applications to preserve signal integrity. Signal relays, not power relays, must be used for this application.

- Watt Demand: This is the normalized kW demand requested by the DGC-2020HD. It is the desired amount of power that the generator produces. It is normalized such that 1.0 indicates the full kW capacity of the generator, 0.5 indicates 50% of the generator's capacity, etc. When the generator breaker is closed, and the kW controller is enabled, the Watt Demand indicates what level of power should be generated. In an island load share system, this will correspond to the value read on the load share lines. If the load share lines are at the 50% point of the load share voltage range, the Watt Demand will be 0.50. If the generator breaker is closed, and the Parallel To Mains logic element is true, the Watt Demand will be equal to the base load set point. When the generator breaker is open or the kW controller is disabled, the Watt Demand will always be equal to the value calculated from the voltage that the DGC-2020HD sees on its load share line.
- kW Total: This is the normalized kW being produced by the generator. A value of 1.0 represents full machine capacity, 0.5 represents 50% of machine capacity, etc.
- Rated kW: This is the rated kW of the machine that should be equal to the Rated kW setting under Settings, System Parameters, Rated Data.
- var Demand: This is the normalized var demand requested by the DGC-2020HD. It is the desired about of var that the generator should produce. It is normalized such that 1.0 indicates the full var capacity of the generator, 0.5 indicates 50% of the generator's capacity, etc. When the generator breaker is closed, and the var/PF controller is enabled, the var demand indicates what level of reactive power should be generated. If the generator breaker is closed, and the Parallel To Mains logic element is true, the var Demand will be equal to the kvar set point (%) if the controller is in var control mode, or will equal the var value that will maintain the machine Power Factor at the PF set point if the controller is in Power Factor mode. When the generator breaker is open or the var/PF controller is disabled, the var Demand will always be 0.0. When running with the generator breaker closed and the Parallel To Mains logic element is false (i.e. the generators are an islanded system), the var Demand will be 0.0 as well. The DGC-2020HD runs in var Droop when on an island system.
- kvar Total: This is the normalized kvar being produced by the generator. A value of 1.0 represents full machine capacity, 0.5 represents 50% of machine capacity, etc.
- Rated kvar: This is the calculated rated kvar of the machine, calculated from the rated kW of the machine and the rated power factor of the machine according to var is equal to the square root of (VA^2 – $Watt^2$).
- Load Share Active: This indicates when the load share line output contacts are closed.

Control

This screen is useful for debugging load share related issues, and kW and var control related issues. It gives visibility into the states of the kW, kvar, Speed Trim, and Voltage controllers in the DGC-2020HD.

The Control diagnostics screen is located on the front panel at Metering > Diagnostics > Control.

The following parameters are visible on the Control diagnostics screen:

- kW Ramp Status: This indicates the current kW ramp direction as None, Up, or Down.
- kW Ramp Demand: This is the normalized kW demand that is ramped from the initial kW loading upon generator breaker closure to the desired kW set point. The rate at which the ramp occurs is set by the Ramp Rate (%) in the Governor Bias Control settings. Note the rate is in terms of percentage of machine capacity, it is not the time to ramp from zero up to the current desired kW

level. Thus, at low loading it may appear that the ramp is skipped. If the system is loaded to only 10% and a unit is brought on line with a ramp rate of 10% per second, it takes only one second to reach 10% of capacity.

- kW Demand: This is the normalized requested kW demand on the generator. It is normalized such that 1.0 indicates the full kW capacity of the generator, 0.5 indicates 50% of the generator's capacity, etc. When the generator breaker is closed, and the kW controller is enabled, the Watt Demand indicates what level of power should be generated. In an island load share system, this will correspond to the normalized value read on the load share lines. If the load share lines are at the 50% point of the load share voltage range, the Watt Demand will be 0.5. If the generator breaker is closed, and the Parallel To Mains logic element is true, the Watt Demand will be equal to the base load set point. When the generator breaker is open or the kW controller is disabled, the Watt Demand will always be equal to the value calculated from the voltage that the DGC-2020HD sees on its load share line.
- Speed PID: This is the output value of the Speed PID controller. It will normally range between -1.0 and 1.0, and will be zero any time the generator breaker is open, unless synchronization is in progress. If the Speed Trim is enabled, the Speed PID will be nonzero when the generator breaker is closed if there is any difference between the machine speed and the Speed Trip Set Point parameter.
- kW PID: This is the output value of the kW PID controller. It will normally range between –1.0 and 1.0, and will be zero any time the generator breaker is open. If the kW Controller is enabled, the kW PID will be nonzero when the generator breaker is closed if there is any difference between the normalized kW generation and the Watt Demand value of the machine. If the kW controller is disabled, the kW PID will always be zero.
- Speed Error: This is the normalized difference between the measured generator frequency and the Speed Trip Set Point. A value of 1.0 means the difference is equal to the speed trip set point; a value of –1.0 means the difference is equal to the negative of the speed trim set point. When the generator breaker is open, or if Speed Trim is disabled, this will always be 0.000 unless synchronization is in progress. When speed trip is enabled, and the generator breaker is closed, this will typically be 0.000 or some relatively small number and move a small amount above and below 0.000 as the speed trim controller corrects for any speed errors.
- kW Error: This is the normalized difference between the measured generator kW generation and the Watt Demand described above. A value of 1.0 means the difference is equal to the Rated kW of the machine; a value of –1.0 means the difference is equal to the negative of the Rated kW of the machine. When the generator breaker is open, or if kW control is disabled, this will always be 0.000. When kW control is enabled, and the generator breaker is closed, this will typically be 0.000 or some relatively small number and move a small amount above and below 0.000 as the kW controller corrects for kW errors. If a load is added or dropped from the system, the error will be a non-zero value until the kW controller brings the kW generation to the desired level.
- Speed Bias: This is the normalized value to which the governor analog bias output of the DGC-2020HD will be driven to accomplish desired kW and speed trim control. It is equal to the sum of the kW PID and the Speed PID. If the value is –1.0, the speed bias output will be driven to the minimum value of the governor bias output range. If the value is 1.0, the output will be driven to the maximum value of the governor bias output range. If the value is 0.00, the output will be driven to the midpoint value (i.e. half way between maximum and minimum values) of the governor bias output range. If the generator breaker is open, or if the generator breaker is closed and speed trim and kW control are disabled, the Speed Bias value will be 0.00, driving the bias output to the midpoint of the governor bias output range indicating the generator should run at rated speed.
- PF Setpoint: This is the power factor setpoint that will be used by the kvar controller when it is in the Power Factor regulation mode.
- var Ramp Status: This indicates the current kvar ramp direction as None, Up, or Down.
- var Ramp Demand: This is the normalized var demand that is ramped from the initial var loading upon generator breaker closure to the desired var output. The rate at which the ramp occurs is

set by the Ramp Rate (%) parameter in the AVR Bias Control settings. Note the rate is in terms of percentage of machine capacity, it is not the time to ramp from zero up to the current desired var level. Thus, at low var loading it may appear that the ramp is skipped. If the system is loaded to only 10% and a unit is brought on line where the load rate is 10% per second, it takes only one second to reach 10% of capacity.

- var Demand: This is the normalized requested kvar demand on the generator. It is normalized such that 1.0 indicates the full kvar capacity of the generator, 0.5 indicates 50% of the generator's capacity, etc. When the generator breaker is closed, and the var/PF controller is enabled, the var Demand indicates what level of reactive power should be generated. In an island load share system, this will be determined by the droop characteristics set by the Droop Percentage and Voltage Droop Gain parameters. If the generator breaker is closed, and the Parallel To Mains logic element is true, the var Demand will be equal to the kvar set point if the var/PF controller is in var mode or it will be calculated from the amount of kW being generated to maintain desired machine Power Factor when the var/PF controller is in Power Factor control mode. When the generator breaker is open, or the var/PF controller is disabled, the var Demand will be zero.
- Volt PID: This is the current output value of the Voltage PID controller. It will normally range between –1.0 and 1.0, and will generally be zero at all times unless synchronization is in progress.
- kvar PID: This is the current output value of the kvar PID controller. It will normally range between –1.0 and 1.0, and will be zero any time the generator breaker is open. If the var/PF controller is enabled, the kvar PID will be nonzero when the generator breaker is closed if there is any difference between the normalized kvar generation and the var Demand value of the machine. If the var/PF controller is disabled, the kvar PID will always be zero.
- Volt Error: This is the normalized difference between the measured generator voltage and the voltage to which the DGC-2020HD is trying to synchronize. It will be 0.00 at all times except when the DGC-2020HD is trying to synchronize its generator inputs to its bus input. When synchronizing, this will typically be 0.000 or some relatively small number and move a small amount above and below 0.000 as voltage controller corrects for any voltage errors.
- kvar Error: This is the normalized difference between the measured generator kvar generation and the var Demand described above. A value of 1.0 means the difference is equal to the Rated kvar of the machine; a value of –1.0 means the difference is equal to the negative of the Rated kvar of the machine. When the generator breaker is open, or if var/PF controller is disabled, this will always be 0.000. When var/PF control is enabled, and the generator breaker is closed, this will typically be 0.000 or some relatively small number and move a small amount above and below 0.000 as the var/PF controller corrects for var errors. If a reactive load is added or dropped from the system, the error will be nonzero until the var/PF controller brings the var generation to the desired level.
- Voltage Bias: This is the normalized value to which the voltage regulator analog bias output of the DGC-2020HD will be driven to accomplish desired kvar and Voltage control. It is equal to the sum of the Volt PID and the kvar PID. If the value is –1.0, the voltage bias output will be driven to the minimum value of the voltage regulator analog bias output range. If the value is 1.0, the output will be driven to the maximum value of the voltage regulator analog bias output range. If the value is 0.000, the output will be driven to the midpoint value (i.e. half way between maximum and minimum values) of the voltage regulator analog bias output range. If the generator breaker is open, or if the generator breaker is closed and kvar control is disabled, the Volt Bias value will be 0.00, driving the bias output to the midpoint of the voltage regulator analog bias output range indicating the voltage regulator should operate the generator at rated voltage.

AEM-2020

This screen shows the binary data that is being sent between the AEM-2020 (Analog Expansion Module) and the DGC-2020HD.

The AEM diagnostics screen is located on the front panel at Metering > Diagnostics > AEM.

The following parameters are visible on the AEM diagnostics screen:

- DGC To AEM BP: DGC-2020HD to AEM-2020 Binary Points. This is a 32-bit, bit packed number representing the binary points transmitted from the DGC-2020HD to the AEM-2020. Debug at this level is not necessary.
- AEM To DGC BP: AEM-2020 to DGC-2020HD Binary Points. This is a 32-bit, bit packed number representing the binary points transmitted from the AEM-2020 to the DGC-2020HD. Debug at this level is not necessary.

CEM-2020

This screen shows the binary data that is being sent between the CEM-2020 (Contact Expansion Module) and the DGC-2020HD.

The CEM diagnostics screen is located on the front panel at Metering > Diagnostics > CEM.

The following parameters are visible on the CEM diagnostics screen:

- DGC To CEM BP: DGC-2020HD to CEM-2020 Binary Points. This is the status of the CEM-2020 output relays being transmitted from the DGC-2020HD to the CEM-2020. This is a 32-bit, bit packed number representing the desired states of the CEM-2020 outputs. The left-most bit is the first output, etc.
- CEM To DGC BP: CEM-2020 to DGC-2020HD Binary Points. This is the status of the CEM-2020 inputs being transmitted from the CEM-2020 to the DGC-2020HD. This is a 32-bit, bit packed number representing the metered states of the CEM-2020 inputs. The left most bit is the first input, etc.

VRM

This screen shows the binary data that is being sent between the VRM-2020 (Voltage Regulator Expansion Module) and the DGC-2020HD.

The VRM diagnostics screen is located on the front panel at Metering > Diagnostics > VRM.

The following parameters are visible on the VRM diagnostics screen:

- DGC To VRM BP: DGC-2020HD to VRM-2020 Binary Points. This is a 32-bit, bit packed number representing the binary points transmitted from the DGC-2020HD to the VRM-2020. Debug at this level is not necessary.
- VRM To DGC BP: VRM-2020 to DGC-2020HD Binary Points. This is a 32-bit, bit packed number representing the binary points transmitted from the VRM-2020 to the DGC-2020HD. Debug at this level is not necessary.

Mains Power

This screen is useful for debugging mains power control mode related issues. It gives visibility into the states of the mains power controller in the DGC-2020HD.

The Mains Power diagnostics screen is located on the front panel at Metering > Diagnostics > Mains Power.

The following parameters are visible on the Mains Power diagnostics screen:

- Total Mains kW: This displays the measured kW level of the mains.
- Error: This is the normalized difference between the measured system generated kW and the kW the DGC-2020HD is trying to achieve.
- Baseload: This displays the commanded baseload to maintain import/export or peak shave level.
- Sys Gen kW: This displays the cumulative kW output of participating generators.
- Sys Rated kW: This displays the total kW capacity of participating generators.
- Total System kW: This displays the cumulative kW output of participating generators summed with the total imported kW from mains.

- Baseload Setpt: This displays the active baseload setpoint.
- Peak Shv Setpt: This displays the active peak shave setpoint.
- Im/Ex Setpt: This displays the active import/export setpoint.

VRM Control

This screen is useful for debugging VRM-2020 control related issues. It gives visibility into the states of the VRM-2020 regulation modes and limiters in the DGC-2020HD.

The VRM Control diagnostics screen is located on the front panel at Metering > Diagnostics > VRM Control.

The following parameters are visible on the VRM Control diagnostics screen:

- VRM AVR Setpoint: This displays the AVR mode setpoint.
- VRM FCR Setpoint: This displays the FCR mode setpoint.
- VRM AVR Ref: This displays the final AVR setpoint (reference) after other factors such as raise/lower biases or an active limiter.
- VRM FCR Ref: This displays the final FCR setpoint (reference) after other factors such as raise/lower biases or an active limiter.
- VRM Control Output: This displays the VRM control output (PID) in per unit.
- VRM AVR Error: This displays the difference between the AVR reference and the measured voltage in per unit.
- VRM FCR Error: This displays the difference between the FCR reference and the measured current in per unit.
- VRM OEL Reference: This displays the calculated OEL reference in per unit of takeover OEL or summing point OEL depending on configuration.
- VRM OEL Takeover Err: This displays the difference between the takeover OEL reference and the measured field current in per unit.
- VRM OEL Summing Err: This displays the difference between the summing point OEL reference and the measured field current in per unit.
- VRM OEL Summing Bias: This displays the OEL Summing control output (PID) in per unit.
- VRM UEL Reference: This displays the calculated UEL reference in per unit.
- VRM UEL Error: This displays the difference between the UEL reference and the measured field current in per unit.
- VRM UEL Bias: This displays the UEL control output (PID) in per unit.
- VRM Tracking Error: This displays the difference of the inactive mode setpoint in relation to the active mode setpoint in percent.
- EDM Ripple: The exciter diode ripple is reported by the exciter diode monitor (EDM) as the induced ripple in the exciter field current.

Revision History

Table 11 provides a historical summary of the changes made to the DGC-2020HD hardware. Application firmware changes are listed in Table 12 and BESTCOMS*Plus*® changes are listed in Table 13. The corresponding revisions made to this instruction manual are summarized in Table 14. Revisions are listed in chronological order.

Table 11. Hardware Revision History

Hardware Version and Date	Change
A, Jan-14	• Initial release
B, Mar-14	• Released firmware version 1.00.02
C, May-14	• Changes invisible to the user
D, May-14	• Released firmware version 1.00.03 and BESTCOMS*Plus* version 3.06.00
E, May-14	• Changes invisible to the user
F,Sep-14	• Changes invisible to the user
G, Sep-14	• Released firmware version 1.00.05 and BESTCOMS*Plus* version 3.08.02
H, Jun-15	• Released firmware version 1.01.00 and BESTCOMS*Plus* version 3.09.00
I	• Version letter not used
J, Aug-15	• Changes invisible to the user
K, Oct-15	• Released firmware versions 1.02.00 and 2.02.00 and BESTCOMS*Plus* version 3.11.00 • Added Color Touch Screen LCD style option.
L, Feb-16	• Changes invisible to the user
M, Sep-16	• Released firmware version 2.03.00 and BESTCOMS*Plus* version 3.15.00
N, Oct-16	• Released firmware version 2.03.03
O	• This revision letter not used
P, Jan-17	• Changed potting material

Table 12. Application Firmware Revision History

Firmware Version and Date	Change
1.00.00, Jan-14	• Initial release
1.00.02, Feb-14	• Added configurable hysteresis settings to generator protection elements • Added Return Timer to Mains Fail Transfer Status screen on DGC-2020HD front panel
1.00.03, Apr-14	• Corrected a firmware conflict with the disconnect timer • Minor firmware improvements
1.00.05, Sep-14	• Changed legacy Modbus registers 94812 bit 22, 94814 bit 12, and 94832 bit 16 for global low coolant level and 94813 bit 24 for global emergency stop alarm
1.01.00, Apr-15	• Added new features and enhancements for complex bus control including current imbalance protection, generator differential protection, automatic mains fail enhancements, Ethernet load sharing enhancements, mains power control modes, kW and var/PF controller enhancements, segmented bus system support, breaker management enhancements, multiple controller breaker operation, auto synchronizer enhancements, seven-day timer, rest timer, configurable alarm levels for protection, contact output text strings on front panel, real-time clock enhancements, selectable event log parameters,

Firmware Version and Date	Change
	configurable protection parameters, remote speed biasing, ability to select whether positive power indicates mains import or generator export, email capabilities, programmable logic enhancements, load shedding, demand start/stop enhancements, breaker power sum • Enhanced J1939 communications • Added ability to enable or disable memory of raise/lower commands • Enhanced voltage trim function • Added various alarms and pre-alarms for Tier 4 Selective Catalytic Reduction (SCR) and Diesel Particulate Filter (DPF) exhaust systems • Added user-programmable initializing message on HMI • Extended activation delay for low battery voltage detection • Increased range of Over and Undervoltage protection • Increased number of configurable protection elements • Added Droop Offset setting for AVR and Governor bias controllers • Added positive and negative ROCOF modes to the 81 function • Improved breaker operation sequence • Modified Raise/Lower speed commands to be bound by the RPM Bandwidth setting • Modified generator protection to be active only when generator is running, where applicable • Improved Reset button operation security • Added an activation delay to prevent nuisance reverse rotation pre-alarms • Improved generator breaker and alarm indication • Improved Engine RPM Modbus™ register • Added name of the generator protection to the alarm on the HMI • Modified Intergenset Communications Fail pre-alarm • Corrected Modbus access level issue • Fixed a few logic points not latching appropriately • Improved arming delay and cooldown mode interaction • Modified exercise timer • Improved real and reactive power ramping in the controllers • Corrected legacy Modbus map • Consolidated configurable protection and metering to a single list • Corrected 81O/U inhibit in single-phase configuration • Improved synchronizer • Shortened Ethernet connection timeout • Improved control sequence during a power cycle • Improved MCS5 protocol interpretation • Improved logic timers resolution • Improved kW and kvar controllers • Increased number of configurable protection elements to 32
2.02.00, Oct-15	• Added Color Touch Screen LCD style option • Added Load Anticipation function • Increased number of Logic Control Relays (LCR) from 16 to 64 • Added Engine ECU Address setting to specify which ECU to correspond with when multiple ECUs are detected on the network • Added support for Volvo EMS2.3 Tier 4 SCR Exhaust System parameter annunciation via proprietary J1939 PGN • Added configurable math functions • Added new system breaker configurations: *Generator and Tie Breaker Control* and *Tie Breaker and Tie Breaker Control* • Added metering screen to display state of all Broadcast Logic elements for all DGC-2020HDs in network

Firmware Version and Date	Change
	• Added metering screen to display state of all Modbus virtual switches. • Added Logic Input Counter Gate element • Added 96 Modbus virtual switches • Added Cylinder Cutout Enable Override logic element • Added setting to enable retention of speed adjustments after shutdown • Added setting to specify normally open or normally closed operation for all programmable contact inputs • Added Weekday of Month mode for generator Exercise Timer • Added hysteresis settings for Low Fuel Alarm and Pre-alarm and High Fuel Level Pre-alarm • Improved redundant Ethernet handling and diagnostic capabilities • Added droop offset setting for AVR and GOV droop modes • Added synchronizer mode selections • Added setting to specify which side of tie breaker is used for power measurements • Added setting to specify ECU or sender as source for coolant temperature and oil pressure data • Added engine hours to the alternating display with the battery voltage and coolant temperature on the front panel overview screen
2.03.00, Jul-16	• Added configuration, protection, limiting, and control support for VRM-2020 Voltage Regulator Expansion Module • Added style option for Load Anticipation function • Added parsing of Proprietary Isuzu Engine ECU J1939 CAN Bus communication to annunciate Tier 4 Exhaust System Parameter Information • Added logic elements for "AVR Lower Limit" and "AVR Upper Limit" • Added Speed Trim and Droop Features • Added Voltage Trim and Droop Features • Added a Logic Element for Analog Load Share Override • Added Settings to configure Run Time Hours Display, Fuel Level Display, and Pre-Alarm annunciation Display on the Overview Screen • Added a setting to allow user to modify the domain name used in emails from Basler products • Added more setpoint adjustment capability to volt trim, speed trim, kW, var, and PF controllers • Added Balanced Engine Hours sequencing mode and use engine hours as secondary sort for Balanced/Staggered Service Time • Added Automatic IP address assignment when no DHCP server available • Added Chinese and Russian language support
2.03.03, Oct-16	• Enhanced readability of monochrome LCD • Changed to prevent issuing of breaker open request on power up when configured as a segmented system
2.03.06, Jan-17	• Changed email formatting so emails are not rejected by some SMTP servers
2.04.00, May-17	• Added configurable DTC detection • Added J1939 battery charger communications • Added Isuzu engine ECU communications • Added minimum and maximum resistance settings to senders • Added logic elements for ECU connect override, kW control inhibit, and kvar control inhibit • Added a setting to enable or disable automatic saving to nonvolatile memory after a Modbus write • Improved time display on HMI

Firmware Version and Date	Change
	• Improved generator exerciser functionality • Improved handling of high Ethernet traffic • Changed so ECU data is parsed all the time CAN Bus is enabled • Changed so the HMI returns to the overview screen after displaying a one-line diagram for 15 minutes • Changed to ramp to a new mode setpoint when changing mains power control mode • Combined ARP Ping detection status into existing Link Loss pre-alarms • Added Daimler CPC4 as an ECU type • Added Crankcase Pressure, Fuel Filter Differential Pressure, and Oil Filter Differential Pressure parsing from CAN Bus and made them available to configurable protection • Increased logic gate limit to 1,024 • Added the capability to add or drop a specific load step from the load shedding table while maintaining coordination in the table • Made currently active DTCs a pop-up metering screen on the HMI • Added 16 more logic timers for a total of 32 • Added 8 more logic counters for a total of 16 • Changed minimum rpm to 25 for Rated rpm, Engine rpm, and Idle rpm • Added EPS Supplying Load to the event log • Added an on-screen keyboard for entering strings on the front panel

Table 13. BESTCOMS*Plus*® Software Revision History

Software Version and Date	Change
3.05.02, Dec-14	• Initial Release
3.05.03, Feb-14	• Updated to support firmware version 1.00.02
3.06.00, May-14	• Maintenance release (BE1-11 changes)
3.07.00, Oct-14	• Removed duplicate results in the device discovery list • Improvements to device directory on Connection screen • Changed to allow a comma in the Device ID • Changed to annunciate a connection failure message when a device is not present on a selected port • Improved prompts to save settings when choosing to close all open views • Changed to allow the middle mouse button to close the security view • Improved display of raw analog input currents • Changed to make BESTlogic*Plus* status LEDs report all logic errors
3.07.03, Jan-15	• Maintenance release (DECS-250 changes)
3.08.00, Feb-15	• Maintenance release (DECS-250 changes)
3.08.02, Mar-15	• Minor regional settings improvement
3.09.00, Apr-15	• Added support for firmware version 1.01.00 (see firmware revision history above) • Analysis view updated with support for 6 plots
3.10.00, Oct-15	• Maintenance release (DECS-150 launch)
3.11.00, Oct-15	• Added support for firmware version 2.02.00 (see firmware revision history above) • Added BESTCOMS*Plus* Settings Loader Tool
3.12.00, Apr-16	• Maintenance release (DECS-250 changes)
3.14.00, Jul-16	• Maintenance release (DECS-250E launch, DECS-150 and BE1-11 changes)

Software Version and Date	Change
3.15.00, Jul-16	• Added support for firmware version 2.03.00 (see firmware revision history above) • Added Chinese and Russian language support • Added Windows 10 compatibility
3.17.00, May-17	• Added support for firmware version 2.04.00 • Added a warning prompt when the Start/Stop buttons are clicked • Changed to allow a maximum of 1,024 gates per logic level with a maximum of 1,024 gates allowed per diagram • Changed to disallow commas in logic labels • Changed to allow firmware upload when unsecured access is set to None

Table 14. Instruction Manual Revision History

Manual Revision and Date	Change
—, Oct-16	• Initial release
A, May-17	• Added support for firmware version 2.04.00 and BESTCOMS*Plus* version 3.17.00 • Added several SPNs broadcast by Woodward PG-Plus Engine ECU

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