DGC-2020ES

Digital Genset Controller

Operation Instruction Manual

12570 Route 143 • Highland, Illinois 62249-1074 USA
Tel +1 618.654.2341 • Fax +1 618.654.2351
www.basler.com • info@basler.com

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Preface

This instruction manual provides information about the operation of the DGC-2020ES. To accomplish this, the following information is provided:

- Controls and indicators
- Operating modes
- Metering
- Reporting and 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 installation or operation.

DGC-2020ES Instruction Manual Catalog

Available instruction manuals for the DGC-2020ES are listed in Table 1.

Table 1. Instruction Manuals

Part Number	Description
9469200993	Quick Start
9469200994	Installation
9469200995	Configuration
9469200996	Operation (this manual)
9469200997	Accessories

12570 State Route 143
Highland IL 62249-1074 USA
www.basler.com
info@basler.com
Tel: +1 618.654.2341
Fax: +1 618.654.2351

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Warning!

READ THIS MANUAL. Read this manual before installing, operating, or maintaining this equipment. 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.

Caution

Installing previous versions of firmware may result in compatibility issues causing the inability to operate properly and may not have the enhancements and resolutions to issues that more recent versions provide. Basler Electric highly recommends using the latest version of firmware at all times. Using previous versions of firmware is at the user's risk and may void the warranty of the unit.

Basler Electric does not assume any responsibility to compliance or noncompliance with national code, local code, or any other applicable code. This manual serves as reference material that must be well understood prior to installation, operation, or maintenance.

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This publication contains confidential information of Basler Electric Company, an Illinois corporation. It is loaned for confidential use, subject to return on request, and with the mutual understanding that it will not be used in any manner detrimental to the interests of Basler Electric Company and used strictly for the purpose intended.

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.

Revision History

A historical summary of the changes made to this instruction manual is provided below. Revisions are listed in reverse chronological order.

Visit https://www.basler.com to download the latest hardware, firmware, and BESTCOMS*Plus*® revision histories.

Instruction Manual Revision History

Manual Revision and Date	Change
D, Nov 2022	• Added metering for Deutz ECU type • Other text edits throughout manual
C, Dec 2021	• Added support for firmware version 1.05.00 and BESTCOMSPlus version 5.02.00 • Updated front-panel display structure and metering screenshots. • Added firmware downgrade caution box
B, Nov 2019	• Removed Rev Letter from all pages • Changed sequential numbering to sectional numbering • Moved Instruction Manual Revision History into Preface • Removed standalone Revision History chapter. (Revision histories for hardware, firmware, and software are now in separate documents on www.basler.com.) • Added support for firmware version 1.04.00 and BESTCOMS*Plus* version 4.01.00
A1, Apr 2019	• Updated Proposition 65 statement
A, Sep 2018	• Updated Revision History chapter
—, Apr 2017	• Initial release

Contents

1 • Controls and Indicators

DGC-2020ES controls and indicators are located on the front panel and are intended for local control and monitoring of DGC-2020ES operation. Front panel controls consist of pushbuttons. Front-panel indicators consist of LED (light emitting diode) indicators and a backlit LCD (liquid crystal display).

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

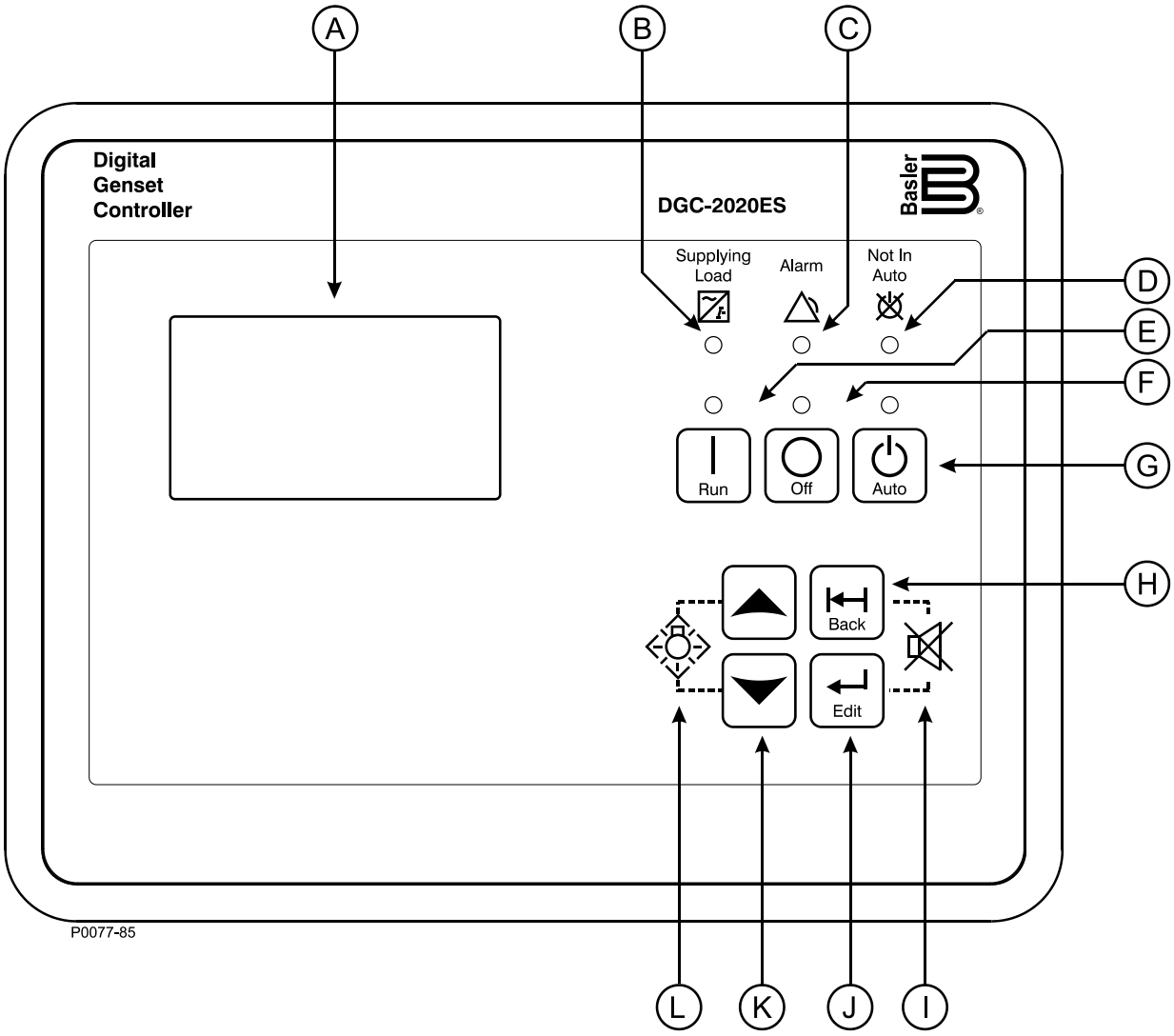


Figure 1-1. Front Panel

Table 1-1. Front-Panel HMI Descriptions

Locator	Description
A	*Liquid Crystal Display.* 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 at –40°C.
B	*Supplying Load Indicator.* This green LED lights when the generator current is greater than Emergency Power Supply (EPS) threshold current.
C	*Alarm Indicator.* This red LED lights continuously during alarm conditions and flashes during pre-alarm conditions.

Locator	Description
D	*Not in Auto Indicator.* This red LED lights when the DGC-2020ES is not operating in Auto mode. When the DGC-2020ES is operating in Run or Off mode, this LED is on.
E	*Run Pushbutton and Mode Indicator.* Pressing this button places the DGC-2020ES in Run mode. The green Run mode LED lights when Run mode is active.
F	*Off Pushbutton and Mode Indicator.* Pressing this button places the DGC-2020ES in Off mode. The red Off mode LED lights when the DGC-2020ES is in Off mode. This button also resets the Breaker Management Pre-Alarms and all *mtu* ECU Alarms.
G	*Auto Pushbutton and Mode Indicator.* Pressing the Auto button places the DGC-2020ES in Auto mode. The green Auto mode LED lights when Auto mode is active.
H	*Back Pushbutton.* This button is pressed to cancel a settings editing session and discard any settings changes. When navigating through menus, pressing this button moves upward a level. When pressed momentarily, this button also 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 Hours Until Maintenance or Maintenance Due Pre-Alarm.
I	*Alarm Silence Pushbutton Combination*. Simultaneously pressing both the *Back* and *Edit* buttons opens the relay output programmed as the horn output.
J	*Edit Pushbutton.* Pressing this button starts an editing session and enables changes to DGC-2020ES settings. At the conclusion of an editing session, the Edit pushbutton is pressed again to save the setting changes. When navigating through menus, pressing this button moves downward one level. When entering a string, such as a password, this button locks the selected character and moves to the next position. When finished, press Edit twice to submit the string.
K	*Arrow Pushbuttons.* These two buttons are used to navigate through the front-panel display menus and modify settings. 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.
L	*Lamp Test Pushbutton Combination*. Simultaneously pressing both the Up- and Down-arrow buttons tests the DGC-2020ES indicators by exercising all LCD pixels and lighting all LEDs for as long as both buttons are held.

Display Operation and Navigation

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

Login and Permissions

To login, navigate to the SETTINGS, ENTER PASSWORD screen and press the *Edit* key. Use the *Up/Down* arrow keys to scroll through the characters. Use the *Edit* key to accept a character and move to the next space. Once the password has been entered, press the *Edit* key again to login. A LOGOUT selection now appears in the list of SETTINGS. To logout, navigate to SETTINGS > LOGOUT and press the *Edit* key. The LOGOUT selection is removed from the SETTINGS list.

If communication access is active through the USB port, the front panel will display REMOTE COMMS, FRONT PANEL IS READ ONLY, and the summary screen. This informs the user that the front panel can only be used for viewing metering data and settings information. USB port access must be ended before modifying settings through the front panel.

If a front-panel key is not pressed for more than 15 minutes, the user is automatically logged out.

Summary Screen and Configurable Metering

The summary screen can be set to standard or scrolling. When set to standard, only the following parameters are displayed:

- VOLT∗
- AMP∗
- PH∗
- Hz
- OIL
- FUEL
- TEMP
- BATT

∗ When set to standard, individual phase information can be automatically toggled at a rate set by the Phase Toggle Delay setting. Navigate to the SETTINGS > GENERAL SETTINGS > FRONT PANEL HMI screen and edit PH TOG DELAY. 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 HMI. 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.

When the summary screen is set to scrolling, you can select/configure the metering values that are displayed. Up to 20 values can be displayed and these values will scroll at a delay time specified by the user. To select a standard or scrolling summary, navigate to the SETTINGS > GENERAL SETTINGS > FRONT PANEL HMI screen and edit the SUMMARY VIEW. The SCROLL DELAY setting is also found on this screen.

To select the scrolling values, navigate to the SETTINGS > GENERAL SETTINGS > FRONT PANEL HMI screen and edit the CONFIGURABLE METERING. The following parameters may be placed in the scrolling summary:

- BATT V
- BLANK (Shows nothing on this line)
- BOOST PRESS
- BUS Hz
- BUS VAB
- BUS VBC
- BUS VCA
- CHRG AIR TMP
- COOLANT PRESS
- DEF1 %
- DEF2 %
- ENGINE % LOAD
- ENG INTCLR TEMP
- ENG OIL TEMP
- FUEL
- FUEL DELV P
- FUEL RATE
- FUEL TEMP
- GEN Hz
- GEN IA
- GEN IB
- GEN IC
- GEN PF
- GEN VAB
- GEN VAN
- GEN VBC
- GEN VBN
- GEN VCA
- GEN VCN
- INJ RAIL PRS
- INTAK MNFLD TMP
- kVA A
- kVA B
- kVA C
- kVA TOT
- kvar A
- kvar B
- kvar C
- kvar TOTAL
- kW A
- kW B
- kW C
- kW LD%
- kWh
- kW TOT
- NONE (Removes a line from the scrolling list)
- OIL P
- RPM
- RPM SRC
- RUN HRS
- TEMP
- TOTAL FUEL USED

Sleep Mode

Sleep mode de-energizes the LCD backlight and heater and turns off the front-panel LEDs when no pushbutton activity is detected for 15 minutes and the DGC-2020ES is 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 will not be entered while an alarm is active. Sleep mode can be permanently disabled through BESTCOMS*Plus*® or the front panel.

One-Line Diagram

A one-line diagram of the breaker hardware configuration can be displayed on the front panel. This diagram changes in real time to reflect the current state of the configured breakers. The one-line diagram is disabled by default. To display the one-line diagram using front panel controls, navigate to Settings > General Settings > Front Panel HMI > One-Line Diagram and enable the setting. If using BESTCOMS*Plus,* navigate to Settings Explorer, General Settings, Front Panel HMI and select Enable on the One-Line Diagram setting.

Once enabled, the one-line diagram appears on both the front-panel Summary and Main Menu screens. The One-Line Diagram Menu screen provides metering for mains fail transfer, generator and bus parameters as well as breaker controls. To access the One-Line Diagram Menu screen, go to the Main Menu and select the one-line diagram as you would a normal menu option and press the *Edit* pushbutton. The one-line diagram, mains fail transfer state (if enabled), generator and bus parameters, and breaker controls are displayed respectively from the top of the menu.

Further mains fail transfer state metering is available by selecting the “MAINSFAIL XFER STATE” and pressing the *Edit* pushbutton. Mains fail transfer state, transfer delay, return delay, and max transfer time are displayed.

To issue a breaker open or breaker close command, select the appropriate menu option, press *Edit* and select ON.

The ONE-LINE DIAGRAM screen options are shown in Figure 1-2.

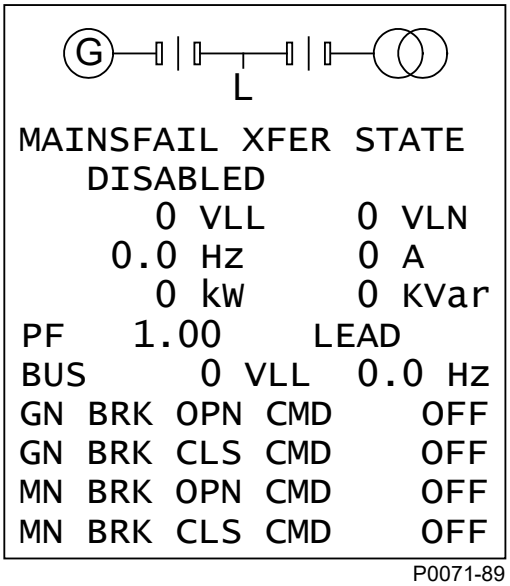
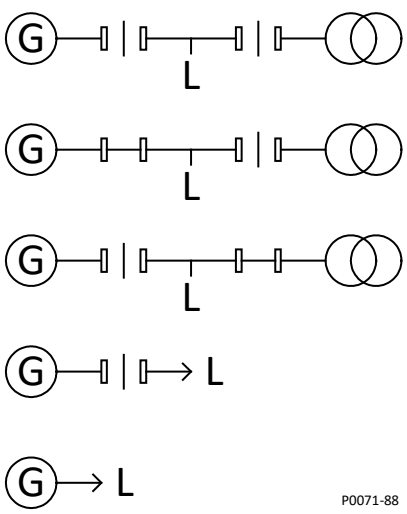


Figure 1-2. One-Line Diagram Menu Options (Available when One-Line Diagram is Enabled)



Generator and mains breakers are configured and both breakers are open.

Generator and mains breakers are configured. The generator breaker is closed and the mains breaker is open.

Generator and mains breakers are configured. The generator breaker is open and the mains breaker is closed.

Generator breaker is configured and open.

No breakers are configured.

Figure 1-3. One-Line Diagram: Breaker Hardware Status Indication

Mains Fail Transfer Status Display

Mains Fail Transfer Status can be viewed from three locations; however, the DGC-2020ES must be equipped with Mains Fail Transfer (style number xx2) and Mains Fail Transfer must be enabled.

To enable Mains Fail Transfer, navigate to Settings > Breaker Management > Breaker Hardware > Mains Fail Transfer using the front panel controls or Settings Explorer, Breaker Management, Mains Fail using BESTCOMS*Plus*.

Mains Fail Transfer Status is displayed on the front panel in Metering > Alarms-Status > Mains Fail Transfer and also on the Breaker Hardware One-Line Diagram screen. It is displayed in BESTCOMS*Plus* on the Metering Explorer, Mains Fail Transfer Status screen.

These screens display the Mains Fail Transfer State and any timers relevant to the mains fail transfer process. These parameters are listed below.

Mains Fail Transfer State: The different mains fail transfer states are described below.

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-2020 is in the OFF or RUN operating mode or in the alarm state.

Transfer Delay: Displays the current timer value in seconds.

Return Delay: Displays the current timer value in seconds.

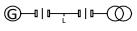
Max Transfer Time: Displays the current timer value in seconds.

Note
The Mains Fail Transfer screen found at Metering > Alarms-Status > Mains Fail Transfer shows only timers that are actively counting and are relevant to mains fail transfer. They are not otherwise visible.

Changing a Setting

To change a setting, navigate to the setting you want to change and press the *Edit* key. If you are not already logged in, you will be prompted for your password. Use the *Up/Down* arrow key to raise or lower the value. Press the *Edit* key again when finished.

Front-Panel Display Structure

The front-panel display structure begins with the SUMMARY SCREEN. Pressing the *Edit* key opens the MAIN MENU screen. The MAIN MENU screen consists of METERING, SETTINGS and, when enabled, the ONE-LINE DIAGRAM, indicated by this symbol:  . The METERING screen branches are shown in Figure 1-4. Details of the METERING screen branches follow Figure 1-4. The SETTINGS screen branches are shown in Figure 1-5. Details of the SETTINGS screen branches follow Figure 1-5.

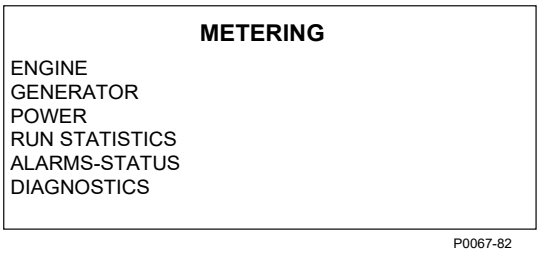


Figure 1-4. Metering Screen Branches

ENGINE

- **OIL PRESSURE**
- **COOLANT TMP**
- **BATTERY VOLT**
- **RPM**
- **SPEED SRC**
- **FUEL LEVEL**
- **ENGINE LOAD**
- **COOLANT LEVL** (Visible when CAN Bus is enabled.)
- **RUN HOURS**
- **ENGINE RUN TM SRC**
- **HRS TO MAINT**
- **DEF TANK 1 LVL %** (Visible when CAN Bus is enabled.)
- **DEF TANK 2 LVL %** (Visible when CAN Bus is enabled.)
- **REQUESTED RPM**
- **REQ ACCL PEDAL** (Visible when the selected ECU type is Volvo Penta.)
- **REQ SPEED BIAS** (Visible when the selected ECU type is Cummins.)

GENERATOR

- **GEN CONNECT**
- **GEN VAB**
- **GEN VBC**
- **GEN VCA**
- **GEN VAN**
- **GEN VBN**
- **GEN VCN**
- **GEN FREQ**
- **GEN AMPS A**
- **GEN AMPS B**
- **GEN AMPS C**
- **BUS CONNECT**
- **BUS VAB**
- **BUS FREQ**

POWER

- **kW A**
- **kW B**
- **kW C**
- **kW TOTAL**
- **kVA A**
- **kVA B**
- **kVA C**
- **kVA TOTAL**
- **kvar A**
- **kvar B**
- **kvar C**
- **kvar TOTAL**
- **PF**

RUN STATISTICS

- **CUMULATIVE**
  - CUMULATIVE
    - START
    - # STARTS
    - HRS TO MAINT
    - kW-HRS
  - TOTAL RUN TIME
    - HOURS
    - MINUTES
    - ENGINE RUN TM SRC
  - LOADED RUN TIME
    - HOURS
    - MINUTES
  - UNLOADED RUN TIME
    - HOURS
    - MINUTES
- **SESSION**
  - SESSION
    - START
    - kW-HRS
  - TOTAL RUN TIME
    - HOURS
    - MINUTES
  - LOADED RUN TIME
    - HOURS
    - MINUTES
  - UNLOADED RUN TIME
    - HOURS
    - MINUTES

ALARMS-STATUS

- **ACTIVE ALARMS**
- **ACTIVE PRE-ALARMS**
- ***mtu* FAULT CODES** (Visible when ECU is configured for *mtu* MDEC, *mtu* ADEC, *mtu* ECU7/ECU8 or *mtu* Smart Connect.)
- ***mtu* STATUS** (Visible when ECU is configured for *mtu* MDEC, *mtu* ADEC, *mtu* ECU7/ECU8, or *mtu* Smart Connect.)
  - NMT-ALIVE STATUS (Visible when ECU is configured for *mtu* MDEC or *mtu* ECU7/ECU8.)
    - SPS_NODE
    - SW_TYP
    - SW_VAR
    - SW_ED1
    - SW_ED2
    - REV
    - SW_MOD

- TRIP FUEL (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - TRIP HRS
  - TRIP IDLE HRS
  - FUEL RATE
  - TRIP FL RATE
  - TOTAL RUN TM
  - DAILY FUEL
  - TOTAL FUEL
- FUEL (Visible when ECU is configured for *mtu* ADEC.)
  - DAY TANK LVL
  - STORE TANK LVL
- ENGINE STATUS (Visible when ECU is configured for *mtu* ADEC, *mtu* ECU7/ECU8, or *mtu* Smart Connect.)
  - *mtu* FAULT CODES
  - ENG RUNNING
  - CYL CUTOUT
  - ENG OPTIMIZED (Visible when ECU is configured for *mtu* ADEC or *mtu* ECU7/ECU8.)
  - PREHT NT RCHD (Visible when ECU is configured for *mtu* ADEC or *mtu* ECU7/ECU8.)
  - SPEC TORQUE (Visible when ECU is configured for *mtu* ADEC or *mtu* ECU7/ECU8.)
  - SPD DMD FL MD (Visible when ECU is configured for *mtu* ADEC.)
  - CURR P DEGREE (Visible when ECU is configured for *mtu* ADEC.)
  - LOAD GEN ON (Visible when ECU is configured for *mtu* ADEC, *mtu* ECU7/ECU8, or *mtu* Smart Connect.)
  - PRIME PUMP ON (Visible when ECU is configured for *mtu* ADEC.)
  - RUNUP SPD LO (Visible when ECU is configured for *mtu* ADEC.)
  - IDLE SPD LO (Visible when ECU is configured for *mtu* ADEC.)
  - CYL CUTOUT CD (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - RPM (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - DROOP % (Visible when ECU is configured for *mtu* ECU7/ECU8 or *mtu* Smart Connect.)
  - ENG COOL TEMP (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - CHRG AIR TMP (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - INTRCOOLR TEMP (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - ENG OIL TEMP (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - FUEL TEMP (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - ECU TEMP (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - OIL PRESSURE (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - CHG AIR P (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - FUEL DELV P (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - FL RAIL P (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - CAMSHAFT RPM (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - IDLE RPM (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - ECU SHUTDOWN (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - TOTAL RUN TM (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - ECU SUPP VOLTS (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - INJCT DBR % (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - RATED RPM (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - INJCT QTY (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - RATED KW (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - RESRV PWR % (Visible when ECU is configured for *mtu* ECU7/ECU8.)
  - START SEQ (Visible when ECU is configured for *mtu* ECU7/ECU8 or *mtu* Smart Connect.)
  - ECU OVRD FDBK (Visible when ECU is configured for *mtu* Smart Connect.)
  - COOLNT PRHT DONE (Visible when ECU is configured for *mtu* Smart Connect.)
  - REQ TORQUE (Visible when ECU is configured for *mtu* Smart Connect.)
  - EXT STOP (Visible when ECU is configured for *mtu* Smart Connect.)
  - OPERATING MODE (Visible when ECU is configured for *mtu* Smart Connect.)
- SPEED (Visible when ECU is configured for *mtu* ADEC, *mtu* ECU7/ECU8, or *mtu* Smart Connect.)
  - SPD DMD SRC
  - CAN SPD DMD
  - ANLG SPD DMD
  - SPEED DEMAND (Visible when ECU is configured for *mtu* Smart Connect.)
  - SEL SPD DMD (Visible when ECU is configured for *mtu* ADEC or *mtu* ECU7/ECU8.)
  - EFF SET SPEED (Visible when ECU is configured for *mtu* ADEC or *mtu* ECU7/ECU8.)
  - SPD DMD FL MD (Visible when ECU is configured for *mtu* ECU7/ECU8 or *mtu* Smart Connect.)
  - RATED RPM (Visible when ECU is configured for *mtu* ECU7/ECU8.)

        - RPM (Visible when ECU is configured for *mtu* ECU7/ECU8.)
        - CAMSHAFT RPM (Visible when ECU is configured for *mtu* ECU7/ECU8.)
        - IDLE RPM (Visible when ECU is configured for *mtu* ECU7/ECU8.)
        - FREQ RPM DMD (Visible when ECU is configured for *mtu* ECU7/ECU8.)
    - SIGNL FEEDBK (Visible when ECU is configured for *mtu* ADEC, *mtu* ECU7/ECU8, or *mtu* Smart Connect.)
        - ECU_OVRD_FDBK
        - EXT STOP
        - SPD UP IN
        - SPD DN IN
        - CAN MODE FDBK (Visible when ECU is configured for *mtu* ADEC or *mtu* ECU7/ECU8.)
        - CYL CUTOUT (Visible when ECU is configured for *mtu* ECU7/ECU8.)
    - DIAGNOSTICS (Visible when ECU is configured for *mtu* ECU7/ECU8.)
        - AL PWR AMP 1
        - AL PWR AMP 2
        - XSTR OUT AL
        - XSTR OUT STS
        - ECU SHUTDOWN
    - CAN BUS (Visible when ECU is configured for *mtu* ECU7/ECU8.)
        - CAN MODE FDBK
        - CAN NODES
        - LOST NODES
    - LIMITS (Visible when ECU is configured for *mtu* ECU7/ECU8.)
        - OIL PRESSURE
        - LO LIM OILP
        - LOLOLIM OILP
        - ENG COOL TEMP
        - CLNT LMT HI
        - CLNT LMT HIHI
        - CHRG AIR TMP
        - CHG AIR LMT HI
        - ECU SUPP VOLTS
        - L1L ECU VOLTS
        - L2L ECU VOLTS
        - U1L ECU VOLTS
        - U2l ECU VOLTS
        - INTRCOOLR TMP
        - INTCLR LMT HI
- **STATUS**
    - AUTO XFER SWITCH (Visible when the Auto Transfer Switch programmable function is configured to be driven by an input.)
        - AUTO XFER SWITCH
        - COMPLEMENTARY MODE
        - ATS N.O. INPUT
        - ATS N.C. INPUT
        - ATS CIRCUIT ERROR
        - ATS PROGFN STATUS
    - EPS SUPP. LOAD
    - GEN BREAKER
    - MAINS BREAKER
    - BATTLE OVERRIDE (Visible when the Battle Override programmable function is configured to be driven by an input.)
    - LOW LINE OVERRIDE (Visible when the Low Line Override programmable function is configured to be driven by an input.)
    - LOW COOL LEVEL (Visible when the Low Coolant Level programmable function is configured to be driven by an input.)
    - LOW FUEL LEVEL (Visible when the Low Coolant Level programmable function is configured to be driven by an input.)
    - BATT CHRG FAIL (Visible when the Battery Charger Fail programmable function is configured to be driven by an input.)
    - FUEL LEAK DETECT (Visible when the Fuel Leak Detect programmable function is configured to be driven by an input.)
    - GRND DELTA O-RIDE (Visible when Generator Connection is configured for Delta and the Grounded Delta Override programmable function is configured to be driven by an input.)

    - 1 PHASE O-RIDE (Visible when the 1-Phase Override programmable function is configured to be driven by an input.)
    - BUS DEAD
    - BUS STABLE
    - BUS FAILED
    - GEN DEAD
    - GEN STABLE
    - GEN FAILED
    - ENG RUNNING
    - CLDN TMR ACTVE
    - OFF MODE COOLDN
    - COOLDN REQ
    - COOL & STOP REQ
    - EXT START DEL
    - START DEL BYPASS
    - ALT FRQ O-RIDE
    - RESET
    - ALARM SILENCE
    - LAMP TEST
    - IDLE REQUEST
    - LOAD TAKEOVER
    - MAINS FAIL TEST
    - CEM CONNECTED
    - MF TRANSFER INHBT
    - AUTO BRKR OP INH
- **INPUTS**
    - INPUT X (X = 1 to 7 (8 to 17 optional))
- **OUTPUTS**
    - START
    - RUN
    - PRESTART
    - OUTPUT X (X = 1 to 4 (5 to 28 optional))
- **LOGIC CTL RELAYS**
    - LCR X (X = 1 to 16)
- **CONF ELEMENTS**
    - CONFIG ELEMENT X (X = 1 to 8)
- **EVENT LOG**
    - [EVENT NAME]
        - ACTIVE
        - OCCURRENCE COUNT
        - FIRST DATE
        - FIRST TIME
        - LAST DATE
        - LAST TIME
        - FIRST ENG HRS
        - LAST ENG HRS
        - DETAILS
            - OCCURRENCE (Use the *Edit/Up/Down* keys to change the occurrence.)
            - DATE
            - TIME
            - ENG HRS
        - CLEAR EVENT (Visible when logged in through the front panel.)
- **J1939 DATA** (Visible when CAN bus is enabled and ECU is configured for Standard, Volvo Penta, *mtu* ADEC, GM/Doosan, Cummins, *mtu* Smart Connect, Scania, or John Deere.)
    - ENGINE ECU ADDR
    - THROTTLE POSITN
    - LOAD @ CRNT RPM
    - ACTUAL ENG TORQ
    - ENGINE SPEED
    - DESIRED SPEED
    - INJ CNTRL PRESS
    - INJ RAIL PRS
    - ENGINE HOURS
    - TRIP FUEL
    - TRIP AVE FL RT

- TOTAL FUEL USED
- ENG COOLANT TEMP
- COOLNT PRHT DONE
- FUEL TEMP
- ENG OIL TEMP
- ENG INTCLR TEMP
- INTRCR CLNT LVL
- FUEL DELV P
- ENG OIL LEVEL
- ENG OIL PRESS
- COOLANT PRESS
- COOLANT LEVEL
- FUEL RATE
- BAROMETRIC PRESS
- AMB AIR TEMP
- AIR INLET TEMP
- BOOST PRESS
- INTAK MNFLD TEMP
- INTAK MNFLD1 ABS PRESS
- AIR FLTR DIF PRS
- EXHAUST GAS TEMP
- BATTERY VOLTAGE
- ECU INPUT VOLTS
- TRANS OIL PRESS
- TRANS OIL TEMP
- WINDG 1 TEMP
- WINDG 2 TEMP
- WINDG 3 TEMP
- ECU TEMP
- AUX PRESSURE1
- AUX PRESSURE2
- RATED KW
- RATED RPM
- EXHAUST TMP A
- EXHAUST TMP B
- AFT1 DPF OUT TEMP
- CHRG AIR TMP
- FUEL 1 LEAK
- FUEL 2 LEAK
- ALARM RST FDBK
- ECU SHUTDOWN
- DEF TANK 1 LVL %
- DEF TANK 2 LVL %
- DPF SOOT LEVEL %
- DPF ASH LEVEL %
- CRANKCASE PRESSURE
- FUEL FLT DF PRS
- OIL FLTR DIFF PRS
- DOC INLET TEMP
- DOC OUTLET TEMP

- **J1939 ENGINE CONFIG** (Visible when CAN bus is enabled and ECU is configured for Standard, Volvo Penta, *mtu* ADEC, GM/Doosan, Cummins, or *mtu* Smart Connect.)
  - SPD @ IDLE PNT 1
  - TRQ @ IDLE PNT 1
  - SPD @ PNT 2
  - TRQ @ PNT 2
  - SPD @ PNT 3
  - TRQ @ PNT 3
  - SPD @ PNT 4
  - TRQ @ PNT 4
  - SPD @ PNT 5
  - TRQ @ PNT 5
  - SPD @ PNT 6
  - ENDSPEED GOV KP
  - REF ENG TORQUE

    - O-RIDE SPD PNT 7
    - O-RIDE TIME LMT
    - SPEED LOWER LMT
    - SPEED UPPER LMT
    - TORQUE LOWER LMT
    - TORQUE UPPER LMT
- **J1939 ECU LAMP STATUS**
    - WARNING LAMP
    - RED LAMP
    - PROTECT LAMP
    - MALFUNC LAMP
- **J1939 ACTIVE DTC**
- **J1939 PREV DTC**
- **J1939 DTC CLEAR**
    - CLEAR ACTIVE DTCS
    - CLEAR PREV DTCS
- **ISUZU STATUS** (Visible when CAN bus is enabled and ECU is configured for Isuzu)
    - DPF AMBER LAMP
    - DPF GREEN LAMP
    - DPF MODE
- **YANMAR STATUS** (Visible when CAN bus is enabled and ECU is configured for Yanmar)
    - REGEN STATUS
    - EGR STATUS
    - AMB AIR TEMP
    - INTK MANIFLD PRESSURE
    - EXH MANIFOLD PRESSURE
    - DOC INLET TEMP
    - DOC OUTLET TEMP
    - DPF SOOT LEVEL %
    - DPF ASH LEVEL %
    - REGEN INTRLK STATUS
    - REGEN MODE
    - REGEN REQ FLG
    - ASH CLEAN REQ
- **DEUTZ STATUS**
    - EPA PGN1
        - RESTRICTN DEF LEVEL
        - DEF LEVEL
    - EPA PGN2
        - RESTRICTN DEF QUALITY
    - EPA PGN3
        - INDUCEMENT REASON
- **MAINS FAIL TRANSFER** (Visible when DGC-2020ES style number is xx2 and Mains Fail Transfer is enabled.)
    - **MAINSFAIL XFER STATE**
        - **DISABLED** (The possible mains fail transfer states are as follows: Power From Mains, Transfer Timer Active, Transferring to Gens, Power From Gens, Return Timer Active, Transferring to Mains, Disabled (when DGC is in OFF or RUN modes, or in the alarm state))
    - **TRANSFER DELAY** (Visible when actively counting and relevant to mains fail transfer.)
    - **RETURN DELAY** (Visible when actively counting and relevant to mains fail transfer.)
    - **MAX TRANSFER TIME** (Visible when actively counting and relevant to mains fail transfer.)

DIAGNOSTICS

- **FLASH WR**

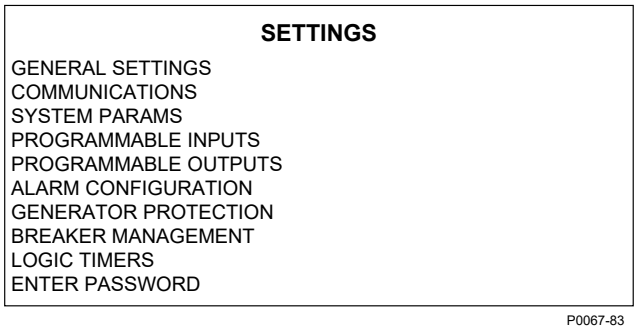


Figure 1-5. Settings Screen Branches

GENERAL SETTINGS

- **FRONT PANEL HMI**
  - SUMMARY VIEW
  - SCROLL DELAY
  - PH TOG DELAY
  - LCD CONTRAST
  - SLEEP MODE
  - LANGUAGE
  - CONFIGURABLE METERING
    - ITEM X (X = 1 to 20)
  - ONE LINE DIAGRAM
  - ENG HRS DISPLAY
  - OVERVIEW
  - EXH DISPLAY
  - EXH DISPL SCRN
  - BATT CHG DISPLAY
  - DISPLAY FL LEVEL BELOW
  - DEF DISPLAY
  - BATTERY/RPM DISPLAY
- **CONFIGURE DATE/TIME**
  - YEAR
  - MONTH
  - DAY
  - HOURS
  - MINUTES
  - SECONDS
  - UTC OFFSET
  - DST ENABLED
  - CLK NOT SET WRN
- **VIEW DATE/TIME**
- **VERSION INFO**
  - DGC-2020ES
    - FIRMWARE VERSION
    - BOOT CODE VERSION
    - SERIAL NUMBER
    - PART NUMBER
    - MODEL NUMBER
    - LANGUAGE VERSION
    - LANGUAGE PART NUM
    - FONT VERSION
    - FONT PART NUM
    - STYLE CODE
  - CEM-2020 (Visible when CEM-2020 is enabled.)
    - FIRMWARE VERSION
    - BOOT CODE VERSION

- SERIAL NUMBER
- PART NUMBER
- MODEL NUMBER
- BUILD DATE

COMMUNICATIONS*

*(Visible when the optional J1939 CAN bus is enabled, style code xCx.)

- **CAN BUS SETUP**
  - CAN BUS SETUP
    - CAN BUS ENABLE
    - DTC ENABLE (Visible when CAN BUS is enabled.)
    - SPN CONV METHOD (Visible when CAN BUS is enabled.)
    - CAN BUS ADDR (Visible when CAN BUS is enabled.)
    - ENGINE ECU ADDRESS (Visible when CAN BUS is enabled.)
    - ECU OPT SLCT (Visible when CAN BUS is enabled.)
    - ECU PULSING (Visible when CAN BUS is enabled.)
    - ENG SHTDN TM (Visible when CAN BUS is enabled.)
    - PLS CYCL TM (Visible when CAN BUS is enabled.)
    - ECU SET TM (Visible when CAN BUS is enabled.)
    - RESP TIMEOUT (Visible when CAN BUS is enabled.)
    - COOL TEMP SRC (Visible when CAN BUS is enabled.)
    - OIL PRESS SRC (Visible when CAN BUS is enabled.)
    - ENGINE RUN TM SRC (Visible when CAN BUS is enabled.)
  - ECU SETUP (Visible when CAN BUS is enabled.)
    - ECU CONF
    - CUMMINS ECU SETUP
      - CUMMINS GEN CONTROL
    - ISUZU ECU SETUP
      - CLEAR ECU MEMORY
      - ESCAPE MODE
    - YANMAR ECU SETUP
    - NUMBER OF CYLINDERS
    - GEN DATA TRANSMIT
    - ENGINE PARAM XMT
    - TRIP RESET (Visible when ECU is configured for Standard, Volvo Penta, *mtu* ADEC, GM/Doosan, Cummins, or *mtu* Smart Connect.)
    - START MODE
    - DPF REGENRATE SETUP (Visible when ECU is configured for Standard, Volvo Penta, *mtu* ADEC, GM/Doosan, Cummins, or *mtu* Smart Connect.)
      - DPF MANUAL REGEN
      - DPF REGEN DISABLE
    - BATT CHARGER SETUP
      - CHARGER 1 TYPE
      - CHARGER 2 TYPE
    - BATT CHARGR PREALARMS
      - CH1 COMMS FAIL
      - CH1 BATTERY FAIL
      - CH1 CHARGER FAIL
      - CH1 AC OFF
      - CH2 COMMS FAIL
      - CH2 BATTERY FAIL
      - CH2 CHARGER FAIL
      - CH2 AC OFF
    - SENS CHARGR PREALARMS
      - CH1 THERMAL LIMIT (Visible when CHARGER 1 TYPE is set to SENS)
      - CH1 HI DC VOLTS (Visible when CHARGER 1 TYPE is set to SENS)
      - CH1 LOW DC VOLTS (Visible when CHARGER 1 TYPE is set to SENS)
      - CH1 LO CRANK V (Visible when CHARGER 1 TYPE is set to SENS)
      - CH1 INVLD SETTINGS (Visible when CHARGER 1 TYPE is set to SENS)
      - CH1 SNGL UNIT FL (Visible when CHARGER 1 TYPE is set to SENS)
      - CH2 THERMAL LIMIT (Visible when CHARGER 2 TYPE is set to SENS)
      - CH2 HI DC VOLTS (Visible when CHARGER 2 TYPE is set to SENS)
      - CH2 LOW DC VOLTS (Visible when CHARGER 2 TYPE is set to SENS)

        - CH2 LO CRANK V (Visible when CHARGER 2 TYPE is set to SENS)
        - CH2 INVLD SETTINGS (Visible when CHARGER 2 TYPE is set to SENS)
        - CH2 SNGL UNIT FL (Visible when CHARGER 2 TYPE is set to SENS)
    - SPEED SELECT (Visible when ECU is configured for Volvo Penta.)
    - ACCEL POSITION (Visible when ECU is configured for Volvo Penta.)
    - MODULE TYPE (Visible when ECU is configured for *mtu* MDEC or *mtu* ECU7/ECU8.)
    - ALIVE MSG (Visible when ECU is configured for *mtu* MDEC or *mtu* ECU7/ECU8.)
    - SPEED SETUP
        - J1939 RPM ENABLE (Visible when ECU is configured for Standard, Volvo Penta, *mtu* ADEC, GM/Doosan, Cummins, or *mtu* Smart Connect.)
        - ENGINE RPM
        - SAVE RPM ADJUSTS
        - RPM BAND WIDTH
        - IDLE RPM
        - RPM CHECKSUM
        - SPEED UP (Visible when ECU is configured for *mtu* ADEC, *mtu* MDEC 304, *mtu* ECU7/ECU8, or *mtu* Smart Connect.)
        - SPEED DN (Visible when ECU is configured for *mtu* ADEC, *mtu* MDEC 304, *mtu* ECU7/ECU8, or *mtu* Smart Connect.)
        - TEST OVRSPEED (Visible when ECU is configured for *mtu* ADEC, *mtu* MDEC 304, *mtu* ECU7/ECU8, or *mtu* Smart Connect.)
        - SPD DMAND SRC (Visible when ECU is configured for *mtu* ADEC, *mtu* MDEC 304, *mtu* ECU7/ECU8, or *mtu* Smart Connect.)
        - IDLE REQUEST (Visible when ECU is configured for *mtu* MDEC 304, *mtu* ECU7/ECU8, or *mtu* Smart Connect.)
        - INCREASE IDLE (Visible when ECU is configured for *mtu* MDEC 304, or *mtu* ECU7/ECU8.)
    - ECU SETUP (Visible when ECU is configured for *mtu* ADEC, *mtu* MDEC 304, *mtu* ECU7/ECU8, or *mtu* Smart Connect.)
        - TRIP RESET (Visible when ECU is configured for *mtu* MDEC 304, or *mtu* ECU7/ECU8.)
        - INT OIL PRIME
        - GOV PRM SW (Visible when ECU is configured for *mtu* ADEC or *mtu* Smart Connect.)
        - ENG STRT PRIME (Visible when ECU is configured for *mtu* MDEC 304, or *mtu* ECU7/ECU8.)
        - FAN OVERRIDE (Visible when ECU is configured for *mtu* MDEC 304, or *mtu* ECU7/ECU8.)
        - MODE SWITCH (Visible when ECU is configured for *mtu* MDEC 304, or *mtu* ECU7/ECU8.)
        - GOV PARAM SET (Visible when ECU is configured for *mtu* ECU7/ECU8.)
        - CAN RATING SW 1 (Visible when ECU is configured for *mtu* ECU7/ECU8.)
        - CAN RATING SW 2 (Visible when ECU is configured for *mtu* ECU7/ECU8.)
        - DIS CYL CUT 1 (Visible when ECU is configured for *mtu* MDEC 304, or *mtu* ECU7/ECU8.)
        - DIS CYL CUT 2 (Visible when ECU is configured for *mtu* MDEC 304, *mtu* ECU7/ECU8 or *mtu* Smart Connect.)
        - OPERATING MODE (Visible when ECU is configured for *mtu* Smart Connect.)
        - CAN START/STOP (Visible when ECU is configured for *mtu* ECU7/ECU8 or *mtu* ADEC or *mtu* Smart Connect.)

SYSTEM PARAMS

- **SYSTEM SETTINGS**
    - GEN CONNECT
    - BUS CONNECT
    - RATED kW
    - RATED VOLTS
    - RATED FREQ
    - ALTRNATE FRQ
    - RATED RPM
    - RATED PF
    - ROTATION
    - EPS

        - EPS THRESHLD
        - LOW LINE SF (Visible when an input is selected for the Low Line Override programmable function.)
    - FUEL LVL TYP
    - SYSTEM UNITS
    - PRESSURE UNITS (Visible when Metric is selected for System Units.)
    - BATTERY VOLT
    - FLYWHL TEETH
    - SPEED SOURCE
    - MAINT RESET
    - NFPA LEVEL
    - POWER UP DELAY
- **REMOTE MODULE SETUP**
    - CEM SETUP
        - ENABLE
        - OUTPUTS (Visible when CEM-2020 is enabled.)
        - CAN BUS ADDR (Visible when CEM-2020 is enabled.)
        - VERSION INFO (Visible when CEM-2020 is enabled.)
            - FIRMWARE VERSION
            - BOOT CODE VERSION
            - SERIAL NUMBER
            - PART NUMBER
            - MODEL NUMBER
            - BUILD DATE
        - CEM DEBUG MENU (Visible when CEM-2020 is enabled.)
            - DGC TO CEM BP
            - CEM TO DGC BP
- **CRANK SETTINGS**
    - DISCNCT LMIT
    - PRECRNK DELY
    - PRESTRT CNTCT
    - STYLE
    - # CYCLES (Visible when Cycle is selected for Cranking Style.)
    - CONT TIME (Visible when Continuous is selected for Cranking Style.)
    - CYCLE TIME
    - REST TIME
    - MIN CRANK TIME
    - COOLDWN TIME
    - COOLDOWN CONFIG
    - RESTART DELAY
    - OFF MODE COOLDN
    - PRESTART REST CONFIG
        - CONF
    - OIL PRS CRANK DISC
        - ENABLE
        - CRANK DISC PRS
- **AUTOMATIC RESTART**
    - ENABLE
    - ATTEMPTS
    - INTERVAL
- **EXERCISE TIMER**
    - MODE
    - WEEK INTERVAL (Visible when Mode is set to N Week Intervals.)
    - START DAY OF MONTH (Visible when Mode is set to Monthly.)
    - WEEK OF MONTH (Visible when Mode is set to Weekday of Month.)
    - DAY OF WEEK (Visible when Mode is set to Weekly or Weekday of Month.)
    - START HOUR
    - START MINUTE
    - RUN HOURS
    - RUN MINUTES
    - RUN WITH LOAD
    - BEGIN DATE MONTH (Visible when Mode is set to N Week Intervals.)
    - BEGIN DATE DAY (Visible when Mode is set to N Week Intervals.)
    - BEGIN DATE YR (Visible when Mode is set to N Week Intervals.)

- **SENSING TRANS**
  - GEN PT PRI V
  - GEN PT SEC V
  - GEN CT PRI A
  - CT LOW LINE SF (Visible when an input is selected for the Low Line Override programmable function.)
  - BUS PT PRI V
  - BUS PT SEC V
- **RELAY CONTROL**
  - START
  - RUN
  - PRESTART
- **AUTO CONFIG DETECT**
  - ENABLE
  - LOW LINE THRESH
  - 1-PH THRESH
  - 1 PH GEN CONN
- **ENGINE STATISTICS**
  - START YEAR
  - START MONTH
  - START DAY
  - # STARTS
  - HRS TO MAINT
  - kW-HRS
  - TOTAL HRS
  - LOADED HRS
  - UNLOADED HRS

PROGRAMMABLE INPUTS

- **CONFIGURABLE INPUTS**
  - INPUT X (X = 1 to 7)
    - ALARM CONFIG
    - ACTIVATN DLY
    - RECOGNITION
- **PROG FUNCTIONS**
  - EMERGENCY STOP
    - INPUT
  - AUTO XFER SWITCH
    - INPUT MODE
    - N.O. INPUT
    - N.C. INPUT (Visible when INPUT MODE is complementary.)
    - CIRCUIT ERROR DELAY (Visible when INPUT MODE is complementary.)
    - CIRCUIT ERROR ACTION (Visible when INPUT MODE is complementary.)
  - GRND DELTA O-RIDE
    - INPUT
    - RECOGNITION (Visible when an INPUT is selected.)
  - BATTLE OVERRIDE
    - INPUT
    - RECOGNITION (Visible when an INPUT is selected.)
  - LOW LINE OVERRIDE
    - INPUT
    - RECOGNITION (Visible when an INPUT is selected.)
  - 1 PHASE O-RIDE
    - INPUT
    - RECOGNITION (Visible when an INPUT is selected.)
  - BATT CHRG FAIL
    - INPUT
    - ALARM CONFIG (Visible when an INPUT is selected.)
    - ACTIVATN DLY (Visible when an INPUT is selected.)
    - RECOGNITION (Visible when an INPUT is selected.)
  - LOW COOL LEVEL
    - INPUT
    - ALARM CONFIG (Visible when an INPUT is selected.)
    - ACTIVATN DLY (Visible when an INPUT is selected.)
    - RECOGNITION (Visible when an INPUT is selected.)

- LOW FUEL LEVEL
  - INPUT
  - ALARM CONFIG (Visible when an INPUT is selected.)
  - ACTIVATN DLY (Visible when an INPUT is selected.)
  - RECOGNITION (Visible when an INPUT is selected.)
- FUEL LEAK DETECT
  - INPUT
  - ALARM CONFIG (Visible when an INPUT is selected.)
  - ACTIVATN DLY (Visible when an INPUT is selected.)
  - RECOGNITION (Visible when an INPUT is selected.)

PROGRAMMABLE OUTPUTS

- **CONFIG ELEMENTS**
  - CONFIG ELEMENT X (X = 1 to 8)
    - ALARM CONFIG
    - ACTIVATN DLY
    - RECOGNITION

ALARM CONFIGURATION

- **HORN CONFIGURATION**
  - HORN
  - NOT IN AUTO HORN
- **PRE-ALARMS**
  - HIGH COOLANT TEMP
    - ENABLE
    - THRESHOLD
  - LOW COOLANT TEMP
    - ENABLE
    - THRESHOLD
  - LOW OIL PRESSURE
    - ENABLE
    - THRESHOLD
  - LOW FUEL LEVEL
    - ENABLE
    - THRESHOLD
    - HYSTERESIS
  - ENGINE OVERLOAD
    - ENG KW OVRLD 1
    - ENG KW OVRLD 2
    - ENG KW OVRLD 3
  - MAINTENANCE INTERVAL
    - ENABLE
    - THRESHOLD
  - BATTERY OVERVOLTAGE
    - ENABLE
    - THRESHOLD
  - LOW BATTERY VOLTAGE
    - ENABLE
    - THRESHOLD
    - ACTIVATN DLY
  - WEAK BATTERY VOLTAGE
    - ENABLE
    - THRESHOLD
    - ACTIVATN DLY
  - HIGH FUEL LEVEL
    - ENABLE
    - THRESHOLD
    - ACTIVATN DLY
    - HYSTERESIS
  - ACTIVE DTC (Visible when DTC is enabled.)
    - ENABLE
  - ECU COMMS FAIL (Visible when CAN BUS is enabled.)
    - ENABLE

- COOLANT LEVEL (Visible when CAN BUS is enabled.)
  - ENABLE
  - THRESHOLD
- CEM COMM FAIL (Visible when CEM-2020 is enabled.)
  - ENABLE
- CHECKSUM FAIL
  - ENABLE
- BRK CLOSE FAIL PALM
  - ENABLE
- BRK OPEN FAIL PALM
  - ENABLE
- REVERSE ROTATION
  - ENABLE
- DEF PREALARMS
  - ENABLE

- **ALARMS**
  - HIGH COOLANT TEMP
    - ENABLE
    - THRESHOLD
    - ARMING DELAY
  - LOW OIL PRESSURE
    - ENABLE
    - THRESHOLD
    - ARMING DELAY
  - LOW FUEL LEVEL
    - ENABLE
    - THRESHOLD
    - ACTIVATN DLY
  - OVERSPEED
    - ENABLE
    - THRESHOLD
    - ACTIVATN DLY
  - COOLANT LEVEL (Visible when CAN bus is enabled.)
    - ENABLE
    - THRESHOLD
  - CAN LOW COOL LEVEL

Note
The HIGH COOLANT TEMP and LOW OIL PRESSURE alarms have an ARMING DLY setting that disables the alarm for the specified time after engine startup.

- **SENDER FAIL**
  - COOL TEMP SENDR FAIL
    - CONFIG TYPE
    - RECOGNITION
    - ACTIVATN DLY
    - MIN OHMS
    - MAX OHMS
    - SF DISPLAY
  - OIL PRESS SENDR FAIL
    - CONFIG TYPE
    - RECOGNITION
    - ACTIVATN DLY
    - MIN OHMS
    - MAX OHMS
    - SF DISPLAY
  - FUEL LEVL SENDR FAIL
    - CONFIG TYPE
    - RECOGNITION
    - ACTIVATN DLY
    - MIN OHMS
    - MAX OHMS
    - SF DISPLAY

- VOLTAGE SENSE FAIL
  - CONFIG TYPE
  - ACTIVATN DLY
- SPEED SENDR FAIL
  - TIME DELAY

GENERATOR PROTECTION

- **27 UNDERVOLTAGE**
  - LOW LINE SF (Visible when an input is selected for the Low Line Override programmable function.)
  - 3 / 1 PHASE SETTINGS
    - PICKUP
    - HYSTERESIS
    - TIME DELAY
    - FREQ INHIBIT
    - ALARM CONFIG
- **59 OVERVOLTAGE**
  - LOW LINE SF (Visible when an input is selected for the Low Line Override programmable function.)
  - 3 / 1 PHASE SETTINGS
    - PICKUP
    - HYSTERESIS
    - TIME DELAY
    - ALARM CONFIG
- **47 PHASE IMBALANCE**
  - PICKUP
  - HYSTERESIS
  - TIME DELAY
  - ALARM CONFIG
  - LOW LINE SF (Visible when an input is selected for the Low Line Override programmable function.)
- **81 O/U FREQUENCY**
  - UNDERFREQUENCY
    - INHIBIT VOLTS
    - PICKUP
    - HYSTERESIS
    - TIME DELAY
    - ALARM CONFIG
  - OVERFREQUENCY
    - PICKUP
    - HYSTERESIS
    - TIME DELAY
    - ALARM CONFIG
  - ALTRNT FRQ SCALE FCTR
    - ALT FREQ SF
- **50 OVERCURRENT**
  - LOW LINE SF (Visible when an input is selected for the Low Line Override programmable function.)
  - 3 / 1 PHASE SETTINGS
    - PICKUP
    - TIME DELAY
    - ALARM CONFIG

BREAKER MANAGEMENT

- **BREAKER HARDWARE**
  - MAINS FAIL TRANSFER
    - ENABLE
    - RETURN DELAY
    - TRANSFER DELAY
    - MAX TRANSFER TIME
  - CLOSE WAIT TIME
    - TIME
  - GEN BREAKER
    - CONTINUOUS
    - CLOSING TIME
    - OPEN CMD
    - CLOSE CMD

- MAINS BREAKER
  - CONFIGURED
  - CONTINUOUS (Visible when configured.)
  - CLOSING TIME (Visible when configured.)
  - OPEN CMD (Visible when configured.)
  - CLOSE CMD (Visible when configured.)
- BRK CLOSE FAIL PALM
- BRK OPEN FAIL PALM

- **BUS CONDITION DETECT**
  - GEN DEAD
    - THRESHOLD
    - TIME DELAY
  - GEN STABLE
    - OV PICKUP
    - OV DROPOUT
    - UV PICKUP
    - UV DROPOUT
    - OF PICKUP
    - OF DROPOUT
    - UF PICKUP
    - UF DROPOUT
    - TIME DELAY
    - LOW LINE SF (Visible when an input is selected for the Low Line Override programmable function.)
    - ALT FREQ SF
  - GEN FAILED
    - TIME DELAY
  - BUS DEAD
    - THRESHOLD
    - TIME DELAY
  - BUS STABLE
    - OV PICKUP
    - OV DROPOUT
    - UV PICKUP
    - UV DROPOUT
    - OF PICKUP
    - OF DROPOUT
    - UF PICKUP
    - UF DROPOUT
    - TIME DELAY
    - LOW LINE SF (Visible when an input is selected for the Low Line Override programmable function.)
    - ALT FREQ SF
  - BUS FAILED
    - TIME DELAY

LOGIC TIMERS

- **TIMER X (X = 1 to 10)**
  - HOURS
  - MINUTES
  - SECONDS

ENTER PASSWORD

LOGOUT (Visible when logged in through the front panel.)

2 • Operating Modes

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

Off

In OFF mode, the DGC-2020ES 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-2020ES 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-2020ES may be started automatically or "self-start" from an automatic starting feature described in the following paragraphs. If the DGC-2020ES 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.

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.

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.

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.

Operating States

The DGC-2020ES goes through the operating states listed in Table 2-1 when starting and stopping the generator.

Table 2-1. Operating States

State	Description
Reset	The first state after a DGC-2020ES power up. Not running and not able to run until system initialization is complete.
Ready	The engine is not running. The DGC-2020ES is ready to run. This is the normal state of the DGC-2020ES in OFF mode, and in AUTO mode when the engine is not running, or in the process of starting or stopping.
Cranking	The DGC-2020ES is cranking the engine as part of the start sequence.
Resting	The DGC-2020ES 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-2020ES 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-2020ES 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-2020ES 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.
Pulsing	The engine is not running. The DGC-2020ES is attempting to connect to the ECU to read data from it.
Unloading	When the DGC-2020ES 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 operating mode are located on the front panel and within BESTCOMS*Plus*.

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

3 • Metering

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

Metering Explorer

DGC-2020ES 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 3-1 and described in Table 3-1.

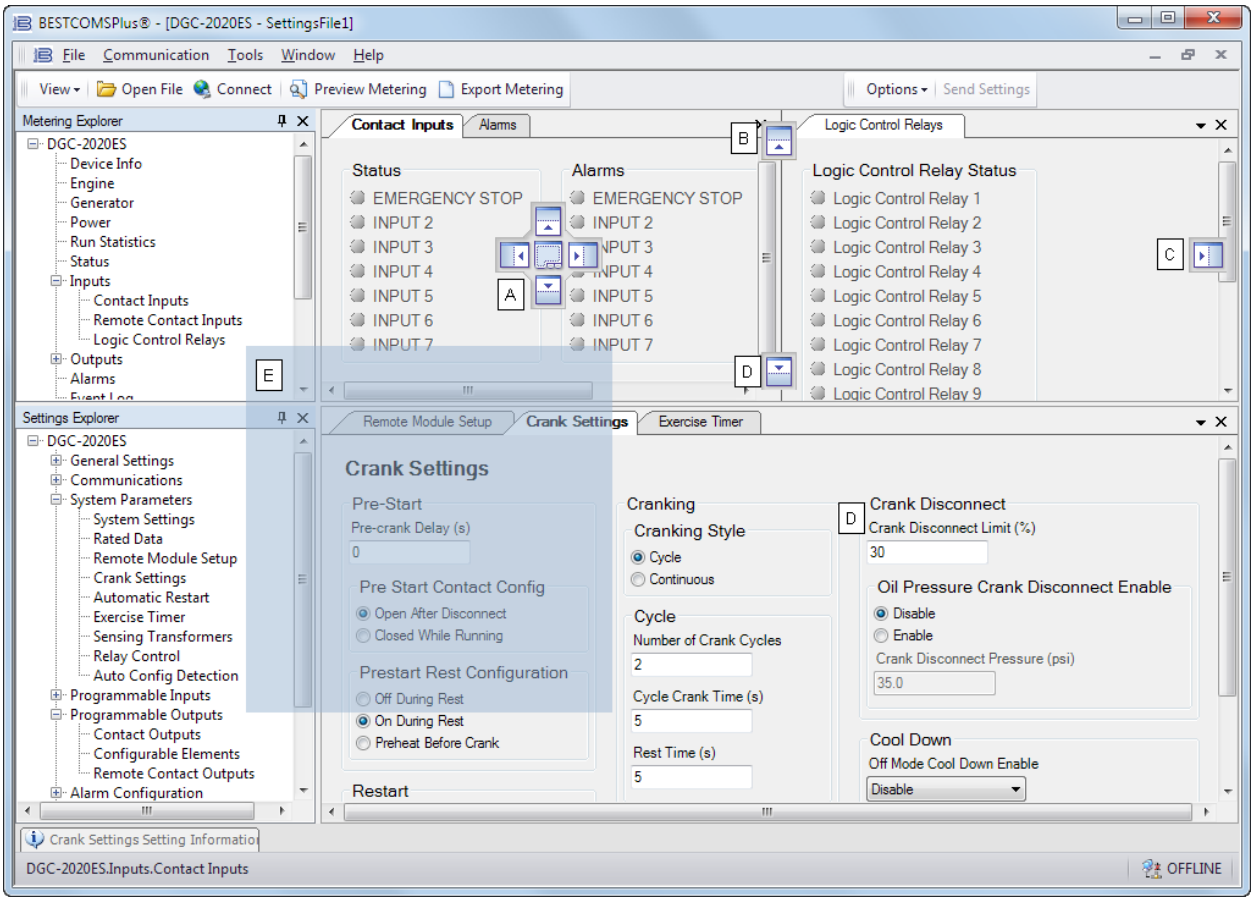
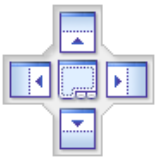
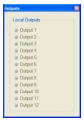


Figure 3-1. Metering Screen Docking Options

Table 3-1. Descriptions of Call-outs in Error! Reference source not found..

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 in the *Configuration* manual for more information on BESTspace.

Engine

The *Engine* metering screen (Figure 3-2) provides information and metering of engine components. Parameters that do not apply to your engine are marked as either NS (not sent) or NA (not applicable).

The *Engine* screen is found in the BESTCOMS*Plus Metering Explorer*. If using the front panel, navigate to Metering > Engine.

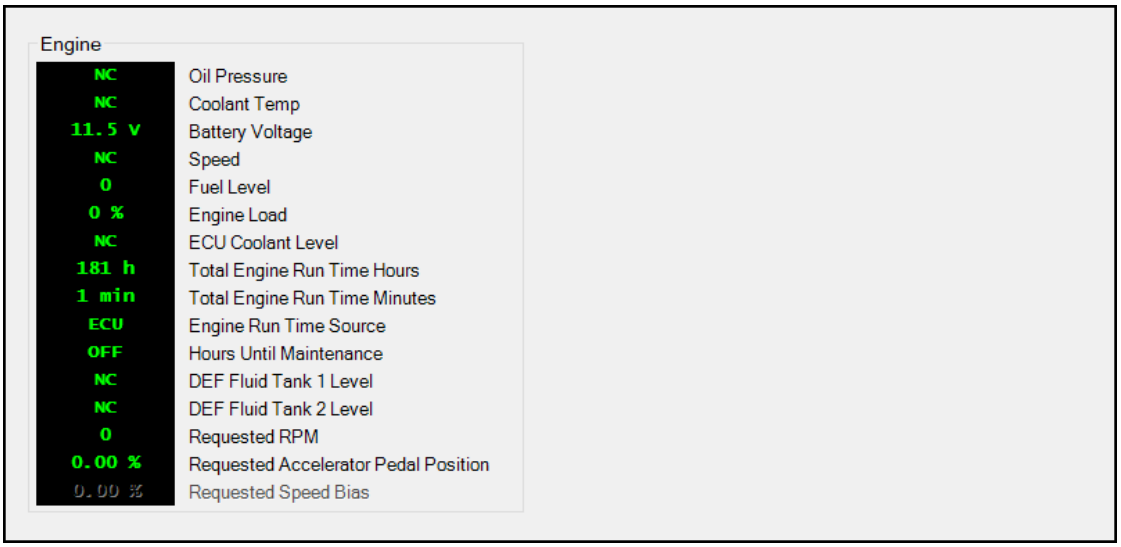


Figure 3-2. Metering Explorer, Engine Screen

Battery Charger

This screen provides information and metering for battery chargers 1 and 2. Refer to Figure 3-3.

The *Battery Charger* screen is found in the BESTCOMS*Plus Metering Explorer*. If using the front panel, navigate to Metering > Battery Charger.

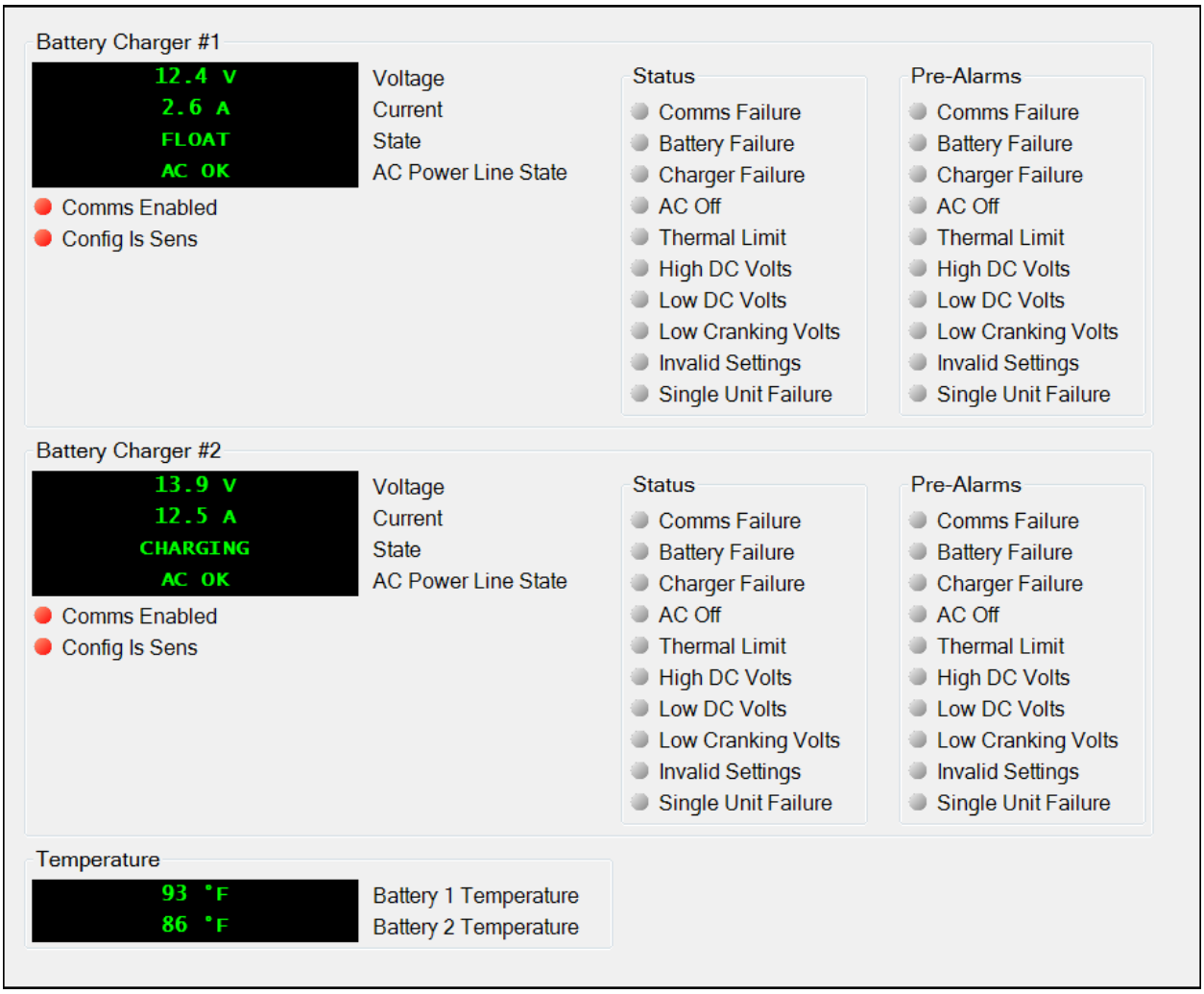


Figure 3-3. Metering Explorer, Battery Charger Screen

Generator

This screen provides metering of generator voltages and currents. See Figure 3-4.

The *Generator* screen is found in the BESTCOMS*Plus Metering Explorer*. If using the front panel, navigate to Metering > Generator.

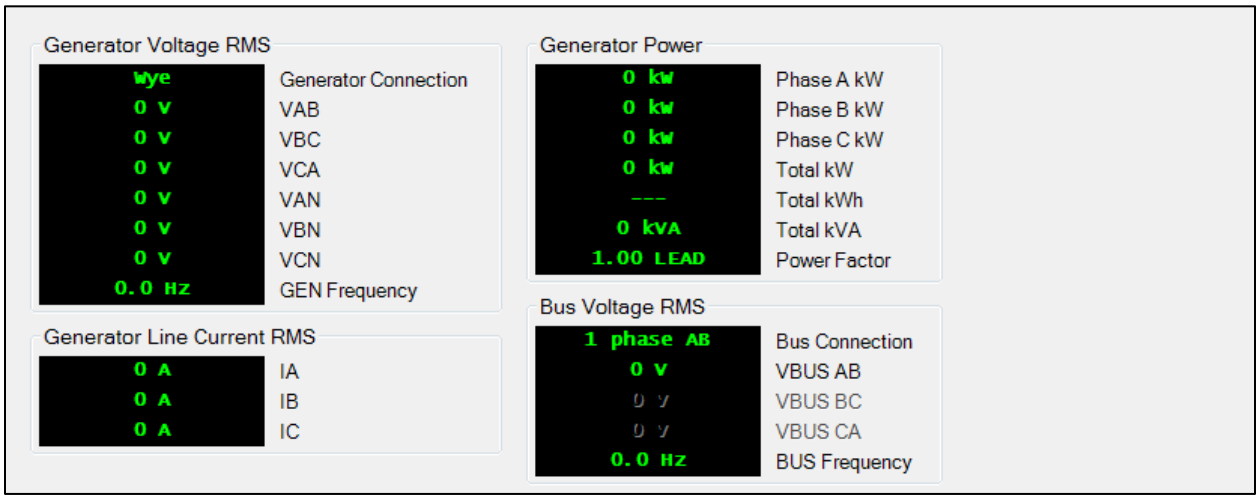


Figure 3-4. Metering Explorer, Generator Screen

Power

This screen provides metering of generator power and power factor. See Figure 3-5.

The *Power* screen is found in the BESTCOMS*Plus Metering Explorer*. If using the front panel, navigate to Metering > Power.

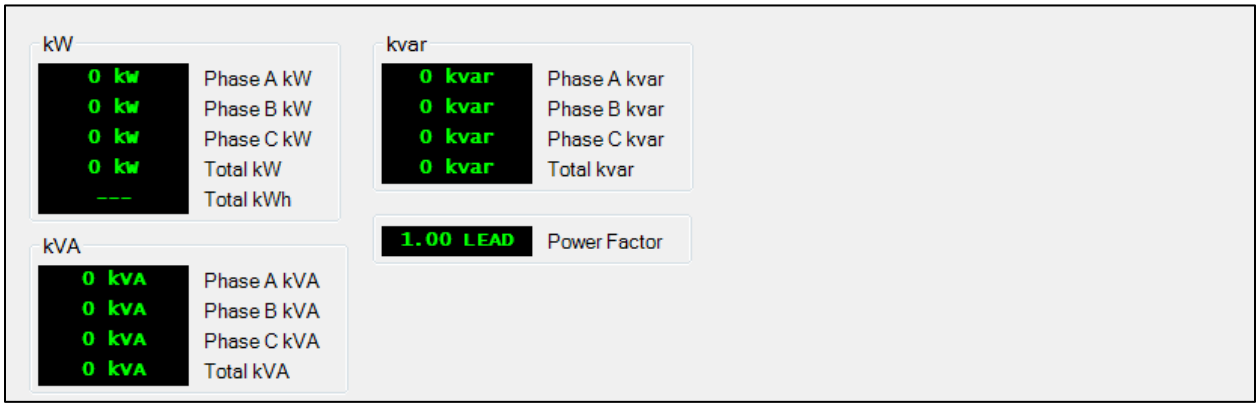


Figure 3-5. Metering Explorer, Power Screen

Run Statistics

This screen provides Cumulative Run Statistics, Session Run Statistics, and Commission Date. See Figure 3-6.

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.

The 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-2020ES into a pre-existing system. This allows the current statistics of the genset to be transferred into the DGC-2020ES 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.

To change the commission date, click *Edit DGC Commission Date.* The DGC Commission Date dialog box appears. Enter the new commission date and click *Upload Data to Device.* Click *Close*. Note that the Commission Date field on the BESTCOMS*Plus* screen updates after the *Close* button is clicked.

The *Run Statistics* screen is found in the BESTCOMS*Plus Metering Explorer*. If using the front panel, navigate to Metering > Run Statistics.

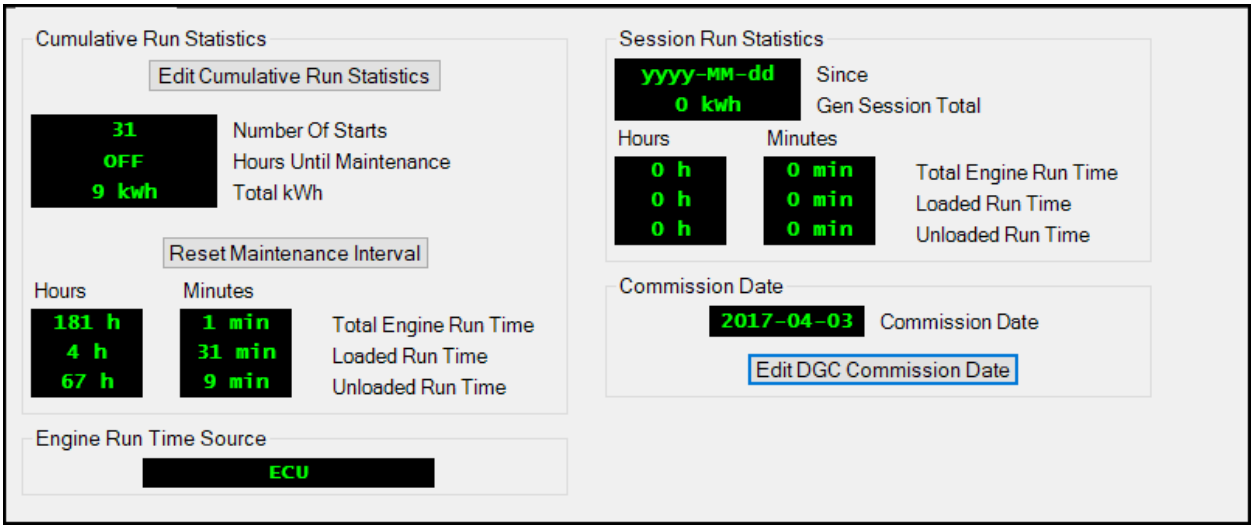


Figure 3-6. Metering Explorer, Run Statistics Screen

Status Indication

This screen indicates status of breakers, modes, switches, and I/O connection status. The status is TRUE when the corresponding indicator is red. See Figure 3-7.

The *Status* screen is found in the BESTCOMS*Plus Metering Explorer*. If using the front panel, navigate to Metering > Alarms-Status > Status.

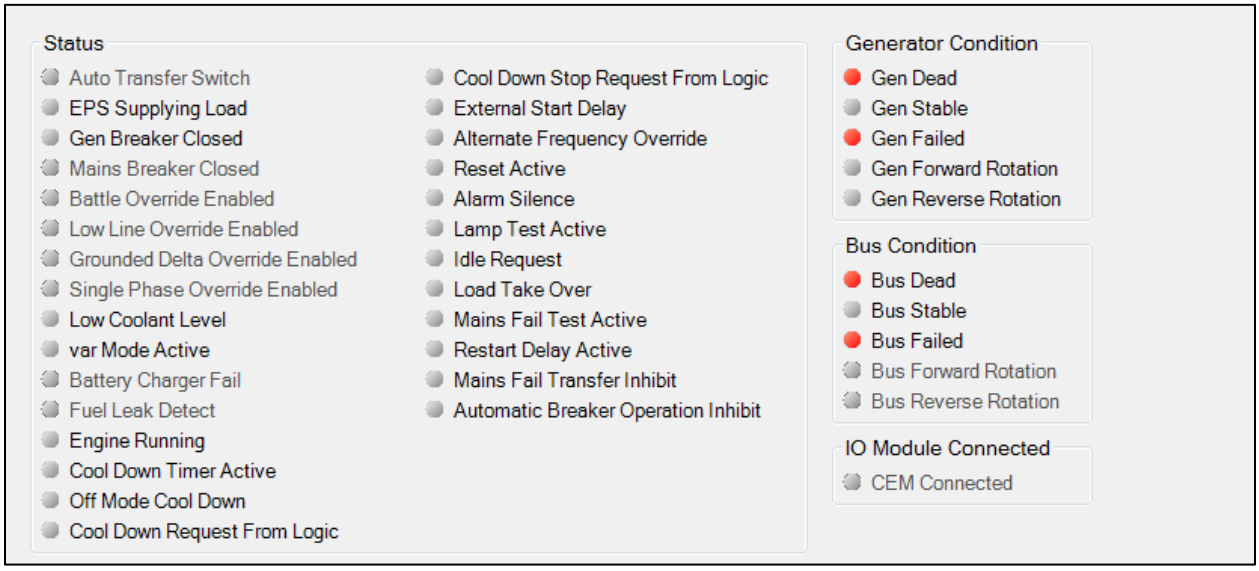


Figure 3-7. Metering Explorer, Status Screen

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 red. See Figure 3-8.

The *Contact Inputs* screen is found in the BESTCOMS*Plus Metering Explorer* under the *Inputs* category. If using the front panel, navigate to Metering > Alarms-Status > Inputs.

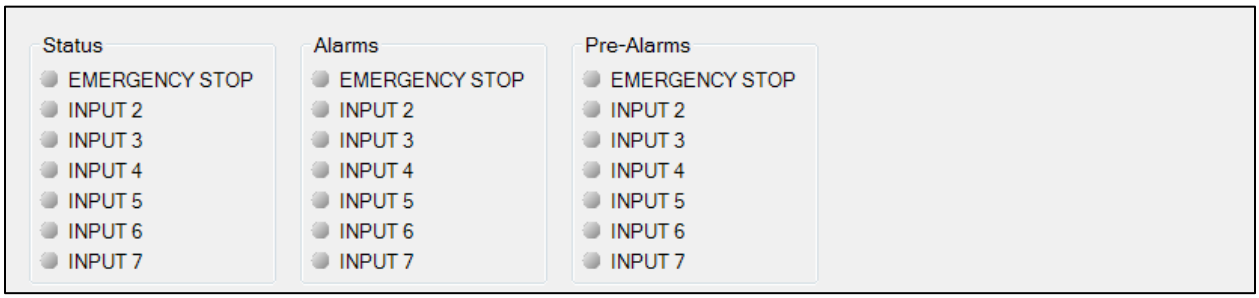


Figure 3-8. Metering Explorer, Inputs, Contact Inputs Screen

Contact Input Timers

This screen displays the current time (count) of the Activation Delays for the contact inputs. See Figure 3-9

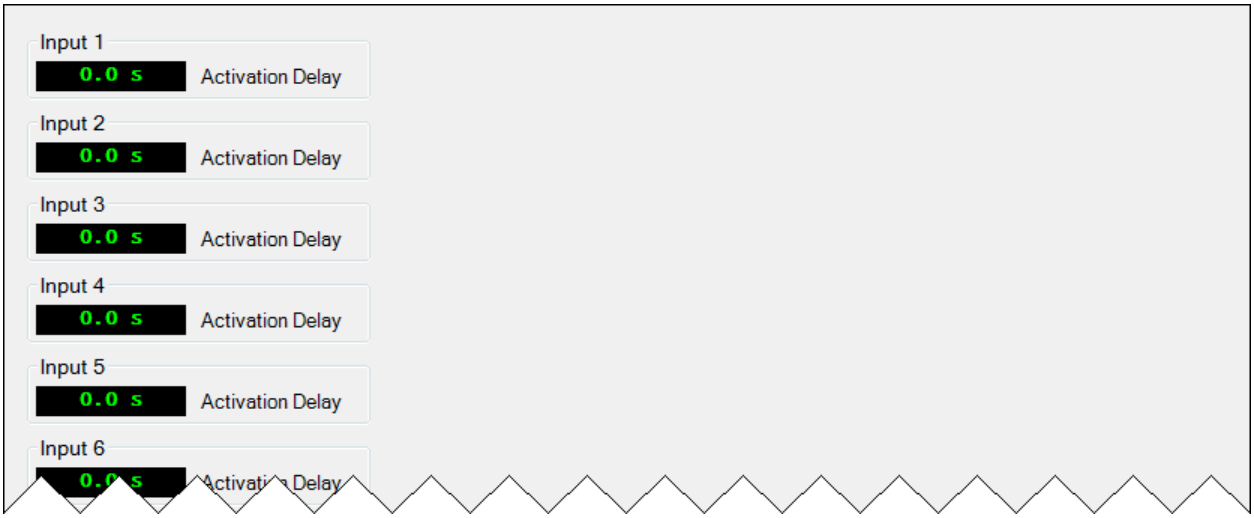


Figure 3-9. Metering Explorer, Inputs, Contact Input Timers Screen

Remote Contact Inputs

When an optional CEM-2020 (Contact Expansion Module) is connected, the status of the remote contact inputs, configurable remote contact input alarms, and remote contact input pre-alarms are shown on this screen. The status is TRUE when the corresponding indicator is red. See Figure 3-10.

The *Remote Contact Inputs* screen is found in the BESTCOMS*Plus Metering Explorer* under the *Inputs* category. If using the front panel, navigate to Metering > Alarms-Status > Inputs.

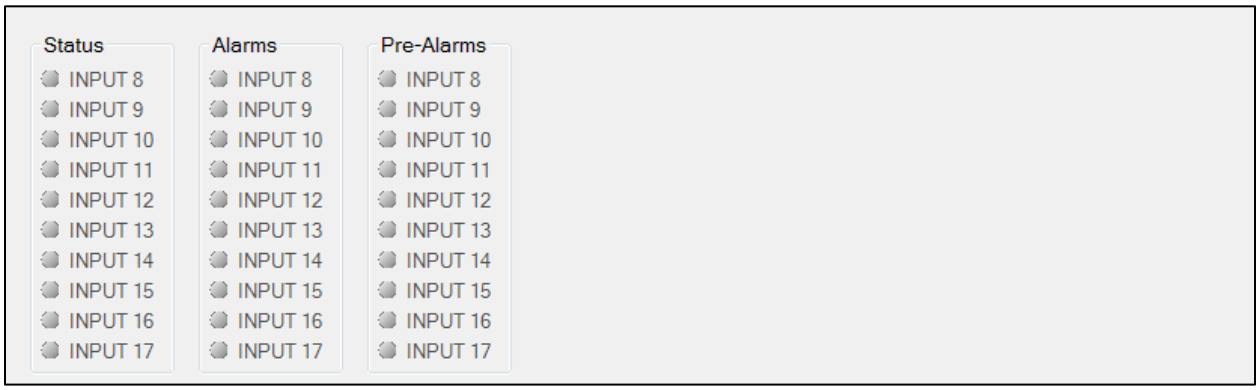


Figure 3-10. Metering Explorer, Inputs, Remote Contact Inputs Screen

Logic Control Relays

This screen indicates the status of logic control relays. The status is TRUE when the corresponding indicator is green. See Figure 3-11.

The *Logic Control Relays* screen is found in the BESTCOMS*Plus Metering Explorer* under the *Inputs* category. If using the front panel, navigate to Metering > Alarms-Status > Logic Control Relays.

Figure 3-11. Metering Explorer, Inputs, Logic Control Relays Screen

Outputs

Contact Outputs

This screen indicates the status of contact outputs. The status is TRUE when the corresponding indicator is green. See Figure 3-12.

The *Contact Outputs* screen is found in the BESTCOMS*Plus Metering Explorer* under the *Outputs* category. If using the front panel, navigate to Metering > Alarms-Status > Outputs.

Figure 3-12. Metering Explorer, Outputs, Contact Outputs Screen

Remote Contact Outputs

When an optional CEM-2020 (Contact Expansion Module) is connected, the status of the remote contact outputs is shown on this screen. The status is TRUE when the corresponding indicator is green. See Figure 3-13.

The *Remote Contact Outputs* screen is found in the BESTCOMS*Plus Metering Explorer* under the *Outputs* category. If using the front panel, navigate to Metering > Alarms-Status > Outputs.

Figure 3-13. Metering Explorer, Outputs, Remote Contact Outputs Screen

Configurable Elements

This screen indicates the status of configurable elements. It also indicates alarms and pre-alarms of configurable elements. The status is TRUE when the corresponding indicator is green. See Figure 3-14.

The *Configurable Elements* screen is found in the BESTCOMS*Plus Metering Explorer* under the *Outputs* category. If using the front panel, navigate to Metering > Alarms-Status > Configurable Elements.

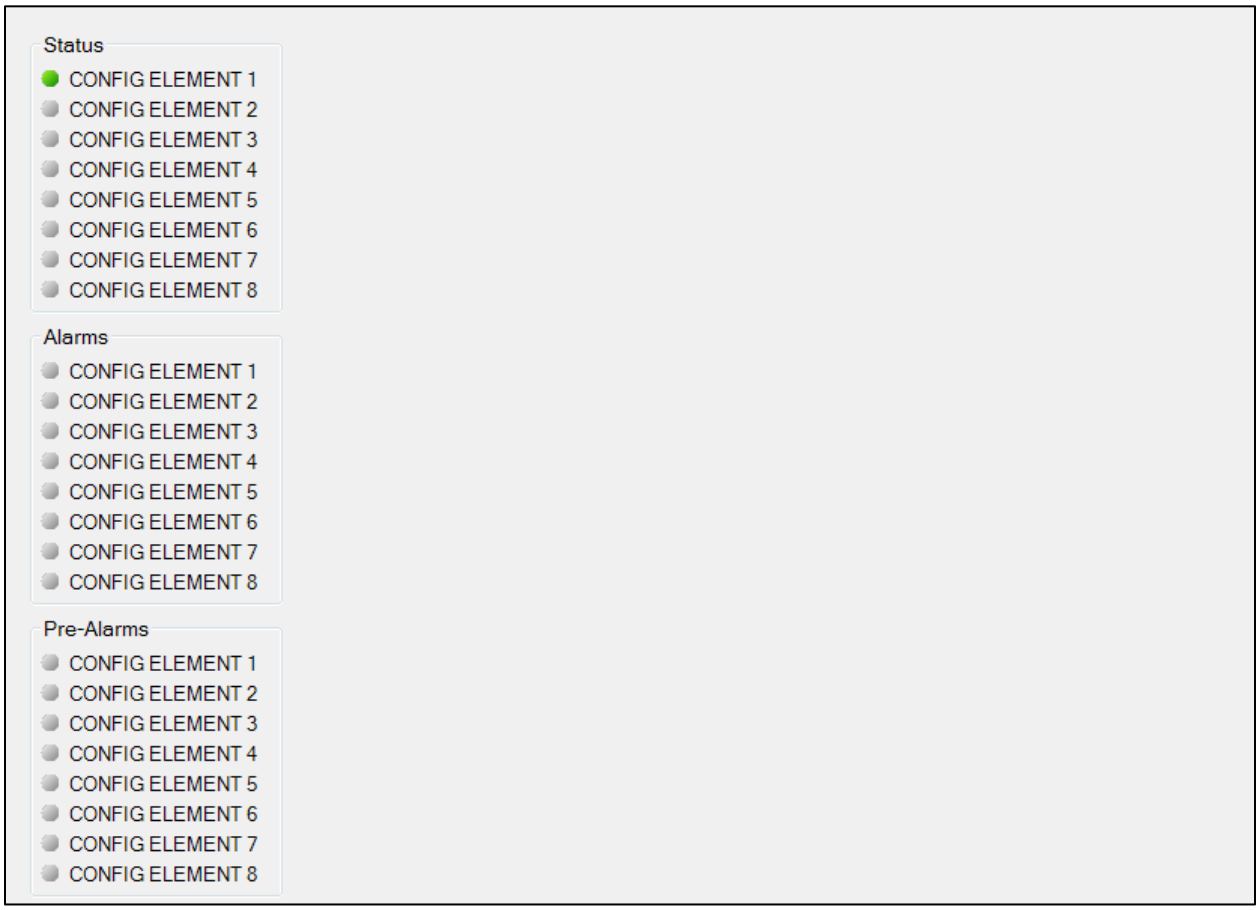


Figure 3-14. Metering Explorer, Outputs, Configurable Elements Screen

Timers

Logic Timers

This screen (Figure 3-15) displays the current time (count) of the logic timers.

Figure 3-15. Metering Explorer, Timers, Logic Timers

Generator Protection Timers

This screen (Figure 3-16) displays the current time (count) of the Activation Delays and Arming Delays for the generator protection timers.

Figure 3-16. Metering Explorer, Timers, Generator Protection Timers

Pre-Alarm Timers

This screen (Figure 3-17) displays the current time (count) of the Activation Delays for the pre-alarm timers.

Figure 3-17. Metering Explorer, Timers, Pre-Alarm Timers

Alarm Timers

This screen (Figure 3-18) displays the current time (count) of the Activation Delays for the alarm timers.

Figure 3-18. Metering Explorer, Timers, Alarm Timers

Sender Fail Timers

This screen (Figure 3-19) displays the current time (count) of the Activation Delays for the sender fail timers.

Figure 3-19. Metering Explorer, Timers, Sender Fail Timers

Cranking Timers

This screen (Figure 3-20) displays the current time (count) of the cranking timers.

Figure 3-20. Metering Explorer, Timers, Cranking Timers

Automatic Restart Timers

This screen (Figure 3-21) displays the current time (count) of the automatic restart timers.

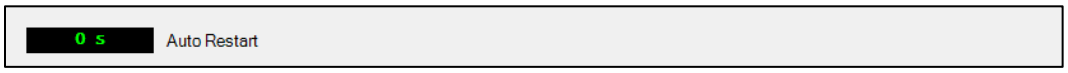


Figure 3-21. Metering Explorer, Timers, Automatic Restart Timers

Programmable Functions Timers

This screen (Figure 3-22) displays the current time (count) of the programmable functions timers.

Figure 3-22. Metering Explorer, Timers, Programmable Functions Timers

Exercise Timers

This screen (Figure 3-23) displays the current time (count) of the session length, session elapsed, and time to next start for the exerciser timers.

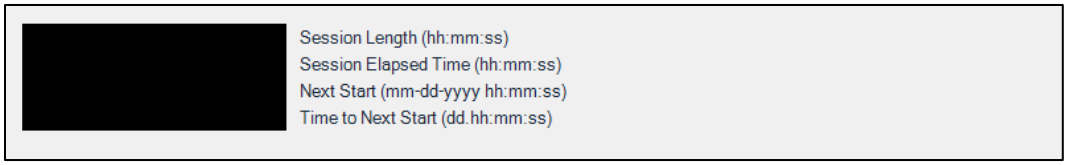


Figure 3-23. Metering Explorer, Timers, Exerciser Timers

J1939 ECU

The ECU reports operating information to the DGC-2020ES through the CAN Bus interface. Operating parameters and diagnostic information, if supported by the ECU, are decoded and displayed on these screens.

ECU Data

This screen displays ECU Lamp Status and ECU Data. The status is TRUE when the corresponding LED is red. Refer to Figure 3-24.

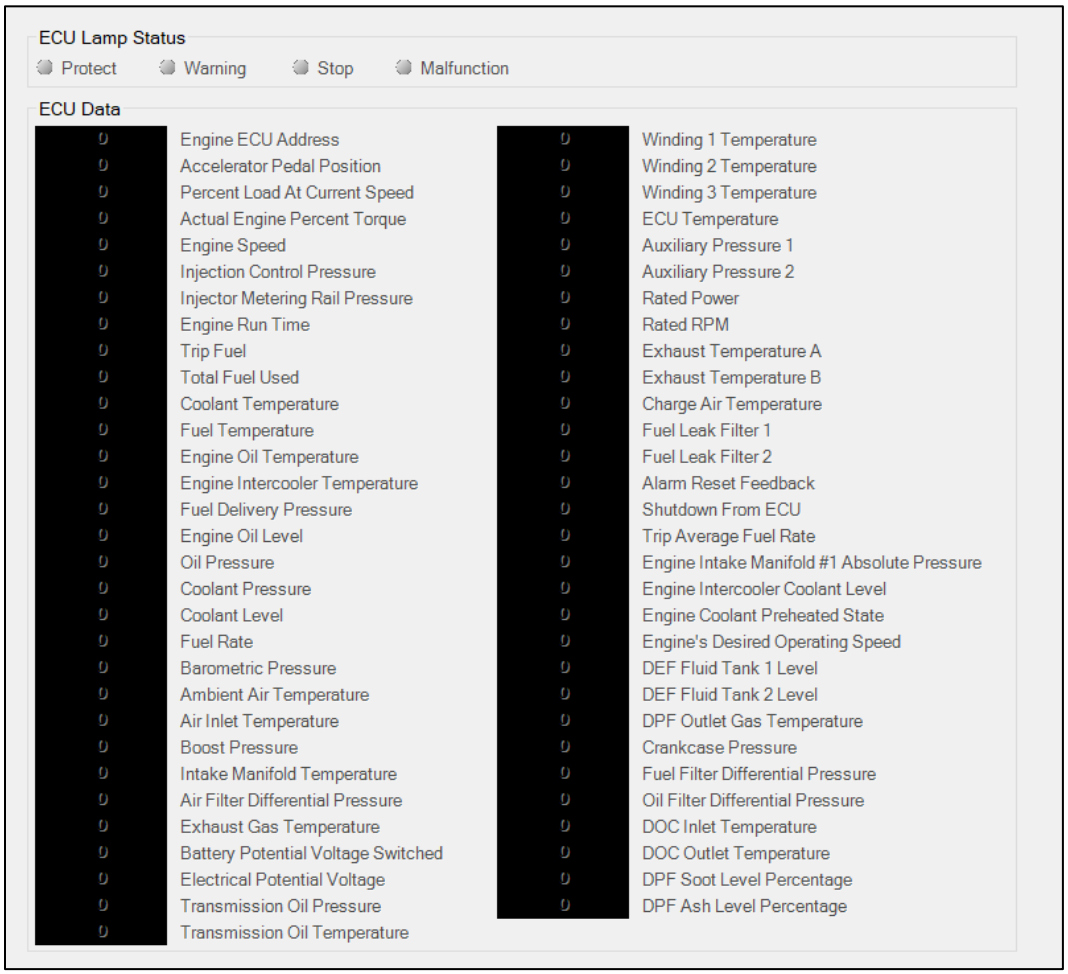


Figure 3-24. Metering Explorer, J1939 ECU, ECU Data

Engine Configuration

This screen displays Engine Configuration. Refer to Figure 3-25.

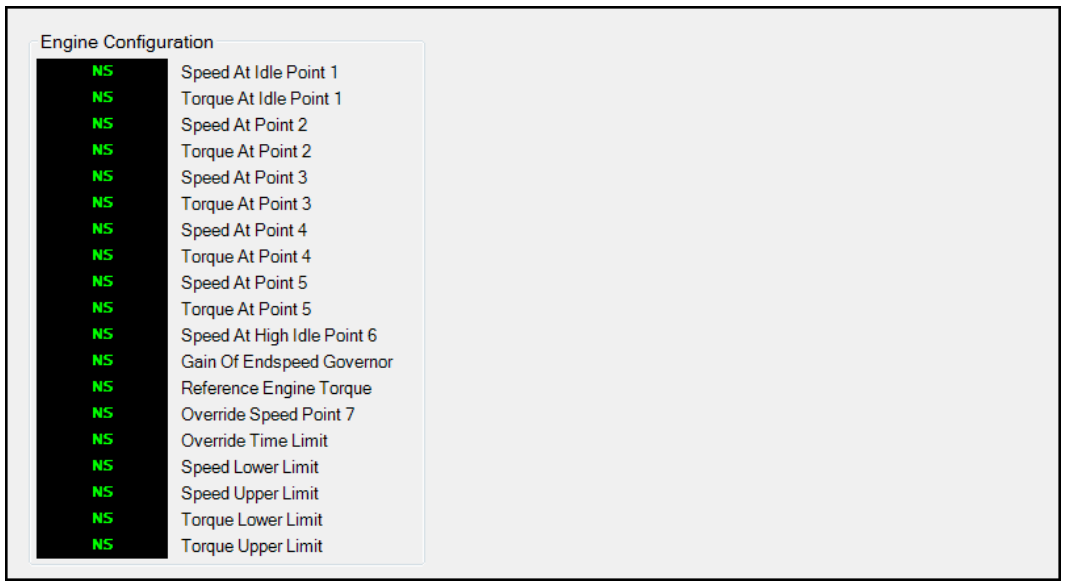


Figure 3-25. Metering Explorer, J1939 ECU, Engine Configuration

Active DTC and Previously Active DTC

This screen is used for viewing, downloading, and clearing DTC (Diagnostic Trouble Codes). Refer to Figure 3-26.

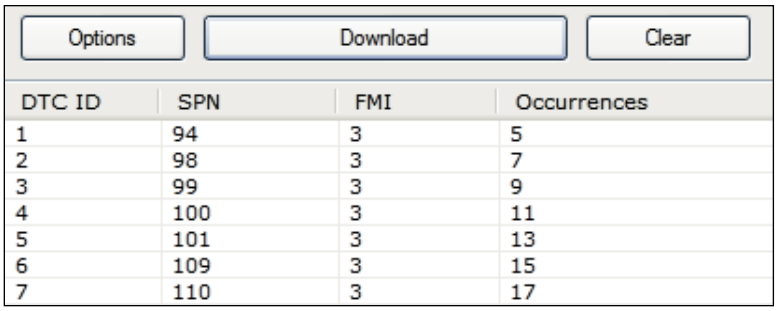


Figure 3-26. Metering Explorer, J1939 ECU, Download DTC

Yanmar Status

This screen (Figure 3-27) displays Yanmar ECU status.

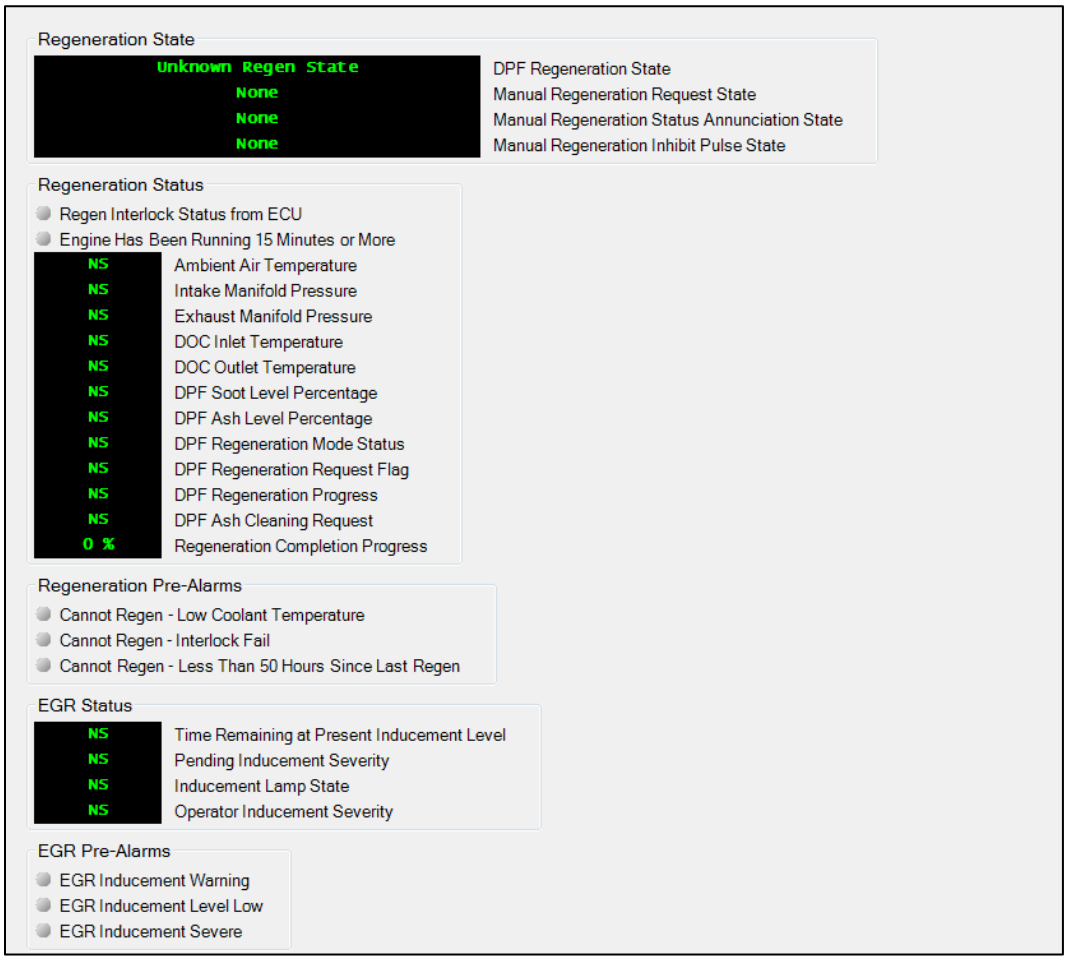


Figure 3-27. Metering Explorer, J1939 ECU, Yanmar Status

Isuzu Status

This screen (Figure 3-28) displays Isuzu ECU status.

Figure 3-28. Metering Explorer, J1939 ECU, Isuzu Status

Deutz Status

This screen (Figure 3-29) displays the following Deutz ECU parameters:

EPA1 PGN: Restriction Due to DEF Level

This field displays the restriction level according to DEF (Diesel Exhaust Fluid) tank level. The value is expressed as a number.

0 = No restriction
1 = Level 1 (i.e. Warning < 5% DEF Level, power reduction after a delay time is possible)
2 = Level 2 torque reduction Step 1 (early inducement)
3 = Level 3 torque reduction Step 2 (severe inducement)

EPA1 PGN: DEF Level

This field displays the DEF tank level. The value is expressed as a number. Thresholds are application parameters set by Deutz.

1 = Level > Threshold 1 (15%)
2 = Threshold 1 > Level > Threshold 2 (10%)
3 = Threshold 2 > Level > Threshold 3 (5%)
4 = Threshold 3 > Level

EPA2 PGN: Restriction Due to DEF Quality

This field displays the restriction level according to SCR efficiency rate / DEF Quality. The value is expressed as a number.

0 = No restriction
1 = Level 1 Warning, power reduction after a delay time is possible
2 = Level 2 torque reduction Step 1 (early inducement)
3 = Level 3 torque reduction Step 2 (severe inducement)

EPA3 PGN: Inducement Reason

This field displays the after treatment SCR (Selective Catalytic Reduction) Operator Inducement reason. The value is expressed as a number.

0 = No inducement active
1 = Reagent Level Low
2 = Incorrect Quality
3 = Incorrect Consumption (not available)
4 = Tampering
5 = Spare (not available)
6 = Error (Hardware Failure) – displays as “SF”
7 = Not Available / Not Supported (No SCR system mounted) – displays as “NA”

Figure 3-29. Metering Explorer, J1939 ECU, Deutz Status

mtu

The *mtu* reports operating information to the DGC-2020ES through the CAN Bus interface when the ECU is configured for *mtu*. Operating parameters and diagnostic information, if supported by the *mtu*, are decoded and displayed on these screens.

mtu Alarms

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. Refer to Figure 3-30.

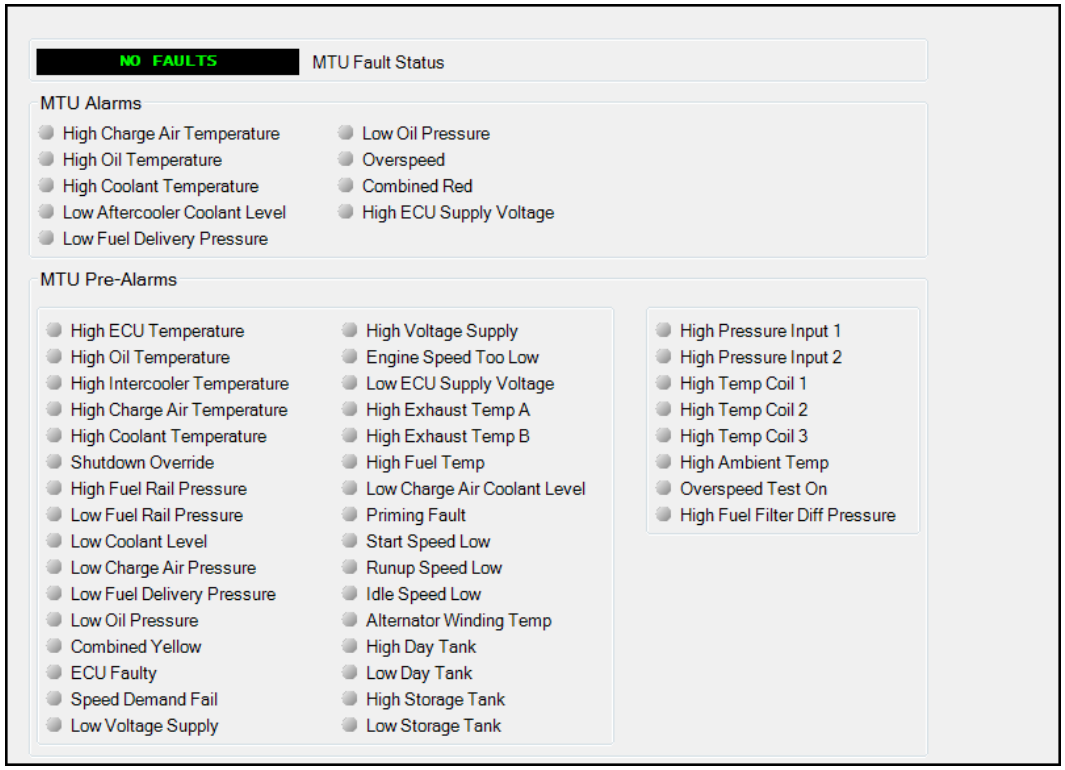


Figure 3-30. Metering Explorer, mtu, mtu Alarms

mtu Fault Codes

mtu Fault Codes can be viewed and downloaded on this screen. Refer to Figure 3-31.

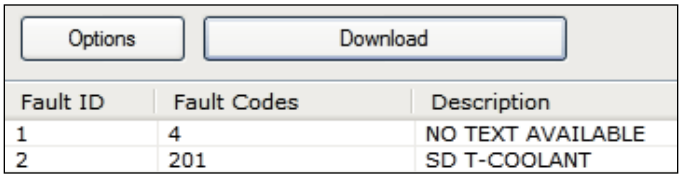


Figure 3-31. Metering Explorer, mtu, mtu Fault Codes

mtu Status

mtu Status is reported on this screen. The status is TRUE when the corresponding LED is red. Refer to Figure 3-32.

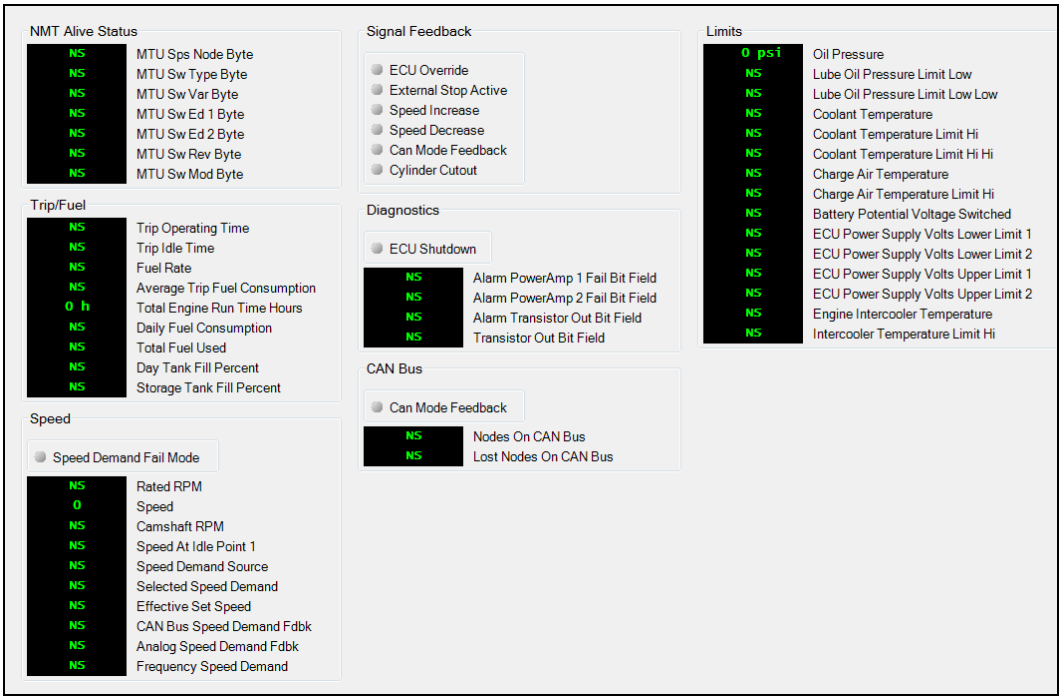


Figure 3-32. Metering Explorer, mtu, mtu Status

mtu Engine Status

mtu Engine Status is reported on this screen. The status is TRUE when the corresponding LED is red. Refer to Figure 3-33.

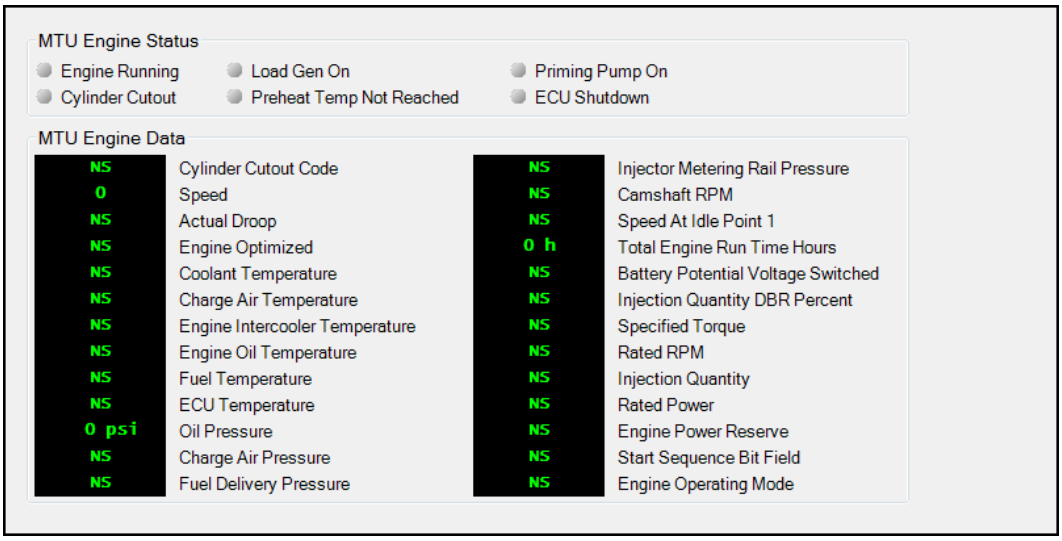


Figure 3-33. Metering Explorer, mtu, mtu Engine Status

Summary

This screen displays a metering summary. Refer to Figure 3-34.

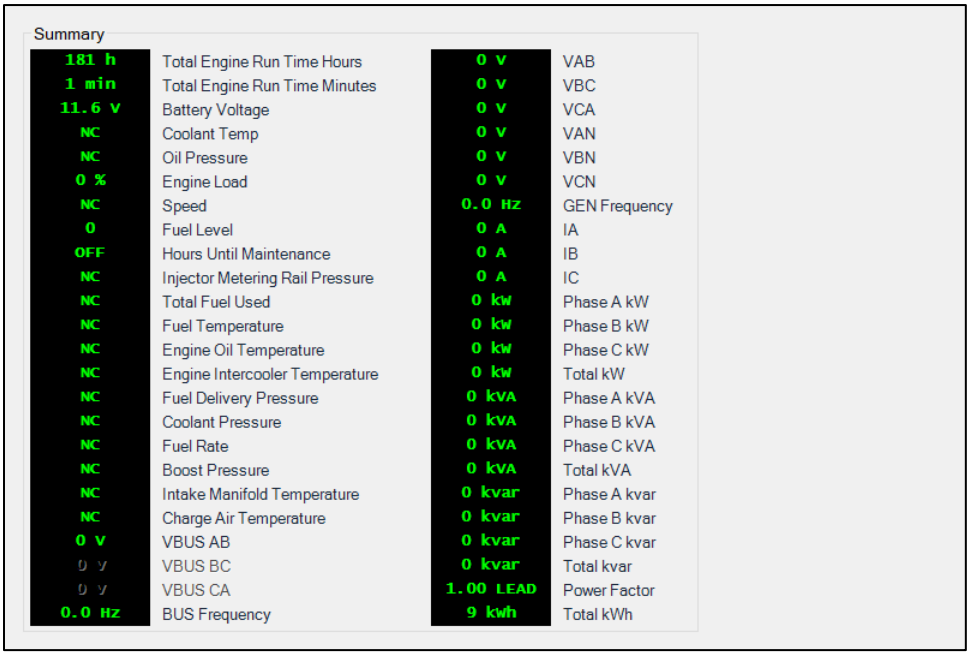


Figure 3-34. Metering Explorer, Summary

Control

Controls for stopping/starting the engine, opening/closing breakers, and opening/closing switches are accessed using BESTCOMS*Plus* through the *Metering Explorer*, *Control* screen. This set of controls is especially useful when commissioning the DGC-2020ES. The PC or laptop running BESTCOMS*Plus* must be connected to the DGC-2020ES via the USB port (see the *Communication* chapter in the *Configuration* manual for details). When running BESTCOMS*Plus* in *Live* mode, these buttons interact with the DGC-2020ES in real time. Otherwise, you will be prompted before the settings are sent.

Using the Metering Explorer in BESTCOMS*Plus,* open the *Control* branch. Refer to Figure 3-35.

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 (CANBus).

Run, Auto, Off

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

Generator and Mains Breakers

There are controls for opening and closing the generator breaker and mains breaker. The breaker is open when the corresponding indicator is green and closed when red. This function requires that the Generator and Mains breakers be configured.

Switches 1 through 4

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 red. 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 in the *Configuration* manual for more information.

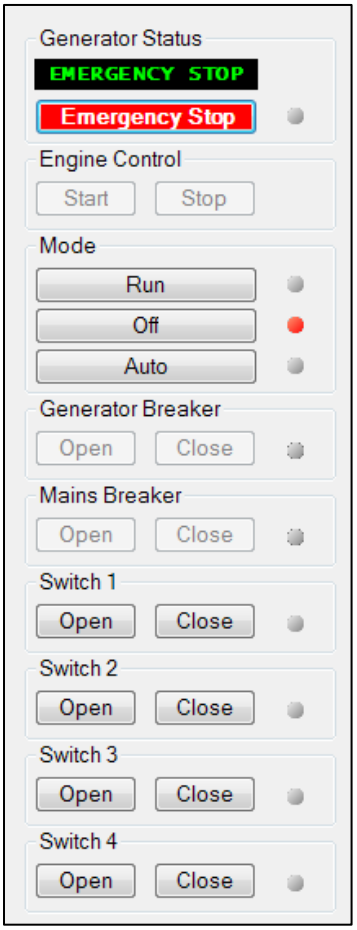


Figure 3-35. Metering Explorer, Control Screen

Mains Fail Transfer Status

The Mains Fail Transfer Status screen (Figure 3-36) displays the Mains Fail Transfer State and any timers relevant to the mains fail transfer process. These parameters are listed below.

Mains Fail Transfer State: The different mains fail transfer states are described below.

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-2020ES is in the OFF or RUN operating mode or in the alarm state.

Remaining Transfer Delay: Displays the current timer value in seconds.

Remaining Return Delay: Displays the current timer value in seconds.

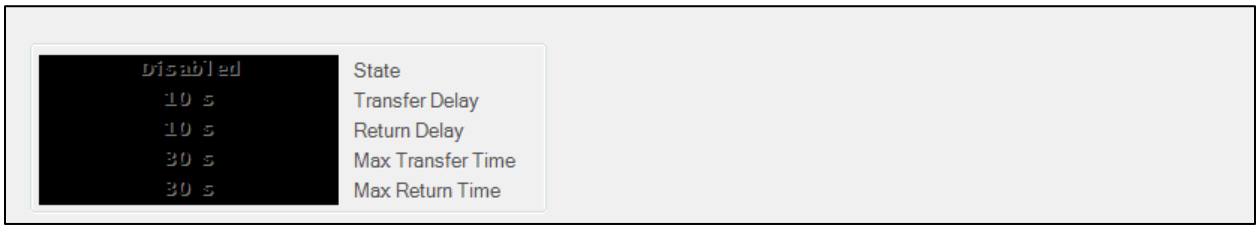


Figure 3-36. Metering Explorer, Mains Fail Transfer Status

Diagnostics

Sender Inputs

The Sender Inputs screen (Figure 3-37) displays the resistance level of the enabled senders.

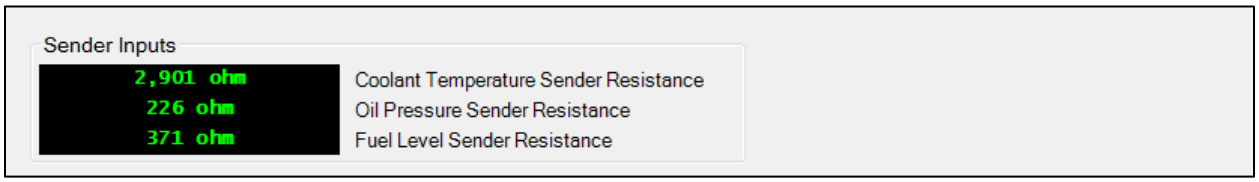


Figure 3-37. Metering Explorer, Diagnostics, Sender Inputs

Auto Export Metering

This function automatically exports metering data over a user-defined period when a DGC-2020ES connection is active. To display the Auto Export Metering screen, click the *Tools* pull-down menu from the upper menu bar and click *Auto Export Metering*. Specify the *Number of Exports* and the *Interval* between each export. Enter a filename for the metering data and a folder in which to save. The file is saved in .CSV (comma separated values) format. The first export is performed immediately after clicking the *Start* button. Click the *Filter* button to select specific metering screens.

4 • Alarms

The DGC-2020ES monitors ECU data, generator protection functions, and engine senders. An alarm or pre-alarm is annunciated when the monitored parameter exceeds its threshold settings.

When an alarm condition exists, the engine is stopped by opening the Fuel output contact. An existing pre-alarm condition is annunciated only.

When alarms are active, the front panel *Overview* screen is replaced by the *Active Alarms* screen. When only pre-alarms are active, the front panel *Overview* screen is alternated with the *Active Pre-Alarms* screen in one-second intervals. Active alarms and pre-alarms can be viewed through BESTCOMS*Plus*®.

The front panel Alarm LED is illuminated when alarms are active. When pre-alarms are active, the Alarm LED flashes in one-second intervals.

If programmed and enabled, the horn output is closed when alarms are active. When pre-alarms are active, the horn output toggles in one-second intervals.

Active alarms are also indicated on the optional remote display panel in the form of LEDs and an audible horn. Red alarm LEDs light and the horn sounds when the corresponding alarm setting is exceeded. If an active alarm condition is not annunciated by the remote display panel, the *Switch Not In Auto* LED lights and the horn sounds.

Alarm configuration is described in the *Configuration* manual.

A detailed list of alarms is provided in Table 4-1.

Table 4-1. Available Alarms

Name	Description
Alarms	
AUTO RESTART FAIL	Automatic Restart Failure
BATT CHRG FAIL	Battery Charger Fail
DEF SEVERE INDUCMT	DEF Severe Inducement
DIAG TRBL CODE	Diagnostic Trouble Code
ECU SHUTDOWN	ECU Shutdown
EMERGENCY STOP	Emergency Shutdown
EXHAUST SYSTEM ERR	Exhaust System Error
FUEL LEAK DETECT	Fuel Leak Detected
GEN TRANSFER FL	Transfer Fail
GLBL ALARM	Global Alarm
GLBL SNDR FAIL	Global Sender Fail
HI COOLANT TMP	High Coolant Temp
LOST ECU COMM	Loss of ECU Communication
LOW COOL LEVEL	Low Coolant Level
LOW FUEL LEVEL	Low Fuel Level
LOW OIL PRES	Low Oil Pressure
MAINS FL TR FAILED	Mains Fail Transfer Failed
mtu COMBINED RED	*mtu* Combined Red
OVERCRANK	Overcrank
OVERSPEED	Overspeed
UNEXPECTED SHUTDN	Unexpected Shutdown

Name	Description
Contact Expansion Module	
CEM COMM FAIL	CEM Communication Failure
CEM HW MISMATCH	CEM Hardware Mismatch
MULTIPLE CEM	Duplicate CEMs
Pre-alarms	
BATT CHRG FAIL	Battery Charger Fail
BATT OVERVOLT	Battery Overvoltage
BUS REV ROT	Reverse Bus Rotation
CEM COMM FAIL	CEM Communication Failure
CHECKSUM FAIL	Checksum Failure
DEF CONSUMPT ERROR	DEF Consumption Error
DEF FLUID LOW	DEF Fluid Low
DEF INDUCEMENT	DEF Inducement
DEF INDUCMT O-RIDE	DEF Inducement Override
DEF LOW SEVERE	DEF Low Severe
DEF QUALITY POOR	DEF Quality Poor
DEF PRESVR INDUCMT	DEF Pre-Severe Inducement
DEF SEVERE INDUCMT	DEF Severe Inducement
DEF TAMPERING	DEF Tampering
DEF WARNING	DEF Warning
DEF WARNING LVL2	DEF Warning Level 2
DIAG TRBL CODE	Active DTC
DPF REGEN INHBTD	DPF Regenerate Disabled
DPF REGEN REQD	DPF Regenerate Required
DPF SOOT HIGH	DPF Soot Level High
DPF SOOT LVL EXT HI	DPF Soot Level Severely High
DPF SOOT LVL MOD HI	DPF Soot Level Moderately High
LOW COOL LEVEL DTC	DTC Low Coolant Level
ENG KW OVRLD-1	Engine kW Overload 1
ENG KW OVRLD-2	Engine kW Overload 2
ENG KW OVRLD-3	Engine kW Overload 3
ESCAPE MODE	Escape Mode
EXHAUST SYSTEM ERR	Exhaust System Error
FUEL 1 LEAK	Fuel Filter 1 Leak
FUEL 2 LEAK	Fuel Filter 2 Leak
FUEL LEAK DETECT	Fuel Leak Detect
GEN REV ROT	Reverse Generator Rotation
GN BRK CL FL	Generator Breaker Close Failure
GN BRK OP FL	Generator Breaker Open Failure

Name	Description
HEATING FOR REGEN	Heating for Regeneration
HI COOLANT TMP	High Coolant Temp
HIGH EXHAUST TEMP	High Exhaust Temperature
HIGH FUEL LEVEL	High Fuel Level
LOST ECU COMM	Loss of ECU Communication
LOW BATT VOLT	Low Battery Voltage
LOW COOL LEVEL	Low Coolant Level
LOW COOL TMP	Low Coolant Temp
LOW FUEL LEVEL	Low Fuel Level
LOW OIL PRES	Low Oil Pressure
MN BKR CL FL	Mains Breaker Close Fail
MN BRK OP FL	Mains Breaker Open Fail
MF RETURN FL	Mains Fail Return Fail
MAINT INTERVAL	Maintenance Due
MPU FAIL	MPU Failure
mtu FAULT CODES	*mtu* Fault Code Active
MULTIPLE CEM	Duplicate CEM
REGEN ACTIVE	Regenerate Active
SERFLASH RD FAIL	Serial Flash Read Failure
SVCTOOL FRC REGEN	Service Tool Forced Regenerate
SWITCH FRC REGEN	Switch Forced Regenerate
TORQUE LIMIT	Torque Limit
TRQ LIMIT SEVERE	Torque Limit Severe
WEAK BATTERY	Weak Battery Voltage
Sender Fail	
COOLANT LEVEL	Coolant Level Sender Fail (from ECU)
COOL SNDR FAIL	Coolant Temp Sender Fail
FUEL LEVEL SNDR	Fuel Level Sender Fail
LOSS OF VOLT	Voltage Sensing Fail
OIL SNDR FAIL	Oil Pressure Sender Fail
SPD SNDR FAIL	Speed Sender Fail
Generator Protection	
27 UNDVOLT TRP	Undervoltage (27)
47 PHS IMBAL TRP	Phase Imbalance (47)
50 OVRCURR TRP	Overcurrent (50)
59 OVRVOLT TRP	Overvoltage (59)
81O OVRFREQ TRP	Frequency (81O)
81U UNDFREQ TRP	Frequency (81U)

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 > Alarms-Status > Active Alarms *or* Active Pre-alarms. These lists are scrollable by using the *Up* and *Down* pushbuttons.

BESTCOMS*Plus*®

The status of each alarm and pre-alarm is displayed on the *Alarms* screen (Figure 4-1). This screen is found in the *Metering Explorer*. Alarms with a red indicator are active.

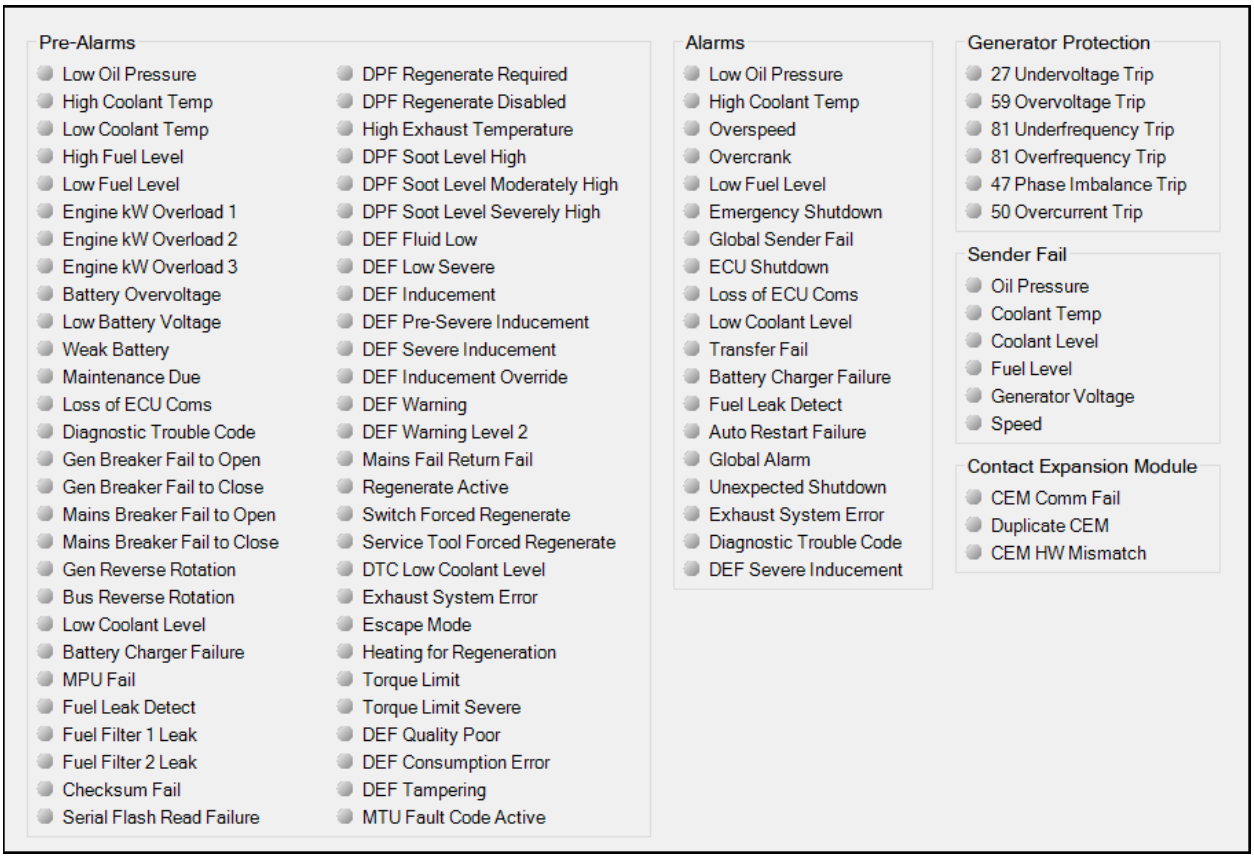


Figure 4-1. Metering Explorer, Alarms Screen

Resetting Alarms and Pre-Alarms

Most pre-alarms automatically reset when the alarm condition no longer exists. Pre-alarms that do not automatically reset are listed below:

- Weak Battery
- Breaker Fail to Open
- Breaker Fail to Close

These pre-alarms are reset by navigating to the Overview screen on the front panel display and holding the *Back* pushbutton for two seconds.

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

Horn

The audible horn can be silenced by simultaneously pressing the *Back* and *Edit* pushbuttons. 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 Params > System Settings > Maint Reset screen. Operator, Settings, or OEM access level is required to reset the maintenance interval pre-alarm. If the maintenance interval pre-alarm is not enabled, the *Maint Reset* parameter is not visible on the front panel.

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.

To reset the maintenance interval pre-alarm from the front panel, navigate to the *Overview* screen and hold the *Back* pushbutton for 12 seconds.

Checksum Failure

The checksum failure pre-alarm can be cleared by holding the *Back* pushbutton for two seconds while displaying the *Overview* screen. However, the pre-alarm will reoccur the next time the checksum is verified if the data is still corrupted. Some checksum calculations are done only on power-up, so this may not occur until the next time operating power is cycled.

If there are consistent checksum failure pre-alarms, attempt the following actions to correct the problem:

1. Load default settings by holding the *Up* and *Down* pushbuttons on the front panel while cycling power. After loading defaults, upload the settings file through BESTCOMS*Plus* if necessary.

Caution

Loading default settings will erase all custom settings. All reports and events will be cleared. It is recommended that all settings are downloaded and saved through BESTCOMS*Plus* before attempting to load defaults. Once defaults are loaded, the saved settings can then be uploaded.

2. If the problem persists, reload the firmware file through BESTCOMS*Plus*. See the *BESTCOMSPlus* chapter in the *Configuration* manual for more information.

Caution

Installing previous versions of firmware may result in compatibility issues causing the inability to operate properly and may not have the enhancements and resolutions to issues that more recent versions provide. Basler Electric highly recommends using the latest version of firmware at all times. Using previous versions of firmware is at the user's risk and may void the warranty of the unit.

3. Contact Basler Electric Technical Support.
4. The checksum failure pre-alarm can be disabled. This disables only the annunciation of the pre-alarm and does not correct any error conditions.

5 • *mtu* Fault Codes

A DGC-2020ES 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 > ALARMS-STATUS > *mtu* FAULT CODES.

Each fault code is displayed with a fault description and the fault number. If the DGC-2020ES 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-2020ES are listed in Table 5-1.

Table 5-1. *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).

Fault Code Number	String	Description
60	SS T COOLANT L4	Coolant temperature too high/too low (limit 4).
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).

Fault Code Number	String	Description
120	HI ECU SUPPLY VOLTS	Power supply voltage too high (limit 1).
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.

Fault Code Number	String	Description
211	SD P LUBE OIL	Lube oil pressure-sensor defect.
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.

Fault Code Number	String	Description
270	SD FREQUENCY INPUT	Frequency input defect.
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.

Fault Code Number	String	Description
329	WIRING CYLNDR A9	Short circuit in injector cable of cylinder A9.
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).

Fault Code Number	String	Description
390	AL MCR EXCEEDED	DBR/MCR Function: MCR (Maximum Continuous Rating) in exceeded.
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.

Fault Code Number	String	Description
438	LO P FUEL RAIL 2 STR	Low pressure on fuel rail 2.
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).

Fault Code Number	String	Description
485	SS T EXHAUST C	High Exhaust C Temperature (Limit 2).
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 1 Limit Alarm.
562	AL LIM EXT PLNT BIN2	External Plant Bin 2 Limit Alarm.
563	AL LIM EXT PLNT BIN3	External Plant Bin 3 Limit Alarm.
564	AL LIM EXT PLNT BIN4	External Plant Bin 4 Limit 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).
572	L3 CAN MAX TIMG RETRD	Maximum Timing Retard from CAN (Limit 3).

Fault Code Number	String	Description
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.
616	AL EIL ERROR STR	EIL Error.

Fault Code Number	String	Description
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	NO_X Value Low (Limit 1).
622	LOLO NOX VALUE	NO_X Value Low (Limit 2).
623	HI NOX VALUE	NO_X Value High (Limit 1).
624	HIHI NOX VALUE	NO_X 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	NO_X A Communications Lost.
659	AL NOXB COMM LOST	NO_X B Communications Lost.
660	AL PHYTRNA COM LST	PHYTRON A Communications Lost.
661	AL PHYTRNB COM LST	PHYTRON B Communications Lost.
662	SD SMRT NOX HTR	Sensor Defect in Smart NO_X Heater Element Sensor.

Fault Code Number	String	Description
663	SD SMRT NOX CONC.	Sensor Defect in Smart NO_X 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 DPF	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 After SCR Filter 1.
751	SD T EXH AFTR SCR F2	Sensor Defect in Exhaust Temperature Sensor After 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	NO_X Sensor E1 Wrong Position Alarm.
780	WRONG NOX SNSR E2	NO_X Sensor E2 Wrong Position Alarm.
781	WRONG NOX SNSR E3	NO_X 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 NO_X Before SCR sensor.
810	NO COMS F1NOX BF SCR	Communications Lost with F1 NO_X Before SCR sensor.
811	SD F1 NOX AFTR SCR	Sensor Defect In F1 NO_X After SCR sensor.
812	NO COMS F1NOX AF SCR	F1 NO_X After SCR Communications lost alarm.
813	SD F2 NOX BEFOR SCR	Sensor Defect In F2 NO_X Before SCR sensor.
814	NO COMS F2NOX BF SCR	F2 NO_X Before SCR Communications lost alarm.
815	SD F2 NOX AFTR SCR	Sensor Defect In F2 NO_X After SCR sensor.
816	NO COMS F2NOX AF SCR	F2 NO_X After SCR Communications lost alarm.
817	SD F3 NOX BEFOR SCR	Sensor Defect In F3 NO_X Before SCR sensor.
818	NO COMS F3NOX BF SCR	F3 NO_X Before SCR Communications lost alarm.
819	SD F3 NOX AFTR SCR	Sensor Defect In F3 NO_X After SCR sensor.
820	NO COMS F3NOX AF SCR	F3 NO_X 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 DEFCT	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	NO_X 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	NO_X Raw Gas Emission Failed Alarm.
908	APPRCH NOX DOS STP FL	Approach NO_X 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	NO_X 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	NO_X P5 Minimum BOI Maximum Active.
961	NOXP5 MX BOI MN ACTV	NO_X 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 NO_X A-B (Limit 1) Alarm.
1014	HIHI DLTA NOX AB	HI Delta NO_X 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 NO_X 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 NO_X 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 NO_X 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.

6 • Diagnostic Trouble Codes

Diagnostic engine information is obtained from a compatible engine control unit (ECU). The DGC-2020ES will receive 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. Table 6-1 lists the diagnostic information that the DGC-2020ES obtains over the CAN interface.

Table 6-1. 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.

For certain DTCs, if the DGC-2020ES recognizes a pair of SPN and FMI numbers, it displays a single string as listed in Table 6-2. If the DGC-2020ES recognizes an SPN in Table 6-2, but the FMI does not match the FMI in Table 6-2, then it displays the string from Table 6-2 corresponding to the table entry where the FMI is # and a second string corresponding to the FMI number listed in Table 6-3. For example, if the DGC-2020ES receives SPN 29 and FMI 13, it displays ACCEL PEDAL 2 POSITN and OUT OF CALIBRATION. If the DGC-2020ES does not have descriptive information about an SPN and FMI that was received, the description will display as “NO TEXT AVAILABLE”.

Table 6-2. DTCs Displayed by the DGC-2020ES

SPN	FMI	String Displayed	Description
27	#	EGR1 VALVE POSITN	EGR1 Valve Position
28	#	ACCEL PEDAL 3 POSITN	accelerator pedal 3 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	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
29	#	ACCEL PEDAL 2 POSITN	accelerator pedal 2 position
51	#	ENG THROTTLE POSITN	Engine Throttle Position
52	#	INTERCOOLER TEMP	Engine Intercooler Temperature
52	15	INTERCOOLER TEMP HI	Engine Intercooler Temperature is above the HIGH threshold
69	#	2 SPEED AXLE SWITCH	Two Speed Axle Switch
70	#	PARKING BRAKE SWITCH	Parking Brake Switch
84	#	VEHICLE SPEED	vehicle speed signal
91	#	ACCEL POSITION	Accelerator Position

SPN	FMI	String Displayed	Description
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	#	FUEL DELIVERY PRESS	Fuel Delivery Pressure
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)
95	#	FUEL FLT DF PRS	Fuel Filter Differential Pressure
96	#	FUEL LEVEL	Fuel Level
97	#	Water in Fuel	Water in Fuel
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
98	#	ENG OIL LEVEL	Engine Oil Level
99	#	OIL FILTER DIFF PRESS	oil filter differential pressure parameter
100	#	ENG OIL PRESS	Engine Oil 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)
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	#	TURBO CH1 SPEED	Turbo Speed
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)
104	#	TRBO CH OIL PRESS	Turbocharger Oil Pressure
105	#	INTAK MNFLD TMP	Intake Manifold Temperature
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)

SPN	FMI	String Displayed	Description
106	#	INTAKE AIR PRESSR	Intake Air Pressure
107	#	AIR FLTR DIF PRS	Air Filter Differential Pressure
107	0	Air Filt Restricted	Air Filter Restriction (High)
108	#	BAROMETRIC PRESS	Barometric Pressure
108	2	Barometrc Prs INVLD	Barometric Pressure (Invalid)
108	31	Barometrc Prs ERR	Barometric Pressure (Error)
109	#	COOLANT PRESS	Coolant Pressure
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
110	#	COOLANT TEMP	Engine Coolant Temperature
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)
111	1	Coolnt Lvl LO	Coolant Level (Low)
111	17	ENG COOLANT LVL LO	Engine Coolant Level is below the LOW threshold
111	#	LOW COOL LEVEL	Low Coolant Level string used in event log and/or Alarm and Pre-alarm annunciation
157	#	INJ RAIL PRS	Fuel Injection Rail Pressure
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
158	#	BATTERY VOLTAGE	Battery Voltage
158	#	KEY SW BATT VOLTAGE	key switch battery potential
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
161	#	TR INPUT SHAFT SPD	Transmission Input Shaft Speed
167	#	CHARGING SYSTM VOLT	Charging System Voltage
168	#	LOW BATT VOLT	Low Battery Voltage string used in event log and/or Alarm and Prealarm annunciation
171	#	AMB AIR TEMP	Ambient Air Temperature
172	#	AIR INLET TEMP	Air Inlet Temperature
173	#	EXHAUST GAS TEMP	Exhaust Gas Temperature
174	#	FUEL TEMP	Fuel 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)

SPN	FMI	String Displayed	Description
174	16	Fuel Temp MHI	Fuel Temp (Moderately High)
175	#	ENG OIL TEMP	Engine Oil Temperature
176	#	TRBO CH OIL TEMP	Turbo Charger Oil Temperature
188	#	IDLE SPEED	Idle Speed parameter
188	17	SPEED AT IDLE LO	Engine Idle speed is below the LOW threshold
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	Engine Speed
191	#	TR OUTPUT SHAFT SPD	Transmission Output Shaft Speed
237	2	VIN Data MisMatch	VIN Data Mismatch with other controllers
247	#	ENGINE HOURS	Engine Run Time in Hours
250	#	TOTAL FUEL USED	Total Fuel Usage
354	#	RELATIVE HUMIDITY	Relative Humidity
412	#	EGR GAS TEMP	Exhaust Gas Recirculation Valve Gas Temperature
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	Aux Temperature 1
442	#	AUX TEMP 2	Aux Temperature 2
443	#	BATTERY VOLT 2	Battery Voltage 2
444	#	AUX PRESSURE2	Auxiliary Pressure 2
515	#	DESIRED SPEED	speed demand desired from the engine.
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

SPN	FMI	String Displayed	Description
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
624	#	COMBINED YELLOW	a Yellow Alarm from the Engine ECU
625	#	PROP COMM NETWK 1	Proprietary Communications Network 1
627	1	Inj Spply Vlt Problm	Injector Supply Voltage Problem
627	16	ECU Power Volt HI	ECU Power High Voltage
627	18	ECU Power Volt LO	ECU Power Low Voltage
627	13	ECU ERROR	ECU Error
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	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
633	#	THROTTLE ACT 1 CNTL	Throttle Actuator 1 Control
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)
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
641	4	Trbo Actuator ERR	Turbo Actuator Error
641	12	ECU/Trbo Comm ERR	ECU/Turbo Communication Error

SPN	FMI	String Displayed	Description
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	J1939 Network number 1
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)
651	#	CYLINDER 1 INJECTOR	Cylinder 1 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)
652	#	CYLINDER 2 INJECTOR	Cylinder 2 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)
653	#	CYLINDER 3 INJECTOR	Cylinder 3 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)
654	#	CYLINDER 4 INJECTOR	Cylinder 4 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)
655	#	CYLINDER 5 INJECTOR	Cylinder 5 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)
656	#	CYLINDER 6 INJECTOR	Cylinder 6 Injector
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

SPN	FMI	String Displayed	Description
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

SPN	FMI	String Displayed	Description
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
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	3	Snsr Supp 1 Volt LO	Sensor Supply 1 Voltage (Low)
1080	4	Snsr Supp 1 Volt HI	Sensor Supply 1 Voltage (High)
1080	#	SENSOR SUPPLY VOLTS 2	Sensor Supply Voltage 2
1081	#	ENG WAIT TO START LMP	Engine Wait to Start Lamp
1083	#	AUX I/O 1	Auxiliary I/O 1
1084	#	AUX I/O 2	Auxiliary I/O 2
1109	31	Eng Shutdown WARNING	Engine Shutdown Warning
1109	#	EPS SHUTDN APPROACHG	Indicates that Engine Protective System Shutdown Is Approaching
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

SPN	FMI	String Displayed	Description
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	#	ECU TEMP	ECU 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)
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)
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
1209	#	EXH PRESSURE	Exhaust Pressure
1213	#	MALFUNC LAMP	the malfunction indicator lamp status that is broadcast by ECU as part of diagnostic trouble code information
1227	#	TEST LIMIT MAX	Caption Indicating Test Limit Maximum
1231	#	J1939 NETWORK 2	J1939 Network number 2
1235	#	J1939 NETWORK 3	J1939 Network number 3
1237	#	ENG SHUTDN ORIDE SW	Engine Shutdown Override Switch
1237	31	AL OVERRIDE ON	Alarm Override is On
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

SPN	FMI	String Displayed	Description
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
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

SPN	FMI	String Displayed	Description
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	31	Fuel Derate	Fuel Derate
1623	#	TACOGRPH OUT SHFT SPD	Tachograph Output Shaft Speed
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

SPN	FMI	String Displayed	Description
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
2440	#	GEN LL VOLTAGE	Generator Line to Line Voltage
2452	#	GEN TOTAL POWER	Generator Total Real Power
2456	#	TRBO 1 OUT TMP HI HI	Turbocharger 1 outlet pressure is above the HIGH HIGH threshold
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	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
2791	#	EGR VALVE CONTROL	EGR Valve Control
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
2950	#	INTK VALVE ACUATOR 1	Intake Valve Actuator 1

SPN	FMI	String Displayed	Description
2951	#	INTK VALVE ACUATOR 2	Intake Valve Actuator 2
2980	#	FUEL PRESSR	Fuel Pressure
3031	#	DEF TEMP	DEF Temperature
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 O_2
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 NO_X Reading Stable
3221	#	AFT1 INTK WR O2 STBL	Aftertreatment 1 Intake Wide-Range Percent O_2 Reading Stable
3222	#	AFT1 INTK SNS HTR FMI	Aftertreatment 1 Intake Gas Sensor Heater Preliminary FMI
3224	#	AFT1 INTK NOXSNSR FMI	Aftertreatment 1 Intake NO_X Sensor Preliminary FMI
3225	#	AFT1 INTK O2 SNSR FMI	Aftertreatment 1 Intake O_2 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 NO_X Sensor Preliminary FMI
3242	#	AFT1 DPF IN TEMP	Aftertreatment1 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 O_2
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
3380	#	FIELD VOLTAGE	Field Voltage
3381	#	FIELD CURRENT	Field Current
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

SPN	FMI	String Displayed	Description
3514	#	SNSR SUPPLY VOLT 6	Sensor Supply Voltage 6
3515	#	DEF TEMP	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 Shutdown
3609	#	DPF INTAKE PRESSR 1	DPF Intake Pressure 1
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 Throttle 2 Position
3695	#	REGEN INHIBIT SWITCH	Regenerate Inhibit Switch
3703	#	DPF RGN INH DUE TO SW	DPF Regeneration Inhibited Due to Inhibit Switch
3719	#	DPF SOOT LEVEL %	Soot level in the Diesel Particulate Filter
3719	0	DPF SOOT LVL EXT HI	Diesel Particulate Filter Soot Level High - Most Severe Level
3719	15	DPF SOOT LVL HI	Diesel Particulate Filter Soot Level High - Least Severe Level
3719	16	DPF SOOT LVL MOD HI	Diesel Particulate Filter Soot Level High - Moderately Severe Level
3720	#	DPF ASH LEVEL %	DPF Ash Level Percent
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 Crank Without Fuel
4257	#	INJECTOR GROUP 3	Injector Group 3
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

SPN	FMI	String Displayed	Description
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 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
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
520838	1	RUN UP SPEED LO LO	Run Up Speed is below the LOW LOW threshold
522192	12	*mtu* ENGINE BAD	Component failure of the *mtu* engine control ECU
523212	#	ENGPRT CAN MSG	Proprietary *mtu* CAN Message
523216	#	PREHTENCMD CAN MSG	Proprietary *mtu* CAN Message

SPN	FMI	String Displayed	Description
523218	#	RxCCVS CAN MSG	Proprietary *mtu* CAN Message
523222	#	TC01 CAN MSG	Proprietary *mtu* CAN Message
523238	#	SWTOUT CAN MSG	Proprietary *mtu* CAN Message
523239	#	DECV1 CAN MSG	Proprietary *mtu* CAN Message
523240	#	FUNMODCTL CAN MSG	Proprietary *mtu* CAN Message
523350	#	CYL BANK 1 INJECTORS	Cylinder Bank 1 Injectors
523351	#	CYL BANK 1 INJECTORS	Cylinder Bank 1 Injectors
523352	#	CYL BANK 2 INJECTORS	Cylinder Bank 2 Injectors
523353	#	CYL BANK 2 INJECTORS	Cylinder Bank 2 Injectors
523354	#	ECU ERROR	ECU Error
523355	#	ECU ERROR	ECU Error
523370	#	RAIL PRESSURE	Rail Pressure
523420	#	ECU ERROR	ECU Error
523450	#	MULTI STATE SWITCH 1	Multi State Switch 1
523451	#	MULTI STATE SWITCH 2	Multi State Switch 2
523452	#	MULTI STATE SWITCH 3	Multi State Switch 3
523470	#	RAIL PRESSURE LMT VLV	Rail Pressure Limit Valve
523490	#	ECU ERROR	ECU Error
523500	#	CAN MSG TIMEOUT	Can Message Timeout has occurred
523550	#	ECU ERROR	ECU Error
523561	#	INJECTN PERIOD CYL 1	Single Cylinder Injection Period
523562	#	INJECTN PERIOD CYL 2	Single Cylinder Injection Period
523563	#	INJECTN PERIOD CYL 3	Single Cylinder Injection Period
523564	#	INJECTN PERIOD CYL 4	Single Cylinder Injection Period
523565	#	INJECTN PERIOD CYL 5	Single Cylinder Injection Period
523566	#	INJECTN PERIOD CYL 6	Single Cylinder Injection Period
523567	#	INJECTN PERIOD CYL 7	Single Cylinder Injection Period
523568	#	INJECTN PERIOD CYL 8	Single Cylinder Injection Period
523600	#	ECU ERROR	ECU Error
523601	#	ECU ERROR	ECU Error
523602	#	FAN SPEED	Engine Fan Speed
523604	#	RXENGTMP CAN MSG	CAN Message
523605	#	TSC1-AE MSG MISSING	CAN Message
523606	#	TSC1-AR MSG MISSING	CAN Message
523607	#	TSC1-DE MSG MISSING	CAN Message
523608	#	TSC1-DR MSG MISSING	CAN Message
523609	#	TSC1-PE MSG MISSING	CAN Message
523610	#	TSC1-VE MSG MISSING	CAN Message
523611	#	TSC1-VR MSG MISSING	CAN Message
523612	#	ECU ERROR	ECU Error
523613	#	RAIL PRESSURE	Rail Pressure
523615	#	METERING UNIT VALVE	Metering Unit Valve
523617	#	ECU ERROR	ECU Error

Table 6-3. DTCs Displayed by the DGC-2020ES (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.

7 • Yanmar Fault Codes

The Yanmar fault codes are actually J1939 Diagnostic Trouble Codes with an additional Yanmar Fault Code designator.

The DGC-2020 obtains Yanmar diagnostic engine information from the Yanmar engine control unit (ECU). The DGC-2020 will receive 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. Table 7-1 lists the diagnostic information that the DGC-2020 obtains over the CAN Bus interface.

Table 7-1. Diagnostic Information Obtained Over the CAN Bus 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.

For certain DTCs, if the DGC-2020 recognizes a pair of SPN and FMI numbers, it displays a single string as listed in Table 7-3. If the DGC-2020 recognizes an SPN in Table 7-3, but the FMI does not match the FMI in Table 7-3, then it displays the text string from Table 7-3 corresponding to the table entry where the FMI is # and a second text string corresponding to the FMI number listed in Table 7-2. For example, if the DGC-2020 receives SPN 29 and FMI 13, it displays ACCEL PEDAL 2 POSITN and OUT OF CALIBRATION. If the DGC-2020 does not have descriptive information about an SPN and FMI that was received, the description will display as “NO TEXT AVAILABLE”.

The Yanmar Fault Code designator consists of a letter and a four-digit number in the form LNNNN, where L is either a U or a P, and NNNN is a four-digit hexadecimal number. This code uniquely identifies the Yanmar fault information. Consult the Yanmar engine documentation or contact Yanmar to determine the corrected action that will remedy the fault.

Table 7-2. DTCs Displayed by the DGC-2020 (FMI Strings)

FMI	Text 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

FMI	Text Displayed	Description
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.

Table 7-3. DTCs with Yanmar Fault Code Designators Displayed by the DGC-2020

SPN	FMI	Text Displayed	Description	Yanmar Code
28	0	ACCEL PEDAL 3 POSITN	accelerator pedal 3 position	P1126
28	1	ACCEL PEDAL 3 POSITN	accelerator pedal 3 position	P1125
28	3	ACCEL PEDAL 2 POSITN	accelerator pedal 2 position	P0223
28	4	ACCEL PEDAL 2 POSITN	accelerator pedal 2 position	P0222
29	3	ACCEL PEDAL 3 POSITN	accelerator pedal 3 position	P0228
29	4	ACCEL PEDAL 3 POSITN	accelerator pedal 3 position	P0227
29	8	ACCEL PEDAL 2 POSITN	accelerator pedal 2 position	P1227
51	3	ENG THROTTLE POSITN	Engine Throttle Position	P02E9
51	4	ENG THROTTLE POSITN	Engine Throttle Position	P02E8
91	3	ACCEL POSITION	Accelerator Position	P0123
91	4	ACCEL POSITION	Accelerator Position	P0122
100	1	ENG OIL PRESS	Engine Oil Pressure	P1198
100	4	ENG OIL PRESS	Engine Oil Pressure	P1192
102	3	INTK MANFLD P SNS BAD	intake manifold pressure sensor malfunction	P0238
102	4	INTK MANFLD P SNS BAD	intake manifold pressure sensor malfunction	P0237
102	10	INTK MANFLD P SNS BAD	intake manifold pressure sensor malfunction	P1673

SPN	FMI	Text Displayed	Description	Yanmar Code
102	13	INTK MANFLD P SNS BAD	intake manifold pressure sensor malfunction	P0236
105	3	INTK MANFLD T SNS BAD	Intake Manifold Temperature Sensor Malfunction	P040D
105	4	INTK MANFLD T SNS BAD	Intake Manifold Temperature Sensor Malfunction	P040C
105	10	INTK MANFLD T SNS BAD	Intake Manifold Temperature Sensor Malfunction	P1676
108	3	ATMOSPHERIC P SNS BAD	Caption string indicating Atmospheric Pressure Sensor Malfunction	P2229
108	4	ATMOSPHERIC P SNS BAD	Caption string indicating Atmospheric Pressure Sensor Malfunction	P2228
108	10	ATMOSPHERIC P SNS BAD	Caption string indicating Atmospheric Pressure Sensor Malfunction	P1231
110	0	COOLANT TMP	Engine Coolant Temperature	P0217
110	3	COOLANT TMP SENSR BAD	Engine Coolant Temperature Sensor Malfunction	P0118
110	4	COOLANT TMP SENSR BAD	Engine Coolant Temperature Sensor Malfunction	P0117
110	10	COOLANT TMP SENSR BAD	Engine Coolant Temperature Sensor Malfunction	P1674
157	0	INJ RAIL PRS	Injector Rail Pressure	P0088
157	3	INJ RAIL PRS	Injector Rail Pressure	P0193
157	4	INJ RAIL PRS	Injector Rail Pressure	P0192
157	15	INJ RAIL PRS	Injector Rail Pressure	P0093
157	16	INJ RAIL PRS	Injector Rail Pressure	P000F
157	18	INJ RAIL PRS	Injector Rail Pressure	P0094
167	1	CHARGING SYSTM VOLT	Charging System Voltage	P1568
167	5	CHARGING SYSTM VOLT	Charging System Voltage	P1562
172	3	AIR INLET TEMP	Air Inlet Temperature	P0113
172	4	AIR INLET TEMP	Air Inlet Temperature	P0112
173	3	EXH MANFLD T SNS BAD	Exhaust Manifold Temperature Sensor Malfunction	P0546
173	4	EXH MANFLD T SNS BAD	Exhaust Manifold Temperature Sensor Malfunction	P0545
173	10	EXH MANFLD T SNS BAD	Exhaust Manifold Temperature Sensor Malfunction	P1677
174	0	FUEL TEMP	Fuel Temperature	P0168
174	3	FUEL TEMP	Fuel Temperature	P0183
174	4	FUEL TEMP	Fuel Temperature	P0182
190	0	ENGINE SPEED	Engine Speed	P0219
237	13	CAN 2	Can Bus 2	U3002
237	31	CAN 2	Can Bus 2	U0168
412	3	EGR GAS TMP SNSR BAD	EGR Gas Temperature Sensor Malfunction	P041D
412	4	EGR GAS TMP SNSR BAD	EGR Gas Temperature Sensor Malfunction	P041C
412	10	EGR GAS TMP SNSR BAD	EGR Gas Temperature Sensor Malfunction	P1675
630	12	EE PROM	the EEPROM memory inside the engine ECU	P0601
633	3	SCV (MPROP)	Proprietary caption text for YANMAR Diagnostic Trouble Codes	P0629

SPN	FMI	Text Displayed	Description	Yanmar Code
633	5	SCV (MPROP)	Proprietary caption text for YANMAR Diagnostic Trouble Codes	P0627
633	6	SCV (MPROP)	Proprietary caption text for YANMAR Diagnostic Trouble Codes	P1642
651	3	CYLINDER 4 INJECTOR	Cylinder 4 Injector	P1271
651	5	CYLINDER 4 INJECTOR	Cylinder 4 Injector	P0204
651	6	CYLINDER 4 INJECTOR	Cylinder 4 Injector	P0271
651	11	CYLINDER 4 INJECTOR	Cylinder 4 Injector	P1272
652	3	CYLINDER 3 INJECTOR	Cylinder 3 Injector	P1268
652	5	CYLINDER 3 INJECTOR	Cylinder 3 Injector	P0203
652	6	CYLINDER 3 INJECTOR	Cylinder 3 Injector	P0268
652	11	CYLINDER 3 INJECTOR	Cylinder 3 Injector	P1269
653	3	CYLINDER 2 INJECTOR	Cylinder 2 Injector	P1265
653	5	CYLINDER 2 INJECTOR	Cylinder 2 Injector	P0202
653	6	CYLINDER 2 INJECTOR	Cylinder 2 Injector	P0265
653	11	CYLINDER 2 INJECTOR	Cylinder 2 Injector	P1266
654	3	CYLINDER 1 INJECTOR	Cylinder 1 Injector	P1262
654	5	CYLINDER 1 INJECTOR	Cylinder 1 Injector	P0201
654	6	CYLINDER 1 INJECTOR	Cylinder 1 Injector	P0262
654	11	CYLINDER 1 INJECTOR	Cylinder 1 Injector	P1263
1209	3	EXH MANFLD P SNS BAD	Exhaust Manifold Pressure Sensor Malfunction	P0473
1209	4	EXH MANFLD P SNS BAD	Exhaust Manifold Pressure Sensor Malfunction	P0472
1209	10	EXH MANFLD P SNS BAD	Exhaust Manifold Pressure Sensor Malfunction	P1679
1209	13	EXH MANFLD P SNS BAD	Exhaust Manifold Pressure Sensor Malfunction	P0471
1485	2	ECU MAIN RELAY	ECU Main Relay	P068A
1485	7	ECU MAIN RELAY	ECU Main Relay	P068B
2791	0	EGR VALVE MALFUNCTN	Exhaust Gas Recirculation (EGR) Malfunction	P0404
2791	1	EGR VALVE MALFUNCTN	Exhaust Gas Recirculation (EGR) Malfunction	P1404
2791	7	EGR VALVE MALFUNCTN	Exhaust Gas Recirculation (EGR) Malfunction	P1409
2791	9	EGR VALVE MALFUNCTN	Exhaust Gas Recirculation (EGR) Malfunction	U0401
2791	12	EGR VALVE MALFUNCTN	Exhaust Gas Recirculation (EGR) Malfunction	P0403
2797	6	INJECTOR GROUP 1	Engine Injector Group 1	P1146
2798	6	INJECTOR GROUP 2	Engine Injector Group 2	P1149
2950	3	INTK THROTTL DRV CKT	Engine Intake Throttle Drive Circuit	P1658
2950	4	INTK THROTTL DRV CKT	Engine Intake Throttle Drive Circuit	P1659
2950	5	INTK THROTTL DRV CKT	Engine Intake Throttle Drive Circuit	P0660
2950	6	INTK THROTTL DRV CKT	Engine Intake Throttle Drive Circuit	P1660
2951	3	INTK THROTTL DRV CKT	Engine Intake Throttle Drive Circuit	P1661
2951	4	INTK THROTTL DRV CKT	Engine Intake Throttle Drive Circuit	P1662
3242	0	DPF INLET T SENSR BAD	Diesel Particulate Filter (DPF) Inlet Temperature Sensor Malfunction	P1436
3242	3	DPF INLET T SENSR BAD	Diesel Particulate Filter (DPF) Inlet Temperature Sensor Malfunction	P1428
3242	4	DPF INLET T SENSR BAD	Diesel Particulate Filter (DPF) Inlet Temperature Sensor Malfunction	P1427

SPN	FMI	Text Displayed	Description	Yanmar Code
3242	10	DPF INLET T SENSR BAD	Diesel Particulate Filter (DPF) Inlet Temperature Sensor Malfunction	P167E
3250	0	DPF INTRMED GAS TEMP	Diesel Particulate Filter (DPF) Intermediate Temperature Sensor Malfunction	P1426
3250	1	DPF INTRMD T SNS BAD	Diesel Particulate Filter (DPF) Intermediate Temperature Sensor Malfunction	P0420
3250	3	DPF INTRMD T SNS BAD	Diesel Particulate Filter (DPF) Intermediate Temperature Sensor Malfunction	P1434
3250	4	DPF INTRMD T SNS BAD	Diesel Particulate Filter (DPF) Intermediate Temperature Sensor Malfunction	P1435
3250	10	DPF INTRMD T SNS BAD	Diesel Particulate Filter (DPF) Intermediate Temperature Sensor Malfunction	P167A
3251	0	DPF DIFF PRS SNSR BAD	Diesel Particulate Filter (DPF) Differential Pressure Sensor Malfunction	P2452
3251	3	DPF DIFF PRS SNSR BAD	Diesel Particulate Filter (DPF) Differential Pressure Sensor Malfunction	P2455
3251	4	DPF DIFF PRS SNSR BAD	Diesel Particulate Filter (DPF) Differential Pressure Sensor Malfunction	P2454
3251	10	DPF DIFF PRS SNSR BAD	Diesel Particulate Filter (DPF) Differential Pressure Sensor Malfunction	P167B
3251	13	DPF DIFF PRS SNSR BAD	Diesel Particulate Filter (DPF) Differential Pressure Sensor Malfunction	P2453
3609	3	DPF HIGH PRS SNS BAD	Diesel Particulate Filter (DPF) High Pressure Sensor Malfunction	P1455
3609	4	DPF HIGH PRS SNS BAD	Diesel Particulate Filter (DPF) High Pressure Sensor Malfunction	P1454
3609	10	DPF HIGH PRS SNS BAD	Diesel Particulate Filter (DPF) High Pressure Sensor Malfunction	P167C
3695	14	REGEN INHIBITED	Text announcing that diesel particulate filter regeneration is disabled	P1425
3719	0	DPF SOOT LEVEL %	the level of soot in the Diesel Particulate Filter	P1424
3719	7	DPF SOOT LEVEL %	the level of soot in the Diesel Particulate Filter	P1446
3719	9	DPF SOOT LEVEL %	the level of soot in the Diesel Particulate Filter	P1445
3719	16	DPF SOOT LEVEL %	the level of soot in the Diesel Particulate Filter	P1421
3720	0	DPF ASH LEVEL %	the level of ash in the Diesel Particulate Filter	P1420
3720	16	DPF ASH LEVEL %	the level of ash in the Diesel Particulate Filter	P242F
4257	12	INJECTOR COMMON	Injector common	P0611
4795	31	DPF SUBSTRATE REMOVED	the substrate has been removed from the Diesel Particulate Filter (DPF)	P226D
522243	5	ENGINE START RELAY	Engine Start Relay	P0543
522243	6	ENGINE START RELAY	Engine Start Relay	P0541
522323	0	AIR CLEANER SWITCH	the Air Cleaner Switch	P1101
522329	0	OIL/WATER SEPARATOR	the Oil/Water Separator Device	P1151
522400	2	CRANKSHAFT SENSOR	Crankshaft Sensor	P0336
522400	5	CRANKSHAFT SENSOR	Crankshaft Sensor	P0337
522401	2	CAMSHAFT SENSOR	Camshaft Sensor	P0341
522401	5	CAMSHAFT SENSOR	Camshaft Sensor	P0342
522401	7	CAMSHAFT SENSOR	Camshaft Sensor	P1341
522571	3	SCV (MPROP)	Proprietary caption text for YANMAR Diagnostic Trouble Codes	P1641
522571	6	SCV (MPROP)	Proprietary caption text for YANMAR Diagnostic Trouble Codes	P1643

SPN	FMI	Text Displayed	Description	Yanmar Code
522572	6	SCV (MPROP)	Proprietary caption text for YANMAR Diagnostic Trouble Codes	P062A
522572	11	SCV (MPROP)	Proprietary caption text for YANMAR Diagnostic Trouble Codes	P1645
522573	0	DPF	Diesel Particulate Filter	P2463
522574	0	DPF	Diesel Particulate Filter	P1463
522575	7	DPF	Diesel Particulate Filter	P2458
522576	12	EE PROM	EEPROM memory inside the engine ECU	P160E
522577	11	DPF	Diesel Particulate Filter	P2459
522578	12	EE PROM	EEPROM memory inside the engine ECU	P160F
522579	12	EGR VALVE MALFUNCTN	Exhaust Gas Recirculation (EGR) Malfunction	P1405
522580	12	EGR VALVE MALFUNCTN	Exhaust Gas Recirculation (EGR) Malfunction	P0488
522581	7	EGR VALVE MALFUNCTN	Exhaust Gas Recirculation (EGR) Malfunction	P148A
522582	7	EGR VALVE MALFUNCTN	Exhaust Gas Recirculation (EGR) Malfunction	P049D
522583	1	EGR VALVE MALFUNCTN	Exhaust Gas Recirculation (EGR) Malfunction	P1410
522584	1	EGR VALVE MALFUNCTN	Exhaust Gas Recirculation (EGR) Malfunction	P1411
522585	12	ECU INTERNAL ERROR	ECU Internal Error	P1613
522588	12	ECU INTERNAL ERROR	ECU Internal Error	P1608
522589	12	ECU INTERNAL ERROR	ECU Internal Error	P1617
522590	12	ECU INTERNAL ERROR	ECU Internal Error	P1609
522591	12	ECU INTERNAL ERROR	ECU Internal Error	P1618
522592	12	ECU INTERNAL ERROR	ECU Internal Error	P1619
522596	9	CAN 2	Can Bus 2	U0292
522597	9	CAN 2	Can Bus 2	U1301
522599	9	CAN 2	Can Bus 2	U1292
522600	9	CAN 2	Can Bus 2	U1293
522601	9	CAN 2	Can Bus 2	U1294
522603	9	CAN 2	Can Bus 2	U1296
522605	9	CAN 2	Can Bus 2	U1298
522609	9	CAN 2	Can Bus 2	U1300
522610	9	EGR VALVE MALFUNCTN	Exhaust Gas Recirculation (EGR) Malfunction	U010B
522611	9	EXHAUST THROTTLE	Exhaust Throttle	U1107
522617	12	EGR VALVE MALFUNCTN	Exhaust Gas Recirculation (EGR) Malfunction	U1401
522618	9	CAN 2	Can Bus 2	U1302
522619	9	CAN 2	Can Bus 2	U1303
522623	7	ACCELERTN SNSR 1 / 2	Acceleration Sensor 1 or Acceleration Sensor 2	P1647
522624	7	ACCELERTN SNSR 1 / 2	Acceleration Sensor 1 or Acceleration Sensor 2	P1646
522744	4	ECU INTERNAL ERROR	ECU Internal Error	P1626
522746	12	EXHAUST THROTTLE	the Exhaust Throttle	P1438
522747	12	EXHAUST THROTTLE	the Exhaust Throttle	P1439
522748	12	EXHAUST THROTTLE	the Exhaust Throttle	P1440
522749	12	EXHAUST THROTTLE	the Exhaust Throttle	P1441
522750	12	EXHAUST THROTTLE	the Exhaust Throttle	P1442
522751	19	EXHAUST THROTTLE	the Exhaust Throttle	P1443
522994	4	ECU INTERNAL ERROR	ECU Internal Error	P1633
523249	5	CRANK/CAM SENSOR	Crankshaft Sensor or the Camshaft sensor	P0008

SPN	FMI	Text Displayed	Description	Yanmar Code
523460	7	RAIL PRESSURE SENSOR	the Fuel Rail Pressure Sensor	P1670
523462	13	QR DATA	YANMAR specific fault code	P1648
523463	13	QR DATA	YANMAR specific fault code	P1649
523464	13	QR DATA	YANMAR specific fault code	P1650
523456	13	QR DATA	YANMAR specific fault code	P1651
523468	9	RAIL PRESSURE SENSOR	the Fuel Rail Pressure Sensor	P1665
523469	0	RAIL PRESSURE SENSOR	the Fuel Rail Pressure Sensor	P1666
523470	0	RAIL PRESSURE SENSOR	the Fuel Rail Pressure Sensor	P1667
523471	6	ECU INTERNAL ERROR	ECU Internal Error	P1467
523473	12	ECU INTERNAL ERROR	ECU Internal Error	P1469
523474	12	ECU INTERNAL ERROR	ECU Internal Error	P1470
523475	12	ECU INTERNAL ERROR	ECU Internal Error	P1471
523476	12	ECU INTERNAL ERROR	ECU Internal Error	P1472
523477	12	ECU INTERNAL ERROR	ECU Internal Error	P1473
523478	12	ECU INTERNAL ERROR	ECU Internal Error	P1474
523479	12	ECU INTERNAL ERROR	ECU Internal Error	P1475
523480	12	ECU INTERNAL ERROR	ECU Internal Error	P1476
523481	12	ECU INTERNAL ERROR	ECU Internal Error	P1477
523482	12	ECU INTERNAL ERROR	ECU Internal Error	P1478
523483	12	ECU INTERNAL ERROR	ECU Internal Error	P1479
523484	12	ECU INTERNAL ERROR	ECU Internal Error	P1480
523485	12	ECU INTERNAL ERROR	ECU Internal Error	P1481
523486	12	ECU INTERNAL ERROR	ECU Internal Error	P1482
523487	12	ECU INTERNAL ERROR	ECU Internal Error	P1483
523488	0	ECU INTERNAL ERROR	ECU Internal Error	P1484
523489	0	RAIL PRESSURE SENSOR	Fuel Rail Pressure Sensor	P1668
523491	0	RAIL PRESSURE SENSOR	Fuel Rail Pressure Sensor	P1669

8 • Event Recording

An event log retains history of system events in nonvolatile memory. Fifty event records are retained and each record contains a time stamp of the first and last event occurrence, and the number of occurrences for each event. In addition, each record contains details of the time, date, and engine hours for the most recent 30 occurrences of the event. The number of occurrences stops incrementing at 99. If an event occurs which is of a type that differs from those in the 50 records in memory, the record that has the oldest “last” event occurrence is removed from the log, and the new category takes its place. Since 50 event records with up to 99 occurrences each are retained in memory, a history of nearly 5,000 specific events are retained by the DGC-2020ES. Detailed occurrence information is retained for the most recent 30 occurrences of each event record, and there are 50 event records. Thus the time, date, and engine hours details for up to 1,500 specific event occurrences are retained in the event log.

Event Log

An event log can be downloaded into BESTCOMS*Plus*® for viewing and storage. The *Options* button is used to save the entire event log to a file, or to save the list to the computer clipboard making it available for insertion into other software applications. It is possible to copy a portion of the log to the computer clipboard by selecting the desired portion with the mouse then using the Options->Copy Selection feature. The *Download* button refreshes the event log list by performing a fresh download of the list from the DGC-2020ES. The *Clear* button gives the user the option of clearing selected or all event logs. Refer to Figure 8-1.

Options | Refresh | Clear | Toggle Sorting | Sorting: Enabled

Event ID	Description	Occurrence	Date	Eng Hrs (H:m)
3	OFF MODE	29	2014-09-22 11:15:04	100:09
3	OFF MODE	28	2014-09-22 11:12:48	100:09
3	OFF MODE	27	2014-09-22 11:12:09	100:09
3	OFF MODE	26	2014-09-22 11:11:51	100:09
3	OFF MODE	25	2014-09-22 11:11:25	100:09
3	OFF MODE	24	2014-09-22 11:06:21	100:09
3	OFF MODE	23	2014-09-22 11:06:06	100:09
3	OFF MODE	22	2014-09-22 10:53:03	100:09
3	OFF MODE	21	2014-04-25 17:31:47	100:09
3	OFF MODE	20	2014-04-25 17:31:26	100:09
3	OFF MODE	19	2014-04-25 17:27:19	100:09
3	OFF MODE	18	2014-04-25 17:21:29	100:09
3	OFF MODE	1	2014-04-15 11:50:54	100:09
4	AUTO MODE	8	2014-09-22 11:24:26	100:09
4	AUTO MODE	7	2014-09-22 11:24:19	100:09
4	AUTO MODE	6	2014-09-22 10:48:39	100:09
4	AUTO MODE	5	2014-04-25 17:31:48	100:09
4	AUTO MODE	4	2014-04-25 17:31:28	100:09
4	AUTO MODE	3	2014-04-25 17:31:08	100:09
4	AUTO MODE	2	2014-04-17 16:57:18	100:09
4	AUTO MODE	1	2014-04-17 16:57:15	100:09
5	RUN MODE	2	2014-09-22 11:24:22	100:09
5	RUN MODE	1	2014-04-17 16:57:16	100:09

Figure 8-1. Metering Explorer, Event Log Screen (Sorted by Event ID)

The event log may also be viewed on the front panel display by navigating to *Metering, Alarms-Status, Event Log.* Use the Up/Down keys to highlight an event and press the *Right* key to view the summary of that event record. The summary contains the description of the event, date, time, and engine hours of the first occurrence of the event, along with date, time, and engine hours of the most recent occurrence of the event. To view details of specific event occurrences, press the *Down* key until DETAILS is highlighted, and then, press the *Right* key. The occurrence number can be changed by pressing the *Edit* key, *Up/Down* keys to select #, and pressing the *Edit* key again to exit. Table 8-1 lists all possible event strings (as shown in the event log).

Table 8-1. Event List

Event String	Event Description	Event Type
27 UNDVOLT TRP A	27 Undervoltage Trip	Alarm
27 UNDVOLT TRP P	27 Undervoltage Trip	Pre-Alarm
47 PHS IMBAL TRP A	47 Phase Imbalance Trip	Alarm
47 PHS IMBAL TRP P	47 Phase Imbalance Trip	Pre-Alarm
50 OVRCURR TRP A	50 Overcurrent Trip	Alarm
50 OVRCURR TRP P	50 Overcurrent Trip	Pre-Alarm
59 OVRVOLT TRP A	59 Overvoltage Trip	Alarm
59 OVRVOLT TRP P	59 Overvoltage Trip	Pre-Alarm
81O OVRFREQ TRP A	81 Overfrequency Trip	Alarm
81O OVRFREQ TRP P	81 Overfrequency Trip	Pre-Alarm
81U UNDFREQ TRP A	81 Underfrequency Trip	Alarm
81U UNDFREQ TRP P	81 Underfrequency Trip	Pre-Alarm
ATS INPUT CLOSED	ATS Input	Status
AUTO RESTART	Automatic Restart in Progress	Status
AUTO RESTART FAIL A	Automatic Restart Fail	Alarm
BATT CHRG FAIL A	Battery Charger Fail	Alarm
BATT CHRG FAIL P	Battery Charger Fail	Pre-Alarm
BATT OVERVOLT P	Battery Overvoltage	Pre-Alarm
BATTLE OVERRIDE	Battle Override	Status
CAN BUS OFF	CAN Bus entered Bus Off state	Status
CAN ERROR PASSIVE	CAN Bus entered Error Passive state	Status
CEM COMM FAIL P	CEM-2020 Communications Failure	Pre-Alarm
CEM HW MISMATCH P	Connected CEM-2020 is wrong type	Pre-Alarm
CHARGER1 AC OFF P	Battery Charger 1, AC Off	Pre-Alarm
CHARGER1 BATT FAIL P	Battery Charger 1, Battery Failure	Pre-Alarm
CHARGER1 COMMS FAIL P	Battery Charger 1, Communications Failure	Pre-Alarm
CHARGER1 FAILURE P	Battery Charger 1,Charger Failure	Pre-Alarm
CHARGER1 HI DC VOLTS P	Battery Charger 1,High Output Voltage	Pre-Alarm
CHARGER1 INVALID SETTINGS P	Battery Charger 1,Invalid Settings	Pre-Alarm
CHARGER1 LO CRANKING V P	Battery Charger 1,Low Cranking Voltage	Pre-Alarm
CHARGER1 LOW DC VOLTS P	Battery Charger 1, Low Output Voltage	Pre-Alarm
CHARGER1 SINGLE UNIT FAIL P	Battery Charger 1,Single Unit Failure	Pre-Alarm
CHARGER1 THERMAL LIMIT P	Battery Charger 1,Thermal Limit	Pre-Alarm
CHARGER2 AC OFF P	Battery Charger 2, AC Off	Pre-Alarm
CHARGER2 BATT FAIL P	Battery Charger 2, Battery Failure	Pre-Alarm
CHARGER2 COMMS FAIL P	Battery Charger 2, Communications Failure	Pre-Alarm
CHARGER2 FAILURE P	Battery Charger 2,Charger Failure	Pre-Alarm
CHARGER2 HI DC VOLTS P	Battery Charger 2,High Output Voltage	Pre-Alarm
CHARGER2 INVALID SETTINGS P	Battery Charger 2,Invalid Settings	Pre-Alarm
CHARGER2 LO CRANKING V P	Battery Charger 2,Low Cranking Voltage	Pre-Alarm
CHARGER2 LOW DC VOLTS P	Battery Charger 2, Low Output Voltage	Pre-Alarm
CHARGER2 SINGLE UNIT FAIL P	Battery Charger 2,Single Unit Failure	Pre-Alarm

Event String	Event Description	Event Type
CHARGER2 THERMAL LIMIT P	Battery Charger 2,Thermal Limit	Pre-Alarm
CHECKSUM FAIL P	Corrupt user settings or firmware code	Pre-Alarm
COMBINED RED A	Combined Red	Alarm
COMBINED YELLOW P	Combined Yellow	Pre-Alarm
CONFIG ELEMENT X A (X = 1 to 8)	Configurable Element X (X = 1 to 8)	Alarm
CONFIG ELEMENT X P (X = 1 to 8)	Configurable Element X (X = 1 to 8)	Pre-Alarm
COOL LVL SNDR FL A	Coolant Level Sender Fail	Alarm
COOL SNDR FAIL	Coolant Temperature Sender Fail	Status
COOL SNDR FAIL A	Coolant Temperature Sender Fail	Alarm
COOL SNDR FAIL P	Coolant Temperature Sender Fail	Pre-Alarm
DEFAULTS LOADED	Default settings were uploaded into the DGC,	Status
DEF FLUID EMPTY P	Diesel Exhaust Fluid Empty	Pre-Alarm
DEF FLUID LOW P	Diesel Exhaust Fluid Low	Pre-Alarm
DEF CONSUMPTN ERR P	Diesel Exhaust Fluid Consumption Incorrect	Pre-Alarm
DEF INDUCEMENT P	Diesel Exhaust Fluid Inducement	Pre-Alarm
DEF INDUCMT O-RIDE P	Diesel Exhaust Fluid Inducement Override	Pre-Alarm
DEF LOW SEVERE P	Diesel Exhaust Fluid Low Severe	Pre-Alarm
DEF PRESVR INDUCMT P	Diesel Exhaust Fluid Pre-Severe Inducement	Pre-Alarm
DEF QUALITY POOR P	Diesel Exhaust Fluid Quality Poor	Pre-Alarm
DEF SEVERE INDUCMT P	Diesel Exhaust Fluid Severe inducement	Pre-Alarm
DEF TAMPERING	Diesel Exhaust Fluid Tampering	Pre-Alarm
DEF WARNING	Diesel Exhaust Fluid Pre-Inducement Warning Level 1	Pre-Alarm
DEF WARNING LEVEL 2	Diesel Exhaust Fluid Pre-Inducement Warning Level 2	Pre-Alarm
DGC HEARTBEAT FAIL P	DGC Heartbeat Fail	Pre-Alarm
DIAG TRBL CODE P	Diagnostic Trouble Code	Pre-Alarm
DPF REGNRATE DISABLD P	Diesel Particulate Filter Regeneration Disabled	Pre-Alarm
DPF REGEN REQD P	Diesel Particulate Filter Regeneration Required	Pre-Alarm
DPF SOOT LVL EXT HI P	Diesel Particulate Filter Soot Level Extremely High	Pre-Alarm
DPF SOOT LVL MOD HI P	Diesel Particulate Filter Soot Level Moderately High	Pre-Alarm
ECU SHUTDOWN A	ECU Shutdown	Alarm
EMERGENCY STOP A	Emergency Stop	Alarm
ENGINE RUNNING	Engine Running	Status
EPS SUPPLYING LOAD	Emergency Power System is Supplying Load	Status
FUEL FLT PRS HI P	Fuel Filter Differential Pressure High	Pre-Alarm
FUEL LEAK 1 P	Fuel Filter 1 Leak	Pre-Alarm
FUEL LEAK 2 P	Fuel Filter 2 Leak	Pre-Alarm
FUEL LEAK DETECT A	Fuel Leak Detect	Alarm
FUEL LEAK DETECT P	Fuel Leak Detect	Pre-Alarm
FUEL LEVL SENDR A	Fuel Level Sender Fail	Alarm
FUEL LEVL SENDR FAIL	Fuel Level Sender Fail	Status
FUEL LEVL SENDR P	Fuel Level Sender Fail	Pre-Alarm
GEN TEST LOADED	Generator Exerciser Test with Load	Status
GEN TEST UNLOADED	Generator Exerciser Test without Load	Status

Event String	Event Description	Event Type
GLBL SNDR FAIL A	Global Sender Fail	Alarm
GN BKR CL FL P	Generator Breaker Fail to Close	Pre-Alarm
GN BKR OP FL P	Generator Breaker Fail to Open	Pre-Alarm
GN BKR SYN FL P	Generator Breaker Synchronization Fail	Pre-Alarm
HI COOLANT TMP A	High Coolant Temp	Alarm
HI COOLANT TMP P	High Coolant Temp	Pre-Alarm
HI DAY TANK LEVEL P	High Day Tank Level	Pre-Alarm
HI ECU VOLTS A	High ECU Supply Voltage	Alarm
HI EXHAUSE B T P	High Exhaust Temp B	Pre-Alarm
HI EXHAUST A T P	High Exhaust Temp A	Pre-Alarm
HI PRESSURE IN 1 P	High Pressure Input 1	Pre-Alarm
HI PRESSURE IN 2 P	High Pressure Input 2	Pre-Alarm
HI SUPPLY VOLTS P	High Voltage Supply	Pre-Alarm
HI T FUEL P	High Fuel Temp	Pre-Alarm
HIGH AMB TEMP P	High Ambient Temp	Pre-Alarm
HIGH CHARGE AIR TEMP A	High Charge Air Temp	Alarm
HIGH CHARGE AIR TEMP P	High Charge Air Temp	Pre-Alarm
HIGH COIL TEMP 1 P	High Temp Coil 1	Pre-Alarm
HIGH COIL TEMP 2 P	High Temp Coil 2	Pre-Alarm
HIGH COIL TEMP 3 P	High Temp Coil 3	Pre-Alarm
HIGH COOLANT TEMP A	High Coolant Temp	Alarm
HIGH COOLANT TEMP P	High Coolant Temp	Pre-Alarm
HIGH ECU TEMPERATURE P	High ECU Temp	Pre-Alarm
HIGH EXHAUST TEMP P	High Exhaust Temp	Pre-Alarm
HIGH FUEL LEVEL P	High Fuel Level	Pre-Alarm
HIGH FUEL RAIL PRESS P	High Fuel Rail Pressure	Pre-Alarm
HIGH INTRCOOLER TEMP P	High Intercooler Temp	Pre-Alarm
HIGH OIL TEMPERATURE P	High Oil Temp	Pre-Alarm
HIGH OIL TERMPERATURE A	High Oil Temp	Alarm
HIGH STRG TANK LEVEL P	High Storage Tank Level	Pre-Alarm
IDLE SPD LO P	Idle Speed Low	Pre-Alarm
INPUT X A (X = 1 to 17)	User Configurable Input X (X = 1 to 17)	Alarm
INPUT X P (X = 1 to 17)	User Configurable Input X (X = 1 to 17)	Pre-Alarm
LO AFTERCLR COOL LVL A	Low After Cooler Cool Level	Alarm
LO CHG AIR CLNT LVL P	Low Charge Air Coolant Level	Pre-Alarm
LO DAY TANK LEVEL P	Low Day Tank Level	Pre-Alarm
LO ECU VOLTS P	Low ECU Supply Voltage	Pre-Alarm
LO FUEL DLV PRESSURE A	Low Fuel Delivery Pressure	Alarm
LO SUPPLY VOLTS P	Low Voltage Supply	Pre-Alarm
LOAD TAKEOVER	Load Takeover	Status
LOGIC OUPUT A	Logic Output	Alarm
LOGIC OUPUT P	Logic Output	Pre-Alarm
LOSS OF VOLT	Voltage Sensing Fail	Status

Event String	Event Description	Event Type
LOSS OF VOLT A	Voltage Sensing Fail	Alarm
LOSS OF VOLT P	Voltage Sensing Fail	Pre-Alarm
LOSS REM COMS P	Loss of Remote Module Communication	Pre-Alarm
LOST ECU COMM A	Loss of ECU Communication	Alarm
LOST ECU COMM P	Loss of ECU Communication	Pre-Alarm
LOW BATT VOLT P	Low Battery Voltage	Pre-Alarm
LOW CHARGE AIR PRESS P	Low Charge Air Pressure	Pre-Alarm
LOW COOL LEVEL A	Low Coolant Level	Alarm
LOW COOL LEVEL P	Low Coolant Level	Pre-Alarm
LOW COOL TMP A	Low Coolant Temperature	Alarm
LOW COOL TMP P	Low Coolant Temperature	Pre-Alarm
LOW COOLANT LEVEL P	Low Coolant Level	Pre-Alarm
LOW FUEL DELIV PRESS P	Low Fuel Delivery Pressure	Pre-Alarm
LOW FUEL LEVEL A	Low Fuel Level	Alarm
LOW FUEL LEVEL P	Low Fuel Level	Pre-Alarm
LOW FUEL RAIL PRESS P	Low Fuel Rail Pressure	Pre-Alarm
LOW OIL PRES A	Low Oil Pressure	Alarm
LOW OIL PRES P	Low Oil Pressure	Pre-Alarm
LOW OIL PRESSURE A	Low Oil Pressure	Alarm
LOW OIL PRESSURE P	Low Oil Pressure	Pre-Alarm
LOW STRG TANK LEVEL P	Low Storage Tank Level	Pre-Alarm
MAINS FAIL TEST	Mains Fail Test	Status
MAINT INTERVAL P	Maintenance Interval	Pre-Alarm
MF TRANSFER	Mains Fail Transfer Complete	Status
MF TRANSFER FAIL	Mains Fail Transfer Fail	Status
MN BKR CL FL P	Mains Breaker Fail to Close	Pre-Alarm
MN BKR OP FL P	Mains Breaker Fail to Open	Pre-Alarm
MPU FAIL P	Magnetic Pickup Fail	Pre-Alarm
MULTIPLE CEM P	Multiple CEM-2020’s	Pre-Alarm
NORM SHUTDOWN	Normal Shutdown	Status
OIL SNDR FAIL	Oil Pressure Sender Fail	Status
OIL SNDR FAIL A	Oil Pressure Sender Fail	Alarm
OIL SNDR FAIL P	Oil Pressure Sender Fail	Pre-Alarm
OVERCRANK A	Overcrank	Alarm
OVERSPD TEST ON P	Overspeed Test On	Pre-Alarm
OVERSPEED A	Overspeed	Alarm
PRIMING FAULT P	Priming Fault	Pre-Alarm
PROT SHUTDOWN	Protective Shutdown	Status
REV BUS ROT P	Reverse Bus Rotation	Pre-Alarm
REV GEN ROT P	Reverse Generator Rotation	Pre-Alarm
RUNUP SPD LO P	Run Up Speed Low	Pre-Alarm
SERFLASH RD FAIL	Serial Flash Read Fail	Pre-Alarm
SPD SNDR FAIL	Speed Sender Fail	Status

Event String	Event Description	Event Type
SPD SNDR FAIL A	Speed Sender Fail	Alarm
SPEED DMD FL P	Speed Demand Fail	Pre-Alarm
SPEED TOO LOW P	Engine Speed Too Low	Pre-Alarm
SS OVERRIDE ON P	Shutdown Override	Pre-Alarm
START SPEED LOW P	Start Speed Low	Pre-Alarm
VOLTAGE SENSE FAIL	Voltage Sensing Fail	Status
VOLTAGE SENSE FAIL A	Voltage Sensing Fail	Alarm
VOLTAGE SENSE FAIL P	Voltage Sensing Fail	Pre-Alarm
UNKNOWN SHUTDOWN A	Unknown Shutdown	Alarm
WEAK BATTERY P	Weak Battery	Pre-Alarm

9 • Troubleshooting

If you do not get the results that you expect from the DGC-2020ES, 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

USB Port Does Not Operate 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.

CAN Communication Does Not Operate 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.

Inputs and Outputs

Programmable Inputs Do Not Operate as Expected

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

Step 2. Confirm that the inputs are programmed properly.

Step 3. Ensure that the input at the DGC-2020ES is actually connected to the BATT– terminal (17).

Programmable Outputs Do Not Operate as Expected

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

Step 2. Confirm that the SENDER COM terminal (2) is 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 (18) and the SENDER COM terminal (2).

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

Step 5. Use a voltmeter connected between the BATT– terminal (17) and the SENDER COM terminal (2) on the DGC-2020ES 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 Connections* chapter in the *Installation* manual.

Step 2. Ensure that the proper voltage is present at the DGC-2020ES voltage sensing inputs (40, 41, 43, and 45).

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 Connections* chapter in the *Installation* manual.

Step 2. Ensure that the proper current is present at the DGC-2020ES current sensing inputs 33, 34, 35, 36, 37, and 38.

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 Connections* 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 (31 and 32) 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-2020ES.

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

Caution

Installing previous versions of firmware may result in compatibility issues causing the inability to operate properly and may not have the enhancements and resolutions to issues that more recent versions provide. Basler Electric highly recommends using the latest version of firmware at all times. Using previous versions of firmware is at the user's risk and may void the warranty of the unit.

Step 1. Start BESTCOMS*Plus*®. Use the top pull-down menu and select FILE > NEW > DGC-2020ES.

Step 2. Select COMMUNICATIONS > UPLOAD DEVICE FILES and select the device package file that contains the firmware and language you want to upload.

Step 3. Check the boxes for DGC-2020ES Firmware and DGC-2020ES Language Module. 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-2020ES 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-2020ES and monitored voltage phases.

Step 4: If potential transformers are in place, remove the connectors from the DGC-2020ES 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 CL ENBL 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 GEN STABLE status LED is lit. If necessary, modify the settings on the SETTINGS > BREAKER MANAGEMENT > BUS CONDITION DETECTION 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 DETECTION 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-2020ES itself when the automatic mains fail transfer (ATS) feature is enabled.

- The DGC-2020ES itself when the RUN WITH LOAD logic element receives a *Start* pulse in the programmable logic.
- The DGC-2020ES 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-2020ES. If it seems OK, 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.

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-2020ES itself when the automatic transfer (ATS) feature is enabled.
- The DGC-2020ES itself when the RUN WITH LOAD logic element receives a *Stop* pulse in the programmable logic.
- The DGC-2020ES itself when shutting down the engine due to an active alarm.
- The DGC-2020ES 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-2020ES. If it seems OK, 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.

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 ENABLE on the SETTINGS > BREAKER MANAGEMENT > BREAKER HARDWARE screen.

Step 4: Verify that a failure of the mains is detected by the DGC-2020ES. Check status using the Metering Explorer in BESTCOMS*Plus* and verify that the MAINS FAIL status LED is lit when the power on the DGC-2020ES bus voltage input is either out of voltage or frequency range. If necessary, modify the settings on the SETTINGS > BREAKER MANAGEMENT > BUS CONDITION DETECTION screen to achieve correct detection.

Step 5: Verify the wiring to the breaker from the DGC-2020ES. If it seems OK, 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 ENABLE on the SETTINGS > BREAKER MANAGEMENT > BREAKER HARDWARE screen.

Step 4: Verify that stable mains power is detected by the DGC-2020ES. 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-2020ES bus voltage input is good. If necessary, modify the settings on the SETTINGS > BREAKER MANAGEMENT > BUS CONDITION DETECTION screen to achieve correct detection.

Step 5: Verify the wiring to the breaker from the DGC-2020ES. If it seems OK, 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.

Generator stays in cooling state when attempting to shut down in Auto mode after Cool Down Timer counts down to zero seconds or when No Load Cool Down time is set to zero

If the unit is in AUTO mode and attempting a normal shutdown, it will always go through the cool down state. It will remain there until the cool down timer counts down to zero, and the generator breaker status is open.

If the unit stays in the cool down state after the cool down timer has expired, it is likely because it has a generator breaker status of closed. This can be checked on the front panel under METERING > ALARMS STATUS > STATUS > GEN BREAKER or in BESTCOMS*Plus* under Metering Explorer > DGC-2020ES > STATUS. The generator will not leave the cooling state until it has an open generator breaker status.

If the Generator Breaker logic element is present in logic and the Status Input is TRUE, the breaker status will be reported as closed even if that breaker block has a large yellow X through it indicating it is not configured.

DGC-2020ES Front Panel Debug Screen

There is one debug screen in the DGC-2020ES that can be useful for debugging I/O module related issues. The following debug screen is available: CEM DEBUG

CEM DEBUG

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

The CEM DEBUG screen is located on the front panel at SETTINGS > SYSTEM PARAMS > REMOTE MODULE SETUP > CEM SETUP > CEM DEBUG MENU.

The following parameters are visible on the CEM DEBUG screen:

- DGC TO CEM BP: DGC-2020ES to CEM-2020 Binary Points. This is the status of the CEM-2020 output relays being transmitted from the DGC-2020ES 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-2020ES Binary Points. This is the status of the CEM-2020 inputs being transmitted from the CEM-2020 to the DGC-2020ES. 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.

Basler Electric®
www.basler.com

12570 Route 143
Highland IL 62249-1074 USA
Tel: +1 618.654.2341
Fax: +1 618.654.2351
email: info@basler.com

No. 59 Heshun Road Loufeng District (N)
Suzhou Industrial Park
215122 Suzhou
P.R. CHINA
Tel: +86 512.8227.2888
Fax: +86 512.8227.2887
email: chinainfo@basler.com

111 North Bridge Road
15-06 Peninsula Plaza
Singapore 179098
Tel: +65 68.44.6445
email: singaporeinfo@basler.com