Operating Manual

GTI Bi-Fuel®

Form GPN2020 and GPN2030 OM 10-15

altronic
HOERBIGER Engine Solutions

INDEX BY SECTION:

FIGURES:

1.0 OVERVIEW

1.1 This manual applies to GTI panels GPN2020 and GPN2030.

PANEL CONFIGURATIONS:

GPN2020	**DE-3020 Display, Terminal Board (691172-5) 16 x 14 x 6.5 enclosure (optional GTI+ gas train)**
GPN2030	**DE-3020 Display, Terminal Board (691172-5) 16 x 18 x 9.2 extreme environment enclosure (optional GTI+ gas train)**

WARNING: DEVIATION FROM THESE INSTRUCTIONS MAY LEAD TO IMPROPER ENGINE OPERATION WHICH COULD CAUSE PERSONAL INJURY TO OPERATORS OR OTHER NEARBY PERSONNEL.

NOTE: Engine must be equipped with a Full Authority governor to operate properly with the GTI Bi-Fuel system.

1.2 The control system panel consists of two main parts packaged in an industrial enclosure: Display Module DE-3020 and Terminal Module 691172-5. Interconnecting cable 693115-1 connects Module DE-3020 to Module 691172-5.

1.3 The Altronic DE-3020 controller system is a dedicated electronic microprocessor-based system designed to sense specific analog and digital input points to control and monitor the GTI Bi-Fuel® natural gas fumigation system for diesel engines. The system is configurable for various applications using a PC (personal computer) and the supplied DE-3020 terminal program and contains a non-volatile memory to store the setup. Serial communications provide an interface to PC's, PLC's, modems and satellite uplinks for remote communication if desired. A color, backlit, 128 x 64 LCD character display shows system status, programmed controller parameters and channel labels. A front mounted keypad serves as the user interface. The DE-3020 provides for the natural gas fueling off/on control function and for an optional closed loop automatic control function to optimize the amount of natural gas substitution of diesel fuel under varying modes of operation. Additionally, the DE-3020 provides for remote data acquisition and supervisory control in a compact, low cost package dedicated to natural gas fuel substitution on industrial diesel engine applications.

NOTE: If possible, keep the original shipping container. If future transportation or storage of the controller is necessary, this container will provide the optimum protection.

2.0 DISPLAY MODULE

2.1 The Display Module serves as the user interface for the DE-3020 system. Packaged in a 6.5" x 6.5" panel mounted enclosure, it consists of an alphanumeric 128 x 64 multi-color graphic LCD display, a 16-key front-mounted keypad, DB-25 D-Sub, DB-9 D-Sub, USB connectors, and five pairs of serial port indicators.

2.2 The keypad is a sealed membrane unit containing the STOP and RESET keys and other keys used to navigate through channel status, description, view screens, and to edit the setpoints.

2.3 The LCD has a "home screen" that displays a status line, BI-FUEL OFF or ON, gas supply pressure (GSP1), manifold air pressure (MAP1) and engine manifold temperature (MAT1). Pressing the VIEW CHANNEL key displays the channel number, its timer status, analog value (if applicable) and the user label.

2.4 The keypad, along with the LCD display, are used to navigate through channel status and descriptions, view screens, and to view or edit the system's configuration. The ↑UNITS or ↓UNITS or the →TENS or ←TENS keys are used to access channels by increasing or decreasing the channel numbers by one or by ten with each key press. Pressing the NEXT key advances the display to the next screen or item. All menu adjustments are saved in nonvolatile EEPROM memory by pressing the ENTER key. The EEPROM memory retains the current configuration during normal operation, after engine shutdown and a system power down.

WARNING: THE CONTROLLER SYSTEM MUST BE CONFIGURED PRIOR TO USE. REFERENCE SECTION 13.0 PROGRAMMING INSTRUCTIONS, FOR INSTRUCTIONS DESCRIBING HOW TO CONFIGURE THE CONTROLLER FOR THE SPECIFIC APPLICATION. VERIFY THE PROGRAM IN NONVOLATILE MEMORY (THE EEPROM) PRIOR TO STARTING THE SYSTEM.

2.5 Five pairs of LED's are provided on the back of the Display Module for troubleshooting purposes, one Receive (RX) and one Transmit (TX) LED for each port. The TX LED will flash when the Display Module is transmitting serial communications on the labeled port. The RX LED will flash when the Display Module is receiving serial communications on the labeled port. Ports 4 and 5 are located on the display board.

3.0 TERMINAL MODULE

3.1 The 24Vdc power for the DE-3020 system is applied to the Terminal Board 691172-5. A 6.3 amp replaceable slow-blow fuse protects the system from over currents, and a power LED lights when power is applied to the system.

3.2 The Terminal Module is mounted to the panel back plate and is the point of interface between the field sensor wiring terminal strip and the DE-3020 control system. A removable dual terminal strip is used for the connection of the system.

4.0 MOUNTING THE PANEL (FIG. 2)

4.1 Mount the control panel(s) to a post or to a suitable flat surface so that the display is at a convenient viewing height, avoiding high EMI areas.

NOTE: Avoid mounting the panel with the LCD display facing direct sunlight. The display operating temperature range is -31°F to +176°F (-35°C to +80°C). The panel(s) should be mounted within 30 feet of the engine, the fuel solenoid valve and fuel pressure regulator.

5.0 WIRING

5.1 SYSTEM COMPONENT WIRING

Up to five individual wiring harnesses are available for use with the Bi-Fuel system. Each wiring harness or "bundle" is made up of functionally grouped connections to sensors or actuators which would normally be located in the same general area. Depending on their function, each bundle is marked as Left Bank Harness, Right Bank Harness, Fuel Harness, or Power Harness. Optional AGV harness is available for multi-substitution systems. The wiring is protected by a flexible plastic tubing and is 30, 50, or 100 feet in length. Each wiring bundle is provided with a bulkhead fitting installed. Mount the bulkhead fittings into the holes provided in the bottom of the panel. Three-conductor shielded cable (603183) is also provided for wiring a KW sensor. When routing the wiring, it is essential that the following practices be adhered to:

- Never run sensor wires in the same conduit with high energy wiring such as the AC line power.
- Keep high voltage wiring at least eight inches (200mm) away from sensor and sensor wiring.
- If it becomes necessary to check sensor to panel wiring with an ohmmeter or other calibrated equipment, first DISCONNECT the plug-in terminal strips from the Terminal Module. Applying voltage to the DE-3020 system through the sensor leads may damage the device.

NOTE: All furnished drawings and instructions assume (–) ground DC system. In the case of a floating ground, or (+) ground DC system, please contact Altronic Factory for support.

NOTE: Do not expose the pressure transducer to temperatures above 221°F. (105°C).

5.2 LEFT BANK (ORANGE) HARNESS WIRING

A. Mount the required pressure sensors to the engine. Mount these on the left bank of a V-type engine. Depending upon the specific application there may be addition wires to add in the bundle. Plug in the mating connectors, VACX is the air cleaner vacuum and MAPX is the MANIFOLD AIR PRESSURE.

B. Mount the thermocouples to the engine and route the thermocouple wires as required. To accommodate the differences in location of the sensors, remove the individual wires from the plastic tubing as required and tape the tubing closed after proper length to reach the sensor location is known. MAT1 is the MANIFOLD AIR TEMPERATURE and EGT1 is the EXHAUST GAS TEMPERATURE.

C. Mount the vibration sensor as indicated in the GTI Installation and Operation Manual and connect the wires marked VIB+ (+24vdc) and VIB1L (signal to panel). VIB2L is used for the second transmitter on the same bank.

D. Mount the bulkhead fitting through the far left hole viewing the control panel from the front. At the panel end, adjust the length of the bundle, if required, by cutting and stripping the wires. Terminate the wires to the customer connection terminal strip. Each wire is marked with the same identifier as the terminal strip; connect these to match.

5.3 RIGHT BANK (GREEN) HARNESS WIRING

A. Mount the required pressure sensors to the engine. Mount these on the right bank of a V-type engine. Depending upon the specific application there may be addition wires to add in the bundle. Plug in the mating connectors, VACX is the air cleaner vacuum and MAPX is the MANIFOLD AIR PRESSURE.

B. Mount the thermocouples to the engine and route the thermocouple wires as required. To accommodate the differences in location of the sensors remove the individual wires from the plastic tubing as required and tape the tubing closed to hold wires after proper length to reach the sensor location is known. MAT2 is the MANIFOLD AIR TEMPERATURE and EGT2 is the EXHAUST GAS TEMPERATURE.

C. Mount the vibration sensor as indicated in the GTI Installation and Operation Manual and connect the wires marked VIB+ (+24vdc) and VIB1R (signal to panel). VIB2R is used for the second transmitter on the same bank.

D. Mount the bulkhead fitting through the far left hole viewing the control panel from the front. At the panel end, adjust the length of the bundle, if required, by cutting and stripping the wires. Terminate the wires to the customer connection terminal strip. Each wire is marked with the same identifier as the terminal strip; connect these to match.

NOTE: Wires from the RIGHT BANK harness connect to GREEN terminals, wires from the FUEL harness connect to BLUE terminals, and wires from the POWER harness connect to RED terminals.

5.4 FUEL (BLUE) HARNESS WIRING

The FUEL HARNESS contains the wiring to the Gas Supply Pressure sensor, Dual Modular Solenoid valve (DMV) and the Regulator Output Pressure switch (ROP) and is not to be routed to the engine.

A. After mounting the Dual Modular Solenoid valve, connect the SOL+ and SOL- wires to the solenoid coil.

B. For Bi-Fuel systems using the standard gas trains, connect the ROP wires to the REGULATOR OUTPUT PRESSURE switch terminals. Do not connect the shield wire, it is terminated at the panel end only. Bi-Fuel systems using the GTI+ gas train utilize a different fuel harness than the standard gas train. This harness contains a connection for a mixer pressure sensor (RGP). It serves the same function as the ROP, however it will get wired into channel 28 (AGV5).

C. Mount the GAS SUPPLY pressure transducer GSP and plug in the connector.

D. At the panel end, adjust the length of the bundle as required, and mount the bulkhead fitting through the third from the left hole viewing the panel from the front. Terminate the wires to the customer connection terminal strip. Each wire is marked with the same identifier as the terminal strip; connect these to match.

5.5 POWER (RED) HARNESS WIRING

The POWER HARNESS contains the power wiring for the panel.

A. Connect the input power to the 24 Vdc input power terminals, plus to terminal (+) and minus to terminal (–); power requirement is 24 Vdc, 10 watts max. The DC terminal must be connected to the panel ground which must be the same as engine chassis ground.

B. At the panel end, adjust the length of the bundle as required, and mount the bulkhead fitting through the hole that is fourth from the left when viewing the panel from the front. Terminate the wires to the customer connection terminal strip. Each wire is marked with the same identifier as the terminal strip; connect these to match.

NOTE: This is the return path for normally-open sensors and must be connected to the engine block or chassis ground for proper operation.

5.6 AGV HARNESS

A. Connect the 19-pin connector of the AGV harness to the 19-pin connection on the AGV.

B. At the panel end, adjust the length of the bundle as required, and mount the bulkhead fitting through the hole farthest to the right. Terminate the wires to the customer connection terminal strip (see Wiring Diagram 6 - AGV). Each wire is marked with the same identifier as the terminal strip; connect these to match.

6.0 KEYPAD DESCRIPTION

6.1 The DE-3020 controller Display Module contains a 16-key sealed membrane keypad which is used to adjust, stop and reset the system.

6.2 STOP
The STOP key is used for a manual stop condition. By pressing the STOP key, the controller deactivates the configured digital outputs in the terminal board.

6.3 RESET
The RESET key clears all past faulted points and resets all input and output timers to their preset values. This can also be accomplished remotely by interrupting the DC power to the panel for 5 seconds.

6.4 CANCEL TIMERS
The CANCEL TIMERS key cancels all active timers.

6.5 VIEW CHAN
The VIEW CHANNELS key allows the user to view the status of any input channel and its user defined label.

6.6 NEXT
The NEXT key allows the user to view the AGV Substitution Set-point screen from the home screen. From the MENU screens, the next value to be edited will appear. The NEXT key also allows the user to view what channel is keeping Bi-Fuel off on a control shutdown.

6.7 ENTER
The ENTER key is used to accept a selection and to save a new value in memory.

6.8 ESC
The ESCAPE key enables the user to exit any view channels, information or menu screens at any time and return to the previous screen without changing programmed values.

6.9 MENU
The menu key allows the user to enter the edit menu. Control setpoints may be viewed and adjusted using the MENU key.

6.10 UNITS/TENS
↑UNITS or ↓UNITS keys increase or decrease values by one. The →TENS or ←TENS keys increase or decrease values by ten. These keys are used to increase or decrease channel numbers, timers and to move the pointer in the menu screen.

6.11 F1
Function key F1 displays the hourmeter.

6.12 F2
Function key F2 displays the time and date of the first fault.

6.13 TEST
Function of this key is described in section 7.4.

6.14 VIEW
Open key for future development.

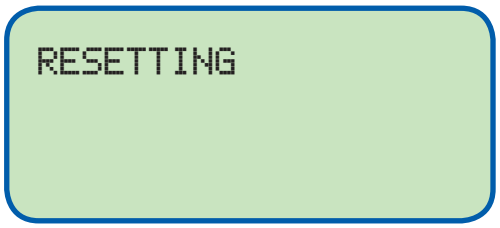
7.0 UNDERSTANDING THE HOME SCREENS/CONTROLS

7.1 The "home screens" are described as a series of screens used to display several of the most critical operating parameters on one screen. All of the home screens provide a status word on the upper line.

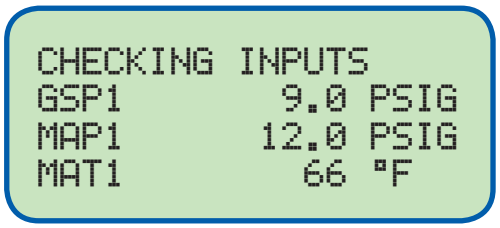
The status line will read one of the following: BI-FUEL ON, BI-FUEL OFF, BI-FUEL INHIB, TIMERS ACTIVE, CHECKING INPUTS, FAULT AL1, MANUAL STOP.

The LCD display always reverts to one of the home screens after a keypad operation is completed or the operation times out.

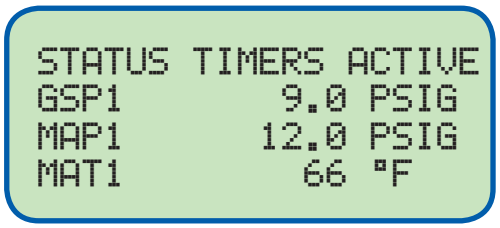
7.2 To activate the Bi-Fuel system, turn on the power; the unit automatically resets. If no system faults are detected during the CHECKING INPUTS scan, the home screen will display the TIMERS ACTIVE message until the programmed fuel delay timer expires. After the time delay is completed, the home screen will display either the BI-FUEL ON or BI-FUEL OFF status according to the current conditions and the programmed control values. The RESETTING message will be displayed momentarily followed by TIMERS ACTIVE, and the home screen will then re-appear.



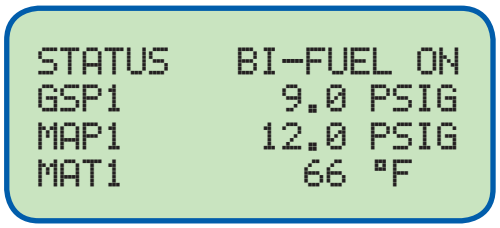
APPEARS AFTER A USER RESET COMMAND FOR ABOUT 1 SECOND



APPEARS AFTER RESET AS UNIT SCANS INPUTS FOR PRE-EXISTING FAULT CONDITIONS



APPEARS AFTER RESET OR BI-FUEL OFF CONDITION WHEN NO FAULTS ARE DETECTED AND THE BI-FUEL DELAY TIMER IS ACTIVE

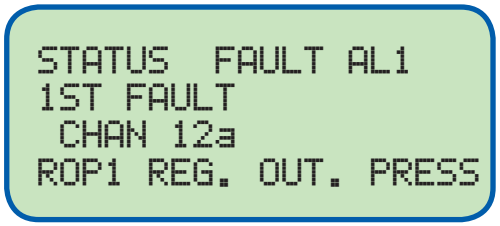


APPEARS WHEN ALL TIMERS ARE EXPIRED, ALL FAULTS ARE CLEAR AND ALL CONTROL SETTINGS ARE PERMITTING THE BI-FUEL GAS VALVE TO BE ON

7.3 The DE-3020 controller continuously monitors the system for two different levels of setpoints. The first group is called control setpoints. When violated, they cause the bi-fuel function to be temporarily suspended (engine reverts to 100% diesel operation) until conditions change. The violation of these setpoints may occur readily in normal operation of the engine and the system does not require any user intervention to begin re-supplying natural gas.

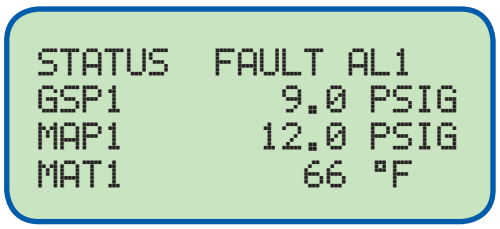
The second level of monitored setpoints are the Safety Shutdowns. When any of these setpoints are violated, even momentarily, the Bi-Fuel System will stop

supplying natural gas (engine reverts to 100% diesel operation) and will NOT begin re-supplying gas until a user-initiated RESET is received. When one of the safety shutdown setpoints has been violated, the gas solenoid valve is closed, and the FAULT message for the first faulted channel will appear on the display and will remain until it is acknowledged by a RESET. The number 1, after AL (alarm), shows the output switch that is faulted. If all of the faulted sensors have been cleared and the RESET key is pressed, the class B and output timers will reset and the display will repeat the sequence of section 7.2.



RETURNS TO HOME SCREEN

ESC



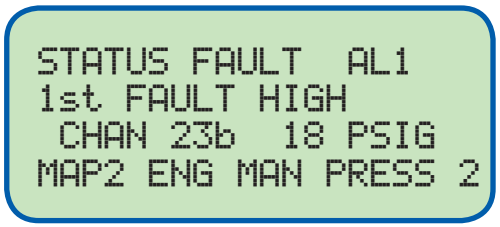
PRESS TO RETURN TO 1ST FAULT SCREEN

VIEW CHAN

TO CLEAR FAULTS, RESET TIMERS & OUTPUTS

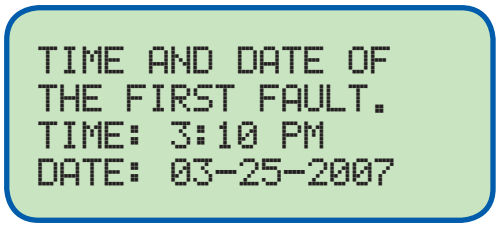
RESET

When a fault occurs on an analog channel, a HIGH or LOW indication will additionally be displayed as to whether the point faulted on a high or low setpoint.



A HIGH SETPOINT FAULTED ON AN ANALOG INPUT. THE CURRENT ANALOG VALUE AND HIGH ARE DISPLAYED

The DE-3020 controller system “stamps” the time and date occurrence of the first fault. To view the time and date of the first fault, press the F2 key after a fault occurs but before reset is initiated. The time and date of the first fault will be displayed. If no key is pressed for 10 seconds, the display will revert to the first fault screen.



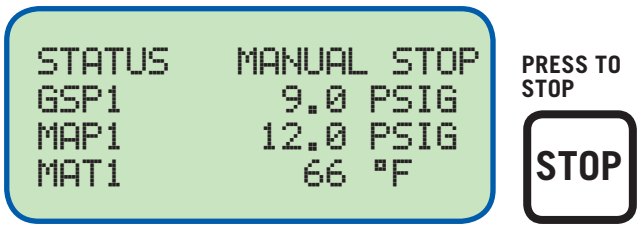
VIEW TIME & DATE OF FIRST FAULT

F2

7.4 From the home screen, any control fault condition can be viewed by pressing the NEXT key once. The screen holds a host of information for optional equipment, but also has the ability to scroll through any outstanding channels with a CONTROL set point violated. As long as the first line is holding the Gas Valve in AUTO mode, the second line will contain the violated channels, scrolled one at a time. If the Gas Valve is in MANUAL mode, or there are no control set points violated, then the second line will contain the HOLD POSITION value.

To alternate between MANUAL and AUTO mode press the test key, followed by the F1 key.

7.5 The MANUAL STOP message will supersede all of the above home screens if the STOP key is pressed. The fuel solenoid valve will close and remain closed until RESET.



8.0 VIEW CHANNEL STATUS SCREENS

8.1 Use the VIEW CHAN key to enter the view channels screens. Once in the VIEW CHAN mode, the user can view any channel's details. Upon pressing the view channel key, the first channel selected in the terminal program will be shown. The UNITS and TENS keys allow the user to quickly navigate through the controller channels. Use the ↑UNITS or ↓UNITS keys to increase or decrease the viewed channel by one. Use the →TENS or ←TENS keys to increase or decrease the viewed channel by ten. To exit the VIEW CHAN mode, press the ESC key.

9.0 VIEWING OR EDITING THE SETPOINT VALUES USING THE MENU MODE

9.1 The menu screens can be accessed from the home screen by pressing the MENU key. The menu screens allow the user to view or edit values, and the time and date. The controller must be initially configured using the terminal program running on a PC connected to the RS-232 port on the back of the controller. Reference the programming instructions, section 13.0, for details on how to configure the controller system for a specific application. The menu screens are intended to view or edit the already programmed values in the field. Changes made in the menu are stored in permanent memory and remain fixed until changed again.

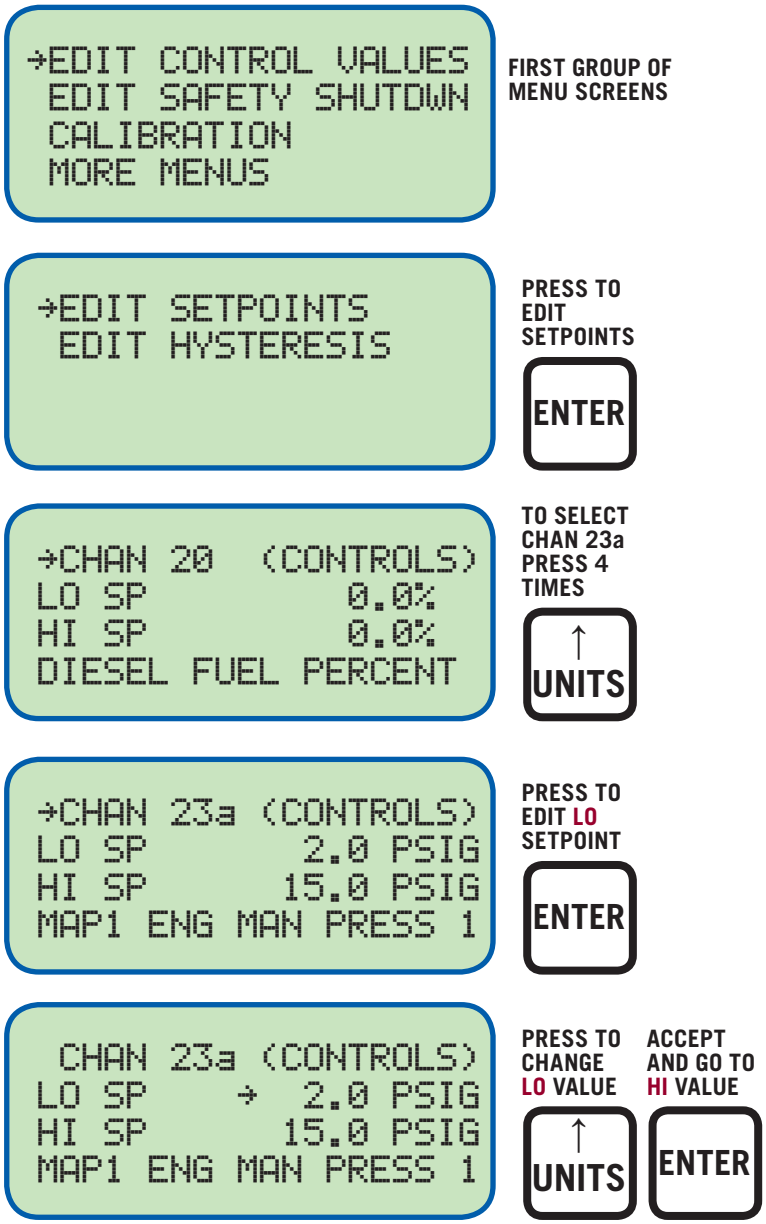
NOTE: To edit any value, the password combination must be entered from first level menu. Press the F2 key followed by the F1 key. Upon pressing this sequence, changes can be made to the configuration.

9.2 To view the controller configuration, from the home screen press the MENU key. To edit the controller configuration, the controller system requires a password key sequence.

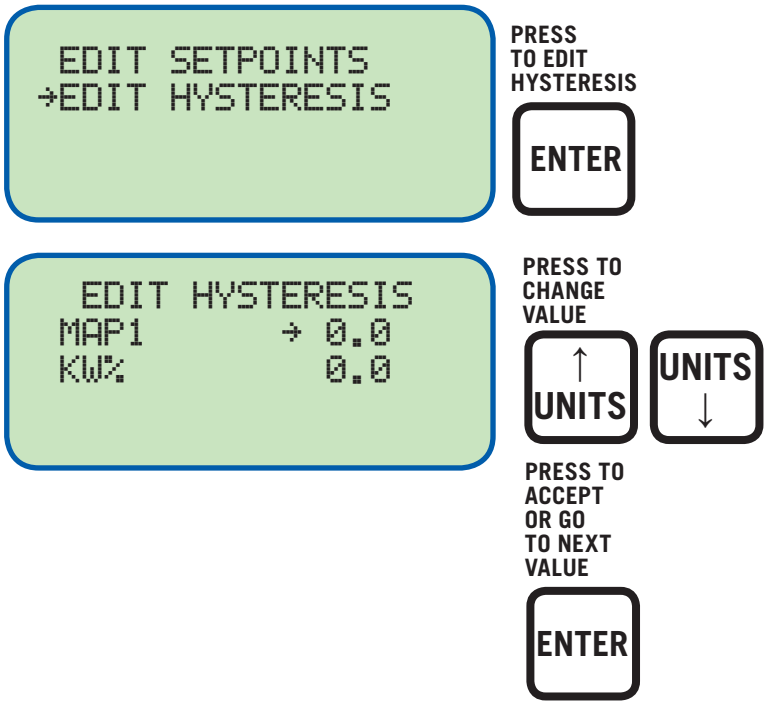
The password procedure is: Press the MENU key. Then press the F2 key followed by the F1 key. Upon pressing this sequence, changes can be made to the configuration.

9.3 The menu screens have two levels. The first level lists the headings of the items to be viewed or edited. Upon selecting one of the headings, the second level is displayed. Press the MENU key to enter the first level of the menu screens. The arrow points to the first selection to be viewed or edited. Three keys can be used to navigate the first level of menu selections: NEXT or ↑UNITS or ↓UNITS keys. The NEXT key will move the arrow down one selection. The ↑UNITS or ↓UNITS keys will move the selector arrow up or down one selection. Once the arrow is pointing to the selection group to be edited, press the ENTER key. The display will advance to the second level to view or allow changes to the values.

9.4 To edit the setpoint values, point to EDIT CONTROL VALUES and press the ENTER key. The edit control values menu is shown. The arrow points to the EDIT SETPOINTS. The example shows how to change the LO setpoint of Chan 23a. Use arrow keys to select desired channels. Use ENTER key to select LO or HI setpoint.

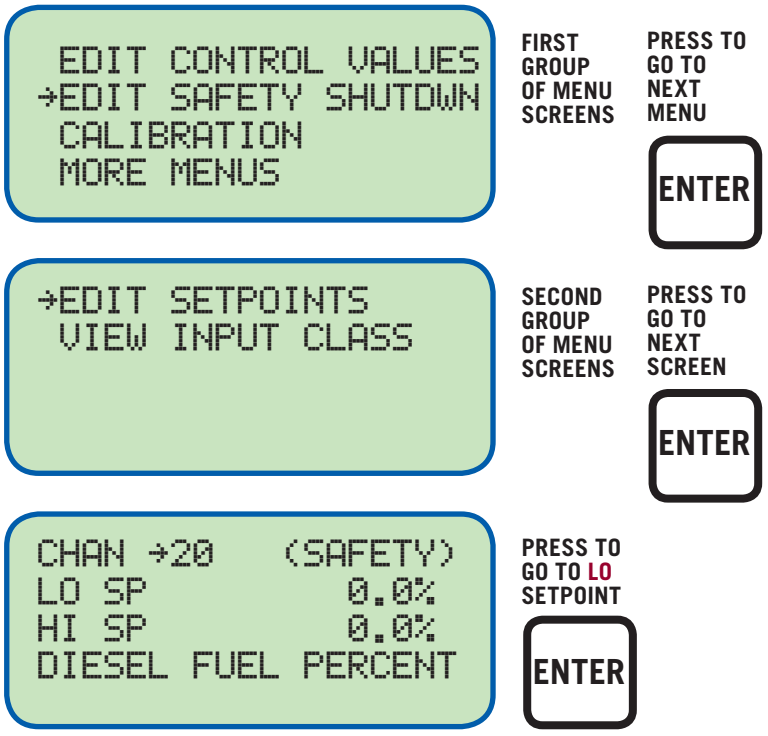


9.5 To edit hysteresis values, select EDIT HYSTERESIS from the main menu and press the ENTER key. The arrow points to EDIT HYSTERESIS.



There is a programmable hysteresis value for both the MAP1 and the KW% sensor which prevents the gas from turning on and off as these channels dither around the high and low control setpoints.

9.6 To view or edit safety shutdown values, choose EDIT SAFETY SHUTDWN from the main menu. To edit or view setpoints, choose EDIT SETPOINTS.



EXAMPLE FOR MAP1 HYSTERESIS

MAP1 Setpoint
Control High: **25psig**
Control Low: **16.7psig**
MAP1 HYSTERESIS: **.3psig**

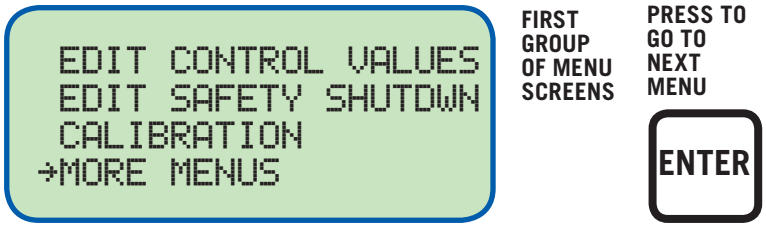
Control High:
If MAP1 surpasses 25psig with MAP1 Hysteresis setpoint of .3, then bi-fuel will turn off at 25psig and will NOT turn back on until MAP1 drops below 24.7psig. (25psig – .3psig = 24.7psig.)

Control Low:
If MAP1 low set point is 16.7psig with MAP1 Hysteresis setpoint of .3, bi-fuel will NOT turn on until MAP1 exceeds the low setpoint (16.7psig + .3psig = 17psig) but will not turn back off until MAP1 low setpoint of 16.7psig is reached.

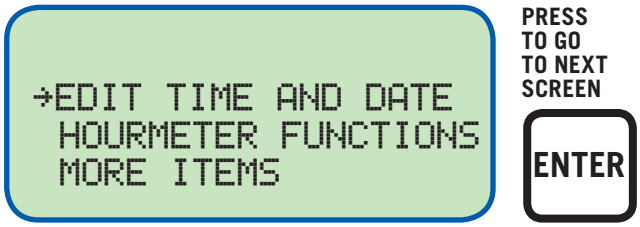
Take care when setting Hysteresis so that gas will not be ON in an area in which data was not recorded.

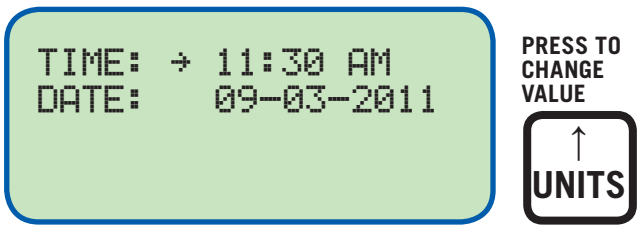
9.7 Calibration from the main menu is disabled. Utilize calibration through the proper terminal program.

9.8 Select MORE MENUS from menu.

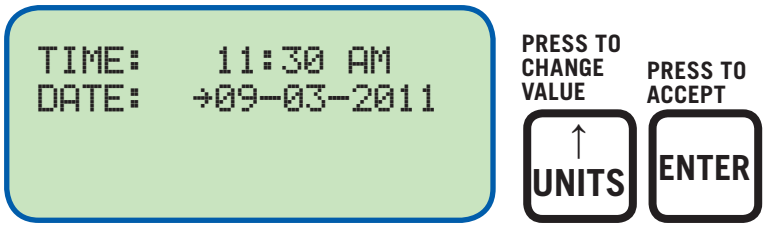


Selection arrow points to EDIT TIME AND DATE.



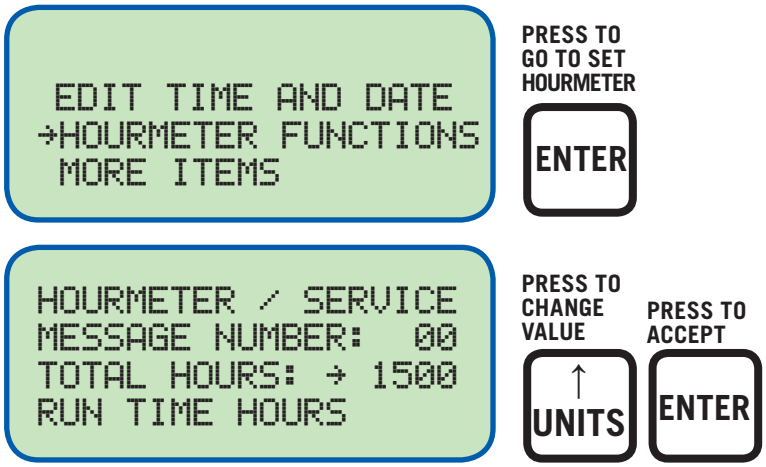


The date is shown as month-day-year. The month, day and year can be edited separately. With the selection arrow pointing to the month, use the ↑UNITS or ↓UNITS keys to increase or decrease the month. Press ENTER to save the new month setting; the selection arrow will point to the day. Use the same procedure to edit the day and the year.

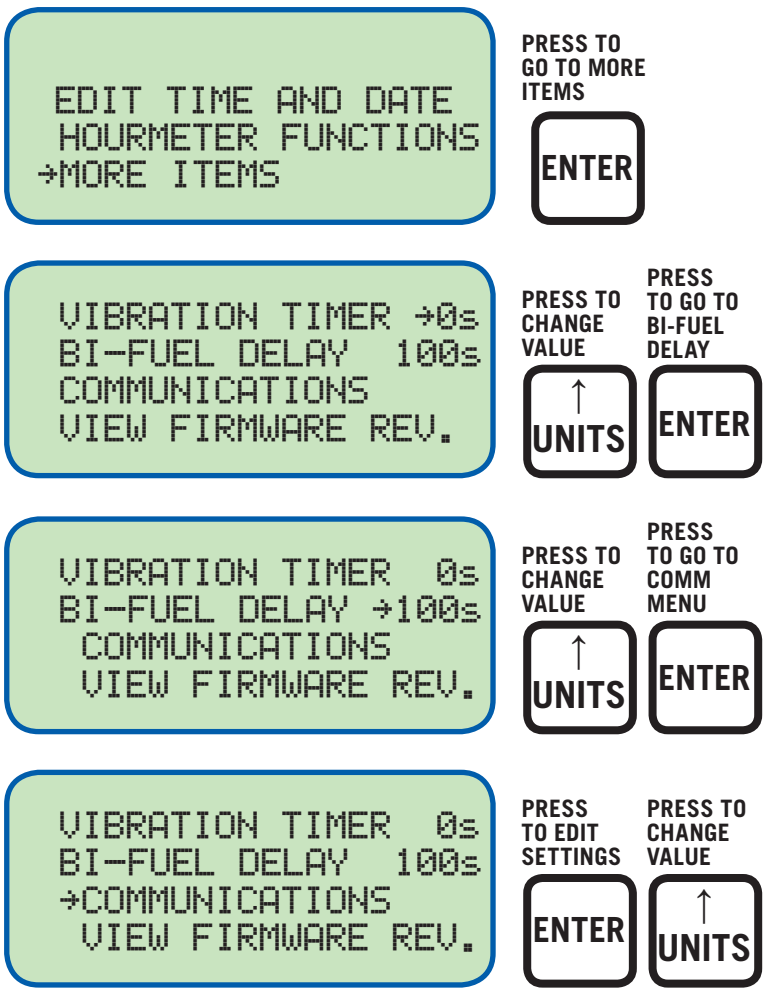


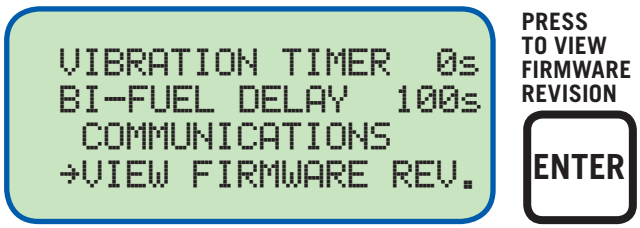
Now the time and date will be displayed with the selection arrow pointing to the time. The hours and minutes can be edited separately; AM and PM follow the hours. With the selection arrow pointing to the hours, use the ↑UNITS or ↓UNITS keys to increase or decrease the hours. Press ENTER to save the new hour setting; the selection arrow will point to the minutes. Use the same procedure to edit the minutes. Use the NEXT key to move through the time and date screen without making a permanent change in memory.

9.10 To view the Hourmeter message, select HOURMETER FUNCTIONS from the main menu and press ENTER.



9.11 To view or edit the values for VIBRATION TIMER, BI-FUEL DELAY TIMER, COMMUNICATION SETTINGS and to view the FIRMWARE REVISION level, select MORE ITEMS. The Vibration Timer is the length of time in seconds that a vibration level must be detected for it to cause a fault. The Bi-Fuel Delay Timer is the amount of time in seconds before Bi-fuel will be allowed to turn on after a power loss or reset, or controlled OFF condition, if no faults exist.





10.0 COMMUNICATION OPTIONS

10.1 The DE-3020 controller system contains a data logging feature. Data logging collects information from the system and keeps track of, or logs, that information over a period of time. That data is then available through a PC or PLC at port 1, the RS-232 port or port 3, the RS-485 port.

10.2 NODE NUMBER
The node number is the address of the controller being contacted. This number is programmed by the terminal program and can be viewed or edited in the menu screen. A two digit number from 01 to 99 can be used.

10.3 COMMUNICATIONS PARAMETERS
This must be set in the PC or PLC to communicate with the controller system:

Baud Rate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	None

10.4 The data logging memory can retain a total of 100 records before writing over the oldest information. The most current data is always record number one; the next most current is number two, etc. The oldest information, record 100, is lost when a new record is written. The logging period is the time between data logs and is set for 5 minutes.

A new record is also written when a first fault occurs. If the first fault occurs between the logging period, the first fault record will be record number one and the next scheduled record will be number two.

11.0 DATA LOGGING

11.1 The following describes the spacing for the fields of the DE-3020 data logging command.

This command is functional from the RS-232 and the RS-485 data logging port. The communications settings are 9600, 8, N and 1. The node number must be correct for the DE-3020 to respond on the RS-485 port. The node number field is ignored on the RS-232 port and responds accordingly.

11.2 The command to access a particular record is as follows:
>(XX DL YYY)
COMMAND HEADER ">" (0) — ASCII value 3Eh
BEGIN TEXT "(" (1) — ASCII value 28h
DE-3020 NODE NUMBER (2-3)
This field consists of the node number associated with the particular DE-3020. The range is from 01 to 99
SPACE (4), (7) — ASCII value 20h
COMMAND (5, 6)
The letters D and L, which stand for data log
REQUESTED RECORD NUMBER (8-10)

Table I:
This value will be between 001 and 100 and represents the requested record number. Record number 001 will always contain the most recent data log event. Record number 002 contains the second most recent data log event and so on. Requesting record number 999 gives a response which occurred due to a first fault condition. If there is no faults and 999 is requested, the NO DATA AVAILABLE message occurs. Requesting record number 000 transmits current status information.

Table II:
Shows the structure of data log command 998. This is for the Hourmeter.

END TEXT ")" (11) - ASCII value 29h

11.3 TABLE I (continued)

11.3 TABLE I

FIELD DESCRIPTION	EXAMPLES OF LOGGED DATA		AMT OF CHARACTERS	CHARACTER LOCATION
SITE LOCATION	GTI Bi-Fuel	GPN-2020	30	0–29
CR, LF			2	30, 31
REC NUM/HOURS	022	12345 HRS	14	32 – 45
CR, LF			2	46, 47
TIME AND DATE	09-23-2013	12:02 PM	20	48 – 67
CR, LF			2	68, 69
STATUS DISPLAY	STATUS	BI-FUEL ON	20	70 – 89
CR, LF			2	90, 91
HOME LINE 2	GSP1	55.3 PSIG	20	92 – 111
CR, LF			2	112, 113
HOME LINE 3	MAP1	15.9 PSIG	20	114 – 133
CR, LF			2	134, 135
HOME LINE 4	MAT1	76 °F	20	136 – 155
CR, LF			2	156, 157
VIEW scn #1, L1	VAC1	-5.3 PSIG	20	158 – 177
CR, LF			2	178, 179
VIEW scn #1, L2	VAC2	14.3 PSIG	20	180 – 199
CR, LF			2	200, 201
VIEW scn #1, L3	MAP2	20.7 PSIG	20	202 – 221
CR, LF			2	222, 223
VIEW scn #1, L4	MAT2	1472 °F	20	224 – 243
CR, LF			2	244, 245
VIEW scn #2, L1	EGT1	74 °F	20	246 – 265
CR, LF			2	266, 267
VIEW scn #2, L2	EGT2	74 °F	20	268 – 287
CR, LF			2	288, 289
VIEW scn #2, L3	VIB1L	0.79 IPS	20	290 – 309
CR, LF			2	310, 311
VIEW scn #2, L4	VIB1R	2.00 IPS	20	312 – 331
CR, LF			2	332, 333
L12	AGV5	138.3 "H_2O	20	334 – 353
CR, LF			2	354, 355
L13	CH90	4.00 mA	20	356 – 375
CR, LF			2	376, 377
L14	KW	4000 kW	20	378 – 397
CR, LF			2	398, 399
L15	DFUEL	33.6 PSIG	20	400 – 419
CR, LF			2	420, 421
POSS. 1ST FAULT	1ST FAULT		20	422 – 441
CR, LF			2	442, 443
POSS. FAULT CH	CHAN 40		20	444 – 463
CR, LF			2	464, 465

FAULT LABEL	VIB1 ENG VIBRATION 1	20	466 – 485
CR, LF		2	486, 487
1ST FAULT TIME	09-23-2013 11:07AM	20	488, 507
CR, LF		2	508, 509
CR, LF		2	510, 511
TOTAL CHARACTERS		512	

The following will be displayed when there is no information in the data log.

"NO DATA AVAILABLE
(CR, LF)
(CR, LF)"

Note that the spacing for the analog labels and values on the 20 character line is:

Location 1–? occupy the label associated with that channel.
(? dependent upon label name)
Location 12–16 occupy the analog value. (100.4)
Location 17 contains a space.
Location 18–20 contain the units of measure. (PSI)

11.4 TABLE II

FIELD DESCRIPTION	EXAMPLES OF LOGGED DATA	AMT OF CHAR	CHARACTER LOCATION	HOUR LOCATION
SITE LOCATION	GTI Bi-Fuel GPN-2020	30	0–29	
CR, LF		2	30, 31	
REC NUM/HOURS	998 12345 HRS	14	32 – 45	
CR, LF		2	46, 47	
TIME AND DATE	09-23-2013 12:02 PM	20	48 – 67	
CR, LF		2	68, 69	
HOURMETER	RUN-TIME HOURS 12345	26	70 – 95	91–95
CR, LF		2	96, 97	
CR, LF		2	98, 99	
LABEL MESSAGE	SERVICE HOURS LEFT:	19	100 – 118	
CR, LF		2	119–120	
SERV. MSG. 1	NOT USED	26	121 – 146	142–146
CR, LF		2	147, 148	
SERV. MSG. 2	NOT USED	26	149–174	170–174
CR, LF		2	175, 176	
SERV. MSG. 3	NOT USED	26	177–202	198–202
CR, LF		2	203, 204	
SERV. MSG. 4	NOT USED	26	205–230	226–230
CR, LF		2	231, 232	
SERV. MSG. 5	NOT USED	26	233–258	254–258
CR, LF		2	259, 260	
SERV. MSG. 6	NOT USED	26	261–286	282–286
CR, LF		2	287, 288	
SERV. MSG. 7	NOT USED	26	289–314	310–314
CR, LF		2	315, 316	
SERV. MSG. 8	NOT USED	26	317–342	338–342
CR, LF		2	343, 344	
SERV. MSG. 9	NOT USED	26	345–370	366–370
CR, LF		2	371, 372	

12.2 MODBUS REGISTERS (continued)

SERV. MSG. 10	NOT USED	26	373–398	394–398
CR, LF		2	399, 400	
SERV. MSG. 11	NOT USED	26	401–426	422–426
CR, LF		2	427, 428	
RESERVED		26	429–454	
CR, LF		2	455, 456	
RESERVED		26	457–482	
CR, LF		2	483, 484	
RESERVED		25	485–509	
CR, LF		2	510, 511	

The CHARACTER LOCATION for the service messages consists of 20 characters which was previously programmed into the DE-3020. The HOUR LOCATION describes the position of the hours associated with the service message or with the hourmeter function. If a service message is NOT USED, then there will be ----- in the HOUR LOCATION field. Values less than 10000 hours are right justified with spaces in locations to the left. For example, the hour value of 12345 will be displayed as 12345 and an hour value of 477 will be shown as 477.

12.0 COMMUNICATIONS PARAMETERS

12.1 COMMUNICATIONS OVERVIEW

The DE-3020 is compliant to the Modicon Modbus RTU standard. The DE-3020 supports DE-3020 Display Modbus Communications. Register reads and data is duplicated for the 30000's & 40000's address range. Maximum number of registers that can be read at one time has been limited to 32.

12.2 MODBUS REGISTERS

REGISTERS	DESCRIPTION	CHANNEL	DESCRIPTION	PLACEMENT	TYPE
30001	SPEED				UNSIGNED INTEGER
30002	HOURMETER				UNSIGNED INTEGER
30003	RESERVED				UNSIGNED INTEGER
30004	STATUS / FAULT	50: RUNNING 51: TIMERS RUNNING 60: MANUAL STOP			UNSIGNED INTEGER
30005	CONTROL STATUS	54: BIFUEL OFF			UNSIGNED INTEGER
30006	SELECTED CHANNEL, 1-16	0 = NOT USED BIT0 = CH01 (ROP), BIT, BIT15=MAP2			UNSIGNED INTEGER
30007	SELECTED CHANNEL, 17-31	1 = USED BIT0 = CH01 (MAP4), BIT, BIT14=SPEED			UNSIGNED INTEGER
30008	RESERVED				UNSIGNED INTEGER
30009	FAULT POSITION	0 = LOW SHUTDOWN 1 = HIGH SHUTDOWN			UNSIGNED INTEGER
30100	ANALOG VALUE	12A	ROP		SIGNED INTEGER
30101	ANALOG VALUE	13	INHIBIT		SIGNED INTEGER
30102	ANALOG VALUE	14	SAFETY		SIGNED INTEGER
30103	ANALOG VALUE	21A	GSP1		SIGNED INTEGER
30104	ANALOG VALUE	22A	VAC1		SIGNED INTEGER
30105	ANALOG VALUE	22C	VAC3		SIGNED INTEGER
30106	ANALOG VALUE	23A	MAP1		SIGNED INTEGER

30107	ANALOG VALUE	23C	MAP3		SIGNED INTEGER
30108	ANALOG VALUE	24A	MAT1		SIGNED INTEGER
30109	ANALOG VALUE	24C	MAT3		SIGNED INTEGER
30110	ANALOG VALUE	25A	EGT1		SIGNED INTEGER
30111	ANALOG VALUE	25C	EGT3		SIGNED INTEGER
30112	ANALOG VALUE	26A	VIB1L		SIGNED INTEGER
30113	ANALOG VALUE	22B	VAC2		SIGNED INTEGER
30114	ANALOG VALUE	22D	VAC4		SIGNED INTEGER
30115	ANALOG VALUE	23B	MAP2		SIGNED INTEGER
30116	ANALOG VALUE	23D	MAP4		SIGNED INTEGER
30117	ANALOG VALUE	24B	MAT2		SIGNED INTEGER
30118	ANALOG VALUE	24D	MAT4		SIGNED INTEGER
30119	ANALOG VALUE	25B	EGT2		SIGNED INTEGER
30120	ANALOG VALUE	25D	EGT4		SIGNED INTEGER
30121	ANALOG VALUE	26B	VIB1R		SIGNED INTEGER
30122	ANALOG VALUE	27	KW		SIGNED INTEGER
30123	ANALOG VALUE	28	AGV5		SIGNED INTEGER
30124	ANALOG VALUE	29	AUX1		SIGNED INTEGER
30125	ANALOG VALUE	30	AUX2		SIGNED INTEGER
30126	ANALOG VALUE	31	AUX3		SIGNED INTEGER
30127	ANALOG VALUE	32	AUX4		SIGNED INTEGER
30128	ANALOG VALUE	33	AUX5		SIGNED INTEGER
30129	ANALOG VALUE	34	AUX6		SIGNED INTEGER
30130	DECIMAL POINT LOCATION	12A	ROP		UNSIGNED INTEGER
30131	DECIMAL POINT LOCATION	13	INHIBIT		UNSIGNED INTEGER
30132	DECIMAL POINT LOCATION	14	SAFETY		UNSIGNED INTEGER
30133	DECIMAL POINT LOCATION	21A	GSP1		UNSIGNED INTEGER
30134	DECIMAL POINT LOCATION	22A	VAC1		UNSIGNED INTEGER
30135	DECIMAL POINT LOCATION	22C	VAC3		UNSIGNED INTEGER
30136	DECIMAL POINT LOCATION	23A	MAP1		UNSIGNED INTEGER
30137	DECIMAL POINT LOCATION	23C	MAP3		UNSIGNED INTEGER
30138	DECIMAL POINT LOCATION	24A	MAT1		UNSIGNED INTEGER
30139	DECIMAL POINT LOCATION	24C	MAT3		UNSIGNED INTEGER
30140	DECIMAL POINT LOCATION	25A	EGT1		UNSIGNED INTEGER
30141	DECIMAL POINT LOCATION	25C	EGT3		UNSIGNED INTEGER
30142	DECIMAL POINT LOCATION	26A	VIB1L		UNSIGNED INTEGER
30143	DECIMAL POINT LOCATION	22B	VAC2		UNSIGNED INTEGER
30144	DECIMAL POINT LOCATION	22D	VAC4		UNSIGNED INTEGER
30145	DECIMAL POINT LOCATION	23B	MAP2		UNSIGNED INTEGER
30146	DECIMAL POINT LOCATION	23D	MAP4		UNSIGNED INTEGER
30147	DECIMAL POINT LOCATION	24B	MAT2		UNSIGNED INTEGER
30148	DECIMAL POINT LOCATION	24D	MAT4		UNSIGNED INTEGER
30149	DECIMAL POINT LOCATION	25B	EGT2		UNSIGNED INTEGER

12.2 MODBUS REGISTERS (continued)

REGISTERS	DESCRIPTION	CHANNEL	DESCRIPTION	PLACEMENT	TYPE
30150	DECIMAL POINT LOCATION	25D	EGT4		UNSIGNED INTEGER
30151	DECIMAL POINT LOCATION	26B	VIB1R		UNSIGNED INTEGER
30152	DECIMAL POINT LOCATION	27	KW		UNSIGNED INTEGER
30153	DECIMAL POINT LOCATION	28	AGV5		UNSIGNED INTEGER
30154	DECIMAL POINT LOCATION	29	AUX1		UNSIGNED INTEGER
30155	DECIMAL POINT LOCATION	30	AUX2		UNSIGNED INTEGER
30156	DECIMAL POINT LOCATION	31	AUX3		UNSIGNED INTEGER
30157	DECIMAL POINT LOCATION	32	AUX4		UNSIGNED INTEGER
30158	DECIMAL POINT LOCATION	33	AUX5		UNSIGNED INTEGER
30159	DECIMAL POINT LOCATION	34	AUX6		UNSIGNED INTEGER
30160	RESERVED				
30161	RESERVED				
30162	RESERVED				
30163	RESERVED				
30240	DISPLAY FIRMWARE MONTH				UNSIGNED INTEGER
30241	DISPLAY FIRMWARE DAY				UNSIGNED INTEGER
30242	DISPLAY FIRMWARE YEAR				UNSIGNED INTEGER
30243	TERMINAL FIRMWARE MONTH				UNSIGNED INTEGER
30244	TERMINAL FIRMWARE DAY				UNSIGNED INTEGER
30245	TERMINAL FIRMWARE YEAR				UNSIGNED INTEGER
40001	LOW SAFETY SETPOINT	12A	ROP	1	SIGNED INTEGER
40002	HIGH SAFETY SETPOINT	12A	ROP	1	SIGNED INTEGER
40003	LOW CONTROLS SETPOINT	12A	ROP	1	SIGNED INTEGER
40004	HIGH CONTROLS SETPOINT	12A	ROP	1	SIGNED INTEGER
40005	LOW SAFETY SETPOINT	13	INHIBIT	2	SIGNED INTEGER
40006	HIGH SAFETY SETPOINT	13	INHIBIT	2	SIGNED INTEGER
40007	LOW CONTROLS SETPOINT	13	INHIBIT	2	SIGNED INTEGER
40008	HIGH CONTROLS SETPOINT	13	INHIBIT	2	SIGNED INTEGER
40009	LOW SAFETY SETPOINT	14	SAFETY	3	SIGNED INTEGER
40010	HIGH SAFETY SETPOINT	14	SAFETY	3	SIGNED INTEGER
40011	LOW CONTROLS SETPOINT	14	SAFETY	3	SIGNED INTEGER
40012	HIGH CONTROLS SETPOINT	14	SAFETY	3	SIGNED INTEGER
40013	LOW SAFETY SETPOINT	21A	GSP1	4	SIGNED INTEGER
40014	HIGH SAFETY SETPOINT	21A	GSP1	4	SIGNED INTEGER
40015	LOW CONTROLS SETPOINT	21A	GSP1	4	SIGNED INTEGER
40016	HIGH CONTROLS SETPOINT	21A	GSP1	4	SIGNED INTEGER
40017	LOW SAFETY SETPOINT	22A	VAC1	5	SIGNED INTEGER
40018	HIGH SAFETY SETPOINT	22A	VAC1	5	SIGNED INTEGER
40019	LOW CONTROLS SETPOINT	22A	VAC1	5	SIGNED INTEGER

40020	HIGH CONTROLS SETPOINT	22A	VAC1	5	SIGNED INTEGER
40021	LOW SAFETY SETPOINT	22C	VAC3	6	SIGNED INTEGER
40022	HIGH SAFETY SETPOINT	22C	VAC3	6	SIGNED INTEGER
40023	LOW CONTROLS SETPOINT	22C	VAC3	6	SIGNED INTEGER
40024	HIGH CONTROLS SETPOINT	22C	VAC3	6	SIGNED INTEGER
40025	LOW SAFETY SETPOINT	23A	MAP1	7	SIGNED INTEGER
40026	HIGH SAFETY SETPOINT	23A	MAP1	7	SIGNED INTEGER
40027	LOW CONTROLS SETPOINT	23A	MAP1	7	SIGNED INTEGER
40028	HIGH CONTROLS SETPOINT	23A	MAP1	7	SIGNED INTEGER
40029	LOW SAFETY SETPOINT	23C	MAP3	8	SIGNED INTEGER
40030	HIGH SAFETY SETPOINT	23C	MAP3	8	SIGNED INTEGER
40031	LOW CONTROLS SETPOINT	23C	MAP3	8	SIGNED INTEGER
40032	HIGH CONTROLS SETPOINT	23C	MAP3	8	SIGNED INTEGER
40033	LOW SAFETY SETPOINT	24A	MAT1	9	SIGNED INTEGER
40034	HIGH SAFETY SETPOINT	24A	MAT1	9	SIGNED INTEGER
40035	LOW CONTROLS SETPOINT	24A	MAT1	9	SIGNED INTEGER
40036	HIGH CONTROLS SETPOINT	24A	MAT1	9	SIGNED INTEGER
40037	LOW SAFETY SETPOINT	24C	MAT3	10	SIGNED INTEGER
40038	HIGH SAFETY SETPOINT	24C	MAT3	10	SIGNED INTEGER
40039	LOW CONTROLS SETPOINT	24C	MAT3	10	SIGNED INTEGER
40040	HIGH CONTROLS SETPOINT	24C	MAT3	10	SIGNED INTEGER
40041	LOW SAFETY SETPOINT	25A	EGT1	11	SIGNED INTEGER
40042	HIGH SAFETY SETPOINT	25A	EGT1	11	SIGNED INTEGER
40043	LOW CONTROLS SETPOINT	25A	EGT1	11	SIGNED INTEGER
40044	HIGH CONTROLS SETPOINT	25A	EGT1	11	SIGNED INTEGER
40045	LOW SAFETY SETPOINT	25C	EGT3	12	SIGNED INTEGER
40046	HIGH SAFETY SETPOINT	25C	EGT3	12	SIGNED INTEGER
40047	LOW CONTROLS SETPOINT	25C	EGT3	12	SIGNED INTEGER
40048	HIGH CONTROLS SETPOINT	25C	EGT3	12	SIGNED INTEGER
40049	LOW SAFETY SETPOINT	26A	VIB1L	13	SIGNED INTEGER
40050	HIGH SAFETY SETPOINT	26A	VIB1L	13	SIGNED INTEGER
40051	LOW CONTROLS SETPOINT	26A	VIB1L	13	SIGNED INTEGER
40052	HIGH CONTROLS SETPOINT	26A	VIB1L	13	SIGNED INTEGER
40053	LOW SAFETY SETPOINT	22B	VAC2	14	SIGNED INTEGER
40054	HIGH SAFETY SETPOINT	22B	VAC2	14	SIGNED INTEGER
40055	LOW CONTROLS SETPOINT	22B	VAC2	14	SIGNED INTEGER
40056	HIGH CONTROLS SETPOINT	22B	VAC2	14	SIGNED INTEGER
40057	LOW SAFETY SETPOINT	22D	VAC4	15	SIGNED INTEGER
40058	HIGH SAFETY SETPOINT	22D	VAC4	15	SIGNED INTEGER
40059	LOW CONTROLS SETPOINT	22D	VAC4	15	SIGNED INTEGER
40060	HIGH CONTROLS SETPOINT	22D	VAC4	15	SIGNED INTEGER
40061	LOW SAFETY SETPOINT	23B	MAP2	16	SIGNED INTEGER
40062	HIGH SAFETY SETPOINT	23B	MAP2	16	SIGNED INTEGER

12.2 MODBUS REGISTERS (continued)

REGISTERS	DESCRIPTION	CHANNEL	DESCRIPTION	PLACEMENT	TYPE
40063	LOW CONTROLS SETPOINT	23B	MAP2	16	SIGNED INTEGER
40064	HIGH CONTROLS SETPOINT	23B	MAP2	16	SIGNED INTEGER
40065	LOW SAFETY SETPOINT	23D	MAP4	17	SIGNED INTEGER
40066	HIGH SAFETY SETPOINT	23D	MAP4	17	SIGNED INTEGER
40067	LOW CONTROLS SETPOINT	23D	MAP4	17	SIGNED INTEGER
40068	HIGH CONTROLS SETPOINT	23D	MAP4	17	SIGNED INTEGER
40069	LOW SAFETY SETPOINT	24B	MAT2	18	SIGNED INTEGER
40070	HIGH SAFETY SETPOINT	24B	MAT2	18	SIGNED INTEGER
40071	LOW CONTROLS SETPOINT	24B	MAT2	18	SIGNED INTEGER
40072	HIGH CONTROLS SETPOINT	24B	MAT2	18	SIGNED INTEGER
40073	LOW SAFETY SETPOINT	24D	MAT4	19	SIGNED INTEGER
40074	HIGH SAFETY SETPOINT	24D	MAT4	19	SIGNED INTEGER
40075	LOW CONTROLS SETPOINT	24D	MAT4	19	SIGNED INTEGER
40076	HIGH CONTROLS SETPOINT	24D	MAT4	19	SIGNED INTEGER
40077	LOW SAFETY SETPOINT	25B	EGT2	20	SIGNED INTEGER
40078	HIGH SAFETY SETPOINT	25B	EGT2	20	SIGNED INTEGER
40079	LOW CONTROLS SETPOINT	25B	EGT2	20	SIGNED INTEGER
40080	HIGH CONTROLS SETPOINT	25B	EGT2	20	SIGNED INTEGER
40081	LOW SAFETY SETPOINT	25D	EGT4	21	SIGNED INTEGER
40082	HIGH SAFETY SETPOINT	25D	EGT4	21	SIGNED INTEGER
40083	LOW CONTROLS SETPOINT	25D	EGT4	21	SIGNED INTEGER
40084	HIGH CONTROLS SETPOINT	25D	EGT4	21	SIGNED INTEGER
40085	LOW SAFETY SETPOINT	26B	VIB1R	22	SIGNED INTEGER
40086	HIGH SAFETY SETPOINT	26B	VIB1R	22	SIGNED INTEGER
40087	LOW CONTROLS SETPOINT	26B	VIB1R	22	SIGNED INTEGER
40088	HIGH CONTROLS SETPOINT	26B	VIB1R	22	SIGNED INTEGER
40089	LOW SAFETY SETPOINT	27	KW	23	SIGNED INTEGER
40090	HIGH SAFETY SETPOINT	27	KW	23	SIGNED INTEGER
40091	LOW CONTROLS SETPOINT	27	KW	23	SIGNED INTEGER
40092	HIGH CONTROLS SETPOINT	27	KW	23	SIGNED INTEGER
40093	LOW SAFETY SETPOINT	28	AGV5	24	SIGNED INTEGER
40094	HIGH SAFETY SETPOINT	28	AGV5	24	SIGNED INTEGER
40095	LOW CONTROLS SETPOINT	28	AGV5	24	SIGNED INTEGER
40096	HIGH CONTROLS SETPOINT	28	AGV5	24	SIGNED INTEGER
40097	LOW SAFETY SETPOINT	29	AUX1	25	SIGNED INTEGER
40098	HIGH SAFETY SETPOINT	29	AUX1	25	SIGNED INTEGER
40099	LOW CONTROLS SETPOINT	29	AUX1	25	SIGNED INTEGER
40100	HIGH CONTROLS SETPOINT	29	AUX1	25	SIGNED INTEGER
40101	LOW SAFETY SETPOINT	30	AUX2	26	SIGNED INTEGER
40102	HIGH SAFETY SETPOINT	30	AUX2	26	SIGNED INTEGER
40103	LOW CONTROLS SETPOINT	30	AUX2	26	SIGNED INTEGER

40104	HIGH CONTROLS SETPOINT	30	AUX2	26	SIGNED INTEGER
40105	LOW SAFETY SETPOINT	31	AUX3	27	SIGNED INTEGER
40106	HIGH SAFETY SETPOINT	31	AUX3	27	SIGNED INTEGER
40107	LOW CONTROLS SETPOINT	31	AUX3	27	SIGNED INTEGER
40108	HIGH CONTROLS SETPOINT	31	AUX3	27	SIGNED INTEGER
40109	LOW SAFETY SETPOINT	32	AUX4	28	SIGNED INTEGER
40110	HIGH SAFETY SETPOINT	32	AUX4	28	SIGNED INTEGER
40111	LOW CONTROLS SETPOINT	32	AUX4	28	SIGNED INTEGER
40112	HIGH CONTROLS SETPOINT	32	AUX4	28	SIGNED INTEGER
40113	LOW SAFETY SETPOINT	33	AUX5	29	SIGNED INTEGER
40114	HIGH SAFETY SETPOINT	33	AUX5	29	SIGNED INTEGER
40115	LOW CONTROLS SETPOINT	33	AUX5	29	SIGNED INTEGER
40116	HIGH CONTROLS SETPOINT	33	AUX5	29	SIGNED INTEGER
40117	LOW SAFETY SETPOINT	34	AUX6	30	SIGNED INTEGER
40118	HIGH SAFETY SETPOINT	34	AUX6	30	SIGNED INTEGER
40119	LOW CONTROLS SETPOINT	34	AUX6	30	SIGNED INTEGER
40120	HIGH CONTROLS SETPOINT	34	AUX6	30	SIGNED INTEGER
40121	LOW SAFETY SETPOINT	S01	SPEED		SIGNED INTEGER
40122	HIGH SAFETY SETPOINT	S01	SPEED		SIGNED INTEGER
40123	LOW CONTROLS SETPOINT	S01	SPEED		SIGNED INTEGER
40124	HIGH CONTROLS SETPOINT	S01	SPEED		SIGNED INTEGER
40125					
40126					
40127	AGV5 DELAY	RANGE (1-10)			
40128	FUEL DELAY	RANGE (1-999)			
40129	VIBRATION DELAY	RANGE (0-10)			
40130	KW HYSTERESIS	RANGE (0-200)			
40131	MAP1 HYSTERESIS	RANGE (0.0 - 10.0)			
40132	SIGNAL	READ ONLY			
40133	DEMAND	READ ONLY			
40134	AUTO / MANUAL	0 = MANUAL, 1 = AUTO			
40135	4-20MA OUT	RANGE (0-4095), 0 = 4MA, 4095 = 20.0MA			

NOTE: 40135 CAN READ THE PAST VALUE SET IN THE UNIT. IT CAN ONLY BE WRITTEN IN THE MANUAL MODE

40998	KEYPAD INPUT	VALUE	FUNCTION		UNSIGNED INTEGER
		1	CANCEL TIMERS		
		2	TEST		
		3	RESET		
		4	STOP		
		5	VIEW		
		6	NEXT		
		7	UP/UNITS		
		8	VIEW CHAN		
		9	F1		

REGISTERS	DESCRIPTION	CHANNEL	DESCRIPTION	PLACEMENT	TYPE
		10	RIGHT / TENS		
		11	ENTER		
		12	LEFT / TENS		
		13	F2		
		14	MENU		
		15	DOWN/UNITS		
		16	ESC		
40999	ALTERNATE FUNCTION	VALUE			UNSIGNED INTEGER
		41BEH	RESET FUNCTION		
		53ACH	STOP FUNCTION		

12.3 Identification

In addition to the above, the DE-3020 will respond to function code 17 with an identification string as follows:

Query: NN 17 CRC CRC
NN = node number, 17 = ID function code, CRC CRC = two byte Modbus RTU CRC.

Response: NN 17 07 DE - 3020 CRC CRC
NN = node number, 17 = ID function code, 07 = number of bytes to follow, DE-3020 (seven byte ASCII ID string), CRC CRC = two byte Modbus RTU CRC

12.4 Stop/Reset

Register 40999 can be written to to remotely trigger the STOP & RESET functions. It will only respond to a single write (function code 06). The stop Command is 0xAC53. The reset command is 0xBE41.

12.5 Remote Keypad Emulation

The DE has a feature called the Remote Keypad Emulation that can be accessed through function code 20 as follows:

Query: NN 20 KP CRC CRC
NN = node number, 20 = KP function code, KP is the single byte Key Press from the table below, CRC CRC = two byte Modbus RTU CRC.

Key Press Table
00 = NONE (no keypress, returns current display)
01 = CANCEL TIMERS
02 = TEST
03 = RESET
04 = STOP
05 = VIEW
06 = NEXT
07 = UP/UNITS
08 = VIEW CHAN
09 = F1
10 = RIGHT/TENS
11 = ENTER
12 = LEFT/TENS
13 = F2
14 = MENU
15 = DOWN/UNITS
16 = ESC

Response: NN 20 88 (20 bytes, 1st line of display) CR LF (20 bytes, 2nd line) CR LF (20 bytes, 3rd line) CR LF (20 bytes, 4th line) CR LF CRC CRC

NN = node number, 20 = KP fucntion code, 88 = number of bytes to follow, CR = Carriage Return, LF = Linefeed, 4 20-byte ASCII blocks that is the display, CRC CRC = two byte Modbus RTU CRC.

13.0 PROGRAMMING THE DE-3020

13.1 The DE-3020 terminal program operates from a standard PC and permits the operator to configure the system. There is a monitor mode that the operator can use to monitor an existing installation and access system data. This data can be accessed locally or remotely via a modem.

The following user-supplied hardware is required:

- Computer: IBM-compatible PC.
- Serial Port - RS-232 port for programming.
- Modem - 9600 baud (or greater) modem required for monitor function.

13.2 The terminal program is available from the local Master Distributor. A minimum of 10MB of free disk space is required. Additional disk space will be required if the remote data log database function is used. The space required will be dependent on the size of the working database.

13.3 Connect the computer cable from the computer to the DB9 connector Port #1 on the back of the DE-3020 display.

13.4 CONFIGURE KEY
The DE-3020 needs to be initially programmed using the DE-3020 Terminal program. The configure key populates a sub menu. Select from the following: Create New, Get From Unit, Get From File, Cancel. Select the items for download which best fit the intended application.

13.5 PROGRAM CHANNELS
The setpoints of the DE-3020 may be changed from the computer after navigating through the Configure Key. Safety ShutDown and Control setpoints are entered in this section. Units displayed and programmable channels can also be edited in this section.

13.6 MONITOR KEY
This feature allows the user to retrieve data logged messages which is typically used for PC monitoring or SCADA/PLC systems. The connections can use either a modem or connected directly into the Comm. Port. Data logs may be retrieved into a standard EXCEL file format.

The following keys are applicable during the monitor function:

CONNECT KEY — This feature selects how the PC is going to connect to the DE-3020. Select either a comm port or a telephone number for a modem.

HANGUP KEY — This disconnects the PC from the port or the modem.

DATALOGS KEY — This feature allows for retrieval of data logged messages in the PC. Data logs may be retrieved into a standard EXCEL file format.

AUTO START KEY — This feature allows for serial communications to STOP Bi-Fuel operation or RESET Bi-Fuel operation.

VIEW DATABASE/CHART DATABASE KEY — These powerful tools allow users to display and chart the data logged information.

13.7 CALIBRATE KEY — This allows the user to calibrate analog sensor channels. Press this button and select the channel to be calibrated. The sensor selection box will show the default values or the last values calibrated. The CURRENT DATA box shows the value being displayed by the DE-3020. On the terminals of the channel being calibrated, connect a voltmeter between the input (+ and -) to measure the output voltage of the transducer. Apply the desired minimum pressure, temperature, vibration, position or KW input to the transducer being calibrated. Now measure the voltage using the voltmeter on the terminal strip. Enter this voltage into the LOW SENSOR VOLTAGE box on the PC screen. Click the ACCEPT button to make this the new calibration value. The CURRENT DATA box will now read the desired minimum value. If the span is to be adjusted, increase the input to the transducer to the desired high value. Measure the voltage at the terminal strip using the voltmeter and enter the measured voltage in the HIGH SENSOR VOLTAGE box and hit the ACCEPT button. The calibration of the channel is now complete.

13.8 EXIT KEY — Exits the DE-3020 PC Terminal program.

13.9 AGV KEY — This key is used to view/modify the switchpoints for mapping the kW, RPM, or Single Point to specific valve sequencing. The switchpoints, valve sequencing, and hysteresis are programmed using this key.

13.10 RPM KEY — This key is used to view/modify the switchpoints for mapping the RPM sensor to specific valve sequencing. The switchpoints, valve sequencing, and RPM hysteresis are programmed using this key.

FIG. 1 GTI CONTROL INPUT CHANNEL LISTING

CHANNEL	DESCRIPTION	DISPLAYED UNITS (Default: English)	DEFAULT CONTROL SETPOINTS		DEFAULT SAFETY SETPOINTS		DISPLAYED UNITS (Metric)	DEFAULT CONTROL SETPOINTS		DEFAULT SAFETY SETPOINTS	
			LOW	HIGH	LOW	HIGH		LOW	HIGH	LOW	HIGH
12A	ROP	—	—	—	—	—	—	—	—	—	—
13	INHIBIT	—	—	—	—	—	—	—	—	—	—
14	SAFETY	—	—	—	—	—	—	—	—	—	—
21A	GSP1	PSIG	-12.5	62.5	-12.5	62.5	KPA	15.2	532.2	15.2	532.2
22A	VAC1	PSIG	-12.5	62.5	-12.5	62.5	KPA	15.2	532.2	15.2	532.2
22C	VAC3	PSIG	-12.5	62.5	-12.5	62.5	KPA	15.2	532.2	15.2	532.2
23A	MAP1	PSIG	20	62.5	20	62.5	KPA	239.1	532.2	239.1	532.2
23C	MAP3	PSIG	-12.5	62.5	-12.5	62.5	KPA	15.2	532.2	15.2	532.2
24A	MAT1	F	-76	1472	-76	1472	C	-60	800	-60	800
24C	MAT3	F	-76	1472	-76	1472	C	-60	800	-60	800
25A	EGT1	F	-76	1472	-76	1472	C	-60	800	-60	800
25C	EGT3	F	-76	1472	-76	1472	C	-60	800	-60	800
26A	VIB1L	IPS	0	2	0	2	MPS	0	50	0	50
22B	VAC2	PSIG	-12.5	62.5	-12.5	62.5	KPA	15.2	532.2	15.2	532.2
22D	VAC4	PSIG	-12.5	62.5	-12.5	62.5	KPA	15.2	532.2	15.2	532.2
23B	MAP2	PSIG	-12.5	62.5	-12.5	62.5	KPA	15.2	532.2	15.2	532.2
23D	MAP4	PSIG	-12.5	62.5	-12.5	62.5	KPA	15.2	532.2	15.2	532.2
24B	MAT2	F	-76	1472	-76	1472	C	-60	800	-60	800
24D	MAT4	F	-76	1472	-76	1472	C	-60	800	-60	800
25B	EGT2	F	-76	1472	-76	1472	C	-60	800	-60	800
25D	EGT4	F	-76	1472	-76	1472	C	-60	800	-60	800
26B	VIB1R	IPS	0	2	0	2	MPS	0	50	0	50
27	KW	kW	-10	4000	-10	4000	kW	-10	4000	0	4000
28	AGV5	"H_2O	-138.3	138.3	—	—	—	—	—	—	—
29	AUX1	USER DEFINED	—	—	—	—	—	—	—	—	—
30	AUX2	USER DEFINED	—	—	—	—	—	—	—	—	—
31	AUX3	USER DEFINED	—	—	—	—	—	—	—	—	—
32	AUX4	USER DEFINED	—	—	—	—	—	—	—	—	—
33	AUX5	USER DEFINED	—	—	—	—	—	—	—	—	—
34	AUX6	USER DEFINED	—	—	—	—	—	—	—	—	—
35	TACH	RPM	—	—	—	—	RPM	—	—	—	—

DE TERMINAL PROGRAM CONFIGURATION DEFAULTS
Device/Units: GPN2020 Controller (English)

FIG. 2 MOUNTING DIMENSIONS – GPN2020

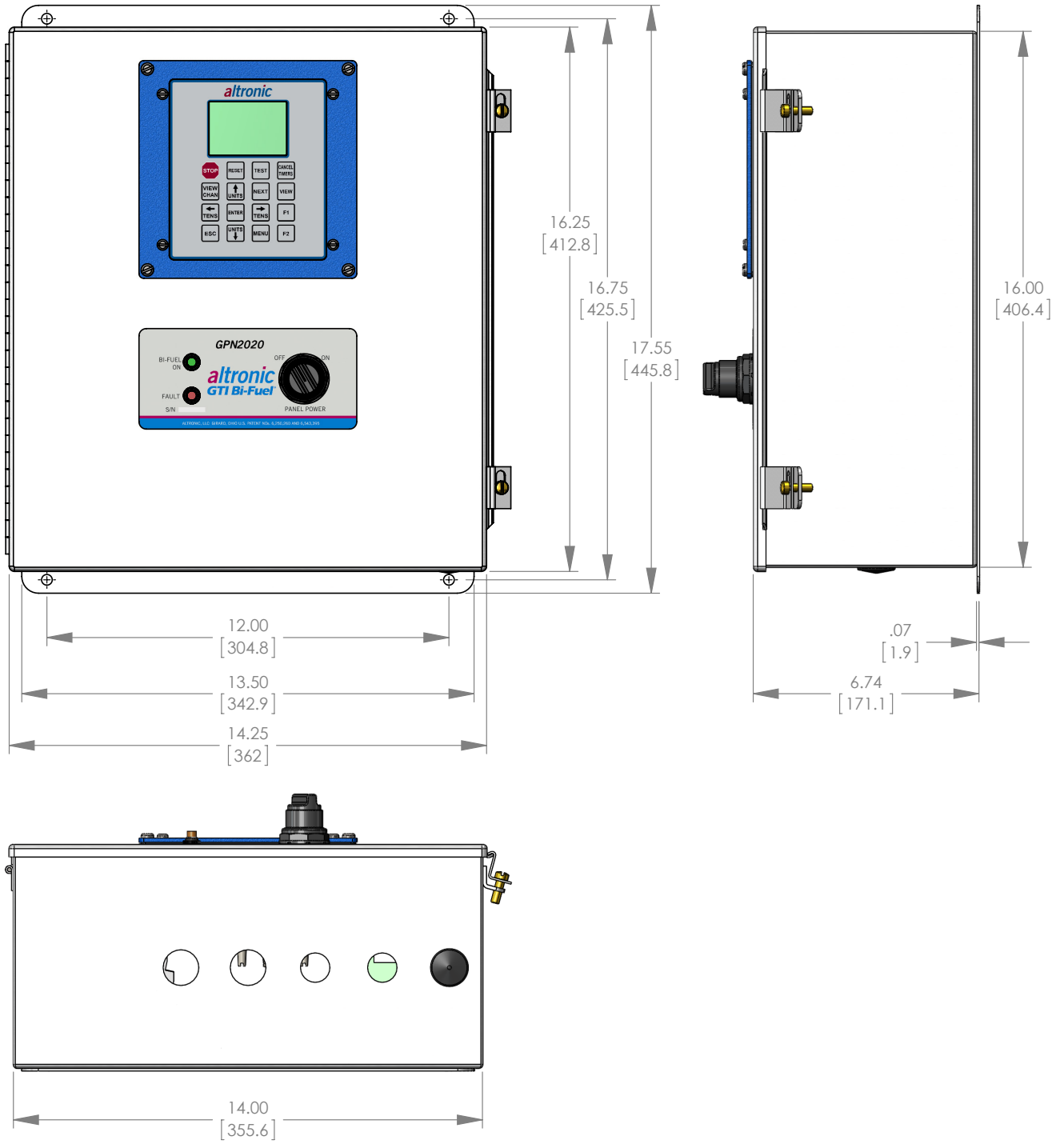


FIG. 3 INSIDE VIEW – GPN2020

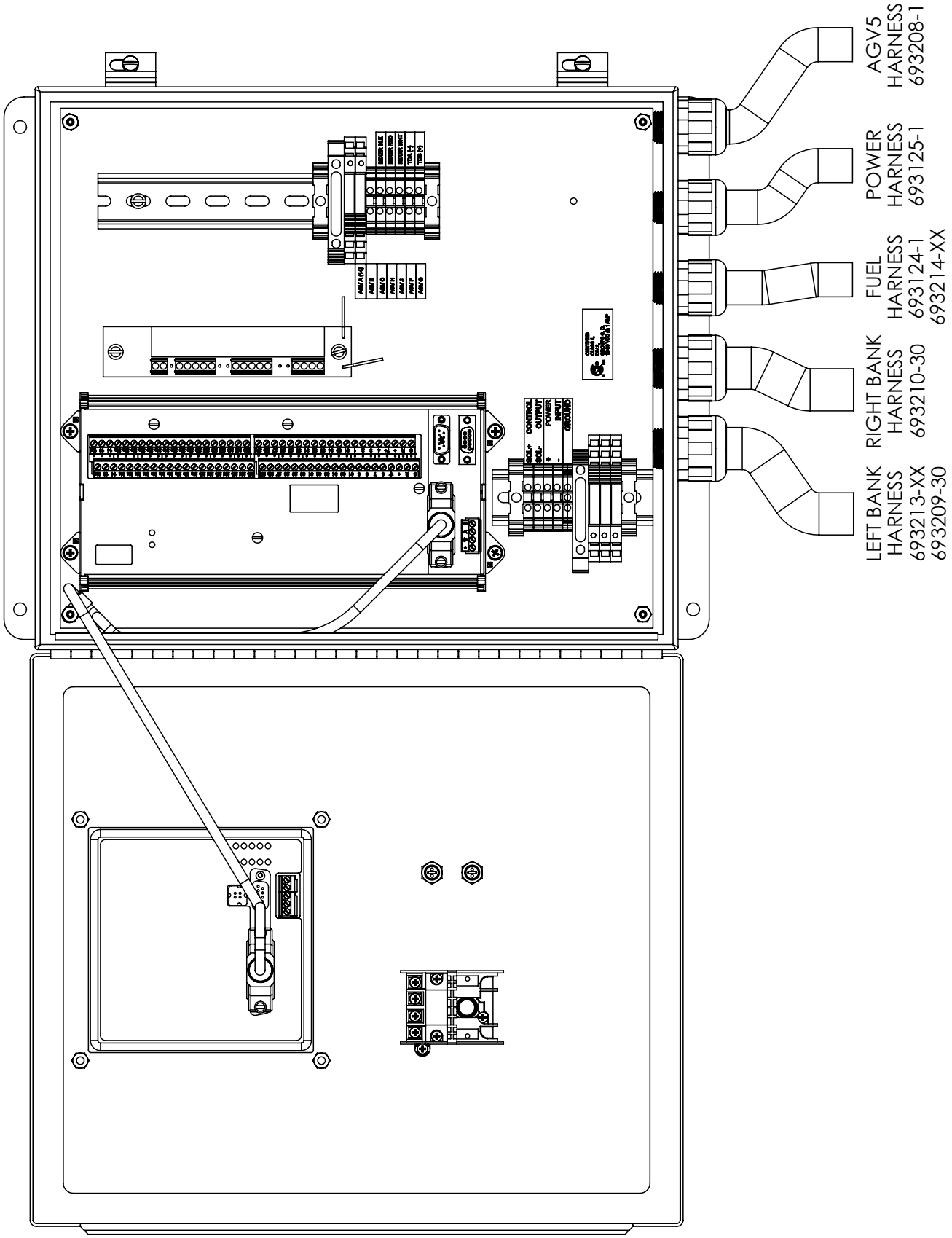


FIG. 4 WIRING DIAGRAM – CUSTOMER CONNECTIONS

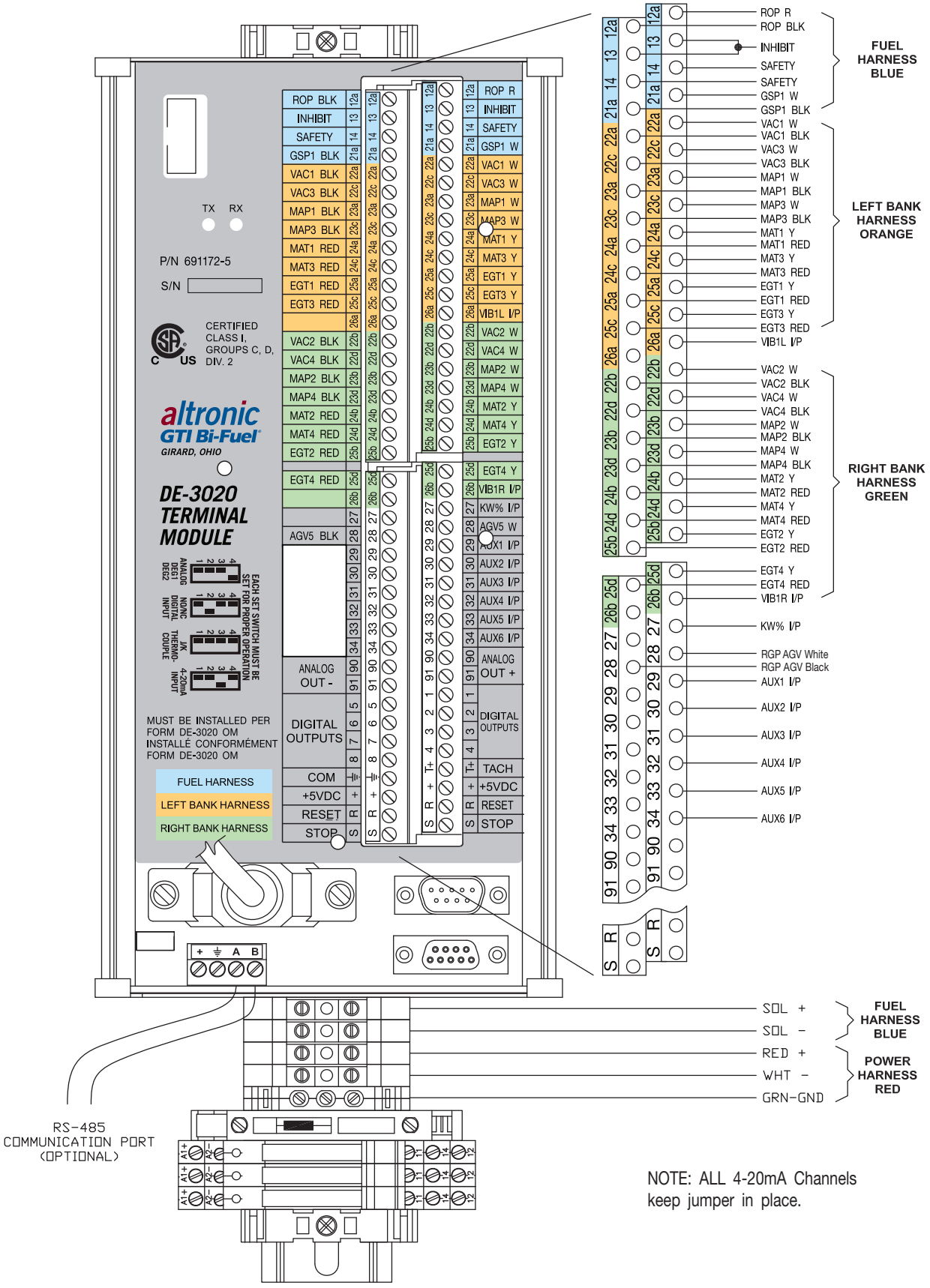


FIG. 5 WIRING DIAGRAM – SENSOR TERMINAL

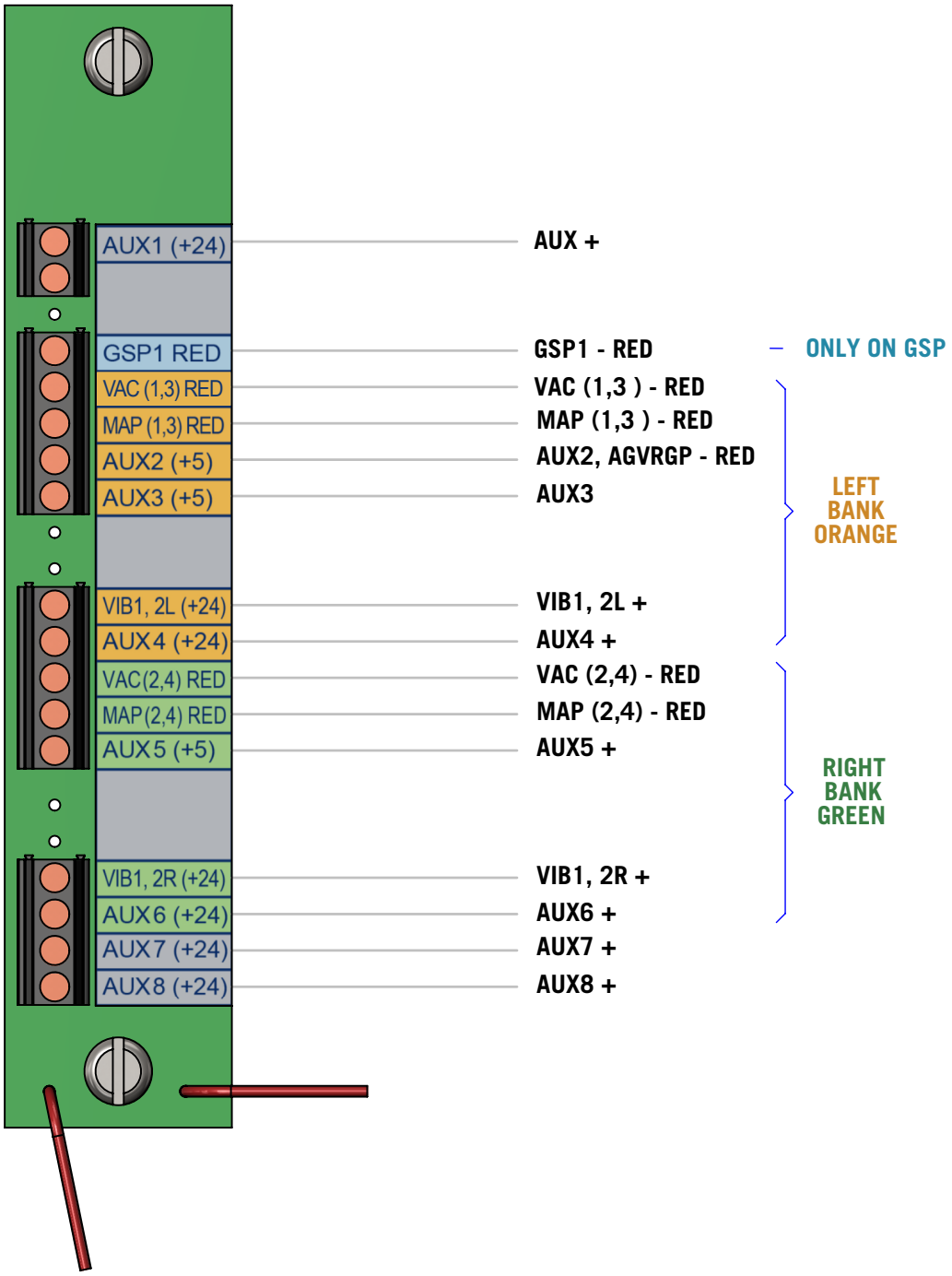


FIG. 6 WIRING DIAGRAM – AGV

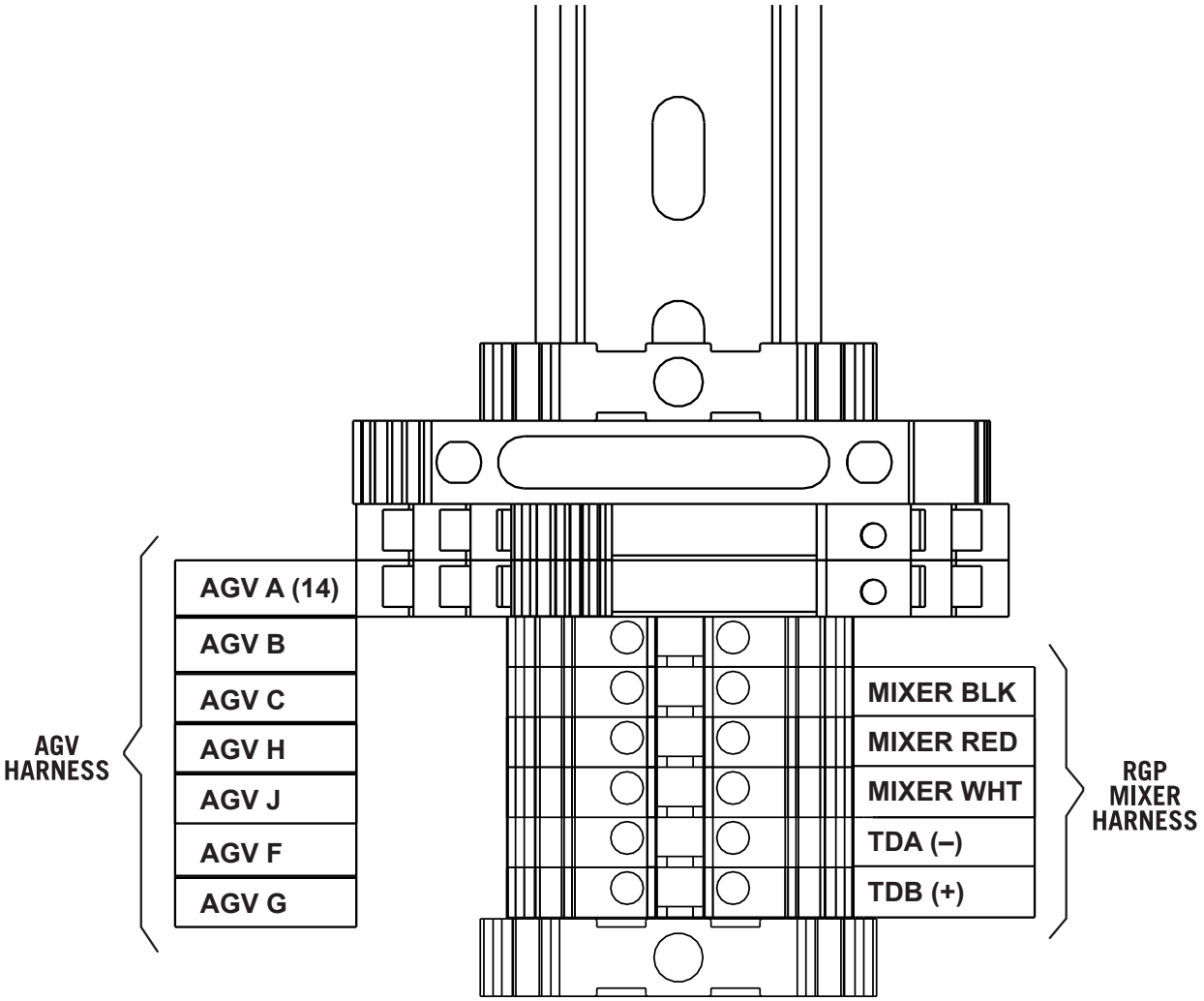
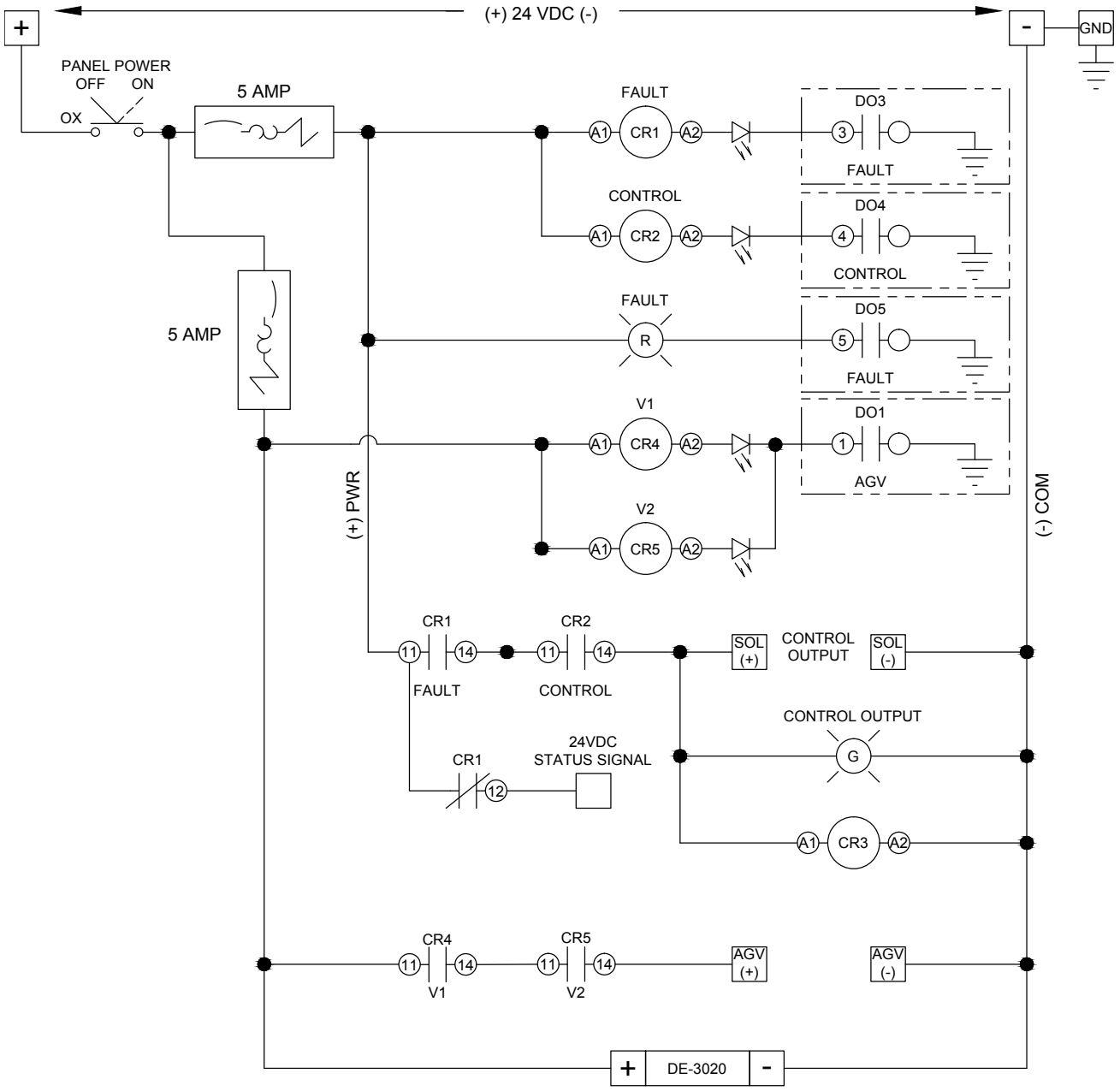


FIG. 7 LADDER LOGIC – GPN2020 AND GPN2030



RELAY CR3 IS AN OPTIONAL
(CUSTOMER CONNECTION (TYPICALLY TO A PLC)
TO DETECT GAS SUBSTITUTION

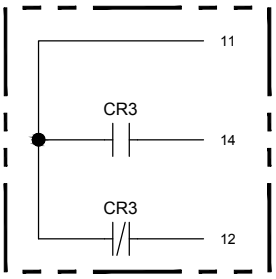
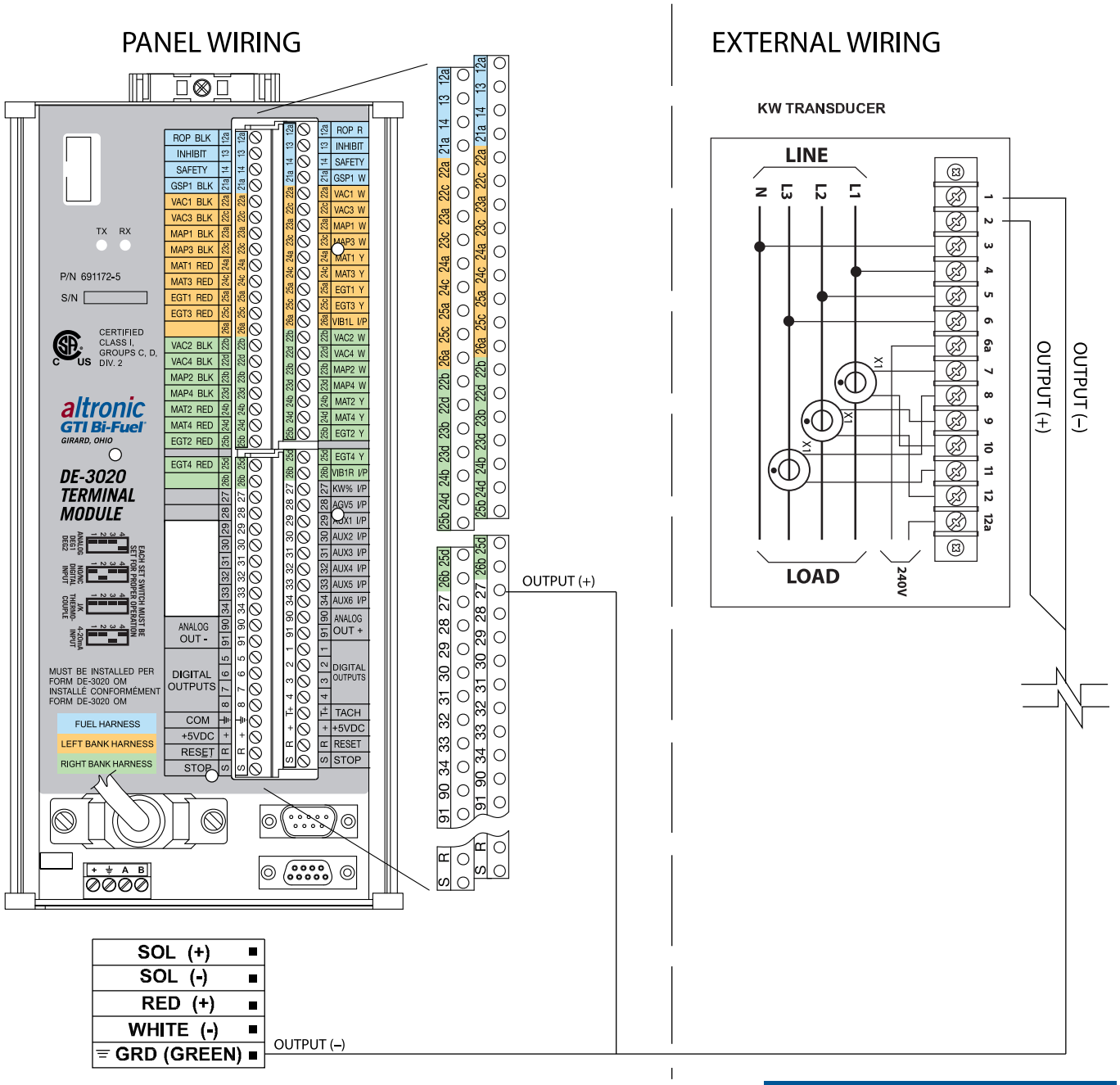


FIG. 8 3-PHASE, 3-WIRE AND 3-PHASE, 4-WIRE WIRING SCHEMATIC



NOTE: KW Terminal Strip Specs.
Wire Strip Length: .38" [9.652]
Recommended Torque: 8 in-lbs.

NOTE: All furnished drawings and instructions assume (–) ground DC system. In the case of a floating ground, or (+) ground DC system, please contact Altronic Factory for support.