Automatic Mains Failure (AMF) Controller
Be142 / Be242 OEM’s Manual V1.X.XX

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Warranty
Bernini Design SRL (hereinafter “BD”) warrants that Be142 shall be free from defect in material or workmanship for a period of 3 years from the BD delivery date. BD shall, at its discretion, repair or replace the product without charge. BD shall return the Be142 to the buyer with the Default parameters at no extra charge. The buyer shall provide sufficient information on any alleged defects in the product, so as to enable BD to determine their cause and existence. If the Be142 is not defective, or the product is defective for reasons other than covered by this warranty, the buyer will be charged accordingly. This warranty shall not apply if the Be142 has not been used in accordance with the User Manual and other operating instruction, particularly if any defects are caused by misuse, improper repair attempts, and negligence in use or handling.
This purchase is non-refundable.

This equipment complies with EMC protection requirements

WARNING!! High voltage is present inside the Be142. To avoid electric-shock hazard, operating personnel must not remove the protective cover. Do not disconnect the Earth connection. The Be142 can start the engine at anytime. Do not work on equipment, which is controlled by the Be142. When servicing the engine, disconnect the battery and battery charger. We recommend that warning signs be placed on equipment indicating the above.

!! WARNING!! Relays and solenoids connected to the Be142 must be suppressed using flywheel diodes or suppression devices as indicated in section 18.0. In case the Vdc supply spuriously introduces spikes over 40 Vdc we recommend placing a 2 A (fast-blow fuse) in series with the terminal #24.
# Alphabetic index

<table>
<thead>
<tr>
<th>Page References</th>
<th>Page References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternator Failure E04</td>
<td>7.02B [P.15]</td>
</tr>
<tr>
<td>Alarms</td>
<td>4.10, 8.0</td>
</tr>
<tr>
<td>Alarm output control</td>
<td>7.09, [39]</td>
</tr>
<tr>
<td>Alarm inputs</td>
<td>7.06, 8.0</td>
</tr>
<tr>
<td>Automatic</td>
<td>2.3</td>
</tr>
<tr>
<td>Battery, Alarms</td>
<td>4.10 [Er.13]</td>
</tr>
<tr>
<td>Belt break</td>
<td>4.10 [Er.02]</td>
</tr>
<tr>
<td>Choke, control</td>
<td>Table 7.03 [P.22]</td>
</tr>
<tr>
<td>Calibration</td>
<td>12.0</td>
</tr>
<tr>
<td>Characteristics</td>
<td>14.0</td>
</tr>
<tr>
<td>Charger Alternator</td>
<td>11.0, 7.03 [P.26]</td>
</tr>
<tr>
<td>Clear the memory</td>
<td>12.3</td>
</tr>
<tr>
<td>Contactors</td>
<td>2.21, 18.0</td>
</tr>
<tr>
<td>Connectors, Plugs</td>
<td>18.0</td>
</tr>
<tr>
<td>Connections list</td>
<td>21.0</td>
</tr>
<tr>
<td>Crank timing</td>
<td>7.03A [P.19]</td>
</tr>
<tr>
<td>Current Transformer</td>
<td>7.02B [P.18]</td>
</tr>
<tr>
<td>Cooling down time</td>
<td>7.03A [P.24]</td>
</tr>
<tr>
<td>Defaults</td>
<td>6.20</td>
</tr>
<tr>
<td>Dimensions</td>
<td>20.0</td>
</tr>
<tr>
<td>Display</td>
<td>3.0</td>
</tr>
<tr>
<td>Display Messages</td>
<td>4.10, 4.20</td>
</tr>
<tr>
<td>Er.0–8.. Error codes</td>
<td>4.10</td>
</tr>
<tr>
<td>[FAIL] Memory error</td>
<td>4.10 [FAIL]</td>
</tr>
<tr>
<td>Engine Running</td>
<td>11.0</td>
</tr>
<tr>
<td>Emergency input</td>
<td>4.10[Er.08]</td>
</tr>
<tr>
<td>Events</td>
<td>4.30</td>
</tr>
<tr>
<td>Fail to Start</td>
<td>4.10[Er.11], P.34</td>
</tr>
<tr>
<td>Fail to Stop</td>
<td>4.10[Er.07]</td>
</tr>
<tr>
<td>Front Panel</td>
<td>1.0 Figure 1</td>
</tr>
<tr>
<td>Frequency</td>
<td>7.02A [P.11][P.12]</td>
</tr>
<tr>
<td>Fuel Level</td>
<td>7.04 [P.36 - 38]</td>
</tr>
<tr>
<td>Generator Voltage</td>
<td>7.02 [P.9] [P.10]</td>
</tr>
<tr>
<td>Generator Frequency</td>
<td>7.02 [P.11] [P.12]</td>
</tr>
<tr>
<td>Generator Failure E04</td>
<td>7.02B [P.15]</td>
</tr>
<tr>
<td>Glow Plugs</td>
<td>7.03 [P.22]</td>
</tr>
<tr>
<td>Hi-U, Over Voltage</td>
<td>7.02A [P.10]</td>
</tr>
<tr>
<td>Hour Counter</td>
<td>9.0</td>
</tr>
<tr>
<td>Horn Programming</td>
<td>7.05 [P.50]</td>
</tr>
<tr>
<td>Inputs (Programmable)</td>
<td>7.06, 7.07</td>
</tr>
<tr>
<td>Idle Speed</td>
<td>16.60</td>
</tr>
<tr>
<td>LED, LEDs</td>
<td>5.0</td>
</tr>
<tr>
<td>Lamp Test</td>
<td>5.1</td>
</tr>
<tr>
<td>Lo-U, Under Voltage</td>
<td>7.02A [P.09]</td>
</tr>
<tr>
<td>Lock, Remote Lock E03</td>
<td>4.10</td>
</tr>
<tr>
<td>Low Battery voltage</td>
<td>4.10,[Er.13]</td>
</tr>
<tr>
<td>Log Events</td>
<td>4.30</td>
</tr>
<tr>
<td>Mains Failure</td>
<td>7.01A [P.01]</td>
</tr>
<tr>
<td>Mains Restore</td>
<td>7.01B [P.02]</td>
</tr>
<tr>
<td>Maintenance timers</td>
<td>7.05, 16.40</td>
</tr>
<tr>
<td>Mains Simulation</td>
<td>7.07 [15]</td>
</tr>
<tr>
<td>Measurements</td>
<td>3.0</td>
</tr>
<tr>
<td>Memory clear</td>
<td>12.3</td>
</tr>
<tr>
<td>Memory Events</td>
<td>4.30</td>
</tr>
<tr>
<td>Messages (Display)</td>
<td>4.0</td>
</tr>
<tr>
<td>Manual</td>
<td>2.2</td>
</tr>
<tr>
<td>Oil pressure</td>
<td>7.03B [P.29]</td>
</tr>
<tr>
<td>Outputs (programmable)</td>
<td>7.09</td>
</tr>
<tr>
<td>Operation modes</td>
<td>2.0</td>
</tr>
<tr>
<td>Overload</td>
<td>4.10 [Er.05]</td>
</tr>
<tr>
<td>Overload (external)</td>
<td>7.07 [20][21]</td>
</tr>
<tr>
<td>Over Frequency</td>
<td>4.10 [Er.01]</td>
</tr>
<tr>
<td>Over Voltage Hi-U</td>
<td>4.10 [HI-U]</td>
</tr>
<tr>
<td>Parameters</td>
<td>7.0</td>
</tr>
<tr>
<td>Password</td>
<td>6.40</td>
</tr>
<tr>
<td>Parameters reading</td>
<td>6.30</td>
</tr>
<tr>
<td>Periodic test</td>
<td>7.05 [P.41][P.42]</td>
</tr>
<tr>
<td>Program, Programming</td>
<td>6.0</td>
</tr>
<tr>
<td>Pre Glow</td>
<td>7.03[P.22]</td>
</tr>
<tr>
<td>Pump Set control</td>
<td>10.0</td>
</tr>
<tr>
<td>Power Supply</td>
<td>14.0</td>
</tr>
<tr>
<td>Push buttons</td>
<td>2.0, 2.2</td>
</tr>
<tr>
<td>Rest time</td>
<td>7.03A [P.21]</td>
</tr>
<tr>
<td>Rental Programming</td>
<td>7.05 [P.47]</td>
</tr>
<tr>
<td>R.P.M</td>
<td>7.02B [P.16]</td>
</tr>
<tr>
<td>Settings (Parameters)</td>
<td>7.0</td>
</tr>
<tr>
<td>Serial interface</td>
<td>22.0</td>
</tr>
<tr>
<td>Single Phase operation</td>
<td>16.30</td>
</tr>
<tr>
<td>Specifications</td>
<td>14.0</td>
</tr>
<tr>
<td>Software upgrade</td>
<td>15.0</td>
</tr>
<tr>
<td>Start</td>
<td>2.2</td>
</tr>
<tr>
<td>Start Attempts</td>
<td>7.03B [P.31]</td>
</tr>
<tr>
<td>Starting Failure</td>
<td>4.10 [Er.11]</td>
</tr>
<tr>
<td>Stop, Stop solenoid</td>
<td>7.03A [P.25]</td>
</tr>
<tr>
<td>Temperature</td>
<td>7.03B [P.30]</td>
</tr>
<tr>
<td>Terminal description</td>
<td>21.0</td>
</tr>
<tr>
<td>Test, Remote Test</td>
<td>7.07 [10] [11]</td>
</tr>
<tr>
<td>Test mode</td>
<td>2.4</td>
</tr>
<tr>
<td>Test timeout</td>
<td>16.60</td>
</tr>
<tr>
<td>Transformer, Current</td>
<td>7.02B [P.18]</td>
</tr>
<tr>
<td>Troubleshooting</td>
<td>13.0</td>
</tr>
<tr>
<td>Under Voltage Lo-U</td>
<td>7.02A [P.09]</td>
</tr>
<tr>
<td>Under Frequency</td>
<td>7.02A [P.11]</td>
</tr>
<tr>
<td>Voltage measurements</td>
<td>3.0</td>
</tr>
<tr>
<td>Warm-Up time</td>
<td>7.03A [P.23]</td>
</tr>
<tr>
<td>Wiring diagram</td>
<td>18.0</td>
</tr>
</tbody>
</table>
Be142 OEM’s Manual - Contents

1.0 Introduction .......................................................... page 4
2.0 Selection of a Mode of operation.................. page 4
  2.1 OFF mode............................................................ page 5
  2.2 MANUAL mode...................................................... page 5
  2.3 AUTO mode........................................................ page 6
  2.4 TEST mode.......................................................... page 6
  2.5 PROGRAM mode .................................................... page 6
  2.6 CALIBRATION mode.............................................. page 6
  2.7 TROUBLESHOOTING mode .................................. page 6
3.0 DISPLAY measurements................................. page 6
4.0 DISPLAY messages and Log Events............. page 8
  4.10 Alarm Messages................................................ page 8
  4.20 Miscellaneous Messages................................. page 8
  4.30 Log Events / Memory Events........................ page 9
5.0 LED indicators ...................................................... page 9
  5.1 Lamp and Display Test................................. page 9
6.0 PROGRAMMING & READING parameters..... page 9
  6.10 Enter the Programming Mode.................... page 9
  6.11 Enter the password........................................... page 9
  6.12 Programming................................................... page 10
  6.13 Saving............................................................. page 10
  6.14 Exit without saving........................................ page 10
  6.20 Re-programming default settings ............ page 10
  6.30 Reading the parameters............................... page 10
  6.40 Activating the password............................... page 11
  6.50 Changing the password................................. page 11
  6.60 Removing the password................................. page 11
7.0 Programmable Parameter............................. page 11
  Table 7.01A-B Mains Failure Control............. page 12
  Table 7.02A-B Generator Parameters ............. page 13
  Table 7.03A-B Engine Parameters.................. page 14
  Table 7.04 Alarms Options................................ page 15
  Table 7.05 Miscellaneous...................................... page 15
  Table 7.06 Programmable Inputs.................... page 16
  Table 7.07 Input Options list......................... page 16
  Table 7.08 Programmable Outputs.................. page 16
  Table 7.09 Outputs Options list.................... page 17
  Table 7.10 Oil Pressure Sensor...................... page 17
  Table 7.11 Temperature Sensor...................... page 18
  Table 7.12 Fuel Level Sensor......................... page 18
8.0 Alarms, Warnings & Shutdowns..................... page 18
9.0 Hour Meter......................................................... page 18
10.0 Be142; settings for Pump Set.................... page 19
11.0 Engine Running detect............................... page 19
12.0 Calibration and Memory Clear.................. page 19
13.0 Troubleshooting guide............................... page 20
14.0 General Specifications............................... page 23
15.0 Software Upgrades & Revisions................ page 23
16.0 Application Notes........................................ page 24
17.0 Interfacing with remote Autostart............ page 25
18.0 Typical application wiring....................... page 26
19.0 Wiring recommendations.............................. page 27
20.0 Dimensions & Miscellaneous...................... page 27
21.0 Connections description.............................. page 28
Section 1.0 Introduction

The Be142 integrates a 3-Phase Automatic Mains Failure controller and a Generating Set controller. The Be142 provides visual indication by means of LEDs and Displays for Engine & Electrical parameters, Alarms and Status of the contactors. It features 7 modes of operation and provides a RS485 (MODBUS-RTU) interface for remote control & monitoring. Figure 1 presents the panel layout. Be242 is cost effective controller without RS485.

Section 2.0: Selection of the Mode of operation

When you apply the DC supply, the display indicates for a second, the version of the software (example 1.0.01) and the date of production (example 22.12, that means week 22 of year 2012). The modes of operation are selected by pushbuttons and indicated by means of green LEDs (indicators) as shown below:

![Operating Modes Pushbuttons](image)

Note: default programming for input #36 is 'normally closed'. To inhibit the alarm [Er.08] you are required to connect terminal #36 to ground (Emergency input).

Every time the power supply is switched on, if the BE142 was in TEST or AUTO prior to power down, the Be142 returns to the "AUTO" mode. In the other cases, the Be142 will enter the OFF mode. The following table indicates the modes of operation.
2.1 OFF mode

Push the button [OFF] to enter the OFF mode. The OFF mode clears the fault alarms and allows you to read or program parameters (section 6.0). The Display and LEDs are turned off and a dot on the display will blink slowly. Push one of the pushbuttons on the front panel to energise the display.

2.2 MANUAL mode

Note: default programming for input #36 is ‘normally closed’. To inhibit the alarm [Er.08] you are required to connect terminal #36 to ground (Emergency input).

The MANUAL mode allows manual control of the Engine and Contactors.

2.21 Contactors: Manual control

To control the contactors follow the instructions:

NOTE: for heavy applications, you can connect external pushbuttons for Start & Stop (see Input options [27]-[28] in table 7.07)
2.3 AUTO mode

Note: default programming for input #36 is ‘normally closed’. To inhibit the alarm [Er.08] you are required to connect terminal #36 to ground (Emergency input).

Push the [AUTO] pushbutton until the green LED illuminates. The engine starts when the Be142 detects a Mains failure (see table 7.01A). The Contactor of the MAINS (KM) opens after the BREAKER timing. After the warm-up time, if the Voltage and Frequency are within the settings, the contactor of the Generator (KG) will close. If the Mains restores, the KG will open. The KM will close following a programmed changeover timing. The Engine will stop after a cooling down time (see tables 7.02 and 7.03). If the engine shuts down, the KM closes independently of the Mains status if the [P.48] is [ON] (NFPA-110 mode), otherwise the KM will close only if the Mains is within programmed settings. In AUTO mode, the Be142 will periodically test the engine if the parameters [P.41] and [P.42] have been programmed. During this test, the green LED of the AUTO mode will continue to blink. In AUTO mode, the Be142 can start and stop the engine according to programmed inputs (see Tables 7.06 and 7.07 options [10] & [11] for example).

2.4 TEST mode

Push the [TEST] pushbutton until the green LED illuminates. The Be142 starts the engine and transfers the load to the Generator if [P.17] is [on]. To stop the engine, select the AUTO mode (if Mains is present) or select the OFF mode. If you push the [STOP] pushbutton when the Be142 is in AUTO or TEST, the [Er.09] will energise. To clear the alarm, select the OFF mode (section 8.0).

2.5 PROGRAM mode

The PROGRAM mode allows parameter programming and modifications of settings. A password can be set to protect the panel from unauthorised access (see 6.0).

2.6 CALIBRATION mode

The CALIBRATION mode allows calibration of all analogue measurements (see 12.0).

2.7 TROUBLESHOOTING mode

The TROUBLESHOOTING mode is used to diagnose system faults (see 13.0).

Section 3.0 Display measurements

The Be142 features a 4 Digit display, two pushbuttons and 5 yellow LEDs as indicated below.

Use [←F8] and [F9→] to select a menu. Use [ACK-F10] (see the layout in section 1.0) to display the name of the parameter. The OFF mode shuts down the display and turns on the dot on the right side of it. Push a button to turn on the panel. The following table lists the functions of the display.
<table>
<thead>
<tr>
<th>Display Function</th>
<th>Display indications (*)</th>
<th>Pushbutton(s)</th>
<th>Menu &amp; Led indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage of the Mains (60 V up to 998 V). If the Mains is simulated, see option [15] in table 7.07, the display will show the message [n-on]</td>
<td>[nXXX] (V R-S) [-XXX] (V S-T) [___XX] (L R-T)</td>
<td>[←F8] or [F9→]</td>
<td>Hz/RPM menu Yellow</td>
</tr>
<tr>
<td>Generator Frequency (20Hz up to 70Hz)</td>
<td>[GXXX] Hz</td>
<td>[←F8] or [F9→]</td>
<td>Hz/RPM menu Yellow</td>
</tr>
<tr>
<td>Mains Frequency (20Hz up to 70Hz)</td>
<td>[nXXX] Hz</td>
<td>[←F8] or [F9→]</td>
<td>Hz/RPM menu Yellow</td>
</tr>
<tr>
<td>Speed (600RPM up to 4000RPM)</td>
<td>[XXX] RPM</td>
<td>[←F8] or [F9→]</td>
<td>Hz/RPM menu Yellow (blinks)</td>
</tr>
<tr>
<td>Battery Voltage (5.5 Vdc up to 36 Vdc)</td>
<td>[bXX.X] Vdc</td>
<td>[←F8] or [F9→]</td>
<td>Engine Yellow</td>
</tr>
<tr>
<td>Charger Voltage (3.0 Vdc up to 36 Vdc)</td>
<td>[cXX.X] Vdc</td>
<td>[←F8] or [F9→]</td>
<td>Engine Yellow</td>
</tr>
<tr>
<td>Oil Pressure 0.0 - 20.0 Bar</td>
<td>[PXX.X] Bar</td>
<td>[←F8] or [F9→]</td>
<td>Engine Yellow</td>
</tr>
<tr>
<td>Temperature 0° - 250 °C</td>
<td>[XXX °] °C</td>
<td>[←F8] or [F9→]</td>
<td>Engine Yellow</td>
</tr>
<tr>
<td>Fuel Level % 0% - 99%</td>
<td>[F XX] %</td>
<td>[←F8] or [F9→]</td>
<td>Engine Yellow</td>
</tr>
<tr>
<td>Hours-count :0 up to 50,000 h. Over 9999 a dot on the right will appear indicating X10.</td>
<td>[XXXX] h</td>
<td>[←F8] or [F9→]</td>
<td>Yellow h/Prog menu</td>
</tr>
</tbody>
</table>

(*)NOTE: X indicates a numerical digit, if the measurement is out of range, the display will indicate [- - - -]
Section 4.0 Display messages and LOG Events

The Be142 shows alarms (table 4.10) and messages (table 4.20). The presence of alarms is indicated by the blinking message [ ALAr.]. Push the [→F9] pushbuttons to display the alarms one by one. Push the [←F8] pushbutton to display additional information (section 8.0).

Table 4.10: Alarm messages

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Description of the Alarm</th>
<th>Display Message</th>
<th>Description of the Alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Er.01]</td>
<td>Over Frequency Shutdown (see [P.12])</td>
<td>[Er. 14]</td>
<td>Low Oil Pressure Shutdown (Pressure switch connected to input #35)</td>
</tr>
<tr>
<td>[Er.02]</td>
<td>Engine Belt Break Shutdown (see [P.26])</td>
<td>[Er. 15]</td>
<td>Temperature Switch Shutdown (Temperature switch connected to Input #34)</td>
</tr>
<tr>
<td>[Er.03]</td>
<td>Remote LOCK Shutdown (see 7.07 option [13])</td>
<td>[Hi-C]</td>
<td>Over Current Shutdown or Warning (see [P.13])</td>
</tr>
<tr>
<td>[Er.04]</td>
<td>Alternator Failure Shutdown</td>
<td>[Hi-U]</td>
<td>Over Voltage Shutdown (see [P.10])</td>
</tr>
<tr>
<td>[Er.05]</td>
<td>Overload Warning (see 7.07 option [20])</td>
<td>[Lo-U]</td>
<td>Under Voltage Shutdown (see [P.09])</td>
</tr>
<tr>
<td>[Er.06]</td>
<td>Under Frequency Shutdown (see [P.11])</td>
<td>[InP.1]</td>
<td>Input 1 Shutdown / Warning (see 7.07)</td>
</tr>
<tr>
<td>[Er.07]</td>
<td>Fail To STOP Shutdown (see parameter P.34, section 7, table 7.04)</td>
<td>[InP.2]</td>
<td>Input 2 Shutdown / Warning (see 7.07)</td>
</tr>
<tr>
<td>[Er.08]</td>
<td>Emergency Shutdown (see parameter P.35, section 7, table 7.04)</td>
<td>[InP.3]</td>
<td>Input 3 Shutdown / Warning (see 7.07)</td>
</tr>
<tr>
<td>[Er.09]</td>
<td>Emergency Shutdown triggered by Front Panel (Stop or [0] pushbutton)</td>
<td>[InP.4]</td>
<td>Input 4 Shutdown / Warning (see 7.07)</td>
</tr>
<tr>
<td>[Er.10]</td>
<td>Maintenance SERVICE warning (see parameters P44,P45 and P46)</td>
<td>[-oIL]</td>
<td>Oil pressure warning or sensor failure. Push [←F8] to display the value (see P29).</td>
</tr>
<tr>
<td>[Er.11]</td>
<td>Fail To START Shutdown</td>
<td>[-°C]</td>
<td>Water temperature warning or sensor failure. Push [←F8] to display the value (see P30).</td>
</tr>
<tr>
<td>[Er.12]</td>
<td>Low Fuel Shutdown (If Low Fuel input, terminal #33, is activated for longer than the P.36 time. See Table 7.04A)</td>
<td>[Fuel]</td>
<td>Fuel level warning (High or Low) or sensor failure. Push [←F8] to display the value.</td>
</tr>
</tbody>
</table>

| [rEST]          | The Be142 is counting the rest time between the starting attempts | [ProG]         | The Be142 is in program mode |
| [n-on]          | MAINS simulated by an input programmed with option [15] (see table 7.07). | [-CAL]         | The Be142 is in calibration mode |
| [ · · · ]        | The Be142 is performing the pre-glow (P22) | [. . .]         | The Be142 is cranking the engine |
| [StoP]          | The Be142 is stopping the engine (P25) | [TEst]         | The Be142 is in Test mode |
| [U-uP]          | Warm up time of the engine before closing the contactor of the generator (P23). | [- - - -]       | Measurement out of range or disabled |
| [dEL]           | Delay time before cranking (P.19,table 7.03A) | [Cool]         | The engine is running off load for cooling. |
4.30 LOG EVENTS

To have access to the LOG events follow the instructions:

- Push the [OFF] button.
- Push and hold the [STOP] button until the message [Hist.] appears on display (approx. 10 seconds).
- Release the [STOP] button.
- Using [←F8] and [F9→] you can browse the events E01 up to E100.
- Push the [STOP] button to display the code of the EVENT (see table 4.10). The message [----] indicates ‘No Event’ in the memory.
- To quit the LOG EVENTS push the [OFF] button.

Note: to cancel the LOG EVENTS push [←F8] and [F9→] simultaneously until the display blinks (approx. 10 seconds).

Section 5.0 LED indicators

5.1 Lamp and Display Testing

To test the LEDs and DISPLAY push the [OFF] pushbutton; the display turns off (OFF mode). Push and hold the [←F8] and [F9→] pushbuttons simultaneously. The LEDs and DISPLAYs remain energised as long as the pushbuttons are pressed and held together.

Section 6.0 Programming and Reading Parameters

We recommend that you use the BE142 - SCADA software for programming. You can also program the controller by using the pushbuttons on the front fascia. The 4-digits display indicates the code of a parameter and its setting. Section 7.0 lists all parameters. To enter the Programming Mode, use the following instructions. To use a password see sections 6.40, 6.50 and 6.60. Monitoring via TCP-IP is also allowed.

6.10 Enter the Programming Mode

1) - Provide a voltage from a battery supply of over 11.5 V. Push the [OFF-F7] pushbutton to enter the OFF mode; the LEDs and display turn OFF (the dot on the right side of the display will start to blink)

2) - Push and hold the [F9→] and [ACK-F10] pushbuttons simultaneously for about 5 seconds, until the yellow Led [h/Prog.] starts to blink. When the display indicates [ProG], release the buttons.

3) - If the Be142 is password protected (*), the messages [PASS] and [42.42] will appear in sequence; you are required to follow the instructions of Table 6.11. If the Be142 is not password protected, the programmable parameter [P.0] will be displayed and the Be142 is ready for programming (section 6.12, step 2).

(*) Note: the password consists of 2 groups of digits ranging from 0 to 99. Example: [12.34]; 12 is the 2-digit code on the left, and 34 is the 2-digit code on the right.

TABLE 6.11: Enter the PASSWORD

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Push [TEST] or [AUTO] in order to choose the proper code (between 00 and 99, except 42).</td>
</tr>
<tr>
<td>2)</td>
<td>Push [F9→] to select the 2 digits on the right side.</td>
</tr>
<tr>
<td>3)</td>
<td>Push [TEST] or [AUTO] in order to choose the proper code (between 00 and 99, except 42).</td>
</tr>
<tr>
<td>4)</td>
<td>Push [ACK-F10] to confirm the password; if the password is ok, the Be142 will indicate [P.0] and the unit is ready for programming. If the password is wrong, the display will indicate [4242] and you are required to insert the correct password.</td>
</tr>
</tbody>
</table>

If you lose the password, the unit must be returned for service.
6.12 Programming

1) - Enter the Programming mode (see section 6.10).
2) - Press the [←F8] or [F9→] pushbutton to select a parameter (see the list in section 7.0).
3) - To adjust the parameter, press [START-F1] and [TEST ↑] (or [AUTO ↓]) simultaneously.
   (example: [P.10] = [500]; the Overvoltage limit is set to 500 Volt. If you want to set 450, push and hold [START-F1] and [AUTO ↓] until the display indicates 450)
4) - To adjust additional features of the same parameter, press [STOP-F2] and [TEST ↑] (or [AUTO ↓]) simultaneously (example: [P.10] [10'']; the timing delay of Overvoltage is set to 10 seconds)
5) - Press the [←F8] or [F9→] pushbutton to select another parameter.
6) - Follow the instructions of section 6.13 or 6.14 according to your needs.

6.13 Saving

Press and hold the [ACK-F10] and [F9→] pushbuttons simultaneously until the [SaVE] message appears (approximately 5 seconds); the Be142 saves the settings and will enter the OFF mode. You can select the mode of operation as indicated in section 2.0.

Note: If the memory fails, the message [FAIL] will appear. Try again to save or remove the power supply. If the message persists, the Be142 is damaged and should be returned to Bernini Design for repair.

6.14 Exit without Saving

Press the [OFF] pushbutton to enter the OFF mode without saving the parameters. You can select a mode of operation as indicated in section 2.0.

6.20 Re-programming Default settings

The parameters of the Be142 are programmed in factory with default settings (section 7.0). To restore them, enter the Programming Mode (section 6.10). When the message [P.0] appears, follow the instructions:

1) - Press and hold the [←F8] and [F9→] pushbuttons simultaneously until the display blinks twice. Select option 2A or 2B according to your needs.

2A) - Press the [OFF] pushbutton to exit the procedure without saving the parameters.

2B) - Press and hold the [ACK-F10] and [F9→] pushbuttons simultaneously until the [SAVE] message appears (approximately 5 seconds); the Be142 saves the settings and the display will indicate [P0]. Push the [OFF] pushbutton in order to enter the OFF mode.

6.30 Reading the parameters

To read the parameter settings, follow the instructions:

1) - Press the [OFF] pushbutton until the LEDs and display turn off (OFF mode of operation).
2) - Push the [←F8] or [F9→] pushbutton to select a parameter (section 7.0).
3) - Push [START-F1] to display the setting of the parameter (example: [P.10] > [450]; the Overvoltage limit is set to 450 Volt).
4) - Push [STOP-F2] to display the setting of the sub-parameter (example: [P.10] > [2'']. The timing delay of Overvoltage is set to 2 seconds).
5) - Push the [←F8] or [F9→] pushbutton to select another parameter.

NOTE: if the pushbuttons remain inoperative for more than 5 minutes, the Be142 enters the OFF mode.
### 6.40 Activating the password

1) - Enter the programming mode as indicated in section 6.10.
2) - When the display shows [P.0], push the [ACK-F10] pushbutton for about 10 seconds until the display shows [PPPP]. When the display will indicate [4242], release the button. The two digits on the right will blink.
3) - Push [TEST] or [AUTO] in order to choose a code.
4) - Push [←F8] to select the 2 digits on the left side. Repeat step 3) in order to choose a code.
5) - Press the [OFF] pushbutton if you want to exit the procedure without activating the password.
6) - Press and hold the [ACK-F10] and [F9→] pushbuttons simultaneously until the [SAVE] message appears; the Be142 saves the password and remains in PROGRAM mode. To exit, push the OFF pushbutton. You can change the password at anytime as indicated in section 6.50.

### 6.50 Changing the password

1) - Enter the programming as indicated in section 6.10 and table 6.11. When the display indicates the parameter [P.0], push and hold the [ACK-F10] pushbutton for about 10 seconds until the messages [PP.PP] and [4242] appear. The two digits on the right side of the display will blink.
2) - Push [TEST] or [AUTO] in order to choose a code.
3) - Push [←F8] to select the 2 digits on the left side. Repeat step 3) in order to choose a code.
4) - Press the [OFF] pushbutton if you want to exit the procedure without activating the password.
5) - Press and hold the [ACK-F10] and [F9→] pushbuttons simultaneously until the [SAVE] message appears (approximately 5 seconds); the Be142 saves the password and remains in PROGRAM mode. To exit, push the OFF pushbutton.

### 6.60 Removing the password

1) - Enter the programming mode as indicated in section 6.10 part 3 (you are required to use the old password).
2) - When the display indicates the parameter [P.0], push and hold the [ACK-F10] pushbutton, for about 10 seconds until the display indicates in sequence [PPPP] and [4242]. The two digits on the right side will start to blink. The code [4242] disables the use of the password. Follow step 3 of 4 according to your needs.
3) - Press the [OFF] pushbutton if you no longer want to remove the password (exits the procedure).
4) - Press and hold the [ACK-F10] and [F9→] pushbuttons simultaneously until the [SAVE] message appears (approximately 5 seconds); the Be142 saves the code [4242] that disables the password. The Be142 remains in PROGRAM mode. To exit, push the OFF pushbutton.

### Section 7.0 Programmable Parameters

The programmable parameters are divided into classes as indicated below.

- 7.01 - A, B - Mains Failure Control
- 7.02 - A, B - Generator Parameters
- 7.03 - A, B - Engine Parameters
- 7.04 - Alarms Options
- 7.05 - Miscellaneous
- 7.06 - Programmable Inputs
- 7.07 - Input Options List
- 7.08 - Programmable Outputs
- 7.09 - Output Options table
- 7.10 - Oil Pressure Sensor
- 7.11 - Temperature Sensor
- 7.12 - Fuel level Sensor
Table 7.01A - Mains Failure Control

<table>
<thead>
<tr>
<th>Parameter Code &amp; Description</th>
<th>Default</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.0 Mains Contactor control (KM).</td>
<td>[ 5’]</td>
<td>0</td>
<td>59 mins</td>
</tr>
<tr>
<td>P.1 Mains Failure time.</td>
<td>[ 5’]</td>
<td>0</td>
<td>23 h</td>
</tr>
<tr>
<td>P.2 Mains Restore time. The Be142 transfers the Load to the Mains once the MAINS is stable for at least [P.2] (seconds, minutes or hours). During [P.2], the engine will continue to run ON-LOAD. After [P.2], the [P.24] timer will take place to run the engine OFF-LOAD (the contactor of the generator will open).</td>
<td>[ 5’]</td>
<td>0</td>
<td>23 h</td>
</tr>
</tbody>
</table>

Table 7.01B - Mains Failure Control

<table>
<thead>
<tr>
<th>Parameter Code &amp; Description</th>
<th>Default</th>
<th>Min</th>
<th>Max</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.3 Contactors changeover. This timing introduces a delay between the switching of the contactors.</td>
<td>[ 2’]</td>
<td>0.1secs</td>
<td>15.0secs</td>
<td>-</td>
</tr>
<tr>
<td>P.4 Under voltage limit. If the Phase-to-Phase voltage falls under this limit, the [P.0] timer will energise.</td>
<td>[320]</td>
<td>60V</td>
<td>998V</td>
<td>[oFF]</td>
</tr>
<tr>
<td>P.5 Over voltage limit. If the Phase-to-Phase voltage rises above the limit, the [P.0] timer will energise.</td>
<td>[500]</td>
<td>60V</td>
<td>998V</td>
<td>[oFF]</td>
</tr>
<tr>
<td>P.6 Under Hz limit. If the Phase-to-Phase frequency falls under the limit, the [P.0] timer will energise.</td>
<td>[47.0]</td>
<td>20.0Hz</td>
<td>70.0Hz</td>
<td>[oFF]</td>
</tr>
<tr>
<td>P.7 Over Hz limit. If the Phase-to-Phase frequency rises above the limit, the [P.0] timer will energise.</td>
<td>[53.0]</td>
<td>20.0Hz</td>
<td>70.0Hz</td>
<td>[oFF]</td>
</tr>
<tr>
<td>P.8 Phase Selection. It allows 3-Phase or Single Phase control The following options are available:</td>
<td>[0]</td>
<td>0</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>[0] 3 Phase V Mains &amp; 3 Phase V/C Generator (*)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[1] 3 Phase V Mains &amp; 1 Phase V/C Generator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[2] 1 Phase V Mains &amp; 3 Phase V/C Generator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[3] 1 Phase V Mains &amp; 1 Phase V/C Generator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(*) V/C means Voltages and Currents
Table 7.02A - GENERATOR PARAMETERS  
Note: [ xx " ] = seconds, [ xx ' ] = minutes, [ oFF ] = disabled

<table>
<thead>
<tr>
<th>Parameter Code &amp; Description</th>
<th>Mode (°)</th>
<th>Default</th>
<th>Min</th>
<th>Max</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.9 Under voltage (AUTO &amp; TEST mode)</td>
<td>1</td>
<td>[320]</td>
<td>60 V</td>
<td>998 V</td>
<td>[oFF]</td>
</tr>
<tr>
<td>Under voltage delay</td>
<td></td>
<td>[ 6&quot; ]</td>
<td>1 sec</td>
<td>15 secs</td>
<td></td>
</tr>
<tr>
<td>P.10 Over voltage</td>
<td>2</td>
<td>[500]</td>
<td>60 V</td>
<td>998 V</td>
<td>[oFF]</td>
</tr>
<tr>
<td>Over voltage delay</td>
<td></td>
<td>[ 2&quot; ]</td>
<td>1 sec</td>
<td>15 secs</td>
<td></td>
</tr>
<tr>
<td>P.11 Under Hz (AUTO &amp; TEST mode)</td>
<td>1</td>
<td>[47.0]</td>
<td>20 Hz</td>
<td>70 Hz</td>
<td>[oFF]</td>
</tr>
<tr>
<td>Under Hz delay</td>
<td></td>
<td>[ 6&quot; ]</td>
<td>1 sec</td>
<td>15 secs</td>
<td></td>
</tr>
<tr>
<td>P.12 Over Hz</td>
<td>2</td>
<td>[53.0]</td>
<td>20 Hz</td>
<td>70 Hz</td>
<td>[oFF]</td>
</tr>
<tr>
<td>Over Hz delay</td>
<td></td>
<td>[ 1&quot; ]</td>
<td>1 sec</td>
<td>15 secs</td>
<td></td>
</tr>
<tr>
<td>P.13 (*) Current limit Warning</td>
<td>3</td>
<td>[oFF]</td>
<td>10 A</td>
<td>999 A</td>
<td>[oFF]</td>
</tr>
<tr>
<td>Current delay Warning</td>
<td></td>
<td>[ 1&quot; ]</td>
<td>1 sec</td>
<td>15 mins</td>
<td></td>
</tr>
<tr>
<td>P.14 (*) Over current shut down</td>
<td>1</td>
<td>[oFF]</td>
<td>10 A</td>
<td>999 A</td>
<td>[oFF]</td>
</tr>
<tr>
<td>Over current shut down delay</td>
<td></td>
<td>[ 1&quot; ]</td>
<td>1 sec</td>
<td>15 mins</td>
<td></td>
</tr>
</tbody>
</table>

(°) Mode1: The engine shuts down after a cooling down time ([P.24]). (°) Mode2: The engine shuts down without a cooling down time.
(°) Mode3: The Be142 provides a warning if the parameters rise above the setting for the specified timing.
(*) The setting is allowed in step of 5 Amps by using the pushbutton on Be142 or in step of 1Amp by using programming by Computer.

Table 7.02B - GENERATOR PARAMETERS  
Note: [ oFF ] = disabled, [ on ] = enabled

<table>
<thead>
<tr>
<th>Parameter Code &amp; Description</th>
<th>Default</th>
<th>Min</th>
<th>Max</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.15 Alternator failure options. The alarm [E04] energises if the voltage (or the frequency) is lower than the setting of P.9 (or P11) for more than 150 seconds.</td>
<td>[oFF]</td>
<td>-</td>
<td>-</td>
<td>[on] [oFF]</td>
</tr>
<tr>
<td>P.16 Alternator number of Poles. Options [2] or [4] allow you to display the engine speed.</td>
<td>[ 4 ]</td>
<td>2</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>P.17 Generator Contactor Control. The option [off] inhibits Load transfer to the generator in TEST mode (or remote TEST) when MAINS is present.</td>
<td>[off]</td>
<td>-</td>
<td>-</td>
<td>[on] [off]</td>
</tr>
<tr>
<td>P.18 CT size (/5Aac).</td>
<td>[500]</td>
<td>50 A</td>
<td>1000 A</td>
<td>-</td>
</tr>
</tbody>
</table>
### Table 7.03A - ENGINE PARAMETERS

Note: [ xx " ] = seconds, [ xx ' ] = minutes, [ oFF ] = disabled

<table>
<thead>
<tr>
<th>Parameter Code &amp; Description</th>
<th>Default</th>
<th>Min</th>
<th>Max</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.19 Crank delay (it delays the cranking)</td>
<td>[ 2&quot; ]</td>
<td>0</td>
<td>15 secs</td>
<td>-</td>
</tr>
<tr>
<td>P.20 Crank time (maximum cranking time if the engine fails to start during the attempt)</td>
<td>[ 5&quot; ]</td>
<td>1 sec</td>
<td>15 secs</td>
<td>-</td>
</tr>
<tr>
<td>P.21 Rest time (pause of time between starting attempts)</td>
<td>[ 5&quot; ]</td>
<td>3 secs</td>
<td>15 secs</td>
<td>-</td>
</tr>
<tr>
<td>P.22 Pre-glow time (see ‘Modes’ for the mode of operation)</td>
<td>[ oFF ]</td>
<td>1 sec</td>
<td>59 mins</td>
<td>[ oFF ]</td>
</tr>
</tbody>
</table>

Modes (see the figure below)

Starting Motor  | Total rest timing
Pre-glow mode 1 | P.20
Pre-glow mode 2
Pre-glow mode 3
Pre-glow mode 4 (Choke) | P.22
Crank termination (engine running detect) | P.26..27..28

<table>
<thead>
<tr>
<th>Parameter Code &amp; Description</th>
<th>Default</th>
<th>Min</th>
<th>Max</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.23 Engine Warm up time</td>
<td>[ 15&quot; ]</td>
<td>0</td>
<td>59 mins</td>
<td>-</td>
</tr>
<tr>
<td>P.24 Engine Cooling time</td>
<td>[ 15&quot; ]</td>
<td>0</td>
<td>59 mins</td>
<td>-</td>
</tr>
<tr>
<td>P.25 Stop Solenoid timing (Energized to stop)</td>
<td>[ 15&quot; ]</td>
<td>1 sec</td>
<td>59 mins</td>
<td>-</td>
</tr>
<tr>
<td>P.26 Crank termination setting (Charger Alternator)</td>
<td>[ 8.0 ]</td>
<td>3.0 V</td>
<td>30.0 V</td>
<td>[oFF]</td>
</tr>
<tr>
<td>Belt break setting (Charger Alternator)</td>
<td>[ 8.0 ]</td>
<td>3.0 V</td>
<td>30.0 V</td>
<td>[oFF]</td>
</tr>
<tr>
<td>P.27 Crank termination setting (Generator Voltage)</td>
<td>[ 70 ]</td>
<td>60 V</td>
<td>998 V</td>
<td>[oFF]</td>
</tr>
<tr>
<td>P.28 Crank termination (Generator Frequency)</td>
<td>[25.0]</td>
<td>20.0 Hz</td>
<td>70.0 Hz</td>
<td>[oFF]</td>
</tr>
</tbody>
</table>

### Table 7.03B - ENGINE PARAMETERS

Note: [ xx " ] = seconds, [ xx ' ] = minutes, [ oFF ] = disabled

<table>
<thead>
<tr>
<th>Parameter Code &amp; Description</th>
<th>Default</th>
<th>Min</th>
<th>Max</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.29 Low Oil pressure warning</td>
<td>[oFF]</td>
<td>0.1 Bar</td>
<td>20.0 Bar</td>
<td>[oFF]</td>
</tr>
<tr>
<td>P.30 High engine temperature warning</td>
<td>[oFF]</td>
<td>40° C</td>
<td>250° C</td>
<td>[oFF]</td>
</tr>
<tr>
<td>P.31 Crank attempts (numbers)</td>
<td>[ 3 ]</td>
<td>3</td>
<td>15</td>
<td>-</td>
</tr>
<tr>
<td>P.32 Purge timing (for Gas fuelled engine)</td>
<td>[ 1&quot; ]</td>
<td>1 sec</td>
<td>15 secs</td>
<td>-</td>
</tr>
</tbody>
</table>
### Table 7.04 - ALARM OPTIONS

<table>
<thead>
<tr>
<th>Parameter Code &amp; Description</th>
<th>Default</th>
<th>Min</th>
<th>Max</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.33 Alarm bypass (for Oil, Temperature, Auxiliary1-2-3-4 alarms)</td>
<td>[5'']</td>
<td>2 secs</td>
<td>90 secs</td>
<td>-</td>
</tr>
<tr>
<td>P.34 Fail to stop alarm control (off = inhibited, on = enabled)</td>
<td>[off]</td>
<td>-</td>
<td>-</td>
<td>[off]/[on]</td>
</tr>
<tr>
<td>P.35 Emergency contact type (Input #36). It generates the alarm [Er.08].</td>
<td>[n.c.]</td>
<td>-</td>
<td>-</td>
<td>[n.o./n.c.]</td>
</tr>
<tr>
<td>P.36 No fuel bypass timeout (it starts to count when you activate the Low Fuel Input, terminal #33)</td>
<td>[5']</td>
<td>15 secs</td>
<td>99 mins</td>
<td>[off]</td>
</tr>
<tr>
<td>P.37 Low fuel % limit</td>
<td>[off]</td>
<td>1%</td>
<td>99%</td>
<td>[off]</td>
</tr>
<tr>
<td>P.38 High fuel % limit</td>
<td>[off]</td>
<td>1%</td>
<td>99%</td>
<td>[off]</td>
</tr>
<tr>
<td>P.39 Engine Temperature Switch type (input # 34)</td>
<td>[n.o.]</td>
<td>-</td>
<td>-</td>
<td>[n.o./n.c.]</td>
</tr>
</tbody>
</table>

### Table 7.05 - MISCELLANEOUS

<table>
<thead>
<tr>
<th>Parameter Code &amp; Description</th>
<th>Default</th>
<th>Min</th>
<th>Max</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.40 EJP time</td>
<td>[5'']</td>
<td>1 sec</td>
<td>99 mins</td>
<td>-</td>
</tr>
<tr>
<td>P.41 Periodic Test interval (see 16.10)</td>
<td>[off]</td>
<td>2 hours</td>
<td>9999 h</td>
<td>[off]</td>
</tr>
<tr>
<td>P.42 Periodic Test duration (see 16.10)</td>
<td>[5']</td>
<td>1 min</td>
<td>99 mins</td>
<td>-</td>
</tr>
<tr>
<td>P.43 Test timeout ([OFF] = no timeout). It limits the running time in case of TEST initiated by a MODBUS command. Idle speed control (see application note in section16.60)</td>
<td>[5']</td>
<td>1 min</td>
<td>99 mins</td>
<td>[off]</td>
</tr>
<tr>
<td>P.44 Maintenance SERVICE 1 / 2 / 3 (for the use, see section 16.40) The alarm generated by these parameters only provides a warning.</td>
<td>[off]</td>
<td>1 h</td>
<td>9999 h</td>
<td>[off]</td>
</tr>
<tr>
<td>P.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P.46</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P.47 Rental Contract Setting (see section 16.40)</td>
<td>[off]</td>
<td>1 h</td>
<td>9999 h</td>
<td>[off]</td>
</tr>
<tr>
<td>P.48 NFPA - 110 Level 1&amp;2</td>
<td>[on]</td>
<td>-</td>
<td>-</td>
<td>[on]/[off]</td>
</tr>
<tr>
<td>P.49 RS485 Node Address</td>
<td>[1]</td>
<td>1</td>
<td>127</td>
<td>-</td>
</tr>
<tr>
<td>P.50 Horn timeout (see section 8.0)</td>
<td>[5'']</td>
<td>5secs</td>
<td>15 mins</td>
<td>[off]</td>
</tr>
<tr>
<td>P.51 Hour Counter set (over 9999, a dot will appear to indicate a value multiplied by10. Example 3250. will indicate 32500 hours. In this case the resolution is 10 hours).</td>
<td>[0]</td>
<td>0 h</td>
<td>50.000</td>
<td>[off]</td>
</tr>
</tbody>
</table>
Table 7.06 - Programmable inputs (see options list in table 7.07)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Options</th>
<th>Default</th>
<th>Parameter</th>
<th>Options</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>[InP.1]</strong> (terminal 32)</td>
<td>Option available</td>
<td>[0] - - [28]</td>
<td>[2]</td>
<td><strong>[InP.3]</strong> (terminal 30)</td>
<td>Option available</td>
</tr>
<tr>
<td>Contact type</td>
<td>[n.o.][n.c.]</td>
<td></td>
<td>Contact type</td>
<td>[n.o.][n.c.]</td>
<td>[n.o.]</td>
</tr>
<tr>
<td><strong>[InP.2]</strong> (terminal 31)</td>
<td>Option available</td>
<td>[0] - - [28]</td>
<td>[13]</td>
<td><strong>[InP.4]</strong> (terminal 29)</td>
<td>Option available</td>
</tr>
<tr>
<td>Contact type</td>
<td>[n.o.][n.c.]</td>
<td>[n.o.]</td>
<td>Contact type</td>
<td>[n.o.][n.c.]</td>
<td>[n.o.]</td>
</tr>
</tbody>
</table>

Table 7.07 - Input Options List

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ 0 ]</td>
<td>Off: disables the input</td>
</tr>
<tr>
<td>[ 1 ]</td>
<td>Immediate Stop</td>
</tr>
<tr>
<td>[ 2 ]</td>
<td>Bypass and Stop</td>
</tr>
<tr>
<td>[ 3 ]</td>
<td>Cooling and Stop</td>
</tr>
<tr>
<td>[ 4 ]</td>
<td>Bypass+Cooling and Stop</td>
</tr>
<tr>
<td>[ 5 ]</td>
<td>Warning only (^)</td>
</tr>
<tr>
<td>[ 6 ]</td>
<td>Bypass and Warning</td>
</tr>
<tr>
<td>[ 8 ]</td>
<td>Remote Auto Mode (^^)</td>
</tr>
<tr>
<td>[ 9 ]</td>
<td>Remote Off Mode (^^)</td>
</tr>
<tr>
<td>[ 10 ]</td>
<td>Remote Engine Test</td>
</tr>
<tr>
<td>[ 12 ]</td>
<td>Ejp function</td>
</tr>
<tr>
<td>[ 13 ]</td>
<td>Remote LOCK</td>
</tr>
<tr>
<td>[ 14 ]</td>
<td>Generator simulation ON</td>
</tr>
<tr>
<td>[ 15 ]</td>
<td>Mains Simulated ON</td>
</tr>
<tr>
<td>[ 16 ]</td>
<td>Front panel LEDs test</td>
</tr>
<tr>
<td>[ 17 ]</td>
<td>Horn silence</td>
</tr>
<tr>
<td>[ 18 ]</td>
<td>Display Right Pushbutton</td>
</tr>
<tr>
<td>[ 19 ]</td>
<td>Display Left Pushbutton</td>
</tr>
<tr>
<td>[ 20 ]</td>
<td>Overload Input Warning</td>
</tr>
<tr>
<td>[ 21 ]</td>
<td>Overload Input Shutdown</td>
</tr>
<tr>
<td>[ 22 ]</td>
<td>KG Forced closed</td>
</tr>
<tr>
<td>[ 23 ]</td>
<td>KM Forced closed</td>
</tr>
<tr>
<td>[ 24 ]</td>
<td>KG LED Feedback</td>
</tr>
<tr>
<td>[ 25 ]</td>
<td>KM LED Feedback</td>
</tr>
<tr>
<td>[ 26 ]</td>
<td>Idle Engine</td>
</tr>
<tr>
<td>[ 27 ]</td>
<td>Manual START pushbutton</td>
</tr>
</tbody>
</table>

(^) The Be142 detects the alarm if the engine is running
(^^) We recommend the use of an AUTO-OFF-MAN switch

7.08 - Programmable Outputs

<table>
<thead>
<tr>
<th>Parameter Code &amp; description</th>
<th>Default</th>
<th>Parameter Code &amp; description</th>
<th>Default</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Out.1] Output 1 (terminal 6)</td>
<td>[39]</td>
<td>[Out.3] Output 3 (terminal 4)</td>
<td>[54]</td>
<td>see 7.09</td>
</tr>
<tr>
<td>[Out.2] Output 2 (terminal 5)</td>
<td>[28]</td>
<td>[Out.4] Output 4 (terminal 3)</td>
<td>[57]</td>
<td>see 7.09</td>
</tr>
</tbody>
</table>
### Table 7.09 - Output Options Table

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[0]</td>
<td>Output is disabled</td>
</tr>
<tr>
<td>[1]</td>
<td>Under Frequency Shutdown</td>
</tr>
<tr>
<td>[2]</td>
<td>Over Frequency Shutdown</td>
</tr>
<tr>
<td>[4]</td>
<td>Over Current Warning</td>
</tr>
<tr>
<td>[5]</td>
<td>Overload Warning or Shutdown (^^^)</td>
</tr>
<tr>
<td>[7]</td>
<td>Under Voltage Shutdown</td>
</tr>
<tr>
<td>[8]</td>
<td>Alternator Failure Shutdown</td>
</tr>
<tr>
<td>[9]</td>
<td>Low Oil Pressure Warning</td>
</tr>
<tr>
<td>[10]</td>
<td>Low Oil Pressure Shutdown</td>
</tr>
<tr>
<td>[11]</td>
<td>Oil Sender Failure Warning</td>
</tr>
<tr>
<td>[12]</td>
<td>High Temperature Warning</td>
</tr>
<tr>
<td>[13]</td>
<td>Temperature Switch Shutdown</td>
</tr>
<tr>
<td>[14]</td>
<td>Temperature Sender Failure Warning</td>
</tr>
<tr>
<td>[15]</td>
<td>Low Battery Voltage Warning</td>
</tr>
<tr>
<td>[16]</td>
<td>High Battery Voltage Warning</td>
</tr>
<tr>
<td>[17]</td>
<td>Low Fuel Shutdown (switch)</td>
</tr>
<tr>
<td>[18]</td>
<td>Fuel Low Warning (sensor)</td>
</tr>
<tr>
<td>[19]</td>
<td>Fuel Reserve Warning (switch)</td>
</tr>
<tr>
<td>[20]</td>
<td>Fuel high Warning (sensor)</td>
</tr>
<tr>
<td>[21]</td>
<td>Fuel Sender Failure Warning</td>
</tr>
<tr>
<td>[22]</td>
<td>Emergency Stop Shutdown (Er08)</td>
</tr>
<tr>
<td>[23]</td>
<td>Stop Pushbutton Used in AUTO (Er09)</td>
</tr>
<tr>
<td>[24]</td>
<td>Maintenance SERVICE 1 (Er10)</td>
</tr>
<tr>
<td>[25]</td>
<td>Maintenance SERVICE 2 (Er10)</td>
</tr>
<tr>
<td>[26]</td>
<td>Maintenance SERVICE 3 (Er10)</td>
</tr>
<tr>
<td>[27]</td>
<td>Engine Belt Break Shutdown</td>
</tr>
<tr>
<td>[28]</td>
<td>Fail To START Shutdown</td>
</tr>
<tr>
<td>[29]</td>
<td>Fail To STOP Shutdown</td>
</tr>
<tr>
<td>[30]</td>
<td>Idle Speed (see section 16.60)</td>
</tr>
<tr>
<td>[31]</td>
<td>Alarm from Input 1: Shutdown/Warning</td>
</tr>
</tbody>
</table>

(^^^) If an input is configured with option [20] or [21] (see table 7.07)

### Table 7.10 - Oil Pressure Sensor Settings

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter</th>
<th>Default</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Pr.1]</td>
<td>Pressure</td>
<td>[ 0.0]</td>
<td>0 up to 20 Bar</td>
</tr>
<tr>
<td>[-r1-]</td>
<td>Resistance</td>
<td>[ 10]</td>
<td>0 up to 2000 Ohm</td>
</tr>
<tr>
<td>[Pr.2]</td>
<td>Pressure</td>
<td>[ 2.0]</td>
<td></td>
</tr>
<tr>
<td>[-r2-]</td>
<td>Resistance</td>
<td>[ 51]</td>
<td></td>
</tr>
<tr>
<td>[Pr.3]</td>
<td>Pressure</td>
<td>[ 4.0]</td>
<td></td>
</tr>
<tr>
<td>[-r3-]</td>
<td>Resistance</td>
<td>[ 86]</td>
<td></td>
</tr>
<tr>
<td>[Pr.4]</td>
<td>Pressure</td>
<td>[ 6.0]</td>
<td></td>
</tr>
<tr>
<td>[-r4-]</td>
<td>Resistance</td>
<td>[122]</td>
<td></td>
</tr>
<tr>
<td>[Pr.5]</td>
<td>Pressure</td>
<td>[ 8.0]</td>
<td></td>
</tr>
<tr>
<td>[-r5-]</td>
<td>Resistance</td>
<td>[152]</td>
<td></td>
</tr>
<tr>
<td>[Pr.6]</td>
<td>Pressure</td>
<td>[10.0]</td>
<td></td>
</tr>
<tr>
<td>[-r6-]</td>
<td>Resistance</td>
<td>[180]</td>
<td></td>
</tr>
</tbody>
</table>
Section 8.0 - Alarms, Warnings and Shutdowns
The Be142 features Shutdowns (the engine stops) and Warnings (the engine will continue to run) and provides:

A) - a general indication of alarm presence by means of the message [ALAR.] on the display
B) - 4 configurable outputs for specific alarm indication with more than 40 options (see 7.08 and 7.09)
C) - symbols on the front panel to indicate the most important alarms
D) - display messages indicating warnings and shutdowns (see Table 4.1)
E) - a pushbutton to silence the Horn ([ACK F10])

Terminal #6 is pre-configured for HORN output (Option 39). A relay and a HORN should be externally provided. To silence the HORN, push the [ACK F10] pushbutton or wait for the [P.50] to expire (see section 7.05). If the [P.50] is set to [OFF], the only way to silence the Horn is by means of the [ACK-F10] pushbutton.

To browse the alarm memory push the [→F9] pushbutton. To display alarm details, push the [←F8] pushbutton. To clear the alarm from the panel, remove the cause of the alarm and then press the [OFF] pushbutton. Table 4.10 in the section 4.0 indicates all alarms.

Section 9.0 Hour Meter

To clear or pre-load the counter, use the following instructions:

1) - Enter the programming mode as indicated in sections 6.10 & 6.20
2) - Select the parameter [P.51] by means of the [←F8] or [F9→] pushbutton.
3) - Press the [START-F1] and [TEST ↑] to set a value. If you set [0], you will cancel the [h-counter]. If you set a value between 1 and 50000, you will pre-set the counter. Follow steps 4A) or 4B) according to your needs.
4A) - Press and hold the [ACK-F10] and [F9→] pushbuttons simultaneously until the [SaVE] message appears (for about 5 seconds); the Be142 saves the hour counter in the memory and will enter the OFF mode.
4B) - Press the [OFF] pushbutton to exit the procedure without modifying the counter.
Section 10.0 B42 for PUMP SETS

If you use the Be142 to control a PUMP SET, we recommend the use of the following settings:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Table 10.0: Recommended settings setup</th>
</tr>
</thead>
<tbody>
<tr>
<td>[P.15]</td>
<td>[oFF] (This disables the ‘alternator failure alarm’)</td>
</tr>
<tr>
<td>[Inp.4]</td>
<td>[ 15 ] (This selects the Mains Simulation input mode). Connect a switch (or level switch) to terminal #29 in order to control the set by remote</td>
</tr>
<tr>
<td>[P.41]</td>
<td>[oFF] (This disables the Periodic Test interval)</td>
</tr>
<tr>
<td>[P.0]</td>
<td>[ 0 ] (This disables the Breaker delay time)</td>
</tr>
<tr>
<td>[P.1]</td>
<td>According to your needs; the engine will start after a delay</td>
</tr>
<tr>
<td>[P.2]</td>
<td>According to your needs; the engine will stop after a delay</td>
</tr>
</tbody>
</table>

Section 11.0 Engine Running Detect (Charger Alternator)

The Be142 inhibits the starter motor when the engine starts running. When the engine is not running, voltage in terminal D+/WL of the charger alternator (input #22) is 0 V. As soon as the Be142 starts the engine, a voltage appears in the D+/WL terminal (0.8 to 2.5 V). When the engine starts running, the voltage of the D+/WL terminal increases by up to 3 V - 6 V. When the engine runs, the voltage reaches 14 V (28 V) needed to charge the battery. The safest point to disconnect the starter motor is between 6 V to 10 V. The default parameter of [P.26] is 8.0 V. This value is recommended for engines using 12 V batteries. For 24 V batteries, we recommend that you set the threshold to 16 V.

For safe calibration, be sure that the green ‘ENGINE RUNNING’ LED on the front panel is off during all of the starting attempts. The Charger Alternator voltage can be displayed in the ‘Engine menu’ as indicated in the section 3.0. For Flywheel chargers, the reading is not accurate. The [P.26] setting, in this case, expresses only a proportional factor.

The Be142 also uses the output of the Generator in order to disconnect the crank motor. Parameters [P.27] and [P.28] set the crank termination. These parameters do not affect the status of the green ‘ENGINE RUNNING’ LED. The insertion of switches or breakers in series to terminals #13 and #14 is not recommended.

**NOTE: THE ‘ENGINE RUNNING’ LED MUST BE LIT WHEN THE ENGINE RUNS. USING THE ENGINE WITHOUT THIS SIGNAL MAY BE DANGEROUS.**

Normally, using a diesel engine, we recommend enabling the BELT BREAK protection. This is accomplished by programming a voltage setting in the [P.26] sub-menu. To test the efficiency of this protection, disconnect terminal D+ from the charger alternator and connect to ground the #22 terminal. This protection is delayed by 15 seconds.

Section 12.0 - Calibration and Memory Reset

12.1 - Enter the calibration mode To enter the calibration mode follow the instructions.

1) - Make sure the Battery voltage is over 12.0 Vdc and select the MAN mode. Start the engine if you need to calibrate a parameter of the generator or,

2) - Push and hold the [F9→] and [ACK-F10] pushbuttons simultaneously, for about 5 seconds, until the yellow LED [h/Prog.] starts to blink and display indicates [-CAL]; release the buttons.

3) - If the Be142 programming is password protected, the message [42.42] will appear; follow the instructions in table 6.11. If the Be142 is not password protected, the parameter [n1.n2] will appear on the display and you can proceed as indicated in section 12.2.
12.2 - Calibrating a measurement  (Note: to exit the procedure push the [OFF] pushbutton at anytime)

1) - Press the [←F8] or [F9→] pushbutton to select a 'Parameter name' (see Table 12.2).
2) - Press the [ACK-F10] pushbutton to display the reading of the measurement (example 395 V).
3) - Press the [TEST ↑] (or [AUTO ↓]) to adjust the reading according to an external reference (example 400 V).
4) - When finished, push the [ACK-F10] again to display the 'Parameter name'. Select another 'Parameter name' to calibrate by pushing the [←F8] or [F9→] pushbutton. When finished, you have 3 options: 5A, 5B or 5C.
5 A ) - Exit the procedure without saving by pushing the [OFF] pushbutton.
5 B ) - Restore the factory default calibration: press and hold the [←F8] and [F9→] pushbuttons simultaneously until the display blinks twice. You are required to save the setting as indicated in step 5C).
5 C ) - Save the calibration: push and hold the [ACK] and [F9→] pushbuttons simultaneously until the [SAVE] message appears (approximately 5 seconds); the Be142 saves the calibrations and remains in Manual mode.

Table 12-2, List of the Measurements

<table>
<thead>
<tr>
<th>'Parameter'</th>
<th>Description</th>
<th>Unit</th>
<th>Recommended Calibration Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>[n1.n2]</td>
<td>Mains Voltage phase R-S</td>
<td>Volt</td>
<td>300 up to 400 Vac</td>
</tr>
<tr>
<td>[n2.n3]</td>
<td>Mains Voltage phase S-T</td>
<td>Volt</td>
<td></td>
</tr>
<tr>
<td>[n1.n3]</td>
<td>Mains Voltage phase T-R</td>
<td>Volt</td>
<td></td>
</tr>
<tr>
<td>[FrEq]</td>
<td>Frequency (Mains/Generator)</td>
<td>Hz.</td>
<td>45 up to 55 Hz</td>
</tr>
<tr>
<td>[L1.L2]</td>
<td>Generator Voltage L1.L2</td>
<td>Volt</td>
<td>300 up to 400 Vac</td>
</tr>
<tr>
<td>[C 1]</td>
<td>Generator Current L1</td>
<td>Amp</td>
<td>4 up to 5 Aac (C.T. output)</td>
</tr>
<tr>
<td>[C 2]</td>
<td>Generator Current L2</td>
<td>Amp</td>
<td></td>
</tr>
<tr>
<td>[C 3]</td>
<td>Generator Current L3</td>
<td>Amp</td>
<td></td>
</tr>
<tr>
<td>[bAtt]</td>
<td>Battery voltage</td>
<td>Vdc</td>
<td>Voltage of the battery</td>
</tr>
<tr>
<td>[bAr] (*)</td>
<td>Oil Pressure</td>
<td>Bar</td>
<td>2 Bar up to 4 Bar</td>
</tr>
<tr>
<td>[°C] (*)</td>
<td>Engine Temperature</td>
<td>°C</td>
<td>80 °C up to 100 °C</td>
</tr>
<tr>
<td>[FUEL] (*)</td>
<td>Fuel Level</td>
<td>%</td>
<td>80% - 90%</td>
</tr>
</tbody>
</table>

(*)Note: in order to obtain a reading on display you are required to set a value in P29, P30 and P38

12.3 - To clear the Memory

- Remove the supply. Push and hold the [I-F3] & [I-F5] pushbuttons simultaneously and apply the Vdc supply.
- As soon as the message AUTO-TEST appears, release the pushbuttons; the display will indicate [ F1].
- Push [F1] and then push, one by one, all pushbuttons indicated by the message on display.
- After pushing the last pushbutton ([AUTO]), the message [-EPP] will appear; wait a few seconds.
- The memory, now, is erased. The Be142 will use the factory-programmed parameters (defaults).
- Remove the supply and re-program the controller according to your need. We always recommend that you program a password in order to limit the access (see section 6.40).

Section 13.0 Troubleshooting Guide

The Basic Troubleshooting Guide is intended to provide you with a guide to problems that you may experience with the Be142. We recommend that you disconnect the unit from the panel and set up the troubleshooting application circuit as indicated in section 13.1. This procedure should only be carried out by qualified personnel.

To exit the Troubleshooting, remove the Vdc supply at anytime
**WARNING!** High voltage is present inside this instrument. To avoid electric-shock hazard, operating personnel must not remove the protective cover. Do not disconnect the Earth connection. Any interruption of the grounding connection can create an electric shock hazard. Before making external connections, always ground the B42 first by connecting the control panel to ground.

Section 13.1 - Be142 Troubleshooting circuit

Follow the instructions:

A) - Remove the battery power supply; disconnect all connectors
B) - Push and hold the [ACK-F10] pushbutton, apply the Vdc power supply; all LEDs and Display turn on.
C) - Release the button when you have verified all indicators; the LEDs will turn off and the message [- - - -] will be displayed.

**NOTE** - At this stage of the TEST, if the display indicates one of the codes contained in Table 13.1 or 13.2, the Be142 is damaged and should be returned to Bernini Design.

To exit the Troubleshooting, remove the Vdc supply at anytime

**13.1 Testing the Pushbuttons**

A) - Push the pushbuttons on the front panel one by one. The display will show a message according to Table 13.1. As soon as you release all buttons, the message [- - - -] will be displayed.
Table 13.1: Pushbuttons true table

<table>
<thead>
<tr>
<th>Pushbutton</th>
<th>Display Code</th>
<th>Pushbutton</th>
<th>Display Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>[START-F1]</td>
<td>[ F1 ]</td>
<td>[OFF-F7]</td>
<td>[ F7 ]</td>
</tr>
<tr>
<td>[STOP-F2]</td>
<td>[ F2 ]</td>
<td>[AUTO]</td>
<td>[ auto ]</td>
</tr>
<tr>
<td>[ I-F3 ]</td>
<td>[ F3 ]</td>
<td>[TEST]</td>
<td>[ tEST ]</td>
</tr>
<tr>
<td>[ O-F4 ]</td>
<td>[ F4 ]</td>
<td>[←F8]</td>
<td>[ F8 ]</td>
</tr>
<tr>
<td>[ I-F5 ]</td>
<td>[ F5 ]</td>
<td>[F9→]</td>
<td>[ F9 ]</td>
</tr>
<tr>
<td>[ MAN-F6 ]</td>
<td>[ F6 ]</td>
<td>[ACK-F10]</td>
<td>[ F10 ]</td>
</tr>
</tbody>
</table>

13.2 Testing the Inputs

Push and hold the [ACK-F10] button until the message [-in-] appears. Connect, one by one, inputs #29 to #36 to the battery minus. For each input, a code will be displayed according to Table 13.2. If more than one input is connected together (or some of them in short circuit), the display indicates the messages in sequence.

Table 13.2

<table>
<thead>
<tr>
<th>Terminal number (function)</th>
<th>Display Code</th>
<th>Terminal number (function)</th>
<th>Display Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>#29 (Input 4)</td>
<td>[ inP 4 ]</td>
<td>#33 (Low fuel)</td>
<td>[ FUEL ]</td>
</tr>
<tr>
<td>#30 (Input 3)</td>
<td>[ inP 3 ]</td>
<td>#34 (Temperature)</td>
<td>[ tEMP ]</td>
</tr>
<tr>
<td>#31 (Input 2)</td>
<td>[ inP 2 ]</td>
<td>#35 (Oil pressure)</td>
<td>[ oil ]</td>
</tr>
<tr>
<td>#32 (Input 1)</td>
<td>[ inP 1 ]</td>
<td>#36 (Emergency)</td>
<td>[ EMEr ]</td>
</tr>
</tbody>
</table>

13.3 Testing the Outputs

A) - Push the [ACK-F10] pushbutton, for about 10 seconds, until the message [-out] appears.  
B) - Plug the output connector (terminal #1 - #10), as indicated in the section 13.1. At this stage, if a lamp turns on, the Be142 is damaged and should be returned for service.  
C) - Push a button on the front panel. According to Table 13.3, the display should indicate the proper message and the lamp turns on. If a lamp fails to turn on, the Be142 is damaged and should be returned for service.

Table 13.3: Outputs true table

<table>
<thead>
<tr>
<th>Pushbutton</th>
<th>Display Code</th>
<th>Terminal Output</th>
<th>Pushbutton</th>
<th>Display Code</th>
<th>Terminal Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>[START-F1]</td>
<td>[KG]</td>
<td># 1</td>
<td>[OFF-F7]</td>
<td>[FUEL]</td>
<td># 7</td>
</tr>
<tr>
<td>[STOP-F2]</td>
<td>[KM]</td>
<td># 2</td>
<td>[DISPLAY-F8]</td>
<td>[StOp]</td>
<td># 8</td>
</tr>
<tr>
<td>[ I-F3 ]</td>
<td>[ out 4 ]</td>
<td># 3</td>
<td>[DISPLAY-F9]</td>
<td>[StAr]</td>
<td># 9</td>
</tr>
<tr>
<td>[O-F4]</td>
<td>[ out 3 ]</td>
<td># 4</td>
<td>[AUTO]</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>[ I-F5 ]</td>
<td>[ out 2 ]</td>
<td># 5</td>
<td>[TEST]</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>[ MAN-F6 ]</td>
<td>[ out 1 ]</td>
<td># 6</td>
<td>[ACK-F10]</td>
<td>none</td>
<td></td>
</tr>
</tbody>
</table>

To exit the Troubleshooting, remove the Vdc supply at anytime
13.4 Testing the senders and analog inputs

A) - Push the [ACK-F10] pushbutton, for about 10 seconds, until the message [SEnS] appears. If the display indicates the message [Gnd] you are requested to connect the ground compensation input terminal #25.

B) - Apply 3 resistors of known value (+/- 1%) in a range 100 Ohm up to 1000 Ohm as indicated in section 13.1.

C) - Push the pushbuttons according to the Table 13.4. You should read the value in OHM on the display. The display indicates the reading as long as you push and hold the button. If the value indicated by the display is more than 3% (or less than 3%), the Be142 is damaged and should be returned for service.

Table 13.4: Senders and Analog inputs true table

<table>
<thead>
<tr>
<th>Pushbutton</th>
<th>Display Code (°)</th>
<th>Terminal number</th>
<th>Function</th>
<th>Recommended range</th>
</tr>
</thead>
<tbody>
<tr>
<td>[I-F5]</td>
<td>[XXXX]</td>
<td># 26</td>
<td>Fuel Level Sensor</td>
<td>100-1000 Ohm</td>
</tr>
<tr>
<td>[O-F4]</td>
<td>[XXXX]</td>
<td># 27</td>
<td>Temperature Sensor</td>
<td>100-1000 Ohm</td>
</tr>
<tr>
<td>[I-F3]</td>
<td>[XXXX]</td>
<td># 28</td>
<td>Oil Pressure Sensor</td>
<td>100-1000 Ohm</td>
</tr>
<tr>
<td>[MAN]</td>
<td>[cXX.X]</td>
<td>#21-22</td>
<td>Voltage of the charger Alternator (*)</td>
<td>10-24 VDC</td>
</tr>
<tr>
<td>[OFF]</td>
<td>[bXX.X]</td>
<td>#23-24</td>
<td>Voltage of the Battery</td>
<td>10-24 VDC</td>
</tr>
</tbody>
</table>

(*)Note. [XXXX] indicates a 4-digit number. (*) You are requested to connect terminals 21(Gnd) & 22 (Plus battery)

Section 14.0 General Specifications

Supply Voltage [**]: 4.5 Vdc to 36 Vdc. Protection: internal 300 mA thermal fuse. Supply Current: 50 mA up to 150 mA (a 2 A fast-blow fuse must be provided in series to the power supply terminal #24). Measurement Precision Vdc: 1%

Dimensions: 224 mm X 105 mm X 68 mm, Panel Cut-out: 190 mm X 93 mm, indoor operation

Operating Temperature range: -30 deg C up to +70 deg C. Humidity Range: 5% up to 95% non-condensing.

Weight: 500 gr., Vibration: 40 mm/sec


Static Output Characteristics:

Mains and Generator Voltage Inputs: Nominal Voltage: 70 Vac up to 600 Vac (permanent & continuously Ph-Ph) Over voltage: 4 KVac for one second. Measurement precision: +/- 2% [**]. Input impedance: 2 Mega Ohm

Mains and Generator Frequency Measurements: 20-99Hz, Resolution 0,1Hz, Precision/Accuracy 0,2% /0,2%.

Current Transformer Inputs (3-Phases): 10 / 5 Aac up to 1000 / 5 Aac. Maximum Over Current: 8 Aac for 30 seconds. Measurement precision: +/- 2% [**]. Internal resistance: 0.05 Ohm


Sensors (Analog Inputs): 0-2000 OHM precision +/-2%. (BAR/FUEL%TEMPERATURE reading precision 2%)

Charger Alternator Monitoring: Operating 3-36 Vdc. Vdc reading accuracy +/- 2%. Excitation Power: max 3 W

Hour Run Counter & Timers: internal Quartz Crystal oscillator 4.91Mhz. Resolution 1 second; precision 0,25%

[*] NOTE: the sum of the total output current (#1 - #10) may not exceed 2 A at 70°C

[**] NOTE: errors can be reduced by using the calibration mode (section 12.0)

[***] NOTE: operations with memory (storing parameters, hours, etc) are allowed only if the Vdc is over 11.5V.

Section 15.0 Software Upgrades & Revisions

<table>
<thead>
<tr>
<th>Firmware Versions</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0.01</td>
<td>December 2012</td>
<td>First release</td>
</tr>
</tbody>
</table>
Section 16.0 Application Notes

16.10 - Programming of the Automatic Periodic Test (example: 20 minutes every 7 days)

A) - Enter the ‘Program Mode’ and set [P.41] to [168] hours (168 hours=7days).
B) - Set [P.42] to [20'] and save the programming
C) - Select the AUTO mode
D) - Disconnect the battery and wait for the desired start time (using an external clock reference).
E) - Connect the battery and select the ‘AUTO’ mode.

The Be142 will start the engine after the programmed hours. The engine will run OFF-LOAD for 20 minutes. If the Mains fails during the automatic periodic test, the Be142 will transfer the load to the generator.

16.11 - Automatic Periodic Test Accuracy

The Be142 does not use an internal real time clock for the programmed hours ([P.41] setting, table 7.05). The user could experiment with shifting the periodic tests (about some minutes a month). To avoid error accumulation, we recommend the following procedures (D) and (E) as indicated in section 16.10.

**IMPORTANT NOTICE** If the Vdc voltage supply is removed, the Be142 loses count of the days. When the supply restores, the Be142 starts to count the A.P.T. from zero. To synchronize the periodic start follow the above instructions (D) & (E).

16.20 - Interfacing an Autostart with Be142 A.T.S Controller

To use the Be142 as an A.T.S. controller, follow the wiring diagram of the section 17.0. If the engine running output from the AUTOSTART is not available, program the [P.26] to [off]. We recommend that you program the [P.31] to [15] (number of attempts) in order to provide proper time for AUTOSTART to start the engine.

16.30 - Single Phase operation

Program the parameter [P.8] with the proper option as indicated in section 7.01B. Connect the Mains to terminals ‘R’ (Phase) and ‘S’ (Neutral). Connect the Generator to terminals ‘L1’ (Phase) and ‘L2’ (Neutral). Connect the current transformer to terminals ‘COM’ and ‘CT1’. Do not forget to set P4, P5, P9 and P10 (Over/Under Voltage settings) according to your needs.

16.40 - Maintenance & Rental Timers

Once a timer expires, the Be142 indicates the [Er.10] on display. To clear the alarm(s), enter the manual mode, push and hold the [ACK-F10] button for at least 20 seconds. You are allowed to modify the programmed Maintenance timer at anytime. Programmable timers are described in section 7, table 7.05A-B (P44, P45 and P46). To restart the Rental Timer, you are required to enter in programming and exit the programming (we recommend that you limit the access to the programming by using a password).

16.50 - Panel & Gen-set Builders Notes:

---------------------------------------------------------------------------------

16.60 – Idle Speed operation

Program an output with option [30] and program the time you need into [P.43]. The output will energize at the beginning of a start attempt. The output will remain active for all time programmed into [P43]. The output will be de-energized after timeout or in case you stop the engine. You can use the output with option [30] to energize a relay that controls the IDLE SPEED function. During the IDLE SPEED timing, the alarm ALTERNATOR FAILURE [Er.04] will be ignored. Please note that [P.43] is used also as TIMEOUT protection in case MODBUS communication fails after sending a start command (e.g. Engine Test or Genset Test). This will prevent Be142 holding engine running for long time: being MODBUS communication out of service you will not be able to stop the engine. After starting the engine by MODBUS, if communication fails, you are sure that BE142 will stop the engine.
Section 17.0 - Automatic Transfer Switch (A.T.S.) controller wiring diagram

**Be142 Rear View**

- **Digital Inputs**
  - DIGITAL INPUTS
  - SENSORS INPUTS
- **Outputs**
  - OUTPUTS
  - CURRENT INPUTS
  - START CONTROL
  - START/Pilot Control
  - START/Pilot Stop Control
  - START/Pilot Charge Control
  - START/Pilot Alarm Control
- **Generator Input**
  - GENERATOR INPUT
  - MAINS INPUT
- **Auxiliary Inputs**
  - Generator Neutral
  - Generator Phase L1
  - Generator Phase L2
  - Generator Phase L3
  - Battery Plus (6-33Vdc)
  - Battery Minus
  - Genset Alarm Output (Positive logic=Alarm)
  - Genset Remote Start Input (Negative logic=Start)
  - Engine Running Output (Positive logic=Running)
  - Generator Neutral

**Notes:**
- (*) Relays connected to the Be142 must be suppressed using flywheel diodes
- (*) Shielding required over 25 meters
- Be242 Rear View
- Power ac Terminal Block
- Genset Remote Start Input
- Engine Running Output
- Generator Neutral
- Generator Phase L1
- Generator Phase L2
- Generator Phase L3
- Battery Plus (6-33Vdc)
- Battery Minus
- Genset Alarm Output (Positive logic=Alarm)

**Suppressed using**
- (*) Shielding required over 25 meters
- (**) Relays connected to the Be142 must be suppressed using flywheel diodes
18.0 Typical application wiring

**NOTE:** a minimum of 4 KVac insulation is recommended for the relays KGC and KMC. A fuse of 2 A (fast-blow) in series with terminal #24 is recommended to protect against large spikes on power supply.

(°°) Relays connected to the Be142 must be suppressed using flywheel diodes
### Section 19.0: Wiring recommendations

**Recommended power supply wiring**

- Electric panel to Be142
- Battery charger

**Not Recommended wiring**

- Electric panel to Be142
- Battery charger

**NOTE**

The separation of the battery charger wires is a mandatory requirement in case of switching or SCR chargers.

**Sensors wiring**

- Fuel sensor
- Temperature sensor
- Ground reference
- Oil sensor

**The separation of AC and DC cables is strongly recommended.**

### Section 20: Dimensions & Miscellaneous

**Miscellaneous**

- **Shipping Dimensions:** 130x250x60mm
- **Shipping Weight:** 560Gr.
- **Connectors:** removable Plug & Socket

**Cut-out 190x93mm**

**Other dimensions:**
- 224 mm
- 204 mm
- 186 mm
- 14 mm
- 45 mm
- 91 mm
- 84 mm
- 105 mm

**Electric panel**

**Battery charger**

*(see NOTE)*

**Fuses**

**NOTE**

The separation of the battery charger wires is a mandatory requirement in case of switching or SCR chargers.

**Fuel sensor**

**Temperature sensor**

**Ground reference**

**Oil sensor**

The separation of AC and DC cables is strongly recommended.
## Section 21.0: Connections description

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
<th>Note</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Generator Contactor output</td>
<td></td>
<td>2.21</td>
</tr>
<tr>
<td>2</td>
<td>Mains Contactor output</td>
<td></td>
<td>7.09</td>
</tr>
<tr>
<td>3</td>
<td>Programmable output ‘4’</td>
<td>300 mA Active ‘Low’</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Programmable output ‘3’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Programmable output ‘2’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Programmable output ‘1’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fuel Solenoid output</td>
<td></td>
<td>18.0</td>
</tr>
<tr>
<td>8</td>
<td>Stop Solenoid output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Crank Pilot output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Alternator Excitation output</td>
<td>Positive Output 3 W</td>
<td>11.0</td>
</tr>
<tr>
<td>CT3</td>
<td>Current Transformer ‘L3’ S1 input</td>
<td>5 Aac nominal; Max 8 Aac</td>
<td>7.02B</td>
</tr>
<tr>
<td>CT2</td>
<td>Current Transformer ‘L2’ S1 input</td>
<td>5 Aac nominal; Max 8 Aac</td>
<td>([P.18])</td>
</tr>
<tr>
<td>CT1</td>
<td>Current Transformer ‘L1’ S1 input</td>
<td>5 Aac nominal; Max 8 Aac</td>
<td></td>
</tr>
<tr>
<td>COM</td>
<td>Current Transformer S2 input common input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L3</td>
<td>Generator Voltage ‘Phase L3’ input</td>
<td>600 Vac rated</td>
<td>7.02B</td>
</tr>
<tr>
<td>L3</td>
<td>Generator Voltage ‘Phase L2’ input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1</td>
<td>Generator Voltage ‘Phase L1’ input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>Mains Voltage ‘Phase T’ input</td>
<td></td>
<td>7.01A</td>
</tr>
<tr>
<td>S</td>
<td>Mains Voltage ‘Phase S’ input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Mains Voltage ‘Phase R’ input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Engine Running Minus detect</td>
<td>Connect to ground</td>
<td>11.0</td>
</tr>
<tr>
<td>22</td>
<td>Engine Running Plus detect</td>
<td>D+ or W.L. sensing</td>
<td>14.0</td>
</tr>
<tr>
<td>23</td>
<td>Supply Battery minus connection</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Supply +12 or +24V Battery connection</td>
<td>Internal 300 mA fuse</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Common Sender ground sense</td>
<td>2000 Ohm max</td>
<td>19.0</td>
</tr>
<tr>
<td>26</td>
<td>Fuel Level Sender input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Temperature Sender input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Oil Pressure Sender input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Programmable input Switch ‘4’</td>
<td></td>
<td>7.07</td>
</tr>
<tr>
<td>30</td>
<td>Programmable input Switch ‘3’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Programmable input Switch ‘2’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Programmable input Switch ‘1’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Low Fuel Switch input</td>
<td></td>
<td>18.0</td>
</tr>
<tr>
<td>34</td>
<td>High Temperature Switch input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Low Oil Pressure Switch input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Emergency Stop Switch input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>RS485 Termination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>RS485 Signal A</td>
<td>See RS485 standard</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>RS485 Signal B</td>
<td>See Be142 MODBUS user manual</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>RS485 Common Ground</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

!! WARNING !! Relays and solenoids connected to the Be142 must be suppressed using flywheel diodes or suppression devices as indicated in section 18.0. We recommend that you connect a 2A Fuse (Fast-Blow type) in series with the terminal #24; it will protect the controller against large spikes on the power supply.