

## AMF Controller Be142 User Manual

# Be142 User's Manual

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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 option, 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 furnish 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 reason 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, negligence in use or handling.

This equipment complies with the 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 grounding 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.**



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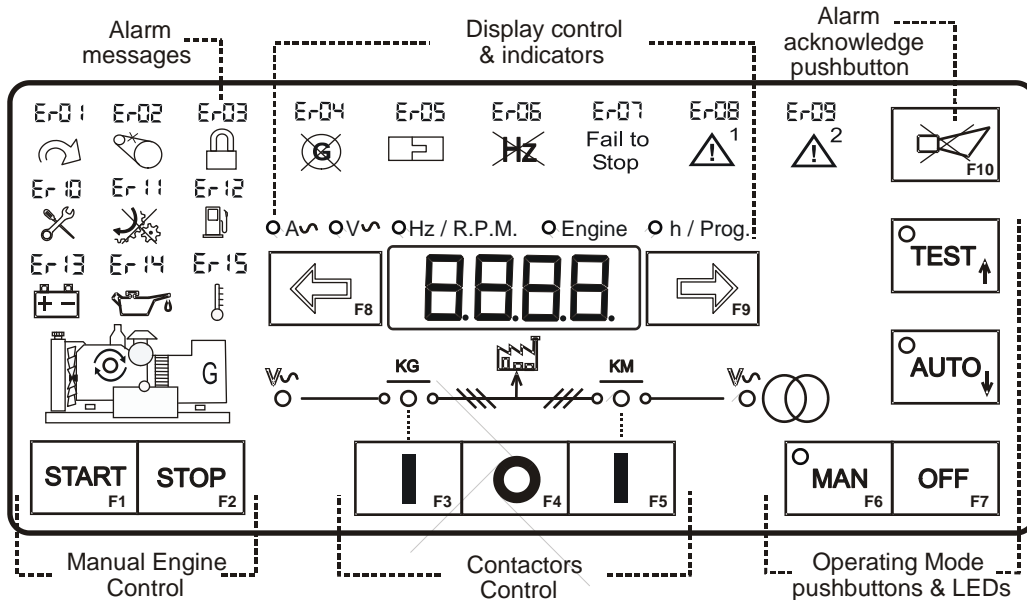
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## Section 1.0 Introduction

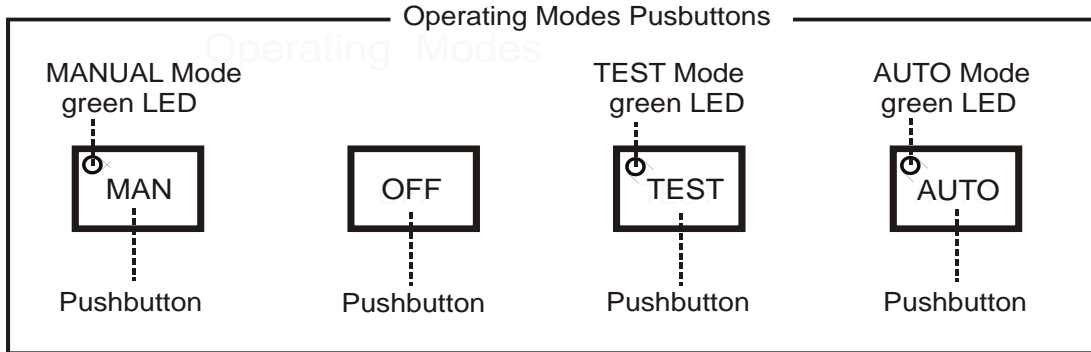
The Be142 integrates a 3-Phase Automatic Mains Failure and a Generating Set controller. The Be142 provides visual indication by means of LEDs and Display for Fuel Level, Engine & Electrical parameters, Alarms and Status of the contactors. It features OFF-MAN-AUTO & TEST mode of operation and provides a RS485 interface for remote control & monitoring. Figure 1 presents the panel layout. Be242 does not features serial interface.

Figure 1: Front Panel layout



### Section 2.0 Mode of operation

A mode of operation is selected via pushbutton and indicated by means of a green LED:



Every time the power supply is switched on, the Be142 returns to the "AUTO" operating mode, if the BE142 was in TEST or AUTO prior to power down. In the other cases, the Be142 will enter the OFF mode.

#### 2.1 OFF mode

Push the [OFF] pushbutton to enter the OFF mode. OFF mode clears the fault alarms. 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 energize the display. The display will turn off automatically after a few minutes.

#### 2.2 MANUAL mode

The MANUAL mode allows you to manual control the Engine and Contactors.

| Manual Engine Control |  | Instructions  |
|-----------------------|--|---|
|                       |  | <p>Push the [MAN] pushbutton to select the MANUAL mode. Push the [START] pushbutton until engine starts; the display indicates the message [!!!] during the preheat and the message [. . .] during the starting attempts. When the engine is running, the green LED turns on. To stop the engine, push the [STOP] pushbutton until the [StOP] message appears on the display.</p> |

To control manually the contactors follow the instructions:

| Contactors Control Panel |  | Instructions   |
|--------------------------|--|--|
|                          |  | <p>Select the MANUAL mode, start the engine (see above) and wait for voltage generator presence. Push the [I] (KG) pushbutton to close the contactor of the Generator. To transfer the Load to Mains, push the [I] (KM) pushbutton (the [KG] will open). To open a Contactor, push the [O] pushbutton.</p> |



**!! WARNING !!**

**LINE VOLTAGE IS EXPOSED WITHIN THE Be142, THE LOAD OR ANCILLARY CIRCUITRY EVEN WHEN THE GREEN LEDs ARE TOTALLY OFF**

**2.3 AUTO mode**

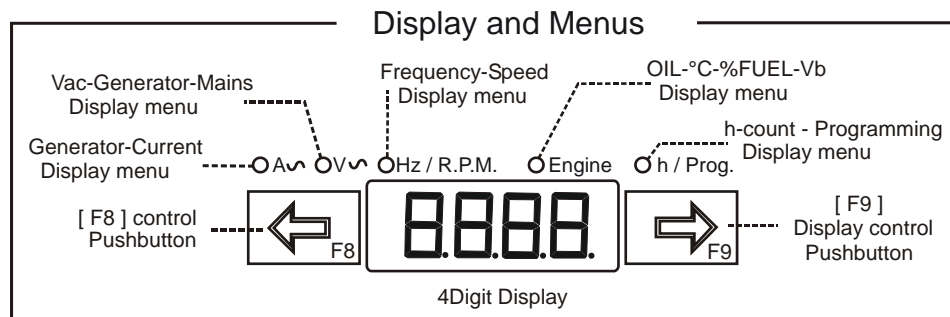
Push the [AUTO] pushbutton until the green LED 'AUTO' illuminates. The engine starts when the Be142 detects a Mains failure. The contactor of the MAINS (KM) opens after a delay. After the warm-up time, if the Voltage and Frequency are within the settings, the contactor of the Generator (KG) will close. If the Mains restores, the KG will open. The KM will close following a programmable changeover timing. The engine will stop after a cooling down time. If the engine shuts down, the KM closes only if the Mains is within the programmed settings. In AUTO mode, the Be142 will periodically test the engine if some parameters have been properly programmed (ask details to your panel manufacturer). During this test, the green LED of the AUTO operating mode will continue to blink. In AUTO mode, the Be142 can start and stop the engine according to programmable inputs also.

**2.4 TEST mode**

Push the [TEST] pushbutton until the green LED illuminates. The Be142 starts the engine and could transfer the load to the Generator according to the settings of the panel manufacturer. To stop the engine, select the AUTO mode (if the Mains is present) or stop the engine in MANUAL mode. If you push the [STOP] pushbutton when the Be142 is in AUTO or TEST, the [Er.09] will energize. To clear the alarm, select the OFF mode (section 7.0).

**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 function present on the display. 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 (see page 5)

| Display Function  | Display indications (*)                                      | Pushbutton(s)  | Menu & Led indicator |                    |
|---|--|----------------|----------------------|--------------------|
| Current of the Generator<br>(0 up to 1000A)   | [A XXX] Ampere L1<br>[-XXX] Ampere L2<br>[_ XXX] Ampere L3   | [←F8] or [F9→] | Aac<br>menu          | Yellow             |
|   | [A -G]   | [ACK-F10]      |                      |                    |
| Voltage of the Generator<br>(60V up to 998V)  | [GXXX] Volt L1-L2<br>[-XXX] Volt L2-L3<br>[_ XXX] Volt L1-L3 | [←F8] or [F9→] | Vac<br>menu          | Yellow             |
|   | [U -G]   | [ACK-F10]      |                      |                    |
| Voltage of the Mains<br>(60V up to 998V). When<br>Mains is simulated, the<br>display indicates the<br>message [U-on]. (contact<br>your panel manufacturer<br>for details) | [nXXX] (V R-S)<br>[-XXX] (V S-T)<br>[_ XXX] (V T-R)          | [←F8] or [F9→] |                      |                    |
|   | [U -on]  | [ACK-F10]      |                      |                    |
| Generator Frequency<br>(20Hz up to 70Hz)  | [GXXX] Hz  | [←F8] or [F9→] | Hz/RPM<br>menu       | Yellow             |
|   | [H - G]  | [ACK-F10]      |                      |                    |
| Mains Frequency<br>(20Hz up to 70Hz)  | [nXXX] Hz  | [←F8] or [F9→] |                      |                    |
|   | [H - n]  | [ACK-F10]      |                      |                    |
| Speed<br>(600RPM up to 4000RPM)   | [XXXX] RPM   | [←F8] or [F9→] | Hz/RPM<br>menu       | Yellow<br>(blinks) |
|   | [SPd]  | [ACK-F10]      |                      |                    |
| Battery Voltage<br>(5,5 Vdc up to 36Vdc)  | [bXX.X] Vdc  | [←F8] or [F9→] | Engine               | Yellow             |
|   | [batt]   | [ACK-F10]      |                      |                    |
| Charger Voltage<br>(3.0 Vdc up to 36Vdc)  | [cXX.X] Vdc  | [←F8] or [F9→] |                      |                    |
|   | [Char.]  | [ACK-F10]      |                      |                    |
| Oil Pressure 0.0-20.0 Bar<br>(If the sensor is not used in<br>your engine, the display<br>indicates [----]).  | [PXX.X] Bar  | [←F8] or [F9→] |                      |                    |
|   | [ bar ]  | [ACK]          |                      |                    |
| Temperature 0°-250 °C<br>(If the sensor is not used in<br>your engine, the display<br>indicates [----]).  | [XXX °] °C   | [←F8] or [F9→] |                      |                    |
|   | [ ° C ]  | [ACK]          |                      |                    |
| Fuel Level % 0% - 99<br>(If the sensor is not used in<br>your engine, the display<br>indicates [----]).   | [F XX] %   | [←F8] or [F9→] |                      |                    |
|   | [FUEL]   | [ACK-F10]      |                      |                    |
| h-meter up to 50,000h.<br>Over 9999, a dot on the<br>right will appear indicating<br>X10. Example [1234.]<br>means 12,340 hours.  | [XXXX] h   | [←F8] or [F9→] | h/Prog<br>menu       | Yellow             |
|   | [Hour]   | [ACK-F10]      |                      |                    |

(\*NOTE: X indicates a numerical digit; if the measurement is not available the display will indicate [- - -])

## **Section 4.0 Display messages**

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 about the alarm. Push [ACK-F10] to silence the HORN (if provided).

**Table 4.10: Alarm messages**

**( !!! ) NOTE: consult always your supplier or the user manual of the engine. A short description of the alarms is indicated below.**

| Display | Description of the Alarm  | Display     | Description of the Alarm   |
|---------|---|-------------|--|
| [Er.01] | Over Frequency Shutdown (!!!)   | [Er. 14]    | Low Oil Pressure Shutdown (!!!)  |
| [Er.02] | Engine Belt Break Shutdown (!!!)  | [Er. 15]    | Temperature Switch Shutdown (!!!)  |
| [Er.03] | Remote LOCK Shutdown.   | [Hi-C]      | Over Current Shutdown or Warning.<br>(ooo)   |
| [Er.04] | Alternator Failure Shutdown (!!!)   | [Hi-U]      | Over Voltage / Under Voltage Shutdown<br>(ooo)   |
| [Er.05] | Overload Warning or Shutdown (ooo)  | [Lo-U]      | Input 1-2-3-4 Shutdown / Warning<br><br>Normally these alarms protect your Generator. Consult your supplier for further details. |
| [Er.06] | Under Frequency Shutdown (ooo)  | [InP.1]     |  |
| [Er.07] | Fail To STOP Shutdown (!!!)   | [InP.2]     |  |
| [Er.08] | Emergency Shutdown. (Wait for the end of the Emergency condition before starting the engine). | [InP.3]     |  |
| [Er.09] | Emergency Shutdown from the Front Panel. (Cancel the Alarm and restart the engine).           | [InP.4]     |  |
| [Er.10] | Maintenance SERVICE warning (!!!)<br><b><u>SEE SECTION 10.0</u></b>                           | [-oIL] (**) | Oil pressure warning or sensor failure.<br>(!!!)   |
| [Er.11] | Fail To START Shutdown (!!!)  | [-°C] (**)  | Water temperature warning or sensor failure.<br>(!!!)  |
| [Er.12] | Low Fuel Shutdown (Fill the tank and restart the engine)                                      | [FUEL] (**) | Fuel level warning (High or Low) or sensor (Fill the tank and restart the engine)  |
| [Er.13] | Battery Voltage Warning (!!!)   | [rEnt.]     | Push [←F8] to display the remaining hours of Rental contract.  |
|         |   | [FAIL]      | There is an internal failure or memory error in the Be142 controller (!!!)   |

**( ooo ) NOTE: verify if you are Overloading the Generator: consult an electrician.**

#### 4.20 Miscellaneous messages

|             |   |             |   |
|-------------|---|-------------|---|
| [rESt]      | The Be142 is counting the rest time between the starting attempts         | [ . . . ]   | The Be142 is cranking the engine.           |
| [n-on]      | MAINS simulated via an external switch.                                   |             |   |
| [ ' ' ' ' ] | The Be142 is performing the pre-glow.                                     | [tEst]      | The Be142 is in Test mode.                  |
| [StoP]      | The Be142 is stopping the engine.   | [ - - - - ] | Measurement out of range or disabled.       |
| [U-uP]      | Warm up time of the engine before closing the contactor of the generator. | [Cool]      | The engine is running off load for cooling. |
| [ dEL]      | Delay time before cranking.   |             |   |

### Section 5.0 LED indicators

To test the LEDs and DISPLAY push the [OFF] pushbutton; the display turns off. 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 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 for the meaning of the codes). The message [----] indicates 'No Event' in the memory.
- To quit the LOG EVENTS push the [OFF] button.

### Section 7.0 - 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**) - symbols and ideograms on the front panel to indicate alarms (see Figure 1, section 1)
- C**) - display messages indicating warnings and shutdowns (see Table 4.10)
- D**) - a pushbutton to silence the Horn ([ACK-F10])

To silence the HORN (if provided by your Panel manufacturer), push the [ACK-F10] pushbutton.

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

**!!! WARNING !!! In case of Alarm consult always your supplier or the user manual of the engine**

### **Section 8.0 Automatic Periodic Test**

The Be142 does not use an internal real time clock for the programmed days of automatic test. Consult your panel manufacturer to find out if Be142 is programmed with a Periodic Test. You could experiment with shifting the periodic tests. To avoid error accumulation, we recommend the following procedure.

- A)** - Power off the controller (if a switch is provided by your panel manufacturer) or disconnect the battery.
- B)** - Connect the supply and select the 'AUTO' mode of operation.

The Be142 will start the engine after the programmed days. The engine will run OFF-LOAD for the time programmed by your panel manufacturer. If the Mains fails during the Periodic Test, the Be142 will transfer the load to the generator.

*IMPORTANT NOTICE If the Vdc supply is removed, the Be142 loses the counts of the days. If the supply restores, the Be142 starts to count the days from zero. To synchronize the periodic start follow the instruction of the section 8.0*

### **!! 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 grounding 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.***

### **9.0 - Panel & Gen-set Builders Notes**

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### **10.0 - MAINTENANCE TIMERS RESET**

When a timer for the MAINTENANCE SERVICE expires, the Be142 indicates the message [Er.10] on display. You can continue to use the generator but we recommend that you contact the genset manufacturer in order to carry out the programmed maintenance. To clear the alarm, after making service, enter the MAN mode (see2.2), push and hold the [ACK-F10] button for at least 20 seconds. The Be142 will restart the programmed timer for the next MAINTENANCE SERVICE.