

Be-1 User Manual

GENERATOR AUTO START KIT

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Warranty

Bernini Design SRL (hereinafter "BD") warrants that Be-1 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 Be-1 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 Be-1 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 Be-1 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. The warranty does not include the membrane keyboard (front panel) in case of visible signs of misuse. This purchase is non-refundable.

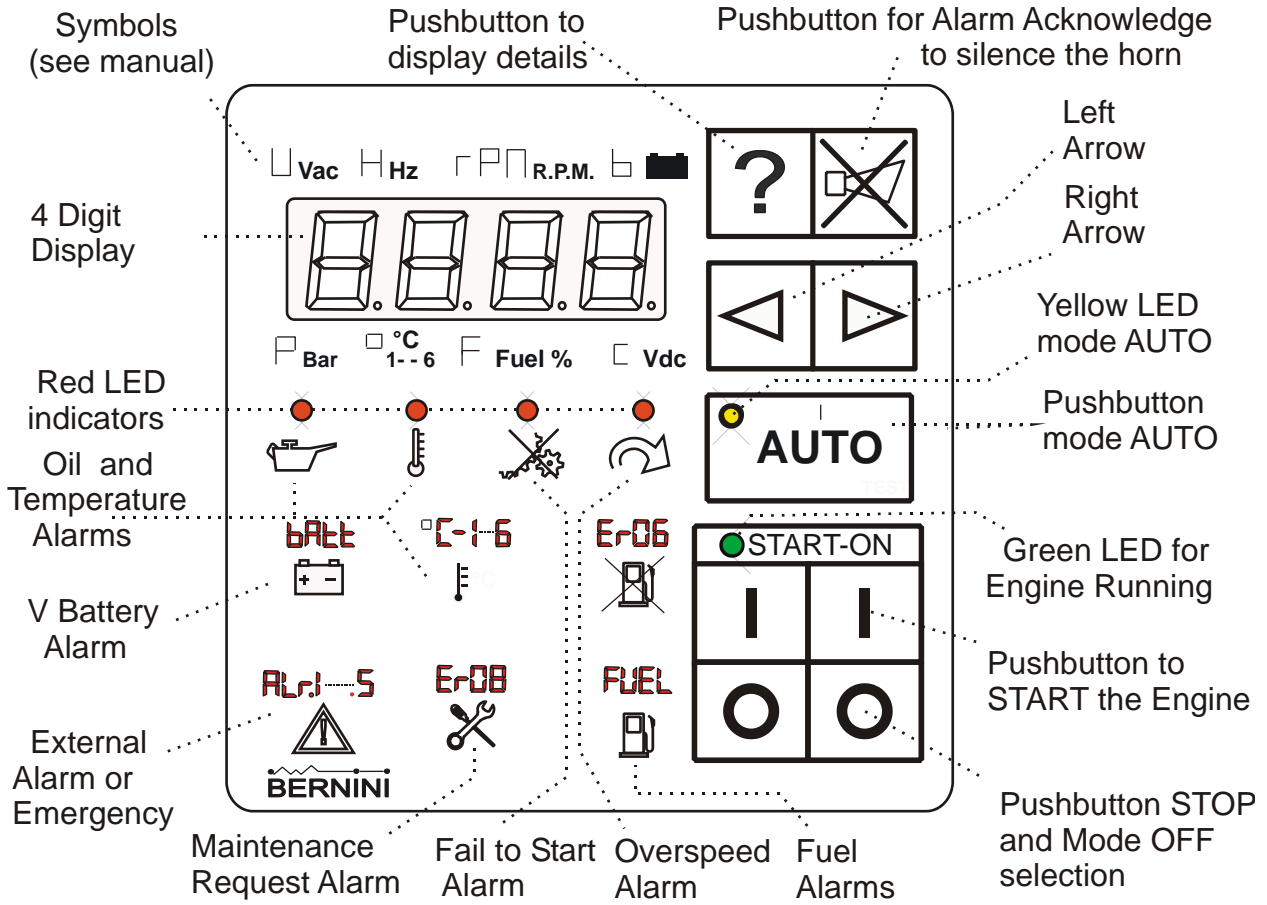
WARNING!! High voltage is present inside the Be-1. To avoid electric-shock hazard, operating personnel must not remove the protective cover. Do not disconnect the grounding connection. The Be-1 can start the engine at anytime. Do not work on equipment, which is controlled by the Be-1. When servicing the engine, disconnect the battery and battery charger. We recommend that warning signs be placed on equipment indicating the above.

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Section 1.0 Introduction

The Be-1 is a microcontroller based engine protection module. It provides visual indication by means of LEDs and Display for Fuel Level, Engine & Generator parameters, warnings and shut downs. See figure 1.

Figure 1 Front Panel Layout.



Section 2.0 Mode selection

The modes of operation are selected by pushbuttons. Every time the power supply is switched on, the Be1 enters the "OFF" mode, unless the Be-1 was in TEST or AUTO prior to power down. The following table indicates the available modes.

Mode	Pushbutton	LED indicators	Section
OFF	[O]	All turned Off, dot on display	2.1
MANUAL	[I]	The yellow LED AUTO is OFF	2.2
AUTO	[AUTO]	The yellow LED AUTO is ON	2.3
TEST	[AUTO]	The yellow LED AUTO blinks	2.4

2.1 OFF mode

Push one of the [O] pushbuttons to enter the OFF mode; the Display and LEDs will turn off, a dot on the display will blink slowly and the alarms will be cleared.

2.2 MANUAL mode

To start and stop the engine follow the instructions (*):

A) - Push one of the [I] pushbuttons until the display indicates the message [MAN] and all LEDs illuminate; release the button.

B) - Push one of the [I] pushbuttons until engine starts. The display indicates the message [. . .] during the starting attempt and [! ! !] in case of pre-glow. When the engine is running, the green LED 'START-ON' will illuminate.

C) - To stop the engine, push one of the [O] pushbutton until the [StOP] message appears on the display. If the engine has already stopped, it is possible to cancel the STOP sequence by pressing the [O] pushbutton. Push [O] when the engine is not running if you want to shutdown the panel.

Note(*): if the display blinks indicating the message [ALAr.], consult section 8.0 (ALARM, WARNINGS and SHUTDOWNS)

2.3 AUTO mode

Push [AUTO] until the yellow LED on the button will illuminate (*). The engine starts when you activate the Remote Start and stops when you de-activate the Remote Start input (if provided by your panel manufacturer). In AUTO mode, the Be-1 will periodically test the engine if programmed by your panel supplier. During this test, the yellow LED AUTO will continue to blink. Once the Be-1 is in AUTO mode, push the [AUTO] pushbutton for a short time if you want to select the manual mode (see 2,2). In case of alarms it is not possible to select the AUTO mode.

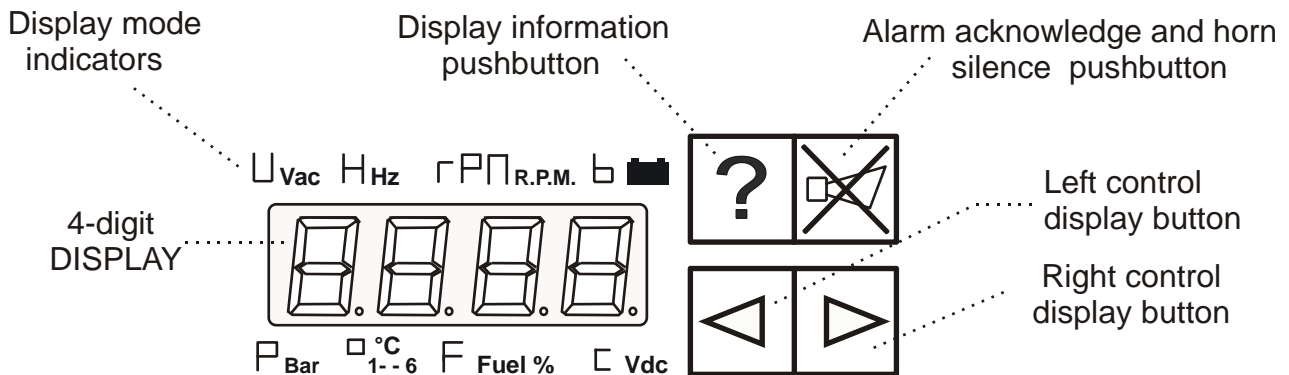
Note(*): if the display blinks indicating the message [ALAr.], consult section 8.0 (ALARM, WARNINGS and SHUTDOWNS)

2.4 TEST mode

Enter the AUTO mode (see 2.3). Push and hold for at least 5 seconds, the [AUTO] pushbutton until the yellow LED will start blinking; the engine will start automatically. To stop the engine, push the [AUTO] or one of the [O] pushbuttons.

Section 3.0 Display measurements

The Be1 features a 4-Digit display and 4 pushbuttons as indicated below.



Use [←] and [→] to select a function. Use [?] to display the name of the function. The following table lists the functions of the display.

Display Function	Display indication (*)	Pushbuttons used to select the function	Push [?] to indicate the name of the parameter
Generator Voltage	[UXXX]	[←] or [→]	[voLt]
Generator Frequency	[HXX.X]		[HErT]
Speed R.P.M.	[XXXX]		[rPM]
Battery Voltage Vdc	[bXX.X]		[bAtt]
Charger Voltage Vdc	[cXX.X]		[cHAr]
Oil Pressure Bar	[PXX.X]		[bAr]
Oil Pressure Bar sensor not used	[P - - -]		[bAr]
Fuel Level % (0% up to 99%)	[F XX]		[FUEL]
Fuel Level sensor not used	[F - - -]		[FUEL]
Coolant temperature (°C) Oil Temperature (°C) Canopy Temperature (°C)	[XXX°]		[°C-1] [°C-2] [°C-3]
Coolant temperature not used Oil Temperature not used Canopy Temperature not used	[t1 - -] [t2 - -] [t3 - -]		[°C-1] [°C-2] [°C-3]
Hours-count up to 50.000 h. Over 9999h, the display indicates a dot on the right. Example: 1234. will mean 12340h	[XXXX]		[Hour]

(*)NOTE: X indicates a numerical digit, if the measurement is out of range, the display will indicate [- - -]

Section 4.0 Display messages

The Be1 indicates alarms messages (table 4.10A-B) and operating messages (table 4.20)

!!! WARNING !!! Always consult your supplier or the user manual of the engine. A short description of the alarm follows below. Recommendations for solving the problem are also indicated.

Alarm messages

The presence of an alarm in the memory is indicated by the message [AlAr.]. Push [?] to display the alarm. Push [→] to search for other alarms. Push [ACK] to acknowledge the alarm (see also sect. 8.0)

Message	TABLE 4.10A Description of the Alarm	Button [?]
[ALAr.]	Indicates the presence of an alarm. Push [→] and [?] to display the alarm (see the list below)	
[OIL.P]	Low Oil Pressure Warning	Bar indication
[Er.01]	Low Oil Pressure Shutdown	
[bELt]	Engine Belt Break Shutdown. It energizes if the Charger Alternator fails to work or if the belt is broken.	Vdc indication

Message	TABLE 4.10-B Description of the Alarm	Button [?]
[PicK]	The Be-1 detects a failure of the pick-up.	None
[bAtt]	Battery Voltage Warning (High or Low)	Vdc indication
[°C-1] [°C-2] [°C-3]	High Engine Temperature shutdown High Oil Temperature shutdown High Canopy Temperature shutdown	°C indication (if the sensor is not used, the display will indicate the message [S.on])
[°C-4] [°C-5] [°C-6]	High Engine Temperature Warning. High Oil Temperature Warning. High Canopy Temperature Warning.	
[FUEL] [Er.06]	Fuel level warning (High or Low). Low Fuel Shutdown	
[AL. 01]....[AL. 05]	Programmable Alarm (if provided by your panel manufacturer)	none
[Er.07]	Failure of a Sensor (Oil pressure, Temperatures or Fuel Level)	[InP1] [InP5]
[Er.08]	Maintenance Service (when this warning turns on, you are not allowed to enter the AUTO mode).	none
[F.StP]	Fail to Stop Alarm	none
[F.Str]	Fail to Start Alarm	none
[Err.]	Memory Failure	none
[ALt]	Alternator Failure	none
[U.SPd] [O.SPd]	Underspeed Overspeed Shutdown	Speed
[Hi-H] [Lo-H]	Over Frequency Shutdown Under Frequency Shutdown	Frequency
[Hi-U] [Lo-U]	Over Voltage Shutdown Under Voltage Shutdown	Voltage ac

TABLE 4.20 Be-1 Operating messages

Message	Description	Message	Description
[rEst]	The Be-1 is counting the rest timing (period of time between the starting attempts)	[Cool]	It indicates the cooling down time (the engine runs off load before stopping)
[. . .]	The Be-1 is starting the engine	[dEL]	Delay time before cranking
[' ' ']	The Be-1 is performing the pre-glow	[- - -]	The measurement is out of range
[StoP]	The Be-1 is stopping the engine	[P0 _][P1 _]	Indicates that the engine is going to start or stop following according to the status of a Remote Switch (consult your panel manufacturer).

Section 5.0 LED (solid state lamps) indicators and Test of the LEDs

To test the LEDs and DISPLAY, push and hold the [←] and [→] pushbuttons simultaneously (in OFF or MANUAL mode). The LEDs and DISPLAY remain energized as long as the pushbuttons are pressed and held together.

6.0 Reading the parameters

To read the setting of the parameters, follow the instructions:

- 1) - Press one of the [O] pushbutton until the LEDs and display turn OFF.
- 2) - Push the [←] or [→] pushbutton to select a parameter.
- 3) - Push [?] to display the setting of the parameter.
- 4) - Push the [←] or [→] pushbutton to select another parameter. Consult your panel manufacturer for details.

NOTE: if the pushbuttons remain inoperative for more than 2 minutes, the Be-1 turns off the display.

Section 8.0 - Alarms, Warnings and Shutdowns

!!! WARNING !!! Always consult your supplier or the user manual of the engine. A short description of the alarm follows below. Recommendations for solving the problem are also indicated.

The Be-1 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 LEDs to indicate: Oil pressure, Temperature, Fail to start and Over speed shutdown.
- C) - display messages indicating warnings and shutdowns (see Table 4.10A-B)
- D) - an [ACK] pushbutton to silence the Horn

To silence the HORN, if provided by you panel manufacturer, push the [ACK] pushbutton.

To browse the alarm memory push the [→] pushbutton. To display the details of the alarm, push the [?] pushbutton. To clear totally the alarm, remove the cause and press the [O] pushbutton. The tables 4.10A-B in the section 4.0 indicate all possible alarms.

Section 8.1 – Event History (INSTRUCTIONS for QUALIFIED PERSONNEL ONLY)

The Be-1 features an Event History register able to record the last 100 shutdown events. To read the contents of the memory, follow the instructions:

- A) – Turn OFF the DC power supply of Be-1 (**NOTE!**)
- B) – Push and hold the [?] pushbutton
- C) – Apply the power supply (continue to hold the [?] pushbutton)
- D) – Release the [?] pushbutton when the display turns on
- E) – The display will indicate the code of the last event ([E 01]). Push the the [?] pushbutton to display the name of the Event. Alarm events have the same display message used for alarm indication (see section 4.10A-B)
- F) – You can select an event from [E 01] to [E100] using the [←] and [→] pushbuttons. [E100] indicates the oldest event. [E01] indicates the recent one.
- G) – To display the code of the Event, push the [?] pushbutton (see table 4.10).

(NOTE!): in case that the supply switch is not available, consult your panel manufacturer