

# Be42 OEM's Manual V5.0.XX

(Consult Section 15.0 for software upgrades & revisions)

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## Warranty

Bernini Design SRL (hereinafter "BD") warrants that Be42 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 Be42 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 Be42 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 Be42 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 purchase is non-refundable.



This equipment complies with EMC protection requirements

***WARNING!! High voltage is present inside the Be42. To avoid electric-shock hazard, operating personnel must not remove the protective cover. Do not disconnect the Earth connection. The Be42 can start the engine at anytime. Do not work on equipment, which is controlled by the Be42. When servicing the engine, disconnect the battery and battery charger. We recommend that warning signs be placed on equipment indicating the above.***

**!! W A R N I N G !! Relays and solenoids connected to the Be42 must be suppressed using flywheel diodes or suppression devices as indicated in section 18.0. In case the VDC supply can deliver spikes over 40 Vdc we recommend to place a 1 A (fast blow) in series to the terminal #24.**

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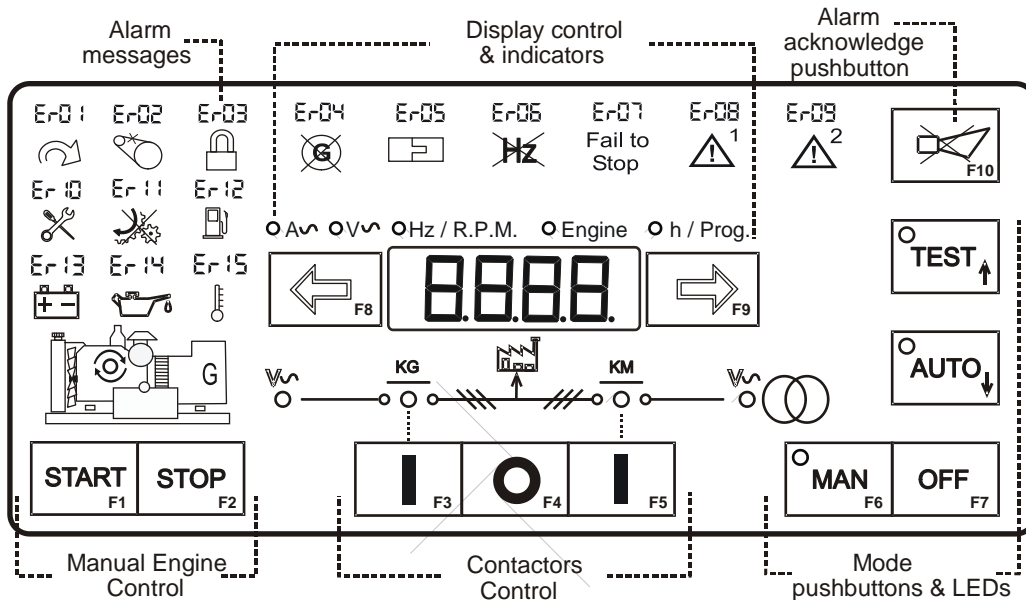
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## Section 1.0 Introduction

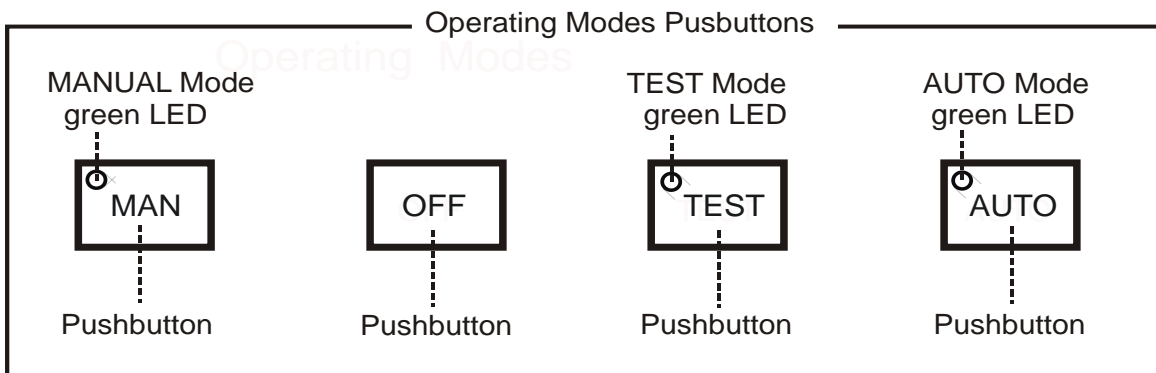
The Be42 integrates a 3-Phase Automatic Mains Failure controller and a Generating Set controller. The Be42 provides visual indication by means of LEDs and Displays for Engine & Electrical parameters, Alarms and Status of the contactors. It features 7 modes of operation and provides a RS485 interface for remote control & monitoring. Figure 1 presents the panel layout.

Figure 1: Front Panel layout



## 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 5.0.84) and the date of production (example 48.10, that means week 48 of year 2010). The modes of operation are selected by pushbuttons and indicated by means of green LEDs as below indicated:



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

Every time the power supply is switched on, if the BE42 was in TEST or AUTO prior to power down, the Be42 returns to the "AUTO" mode. In the other cases, the Be42 will enter the OFF mode. The following table indicates the modes of operation.

Mode	Pushbutton	Indication	Section
OFF	[ OFF ]	All turned Off, dot on display	2.1
MANUAL	[ MAN ]	Green LED on the button	2.2
AUTO	[AUTO]	Green LED on the button	2.3
TEST	[TEST]	Green LED on the button	2.4
PROGRAMMING	-	The display shows <b>[ProG]</b>	6.0
CALIBRATION	-	The display shows <b>[-CAL]</b>	12.0
TROUBLESHOOTING	-	Various messages	13.0

**2.1 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 energize 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 to ground terminal #36 (Emergency input).*

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

Manual Engine Control		Instructions
		<p>Push the [MAN] pushbutton to select the MANUAL mode (if in AUTO mode, push the OFF button first). Push the [START] pushbutton until engine starts; the display indicates the message [ . . . ] during the starting attempts (and [! ! !] during the preheat). 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. If the engine has already stopped, it is possible to reset the STOP sequence by pressing the [STOP] pushbutton.</p>

**2.21 Contactors: Manual control**

To control the contactors follow the instructions:

Contactors Control Panel		Instructions
		<p>Select the MANUAL mode, start the engine (see above) and wait for voltage presence. Push the [ I ] (KG) pushbuttons 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. In manual mode the CHANGEOVER timer lasts one second.</p>
		<p><b>NOTE:</b> for heavy applications, you can connect external pushbuttons for Start Stop (see Input options [27]-[28] in table 7.07)</p>

### 2.3 AUTO mode

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

Push the [AUTO] pushbutton until the green LED illuminates. The engine starts when the Be42 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 Be42 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 Be42 can start and stop the engine according to programmed inputs (see Tables 7.06 and 7.07).

### 2.4 TEST mode

Push the [TEST] pushbutton until the green LED illuminates. The Be42 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 Be42 is in AUTO or TEST, the [Er.09] will energize. 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 from unauthorized access (see 6.0).

### 2.6 CALIBRATION mode

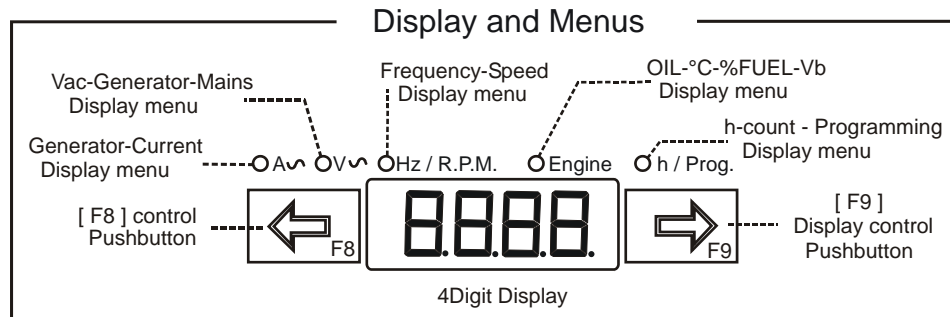
The CALIBRATION mode allows calibration of all analogue measurements (see 12.0).

### 2.7 TROUBLESHOOTING mode

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

## Section 3.0 Display measurements

The Be42 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.

Display Function	Display indications (*)	Pushbutton(s)	Menu & Led indicator	
Current of the Generator (0 up to 2000A)	[XXXX] Ampere	[←F8] or [F9→]	Aac menu	Yellow
	[A -G]	[ACK-F10]		
Voltage of the Generator (60V up to 998V)	[GXXX] Volt L1-L2	[←F8] or [F9→]	Vac menu	Yellow
	[U -G]	[ACK-F10]		
Voltage of the Mains (60V up to 998V). If the Mains is simulated, see option [15] in table 7.07, the display will show the message [n-on]	[nXXX] (VL1-2) [-XXX] (V L2-3) [_XXX] (L1-L3)	[←F8] or [F9→]		
	[U -on]	[ACK-F10]		
Generator Frequency (20Hz up to 70Hz)	[GXXX] Hz	[←F8] or [F9→]	Hz/RPM menu	Yellow
	[H - G]	[ACK-F10]		
Mains Frequency (20Hz up to 70Hz)	[nXXX] Hz	[←F8] or [F9→]		
	[H - n]	[ACK-F10]		
Speed (600RPM up to 4000RPM)	[XXXX] RPM	[←F8] or [F9→]	Hz/RPM menu	Yellow (blinks)
	[SPd]	[ACK-F10]		
Battery Voltage (5.5 Vdc up to 36Vdc)	[bXX.X] Vdc	[←F8] or [F9→]	Engine	Yellow
	[batt]	[ACK-F10]		
Charger Voltage (3.0 Vdc up to 36Vdc)	[cXX.X] Vdc	[←F8] or [F9→]		
	[Char.]	[ACK-F10]		
Oil Pressure 0.0-20.0 Bar	[PXX.X] Bar	[←F8] or [F9→]		
	[ bar ]	[ACK]		
Temperature 0°-250 °C	[XXX °] °C	[←F8] or [F9→]		
	[ °C ]	[ACK]		
Fuel Level % 0% - 99%	[F XX] %	[←F8] or [F9→]		
	[FUEL]	[ACK-F10]		
Hours-count (0 up to 9999h)	[XXXX] h	[←F8] or [F9→]	h/Prog menu	Yellow
	[Hour]	[ACK-F10]		
Miscellaneous modes (see sections 6.0,12.0 and 13.0)	[ProG] [-Cal] [tEst]	[←F8] or [F9→]		Yellow (blinks)
OFF	[ . ]	[OFF-F7]	OFF	OFF

(\*)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 Be42 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**

Display Message	Description of the Alarm	Display Message	Description of the Alarm
[Er.01]	Over Frequency Shutdown (see [P.12])	[Er. 14]	Low Oil Pressure Shutdown (Pressure switch connected to input #35)
[Er.02]	Engine Belt Break Shutdown (see [P.26])	[Er. 15]	Temperature Switch Shutdown (Temperature switch connected to Input #34)
[Er.03]	Remote LOCK Shutdown (see 7.07 option [13])	[Hi-C]	Over Current Shutdown or Warning (see [P.13]).
[Er.04]	Alternator Failure Shutdown	[Hi-U]	Over Voltage Shutdown (see [P.10])
[Er.05]	Overload Warning (see 7.07 option [20])	[Lo-U]	Under Voltage Shutdown (see [P.09])
[Er.05]	Overload Shutdown (see 7.07 option [21])	[InP.1]	Input 1 Shutdown / Warning (see 7.07)
[Er.06]	Under Frequency Shutdown (see [P.11])	[InP.2]	Input 2 Shutdown / Warning (see 7.07)
[Er.07]	Fail To STOP Shutdown (see parameter P.34, section 7, table 7.04)	[InP.3]	Input 3 Shutdown / Warning (see 7.07)
[Er.08]	Emergency Shutdown (see paramter P.35, section 7, table 7.04)	[InP.4]	Input 4 Shutdown / Warning (see 7.07)
[Er.09]	Emergency Shutdown triggered by Front Panel (Stop or [0] pushbutton)	[-oIL]	Oil pressure warning or sensor failure. Push [←F8] to display the value (see P29).
[Er.10]	Maintenance SERVICE warning (see parameters P44,P45 and P46)	[- °C]	Water temperature warning or sensor failure. Push [←F8] to display the value (see P30).
[Er.11]	Fail To START Shutdown	[FUEL]	Fuel level warning (High or Low) or sensor failure. Push [←F8] to display the value.
[Er.12]	Low Fuel Shutdown (If Low Fuel input, terminal #33, is activated for longer than the P.36 time. See Table 7.04A)	[rEnt]	The rental contract is going to expire (48 hours remaining). Push [←F8] to display the value.
[Er. 13]	Battery Voltage Warning. Push [←F8] to display the value.	[FAIL]	There is an internal failure or memory error in the BE42 controller (see 12.3)

**4.20 Miscellaneous [messages] & description**

[rESt]	The Be42 is counting the rest time between the starting attempts	[ProG]	The Be42 is in program mode
[n-on]	MAINS Simulated by an input (see option [15] in the table 7.07).	[-CAL]	The Be42 is in calibration mode
		[. . . .]	The Be42 is cranking the engine
[ ' ' ' ' ]	The Be42 is performing the pre-glow (P22)	[tEst]	The Be42 is in Test mode
[StoP]	The Be42 is stopping the engine (P25)	[ - - - - ]	Measurement out of range or disabled
[U-uP]	Warm up time of the engine before closing the contactor of the generator (P23).	[Cool]	The engine is running off load for cooling.
[ dEL]	Delay time before cranking (P.19,table 7.03A)		



### 4.30 LOG EVENTS

To have access to the LOG (Memory) events follow the instructions:

- Push the [OFF] button
- Remove the power supply
- Push and hold the [STOP] button; in the same time apply the Vdc supply (battery)
- When display turns on, 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)
- To quit the LOG EVENTS, remove the power supply

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

## 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 energized as long as the pushbuttons are pressed and held together.

## Section 6.0 Programming and Reading Parameters

We recommend that you use the BE42-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.

### 6.10 Enter the Programming Mode

- 1) - Provide a voltage from a battery supply of over 11.5V. 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 Be42 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 Be42 is **not password protected**, the programmable parameter [P.0] will be displayed and the Be42 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**

- 1) - Push [TEST] or [AUTO] in order to choose the proper code (between 00 and 99, except 42).
- 2) - Push [F9→] to select the 2 digits on the right side.
- 3) - Push [TEST] or [AUTO] in order to choose the proper code (between 00 and 99, except 42).
- 4) - Push [ACK-F10] to confirm the password; if the password is ok, the Be42 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.

*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 500Volt. 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 Be42 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 Be42 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 Be42 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 Be42 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 450Volt).
- 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 Be42 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 indicates [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 Be42 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 Be42 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 Be42 saves the code [4242] that disables the password. The Be42 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.

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

<b>Table 7.01A - Mains Failure Control</b> Note: [ xx " ] = seconds, [ xx ' ] = minutes, [xxh ] = hours				
Parameter Code & Description		Default	Min	Max
P.0	Mains Contactor control (KM). If the Mains Failure persists for more than [P.0] (seconds or minutes), the Mains contactor will open and the [P.1] timer will start to count. The Mains contactor will close only after the [P.2] timing.	[ 5'' ]	0	59mins
P.1	Mains Failure time. After the [P.0] timing (see above), the engine will start if the Mains Failure persists for the [P.1] time.	[ 5'' ]	0	23h
P.2	Mains Restore time. The Be42 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)	[ 5'' ]	0	23h

<b>Table 7.01B - Mains Failure Control</b> Note: [ xx " ] = seconds, [ xx ' ] = minutes, [ oFF ] = disabled					
Parameter Code & Description		Default	Min	Max	Options
P.3	Contactors changeover. This timing introduces a delay between the switching of the contactors.	[ 2'' ]	0.1secs	15.0secs	-
P.4	Under voltage limit. If the Phase-to-Phase voltage falls under this limit, the [P.0] timer will energize.	[320]	60V	998V	[oFF]
P.5	Over voltage limit. If the Phase-to-Phase voltage rises above the limit, the [P.0] timer will energise.	[500]	60V	998V	[oFF]
P.6	Under Hz limit. If the Phase-to-Phase frequency falls under the limit, the [P.0] timer will energize.	[47.0]	20.0Hz	70.0Hz	[oFF]
P.7	Over Hz limit. If the Phase-to-Phase frequency rises above the limit, the [P.0] timer will energise.	[53.0]	20.0Hz	70.0Hz	[oFF]
P.8	Phase Selection. It allows 3-Phase or Single Phase control (see section 16.30).	[3-P]	-	-	[3-P] [Ph-]

<b>Table 7.02A - GENERATOR PARAMETERS</b> Note: [ xx " ] = seconds, [ xx ' ] = minutes, [ oFF ] = disabled						
<b>Parameter Code &amp; Description</b>		<b>Mode (°)</b>	<b>Default</b>	<b>Min</b>	<b>Max</b>	<b>Options</b>
P.9	Under voltage (AUTO & TEST mode)	1	[320]	60V	998V	[oFF]
	Under voltage delay		[ 6" ]	1sec	15secs	-
P.10	Over voltage	2	[500]	60V	998V	[oFF]
	Over voltage delay		[ 2" ]	1sec	15secs	-
P.11	Under Hz (AUTO & TEST mode)	1	[47.0]	20.0Hz	70.0Hz	[oFF]
	Under Hz delay		[ 6" ]	1sec	15secs	-
P.12	Over Hz	2	[53.0]	20.0Hz	70.0Hz	[oFF]
	Over Hz delay		[ 1" ]	1sec	15secs	-
P.13	Current limit Warning	3	[oFF]	10A	2000A	[oFF]
	Current delay Warning		[ 1" ]	1sec	15mins	-
P.14	Over current shut down	1	[oFF]	10A	2000A	[oFF]
	Over current shut down delay		[ 1" ]	1sec	15mins	-

(°) Mode1: The engine shuts down after a cooling down time ((P.24)). (°) Mode2: The engine shuts down without a cooling down time.  
 (°) Mode3: The Be42 provides a warning if the parameters rise above the setting for the specified timing.

<b>Table 7.02B - GENERATOR PARAMETERS</b> Note: [ oFF ] = disabled, [ on ] = enabled						
<b>Parameter Code &amp; Description</b>			<b>Default</b>	<b>Min</b>	<b>Max</b>	<b>Options</b>
P.15	Alternator failure options. The alarm [E04] energizes if the voltage (or the frequency) is lower than the setting of P.9 (or P11) for more than 150 seconds.		[oFF]	-	-	[on] [oFF]
P.16	Alternator number of Poles. Options [2] or [4] allow you to display the engine speed.		[ 4 ]	2	4	-
P.17	Generator Contactor Control. The option [off] inhibits Load transfer to the generator in TEST mode (or remote TEST) when MAINS is present.		[oFF]	-	-	[on] [oFF]
P.18	CT size (/5Aac).		[500]	50A	2000A	-

**Table 7.03A - ENGINE PARAMETERS** Note: [ xx " ] = seconds, [ xx ' ] = minutes, [ oFF ] = disabled

Parameter Code & Description		Default	Min	Max	Options
P.19	Crank delay (it delays the cranking)	[ 2" ]	0	15secs	-
P.20	Crank time (maximum cranking time if the engine fails to start during the attempt)	[ 5" ]	1 sec	15secs	-
P.21	Rest time (pause of time between starting attempts)	[ 5" ]	3secs	15secs	-
P.22	Pre-glow time (see 'Modes' for the mode of operation)	[ oFF ]	1sec	59mins	[ oFF ]
	Modes (see the figure below)	[ 1 ]	-	-	1-2-3-4
P.23	Engine Warm up time	[ 15" ]	0	59mins	-
P.24	Engine Cooling time	[ 15" ]	0	59mins	-
P.25	Stop Solenoid timing (Energized to stop)	[ 15" ]	1sec	59mins	-
P.26	Crank termination setting (Charger Alternator)	[ 8.0 ]	3.0V	30.0V	[oFF]
	Belt break setting (Charger Alternator)	[ 8.0 ]	3.0V	30.0V	[oFF]
P.27	Crank termination setting (Generator Voltage)	[ 70 ]	60V	998V	[oFF]
P.28	Crank termination (GeneratorFrequency)	[25.0]	20.0Hz	70.0Hz	[oFF]

**Table 7.03B - ENGINE PARAMETERS** Note: [ xx " ] = seconds, [ xx ' ] = minutes, [ oFF ] = disabled

Parameter Code & Description		Default	Min	Max	Options
P.29	Low Oil pressure warning	[oFF]	0.1Bar	20.0 Bar	[oFF]
P.30	High engine temperature warning	[oFF]	40°C	250°C	[oFF]
P.31	Crank attempts (numbers)	[ 3 ]	3	15	-
P.32	Purge timing (for Gas fuelled engine)	[ 1" ]	1sec	15secs	-

<b>Table 7.04 - ALARM OPTIONS</b> Note: [ xx " ] = seconds, [ xx ' ] = minutes, [ oFF ] = disabled					
<b>Parameter Code &amp; Description</b>		<b>Default</b>	<b>Min</b>	<b>Max</b>	<b>Options</b>
P.33	Alarm bypass (for oil, temperature, auxiliary1-2-3-4 alarms)	[ 5" ]	2secs	90secs	-
P.34	Fail to stop alarm control (oFF = inhibited, on = enabled)	[oFF]	-	-	[oFF]/ [on]
P.35	Emergency contact type (Input #36). It generates the alarm [Er.08]	[n.c.]	-	-	[n.o. / n.c.]
P.36	No fuel bypass timeout (it starts to count when you activate the Low Fuel Input, terminal #33)	[ 5' ]	15secs	99mins	[oFF]
P.37	Low fuel % limit	[oFF]	1%	99%	[oFF]
P.38	High fuel % limit	[oFF]	1%	99%	[oFF]
P.39	Engine Temperature Switch type (input # 34)	[n.o.]	-	-	[n.o. / n.c.]

<b>Table 7.05 - MISCELLANEOUS</b> Note: [ xx " ] = seconds, [ xx ' ] = minutes, [ oFF ] = disabled					
<b>Parameter Code &amp; Description</b>		<b>Default</b>	<b>Min</b>	<b>Max</b>	<b>Options</b>
P.40	EJP time	[ 5" ]	1 sec	99 mins	-
P.41	Periodic Test interval (see 16.10)	[oFF]	2 hours	9999h	[oFF]
P.42	Periodic Test duration (see 16.10)	[ 5' ]	1 min	99 mins	-
P.43	Test timeout ([oFF]= no timeout). It limits the running time in case of TEST initiated by a MODBUS command.	[ 5' ]	1 min	99 mins	[oFF]
P.44	Maintenance SERVICE 1 (for the use, see section 16.40)	[oFF]	1h	9999h	[oFF]
P.45/46	Maintenance SERVICE 2 /3 (for the use, see section 16.40)	[oFF]	1h	9999h	[oFF]
P.47	Rental Contract Setting (see section 16.40)	[oFF]	1h	9999h	[oFF]
P.48	NFPA - 110 Level 1&2	[on]	-	-	[on]/[oFF]
P.49	RS485 Node Address	[ 1 ]	1	127	-
P.50	Horn timeout (see section 8.0)	[ 5" ]	5secs	15mins	[oFF]
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).	[ 0 ]	0h	50.000	[oFF]

Table 7.06 - Programmable inputs (see options list in table 7.07)							
Parameter		Options	Default	Parameter		Options	Default
[InP.1]	Option available	[0] - - - [28]	[2]	[InP.3]	Option available	[0] - - - [28]	[10]
	Contact type	[n.o.][n.c.]	[n.o.]		Contact type	[n.o.][n.c.]	[n.o.]
[InP.2]	Option available	[0] - - - [28]	[13]	[InP.4]	Option available	[0] - - - [28]	[15]
	Contac_t type	[n.o.][n.c.]	[n.o.]		Contact type	[n.o. ][n.c.]	[n.o.]

Table 7.07 - Input Options List			
Note: (+) Indicates the factory programming; (v) Indicates a valid option for the input			
Option		Option	
[ 0 ]	Off: disables the input	[ 14 ]	Generator simulation ON
[ 1 ]	Immediate Stop	[ 15 ]	Mains Simulated ON
[ 2 ]	Bypass and Stop	[ 16 ]	Front panel LEDs test
[ 3 ]	Cooling and Stop	[ 17 ]	Horn silence
[ 4 ]	Bypass+Cooling and Stop	[ 18 ]	Display Right Pushbutton
[ 5 ]	Warning only (^)	[ 19 ]	Display Left Pushbutton
[ 6 ]	Bypass and Warning	[ 20 ]	Overload Input Warning
[ 7 ]	Remote Manual Mode (^^)	[ 21 ]	Overload Input Shutdown
[ 8 ]	Remote Auto Mode (^^)	[ 22 ]	KG Forced closed
[ 9 ]	Remote Off Mode (^^)	[ 23 ]	KM Forced closed
[ 10 ]	Remote Engine Test	[ 24 ]	KG LED Feedback
[ 11 ]	Remote Generator Test	[ 25 ]	KM LED Feedback
[ 12 ]	Ejp function	[ 26 ]	Idle Engine
[ 13 ]	Remote LOCK	[ 27 ]	Manual STARTpushbutton
		[ 28 ]	Manual STOP pushbutton

(^) The Be42 detects the alarm if the engine is running  
 (^^) We recommend the use of an AUTO-OFF-MAN switch

7.08 - Programmable Outputs						
Parameter Code & description		Default	Parameter Code &description		Default	Options
[Out.1]	Output 1	[ 39 ]	[Out.3]	Output 3	[ 54 ]	see 7.09
[Out.2]	Output 2	[ 29 ]	[Out.4]	Output 4	[ 57 ]	see 7.09



**Table 7.09 - Output Options Table**

Option & description		Option & description	
[ 0 ]	Output is disabled	[32]	Alarm form Input 2: Shutdown/Warning
[ 1 ]	Under Frequency Shutdown	[33]	Alarm form Input 3: Shutdown/Warning
[ 2 ]	Over Frequency Shutdown	[34]	Alarm form Input 4: Shutdown/Warning
[ 3 ]	Over Current Shutdown	[35]	Cumulative Oil Alarms
[ 4 ]	Over Current Warning	[36]	Cumulative Temperature Alarms
[ 5 ]	Overload Warning or Shutdown (^^^)	[37]	Cumulative Alternator Alarms
[ 6 ]	Over Voltage Shutdown	[38]	Common Fuel Alarms
[ 7 ]	Under Voltage Shutdown	[39]	Horn Output (See table 7.05 [P50])
[ 8 ]	Alternator Failure Shutdown	[40]	Crank Delay (Start Warning)
[ 9 ]	Low Oil Pressure Warning	[41]	Presence of Nominal Mains Parameters
[10]	Low Oil Pressure Shutdown	[42]	Mains Failure Timing
[11]	Oil Sender Failure Warning	[43]	Mains Restore Timing
[12]	High Temperature Warning	[44]	KG Status
[13]	Temperature Switch Shutdown	[45]	KM Status
[14]	Temperature Sender Failure Warning	[46]	Pre-glow MODE 1/2/3/4
[15]	Low Battery Voltage Warning	[47]	PURGE (gas engine valve control)
[16]	High Battery Voltage Warning	[48]	RENT<48h
[17]	Low Fuel Shutdown (switch)	[49]	RENT=0h (Expired)
[18]	Fuel Low Warning (sensor)	[50]	Engine Running Status
[19]	Fuel Reserve Warning (switch)	[51]	Presence of Nominal Generator Voltage
[20]	Fuel high Warning (sensor)	[52]	BE42 in OFF MODE (Status)
[21]	Fuel Sender Failure Warning	[53]	BE42 in MANUAL MODE (Status)
[22]	Emergency Stop Shutdown (Er08)	[54]	BE42 in AUTO MODE (Status)
[23]	Stop Pushbutton Used in AUTO (Er09)	[55]	BE42 in TEST MODE (Status)
[24]	Maintenance SERVICE 1 (Er10)	[56]	BE42 in LOCK MODE (Status)
[25]	Maintenance SERVICE 2 (Er10)	[57]	Be42 runs the Automatic Periodic Test
[26]	Maintenance SERVICE 3 (Er10)	[58]	Cooling Timing
[27]	Engine Belt Break Shutdown	[59]	Warm up Timing
[28]	Fail To START Shutdown	[60]	Cycling mode (Logical OR of engine running and stop solenoid)
[29]	Fail To STOP Shutdown	[61]	Start Pilot repeat output (it repeats the crank output terminal #9)
[30]	Indication of Parameter Error warning	-	--
[31]	Alarm form Input 1: Shutdown/Warning	-	--

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

**Table 7.10 - Oil Pressure Sensor Settings**

Display	Parameter	Default	Range
[Pr.1]	Pressure	[ 0.0] Bar	0 up to 20 Bar 0 up to 2000 Ohm
[-r1-]	Resistance	[ 10] Ohm	
[Pr.2]	Pressure	[ 2.0] Bar	
[-r2-]	Resistance	[ 51] Ohm	
[Pr.3]	Pressure	[ 4.0] Bar	
[-r3-]	Resistance	[ 86] Ohm	
[Pr.4]	Pressure	[ 6.0] Bar	
[-r4-]	Resistance	[ 122] Ohm	
[Pr.5]	Pressure	[ 8.0] Bar	
[-r5-]	Resistance	[ 152] Ohm	
[Pr.6]	Pressure	[ 10.0] Bar	
[-r6-]	Resistance	[ 180] Ohm	

7.11 - Temperature Sensor				7.12 - Fuel Level Sensor			
Display	Parameter	Default	Range	Display	Parameter	Default	Range
[°C1]	Temperature	[ 128]	0°C up to 250°C 0 Ohm up to 2000 Ohm	[FUE1]	Fuel Level	[ 0 ]	0% up to 99% 0 Ohm up to 2000 Ohm
[-r1-]	Resistance	[ 19 ]		[-r1-]	Resistance	[ 10 ]	
[°C 2]	Temperature	[ 115]		[FUE2]	Fuel Level	[ 20 ]	
[-r2-]	Resistance	[ 26]		[-r2-]	Resistance	[ 50 ]	
[°C 3]	Temperature	[ 90]		[FUE3]	Fuel Level	[ 50 ]	
[-r3- ]	Resistance	[ 46]		[-r3-]	Resistance	[ 100]	
[°C 4]	Temperature	[ 80]		[FUE4]	Fuel Level	[ 80]	
[-r4- ]	Resistance	[ 67]		[-r4-]	Resistance	[ 150]	
[°C 5]	Temperature	[ 70]		[FUE5]	Fuel Level	[ 90]	
[-r5- ]	Resistance	[ 95]		[-r5-]	Resistance	[ 200]	
[°C 6]	Temperature	[ 40]		[FUE6]	Fuel Level	[ 99]	
[-r6- ]	Resistance	[ 287]		[-r6-]	Resistance	[ 250]	

**Section 8.0 - Alarms, Warnings and Shutdowns**

The Be42 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. Follows 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 Be42 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 Be42 to control a PUMP SET, we recommend the use of the following settings:

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

## **Section 11.0 Engine Running Detect (Charger Alternator)**

The B42 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 0V. As soon as the B42 starts the engine, a voltage appears in the D+/WL terminal (0.8 to 2.5V). When the engine starts running, the voltage of the D+/WL terminal increases by up to 3V-6V. When the engine runs, the voltage reaches 14V (28V) needed to charge the battery. The safest point to disconnect the starter motor is between 6V to 10V. The default parameter of [P.26] is 8.0V. This value is recommended for engines using 12V batteries. For 24V batteries, we recommend that you set the threshold to 16V.

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 B42 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 12.0Vdc 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 2 seconds, until the yellow LED [h/Prog.] starts to blink and display indicates [-CAL]; release the buttons.
- 3)** - If the Be42 programming is password protected, the message [42.42] will appear; follow the instructions in table 6.11. If the Be42 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 395V).
- 3) - Press the [TEST ↑] (or [AUTO ↓]) to adjust the reading according to an external reference (example 400V).
- 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 Be42 saves the calibrations and remains in Manual mode.

**Table 12-2, List of the Measurements**

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

(°)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**

***note: you are required to stop the engine before clearing the memory***

- Remove the supply. Push and hold [I-F3] & [I-F5] pushbuttons simultaneously and apply the Vdc supply.
- Push the pushbuttons according to the message that appears on display (in a sequence)
- After pushing the last pushbutton [AUTO], the message [-EPP] will appear
- Remove the supply and re-program the controller according to your need. We recommend to program a password in order to limit the access.

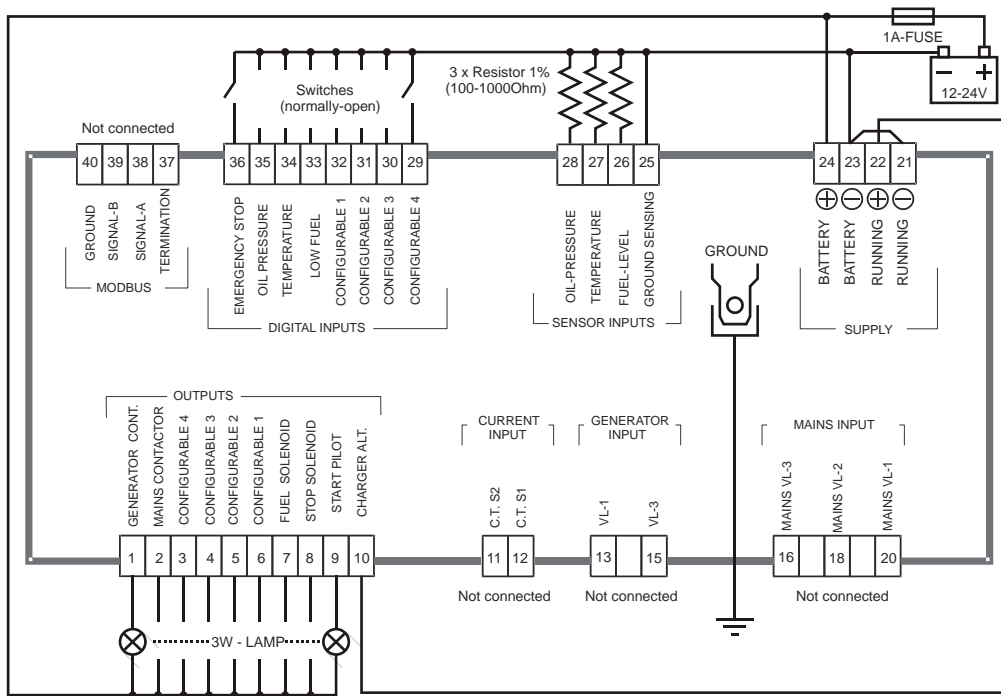
**Section 13.0 Troubleshooting Guide**

The Basic Troubleshooting Guide is intended to provide you with a guide to problems that you may experience with the Be42. 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 be carried out by qualified personnel only.

**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.

Section13.1 - Be42 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 Table13.1 or 13.2, the Be42 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**

Pushbutton	Display Code	Pushbutton	Display Code
[START-F1]	[ F1 ]	[OFF-F7 ]	[ F7 ]
[STOP-F2]	[ F2 ]	[AUTO↓]	[auto]
[ I-F3 ]	[ F3 ]	[TEST↑]	[tESt]
[ O-F4 ]	[ F4 ]	[←F8]	[ F8 ]
[ I-F5 ]	[ F5 ]	[F9→]	[ F9 ]
[ MAN-F6 ]	[ F6 ]	[ACK-F10]	[ F10]

**13.2 Testing the Inputs**

Plug the input connector (#29 up to #36). 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 inputs are connected together (or some of them in short circuit), the display indicates the messages in sequence.

**Table 13.2**

Terminal number (function)	Display Code	Terminal number (function)	Display Code
#29 (Input 4)	[ inP 4]	#33 (Low fuel)	[ FUEL]
#30 (Input 3)	[ inP 3]	#34 (Temperature)	[ tEMP]
#31 (Input 2)	[ inP 2]	#35 (Oil pressure)	[ oil]
#32 (Input 1)	[ inP 1]	#36 (Emergency)	[ EMER]

**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 Be42 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 Be42 is damaged and should be returned for service.

**Table 13.3: Outputs true table**

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

**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.
  - 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 Be42 is damaged and should be returned for service.
- You can apply Voltages and Current in order to verify the performance of the controller. Apply signals as closer as you can to 'Recommended range' (see the table below)

**Table 13.4: Senders and Analog inputs true table**

Pushbutton	Display Code (°)	Terminal number	Function	Recommended range
[I-F5]	[XXXX]	# 26	Fuel Level Sensor	100-1000 Ohm
[O-F4]	[XXXX]	# 27	Temperature Sensor	100-1000 Ohm
[I-F3]	[XXXX]	# 28	Oil Pressure Sensor	100-1000 Ohm
[START]	[UXXX]	#13-15	Voltage of the Generator	400Vac
[AUTO]	[MXXXX]	#16-18-20	Voltage of the Mains	400Vac
[MAN]	[cXX.X]	#21-22	Voltage of the charger Alternator	10-24 VDC
[OFF]	[bXX.X]	#23-24	Voltage of the Battery	10-24 VDC
[←F8]	[GXX.X]	#13-15	Frequency of the Generator	50Hz
[F9→]	[MXX.X]	#16-18-20	Frequency of the Mains	50Hz
[STOP]	[XXXX]	#11-12	Current of the Generator	100A

(°)Note. [XXXX] indicates a 4 digit number.

Note: If readings are within +/- 3% tolerance, the Be42 is working well. You can increase the precision by using the calibration (see section 12.0). If the readings are outside + / - 3% tolerance, the Be42 is damaged and should be returned for service.

**To exit the Troubleshooting, remove the Vdc supply at anytime**

**Section 14.0 General Specifications**

**Supply Voltage [\*\*\*]:** 4.5Vdc to 36Vdc. **Protection:** internal 300mA thermal fuse. **Supply Current:** 50 mA up to 150mA  
**Non repetitive Supply Over Voltage [ @ 100ms]:** 80Vdc ,[ @ 10ms ] : 200Vdc (a 1A fuse fast must be provided in series to the power supply terminal #24. It must blow within 300ms at 1A current).

**Dimensions:** 224mm X 105mm X 68mm, **Panel Cut-out:** 190mm X 93mm, indoor operation  
**Operating Temperature range:** -30 deg C up to +70 deg C. **Humidity Range:** 5% up to 95% non-condensing.

**Weight:** 850 gr., **Vibration:** 40mm/sec

**General Design:** 89/336 EEC, 89/392 EEC, 73/23 EEC, 93/68 EEC, IEC 68-2-6 **Certification:** CE

**Static Output Characteristics**

Output Current: 300mA/100Vdc (internal AUTO-reset 700mA Fuse is provided). Logic: negative.

**Mains and Generator Voltage Input**

Nominal Voltage input: 70 Vac up to 600Vac

Over voltage admitted: 4KVac for one second. Measurement precision: +/- 2% [\*\*]. Input impedance: 2 Mega Ohm

**Current Transformer Input**

Size: 10/5Aac up to 2000/5Aac. Maximum Over Current: 8Aac for 30 seconds.

Measurement precision: +/- 2% [\*\*]. Internal resistance: 0.05 Ohm

**Digital /Analog Inputs**

Open circuit voltage: 10Vdc (12V supply) or 22Vdc (24V supply) - Closed circuit current: 15mAdc maximum.

Trigger level for digital inputs: < 2Vdc.

**Charger Alternator Monitoring**

Operating Voltage up to 36Vdc. Vdc reading accuracy +/- 5%. Excitation Power: max 3W

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

Firmware Versions	Date	Description
4.0.XX	July 2009	First release
5.0.XX	December 2010	When you connect the DC supply, the Be42 displays the version of software (example 5.0.92) and then, the date of production in the form [WW.YY] (WW= number of the week of the year and YY= last significant digits of the year). Example 48.10: week 48 of year 2010. We recommend that you use a 1A Fuse (FAST time-blowing) to protect against large spikes on VDC supply.

**Section 16.0 Application Notes**

**16.10 - Automatic Periodic Test (hereinafter A.P.T)**

The Be42 does not use an internal real time clock for the programmed days ([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 to follow the instructions (D) & (E).

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

- A) - Enter the 'Program Mode' and set [P.41] to [ 7 ] days.
  - 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 Be42 will start the engine after the programmed days. The engine will run OFF-LOAD for 20 minutes. If the Mains fails during the A.P.T., the B42 will transfer the load to the generator.

***IMPORTANT NOTICE** If the Vdc voltage supply is removed, the Be42 loses count of the days. If the supply restores, the Be42 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 Be42 A.T.S Controller**

To use the Be42 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**

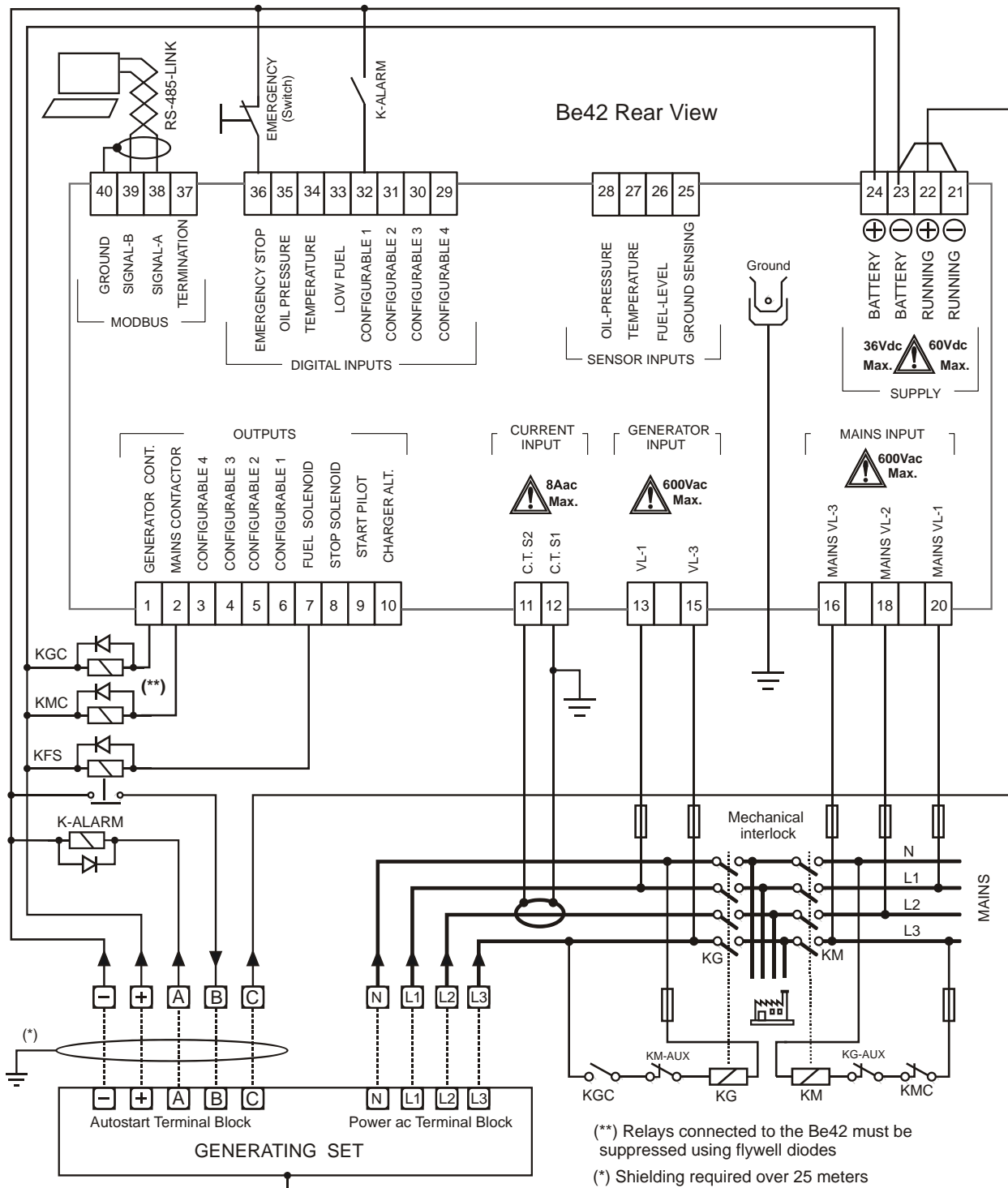
Program the parameter P.8 in [Ph-n] mode (see section 7.01B) and connect Mains to terminals #20 (VL1) and #18 (VL2). You are required to adjust the parameters [P4] and [P5] according to your needs.

**16.40 - Maintenance & Rental Timers**

Once a timer expires, the Be42 indicates the [Er.10] on display. To clear the alarm(s), enter and exit the programming mode (without modify parameters). The timers will restart the count of the programmed maintenance period. 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).

**16.50 - Panel & Gen-set Builders Notes**

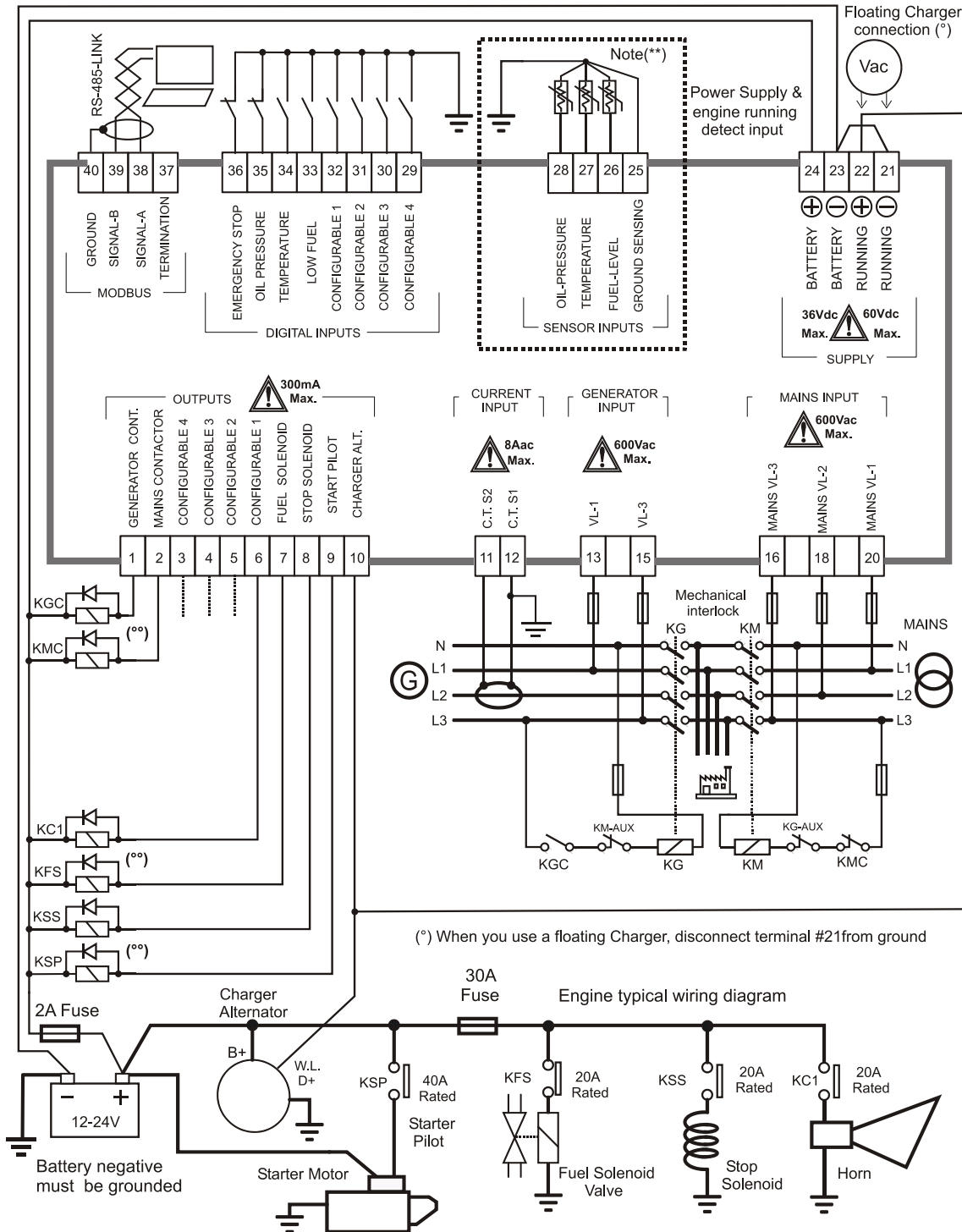




- |   |   |                              |
|---|---|------------------------------|
| <b>-</b> Battery Minus                              | <b>B</b> Genset Remote Start Input (Negative logic=Start) | <b>L1</b> Generator Phase L1 |
| <b>+</b> Battery Plus (6-33Vdc)                     | <b>C</b> Engine Running Output (Positive logic=Running)   | <b>L2</b> Generator Phase L2 |
| <b>A</b> Genset Alarm Output (Positive logic=Alarm) | <b>N</b> Generator Neutral                                | <b>L3</b> Generator Phase L3 |

### 18.0 Typical application wiring

**NOTE: a minimum of 4KVac insulation is recommended for the relays KGC and KMC, A fuse of 1A (fast-blow) in series with terminal #24 is recommended to protect against large spikes on power supply.**

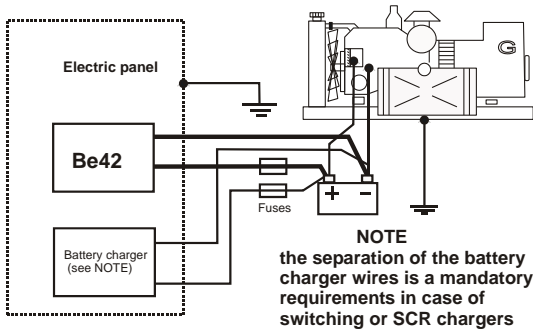


(°) When you use a floating Charger, disconnect terminal #21 from ground

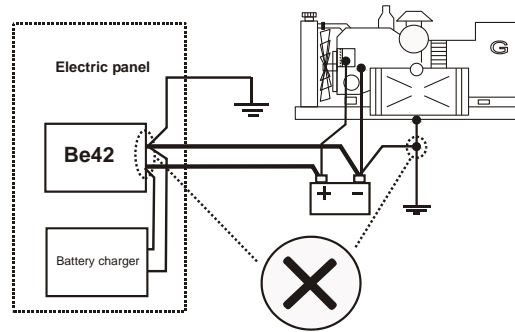
(°°) Relays connected to the Be42 must be suppressed using flywheel diodes

(\*\*) These connections are not available in the controller Be42-N

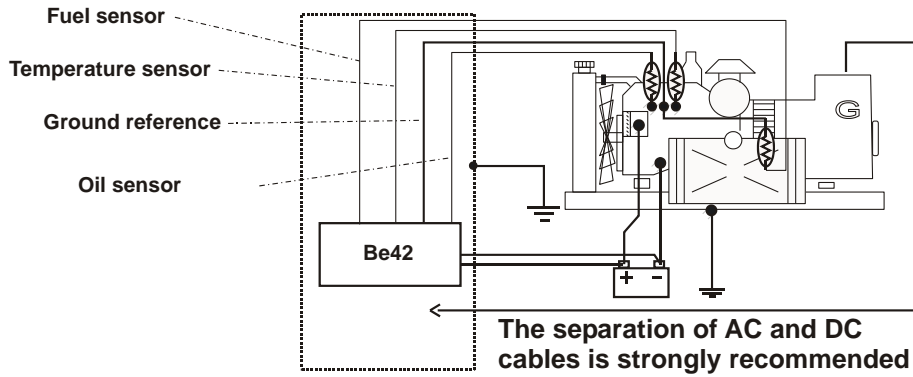
Recommended power supply wiring



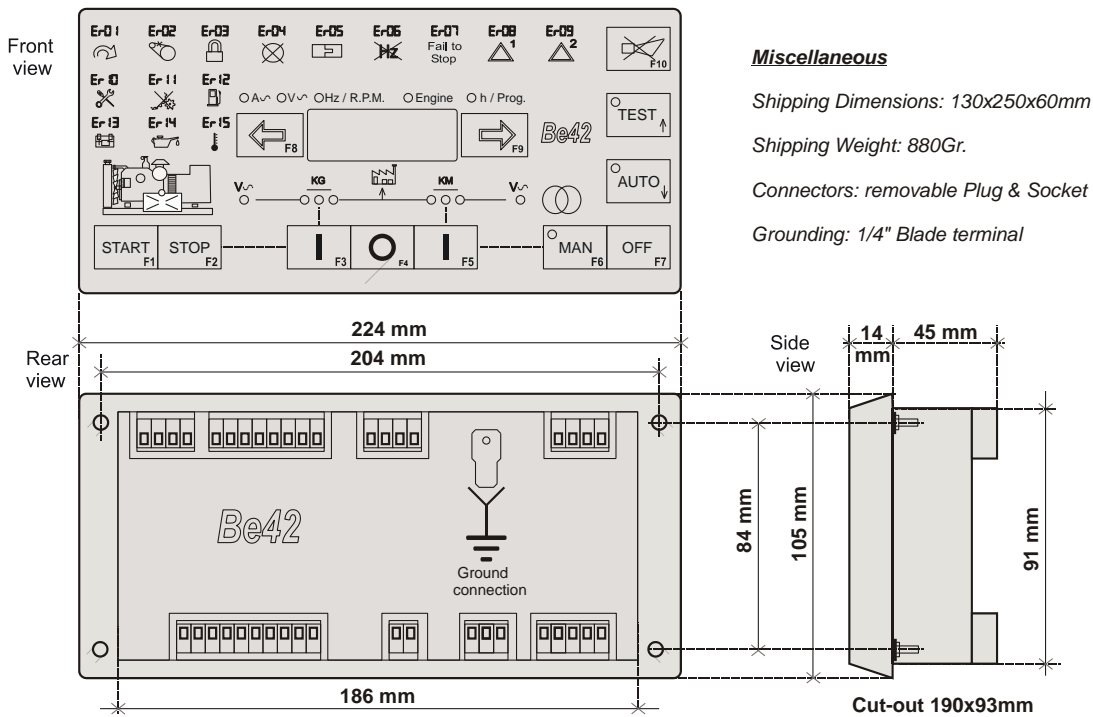
Not Recommended wiring



Sensors wiring



**Section 20: Dimensions & Miscellaneous**



**Section 21.0: Connections description**

Terminal	Description	Note	Section
1	Generator Contactor output	300mA Active 'Low'	2.21
2	Mains Contactor output		
3	Programmable output '4'		7.09
4	Programmable output '3'		
5	Programmable output '2'		
6	Programmable output '1'		
7	Fuel Solenoid output		18.0
8	Stop Solenoid output		
9	Crank Pilot output		
10	Alternator Excitement output	Positive Output 3W	11.0
11	Current Transformer 'L1' S1 input	5Aac nominal; Max 8Aac	7.02B ([P.18])
12	Current Transformer 'L1' S2 input		
13	Generator Voltage' Phase L1' input	600Vac rated	7.02B
14	Not connected		
15	Generator Voltage 'Phase L3' input		
16	Mains Voltage 'Phase L3' input		7.01A
17	Not connected		
18	Mains Voltage 'Phase L2' input		
19	Not connected		
20	Mains Voltage' Phase L1' input		
21	Engine Running Minus detect	Connect to ground	11.0
22	Engine Running Plus detect	D+ or W.L. sensing	
23	Supply Battery minus connection	-	14.0
24	Supply +12 or +24V Battery connection	Internal 300mA fuse	
25	Common Sender ground sense	-	19.0
26	Fuel Level Sender input	2000 Ohm max	7.12
27	Temperature Sender input		7.11
28	Oil Pressure Sender input		7.10
29	Programmable input Switch '4'	Active Low (<2Vdc)	7.07
30	Programmable input Switch '3'		
31	Programmable input Switch '2'		
32	Programmable input Switch '1'		
33	Low Fuel Switch input		18.0
34	High Temperature Switch input		
35	Low Oil Pressure Switch input		
36	Emergency Stop Switch input		
37	RS485 Termination	See RS485 standard	See Be42 MODBUS user manual
38	RS485 Signal A		
39	RS485 Signal B		
40	RS485 Common Ground		

**!! WARNING !! Relays and solenoids connected to the Be42 must be suppressed using flywheel diodes or suppression devices as indicated in section 18.0. We recommend that you connect a 1A Fuse (fast BLOWING) in series to the terminal #24; it will protect the controller against large spikes on the power supply.**