
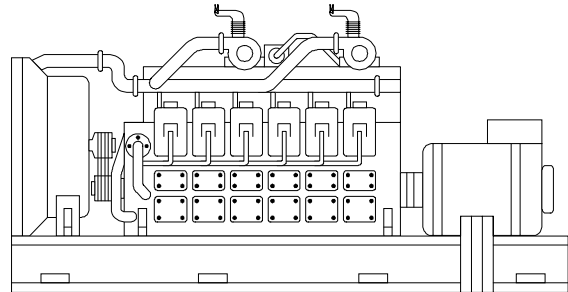
 Genset Automation Systems	<b>Document:</b> Data Sheet <b>Version:</b> 2 <b>Status:</b> Replaces prev. versions <b>Author:</b> wl <b>Date:</b> 21.8.00 <b>Approved:</b> wl <b>Date:</b> 21.8.00 <b>File:</b> PC	<b>BERNINI</b> <b>Engine and Genset</b> <b>Automation</b>	 HUEGLI TECH LTD SWITZERLAND Tel.: + 41-62-916 50 30 Fax. + 41-62-916 50 35
--	---	---	--

# PRODUCT OVERVIEW

## September 2000

### Features and benefits

Bernini Manufactures Universal Automation Equipment for Diesel Engines and Standby Gensets. Overall Features are CE-Conformity, 3 Years Warranty and a Professional Design. Bernini Control and Automation Systems are Proofed for their Reliability and Durability in Thousands of Applications on Engine Frames or in Cabinets. All Shipments Come Along with a Professional User Manual.



### Why AMF / Protection Units?

A Hardware Wiring of Fault Alarms and Protection Circuits is a Complicated, Expensive and Failure Rated Way to Protect Standard Applications like Gensets or Engines. Furthermore, the Compact Units Save Lots of Space! Just Use BERNINI's Advanced Protection and Automation Modules, then Plug and Play!

# BERNINI

## Universal Engine and Genset Automation and Protection

### BE20 - Engine Protection / Control

BE20 is a compact control and protection system for diesel engines. It can easily be mounted on different kind of engine frames or be put in a cabinet. BE20 monitors oil pressure, fuel level, battery voltage, dynamo plus (belt break) and generates alarms in abnormal engine conditions. Belt-break or charge failure can be detected by monitoring the alternator voltage. Alternator excitation is also provided via this connection. Any alarm input is connected to protection switches, has LED indication and is memory resident until the key-switch is turned in 'OFF' position. Except 'LOW FUEL LEVEL' any alarm stops the engine. An external emergency stop input is provided for remote stop.

During engine cranking and for a short time afterwards, all relevant alarm inputs are overwritten in order to let the engine achieve a normal running condition. Once the timer has expired, normal fault protection is provided by the module.

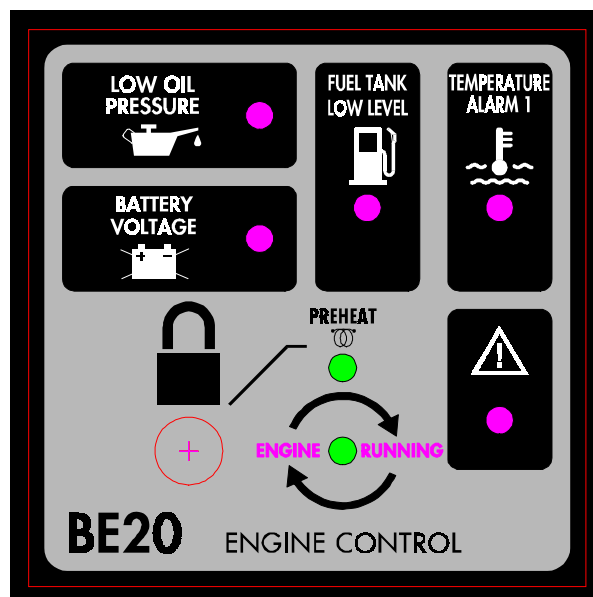
### Features

Indication of the following engine conditions (\*stops the engine):

- Low oil pressure\*
- External emergency stop\*
- Low battery voltage/belt-break\*
- Engine running
- High coolant temperature\*
- Low fuel level
- Preheat

Relay outputs for:

- Start
- Alarm output
- Glow preheat
- Stop solenoid
- Fuel solenoid (electric fuel valve)



### General characteristics

#### Supply

7Vdc To 18Vdc (12V Version),  
16Vdc To 33Vdc (24V Version), 130mA max.

#### Maximum Over Voltage

200V (8/20 Microseconds)

#### Relay Rating

250Vac/3A

#### Static Output

12V/24V 0.2A, Short Circuit Protected

#### Engine/Field Inputs

Contacts Closed to Ground

#### Dynamo/Charge Alternator

2,5W 12Vdc Or 24Vdc

#### Dimensions and Weight

96x96x70mm, 400 grs.

#### Operating Temperature

-25° C To 60° C (R.H. 95%)

#### Vibration

9G (10-100Hz), 10ms

#### Design

Meets EN 50081-1-2, 50082-1-2, 60801-2,  
61003-1, EN 60546-1, CE Mark

#### Warranty

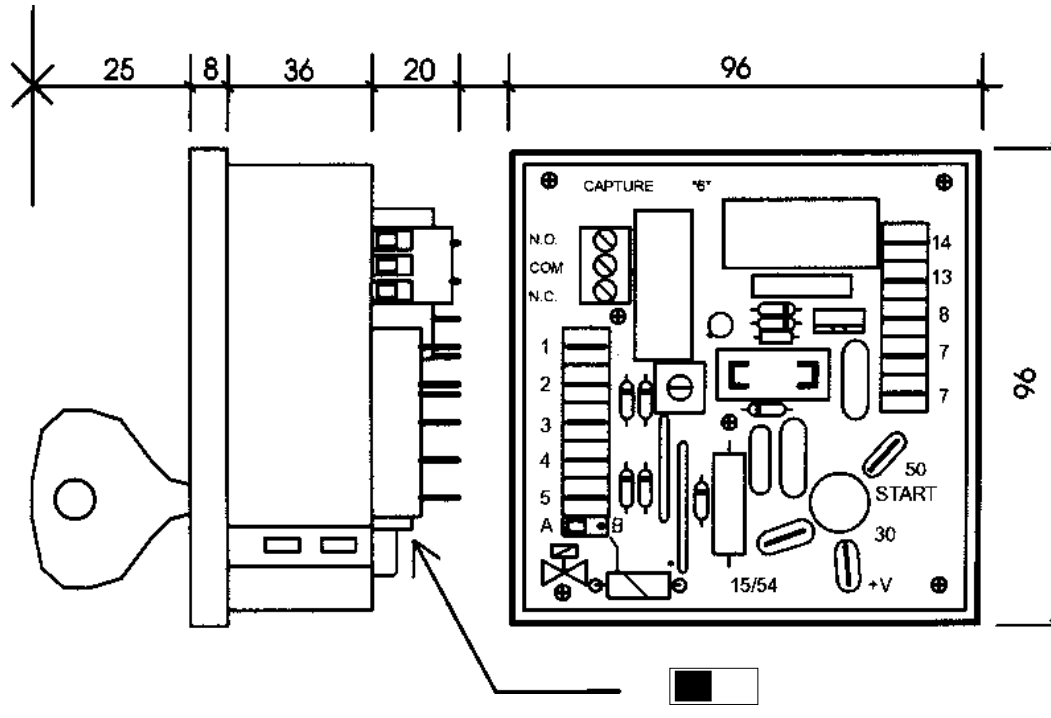
3 Years

# BERNINI

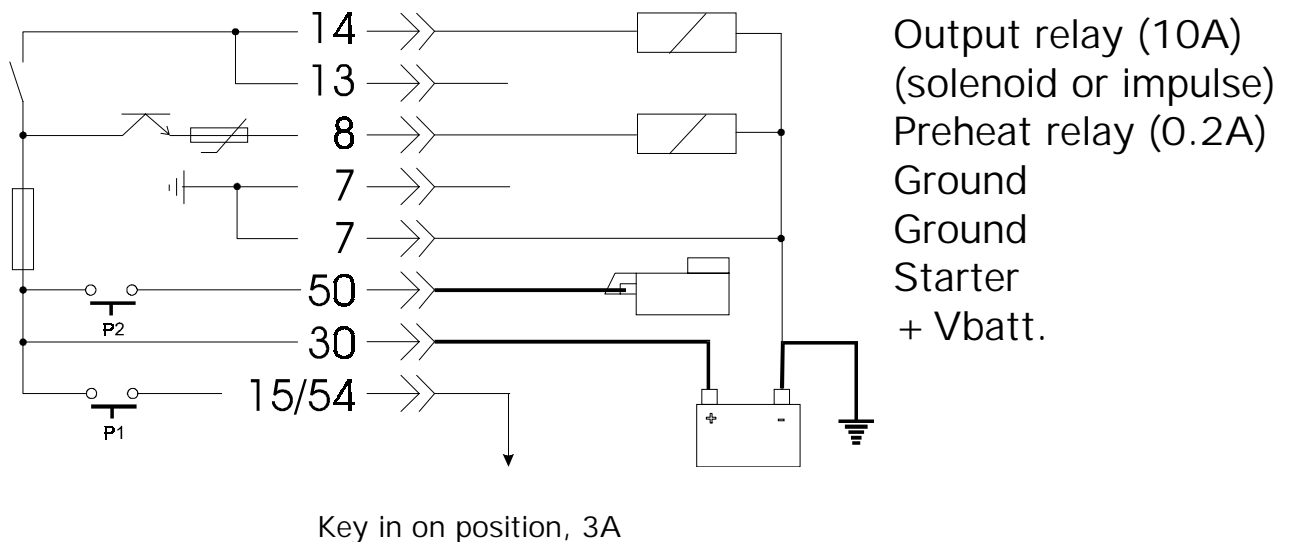
Universal Engine and Genset Automation and Protection

## BE20 - Engine Protection / Control

### Case Dimensions



### Typical Connections



# BERNINI

## Universal Engine and Genset Automation and Protection

### BE11 - Genset Automation

#### 1 Phase AMF Module, 12 or 24V

BE11 is a basic 1-phase automatic Mains failure module including protection for (STANDBY) GENSETS. It uses an advanced single chip microcomputer for an easy and trouble free GENSET control in case of Mains power failures. If Mains fails (over-/under voltage, loss of Mains), the BE11 initiates ('AUTO' and 'TEST' mode only) an automatic Genset start cycle including load transfer to the generator by switching the Mains/generator contactors. After Mains is restored, the load will be automatically transferred back to Mains and the Genset will stop after a cooling down time. In 'MAN' mode, the load transfer from Mains to generator and vice versa must be provided by external wiring. During all cycles, the engine and generator are fully protected against malfunction. All alarms occurring at abnormal Genset conditions are computed and displayed either by LED or the 3 digit display. They stop, if necessary, the Genset by protection switches.

Values of voltage to initiate Genset start and timer settings for preheat, cooling down time etc. are free programmable.

The basic BE11 can be upgraded by adding the 3-phase module BE11-3 (for unbalanced loads) with prefabricated AMP MATE-N-LOCK connectors.

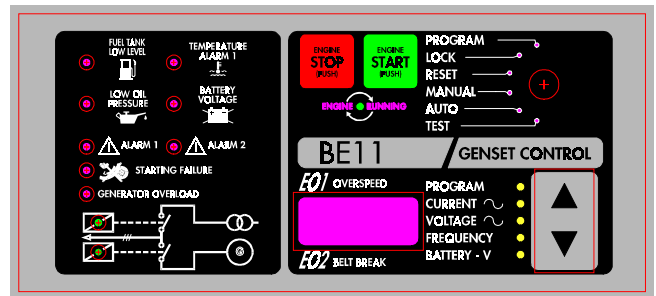
The BE11 has 20 powerful automatic programmable parameters to fit the program flow to customers needs. The BE11 is designed to be mounted directly on the engine frame or in cabinets.

#### Option BE11-3

3-phase option for BE11-12V/24V (measures T-N and L3-N voltages). This additional unit provides 3-phase voltage protection for the BE11-series. The voltages of the phases L1-L2 (Mains) and R-S (generator) are sampled to detect unbalanced loads on the Mains in order to start the GENSET in any Mains failure situation. Calibration range 320-360Vac. Power supply range from 7Vdc to 33Vdc.

#### Features

- Manual and automatic Mains failure contr.
- Display of V-Hz-A-hours, Mains or generator
- 20 programmable parameters
- No external programming equipment needed
- Current transformer ratio programmable
- Alternator excitation circuit



- 9 Digital inputs, 6 relay outputs
- Relay output for Mains/generator contactor
- Various timer and level settings
- Periodic start/stop for test/safety purpose
- Alarm indication LED or display/Lamp test
- Mains on simulation input
- External (remote) lock input
- Option: 3-phase upgrade BE11-3

#### General characteristics

##### Supply

8-18Vdc (Be11-12V) or 18-33Vdc (Be11-24V),  
40-150 mA

##### Current Transformer

5Aac Continuously (Ratio Programmable)

##### Vac Inputs Ratings

Continuously 300Vac max.

##### Vac Maximum Over Voltage

1000V / 1min or 5000V (8/20 Microseconds)

##### Relay Outputs

3a/12 To 24Vdc

##### Engine/Periphery Inputs

Contacts Closed to Ground

##### Dynamo/Charge Alternator

2,5W 12Vdc or 24Vdc

##### Dimensions And Weight

Front Panel: 212x104x60mm, Hole:190x91mm,  
Weight: 850gr.

##### Terminals AMP Mate-N-Lock

##### Operating Temperature

-25 To 55 °C (R.H. 95%)

##### Display Accuracy

+/- 1%, +/- 1 LSD (Least Significant Digit)

##### Vibration

8g @ 10ms (10-100hz)

##### Design

Meets EN 50081-1-2, 50082-1-2, 60801-2,  
61003-1, EN 60546-1, CE Mark

##### Warranty

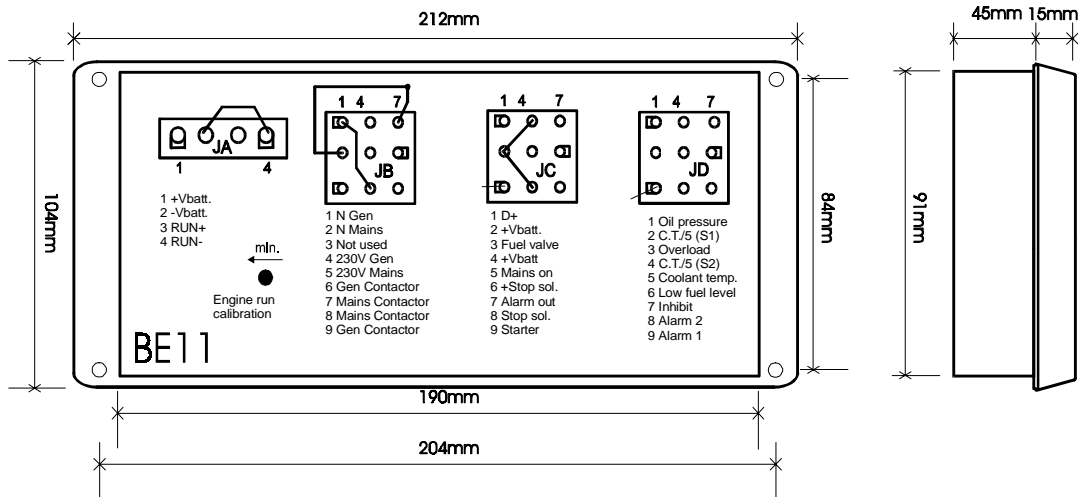
3 Years

# BERNINI

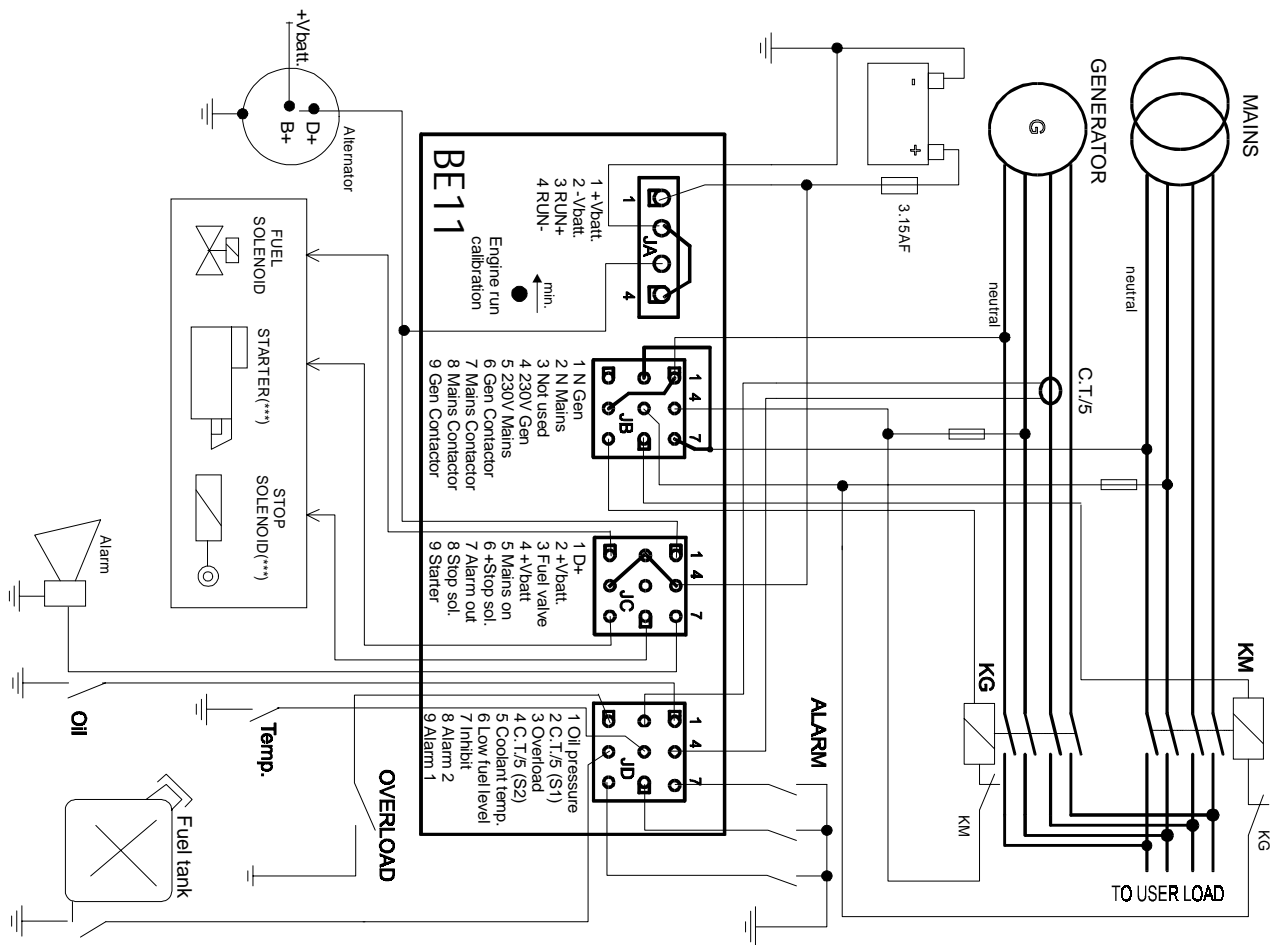
## Universal Engine and Genset Automation and Protection

### BE11 - Genset Automation

#### Case Dimensions



#### Typical Connections



# BERNINI

## Universal Engine and Genset Automation and Protection

### BE32 / BE32-N

#### Genset Automation 3 Phase AMF Module, 12 - 24V

BE 32 is a 3-phase automatic Mains failure module including protections for stand-by Gensets and Prime Movers.

If Mains fails (over-/under frequency, over-/under voltage, loss of Mains), the BE32 initiates ('AUTO' mode) an automatic Genset start cycle including load transfer to the generator by switching the Mains/generator contactors. After Mains is restored, the load will be automatically transferred back to Mains and the Genset will stop after a cooling down time. In 'MAN' mode, the load transfer from Mains to generator and vice versa must be provided by external wiring.

During all cycles, the engine and generator are fully protected against malfunction. All alarms occurring at abnormal Genset conditions are computed and displayed either by LED or the 3 digit display. They stop, if necessary, the Genset by protection switches. VDE sensors for oil pressure and water temperature can be used for indication on the 3 digit display.

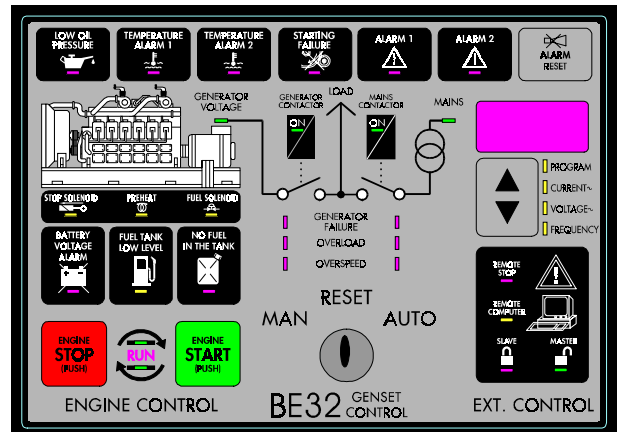
The BE32 has 25 powerful programmable parameters to fit the program flow to customers needs such as free programmable C.T. ratio and over current settings. Values of voltage, and frequency to initiate Genset start in AMF mode and timer settings for preheat, cooling down time, etc. can be set. BE32 is designed to be mounted in cabinets and protected environments.

#### Option BE32-N

An RS232-C interface and software is provided for data management and parameter programming via PC. In connection with a modem, complete remote control and monitoring is possible.

#### Features

- Manual and automatic Mains failure contr.
- Display of V-Hz-A-hours, Mains or Generator
- 25 fully programmable parameters
- No external programming equipment needed
- Current transformer ratio free programmable
- Alternator excitation circuit
- 12 Digital inputs, 7 relay and 8 static outputs
- Relay output for Mains/generator contactor
- Various timer and level settings
- Periodic start/stop for test/safety purpose
- Alarm indication LED or display/Lamp test



- Mains on simulation input
- Remote test (external enable/disable) input
- Alternator failure (non-charging/belt-break)
- Analogue inputs for oil and water (VDO)
- BE32-N: Interface RS232-C&Software

#### General Characteristics

##### Supply

7Vdc to 33Vdc, 40 to 150 mA, Separated Conn.

##### Current Transformer

5Aac Continuously (Ratio Programmable)

##### Vac Inputs Ratings

Continuously 600Vac Max. Line to Line

##### Vac Maximum

2000Vac Line to Line/2min or 5000V (8/20 $\mu$ s)

##### Static Outputs

12,24V/150 mA

##### Relay Outputs

4A/12 to 24Vdc

##### Engine/Field Inputs

Contacts Closed to Ground

##### Dynamo/Charge Alternator

2,5W 12Vdc or 24Vdc

##### Dimensions and Weight

250x185x67, Hole: 237x171, Weight:1250gr

##### Operating Temperature

-20C to 50C (R.H. 95%)

##### Vibration

8G @ 10ms (10-100Hz)

##### Display Accuracy

+/- 1%, +/- 1 LSD(least significant digit)

##### Design

meets EN 50081-1-2, 50082-1-2, 60801-2, 61003-1, EN 60546-1, CE mark

##### Warranty

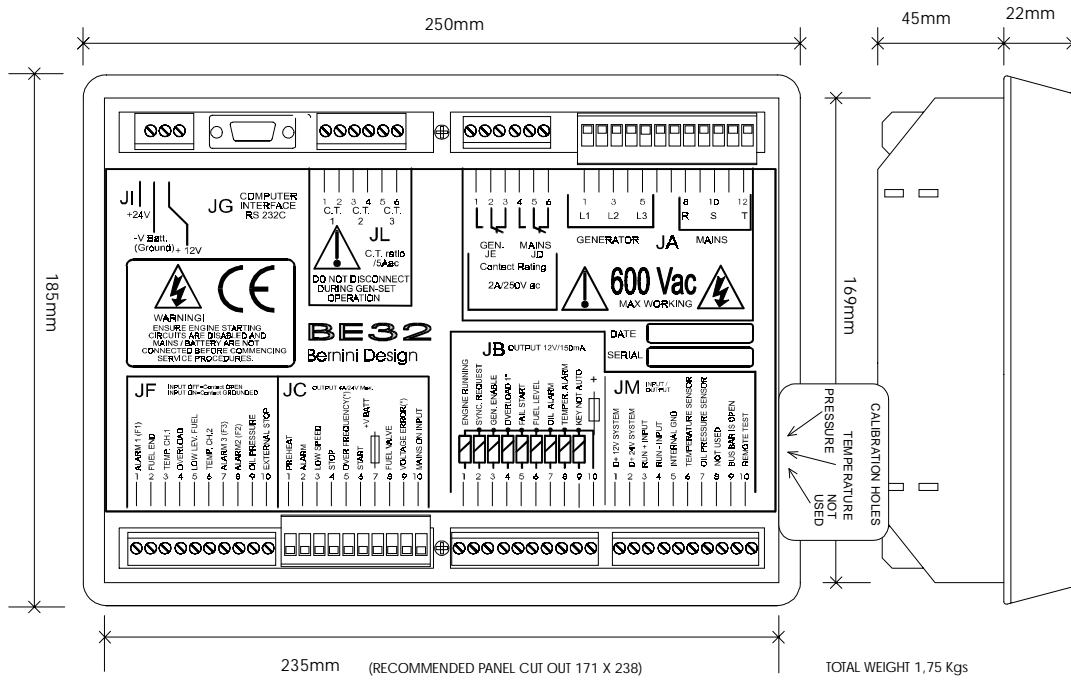
3 years

# BERNINI

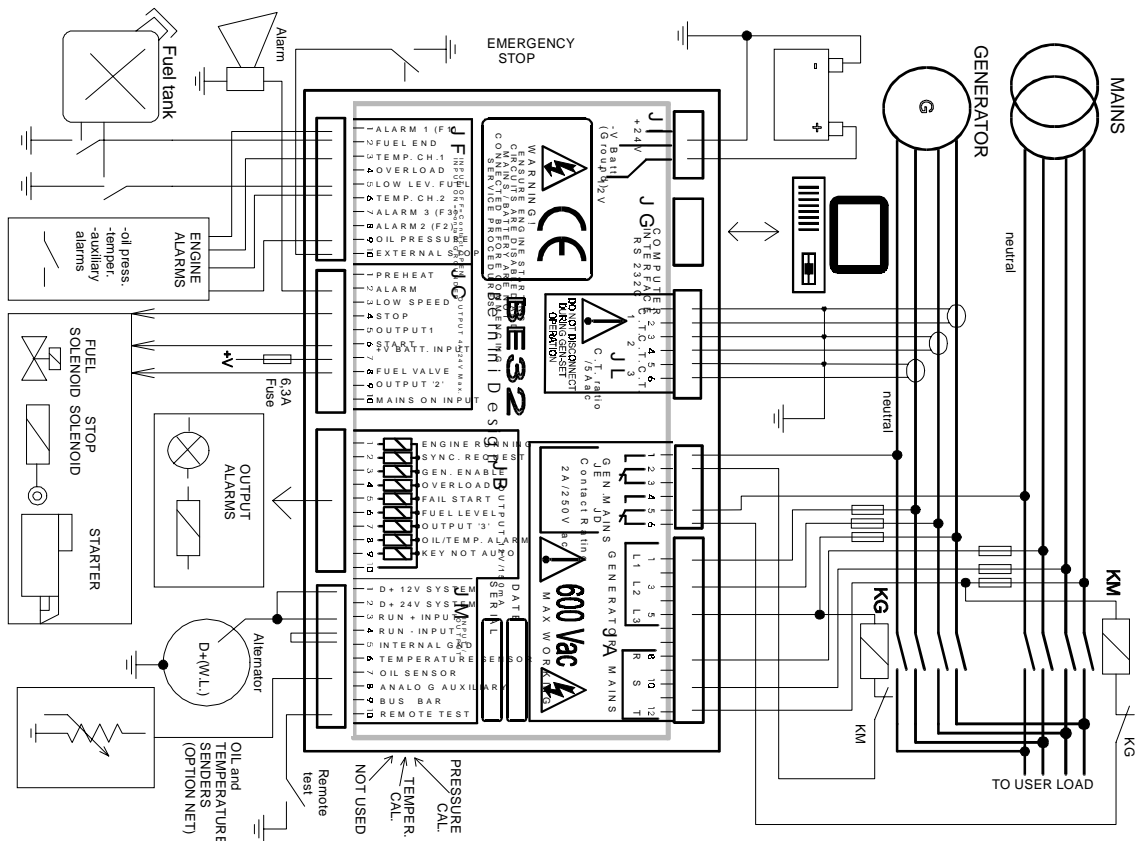
## Universal Engine and Genset Automation and Protection

### BE32 - Genset Automation

#### Case Dimensions



#### Typical Connections





# BERNINI

## Universal Engine and Genset Automation and Protection

### BE23 – Autostart Unit for Gensets 12 to 24V

BE 23 is an autostart unit for starting and stopping the engine and to protect the Generating Set from faulty conditions. Up and down keys allow the user to switch between menus in order to see detailed information on alarms, program parameters, power values of the generator and analogue engine quantities such as water temperature and oil pressure. The push buttons allow the user to set various parameters on the unit itself.

Operation is done via the "START", "STOP", "MAN and "AUTO" push buttons. The reset button enables resetting of alarms and outputs. An external key-switch input is provided.

The unit measures 3 phase voltage, the frequency and the actual current on one phase. Also, true power and reactive power is displayed. The bright, powerful 4 digit LED display allows easy readability. User programmable inputs and outputs allow adapting the module to customer needs such as N/O, N/C switches, delays, shut down modes.

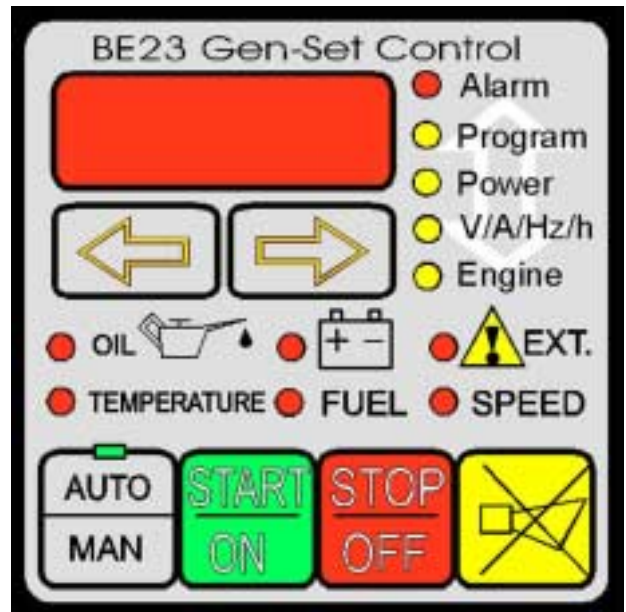
The BE23 has powerful programmable parameters to fit the program flow to customers needs and is designed for front panel mounting.

#### Option BE23-RS232

RS 232 is a plug on interface to BE23 to connect BE23 to a PC. In order to let the PC remotely monitor and adjust the parameters, a special software is supplied.

#### Features

- Remote Start capability
- Display of V-Hz-A-hours-RPM
- 20 Programmable parameters
- No external programming equipment needed
- Current transformer ratio programmable
- Alternator excitation circuit
- 7 Digital inputs, 2 configurable
- 8 transistor outputs, 2 free configurable
- Output for generator contactor
- 2 analog inputs for sensors, programmable
- Various timer and level settings
- Periodic start/stop for test/safety purpose
- Alarm indication LED or display/Lamp test
- Pick-up input for RPM
- Under/over protection for V, Hz, RPM
- Protection against overload (A) and kVA



#### General characteristics

##### Supply

7 to 40Vdc

##### Current Transformer

5Aac Continuously (Ratio Programmable)

##### Vac Inputs Ratings

Continuously 600Vac max.

##### Vac Maximum Over Voltage

1000V / 1min

##### Static Outputs

500mA, short circuit proof

##### Engine/Periphery Inputs

Contacts Closed to Ground

##### Dynamo/Charge Alternator

200mA, 12Vdc or 24Vdc

##### Dimensions And Weight

96x96x119mm, Hole: 92x92, Weight: 350grs.

##### Operating Temperature

-30 To 75 °C (R.H. 95%)

##### Display Accuracy

+/- 2%, +/- 1 LSD (Least Significant Digit)

##### Vibration

40mm/sec

##### Design

Meets 89/336EEC, 89/392EEC, 93/68EEC, IEC 68-2-6, EN 61000-2-4-5-6-8-11, CE Mark

##### Warranty

3 Years

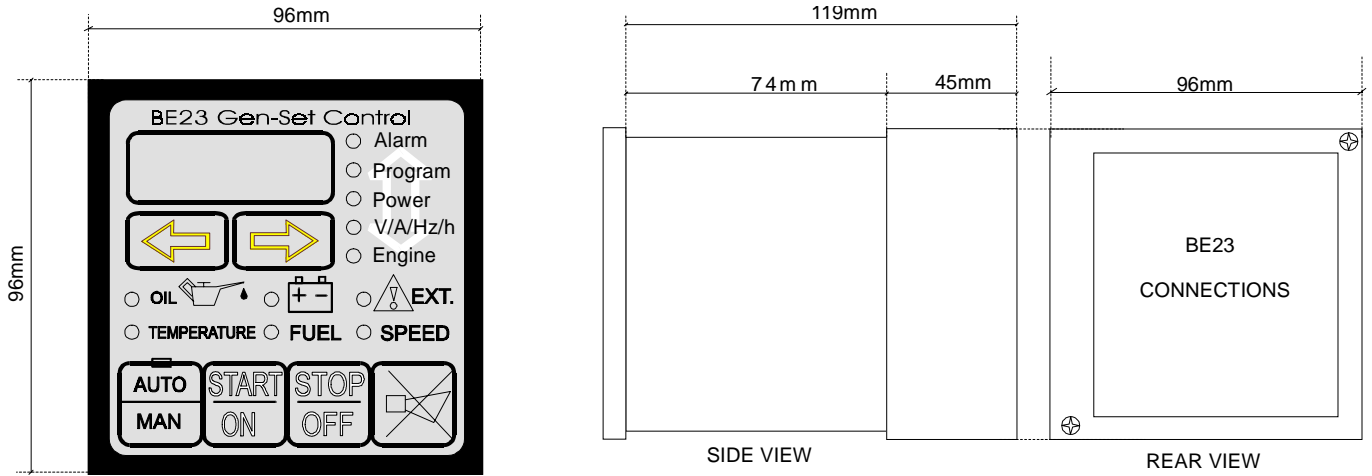


# BERNINI

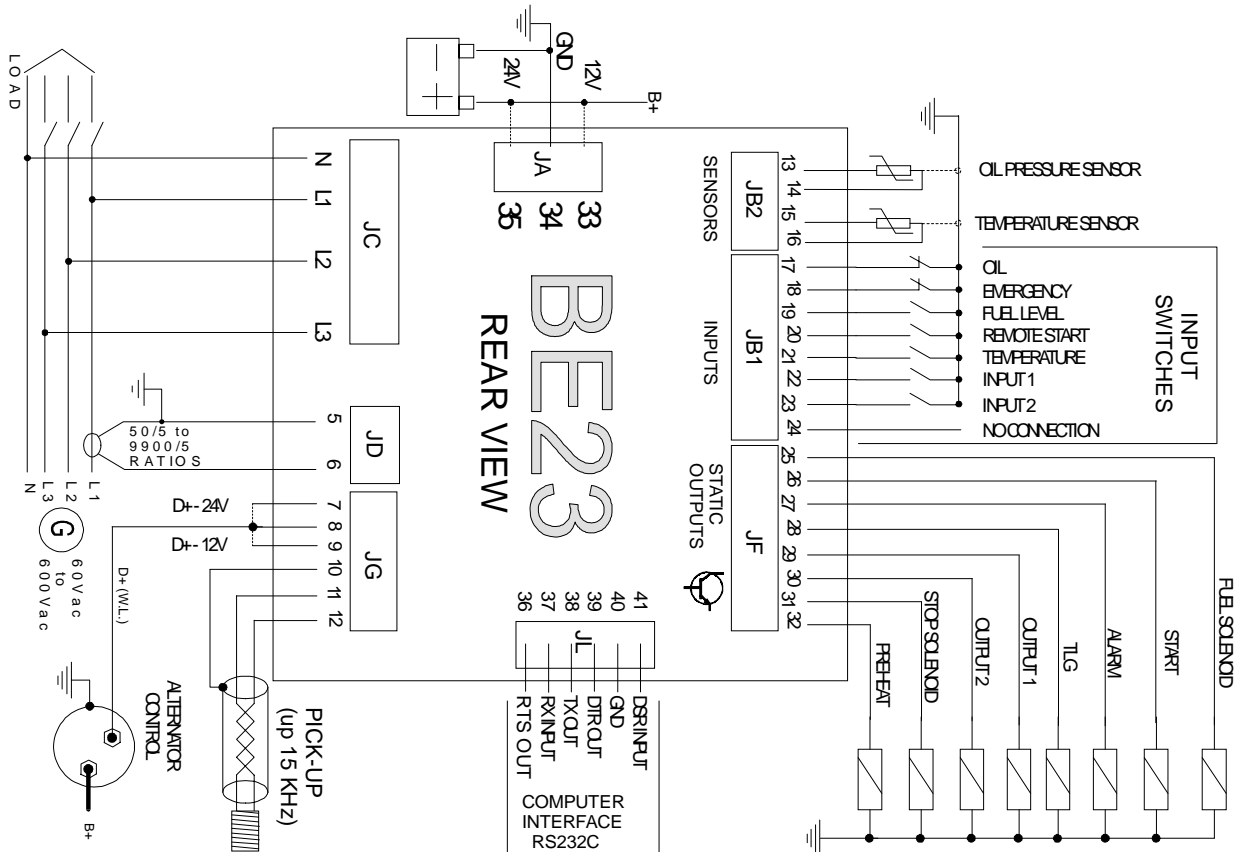
Universal Engine and Genset Automation and Protection

## BE23 – Autostart Unit for Gensets

### Case dimensions



### Typical Connections



# BERNINI

## Universal Engine and Genset Automation and Protection

### BE2000 - Genset Automation

#### 1&3 Phase AMF Module, 12 - 24V

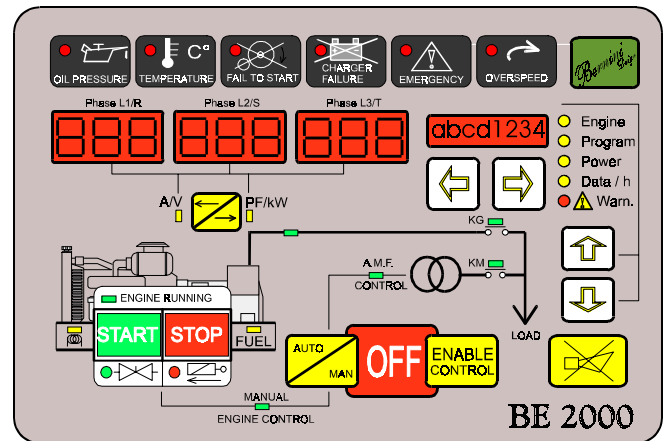
BE 2000 is a sophisticated, 1/3-phase automatic Mains failure module including protection for stand-by Gensets running in isolated mode. Key features of the unit are the bright 3x3 digit LED display for V/A/PF/kW of Mains and Generator as well as the 8 digit real text display for values, parameters and alarms. An RS232 interface and a easy to use software provide direct or remote control via PC. Parameters can be easy copied from unit to unit and parameters/values/alarms can be stored for tracing and fault analysis.

If Mains fails (over-/under frequency, over-/under voltage, loss of Mains), the BE 2000 initiates an automatic Genset start cycle including load transfer to the generator by switching the Mains/generator contactors. After Mains is restored, the load will be automatically transferred back to Mains and the Genset will stop after a cooling down time. In 'MAN' mode, the load transfer from Mains to generator and vice versa must be provided by external wiring. During all cycles, the engine and generator are fully protected against malfunction. All alarms occurring at abnormal Genset conditions are computed and displayed either by LED/Icons or on the 8 digit display. They stop, if necessary, the Genset by protection switches.

The main task for BE2000 is the easy use of the unit combined with elimination of traditional panel meters. So, the unit calculates and displays all important electrical values of the Generator and Mains in total and per phase. A set of 10 programmable parameters fit the program flow to customers needs. BE 2000 is designed to be mounted in cabinets and protected environments.

#### Features

- Bright 3x3 digit display to replace panel meters
- Manual and automatic Mains failure contr.
- Display of V-Hz-A-hours, Mains or generator
- Display of kW, KVA, KVA<sub>r</sub>, PF, 1 or 3 phase
- No external programming equipment needed
- Current transformer ratio programmable
- Alternator excitation circuit
- 5 Digital inputs, 3 relay and 8 static outputs
- Output for Mains/generator contactor
- Various timer and level settings
- Programmable analogue input for oil and water
- Alarm indication LED and real text display



- Mains on simulation input
- Remote test (external enable/disable) input
- Alternator failure (non-charging/belt-break)
- RS232-C interface

#### General Characteristics

##### Supply

7Vdc to 33Vdc, 1s supply loss covered

##### Current Transformer

5Aac Continuously (Ratio Programmable)

##### Vac Inputs Ratings

Continuously 600Vac Max. Line to Line

##### Vac Maximum

2000Vac Line to Line/ 300s

##### Static Outputs

12,24V/500 mA, short circuit proof

##### Relay Outputs

10A/250Vac, changeover

##### Engine/Field Inputs

Contacts Closed to Ground

##### Dynamo/Charge Alternator

Max. 3W, 200mA

##### Dimensions and Weight

238x138x40, Hole: 213x142, Weight:1250gr

##### Operating Temperature

-30° C to 75° C (R.H. 95%)

##### Vibration

40mm/sec

##### Display Accuracy

+/- 2%, +/- 1 LSD(least significant digit)

##### Design

Meets 89/336EEC, 89/392EEC, 93/68EEC, IEC 68-2-6, EN 61000-2-4-5-6-8-11, CE Mark

##### Warranty

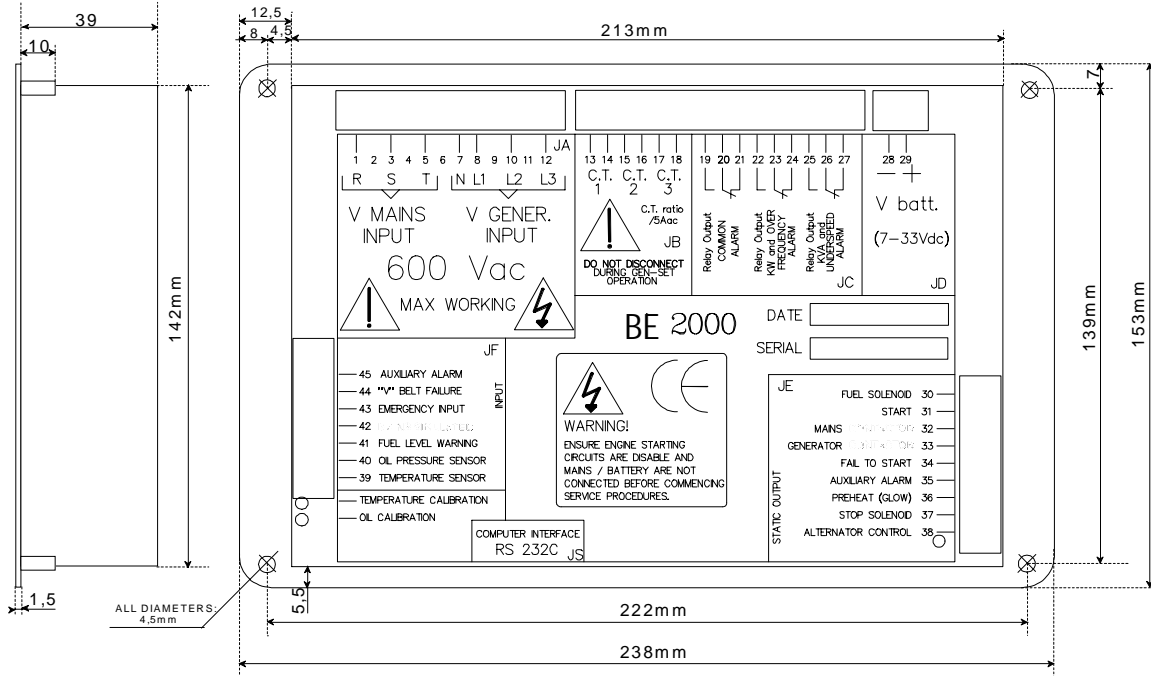
3 years

# BERNINI

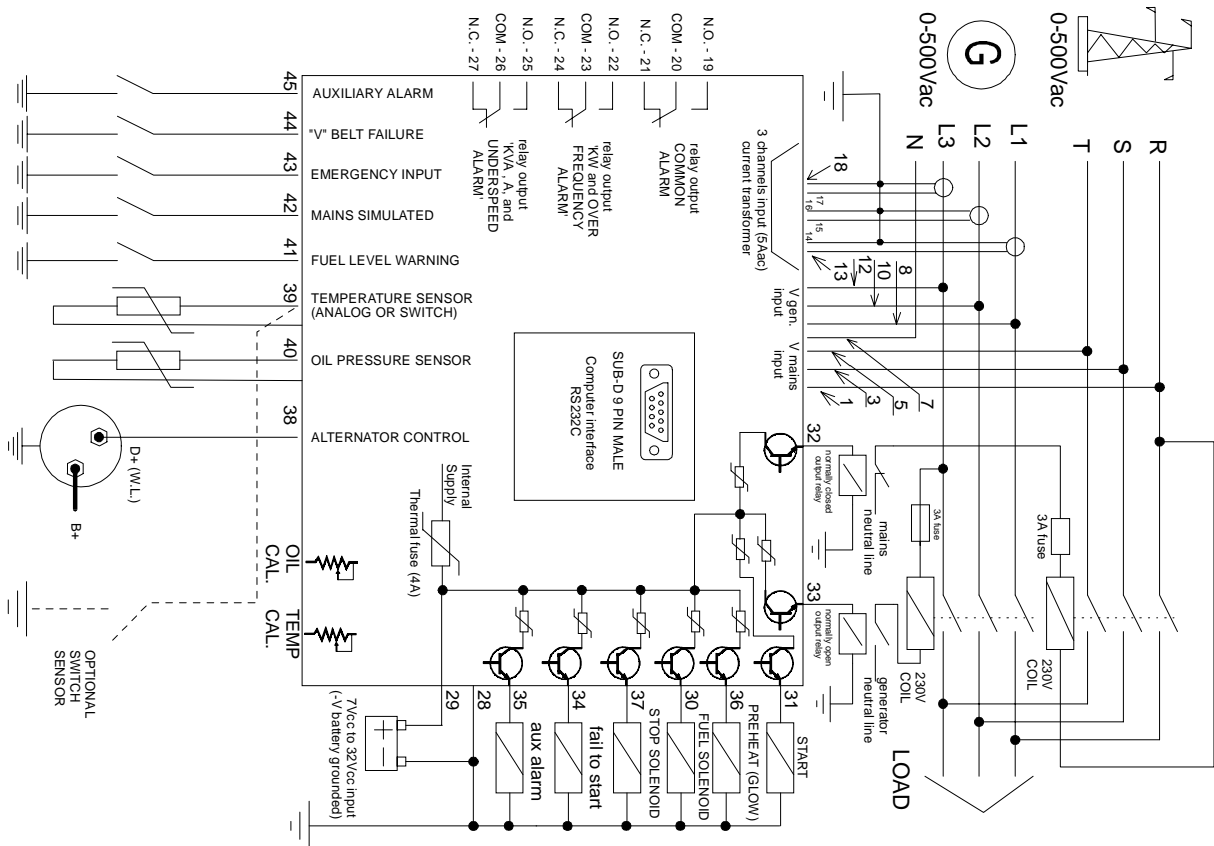
## Universal Engine and Genset Automation and Protection

### BE 2000 - Genset Automation

#### Case Dimensions



#### Typical Connections



# BERNINI

## Universal Engine and Genset Automation and Protection

### BM80B - Genset Automation 3 Phase AMF Module, 12 to 24V

BM80B is a cost effective 3-phase automatic Mains failure module including protection for stand-by Gensets and Prime Movers up to 270kW. The BM80B consists of BM80B control unit for front panel mounting and the BM80C battery charger & relay card. The charger module mounts on DIN-Rail and contains all necessary connectors for the wiring. The two units are connected via flat band cable and no additional wires have to be brought to the front door of the panel. The key features are the simplicity of use as well as the included battery charger module, which reduces additional installation costs to main breakers and panel meters.

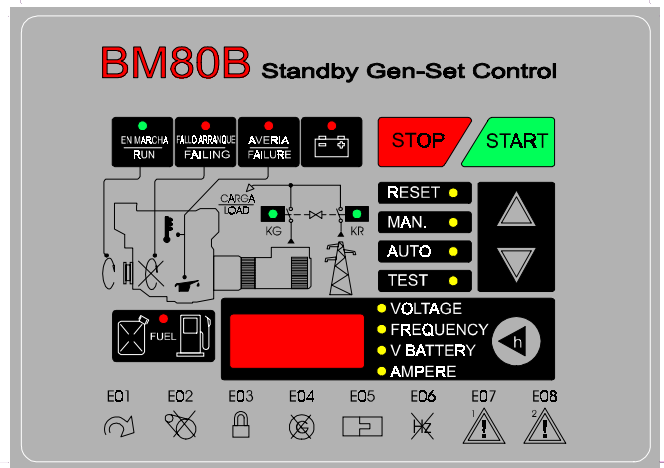
If Mains fails (over-/under voltage, loss of Mains), the BM80B initiates an automatic Genset start cycle (In 'AUTO' mode) including load transfer to the generator by switching the Mains/generator contactors. After Mains is restored, the load will be automatically transferred back to Mains and the Genset will stop after a cooling down time. In 'MAN' mode, the load transfer from Mains to generator and vice versa must be provided by external wiring. During all cycles, the engine and generator are fully protected against malfunction. All alarms occurring at abnormal Genset conditions are computed and displayed either by LED or the 3 digit display. They stop, if necessary, the Genset by protection switches.

Values of voltage to initiate Genset start and timer settings for overload, cooling down time etc. are programmable via potentiometers.

The BM80B has programmable parameters to fit the program flow to customers needs either settable via potentiometers or dip-switches. BM80B is designed to be mounted directly on the engine frame or in cabinets.

#### Features

- Manual and automatic Mains failure contr.
- Display of V, Hz, Mains, 3 phase
- Display of V-Hz-A-hours, generator, 1 phase
- Included battery charger module
- No external programming equipment needed
- Various timer and level settings



- Alternator excitation circuit
- 5 Digital inputs, 4 relay outputs
- Relay output for Mains/generator contactor
- Alarm indication LED or display/Lamp test
- Mains on simulation input

### General characteristics

#### Supply

6.5 to 30Vdc

#### Current Transformer

5Aac Continuously (Ratio settable, dip switch)

#### Vac Mains Input Ratings

Continuously 400Vac max.

#### Vac Generator Input Ratings

Continuously 250Vac max.

#### Vac Maximum Over Voltage

2000V / 1min

#### Relay Outputs

3a/12 To 24Vdc

#### Engine/Periphery Inputs

Contacts Closed to Ground

#### Dynamo/Charge Alternator

150mA, 12Vdc or 24Vdc

#### Dimensions And Weight

BM80B: 190x135x22mm,

Hole: 172x118mm, Weight: 200grs.

BM80C: 195x112x75, Weight: 950grs.

#### Operating Temperature

-15 To 55 °C (R.H. 95%)

#### Display Accuracy

+/- 2%, +/- 1 LSD (Least Significant Digit)

#### Design

Meets EN 50081-1-2, 50082-1-2, 60801-2, 61003-1, EN 60546-1, CE Mark

#### Warranty

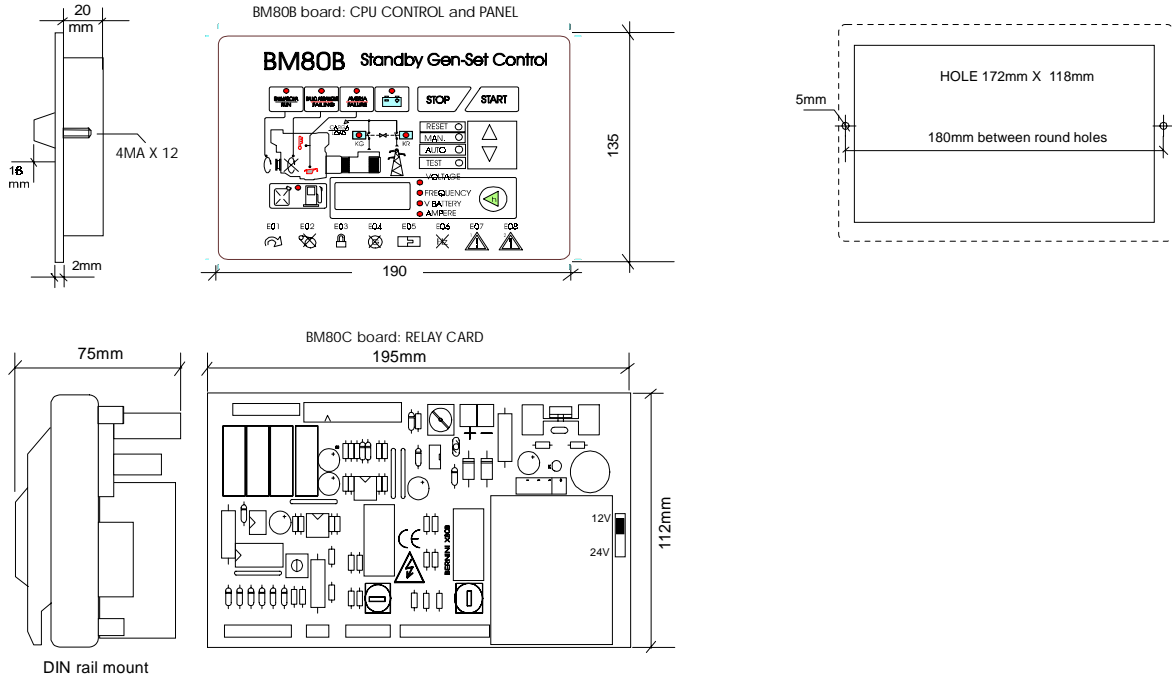
3 Years

# BERNINI

## Universal Engine and Genset Automation and Protection

### BM 80B - Genset Automation

#### Case Dimensions



#### Typical Connections

