

# EM10 / EM20 – USER MANUAL

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## 1 – GENERAL DESCRIPTION

EM20 is a universal controller for manual or automatic management of a genset, designed for on-board mounting. EM20 incorporates **all the fittings** normally requested to realize a manual panel: key switch, emergency push-button, 14 measurement instruments (included: diesel level, water temperature, oil pressure), running hourcounter, starting-counter.

It is equipped with a programming/diagnostics microterminal (4 keys + 2x16 characters LCD display) for an easy dialogue with the operator, and can enter into more than **70 programmable parameters**, with **bilingual** diagnostics (Italian or English).

It manages all the necessary alarms: alternator voltages and frequency, oil pressure and temperature, water level and temperature, diesel level, dynamo belt, turns, battery state.

EM20 has the **SUPERMANUAL** modality (run by sight, with ignored alarms), for the emergency situations. Moreover EM20 can be also used to realize an **automatic** switchboard, with the addition of an external main voltage relays.

EM20 can be fed with 12V or 24V, through internal switch .

**EM10** is a simplified version of EM20; there aren't mechanical measurements; it has 2 programmable inputs and 2 programmable outputs, and only works at 12V.

On the front panel are present:

KEY switch	It turns on the controller
EMERGENCY pb.	It stops everything
START key	It starts the engine
STOP key	It stops the engine / resets failure
INC key	It visualizes following page
DEC key	It visualizes previous page
FAILURE led	Failure current or stored
READY led	genset OK and operating
LCD display	Measures and state description

The **key switch** has two positions (OFF/ON); in OFF position the controller is totally turned off and the key can be extracted; in ON position the controller is turned on and waits for commands. Then this switch is not suitable to start/stop the engine (there are other two proper keys), but only to prevent a not authorized use of the genset.

The **EMERGENCY** push-button, if pressed, stops the genset and blocks the controller, preventing it from new startings. To unblock it: rotate the knob clock-wise <sup>1</sup>

The **START** key allows the starting of the engine. The starting engine is activated only for the time of activation of this key, or even less if the engine starts. When the engine is running this key is forbidden. During the programming phase the START key develops the function of ENTER (confirmation).

Pressing briefly the **STOP** key, the stopping of the genset happens; **keeping pressed this key for 1 second the ahead failures RESET is obtained**. During the programming phase this key develops the function of **ESCAPE** (exit or refusal).

The two keys **INC** and **DEC** serve to choose the block of informations to visualize to the LCD display (selection of the **page**), or to regulate the value of the programmable parameters.

The LCD display has 2 lines of 16 characters each one, and can visualize the following pages:

1. Genset state and battery voltage
2. RS voltage / frequency, and R-S-T currents
3. Phase-phase voltage, and phase-neutral voltages
4. Diesel level, oil pressure, water temperature(EM20 only)
5. Hour-counter, engine speed, starting-counter
6. Programming<sup>2</sup>

At power-on, the controller visualizes the page 1, and in case of failure automatically returns to the page 1 to visualize the failure description <sup>3</sup>.

The **FAILURE** led lights on to signal that a failure has been found and stored, whose description can be read in page 1 on the display. According to the type of failure the controller provides immediatly for the genset stopping (immediate stop), or to stop it after the ventilation time (delayed stop), or it doesn't stop it at all (alarm only).

All the failure causes are deactivable individually or in block (**SUPERMANUAL** mode: speed by sight).

**To reset the failure press STOP for 1 second.**

The **Ready** led signals that the genset is running and all the electrical parameters are within the programmed<sup>4</sup> windows; then the genset can be connected to the user load.

<sup>1</sup> When the controller is in emergency block the display visualizes "EMERGENCY STOP".

<sup>2</sup> See at PROGRAMMING paragraph.

<sup>3</sup> The messages can be visualized in Italian or in English, according to the effected programming.

<sup>4</sup> This led flashes during the **heating** phase, or during a temporary deviation from the nominal conditions.

This condition is available on the auxiliary output (TLG), for the possible automatic activation of user load.

If the controller (EM20 only) is installed in an automatic switch-board (main aid genset) it must be put in AUTOMATIC mode; this is obtained keeping the **DEC** key pressed and pressing **START** key briefly<sup>5</sup>.

In AUTOMATIC mode the controller starts or stops the genset accordingly to the RINT signal at auxiliary input.

The starting is totally automatic, (3 starting attempts), and is followed by SLOW RUNNING phase and the HEATING phase, if programmed. At RINT signal deactivation the engine stop after the programmed COOLING phase.

**WARNING: at power-on EM20 comes again in the operating mode in which it had been switched-off (the diesel can restart by itself!)**

### FIRST STARTING

- **Verify the 12V/24 switch position**
- Feed the genset
- Enter the programming and verify all the settings, making sure that they are coherent with the GE managing. Carry out all the necessary adjustments.
- **Note the effected programming**
- Start the unit<sup>6</sup> and verify the lighting of the READY led within few seconds (plus the possible time of programmed heating); verify the protections intervention and the measurement instruments calibration<sup>7</sup>

**Warning:** make sure that the temperature inside the panel where the genset is installed doesn't exceed 50° C, with the unit at the height of the power. Insert correctly and completely the various connectors, and make sure that the wires traction or the vibrations can't disconnect them.

## 2 – PROGRAMMING

The programmable parameters are protected by password, and are organized in a tree structure like a cellular phone.

Each parameter can be reached through the keys: **START** (=ENTER), **STOP** (=ESCAPE), **INC**, **DEC**.

To visualize a parameter, select the page PROGRAMMING through the **INC/DEC** keys; press ENTER, and select the wanted menu through the keys INC/DEC. Press again ENTER to enter in the menu and select the wanted parameter through the INC/DEC keys. If you want to modify the value of the selec-

<sup>5</sup> Pressing **DEC** (in page 1) the current operational mode and the installed software version are visualized.

<sup>6</sup> **DEC+ESCAPE** put EM10/EM20 in MANUAL mode. Verify the engine stopping, keeping pressed also START, within 0.5" from the occurred starting

<sup>7</sup> The measurement instruments have to be periodically verified and, if necessary, recalibrated. The calibration is carried out by keyboard, regulating one by one the calibration constants associated to each measurement instrument (see menu instruments calibration), in comparison with the reading on a sample instrument. Increase the constant to increase the reading of the measured size (that is visible on the second line of the display, on the left, and viceversa to decrease it

ted parameter<sup>8</sup> press again ENTER (the led READY flashes to signal that you are in REGULATION mode) and regulate the value of the parameter through INC/DEC<sup>9</sup>. Press again ENTER **to store the new value** (the led READY lights off).

Select a new parameter or go back to the main menu pressing more times ESCAPE.

The programming can be visualized or modified in **whatever exercise condition; the changes have immediate effect, and have to be carried out with cognizance of the case:** a programming error will give place to wrong behaviours.

**WARNING: in PROGRAMMING the START/STOP keys don't allow to start or stop the engine<sup>10</sup>; to give again these keys their normal function, you need to go out from the programming, choosing any other page.**

The parameters are stored in a non-volatile memory (they are not cancelled at the controller switch-off). At the switch-on EM20 verify the validity of these data and, if they are corrupted, it asks the authorization to reload the **default** parameters (factory starting regulations). In such case, after the reload, it's necessary to verify the congruence with the specific installation: so it's useful to annotate the programming effected during the installation phase.

## 3 – OPERATIONAL MODES

### 3.1– MANUAL mode

It is the natural operational mode of this genset, and allows to start or stop the diesel, with automatic enabling of the possible unit contactor (TLG).

The genset behaviour was described at par.1; we only add that EM20 displays at page 1 the current state of the unit with messages, for ex., such as:

Stopped unit, no failure:	<b>GE STATE: OKAY</b> <b>BATTERY: 12.5V</b>
During the starting:	<b>Diesel starting</b> <b>BATTERY: 12.5V</b>
at diesel started:	<b>diesel running</b> <b>BATTERY: 12.5V</b>
During the heating:	<b>Heating running</b> <b>BATTERY: 12.5V</b>
Full capacity:	<b>GE STATE: READY</b> <b>BATTERY: 12.5V</b>

Through the INC/DEC keys it is possible to select other display pages:

<sup>8</sup> It's possible only if the current password is the right one.

<sup>9</sup> The INC/DEC keys are equipped with **autorepeat** facilities, that starts after 0.8". To accelerate the regulation you can press the key ESCAPE while INC or DEC is keeping pressed.

<sup>10</sup> However to stop it, you can always use EMERGENCY pushb.

Page 2: voltage RS/Hz/currents	<b>Tens: 405V / 50.6Hz</b> <b>Corr: 389 360 395</b>
Page 3: voltages PH/PH, PH/N	<b>F/F:400 400 400V</b> <b>F/N:230 230 230V</b>
Page 4: mechanical measures	<b>LGAS P.OLIO TEMP</b> <b>67% 5.3bar 85C</b>
Page 5: <sup>11</sup> hourcounter/RPM/ startingcounter	<b>TOT.ORE: 185.59</b> <b>1567RPM / 235AVV</b>
Page 6: programming	<b>PROGRAMMING</b> <b>(pusch ENTER)</b>

EM20 controls all the electrical and mechanical parameters that are made available, and generates the necessary alarms. Each alarm is always accompanied by a message to the LCD display: read with attention the displayed message and provide to the correction of the failure cause. If you think that you can have the system restarted, **RESET pressing the STOP key for 1 second.** The possible failures derive from the connected protection devices and from the carried out programming. The failure causes can be individually disabled through programming<sup>12</sup>; in general, the mechanical failures provoke the immediate diesel stopping and the TLG output deactivation, while the electrical ones (that is, related to the alternator only) provoke only the release of the TLG.

See alongside the **ALARM TABLE**:

Mechanical failure example:	<b>DAMAGED UNIT</b> <b>Low oil pressure</b>
Electrical failure example:	<b>DAMAGED UNIT</b> <b>overload</b>

**All the failures are retentive (that is, they are stored and request the RESET to be deleted), they provoke the lighting of the FAILURE led, and the activation of the CUMULATIVE ALARM auxiliary outputs and SIREN.**

### 3.2- SUPERMANUAL mode

The **SUPERMANUAL** mode is only used in case of serious emergency, and keeping in mind that in this operational mode the genset or the users can be seriously damaged, since all the mechanic and electrical protections are suspended: the failures are signaled, but the genset isn't stopped (if the genset is OK the led READY lights on at fixed light, otherwise it flashes). The SUPERMANUAL mode also allows the starting with a failure ahead, and can be activated by programming (in ALARMS menu) or activating the auxiliary input programmed as SUPERMANUAL. In this operating mode the LCD display the flashing message "SUPERMANUAL mode".

<sup>11</sup> There isn't this page in EM10.

<sup>12</sup> In case of serious emergency it is possible to activate the SUPERMANUAL mode as well, which inhibits all the failures.

EM10/EM20 is equipped with a HOUR-COUNTER storing the engine running time, and a programmable parameter (HOURS MAINTENANCE) allowing to obtain automatically an alarm when the HOUR-COUNTER value exceed the programmed value in HOURS MAINTENANCE.

When this condition happens the controller keeps on operating regularly, but generates an alarm each 60", with message:

maintenance alarm	<b>ATTENTION!</b> <b>Maintenance alarm.</b>
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To eliminate this message (after having made the maintenance, we hope) it is necessary enter in the programming, select the parameter "17:CALL FOR SERVICE." <sup>13</sup> in MACHINE SETTING menu, and increase it on the number of hours for which the next alarm is wanted.

### 3.3- AUTOMATIC mode (only in EM20)

To carry an automatic panel out with EM20 it is necessary to foresee an external voltage relay activating an intervention request (RINT) when the system is anomalous, and obviously a couple of contactors TLR/TLG interlocked between them. The function RINT (intervention request) must be programmed on one of the auxiliary inputs, and the genset must be in AUTOMATIC<sup>14</sup>. When the system passes the limits, the voltage relay deactivates the TLR and sends the RINT to EM20. EM20 carries out a starting cycle ( 3 attempts of 8", with 2 pauses of 8") and, as soon as the unit is running (therefore after the programmed heating time), it activates the TLG output.

When the voltage relay replaces the RINT, the unit deactivates the TLG and once the programmed ventilation time has passed, it stops the diesel.

In AUTOMATIC mode the START/STOP keys are inactive, but to stop the diesel you can always use EMERGENCY. The passage from AUTOMATIC to MANUAL doesn't change the diesel state, if no commands are given. Viceversa, the passage from MANUAL to AUTOMATIC provokes the diesel adaptation to the state of RINT signal.

**Warning: at the starting, EM20 takes again itself back in the operational mode in which it was switched off (so the GE can start again by itself).**

<sup>13</sup> This parameter doesn't request any password.

<sup>14</sup> To pass quickly to AUTOMATIC mode keep pressed the DEC key and press briefly START. Viceversa, to come back to MANUALE: DEC+ STOP. In EM10: DEC+START starts up the SUPERMANUAL mode

## 4 - INPUTS / OUTPUTS

All the **logical inputs** (terminal board M1) are ACTIVE at GROUND, that is the connected function considers itself ACTIVATED when the input is put at GROUND, and deactivated when the input is left open.

TERMINAL BOARD M1 (ALIM. and logical IN / OUT)	
1	<b>+B: POSITIVE feeding from battery</b> (12 or 24V for EM20; 12V only for EM10)
2	<b>GROUND: negative of battery</b> (genset frame)
3	<b>+AVV: E.M.STARTING output</b> (30Amax)
4	<b>+EVC: FUEL VALVE output</b> (6Amax)
5	<b>+D : ENGINE STARTED input</b>
6	<b>+BK: +BATT with key ON output</b> (1Amax)
7	<b>-RL3: programmable output</b> NPN/200mA
8	<b>-RL4: programmable output</b> NPN/200mA
9	<b>-RL5: programm. output</b> NPN/200mA (EM20 only)
10	<b>-RL6: programm. output</b> NPN/200mA (EM20 only)
11	<b>LOW OIL PRESSURE ON/OFF input</b>
12	<b>ENGINE OVERHEATING ON/OFF input</b>
13	<b>FUEL RESERVE ON/OFF input</b>
14	<b>FUEL END ON/OFF input</b>
15	<b>AUX1: ON/OFF programmable input</b>
16	<b>AUX2: ON/OFF programmable input</b>
17	<b>AUX3: ON/OFF programmable input</b> (EM20 only)
18	<b>AUX4: ON/OFF programmable input</b> (EM20 only)

TERMINAL BOARD M2 (SENSORS / C.T.INPUTS)	
1	<b>OIL PRESSURE measuring sensor</b> <sup>15</sup> (EM20 only)
2	<b>ENGINE TEMPERATURE</b> <sup>16</sup> sensor (EM20 only)
3	<b>FUEL LEVEL</b> <sup>17</sup> measuring sensor (EM20 only)
4	<b>common return of sensors</b> <sup>18</sup> (EM20 only)
5	<b>common return of C.T.</b>
6	<b>phase R C.T. input</b> (5A)
7	<b>phase S C.T. input</b> (5A)
8	<b>phase T C.T. input</b> (5A)

TERMINAL BOARD M3 (GENSET OUTPUT)	
1	<b>T phase input</b> (600V max )
2	<b>S phase input</b> (600V max )
3	<b>R phase input</b> (600V max )
4	<b>NEUTRAL input</b>

**Attention:** before feeding EM20, set the 12V/24V switch (visible from the upper side slit) accordly to the genset battery. Feeding at 24V a controller presetted for 12V can causes an **out of guarantee failure!** (Note: EM10 is for 12V only).

<sup>15</sup> Program the sensor type (0=sensor absent; display: -.- ).

The reading of the oil pressure is used also to generate failure MIN.OIL PRESSURE (2 programmable thresholds). If the sensor opens, it reads pressure 0.

<sup>16</sup> Program the sensor type (0=sensor absent; display: --- ).

The reading of the engine temperature is also used to generate failure MAX TEMP. (2 programmable thresholds).

<sup>17</sup> Program the sensor type (0=sensor absent; display: -- ).

The reading of the fuel level is also used to generate fuel failure (2 programmable thresholds).

If the sensor opens, it reads level 0.

<sup>18</sup> To use with 2 wire sensors (higher precision).

The **+B** must be protected with external fuse having a capacity adequate to the current that the controller will have to supply on +AVV and +EVC outputs. Controller has no internal fuses.

The **ENGINE STARTED** detection is made through the signal **+D** (from pre-energized battery charger alternator ), connected to pin 5 of M1. This pin has an internal pull-up destined to the pre-energization<sup>19</sup>; therefore, if this pin is left open, the engine is always seen running; instead if the +D voltage is lower of 6V the engine is considered not running.

Each one of the 4 (2 in EM10) **programmable outputs** RL3, RL4, RL5, RL6 can be programmed to perform anyone of the following functions (**EM10/20=** factory assignment):

F	PROGRAMMABLE OUTPUTS	EM10	EM20
0	Not used		
1	GENSET READY output (=TLG)	RL3	RL3
2	CUMULATIVE ALARM light output	RL4	RL4
3	SIREN command output		RL5
4	NOMINAL CURRENT output		RL6
5	Not used		
6	LOW TURNS command output		
7	GENSET RUNNING light output		
8	E.M.STOP command output		
9	FUEL failure light output		
10	OPEN LOAD SWITCH pulse output		

Each one of the 4 (2 in EM10) **programmable inputs** AUX1, AUX2, AUX3, AUX4 can be programmed to perform anyone of the following functions (**EM10/20=**factory assignment ):

F	PROGRAMMABLE INPUTS	EM10	EM20
0	Inactive input		
1	Oil overtemperature		
2	Low water level		
3	Electro-radiator failure		
4	LOAD SWITCH activated		
5	Differential load switch opened		
6	RINT (interv. request) (EM20 only)		AUX2
7	Alternator overtemperature	AUX1	AUX3
8	SUPERMANUAL mode	AUX2	AUX4
9	AUTOMATIC mode (EM20 only)		AUX1

**Attention:** it is not allowed to assign the same function to more inputs (the controller display fault; 0 is allowed).

EMxx uses the current readings also for the **OVERCURRENT** and **SHORTCIRCUIT** protections<sup>20</sup>, both programmable.

The release for **SHORTCIRCUIT** happens within 0.5", while that for **OVERCURRENT** happens after a programmable time.

The alternator can have **NEUTRAL** connected to genset frame (negative general, earth) or completely isolated: on the **NEUTRAL** a voltage out of earth of 50Vmax is admitted; a greater voltage doesn't provokes damages, but loss of precision on the voltages reading.

<sup>19</sup> The pre-energization current (140mA at 12V and 100mA at 24V) is supplied only when +EVC=ON.

<sup>20</sup> Use an auxiliary output programmed as TLG to command a load contactor, or as OPEN LOAD SWITCH pulse output to open the load switch through impulse.

## 5 –MEASUREMENT INSTRUMENTS

The measurement instruments have to be verified periodically and, if necessary, recalibrated. The calibration is effected from keyboard, regulating one by one the constants of calibration associated to each measurement instrument (in METERS CALIB.menu), in comparison with the reading on a sample instrument.

Increase the constant to increase the reading of the measurement (that is visible on the second line of the display, on the left), and viceversa to decrease.

## 6 - SECURITY

This manual is exclusively addressed to the operator equipped with all the technical knowledges necessary for the management of a genset. The use of the controller from not properly trained staff must be prevented.

**This product uses very dangerous voltages.**

**So it is forbidden to remove the back cover, only after having switched-off all the 400V circuits and having disconnected all the terminal boards.**

**When it must be effected a maintenance on the genset, it is necessary to switch off the controller,disconnecting the +BATT .**

## 7 - TERMS OF GUARANTEE

This apparatus is guaranteed free from defects materials or manufacturing. Possible bad-functionings that should show in the first **24 MONTHS** from the buying will be repaired free of charge (materials and manufacture;the parts subject to normal use or consumption are excluded from the guarantee,still less the user set-up data resetting).The technical assistance is made in our offices ,with carriage to be paid by the customer.

The guarantee decays in case of use out of the indicated specifications, whatever is the cause (in particular: atmospheric disturbances,installation mistakes,input or output over tensions, exposure to anomalous temperature/humidity, mechanical stresses) or repairs/modifications not carried out by our staff or not authorized by us in writing).

**The Constructor declines each and any responsibility for the possible damages derived directly or indirectly to people, things or animals by an unsuccessful or imperfect functioning of the apparatus;the guarantee covers the apparatus in itself and not the consequences of a possible damage. It is explicitly made charge to the Customer the verification of the suitability of the apparatus to its particular planting, and the following periodical verification of its real exercise conditions.**

EM20 is designed and manufactured in Italy by:

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**FOR MORE DETAILS ABOUT INSTALLATION AND USE of EM10/EM20 it is available the INSTALLER MANUAL (download from our site [www.micropi.com](http://www.micropi.com))**

<b>WORKING PARAMETERS (PASSWORD=1234)</b>					
<b>description of the parameter</b>		<b>Range</b>	<b>step</b>	<b>default</b>	<b>set</b>
<b>1</b>	<b>MINIMUM ALTERNATOR VOLTAGE for OK</b>	<b>0_600V</b>	<b>1V</b>	<b>340V</b>	
<b>2</b>	<b>MAXIMUM ALTERNATOR VOLTAGE for OK</b> These two parameters define the voltage window (voltage phase/phase, valid for the 3 phases) within which the genset is considered OK; if a phase goes out of window the READY led flashes; if the genset doesn't get back within the programmed time, it is put into failure. NB: In this one such as in all the electrical failures, the engine remains running. This two parameters are interconnected (the first must be inferior to the second).	<b>0_600V</b>	<b>1V</b>	<b>460V</b>	
<b>3</b>	<b>MINIMUM ALTERNATOR FREQUENCY for OK</b>	<b>25_70Hz</b>	<b>0.1Hz</b>	<b>45.0Hz</b>	
<b>4</b>	<b>MAXIMUM ALTERNATOR FREQUENCY for OK</b> These two parameters define the frequency window within which the genset is considered settled. If the frequency goes out of the window the led READY flashes; if the genset doesn't get back within the programmed time, it is put into failure. NB: the first parameter must be inferior to the second.	<b>25_70Hz</b>	<b>0.1Hz</b>	<b>55.0Hz</b>	
<b>5</b>	<b>GENSET NOMINAL CURRENT</b> When this current can be surpassed the controlles set the NOMINAL CURRENT output. This current can be surpassed in continuative mode for the OVERLOAD TIME (unless it doesn't exceed also the shortcircuit current ); after this time EM20 goes into failure.	<b>5_5000A</b>	<b>5A</b>	<b>250A</b>	
<b>6</b>	<b>OVERLOAD TIME</b> Time in which the current can exceed the nominal current without provoking failure (unless it doesn't exceed also the shortcircuit current); after this time EM20 opens TLG and gives the alarm.	<b>0_250"</b>	<b>1"</b>	<b>5"</b>	
<b>7</b>	<b>SHORTCIRCUIT FACTOR (KC)</b> EM20 calculates the shortcircuit current as: SCCURRENT = NOM. CURRENT* KC/100. <b>The resultant value is automatically limited to 120% of the C.T. capacity.</b> The response time to shortcircuit is within 0.5".	<b>100%</b> <b>-</b> <b>500%</b>	<b>10%</b>	<b>200%</b>	
<b>8</b>	<b>INITIAL GENSET HEATING TIME</b> Started the engine, EM20 waits for this time before going in READY, in order to avoid abrupt loading without pre-heating. The timer starts when the genset reaches the nominal conditions. This time can be set at zero giving the RESET. During the heating it maintains actived the <b>LOW TURNS</b> output (if programmed), that is deactivated in the last 5" of heating. During the heating (if the genset is OK) the <b>READY led flashes.</b>	<b>0_250"</b>	<b>1"</b>	<b>10"</b>	
<b>9</b>	<b>COOLING TIME BEFORE DIESEL STOPPING</b> After an automatic intervention or after a failure not requesting the immediate stop, EM20 waits for this time before stopping the diesel, in such a way to allow the engine to get cold.	<b>0_250"</b>	<b>1"</b>	<b>10"</b>	
<b>10</b>	<b>MAXIMUM WAITING TIME for OK after starting</b> If within this time it isn't in stationary steady (READY led OFF or flashing) there is a failure.	<b>1_250"</b>	<b>1"</b>	<b>30"</b>	
<b>11</b>	<b>MAXIMUM TRANSIENT TIME (in READY)</b> If within this time the genset doesn't go to OK, there is failure. It serves to avoid that the normal swinging of voltage/frequency (consequent, for e.x., to a load variation), is seen as a failure.	<b>0.1_250"</b>	<b>0.1"</b>	<b>5.0"</b>	
<b>12</b>	<b>OVERSPEED THRESHOLD</b> The alarm (non deactivable) is at immediate response (within 0.5"). The RPM are calculated from the frequency of the GE, with the criterion: RPM = 30*Hz	<b>1000_5000 rpm</b>	<b>10 rpm</b>	<b>1800 rpm</b>	
<b>13</b>	<b>INHIBITION TIME of OIL PRESSURE CONTROL after starting</b> This timer is activated only at the starting; then the response becomes immediate	<b>1_250"</b>	<b>1"</b>	<b>10"</b>	
<b>14</b>	<b>FAILURE THRESHOLD FOR LOW OIL PRESSURE ( RUNNING) (EM20 only)</b>	<b>0_10.0</b>	<b>0.1</b>	<b>0.0</b>	
<b>15</b>	<b>ALARM THRESHOLD FOR LOW OIL PRESSURE ( RUNNING) (EM20 only)</b> These thresholds are used only if the reading pressure sensor is installed. The failure thresholds provokes the immediate stopping of the diesel, while that of alarm provokes only the alarm, without stopping. Obviously the first must be programmed inferior to the second.	<b>0_10.0 bar</b>	<b>0.1 bar</b>	<b>0.0 bar</b>	
<b>16</b>	<b>WARNING THRESHOLD for HIGH ENGINE TEMPERATURE (EM20 only)</b>	<b>20_140°C</b>	<b>1°C</b>	<b>95°C</b>	
<b>17</b>	<b>FAILURE THRESHOLD for HIGH ENGINE TEMPERATURE (EM20 only)</b> These thresholds are used only if the sensor for the engine temperature reading is installed. The failure threshold provokes the immediate stopping of the diesel, while that of alarm provokes the alarm only, without stopping. Obviously the first must be programmed inferior to the second.	<b>20_140°C</b>	<b>1°C</b>	<b>105°C</b>	
<b>18</b>	<b>FAILURE THRESHOLD FUEL END (delay: 10") (EM20 only)</b>	<b>0%_99%</b>	<b>1%</b>	<b>0%</b>	
<b>19</b>	<b>ALARM THRESHOLD FUEL RESERVE (delay: 2") (EM20 only)</b> These thresholds are only used if the sensor for the reading level diesel is installed. The failure threshold provokes the immediate stopping of the diesel, while that of alarm provokes the alarm only, without stopping. Obviously the first must be programmed inferior to the second.	<b>0%_99%</b>	<b>1%</b>	<b>0%</b>	
<b>20</b>	<b>SIREN TIME</b> It requests that anyone of the auxiliary outputs is programmed as SIREN command. Particular values: 0= siren excluded; 255= siren not timed (always playing).	<b>0_255 minuti</b>	<b>1'</b>	<b>10'</b>	

<b>ALARMS ENABLING PARAMETERS (PASSWORD=1234)</b>					
<b>Description of the parameter</b>		<b>range</b>	<b>step</b>	<b>Def.</b>	<b>set</b>
<b>1</b>	<b>ENABLING LOW OIL PRESSURE failure (delay=1")</b> The input is heard after the time programmed in INHIBITION TIME of OIL PRESSURE	Y/NO	--	YES	
<b>2</b>	<b>ENABLING HIGH TEMPERATURE ENGINE failure (delay=1")</b>	Y/NO	--	YES	
<b>3</b>	<b>ENABLING LOW LEVEL WATER failure (delay=5")</b> 0=ignores input, 1=alarm only, 2=alarm+stop.	0_2	1	2	
<b>4</b>	<b>ENABLING END FUEL failure (delay=10")</b>	Y/NO	--	YES	
<b>5</b>	<b>ENABLING BREAKING DYNAMO BELT failure (delay=1")</b> The input is heard after the time programmed in INHIBITION TIME of OIL PRESSURE	Y/NO	--	YES	
<b>6</b>	<b>ENABLING BATTERY VOLTAGE failure (delay=5")</b>	Y/NO	--	YES	
<b>7</b>	<b>ENABLING GENSET VOLTAGES failure</b>	Y/NO	--	YES	
<b>8</b>	<b>ENABLING FREQUENCY failure</b>	Y/NO	--	YES	
<b>9</b>	<b>ENABLING LOAD CURRENT failure</b>	Y/NO	--	YES	
<b>10</b>	<b>ENABLING ALTERNATOR OVERTEMPERATURE failure</b>	Y/NO	--	YES	

<b>MACHINE SETTING PARAMETERS (PASSWORD=1234)</b>					
<b>Description of the parameter</b>		<b>Range</b>	<b>step</b>	<b>def</b>	<b>set</b>
<b>1</b>	<b>LANGUAGE CHOICE (0=Italian, 1=English)</b>	0_1	1	0	
<b>2</b>	<b>DEFAULT OPERATING MODE (0=SUPERM, 1=MANUAL, 2=AUTOMATIC)</b> NB: only mode 0,1 in EM10	0_2	1	1	
<b>3</b>	<b>C.T. NOMINAL CURRENT</b> NB: choose the TA on the basis of the current of shortcircuit	50_5000A	50A	500A	
<b>4</b>	<b>OIL PRESSURE sensor type (EM20 only)</b> 0 = none 1 = VDO 29/10 ( 10Ω=0BAR, 184Ω=10BAR) 2 = VEGLIA UM2M02001001 (303Ω=0BAR, 25Ω= 6BAR) 3 = VDO KR511 ( 10Ω=0BAR, 180Ω=10BAR)	0_3	1	3	
<b>5</b>	<b>ENGINE TEMPERATURE sensor type (EM20 only)</b> 0 = none 1 = VDO 323.801/001/006 (NTC 200Ω a 50C) 2 = COBO U2M020023 (NTC 750Ω a 50C) 3 = VDO 323.803/014/001../03 (NTC 324Ω a 50C) 4 = VDO KR812 (NTC 206Ω a 50C)	0_4	1	1	
<b>6</b>	<b>FUEL LEVEL sensor type (EM20 only)</b> 0 = none 1 = VDO (0Ω = 100%) nb: need calibration during installation 2 = VEGLIA (0Ω = 0%) nb: need calibration during installation For calibration it is necessary introduce parameters related to the 0%, 50%, 100% of the level	0_2	1	1	
<b>7</b>	<b>CONFIGURATION of AUXILIARY input AUX1</b> See at par. INSTALLATION for the criterions of programming of the auxiliary inputs.	0_8	1	7/9	
<b>8</b>	<b>CONFIGURATION of AUXILIARY input AUX2</b>	0_8	1	8/6	
<b>9</b>	<b>CONFIGURATION of AUXILIARY input AUX3 (EM20 only)</b>	0_8	1	7	
<b>10</b>	<b>CONFIGURATION of AUXILIARY input AUX4 (EM20 only)</b>	0_8	1	8	
<b>11</b>	<b>CONFIGURATION AUSILIARY output RL3</b> See at par. INSTALLATION for the criterions of programming of the auxiliary exits.	0_10	1	1	
<b>12</b>	<b>CONFIGURATION of AUSILIARY output RL4</b>	0_10	1	2	
<b>13</b>	<b>CONFIGURATION of AUSILIARY output RL5 (EM20 only)</b>	0_10	1	3	
<b>14</b>	<b>CONFIGURATION of AUSILIARY output RL6 (EM20 only)</b>	0_10	1	4	
<b>15</b>	<b>STARTINGS COUNTER</b>	0_65000	1	0	
<b>16</b>	<b>RUNNING COUNTER (HOURS)</b>	0_65000	1	0	
<b>17</b>	<b>RUNNING COUNTER (MINUTES)</b>	0_59	1	0	
<b>18</b>	<b>RUNNING HOURS FOR ALARM MAINTENANCE</b> note: password not necessary	0_65000	1	1000	

18: CALL FOR SERVICE to HOURS  
 17: MINUTES RUN COUNTER  
 16: HOURS RUN COUNTER  
 15: START COUNTER  
 14\*: RL6 OUTPUT FUNCTION  
 13\*: RL5 OUTPUT FUNCTION  
 12: RL4 OUTPUT FUNCTION  
 11: RL3 OUTPUT FUNCTION  
 10\*: AUX4 INPUT FUNCTION  
 09\*: AUX3 INPUT FUNCTION  
 07: AUX2 INPUT FUNCTION  
 07: AUX1 INPUT FUNCTION  
 06\*: FUEL LEVEL SENSOR TYPE (0=NO)  
 05\*: TEMPERATURE SENSOR TYPE (0=NO)  
 04\*: OIL PRESSURE SENSOR TYPE (0=NO)  
 03: CURRENT TRANSF.(C.T.) CURRENT  
 02: OPERATING MODE (1=MANUAL)  
 01: LANGUAGE (ITALIAN/ENGLISH)

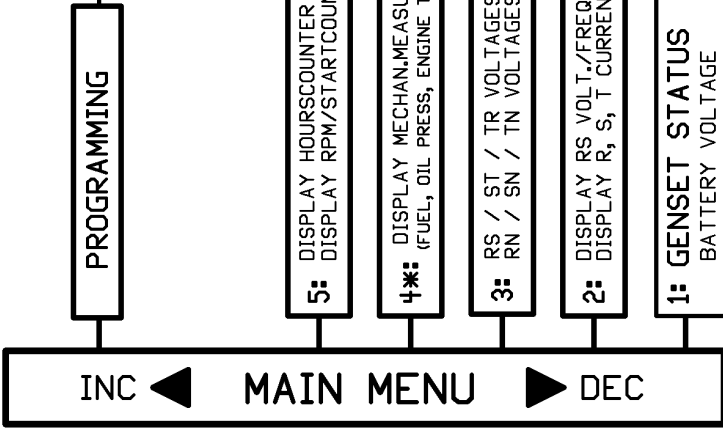
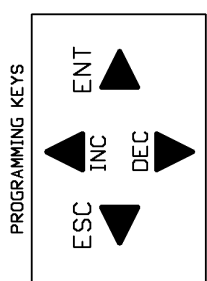
10: ALTERNATOR OVERTEMP.MONITOR.  
 09: OVERCURRENT MONITORING  
 08: FREQUENCY MONITORING  
 07: VOLTAGE MONITORING  
 06: BATTERY MONITORING  
 05: BATT.CHARGER BELT MONITORING  
 04: END FUEL MONITORING  
 03: WATER LEVEL MONITORING  
 02: ENGINE TEMPERATURE MONIT.  
 01: OIL PRESSURE MONITORING

**NOTE:** ITEM WITH \* IN EM20 ONLY

21-23:LEVEL CALIBR. TYPE 2 (0,50,100%)  
 18-20:LEVEL CALIBR. TYPE 1 (0,50,100%)  
 17: TEMPERAT.CALIBR. (SHIFT)  
 16: PRESSURE CALIBR. (SHIFT)  
 13-15:METERS DUMPING (n.3: V,C,F)  
 12: BATTERY VOLTAGE CALIBRATION  
 9-11: AMPEROMETERS CALIBR.(n.3: R,S,T)  
 08: AMPEROMETERS ZERO CALIBR.  
 07: VOLTOMETERS LEVELMENT WINDOW  
 4-6: VOLTOMETERS P/N CAL. (n.3: RN,SN,TN)  
 1-3: VOLTOMETERS P/P CAL. (n.3: RS,ST,TR)

20: SIREN TIME (0=OFF)  
 19\*: FUEL RESERVE THRESHOLD  
 18\*: FUEL END THRESHOLD  
 17\*: ENGINE FAULT TEMPERATURE  
 16\*: ENGINE WARNING TEMPERATURE  
 15\*: OIL PRESSURE WARNING THRESHOLD  
 14\*: OIL PRESSURE FAULT THRESHOLD  
 13: MAX TIME FOR OIL IN PRESSURE  
 12: ENGINE OVERSPEED  
 11: MAX TIME FOR TRANSIENT  
 10: MAX TIME FOR STATIONARY STEADY  
 09: COOLING TIME  
 08: HEATING TIME  
 07: SHORTCIRCUIT FACTOR  
 06: MAX OVERLOAD TIME  
 05: GENSET NOMINAL CURRENT  
 04: MAX FREQUENCY  
 03: MIN FREQUENCY  
 02: MAX VOLTAGE (PH/PH)  
 01: MIN VOLTAGE (PH/PH)

- 6: PASSWORD INPUT (STANDARD VALUE= 1234)
- 5: MANUFACT.PARAMET. (RESERVED)
- 4: METERS CALIBRAT.
- 3: MACHINE SETTING
- 2: ALARMS ABILIT.
- 1: WORKING PARAM.



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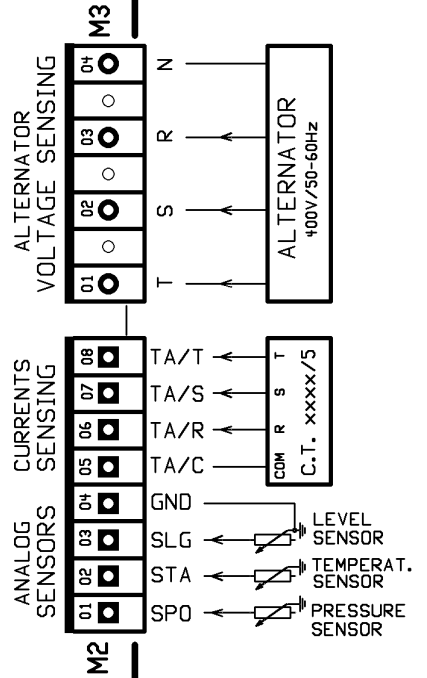
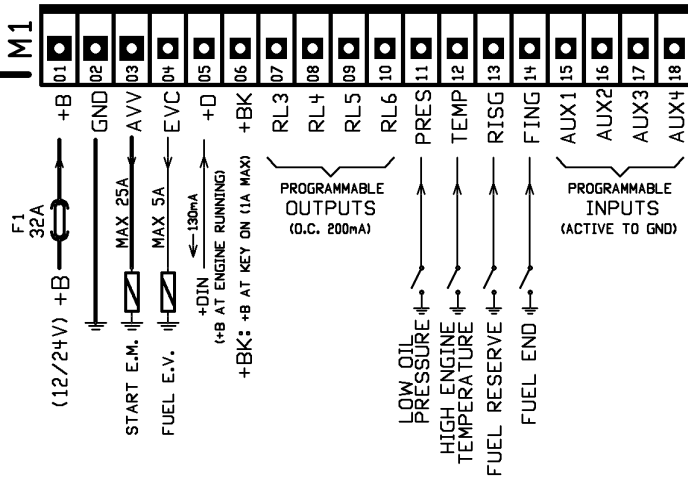
**EM20 CONTROLLER**  
 GENERAL MENU TREE

MENUE 14.SCH  
 30.10.2003

12/24

INTERNAL SWITCH

# EM20 CONTROLLER BOTTOM VIEW 1:1 SCALE



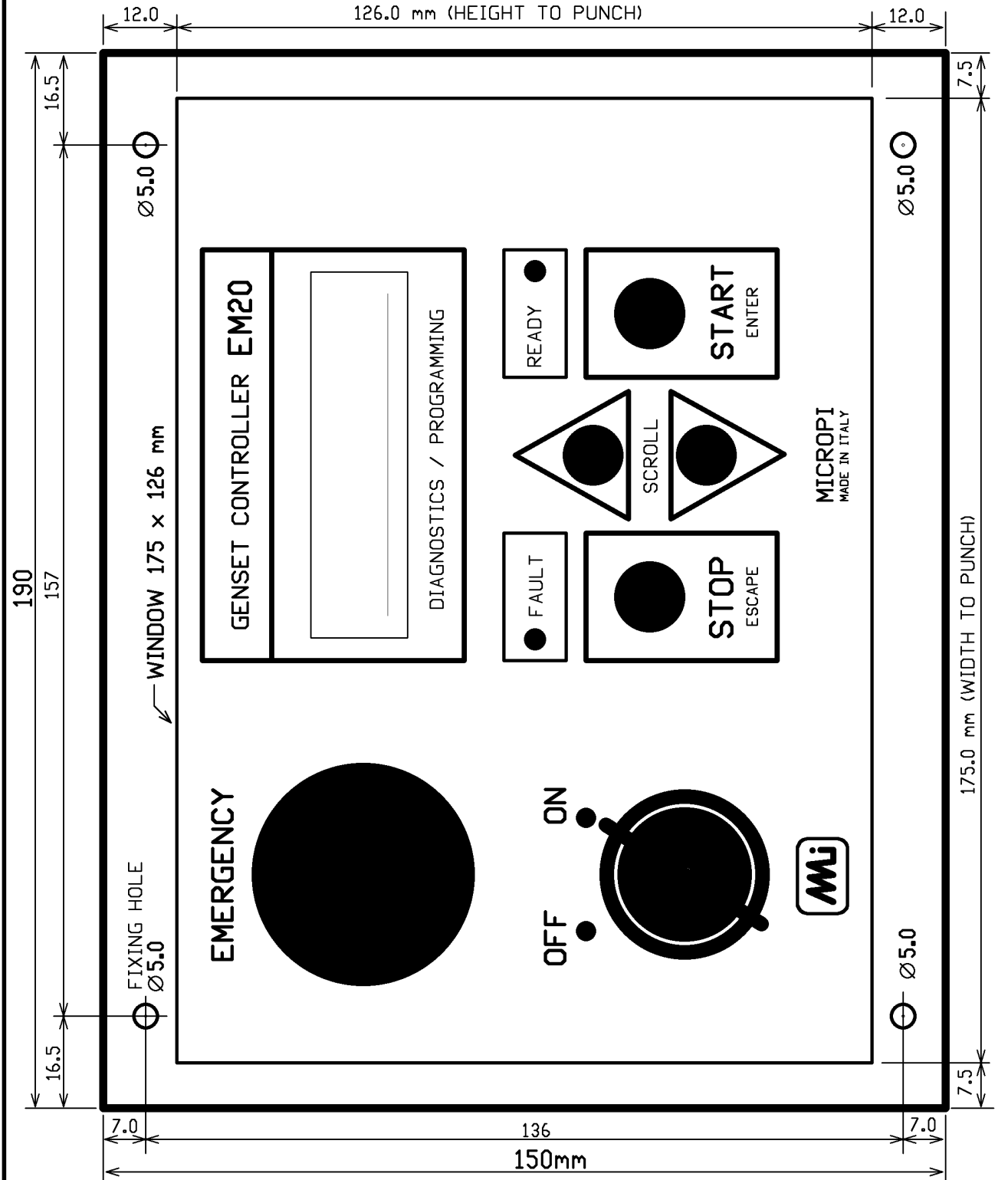
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**EM20 CONTROLLER**  
INSTALLATION

EM20INE12.SCH  
09.09.2003

# EM10/EM20 - 1:1 SCALE - MECHANICAL INSTALLATION



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**EM20 CONTROLLER**  
MECHANICAL INSTALLATION

EM\_E14A.MEC  
30.10.2003