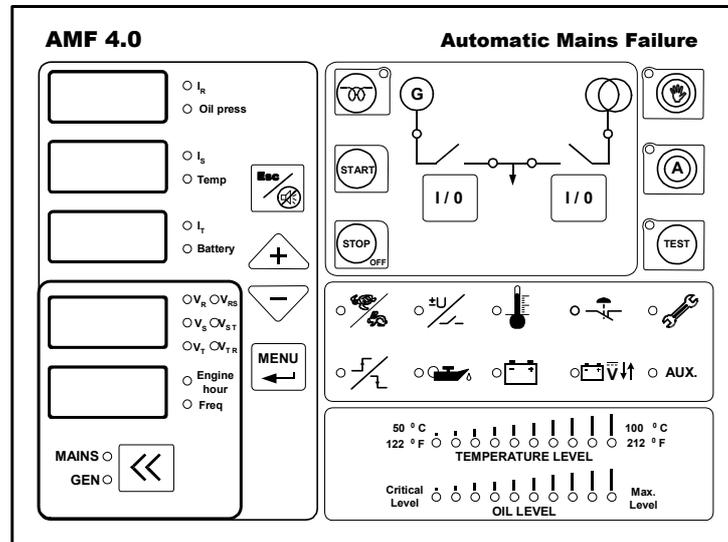


AMF 4.0 AUTOMATIC MAINS FAILURE UNIT

USER MANUAL

V1.36

(AMF 4.0 version 25)



DESCRIPTION

AMF 4.0 genset control unit provides the functions, required in automatic mains failure applications of gensets. It can be operated in automatic, test and manual modes. It contains digital displays providing functions of all analog displays needed in generator panels. Device digital displays show 3 phase mains and generator voltages, 3 phase generator currents, mains and generator frequencies, battery voltage, oil pressure (bar), engine temperature and engine hour. Generator is monitored constantly and when generator or mains values exceed the limits adjusted in the parameter menu, necessary actions are taken and alarm is activated. Last ten alarms are recorded in the device memory. All operating modes and timings can be adjusted in the parameter menu. This flexibility is provided for different kinds of generator applications.

FUNCTIONS

- Manual engine starting and stopping
- Mains monitoring, automatic start, stop and transfer switch functions
- True RMS voltage and current measurements
- Failures monitoring
- Preheating
- Manual, automatic and test modes
- Cost effective digital measurement displays
- Recording of last 10 failure
- Engine hour measurement and periodic service time warning
- Manual and automatic control of mains and generator contactors
- Analog engine temperature and oil pressure measurement capability
- Adjustable operating modes and timings via parameter menu
- Analog bar graph, engine temperature and oil pressure displays
- Adjustable measurement calibrations
- Remote Start

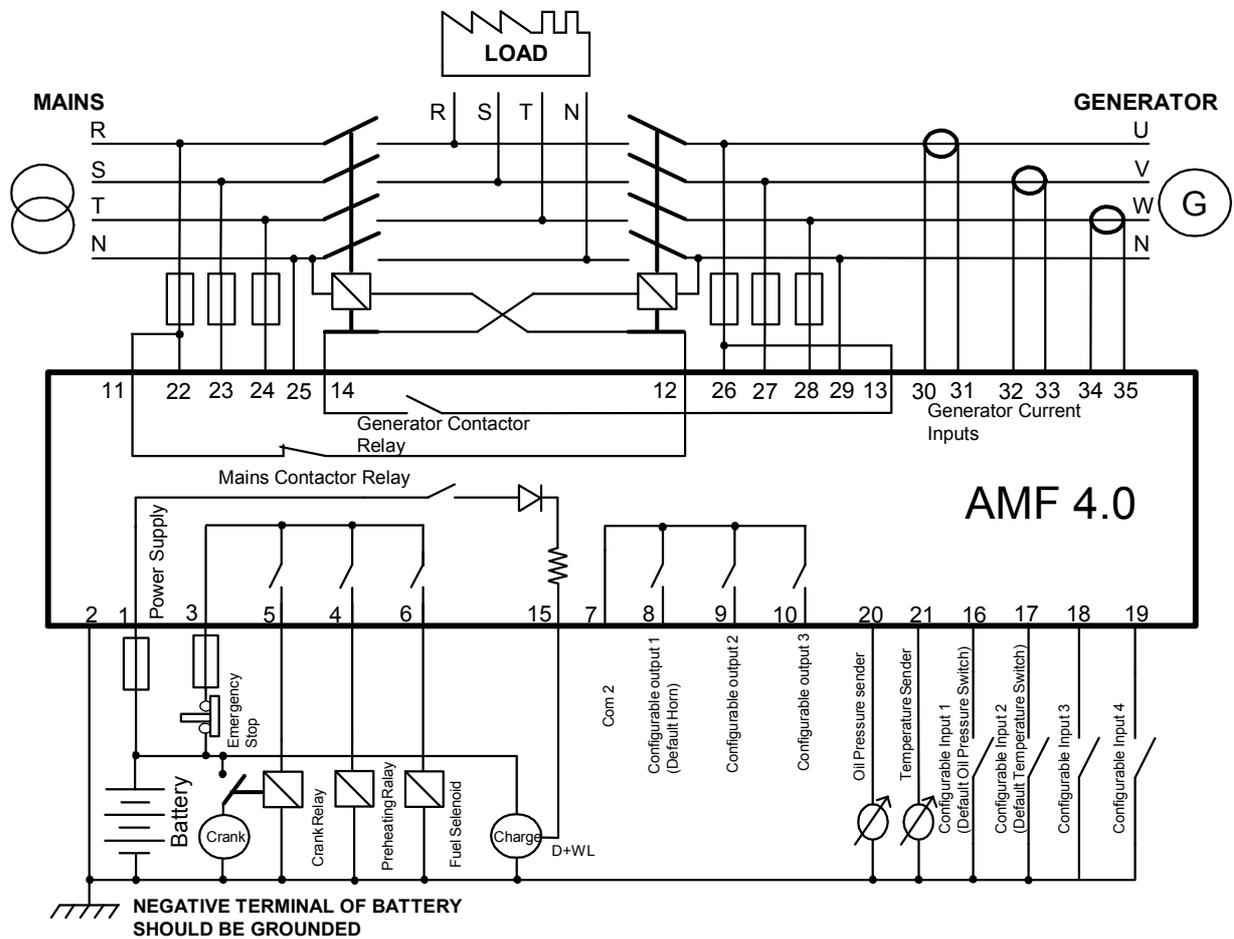
INPUT / OUTPUTS

- 3 phase mains and generator voltage inputs
- 3 phase generator current inputs
- 12 or 24 V battery supply input
- Oil pressure and temperature analog inputs
- Charge alternator input
- Cranking relay output
- Preheat relay output
- Fuel solenoid relay output
- Mains contactor relay output
- Generator contactor relay output
- Alarm relay output
- 2 programmable auxiliary relay output
- 2 programmable auxiliary input

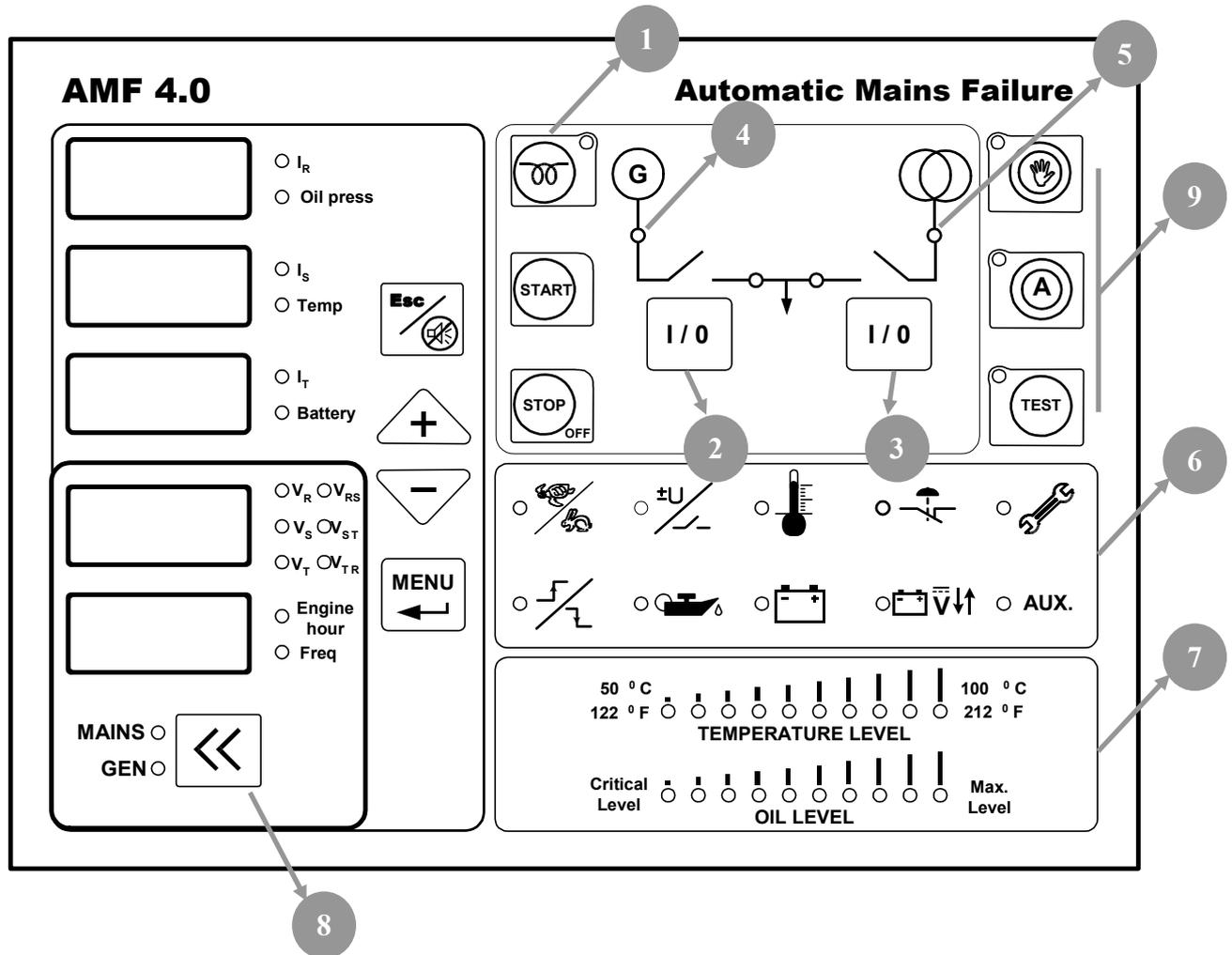
ALARMS

- Engine start/stop failure
- Under/over speed failure
- Under/over voltage failure
- Over current failure
- High temperature failure
- Charge fail warning
- Low oil pressure failure
- Periodic service time warning
- Auxiliary failure

AMF 4.0 CONNECTION DIAGRAM



FRONT PANEL



PreHeat Button (1): When genset doesn't start in cold weathers, engine can be preheated with this button. Button function can be set as "button must be held down to preheat" or "preset preheat time when you press button". Preheat button can be used in manual mode and when engine is not running.

Start Button: This button is used to start genset. Panel will stop cranking when it detects engine running signals. Button function can be set as "button must be held down to crank" or "preset cranking time when you press button". Start button can be used in manual mode and when engine is not running. Panel will display "Str" message during cranking.

Stop Button: This button is used to stop the genset. When you pressed this button first time panel switched to manual mode and if generator contactor is used before, genset is switched to cooling mode. If you pressed second time genset stops immediately. Second function of this button when you press more than 3 seconds panel will switch to off mode.

Generator Contactor (2): This button is used to transfer load to genset. When genset is running this button can be used. Led lamp above the button shows contactor status. When the led lamp is lit, contactor is closed. Generator contactor cannot be closed when the mains contactor is closed. To close generator contactor, you must open the mains contactor first. In engine running condition, when you press stop button, generator contactor will open immediately.

Mains Contactor (3): This button is used to control mains contactor. It cannot be closed if generator contactor is closed.

Generator Status Led Lamp (4):

- It is off, if engine isn't running.
- It is on, if engine is running
- It is blinking, if genset is in engine stabilization, cooling or stopping. These topics will be explained later

Mains Status Led Lamp (5):

- It is off, if mains voltage is outside the limits of preset values.
- It is on, if mains voltage is inside the limits of preset values.
- It is blinking in transition times (mains failure delay and mains return delay) if mains change the state from normal to failure or failure to normal state

Alarm Led Lamps (6): From the upper left corner, high and low generator speed, high and low generator voltage, high coolant temperature, over current and service alarms. From lower left corner start and stop failure, low oil pressure, charge failure, battery voltage failure and auxiliary alarms. Detailed description will be given in the following chapters.

Oil Pressure and Coolant Temperature bar graphs (7): Analog oil pressure and coolant temperatures can be seen in bar graphs. In temperature bar graph temperature can be seen from 50° C/ 112 °F to 100 °C/212 °F. In oil press bar graph, oil press can be seen from oil pressure failure level to maximum oil press sender level.

Display Leds: These leds are in the right side of numerical displays. Leds indicates meaning of the value in the displays. Values in the displays can be changed by up, down and menu buttons.

Measuring Mode Button (8): The button selects the displayed values at lower 2 numerical display. These displays can show generator voltage and frequency or mains voltage and frequency.

Esc Button: This button has multiple tasks. These are listed below,

- In alarm condition, first press stops the horn and second press clears the alarm.
- It is used to exit parameter menu. For this process button must be held down 3 seconds.
- In the process of changing parameter when you enter invalid values you can cancel by this button.

Menu Button (Enter): This button has multiple tasks. These are listed below

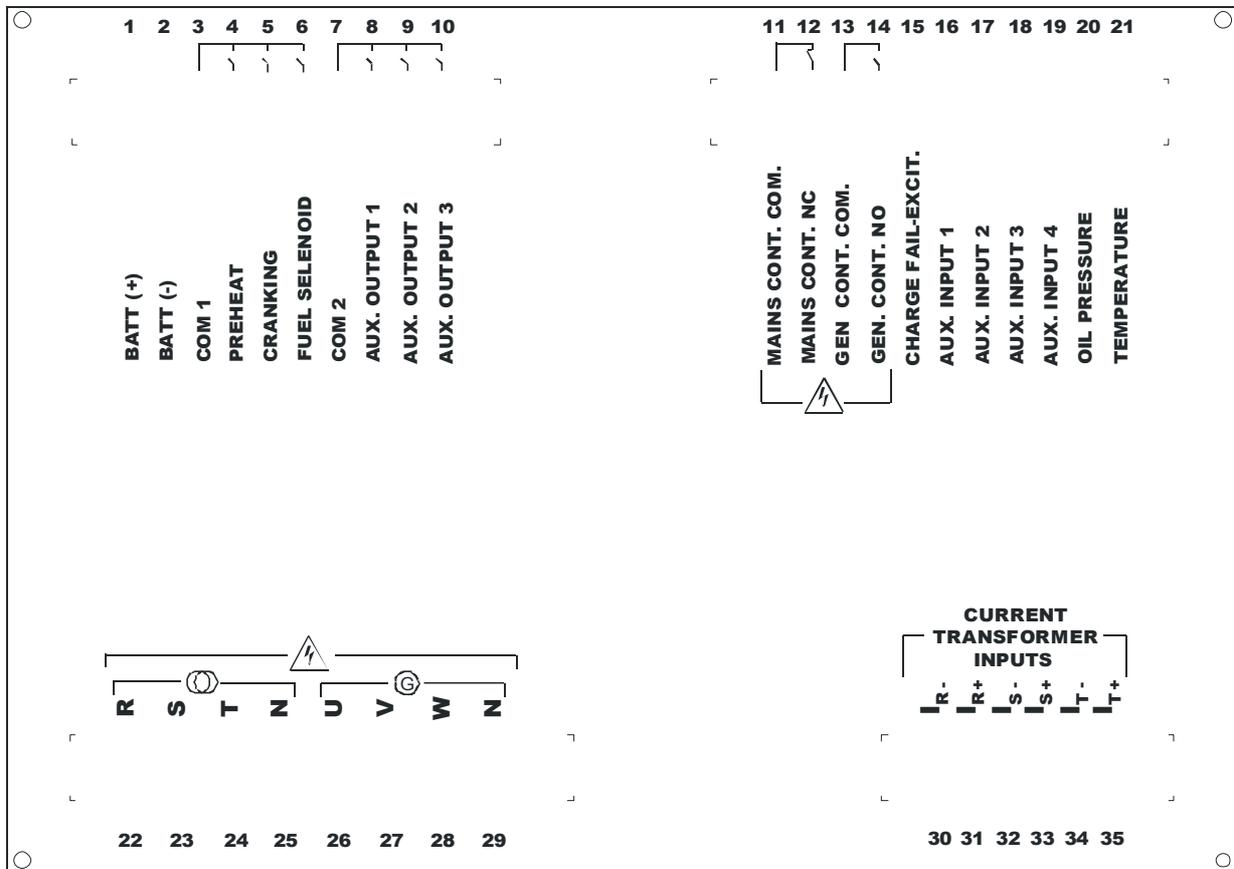
- It is used to select the values in the numerical displays. When you press first time led will be lit on the right of the display that is in selection mode. If you press up and down buttons before stop blinking you can change the value shown in display. If the display that is wanted to change mode is different you can press menu button and change the display in selection mode.
- If you press this button 3 seconds, you will enter the parameter menu. In parameter menu you can use menu button to change selected parameter. You can change the active digit. After all active digits are set last press will write value to parameter memory. Detailed information will be given in parameters section.

Up, Down Buttons (+, -): This button has two tasks. These are listed below.

- It is used to select the values in the numerical displays. When you press first time led will be lit on the right of the display that is in selection mode. If you press second time you can change the value of display that is in selection mode.
- In parameter menu you can press menu button to change selected parameter. You can change the number of active digit.

Running Mode Buttons (9): These are manual (hand mark), automatic (A letter) and test buttons. These buttons set running mode of genset. There is mode indication leds near each of these buttons. When panel is in off mode you can press these buttons to wake up panel and genset will run in selected mode.

REAR CONNECTIONS



CONNECTIONS

Terminal No	Terminal Name	Description
1	Bat (+)	Battery positive. Voltage must be between 9- 30 V
2	Bat (-)	Battery negative. Battery negative must be connected to earth.
3	Com 1	Common terminal of preheat, fuel solenoid and cranking relays.
4	Preheat	Preheat relay
5	Cranking	Cranking relay
6	Fuel Solenoid	Fuel or stop solenoid relay. Operating mode must be selected from parameter menu.
7	Com 2	Common terminal of auxiliary relay 1, 2, 3
8,9,10	Aux. Output 1, 2, 3	Multiple function auxiliary relay outputs. Auxiliary output 1 is default horn output.
11 HIGH VOLTAGE	Mains Cont. Com.	Input terminal of mains contactor relay. Line R of mains can be connected to this terminal
12 HIGH VOLTAGE	Mains Cont. NC	Output terminal of mains contactor relay. This output is connected to mains contactor.
13 HIGH VOLTAGE	Gen Cont. Com.	Input terminal of generator contactor relay. Line U of generator can be connected to this terminal
14 HIGH VOLTAGE	Gen Cont. NO	Output terminal of generator contactor relay. This output is connected to generator contactor.
15	Charge Fail Excit.	Warning lamp output of charge alternator must be connected here. In the cranking excitation current is supplied to charge alternator over 150 ohm resistor.
16	Aux. Input 1	Multiple function auxiliary input. These inputs are activated if it is connected to battery negative. If oil sender that have both sender and switch function is used, switch terminal must be connected to this terminal. Suitable configuration must be set for this input to use it as oil pressure switch input. If this input is used for auxiliary input. Alarm will be shown as A1 in the display at the same time with auxiliary led indication.
17	Aux. Input 2	Multiple function auxiliary input. These inputs are activated if it is connected to battery negative. If temperature sender that have both sender and switch function is used, switch terminal must be connected to this terminal. Suitable configuration must be set for this input to use it as temperature switch input. If this input is used for auxiliary input. Alarm will be shown as A2 in the display at the same time with auxiliary led indication.

18	Aux. Input 3	Multiple function auxiliary input. These inputs are activated if it is connected to battery negative. If this input is used for auxiliary input. Alarm will be shown as A3 in the display at the same time with auxiliary led indication.
19	Aux. Input 4	Multiple function auxiliary input. These inputs are activated if it is connected to battery negative. If this input is used for auxiliary input. Alarm will be shown as A4 in the display at the same time with auxiliary led indication.
20	Oil Pressure	If oil sender that have both sender and switch function is used, sender terminal must be connected to this terminal. If oil sender that has single oil pressure switch output, switch output must be connected to this input. Suitable configuration must be set for this input to use it as oil pressure switch or sender input.
21	Temperature	If temperature sender that have both sender and switch function is used, sender terminal must be connected to this terminal. If temperature sender that has single temperature switch output, switch output must be connected to this input. Suitable configuration must be set for this input to use it as temperature switch or sender input.
22,23,24,25 HIGH VOLTAGE	Mains Line and Neutral Inputs	Mains line and neutral are connected to these terminals.
26,27,28,29 HIGH VOLTAGE	Generator Line and Neutral Inputs	Generator line and neutral are connected to these terminals.
30,31,32,33 34, 35	Current Transformer Inputs	Secondary side of current transformer must be connected here. Each transformer must be connected separately.

Note: Battery negative must be connected to earth

RUNNING MODES

Automatic Mode: If you press automatic button marked “A” genset will switch to automatic mode. In this mode panel controls mains voltages and if mains is outside the limits that you programmed, Panel will open the mains contactor and starts the genset. After “engine stabilization time” and “generator contactor delay” load transferred to the generator. Panel controls all the engine values to detect possible failures after engine stabilization time. If mains come to normal condition, mains is controlled during “mains return delay” for stabilization. If mains is normal “after mains return delay”, generator contactor opens and mains contactor closes. Genset is stopped after cooling period. In automatic mode, if panel is in engine off state and detects an engine running signal. Panel will stop the engine.

Test Mode: If you press test button at the right side of front panel. Genset will be switched to test mode. In test mode engine starts immediately. After “engine stabilization time” if parameter “test mode” is test off load genset wait for mains failure in running condition. When mains failure occur mains contactor opens and generator contactor closes. In same way when mains returns, panel waits “mains return delay” and switch back to mains. If parameter “test mode” is test on load. After engine starting, generator contactor closes and genset supply the

load. If operator wants to stop the engine in test mode panel must be returned to automatic or manual mode. In manual mode you can stop the engine by stop button.

Manual Mode: If you press the manual button genset will be switched to manual mode. In manual mode all start stop and preheat operations, contactor control fulfilled by panel buttons.

PANEL RUNNING PHASES

- 1. Generator is still:** In this condition engine running signals must be absent. These are oil pressure, charging alternator warning lamp signal, generator voltage and frequency. In manual mode panel doesn't react to this signal but in automatic mode panel will try to stop engine. If electricity panel of genset has manual control and these are wanted to be used. Electronic panel must be switched to manual mode.
- 2. Preheating:** In cold weathers preheating of engine can be necessary. Engine must be still during preheating. If parameter "preheating time" is not zero, preheating is accomplished before starting process by panel.
- 3. Cranking:** In this stage engine is cranking. All engine signals must be absent and engine must be still before cranking. If one of the engine signal is detected before cranking, panel switch to start and stop alarm. Panel will show which signal is detected with engine start stop alarm. If oil pressure signal is detected before cranking panel will wait for it to decrease to zero. If "before cranking oil pressure delay" is elapsed and oil pressure is not zero panel will switch to start and stop alarm. In cranking stage all engine signals, alternator frequency, alternator voltage, charge alternator voltage and oil pressure is controlled. If one of the signals is detected, Panel detects engine is running, crank disconnects and switch to engine stabilization time. Generator status led starts to blink. During cranking, "Str" message is shown in the display. Oil pressure can rise before engine running so when oil pressure is detected, crank disconnected after "crank disconnect oil pressure delay".
- 4. Stabilization:** After generator running signals detected panel waits for engine signals to stabilize. After engine stabilization time, all alarms are activated.
- 5. Running:** After stabilization time genset is in running condition. If genset in manual and test modes, alternator contactor time is waited and alternator contactor is closed. In manual mode operator can close the generator contactor by generator contactor button. In running mode generator status led is lit.
- 6. Cooling:** If a stop condition occurs by operator or mains status. Generator is switched to cooling period and engine is cooled during "cooling time". During this time engine status led is blinking. If alternator contactor hasn't been closed since last start cooling period is bypassed. If mains failure occurs during cooling process generator is switched back to running mode and alternator contactor is closed. After cooling process generator is switched to stopping condition.
- 7. Stopping:** After cooling stage, generator switches to stopping stage. If fueling system is operating solenoid, operating solenoid is de-energized. If fueling system is stop solenoid energizes until engine stops. If one of the engine running signals is detected stopping period doesn't ends. Alternator frequency and voltage, charge alternator warning lamp signal and oil pressure must be absent. If panel detects engine signals after "fail to stop delay" panel will switch to start stop alarm.
- 8. Generator shutdown:** Generator is stopped because of a red alarm. Generator cannot be started if alarm is not cleared.

ALARMS

Alarms are divided to red and yellow alarms. Yellow alarms are for warning purposes and don't stop the generator. Red alarms are serious and if occur generator contactor is opened and generator is stopped immediately.



High and low speed (RED ALARM): If alternator frequency is higher than “generator over frequency failure” or is lower than “generator under frequency failure” “panel switches to this alarm. Alarm is activated after “generator frequency failure delay”.



High and low alternator voltage (RED ALARM): If alternator voltage is higher than “generator over voltage failure” or is lower than “generator under voltage failure” “panel switches to this alarm. Alarm is activated after “generator voltage failure delay”.



High coolant temperature (RED ALARM): If temperature that is read from temperature sender is higher than “high coolant temperature level” or if temperature switch sends alarm to panel. Panel switches to high coolant temperature alarm.



Over current failure (RED ALARM): If currents values read from current transformers is higher than “over current level”. Generator contactor is opened and generator switches to cooling. After cooling stage generator stops. Alarm is activated if condition continues for “over current alarm delay”.



Periodic service: When periodic service time elapsed after last periodic service. Alarm is displayed. Only service personnel can reset alarm.



Fail to start stop: If this alarm occurs that means panel couldn't start or stop engine. All engine signals must be absent and engine must be still before cranking. If one of the engine signals is detected, before cranking, panel switch to start and stop alarm. Panel will show which signal is detected with engine start stop alarm. If oil pressure signal is detected before cranking panel will wait for it to decrease to zero. If “before cranking oil pressure delay” is elapsed and oil pressure is not zero panel will switch to start and stop alarm. In automatic and test modes if generator couldn't be started after user defined crank attempts, panel switches to fail to start stop alarm. In engine stopping stage if panel still detects engine signals after “fail to stop delay”. Panel switches to fail to start stop alarm. Alarm led lamps indicates which engine signal is still present and causes fail to start stop alarm.



Low oil pressure (RED ALARM): If oil pressure that is read from oil pressure sender is lower than “low oil pressure level” or if oil pressure switch sends alarm to panel. Panel switches to low oil pressure alarm.



Charge Failure (YELLOW ALARM): If charge voltage read from charge alternator warning lamp terminal decreases, panel switches to this alarm. This alarm doesn't stop generator.



Battery high and low voltage (YELLOW ALARM): If battery voltage is higher than “battery high alarm level” or is lower than “battery low alarm level” panel switches to this alarm. This alarm doesn't stop engine.

AUX.

Auxiliary input (YELLOW or RED ALARM): When an auxiliary input alarm occur. This led is lit and A1, A2, A3 or A4 message is written to display. A1 means auxiliary input1 alarm.

Mains failure: If mains voltage is lower than “mains under voltage failure” or is higher than “mains over voltage failure” mains failure occur and in automatic mode generator is started. If mains comes to normal condition (higher than “under voltage return” and lower than “over voltage return”) generator is stopped in automatic condition.

Emergency stop: If auxiliary input is adjusted for emergency stop and user presses emergency stop button. “StP” message is shown in the display, generator contactor opens and engine stops immediately. To clear this alarm user must pull emergency stop button and clear the alarm.

Sensor failure: If cable connected to sender terminal of oil pressure and temperature senders breaks. Sensor failure alarm is given. For oil pressure sender “oSn” message and for coolant temperature sender “tSn” message is shown in the display. Alarm is activated if condition continues for 4 seconds. If “analog oil pressure sender usage” and “analog coolant temperature sender usage” parameters are set to 0, sender will be used for display purposes and no alarm is given in sensor failure condition.

EEProm Failure: When this alarm occurs “EEP” message is written to display and you must call service. Genset mustn't be started.

PARAMETER MENU

To enter parameter menu, menu button must held down for 3 seconds. Password screen is displayed. Parameter menu contains 3 separate sections. These are operator, technician and calibration parameters sections. You can give separate password to these sections and enter to these sections by its passwords. In parameter section leftmost digit starts to blink. If you press up and down buttons you can increase and decrease the value shown in the blinking digit. If you want to proceed to digit at one-step right menu button must be pressed. You can adjust this digit up and down buttons and then you press menu button again. If you are in the rightmost digit and you have adjusted this digit, you can complete password entering by pressing menu button. You can exit menu by holding esc button for 3 second. When you enter the parameter menu at the first row of display “P0” (first parameter number) is shown. At the second row of display value of parameters is shown. If you want to proceed to other parameters you can use up and down buttons (P0, P1, P2...). Maximum parameter number is depends on your entered password (operator, technician or calibration). If you want to change parameter, menu button must be pressed at the selected parameter. At the third row parameter value is displayed and first digit of value blinks. Changing process is same as password entering process. By pressing menu button at last blinking digit new value is recorded. If you want cancel entering process you can press esc key. In return to factory defaults parameters when you press menu button NO message displayed if you press up and down buttons message will switch to YES and NO messages if you press menu button, when selection is YES, parameters will be returned to factory defaults. If you press NO process is cancelled. Each return to factory defaults, return its own section to factory defaults (operator, technician, calibration). If you want exit menu you can press down esc button for 3 second.

AMF 4.0 PARAMETERS

Initial parameter settings are for genset model 10. These are as following table. For chosen genset model, parameter table can be loaded by means of parameter 69. Parameters that is changed according to genset models are specified in the next sections.

No	Parameter	Setting Range	Default Value
Operator Parameters			
P0	Operator menu password	0-999	050
P1	Temperature unit	0: Celsius 1: Fahrenheit	0
P2	Crank attempts	1 – 9	3
P3	Cranking time	1-60 sec	10 sec
P4	Cranking pause time	3-60 sec	10 sec
P5	Manuel cranking type	0: Start button must be held down to crank 1: Automatic start	0
P6	Preheating type	0:Preheat button must be hold down to preheat 1: Automatic preheat	0
P7	Auxiliary input 1 function	0: Input disabled 1: Yellow alarm (always active) 2: Yellow alarm (active from starting) 3: Yellow alarm (active form engine stabilization time) 4: Red alarm (always active) 5: Red alarm (active from starting) 6: Red alarm (active from engine stabilization time) 7: Remote start 8: Remote main failure disable 9: Mains available 10: Emergency stop 11: Cabinet thermostat alarm	6
P8	Auxiliary input 2 function	Same as auxiliary input 1	0
P9	Auxiliary input 3 function	Same as auxiliary input 1	10
P10	Auxiliary input 4 function	Same as auxiliary input 1	4
P11	Auxiliary input 1 activation method	0: Close to activate 1: Open to activate	0
P12	Auxiliary input 2 activation method	Same as auxiliary input 1	0
P13	Auxiliary input 3 activation method	Same as auxiliary input 1	0
P14	Auxiliary input 4 activation method	Same as auxiliary input 1	0
P15	Auxiliary output 1 function	0: Output disabled 1: Engine running 2: Panel is in auto or test mode 3: Yellow alarm 4: Red alarm 5: Common alarm 6: Horn 7: Panel is in manual, auto or test mode 8: Panel is in auto mode 9: 6 sec stop output during engine stop 10: Fuel solenoid output 11: Auxiliary services	0
P16	Auxiliary output 2 function	Same as auxiliary output 1	0
P17	Auxiliary output 3 function	Same as auxiliary output 1	0
P18	Auxiliary output 1 activation method	0: De-Energize 1: Energize	1
P19	Auxiliary output 2 activation method	Same as auxiliary output 1	1
P20	Auxiliary output 3 activation method	Same as auxiliary output 1	1
P21	Test Mode	0: Test off load 1: Test on load	0
P22	Max. Stop solenoid working time	1-180 sec	6 sec

P23	Mains failure delay	0-120 sec	3 sec
P24	Transfer delay	1-60 sec	1 sec
P25	Alternator contactor delay	0-90 sec	2 sec
P26	Mains return delay	2-900 sec	5 sec
P27	Preheat time	0-300 sec	0 sec
P28	Generator voltage failure delay	2-20 sec	3 sec
P29	Generator frequency failure delay	2-20 sec	3 sec
P30	Horn time	0-900 sec	30 sec
P31	Current failure mode	0: Disabled 1: Enabled	1
P32	Crank disconnect on charge signal	0: Disabled 1: Enabled	0
P33	Crank disconnect on generator voltage	20V-500V	165V
P34	Mains under voltage failure	46V-500V	184 V
P35	Mains under voltage return	46V-500V	194 V
P36	Mains over voltage return	46V-500V	244 V
P37	Mains over voltage failure	46V-500V	254 V
P38	Generator under voltage failure	46V-500V	184 V
P39	Generator over voltage failure	46V-500V	254 V
P40	Generator under frequency failure	10-75 Hz	42.5 Hz
P41	Generator over frequency failure	10-75 Hz	57.5 Hz
P42	Last 10 failure		
P43	Return to operator factory defaults	Yes / No	
Technician Parameters			
P44	Technician menu password	0-999	060
P45	Analog Oil sender type	0: Analog oil sender disabled 1: Analog Endiksan type 2: Analog Olcusan (VDO 7 Bar) type 3: Analog Olcusan (VDO 10 Bar) type 4: Analog Olcusan (VDO 80 PSI) type 5: Analog VDO 5 Bar 6: Analog AKSA type	6
P46	Oil switch type	0: Oil switch disabled 1: Normally closed for low pressure 2: Normally open for low pressure	0
P47	Low oil pressure level	0.1 – 9.5 bar	1.2 bar
P48	Analog temperature sender type	0: Not used 1: Analog Endiksan type 2: Analog Olcusan (VDO 120 C) type 3: Analog Volvo type 4: Analog AKSA type 5: Analog AKSA type 2	4
P49	Digital temperature switch type	0: Not used 1: Digital open for high temperature 2: Digital closed for high temperature	2
P50	Analog oil pressure sender usage	0: Only for indication 1: For indication and control	1
P51	Analog coolant temperature sender usage	0: Only for indication 1: For indication and control	1
P52	Fueling system	0: Operating solenoid 1: Stop solenoid 2: ECU type	0
P53	Charging alternator	0: Charging alternator isn't present 1: Charging alternator is present	1
P54	Crank disconnect alternator frequency	10-30 Hz	21 Hz
P55	Crank disconnect oil pressure	0.5 – 9.5 bar	4.0 bar
P56	Crank disconnect oil pressure delay	1-30 sec	3 sec
P57	Before cranking oil pressure delay	1-10 sec	3 sec

P58	Cooling Time	0-600 sec	180 sec
P59	Fail to stop delay	4-120 sec	30 sec
P60	Engine stabilization time	2-60 sec	10 sec
P61	Engine protection delay after stopping	1-60 sec	3 sec
P62	Current transformer primary	5-900	200
P63	Parameter menu current multiplier	0: x1 mode 1: x10 mode	0
P64	Over current level	1-990 A	159 A
P65	Over current alarm delay	2-250 sec	30 sec
P66	High coolant temperature level	80 C – 140 C (176 – 284 F)	105 C (221 F)
P67	Battery low alarm level	0-40 V	24.0
P68	Battery high alarm level	0-40 V	30.0
P69	Automatic parameter load	0-41	10
P70	Periodic service time	10-5000	50
P71	Engine hour adjustment	0.0 - 99999.0 hour	0
P72	Clear last ten alarm	Yes/ No	
P73	Clear periodic service alarm	Yes/ No	
P74	Return to technician factory defaults	Yes/ No	
Calibration Parameters			
P75	Calibration menu password	0-999	070
P76	Mains Vr gain	0.01-9.99	0.87
P77	Mains Vs gain	0.01-9.99	0.87
P78	Mains Vt gain	0.01-9.99	0.87
P79	Generator Vr gain	0.01-9.99	0.87
P80	Generator Vs gain	0.01-9.99	0.87
P81	Generator Vt gain	0.01-9.99	0.87
P82	Generator Ir gain	0.01-9.99	3.53
P83	Generator Is gain	0.01-9.99	3.53
P84	Generator It gain	0.01-9.99	3.53
P85	Battery Voltage gain	0.01-9.99	0.54
P86	Mains Vr offset	-29,+29 V	0
P87	Mains Vs offset	-29,+29 V	0
P88	Mains Vt offset	-29,+29 V	0
P89	Generator Vr offset	-29,+29 V	0
P90	Generator Vs offset	-29,+29 V	0
P91	Generator Vt offset	-29,+29 V	0
P92	Battery voltage offset	-9.9,+9.9	0.8
P93	Oil pressure offset	-9.9,+9.9	0.0
P94	Temperature offset	-9,+9	0
P95	Generator Ir offset	-0.99, +0.99 (for 5 A)	0.00
P96	Generator Is offset	-0.99, +0.99 (for 5 A)	0.00
P97	Generator It offset	-0.99, +0.99 (for 5 A)	0.00
P98	Return to calibration factory defaults	Yes / No	
P99	Mains contactor control in off mode	0: No 1: Yes	1

CHANGED PARAMETERS FOR GENSET MODELS

Initial parameter settings are for genset model 10. Parameter settings are different for other genset models. Parameters that are different from model 10 parameters are as following table. Model number is used to select genset model in parameter 69

Models Number	Changed Parameters			
	0	P15 → 1 P62 → 100	P45 → 3 P64 → 29	P52 → 1 P67 → 9
1	P15 → 1 P62 → 100	P45 → 3 P64 → 36	P52 → 1 P67 → 9	P53 → 0 P68 → 15

2	P15 → 1 P62 → 100	P45 → 3 P64 → 48	P52 → 1 P67 → 9	P53 → 0 P68 → 15
3	P62 → 100	P64 → 43		
4	P15 → 1 P62 → 100	P45 → 3 P64 → 54	P52 → 1	P53 → 0
5	P62 → 100	P64 → 62		
6	P15 → 1	P52 → 1	P62 → 100	P64 → 64
7	P15 → 1	P52 → 1	P62 → 100	P64 → 87
8	P62 → 100	P64 → 87		
9	P15 → 1	P52 → 1	P64 → 149	
10	Default parameters			
11	P62 → 300	P64 → 210		
12	P15 → 1	P52 → 1	P62 → 300	P64 → 269
13	P62 → 300	P64 → 289		
14	P15 → 1	P48 → 2 P64 → 26	P52 → 1	P62 → 50
15	P48 → 2	P62 → 150	P64 → 130	
16	P48 → 2	P62 → 250	P64 → 217	
17	P48 → 2	P62 → 300	P64 → 289	
18	P48 → 2	P62 → 500	P64 → 433	
19	P48 → 2	P62 → 400	P64 → 360	
20	P48 → 2	P62 → 500	P64 → 437	
21	P48 → 2	P62 → 400	P64 → 383	
22	P48 → 2	P62 → 600	P64 → 506	
23	P48 → 2	P62 → 600	P64 → 542	
24	P48 → 2	P62 → 100	P63 → 1	P64 → 98
25	P48 → 2	P62 → 100	P63 → 1	P64 → 99
26	P48 → 2	P62 → 125	P63 → 1	P64 → 103
27	P48 → 2	P62 → 150	P63 → 1	P64 → 144
28	P15 → 1 P62 → 100 P53 → 0	P45 → 3 P64 → 17	P48 → 2 P67 → 9	P52 → 1 P68 → 15
29	P15 → 1 P62 → 100 P53 → 0	P45 → 3 P64 → 23	P48 → 2 P67 → 9	P52 → 1 P68 → 15
30	P15 → 1 P62 → 100 P53 → 0	P45 → 3 P64 → 48 P9 → 10	P48 → 2 P67 → 9	P52 → 1 P68 → 15
31	P15 → 1 P62 → 100	P45 → 6 P64 → 51	P48 → 2 P68 → 15	P52 → 1 P67 → 9
32	P15 → 1 P62 → 100	P45 → 6 P64 → 65	P48 → 2 P68 → 15	P52 → 1 P67 → 9
33	P15 → 1 P62 → 100	P45 → 6 P64 → 72	P48 → 2 P68 → 15	P52 → 1 P67 → 9
34	P15 → 1 P62 → 100	P45 → 6 P64 → 95	P48 → 2 P68 → 15	P52 → 1 P67 → 9
35	P15 → 0 P62 → 100	P45 → 6 P64 → 95	P48 → 4	P52 → 0
36	P15 → 1 P62 → 150	P45 → 6 P64 → 101	P48 → 2 P68 → 15	P52 → 1 P67 → 9
37	P15 → 0 P62 → 300	P45 → 6 P64 → 253	P48 → 4	P52 → 0
38	P15 → 0 P62 → 400	P45 → 6 P64 → 310	P48 → 2	P52 → 0
39	P15 → 0 P62 → 400	P45 → 6 P64 → 318	P48 → 2	P52 → 0
40	P15 → 0 P62 → 400	P45 → 6 P64 → 397	P48 → 2	P52 → 0
41	P15 → 0 P62 → 500	P45 → 6 P64 → 476	P48 → 2	P52 → 0

PARAMETER DESCRIPTIONS

No	Parameters	Description
Operator Parameters		
P0	Operator menu password	Operator password can be changed by this parameter
P1	Temperature unit	This parameter selects coolant temperature unit shown in the display. According to selected unit “high coolant temperature level“ is adjusted.
P2	Crank attempts	Number of cranking during starting in automatic, test and manual modes.
P3	Cranking time	Cranking time during automatic cranking
P4	Cranking pause time	Interval between two cranking period in automatic and test modes.
P5	Manuel cranking type	If this parameter selected”0”, operator must hold down start button pressed during cranking period. If this parameter selected “1” panel will perform cranking for “cranking time”. Crank is disconnected automatically when panel detects engine-running signals.
P6	Preheating type	If this parameter selected”0”, operator must hold down preheat button pressed during preheating period. If this parameter selected “1” panel will perform preheating for “Preheat time”.
P7	Auxiliary input 1 function	<p>It selects function of auxiliary input</p> <ul style="list-style-type: none"> • Auxiliary input can be adjusted as red or yellow alarm. Activation time can be “always active, active from engine starting or active from engine stabilization time”. When input activates auxiliary input led lit and A1.A2, A3 or A4 message is shown according to activated auxiliary input number. • When remote start input is activated generator starts and generator contactor closes. If input deactivated generator contactor opens, engine enters cooling period and then generator stops. Remote start is active only in automatic mode. • When mains failure disable input is activated if mains failure occur generator doesn’t start. Generator opens mains contactor. • If mains available input is activated panel assume mains is available. If this input deactivated genset return to its normal mode. • If emergency stop button is pressed, generator opens generator contactor and stops immediately. Panel show “StP” message in the display. To clear emergency stop alarm, emergency stop button must be pulled back and alarm clear button must be pressed. • Cabin thermostat function is used in cabinet type

		<p>generators. Panel doesn't control this input for 2 minute after engine start. After 2 minute if input is still active panel gives alarm, open generator contactor, cools engine then stop generator.</p> <p>If oil pressure sender that has both sender and switch is used, switch terminal must be connected to this input and this parameter is disabled.</p>
P8	Auxiliary input 2 function	<p>Functions are same as auxiliary input 1</p> <p>If coolant temperature sender that has both sender and switch is used, switch terminal must be connected to this input and this parameter is disabled.</p>
P9	Auxiliary input 3 function	Functions are same as auxiliary input 1
P10	Auxiliary input 4 function	Functions are same as auxiliary input 1
P11	Auxiliary input 1 activation method	If this parameter is 0, input will be activated when it is connected to battery negative. If this input is 1, input will be activated, when input is disconnected from battery negative.
P12	Auxiliary input 2 activation method	Same as auxiliary input 1
P13	Auxiliary input 3 activation method	Same as auxiliary input 1
P14	Auxiliary input 4 activation method	Same as auxiliary input 1
P15	Auxiliary output 1 function	<p>This parameter select the functions of auxiliary output 1</p> <ul style="list-style-type: none"> • Engine running: If engine running signal generator voltage, frequency or charge alternator warning lamp voltage is detected this output will be activated. • Panel is in auto or test mode: If panel is in automatic or test mode this output is activated. • Yellow alarm: If yellow alarm occurs, this output is activated. • Red alarm: If red alarm occurs, this output is activated. • Common Alarm: If yellow or red alarm occurs, this output is activated. • Horn: If horn is activated. This output will close and open by intervals of 1 second. • Panel is in manual, auto or test mode: If panel is in manual, automatic or test mode, this output will be activated. • Panel is in auto mode: If panel is in automatic mode, this output will be activated. • 6 sec stop output during engine stop: This output is activated for 6 second during engine stopping • Fuel solenoid output: This output can be used as auxiliary fuel solenoid output
P16	Auxiliary output 2 function	Same as auxiliary output 1
P17	Auxiliary output 3 function	Same as auxiliary output 1
P18	Auxiliary output 1 activation	If this parameter is selected as 0, when output is activated

	method	output relay de-energizes. At startup when you supply battery to panel this relay energizes and when output is activated relay energizes. If this parameter is selected as 1, when output activates, output relay energizes.
P19	Auxiliary output 2 activation method	Same as auxiliary output 1
P20	Auxiliary output 3 activation method	Same as auxiliary output 1
P21	Test Mode	If this parameter is selected as "0". In test mode, when engine is started, load isn't transferred to generator if mains is available. If mains isn't available generator contactor closes. If this parameter is selected as "1" generator contactor is closed, in test mode, without controlling mains
P22	Max stop solenoid working time	This parameter is used to limit maximum working time of stop solenoid.
P23	Mains failure delay	If mains is out of limits specified in the parameter menu, Mains failure occur and generator starts.
P24	Transfer delay	If generator contactor opens and mains contactor closes or vice versa. Transfer time is waited between them. It is used in test and automatic modes.
P25	Alternator contactor delay	In automatic and test modes after engine stabilization time alternator contactor delay is waited and alternator contactor closes.
P26	Mains return delay	If mains return from a mains failure condition. Mains return delay is waited before mains accepted as normal. After this delay in auto mode load transferred to mains.
P27	Preheat time	This parameter defines, in automatic preheating, how long preheating continues.
P28	Generator voltage failure delay	When generator voltages are out of voltage limits, a voltage alarm is given after "generator voltage failure delay".
P29	Generator frequency failure delay	When generator frequency is out of frequency limits, high low speed alarm is given after "generator frequency failure delay".
P30	Horn time	If horn output is activated. After "horn time" horn is deactivated. If parameter is "0", horn isn't deactivated until pressing alarm reset button.
P31	Current failure mode	This parameter defines that alternator current alarms is enabled or disabled.
P32	Crank disconnect on charge signal	If this parameter is enabled. Crank is disconnected when charge alternator voltage rises. (approx. 7 V)
P33	Crank disconnect on generator voltage	If alternator voltage rises to the voltage level defined in this parameter, Crank is disconnected.
P34	Mains under voltage failure	If mains fall bellow this limit mains failure occur and generator started in auto mode. Mains failure delay is waited before mains failure.
P35	Mains under voltage return	If mains exceeds this limit after a mains failure. Mains is accepted normal after "mains return delay" and in auto mode generator contactor is opened and generator is stopped.
P36	Mains over voltage return	If mains fall below this limit after a mains failure. Mains is accepted normal after "mains return delay" and in auto mode generator contactor is opened and generator is stopped.
P37	Mains over voltage failure	If mains exceeds this limit mains failure occur and generator

		started in auto mode. Mains failure delay is waited before mains failure.
P38	Generator under voltage failure	If generator voltage fall below this limit under over voltage alarm occur. Failure occurred after generator voltage failure delay
P39	Generator over voltage failure	If generator voltage exceeds this limit under over voltage alarm occur. Failure occurred after generator voltage failure delay
P40	Generator under frequency failure	If generator frequency fall below this limit under over speed alarm occur. Failure occurred after generator frequency failure delay
P41	Generator over frequency failure	If generator frequency exceeds this limit under over speed alarm occur. Failure occurred after generator frequency failure delay
P42	Last 10 failure	Last ten alarm is recorded in the panel memory. There alarm can be controlled by this parameter.
P43	Return to operator factory defaults	When you select “YES” and press menu key operator parameters is returned to factory defaults
Technician Parameters		
P44	Technician menu password	Technician password can be changed by this parameter
P45	Analog oil sender type	Analog oil pressure sender type can be selected from this parameter. If genset has only digital oil switch, and this parameter is adjusted to “0” oil switch input is transferred to analog oil pressure sender input.
P46	Oil switch type	Oil pressure switch type can be selected from this parameter.
P47	Low oil pressure failure	If oil pressure fall below this limit. Oil pressure failure alarm is activated.
P48	Analog temperature sender type	Analog coolant temperature sender can be selected from this parameter. If genset has only digital coolant temperature switch, and this parameter is adjusted to “0” coolant temperature switch input is transferred to analog temperature sender input.
P49	Digital temperature switch type	Analog coolant temperature sender can be selected from this parameter.
P50	Analog Oil pressure usage	If analog sender is used for display purposes only. Generator doesn't control this analog value. Value read from sender is used only for display purposes. No sensor alarm is given if sensor cable breaks.
P51	Analog temperature sensor usage	If analog sender is used for display purposes only. Generator doesn't control this analog value. Value read from sender is used only for display purposes. No sensor alarm is given if sensor cable breaks.
P52	Fueling system	Fueling system is can be adjusted as operating or stop solenoid. When this parameter is selected as ECU type. Cranking output behaves like start output and fuel solenoid output behaves like stop output. This configuration is necessary in some type of ECU managed engines. In engine starting condition, start output is activated for 3 second and cranking is stopped by means of activating stop output for 2

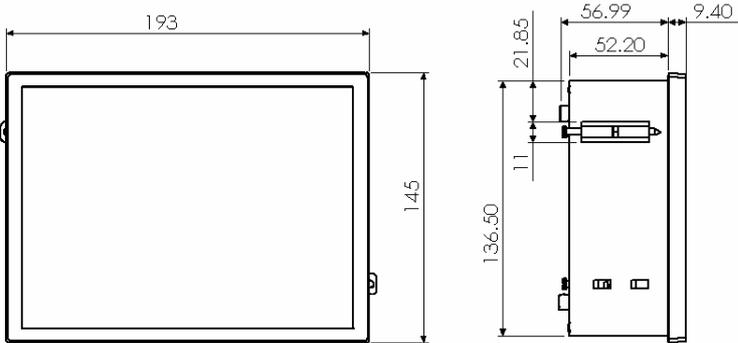
		second. In engine stopping condition stop output is activated as 2 second cycling pulses.
P53	Charging alternator	If parameter is adjusted as "0". Charge alternator failure doesn't occur and crank doesn't disconnected by charge alternator.
P54	Crank disconnect alternator frequency	In cranking if alternator frequency exceeds this limit crank disconnected.
P55	Crank disconnect oil pressure	In cranking if oil pressure exceed this limit and stay high, after "crank disconnect oil pressure delay" crank disconnected.
P56	Crank disconnect oil pressure delay	In cranking if oil pressure rise, after "crank disconnect oil pressure delay" crank disconnected.
P57	Before cranking oil pressure delay	If oil pressure is high before cranking this delay is waited. If oil pressure is fall down cranking begins. If oil pressure doesn't fall panel give fail to start stop alarm.
P58	Cooling Time	Parameter contains how long cooling period continue
P59	Fail to stop delay	In stopping period, parameter defines how long panel will wait for engine to stop before giving fail to start stop alarm.
P60	Engine stabilization time	When generator starts all engine alarms will be delayed for engine stabilization time. During this time all values read from sensors stabilize (Alternator voltage, frequency, charge alternator warning lamp voltage and oil pressure).
P61	Engine protection delay after stopping	In stopping period after panel detected all engine running signals absent, panel will wait an additional protection delay This is necessary for engine to stop completely before next engine start. Do not decrease this value if not necessary.
P62	Current transformer primary	This parameter contains current transformer primary value. If Current transformer primary is more than 999 you must change parameter menu current multiplier to x10 mode.
P63	Parameter menu current multiplier	If this parameter is made x10, Parameter "P62: current transformer primary" and "P64: over current level" are multiplied by 10. You must use this parameter if values are bigger than 999. For example for 2500:5 current transformer and 2000 Amp over current level. After setting parameter menu current multiplier x10, you must set current transformer primary as 250 and over current level 200.
P64	Over current level	If measured alternator current exceeds value that parameter contains. Over current alarm will be given.
P65	Over current alarm delay	If over current condition occur more than over current alarm delay. Panel will give over current alarm.
P66	High coolant temperature level	If engine coolant temperature exceeds the value that this parameter contain. Panel will give high coolant temperature alarm. This parameter must be entered according to parameter temperature unit.
P67	Battery low alarm level	If battery voltage falls below voltage level that parameter contains battery high low alarm will be given.
P68	Battery high alarm level	If battery voltage exceeds voltage level that parameter contains battery high low alarm will be given.
P69	Automatic parameter load	Parameter tables according to genset models can be loaded.

		Enter model number to load parameter table of selected genset model.
P70	Periodic service time	This parameters selects After how many running hour periodic service alarm will be given
P71	Engine hour adjustment	Engine hour is adjusted by this parameter.
P72	Clear last ten alarm	When you select “YES” and press menu key last ten failure is cleared.
P73	Clear periodic service alarm	When you select “YES” and press menu key, periodic service alarm is cleared and service time is reset
P74	Return to technician factory defaults	When you select “YES” and press menu key technician parameters is returned to factory defaults
Calibration Parameters		
P75	Calibration menu password	Calibration menu password adjustment
P76	Mains Vr gain	Mains line R voltage gain calibration.
P77	Mains Vs gain	Mains line S voltage gain calibration.
P78	Mains Vt gain	Mains line T voltage gain calibration.
P79	Generator Vr gain	Generator line R voltage gain calibration.
P80	Generator Vs gain	Generator line S voltage gain calibration.
P81	Generator Vt gain	Generator line T voltage gain calibration.
P82	Generator Ir gain	Generator line R current gain calibration.
P83	Generator Is gain	Generator line S current gain calibration.
P84	Generator It gain	Generator line T current gain calibration.
P85	Battery Voltage gain	Battery voltage gain calibration.
P86	Mains Vr offset	Mains line R voltage offset calibration.
P87	Mains Vs offset	Mains line S voltage offset calibration.
P88	Mains Vt offset	Mains line T voltage offset calibration.
P89	Generator Vr offset	Generator line R voltage offset calibration.
P90	Generator Vs offset	Generator line S voltage offset calibration.
P91	Generator Vt offset	Generator line T voltage offset calibration.
P92	Battery voltage offset	Battery voltage offset calibration.
P93	Oil pressure offset	Oil pressure offset calibration.
P94	Temperature offset	Coolant temperature offset calibration.
P95	Generator Ir offset	Generator line R current offset calibration.
P96	Generator Is offset	Generator line S current offset calibration.
P97	Generator It offset	Generator line T current offset calibration.
P98	Return to calibration factory defaults	When you select “YES” and press menu key calibration parameters is returned to factory defaults
P99	Mains contactor control in off mode	If this parameter is selected as “YES”, Unit will control mains voltages in off mode and when mains exceed the limits defined in parameter menu, mains contactor opens and protect the load and when mains returns to normal condition mains contactor closes. If this parameter is selected as “NO”, mains isn’t controlled and mains contactor is always closed.

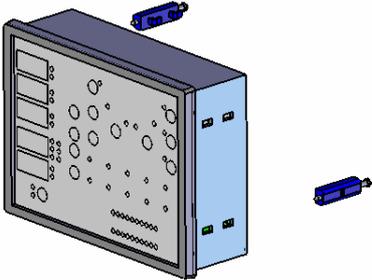
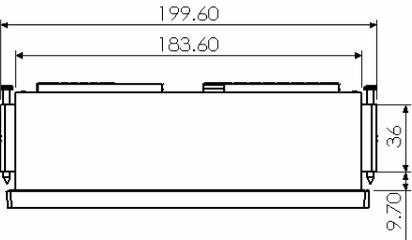
SPECIFICATIONS

Power Supply	9-35 VDC 140 mA (all relays are de-energized)
Ambient Temperature	-10°C / +70°C
Relative Humidity	%10-%95 non-condensing
Relay outputs	For cranking, fuel solenoid, preheating and auxiliary outputs max. 12V/24VDC 6 A, For mains and generator contactor relays max. 250VAC/10 A
Voltage measurement	20-300VAC
Frequency measurement	1-99 Hz
Current measurements	.../5 A current inputs (current transformer should be used)
Connection	Screw socket
Measurement Accuracy	Phase voltages : + / - %2 Frequency : + / - 0.1Hz Phase currents : + / - %2
Charge Excitation Current	80mA @ 12VDC 160mA@ 24VDC
Housing	PPO (Polyphenylene oxide) %30 Glass Fiber
Protection Class	IP 52 (Front side)
Weight	600 gr. (aprox.)
Dimensions (WxHxD)	192x144x62 mm
Panel Cut Out	186x138 mm
Mounting Installation	Front panel mounted with metal screw fixings

DIMENSIONS AND MOUTING



Dimensions in mm



" Specifications are subject to change without notice."