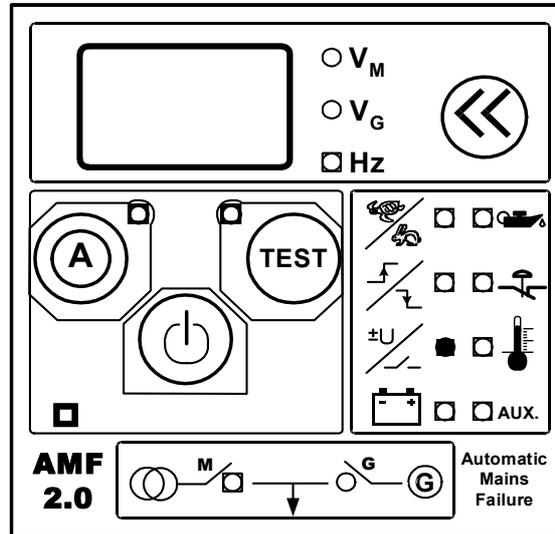


## AMF2.0 AUTOMATIC MAINS FAILURE UNIT OPERATORS MANUAL

### INTRODUCTION



AMF2.0 automatic mains failure unit is a microprocessor based digital unit monitoring the 3 phases of the mains and controls the changeover of mains and generator contactors if a mains failure on any phase is detected. The module offers a very cost effective and space saving solutions as it is able to display all the parameters which are essential for the basic gen-set control. The module has 3 operation modes. Stop, test and Auto operation modes can be chosen via the push-buttons mounted on the front panel. While the module is in Stop mode, if the menu button is pressed, the 41 parameter settings, which are used for controlling the generator, can be adjusted. So the module can be adapted to all the generator without the need of any other unit or module.

#### Features:

- Micro-processor based design
- Automatic engine starting and stopping
- Automatic load transfer
- Configurable via front panel
- Automatic shut down on fault condition
- Test mode
- Operate with cranking dropouts
- Preheat, auto ready and engine start outputs
- Stop/fuel solenoid selection
- 3 phase true RMS voltage measuring and monitoring
- Generator phase true RMS voltage measuring and monitoring
- Generator frequency measuring and monitoring
- Digitally adjustable low&high mains and generator voltage limits

- Digitally adjustable generator start timings
- Digitally adjustable generator overspeed /underspeed limits
- Digitally adjustable generator stop timings
- Digitally adjustable generator failure control timings
- Digitally adjustable auxiliary inputs specifications
- Digitally adjustable auxiliary outputs specifications
- Digitally adjustable preheat, cooling and load transfer timings
- Failure control and indicators
- Digitally adjustable sleep-mode selection
- Digitally adjustable measurement calibrations
- Digital display
- Low cost, small dimensions

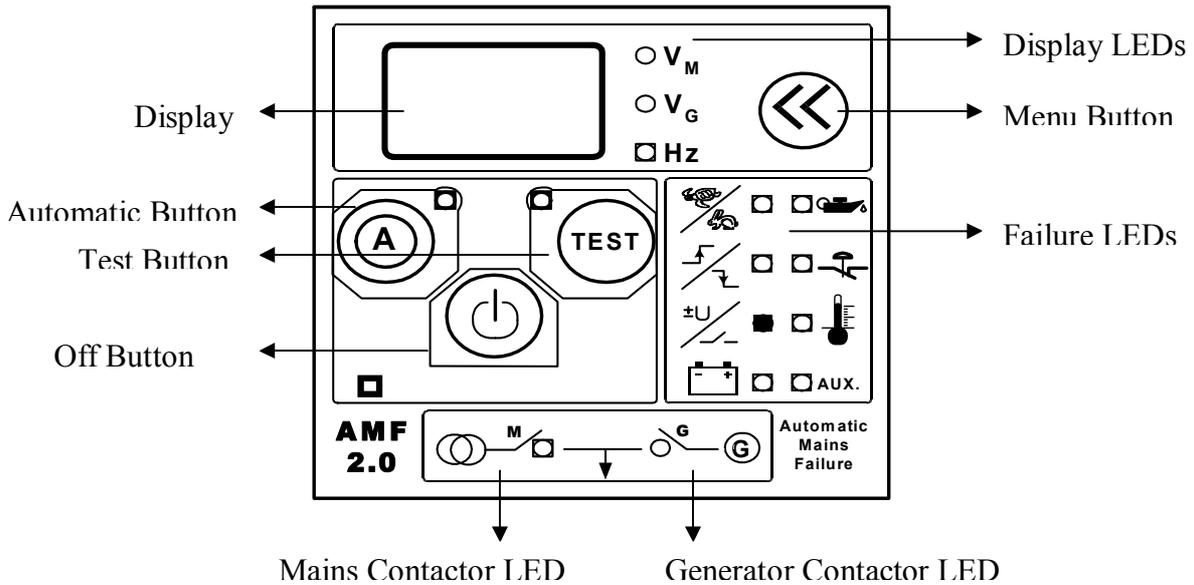
#### **Failures:**

- Start/stop failure
- Low oil pressure failure
- High engine temperature failure
- Overspeed/underspeed failure
- Auxiliary failure
- Over/under voltage failure
- Over current failure
- Charge fail warning

#### **Inputs/Outputs:**

- 3 phase mains voltage inputs
- Single phase generator voltage input
- 12 / 24 V battery voltage inputs
- Low oil pressure switch input
- Engine temperature switch input
- Charge input
- Configurable input
- Over current switch input
- Start relay output
- Fuel relay output
- Alarm relay output
- Configurable relay output
- Generator contactor relay output
- Mains contactor relay output

## Front View



**Display:** By pressing the menu button in auto or test mode, the voltage and frequency parameters can be displayed on the unit.

- L1-N Mains Voltage
- L2-N Mains Voltage
- L3-N Mains Voltage
- L13 Mains Voltage R-T
- L23 Mains Voltage S-T
- L12 Mains Voltage R-S
- L1-N Generator Voltage
- Generator Frequency

### Display Leds:

- $V_M$ : Indicates the displayed value is a mains voltage.
- $V_G$ : Indicates the displayed value is a generator voltage.
- Hz: Indicates the displayed value is a generator frequency.

**Automatic Button:** Auto button places the unit into automatic mode.

**Test Button:** Test button places the unit into test mode.

**Off Button:** Off button places the unit into off mode. In case of a failure, first pressing to the off button will reset the failures and alarm output. The second pressing will place the unit into the off mode. And during cooling time, by pressing the off button will cease the cooling operation.

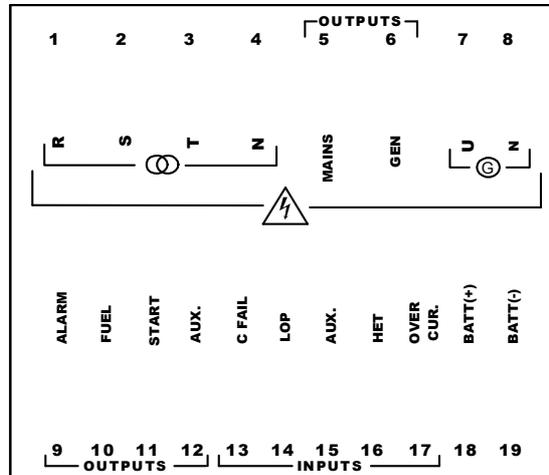
**Menu Button:** By pressing the menu button in auto or test mode, the voltage and frequency values can be displayed on the unit. If the unit is into off mode, pressing the menu button will place the unit into the menu mode. In menu mode, the parameter which will be adjusted can be chosen with test or auto button by changing the parameter number. After selecting the parameter, by pressing menu button again will place the unit into the parameter mode. The parameter can be adjusted with auto or test buttons and by pressing menu or off mode, the new parameter is written to the memory.

**Failure Leds:** In case of a failure, the relevant failure LED is activated and can be reset by pressing off button.

**Mains Contactor Led:** Mains contactor LED is activated when the unit energizes the mains contactor .It blinks during the mains voltage safety time after the mains voltage returns.

**Generator Contactor Led:** Generator contactor LED is activated when the unit energizes the generator contactor .It blinks during the cooling time of the generator.

### Rear View



### TERMINAL CONNECTIONS

Terminal No:	Description:	Notes:
1	R	Mains R phase voltage sensing input
2	S	Mains S phase voltage sensing input
3	T	Mains T phase voltage sensing input
4	N	Mains Neutral sensing input
5	MAINS	Outputs mains R phase voltage to energize the main contactor.
6	GEN	Outputs alternator R phase voltage to energize the generator contactor.
7	U	Alternator R phase voltage sensing input
8	N	Alternator Neutral sensing input
9	ALARM	Positive output relay activated by any alarm condition
10	FUEL	Positive output relay used to control the fuel solenoid
11	START	Positive output relay used to control the engine starter solenoid
12	AUX.	Configurable positive output relay
13	C.FAIL	Input for charge fail detection
14	LOP	Negative closing switch input used to control low oil pressure protection.
15	AUX.	Configurable failure input
16	HET	Negative closing switch input used to control engine high temperature protection
17	OVER CUR.	Negative closing switch input used to control over current protection
18	BAT(+)	DC + supply input
19	BAT(-)	DC - supply input

## OPERATION MODES

### **OFF Mode:**

The module is placed into off mode by pressing off button. Off button is used for resetting alarm and failures. It is also used for stopping the engine. If off button is pressed while the module is in auto or test mode, the module will de-energize start relay, pre-heat relay and generator contactor output relay if they are energized and if the engine is running on load, the module allow the alternator to run off load to cool it adequately. When the cooling time is expired, the module de-energizes the fuel solenoid and the engine are brought to rest. Cooling time can be expired by pressing again off button while cooling the engine.

While the module is in off mode, by pressing the menu button, 41 parameters needed for starting, stopping, controlling the generator and measuring mains voltage generator voltage and frequency can be adjusted.

### **AUTO Mode:**

The module is placed into auto mode by pressing auto button. If the mains voltage has no failure, the module will supply the load with mains voltage. It will go on monitoring 3 phase of the mains voltage and If a mains failure on any phase is detected, the load is switched off from the mains and the module automatically will initiate to operate the generator by using the parameters settings which are adjusted before. After the modules ensure that the engine is not running, the start sequence is initiated. The fuel solenoid is energized and start motor is engaged. The engine is cranked for the duration of crank timer. If the engine isn't fired on the first attempt and the crank timer expires, the module will rest the starter for the duration of crank rest timer. Once this has expired, the module will once again attempt to start. This will be repeated until either the engine fires or the pre-set number of attempts has been completed. If the engine couldn't fired, the module will indicate "fail to start/stop alarm".

If the engine start is successful, the starter motor is disengaged and safety on timer is initiated. Once the engine is running and safety on timer is expired, full fault protection is made available. After the alternator contactor delay timer is expired, the module will open the mains contactor relay and close the generator contactor relay. Now, the engine is running on load. If there is any failure, the module will de-energize the generator contactor relay and fuel solenoid relay (if the failure is shutdown failure).The engine is being stopped.

When the mains voltage returns within limits while engine is running, the mains return timer is initiated. During this timer, mains contactor LED will blink. When this timer expires, the module de-energizes the both contactor outputs (because the mains contactor output is normally closed).The engine is operated off load during cooling time. During cooling time, the generator contactor LED will blink. When this timer expires, the module de-energizes the fuel solenoid and bring the module to rest. If it fails to stop, the module will indicate "fail to start/stop alarm".

### **TEST Mode:**

The module is placed into test mode by pressing test button. This mode is used to simulate an automatic start and will start the generator off load even the mains voltage is within the limits.

If the mains voltage become outside of the acceptable limits, the module transfer the load from mains supply to generator.

## GENERATOR START SEQUENCE

If the module requires starting the engine, the following sequence will occur:

### 1. Generator at Rest:

While generator is at rest, there must be no generator voltage, frequency charge and oil pressure. If the module detects any of these signals in auto mode, it accepts the engine is fired. If these signals are detected during off mode after cooling time, the module will try to stop the engine. So **if the generator is required to start manually without the module, the supply of the module must be disconnected. Otherwise the module will try to stop the engine while the engine is manually operated.**

### 2. Cranking:

If a mains failure on any phase is detected during auto mode or whenever the module is brought to the test mode, the model initiates cranking. Before initiating to crank, the engine must be at rest. The fuel solenoid is energized and start motor is engaged. The engine is cranked for the duration of crank timer. If the engine isn't fired on the first attempt and the crank timer expires, the module will rest the starter for the duration of crank rest timer. Once this has expired, the module will once again attempt to start. This will be repeated until either the engine fires or the pre-set numbers of attempts have been completed. And after crank rest timer expires between two cranking attempts, if the oil pressure doesn't fall to the low level the module will not attempt next cranking. And after waiting the relevant timer, the module will indicate "start/stop failure".

If any of voltage, frequency, charge and oil pressure signals rise during cranking, the module will disengage the starter motor and accept the engine is fired.

### 3. Fault Protection Delay:

This timer allows Oil Pressure, High Engine Temperature, under speed, under volts, Charge Fail and any delayed Auxiliary fault inputs to stabilize without triggering the fault. Once the engine is running and the safety on timer has expired, full fault protection is made available.

### 4. Running:

Once the generator is running at the correct speed and up to voltage and charge the generator contactor delay timer is then initiated. After this timer is expired the module will open the mains contactor relay and close the generator contactor relay.

### 5. Cooling:

When the mains voltage returns in safe within acceptable limits, the engine is operated off load during cooling time. During cooling time, the generator contactor LED will blink. When this timer expires, the module de-energizes the fuel solenoid and bring the module to rest. If it fails to stop, the module will indicate "fail to start/stop alarm". The module also initiates to cool down the engine when the engine places into the off mode after running on load.

If there is any mains failure during cooling time, the module will continue to run on load.

### 6. Stopping:

Once the cooling timer has expired the module will de-energize the fuel solenoid and the engine will be brought to rest. If the engine is still running when the 'maximum stop timer' expires the module will alarm. The module accept the generator at rest only if there is no voltage, frequency, charge and oil pressure of the generator.

## **7. Failure:**

When the module indicates any failure, it wouldn't initiate start sequence unless reset the failures. By using off buttons, the indicated failures have to be reset to start cranking.

## **INPUTS/OUTPUTS**

**DC Supply Input:** Battery + DC supply is connected to BATT+ terminal. Battery – DC supply is connected to BATT- terminal. The module is protected to reverse connection. 12/24V battery can be connected by using the same terminals.

**Alternator Input:** Alternator single phase and neutral outputs is connected alternator inputs of the modul. Alternator voltage and frequency are monitored from these inputs.

**Mains Input:** Mains 3 phase and neutral supply voltage is connected mains inputs of the modul. Mains voltage is monitored from these inputs. If only one phase of the mains voltage is required to be monitored, other mains voltage inputs of the module have to be short circuited with the connected phase voltage.

**Charge Input:** WL terminal of the charge alternator is connected to the charge failure input of the modul. Charge alternator signal is one of the engine running signals. And whenever charge voltage rises during cranking, the engine is accepted fired. If there is no charge alternator, P25 number of parameter has to be selected “No” and leaved empty. It is also configured that charge fail is a warning or shutdown failure by adjusting P26.

**Oil Pressure Input:** Oil pressure switch output of the generator is connected to the oil pressure input of the modul. It is a negative closing switch for low oil pressure. And whenever oil pressure rises during cranking, the engine is accepted fired. If there is no oil pressure switch in the generator, P34 number of the parameter has to be selected “No”. It can also be selected whether the switch is Normally Close or Normally Open by adjusting P35 parameter.

**Auxiliary Input:** Auxiliary input can be configured as Normally Open failure input, normally close failure input, remote disable command and simulating mains voltage command by adjusting P22 number of the parameter. If this parameter is configured as failure input, it will be a shutdown failure. If this input will not be used, it has to be configured as NO failure and leaved empty.

**High Engine Temperature Input:** Engine temperature switch output of the generator is connected to the high engine temperature input of the module. It is a negative closing switch for high engine temperature. If it is not used, leave this input empty.

**Over Current Input:** Over current switch output of the generator is connected to the over current input of the module. It is a negative closing switch for over current. If it is not used, leave this input empty.

**Mains Contactor Relay Output:** Mains contactor output is used for energizing the mains contactor to transfer load to the mains. It outputs R phase of the mains from its normally close terminal.

**Generator Contactor Relay Output:** Generator contactor output is used for energizing the generator contactor to transfer load to the generator. It outputs R phase of the generator from its normally open terminal.

**Alarm Relay Output:** Alarm output is used for indicating any failure event. It outputs battery + supply voltage.

**Fuel/Stop Solenoid Relay Output:** Used for energizing the fuel/stop solenoid relay of the generator. It outputs battery + supply voltage. It can be configured as fuel or stop solenoid by adjusting P23 number of parameter.

**Starter Relay Output:** Used for energizing the starter motor relay. It outputs battery + supply voltage.

**Auxiliary Relay Output:** Auxiliary output can be configured as preheat, auto ready and motor running output. It outputs battery + supply voltage.

## FAILURES

In the event of a failure, relevant fault LEDs identify the problem and activate the alarm output to sound the external horn. If the failure is a shutdown failure, the module will de-energize the fuel solenoid and stop the generator. If it is a warning failure, the unit will indicate the fault but continue to operate. By pressing the off button the failure can be reset. The alarm condition must be reset to enable the module operating again.



**Overspeed/Underspeed Failure (shutdown):** If the frequency of the generator output exceeds or falls below the pre-configured alarm level a shutdown is initiated. The relevant failure LED will illuminate and alarm output is energized.



**High/Low Voltage Failure (shutdown):** If the voltage of the generator output exceeds or falls below the pre-configured alarm level a shutdown is initiated. The relevant failure LED will illuminate and alarm output is energized.



**High Engine Temperature Switch (shutdown):** If the module detects a negative signal from the high engine temperature switch (close circuit) while operating, a shutdown is initiated. The relevant failure LED will illuminate and alarm output is energized.



**Over Current Switch (shutdown):** If the module detects a negative signal from the over current switch (close circuit) while operating, a shutdown is initiated. The relevant failure LED will illuminate and alarm output is energized.



**Start/Stop Failure (shutdown):** If the engine does not fire after the pre-set number of attempts has been made a start failure shutdown will be initiated. The start/stop failure LED will illuminate. And if the start signal of the generator has still existed while fuel solenoid de-energized, the module will indicate stop failure. The start/stop failure LED will illuminate with the active signal's failure LED which must be inactive.



**Low Oil Pressure Switch (shutdown):** If the module detects a loss of signal from the oil pressure sender (open circuit) a shutdown is initiated. This parameter can be disabled by configuring P34 number of parameter. Switch position (NC, NO) can also be adjusted by configuring P35 number of parameter. The relevant failure

LED will illuminate and alarm output is energized.

If the oil pressure remains high after maximum stopping time is expired, start/stop and LOP failure LEDs will illuminate and alarm output is energized.



**Charge Failure (shutdown or warning):** If the module does not detect a voltage from the warning light terminal on the auxiliary charge alternator, the relevant failure LED will illuminate and alarm output is energised. The failure can be adjusted as a shutdown or warning failure by P26 number of parameter.

If the charge voltage remains high after maximum stopping time is expired, start/stop and charge failure LEDs will illuminate and alarm output is energized.

**AUX.**

**Auxiliary Failure (KIRMIZI ARIZA):** If the module detects a negative signal from the over current switch (close circuit) while operating, a shutdown is initiated. The relevant failure LED will illuminate and alarm output is energised. This input can be configured as normally open switch or normally closed switch by adjusting P22.

## PROGRAMING AND CONFIGURABLE PARAMETRES

Modules are easily programmed and the parameters are displayed and configured by using push-buttons on the front panel. Once the module is in the off mode, by pressing menu button the module is placed to the menu mode. In menu mode, the parameter number can be increased with test button and decreased with auto mode. After selecting the parameter number which will be configured, by pressing menu button again, the module is placed to the parameter mode. The parameter value is displayed and can be increased with test button and decreased with auto button. By pressing menu button, the configured value is written to the memory with display flashing 3 times. With the pressing off button, off mode is returned.

Parameter Number:	Configurable parameter:	Standard Value:	Minimum Value:	Maximum Value:
P0	Start delay:	5s	0s	240s
P1	Number of starting attempts:	3 attempts	1 attempts	10 attempts
P2	Starting attempt duration	5s	1s	60s
P3	Waiting duration between starting attempts	5s	1s	60s
P4	Stopping duration	5s	1s	60s
P5	Maximum stopping duration	60s	30s	900s
P6	Engine cooling duration	60s	0s	900s
P7	Mains transition delay	60s	0s	900s
P8	Generator contactor delay	8s	2s	60s

P9	Mains contactor delay	1s	0s	60s
P10	Oil pressure control delay	5s	3s	60s
P11	Fault control delay	7s	2s	60s
P12	Generator frequency upper limit	53 Hz	40Hz	99 Hz
P13	Generator frequency lower limit	47 Hz	10 Hz	90 Hz
P14	Generator voltage upper limit	250V	70V	350V
P15	Generator voltage lower limit	170V	60V	250V
P16	Generator fault control delay	5s	1s	10s
P17	Mains voltage lower limit	170V	60V	250V
P18	Mains voltage acceptance limit	180V	60V	250V
P19	Mains voltage upper limit	265V	70V	350V
P20	Generator frequency for crank disconnection	20Hz	15 Hz	50 Hz
<b>Parameter Number:</b>	<b>Configurable Parameter:</b>	<b>Standard Function:</b>	<b>Other Function:</b>	<b>Other Function:</b>
P21	Configurable output	Preheat	Engine start	Auto Ready
P22	Configurable input	NC(Nor.close)	NO(Nor.open)	Mains Simulate
P23	Solenoid selection:	Fuel	Stop	
P24	Frequency selection:	50Hz	60Hz	
P25	Charge failure selection	Y(yes)	N(no)	
P26	Charge.failure type	Shutdown Failure	Warning Failure	
P27	Mains control in close mode	Y(yes)	N(no)	
P28	Default parameters	N(no)	Y(yes)	
P29	Calibrations L1	0	+9(1 = 2.5V)	-9(1= 2.5V)
P30	Calibrations L2	0	+9(1 = 2.5V)	-9(1= 2.5V)
P31	Calibrations L3	0	+9(1 = 2.5V)	-9(1= 2.5V)
P32	Calibrations GEN	0	+9(1 = 2.5V)	-9(1= 2.5V)
P33	Sleep mode enable selection:	Y(yes)	N(no)	
P34	Oil pressure enable selection:	Y(yes)	N(no)	
P35	Oil pressure switch position	NC(Nor.close)	NO(Nor.open)	
P36	Alarm time	0(continuous)	Other(seconds)	
P37	Customer Code			
P38	Test on load	Y(yes)	N(no)	
P39	Crank disconnect Charge Fail	Y(yes)	N(no)	
P40	Crank disconnect Oil Pressure	Y(yes)	N(no)	

## DESCRIPTION OF PARAMETERS

No	Parameter	Description
<b>Parameters</b>		
P00	<b>Start Delay:</b>	The engine is cranked after the start delay timer. This is used to ensure that the start event is really required and not just a momentary transient signal. If the auxiliary output is configured as preheat output, the preheat output is activated during this timer.
P01	<b>Number Of Starting Attempts:</b>	This parameter specifies the number of which the unit will try to crank the engine. After the pre-set numbers of attempts

		to start have been completed, the module will indicate start fail.
P02	<b>Starting Attempt Duration (Crank Timer):</b>	The engine is cranked for the duration of the starting attempt duration.
P03	<b>Waiting Duration Between Starting Attempts(Crank Rest Timer):</b>	If the engine not fire on the first attempt and the crank timer expires, the module will rest the starter for the duration of the crank rest timer.
P04	<b>Stopping Duration:</b>	Once the cooling timer has expired the module will de-energize the fuel solenoid and the engine will be brought to rest after the stopping duration timer expires.
P05	<b>Maximum Stopping Duration:</b>	If the engine is still running when the stopping duration timer expires, the module will indicate fail to start alarm after maximum stopping timer expires. By pressing the off button, the timer is initiated again.
P06	<b>Engine Cooling Duration:</b>	After the module de-energize the generator contactor output, the module will then initiate its cooling timer. This allows the engine to run off load to ensure that it has adequately cooled before being brought to a standstill.
P07	<b>Mains Transition Delay:</b>	When the mains returns within the limits, the module will first initiate mains transition delay timer to ensure that it is safe to stop the generator. If the mains voltage has no failure after this timer expires, the module will initiate mains contactor delay timer.
P08	<b>Generator Contactor Delay:</b>	After the starter motor is detected starting, the generator contactor delay timer is activated. After this timer expires, the module will energize the generator contactor if there is no failure with the generator signals. <b>This parameter must be adjusted bigger than P11 parameter.</b>
P09	<b>Mains Contactor Delay:</b>	If the mains voltage has no failure after the mains transition delay timer expires, the module will initiate mains contactor delay timer. When the timer expires, the module will energize the mains contactor output...
P10	<b>Oil Pressure Control Delay:</b>	The module will indicate start failure, if the oil pressure is still high after expiring the oil pressure control delay timer.
P11	<b>Fault Control Delay:</b>	If the engine start is successful, the fault control delay timer is activated. This timer allows Oil Pressure, High Engine Temperature, Under speed, Under volts, Charge Fail and any delayed auxiliary fault inputs to stabilize without triggering the fault. Once the engine is running and the fault control delay timer has expired, full fault protection is made available.
P12	<b>Generator Frequency Upper Limit:</b>	If the frequency of the generator output exceeds generator frequency upper limit a shutdown is initiated. The module will indicate speed failure.
P13	<b>Generator Frequency Lower Limit:</b>	If the frequency of the generator output falls below generator frequency lower limit a shutdown is initiated. The module will indicate speed failure.
P14	<b>Generator Voltage Upper Limit:</b>	If the voltage of the generator output exceeds generator voltage upper limit a shutdown is initiated. The module will indicate voltage failure

P15	<b>Generator Voltage Lower Limit:</b>	If the voltage of the generator output falls below generator voltage lower limit a shutdown is initiated. The module will indicate voltage failure.
P16	<b>Generator Fault Control Delay:</b>	If the generator voltage or frequency is out of acceptable limits, the module will wait during the generator fault control delay timer before indicating any alarm condition. This parameter is useful during instant load changing.
P17	<b>Mains Voltage Lower Limit:</b>	If the voltage of the mains falls below mains voltage lower limit the module will indicate mains failure.
P18	<b>Mains Voltage Acceptance Limit:</b>	If the voltage of the mains exceeds mains voltage acceptance limit the module will accept the mains normal.
P19	<b>Mains Voltage Upper Limit</b>	If the voltage of the mains exceeds mains voltage upper limit the module will indicate mains failure.
P20	<b>Generator Frequency For Crank Disconnection:</b>	If the frequency of the generator output exceeds this limit, the crank is disconnected.
P21	<b>Configurable Output:</b>	Auxiliary output function can be configured as one of the following: <b>a-Prh(preheat):</b> Auxiliary output relay is energized and outputs battery positive voltage to provide preheat function during start delay timer. <b>b-Opt(engine running):</b> Auxiliary output relay is energized and outputs battery positive voltage to indicate engine running. <b>c-Auto (automatic mode):</b> Auxiliary output relay is energized and outputs battery positive voltage to indicate automatic mode.
P22	<b>Configurable Input:</b>	Auxiliary input function can be configured as one of the following: <b>a-NC(Normally closed):</b> Auxiliary input is configured as shutdown failure by disconnecting the input from the battery negative voltage. It is enable during engine running. <b>b-NO(Normally Open):</b> Auxiliary input is configured as shutdown failure by connecting the input to the battery negative voltage. It is enable during engine running <b>c-dsb(Remote Disable):</b> The module is prevented to operate by connecting the input to the battery negative voltage. This function is enabled in auto mode. <b>d-220(Mains Simulate):</b> The mains voltage is accepted normal by connecting the input to the battery negative voltage. This function is enabled in auto mode.
P23	<b>Solenoid selection:</b>	<b>a-Ful(Fuel solenoid):</b> Fuel solenoid is energized while cranking. <b>b-Stp(Stop solenoid):</b> Fuel solenoid is de-energized while cranking.It is energized while engine is stopping.
P24	<b>Frequency selection:</b>	<b>a-50Hz:</b> Mains frequency is 50Hz. <b>b-60Hz:</b> Mains frequency is 60Hz.
P25	<b>Charge failure selection:</b>	<b>a-y(Yes):</b> Charge signal is activated. It is used while engine is cranking and stopping. While engine is running, if the charge signal isn't monitored, the module will indicate a failure. <b>b-n(No):</b> This parameter is selected if the charge signal isn't used.

P26	<b>Charge failure type:</b>	<p><b>a-red(Shutdown):</b> If the module does not detect a voltage from the warning light terminal on the auxiliary charge alternator, the relevant failure LED will illuminate and alarm output is energised. The engine is stopped.</p> <p><b>b-yel(Warning):</b> If the module does not detect a voltage from the warning light terminal on the auxiliary charge alternator, the relevant failure LED will illuminate and alarm output is energised. The engine goes on running. By pressing off button, the failure is reset.</p>
P27	<b>Mains control in off mode:</b>	<p><b>a-y(Yes):</b> The module control the mains 3 phase voltage. If the mains voltage has no failure, the module will supply the load with mains voltage in off mode. If there is any failure in any phase of the mains voltage the module switches off the load from the mains voltage.</p> <p><b>b-n(No):</b> The module doesn't control the mains voltage in off mode. It always supplies the load with the R phase of the mains voltage.</p>
P28	<b>Return to default settings:</b>	<b>y(Yes):</b> All parameters return to the factory defaults.
P29	<b>Calibrations L1:</b>	Mains line R voltage calibration. The calibration value is between +9/-9. Each + numbers add 2.5V, each - numbers subtract 2.5V from the calculated voltage.
P30	<b>Calibrations L2:</b>	Mains line S voltage calibration. The calibration value is between +9/-9. Each + numbers add 2.5V, each - numbers subtract 2.5V from the calculated voltage.
P31	<b>Calibration L3:</b>	Mains line T voltage calibration. The calibration value is between +9/-9. Each + numbers add 2.5V, each - numbers subtract 2.5V from the calculated voltage.
P32	<b>Calibration GEN:</b>	Generator line R voltage calibration. The calibration value is between +9/-9. Each + numbers add 2.5V, each - numbers subtract 2.5V from the calculated voltage.
P33	<b>Sleep mode enable selection:</b>	<p><b>a-y(Yes):</b> Sleep mode is activated. If no button is pressed during 3 minutes, the module is placed into sleep mode. But whenever menu button is pressed, it wakes up. The sleep mode is disabled in engine running mode and in failure mode.</p> <p><b>b-n(No):</b> Sleep mode is disabled.</p>
P34	<b>Oil pressure enable selection:</b>	<p><b>a-y(Yes):</b> Oil pressure signal is activated. This signal is used for engine cranking, running and stopping.</p> <p><b>b-n(No):</b> This parameter is selected if the oil pressure signal isn't used.</p>
P35	<b>Oil pressure switch position:</b>	<p><b>a-NC(Normally closed):</b> The oil pressure switch is connected to the battery negative when the pressure is low. When it rises, it is disconnected from the battery negative voltage.</p> <p><b>b-NO(Normally open):</b> The oil pressure switch is disconnected from the battery negative when the pressure is low. When it rises, it is connected to the battery negative voltage.</p>
P36	<b>Alarm time:</b>	Alarm output is activated during this time. When this parameter is selected "0", the alarm output is activated until resetting the failure.
P37	<b>Costumer Code:</b>	All customers have their own code. This parameter shows

		this code. It can not be configured.
P38	<b>Test On Load:</b>	<b>a-y(Yes):</b> The module supplies the load in test mode. <b>b-n(No):</b> In test mode, if there is no failure in mains voltage, load is supplied by the mains voltage. In case of mains failure, the load is supplied from the generator.
P39	<b>Crank Disconnect Charge Signal</b>	<b>a-y(Yes):</b> Charge signal is selected as one of the crank disconnect signals. During cranking, if the charge signal rises, the crank is disconnected. <b>b-n(No):</b> Charge signal isn't selected as one of the crank disconnect signals
P40	<b>Crank Disconnect Oil Pressure Signal</b>	<b>a-y(Yes):</b> Oil pressure signal is selected as one of the crank disconnect signals. During cranking, if the oil pressure rises, the crank is disconnected. <b>b-n(No):</b> Oil pressure signal isn't selected as one of the crank disconnect signals

### ENGINE SIGNALS:

#### Engine Running:

The module accepts the engine running whenever these signals occur.

- Alternator Voltage( > 125V)
- Alternator Frequency(> P20 parameter)
- Oil Pressure Signal(configurable by P40)
- Charge Signal(configurable by P39)

#### Engine Stopping:

The module accepts the engine stopping when all the following signals don't occur.

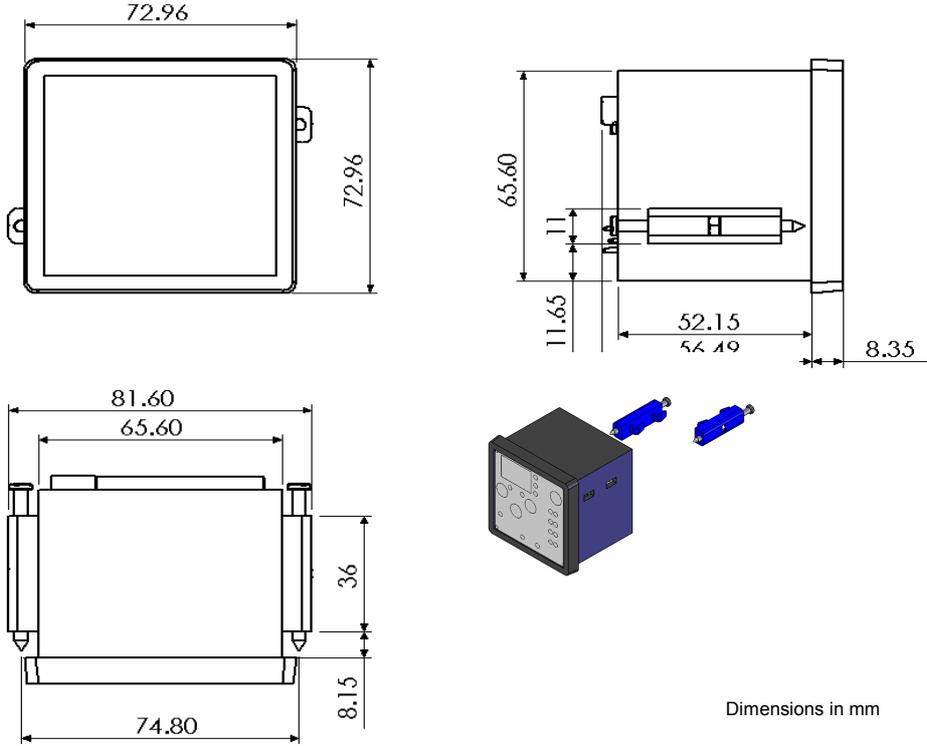
- Alternator Voltage( < 125V)
- Alternator Frequency(< P20 parameter)
- Oil Pressure Signal
- Charge Signal

### SPECIFICATIONS

<b>DC Supply:</b>	9-35VDC 30mA (stop mode) 90mA (auto mode) 130mA(maximum current)
<b>Operating Temperature:</b>	-10°C / +70°C
<b>Relative Humidity:</b>	%10-%95 non-condensing
<b>Relay Outputs:</b>	Alarm, fuel, start and auxiliary outputs 6A/12-24VDC Generator and mains contactor outputs 10A / 250VAC
<b>Voltage Measurement:</b>	20-300VAC
<b>Frequency Measurement:</b>	1-99 Hz
<b>Connection:</b>	Screw socket
<b>Measurement Accuracy:</b>	Phase Voltages : + / - %1 Generator Frequency : + / - 0.2Hz
<b>Housing</b>	High temperature proof PPO GF %20
<b>Protection Class</b>	IP 52 (Front side)
<b>Weight</b>	230 gr. (approx.)
<b>Dimensions (WxHxD)</b>	72x72x62 mm

<b>Panel Cut Out</b>	67x67mm
<b>Mounting Installation</b>	Front panel mounted with rear metal screw fixings Max. allowable mounting panel thickness 3mm

**DIMENSIONS AND MOUNTING**



# CONNECTIONS

