



# TRANS-AMF.SYNCRO

## AUTOMATIC GEN-SET CONTROLLER WITH TRANSFER SWITCHING & LOAD SHARING

### 1. Introduction

#### 1.1 General Specifications

TRANS-AMF.SYNCRO is a synchronising & automatic mains failure unit for diesel, gas or gasoline generators.

The unit is designed to synchronise the one genset with the one mains supply. The unit controls the change over from mains supply to genset supply or runs genset in parallel with the mains to provide no-break, peak lopping and peak shaving power solutions.

#### General Specifications:

- Mains voltages and frequency measurements
- Generator voltages and frequency measurements
- Peak lopping (mains or genset)
- Power export to mains
- Mains de-coupling protection with R.O.C.O.F and vector shift methods
- Manual voltage/frequency adjustment
- Direct/Reverse Governor and AVR control
- Auto adjust feature for Governor and AVR
- Volts, frequency and phase matching
- Synchroscope display
- Logic Controller functionality for PLC
- Black or gray theme selection for 4.3" TFT LCD screen

#### 1.2 Warranty

EMKO Elektronik warrants that the equipment delivered is free from defects in material and workmanship. This warranty is provided for a period of two years. The warranty period starts from the delivery date. This warranty is in force if duty and responsibilities which are determined in warranty document and instruction manual performs by the customer completely.

#### 1.3 Maintenance

Repairs should only be performed by trained and specialized personnel. Cut power to the device before accessing internal parts.

Do not clean the case with hydrocarbon-based solvents (Petrol, Trichlorethylene etc.). Use of these solvents can reduce the mechanical reliability of the device. Use a cloth dampened in ethyl alcohol or water to clean the external plastic case.

## 2. Installation



**Before beginning installation of this product, please read the instruction manual and warnings below carefully.**

A visual inspection of this product for possible damage occurred during shipment is recommended before installation. It is your responsibility to ensure that qualified mechanical and electrical technicians install this product.

If there is danger of serious accident resulting from a failure or defect in this unit, power off the system and separate the electrical connection of the device from the system.

Keep the power off until all of the wiring is completed so that electric shock and trouble with the unit can be prevented.

### 2.1 Unit Configuration

The unit can be programmed using the buttons and LCD display on the front panel or PC Software.

### 2.2 Panel Mounting

The unit is designed for panel mounting. Fixing is by two screw fixings.

**1-** Insert the unit in the panel cut-out from the front.

**2-** Insert the fixings in the slotted at the corners of the unit and tighten the fixing screws to secure the unit against the panel.



**During the equipment is putted in hole on the metal panel while mechanical installation some metal burrs can cause injury on hands, you must be careful.**

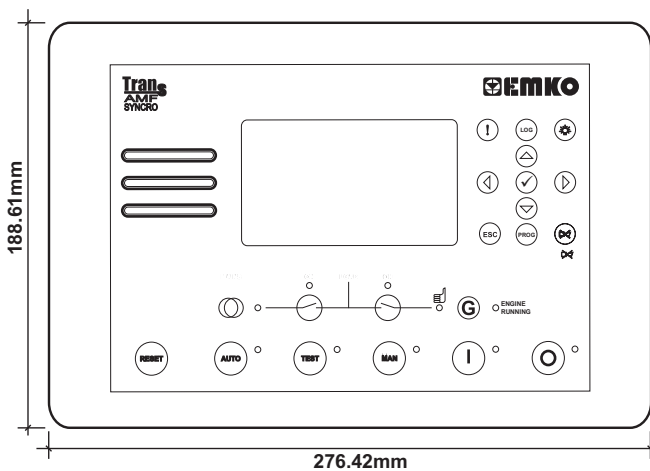


Figure 2.1 Front View

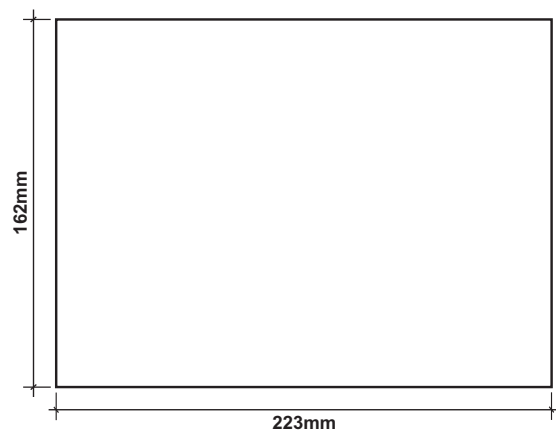
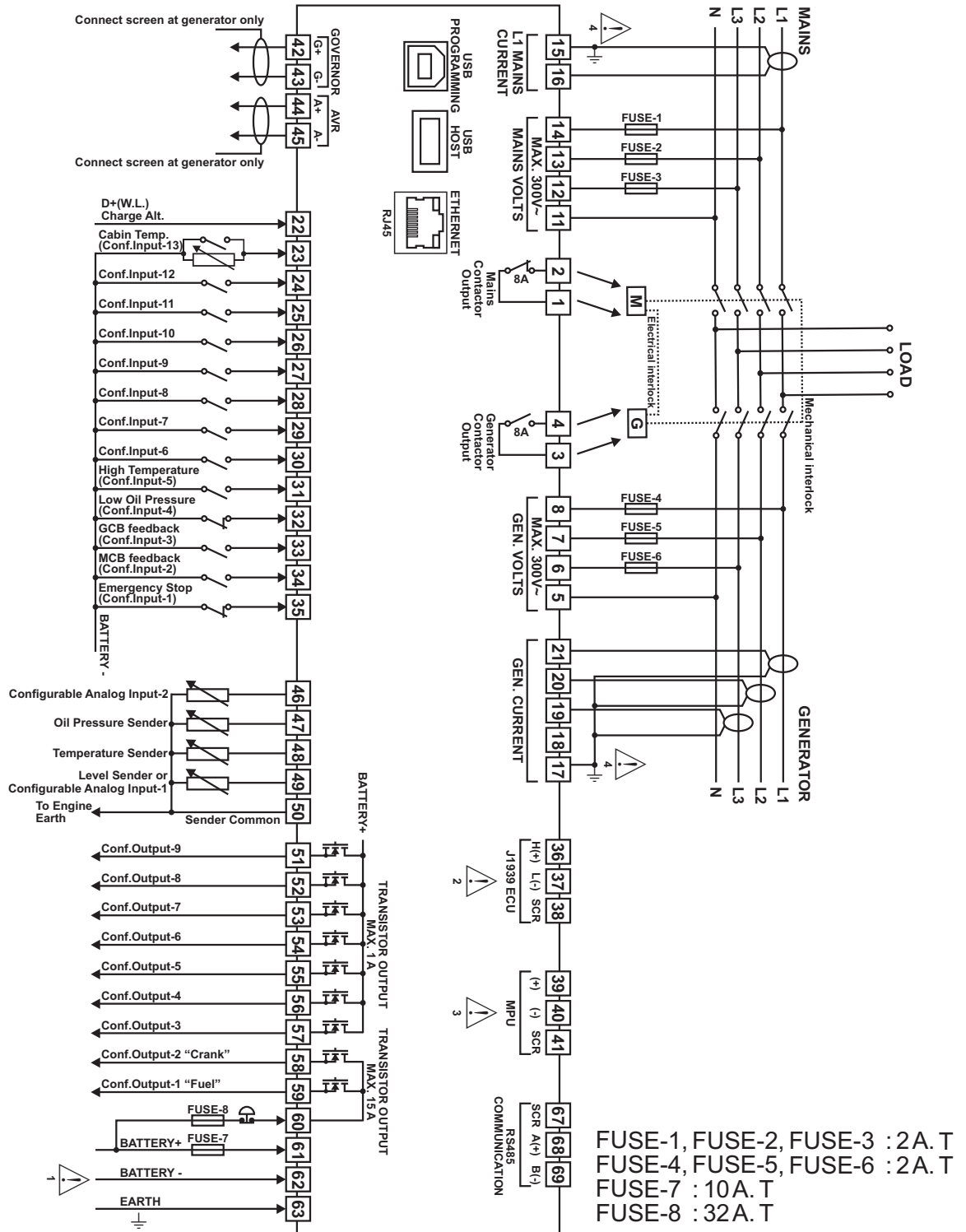


Figure 2.2 Panel Cut-Out

## 2.3 Electrical Connection

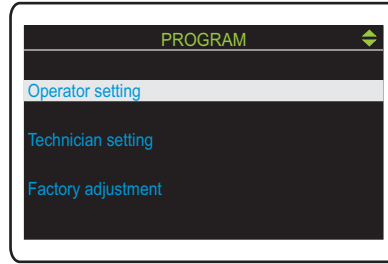
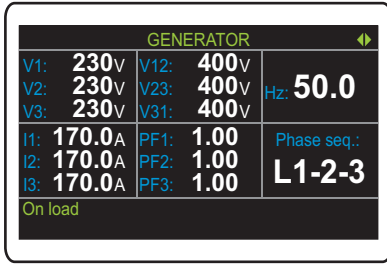
### TRANS-AMF.SYNCR0 three phase connections schematic



- 1- Connect the unit as shown in the appropriate diagram. Be sure to connect the battery supply the right way round.
- 2- The CAN interface requires that a 120 Ohms terminator is fitted to each end of the communications link. This termination resistor is fitted internally into the unit. So it is not required externally. Screened cable must be used for connecting the CAN, ensuring that the screen is grounded at one end ONLY.
- 3- Screened cable must be used for connecting the Magnetic Pickup, ensuring that the screen is grounded at one end ONLY.
- 4- Current transformers secondary should be grounded. The CT of 5VA is recommended. The unit has a burden of 0.5VA on the CT.

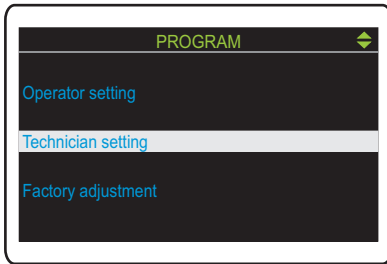
### 3. Changing And Saving Parameters Values

#### Operation Screen

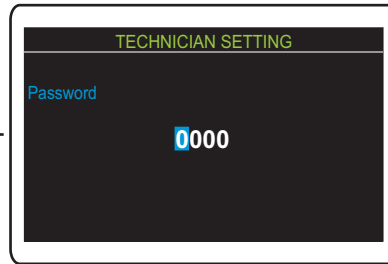


When the Prog button is pressed, the parameters section is asked for accessing to parameters.

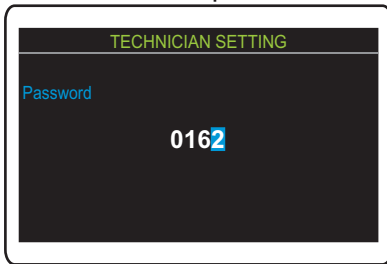
Press the Up or Down buttons to select the section you wish to view/change.



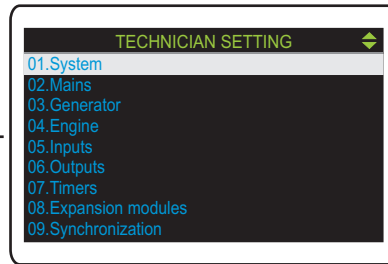
Press the Enter button.



Enter password with cursor (Right, Left, Up and Down) buttons.

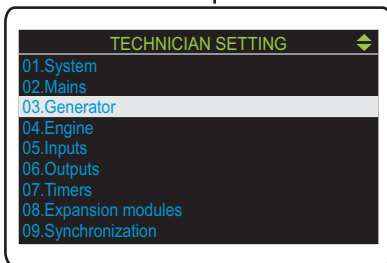


Press the Enter button to confirm password. If the password is incorrect, the unit will drop out of program mode.

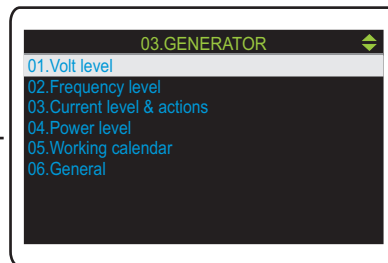


Press the Up or Down buttons to select the main parameter group you wish to view/change.

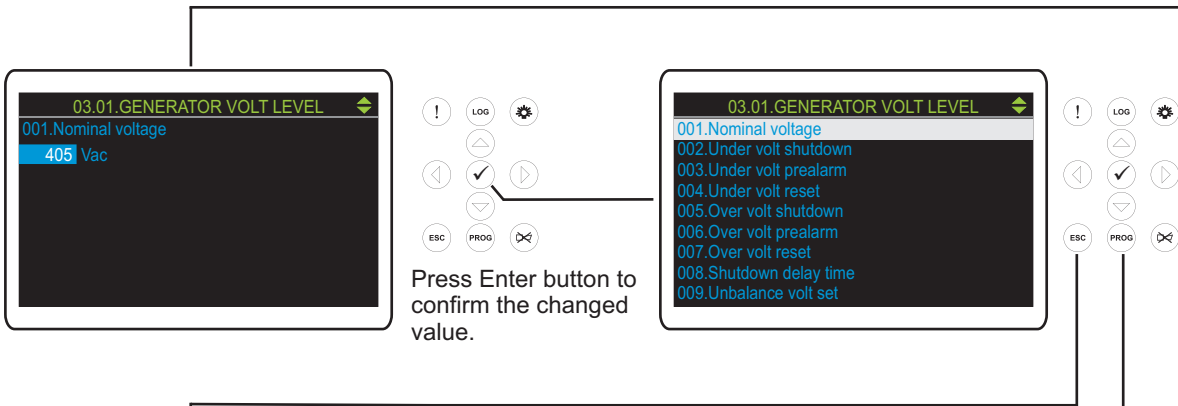
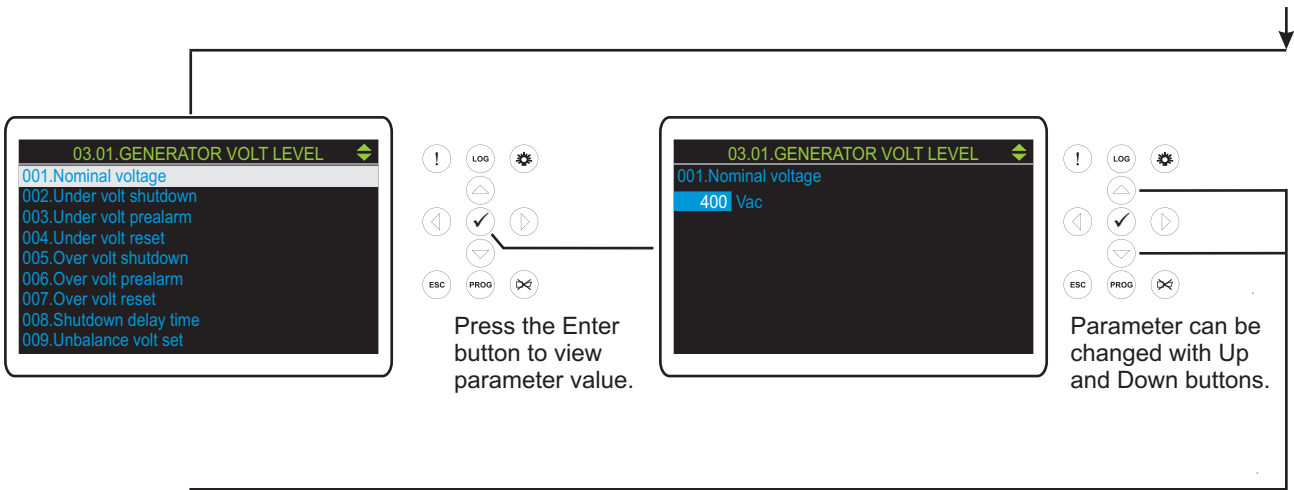
**Note1:** If Enter button is pressed and the technician password is zero, Password screen is ignored.



Press Enter button to access to all parameters page in currently main parameter group.

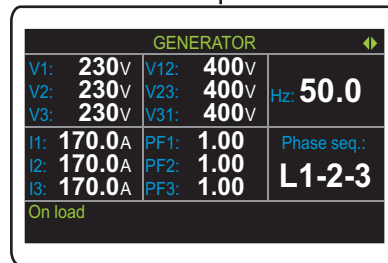
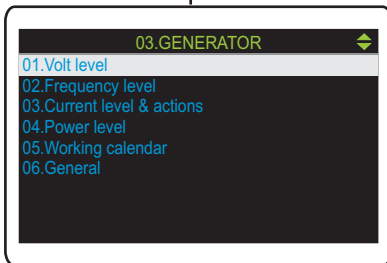


Press Enter button to access to all parameters in currently parameter page.



When the Escape button is pressed any time, previous page can be accessed.

To exit from programming mode any time, press Prog button.



### Operation Screen

## 4. Parameters

### 4.1 Operator Parameters

#### 4.1.1 Mains

<b>02.01.MAINS VOLT LEVEL (<i>Mains-&gt;Volt level</i>)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Under volt trip	Mains Under Voltage	60	600	320	V~
002.Under volt return	Mains Under Voltage Return	60	600	340	V~
003.Over volt trip	Mains Over Voltage	60	600	440	V~
004.Over volt return	Mains Over Voltage Return	60	600	420	V~

<b>02.02.MAINS FREQ. LEVEL (<i>Mains-&gt;Frequency level</i>)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Under freq trip	Mains Under Frequency	20.0	75.0	45.0	Hz
002.Under freq return	Mains Under Frequency Return	20.0	75.0	48.0	Hz
003.Over freq trip	Mains Over Frequency	20.0	75.0	55.0	Hz
004.Over freq return	Mains Over Frequency Return	20.0	75.0	52.0	Hz

#### 4.1.2 Generator

<b>03.01.GENERATOR VOLT LEVEL (<i>Generator-&gt;Volt level</i>)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Nominal voltage	Nominal Voltage	60	600	400	V~
002.Under volt shutdown	Under Voltage Shutdown	60(dis)	600	320	V~
003.Under volt prealarm	Under Voltage Pre-Alarm	60(dis)	600	340	V~
004.Under volt reset	Under Voltage Pre-Alarm Reset	60	600	350	V~
005.Over volt shutdown	Over Voltage Shutdown	60	600	470	V~
006.Over volt prealarm	Over Voltage Pre-Alarm	60(dis)	600	450	V~
007.Over volt reset	Over Voltage Pre-Alarm Reset	60	600	430	V~
008.Shutdown delay time	Voltage Shutdown Delay Time	0.0	10.0	2.0	Sec
009.Unbalance volt set	Unbalance Volt Set	0	230	20	V~

<b>03.02.GENERATOR FREQ LEVEL (<i>Generator-&gt;Frequency level</i>)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Nominal frequency	Nominal Alternator Frequency	30.0	75.0	50.0	Hz
002.Under freq shutdown	Under Frequency Shutdown	30.0(dis)	75.0	43.0	Hz
003.Under freq prealarm	Under Frequency Pre-Alarm	30.0(dis)	75.0	45.0	Hz
004.Under freq reset	Under Frequency Pre-Alarm Reset	30.0	75.0	46.0	Hz
005.Over freq shutdown	Over Frequency Shutdown	30.0(dis)	75.0	58.0	Hz
006.Over freq prealarm	Over Frequency Pre-Alarm	30.0(dis)	75.0	55.0	Hz
007.Over freq reset	Over Frequency Pre-Alarm Reset	30.0	75.0	54.0	Hz
008.Shutdown delay time	Frequency Shutdown Delay Time	0.0	10.0	2.0	Sec

<b>03.03.GENERATOR CUR LEVEL (<i>Generator-&gt;Current level</i>)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Under current set	Under Current Set	0	9999	0	A~
002.Under current prealarm	Under Current Pre-Alarm	0(dis)	9999	dis	A~
003.Under current reset	Under Current Pre-Alarm Reset	0	9999	5	A~
006.Over current set	Over Current Set	0	9999	9999	A~
007.Over current prealarm	Over Current Pre-Alarm	0(dis)	9999	dis	A~
008.Over current reset	Over Current Pre-Alarm Reset	0	9999	9980	A~

<b>03.04.GEN POWER LEVEL (Generator-&gt;Power level)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Under power set	Under Power Set	0	9999	0	kVA
002.Under power prealarm	Under Power Pre-Alarm	0(dis)	9999	dis	kVA
003.Under power reset	Under Power Pre-Alarm Reset	0	9999	5	kVA
006.Over power set	Over Power Set	0	9999	0	kVA
007.Over power prealarm	Over Power Pre-Alarm	0(dis)	9999	dis	kVA
008.Over power reset	Over Power Pre-Alarm Reset	0	9999	0	kVA
011.Reverse power set	Reverse Power Set	-9999	0	-30	kW
014.Excitation loss set	Excitation Loss Set	-9999	0	-100	KVAr

<b>03.05.GEN WORKING CALENDAR (Generator-&gt;Working calendar)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Disable/enable select	Calendar Disable or Enable	DISBL/ENABL		DISBL	
002.Start time on Monday	Calendar Start Time on Monday	0.00	23.59	0.00	H.Min
003.Stop time on Monday	Calendar Stop Time on Monday	0.00	23.59	23.59	H.Min
004.Start time on Tuesday	Calendar Start Time on Tuesday	0.00	23.59	0.00	H.Min
005.Stop time on Tuesday	Calendar Stop Time on Tuesday	0.00	23.59	23.59	H.Min
006.Start time on Wednesday	Calendar Start Time on Wednesday	0.00	23.59	0.00	H.Min
007.Stop time on Wednesday	Calendar Stop Time on Wednesday	0.00	23.59	23.59	H.Min
008.Start time on Thursday	Calendar Start Time on Thursday	0.00	23.59	0.00	H.Min
009.Stop time on Thursday	Calendar Stop Time on Thursday	0.00	23.59	23.59	H.Min
010.Start time on Friday	Calendar Start Time on Friday	0.00	23.59	0.00	H.Min
011.Stop time on Friday	Calendar Stop Time on Friday	0.00	23.59	23.59	H.Min
012.Start time on Saturday	Calendar Start Time on Saturday	0.00	23.59	0.00	H.Min
013.Stop time on Saturday	Calendar Stop Time on Saturday	0.00	23.59	23.59	H.Min
014.Start time on Sunday	Calendar Start Time on Sunday	0.00	23.59	0.00	H.Min
015.Stop time on Sunday	Calendar Stop Time on Sunday	0.00	23.59	23.59	H.Min

**Note:** dis = disable

## 4.2 Technician Parameters

### 4.2.1 System

01.01.SYSTEM NETWORK (System->Network)		Min	Max	Default	Unit
001.Mains CT ratio	Mains Current Transformer Ratio	1	9999	100	
002.Generator CT ratio	Gen. Current Transformer Ratio	1	9999	100	
003.PT ratio	Voltage Transformer Ratio	0.1	500.0	1.0	
004.Type of AC system	0- 1 Phase 2 Wire 1- 3 Phase 4 Wire 2- 2 Phase 3 Wire L1-L2 3- 2 Phase 3 Wire L1-L3	0	3	1	
005.Phase sequence	System Phase Sequence	DISBL, L123, L321		L123	
006.Generator kVA rating	Generator kVA rating	0	9999	150	kVA
007.Power unit	Power unit	kVA/kW		kVA	
008.Mains kW rating	Mains kW Rating	0	9999	300	kW

01.02.BREAKERS (System->Breakers)		Min	Max	Default	Unit
001.Type of Breaker	Hardware Breaker Selection: 0-Breakers 1-User Configured 2-Motorised Breakers (Compact Type) 3-Motorised Breakers (Open Type)	0	3	0	
002.Gen.close breaker cont.type	Gen. Close Breaker Contact Type	NO / NC		NO	
003.Gen.close breaker relay type	Gen. Close Breaker Relay Type	NOR / PULS		0	
004.Generator close timer	Generator Close Timer	1	250	5	Sec
005.Gen.open breaker relay type	Gen. Open Breaker Relay Type	NOR / PULS		0	
006.Generator open timer	Generator Open Timer	1	250	5	Sec
007.Mains close breaker cont.type	Mains Close Breaker Cont. Type	NO / NC		NO	
008.Mains close breaker relay type	Mains Close Breaker Relay Type	NOR / PULS		0	
009.Mains close timer	Mains Close Timer	1	250	5	Sec
010.Mains open breaker relay type	Mains Open Breaker Relay Type	NOR / PULS		0	
011.Mains open timer	Mains Open Timer	1	250	5	Sec
012.Breaker close pulse time	Breaker Close Pulse Time	0.0	10.0	0.5	Sec
013.Breaker open pulse time	Breaker Open Pulse Time	0.0	10.0	0.5	Sec
014.Transfer time	Transfer Time	0	250	2	Sec
015.Spring loading time	Spring Loading Time	0	250	3	Sec
016.Retry number	Retry Number	1	250	5	

01.03.LCD DISPLAY (System->LCD display)		Min	Max	Default	Unit
001.Language	Language Selection	ENGLISH/TURKISH		ENGLISH	
002.Auto scroll time	Auto Scroll Time	0(dis)	250	0	Sec
003.Auto scroll number	Auto Scroll Number	1	22	5	
004.Err. mesg scroll time	Scroll Time For Error Messages	1	250	2	Sec
005.Theme selection	Theme Selection: 0-Black theme, 1-Gray theme	0	1	0	

**Notes:** NO / NC : Normally Open / Normally Close  
 NOR / PULS : Normal / Pulse  
 dis = disable



<b>01.04.SERIAL COMMUNICATION (System-&gt;Serial Comm.)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Slave address	Slave Address	1	247	1	
002.Baud rate	Baud Rate: 0 - 1200 baud 1 - 2400 baud 2 - 4800 baud 3 - 9600 baud 4 - 19200 baud 5 - 38400 baud	0	5	3	
005.Timeout	Timeout	0(dis)	999	3	Min

<b>01.05.RS485 COMMUNICATION (System-&gt;RS 485 Comm.)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Slave address	Slave Address	1	247	1	
002.Baud rate	Baud Rate: 0 - 1200 baud 1 - 2400 baud 2 - 4800 baud 3 - 9600 baud 4 - 19200 baud 5 - 38400 baud	0	5	3	
005.ASCII/RTU selection	ModBus ASCII/RTU Selection	ASCII / RTU		ASCII	

<b>01.06.DATA LOGGING (System-&gt;Data logging)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Data log memory	Data Logging Memory	0-Disable 1-Internal memory 2-External USB Host		1	
002.Data log period	Data log Period	0.1	999.9	1.0	Min

<b>01.07.DATE &amp; TIME SET (System-&gt;Date &amp; time set)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Year	Year	0	99		
002.Month	Month	1	12		
003.Day	Date	1	31		
004.Week	Day of week	1	7		
005.Hour	Hour	0	23		
006.Minute	Minute	0	59		
007.Second	Second	0	59		

<b>01.08.DEFAULT SETTINGS (System-&gt;Default settings)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Save setting to def.	Save setting to default	YES / NO		NO	
002.Reset default sets	Reset default sets	YES / NO		NO	
003.Reset factory sets	Reset factory sets	YES / NO		NO	

<b>01.09.PASSWORD SETTINGS (System-&gt;Password settings)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Operator password	Operator Password	0	9999	0	
002.Technician password	Technician Password	0	9999	0	

<b>01.10.ETHERNET SETTINGS (System-&gt;Ethernet settings)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Tcp client mode	Tcp Client Mode	ENABL/DISBL		DISBL	

**Note:** dis = disable

## 4.2.2 Mains

<b>02.01.MAINS VOLT LEVEL (<i>Mains-&gt;Volt level</i>)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Under volt trip</b>	Mains Under Voltage	60	600	320	V~
<b>002.Under volt return</b>	Mains Under Voltage Return	60	600	340	V~
<b>003.Over volt trip</b>	Mains Over Voltage	60	600	440	V~
<b>004.Over volt return</b>	Mains Over Voltage Return	60	600	420	V~

<b>02.02.MAINS FREQ. LEVEL (<i>Mains-&gt;Frequency level</i>)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Under freq trip</b>	Mains Under Frequency	20.0	75.0	45.0	Hz
<b>002.Under freq return</b>	Mains Under Frequency Return	20.0	75.0	48.0	Hz
<b>003.Over freq trip</b>	Mains Over Frequency	20.0	75.0	55.0	Hz
<b>004.Over freq return</b>	Mains Over Frequency Return	20.0	75.0	52.0	Hz

<b>02.03.MAINS ACTIONS (<i>Mains-&gt;Actions</i>)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Mains failure detection</b>	Mains Failure Detection En/Dis	ENABL/DISBL		ENABL	
<b>002.Mains failure at stop mode</b>	Look Mains Failure at Stop Mode	ENABL/DISBL		ENABL	
<b>003.Always return delay</b>	Always Look Mains Return Delay	ENABL/DISBL		DISBL	

**Note:** dis = disable

### 4.2.3 Generator

<b>03.01.GENERATOR VOLT LEVEL (<i>Generator-&gt;Volt level</i>)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Nominal voltage	Nominal Voltage	60	600	400	V~
002.Under volt shutdown	Under Voltage Shutdown	60(dis)	600	320	V~
003.Under volt prealarm	Under Voltage Pre-Alarm	60(dis)	600	340	V~
004.Under volt reset	Under Voltage Pre-Alarm Reset	60	600	350	V~
005.Over volt shutdown	Over Voltage Shutdown	60	600	470	V~
006.Over volt prealarm	Over Voltage Pre-Alarm	60(dis)	600	450	V~
007.Over volt reset	Over Voltage Pre-Alarm Reset	60	600	430	V~
008.Shutdown delay time	Voltage Shutdown Delay Time	0.0	10.0	2.0	Sec
009.Unbalance volt set	Unbalance Volt Set	0	230	20	V~
010.Unbalance volt actions	Unbalance Volt Actions: 0- Disable, 1- Warning, 2- Electrical Trip, 3- Shutdown.	0(dis)	3	dis	
011.Unbalance volt actions delay	Unbalance Volt Actions Delay Time	0	99	2	Sec

<b>03.02.GENERATOR FREQ LEVEL (<i>Generator-&gt;Frequency level</i>)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Nominal frequency	Nominal Alternator Frequency	30.0	75.0	50.0	Hz
002.Under freq shutdown	Under Frequency Shutdown	30.0(dis)	75.0	43.0	Hz
003.Under freq prealarm	Under Frequency Pre-Alarm	30.0(dis)	75.0	45.0	Hz
004.Under freq reset	Under Frequency Pre-Alarm Reset	30.0	75.0	46.0	Hz
005.Over freq shutdown	Over Frequency Shutdown	30.0(dis)	75.0	58.0	Hz
006.Over freq prealarm	Over Frequency Pre-Alarm	30.0(dis)	75.0	55.0	Hz
007.Over freq reset	Over Frequency Pre-Alarm Reset	30.0	75.0	54.0	Hz
008.Shutdown delay time	Frequency Shutdown Delay Time	0.0	10.0	2.0	Sec

**Note:** dis = disable

<b>03.03.GEN CUR LEVEL &amp; ACT (Generator-&gt;Current level &amp; act.)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Under current set</b>	Under Current Set	0	9999	0	A~
<b>002.Under current prealarm</b>	Under Current Pre-Alarm	0(dis)	9999	dis	A~
<b>003.Under current reset</b>	Under Current Pre-Alarm Reset	0	9999	5	A~
<b>004.Under current actions</b>	Under Current Actions 0 - Disable 1 - Warning 2 - Electrical Trip 3 - Shutdown	0(dis)	3	dis	
<b>005.Under actions delay time</b>	Under Current Actions Delay Time	0	99	2	Sec
<b>006.Over current set</b>	Over Current Set	0	9999	9999	A~
<b>007.Over current prealarm</b>	Over Current Pre-Alarm	0(dis)	9999	dis	A~
<b>008.Over current reset</b>	Over Current Pre-Alarm Reset	0	9999	9980	A~
<b>009.Over current actions</b>	Over Current Actions 0 - Disable 1 - Warning 2 - Electrical Trip 3 - Shutdown	0(dis)	3	dis	
<b>010.Over actions delay time</b>	Over Current Actions Delay Time	0	99	5	Sec
<b>011.Short circuit current</b>	Short Circuit Current Set	0	9999	9999	A~
<b>012.Earth fault current</b>	Earth Fault Current Set	0	9999	100	A~
<b>013.Earth fault current actions</b>	Earth Fault Current Actions 0 - Disable 1 - Warning 2 - Electrical Trip 3 - Shutdown	0(dis)	3	dis	
<b>014.E.F. actions delay time</b>	Earth Fault Current Actions Delay Time	0	99	2	Sec
<b>015.Unbalance load set</b>	Unbalance Load Set	0	9999	0	A~
<b>016.Unbalance load actions</b>	Unbalance Load Actions 0 - Disable 1 - Warning 2 - Electrical Trip 3 - Shutdown	0(dis)	3	dis	
<b>017.Unbalance load actions delay</b>	Unbalance Load Actions Delay Time	0	99	2	Sec

**Note:** dis = disable

<b>03.04.GEN POWER LEVEL (Generator-&gt;Power level)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Under power set	Under Power Set	0	9999	0	kVA
002.Under power prealarm	Under Power Pre-Alarm	0(dis)	9999	dis	kVA
003.Under power reset	Under Power Pre-Alarm Reset	0	9999	5	kVA
004.Under power actions	Under Power Actions 0 - Disable 1 - Warning 2 - Electrical Trip 3 - Shutdown	0(dis)	3	0(dis)	
005.Under actions delay time	Under Power Action Delay Time	0	99	2	Sec
006.Over power set	Over Power Set	0	9999	0	kVA
007.Over power prealarm	Over Power Pre-Alarm	0(dis)	9999	dis	kVA
008.Over power reset	Over Power Pre-Alarm Reset	0	9999	0	kVA
009.Over power actions	Over Power Actions 0 - Disable 1 - Warning 2 - Electrical Trip 3 - Shutdown	0(dis)	3	0(dis)	
010.Over actions delay time	Over Power Action Delay Time	0	99	2	Sec
011.Reverse power set	Reverse Power Set	-9999	0	-30	kW
012.Reverse power actions	Reverse Power Actions 0 - Disable 1 - Warning 2 - Electrical Trip 3 - Shutdown	0(dis)	3	2	
013.Reverse power act.delay time	Reverse Power Action Delay Time	0	99	6	Sec
014.Excitation loss set	Excitation Loss Set	-9999	0	-100	KVAr
015.Excitation loss actions	Excitation Loss Actions 0 - Disable 1 - Warning 2 - Electrical Trip 3 - Shutdown	0(dis)	3	0(dis)	
016.Excitation loss act.delay time	Excitation Loss Action Delay Time	0	99	2	Sec

<b>03.05.GEN WORKING CALENDAR (Generator-&gt;Working calendar)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Disable/enable select	Calendar Disable or Enable	DISBL/ENABL		DISBL	
002.Start time on Monday	Calendar Start Time on Monday	0.00	23.59	0.00	H.Min
003.Stop time on Monday	Calendar Stop Time on Monday	0.00	23.59	23.59	H.Min
004.Start time on Tuesday	Calendar Start Time on Tuesday	0.00	23.59	0.00	H.Min
005.Stop time on Tuesday	Calendar Stop Time on Tuesday	0.00	23.59	23.59	H.Min
006.Start time on Wednesday	Calendar Start Time on Wednesday	0.00	23.59	0.00	H.Min
007.Stop time on Wednesday	Calendar Stop Time on Wednesday	0.00	23.59	23.59	H.Min
008.Start time on Thursday	Calendar Start Time on Thursday	0.00	23.59	0.00	H.Min
009.Stop time on Thursday	Calendar Stop Time on Thursday	0.00	23.59	23.59	H.Min
010.Start time on Friday	Calendar Start Time on Friday	0.00	23.59	0.00	H.Min
011.Stop time on Friday	Calendar Stop Time on Friday	0.00	23.59	23.59	H.Min
012.Start time on Saturday	Calendar Start Time on Saturday	0.00	23.59	0.00	H.Min
013.Stop time on Saturday	Calendar Stop Time on Saturday	0.00	23.59	23.59	H.Min
014.Start time on Sunday	Calendar Start Time on Sunday	0.00	23.59	0.00	H.Min
015.Stop time on Sunday	Calendar Stop Time on Sunday	0.00	23.59	23.59	H.Min

<b>03.06.GENERATOR GENERAL (Generator-&gt;General)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Sensing option gen.frequency	Sensing Opt Generator Frq En/Dis	ENABL/DISBL		ENABL	
002.Sensing option pickup&flywheel	Sensing Opt Pickup En/Dis&Flywheel	0(dis)	1000	DISBL	
003.All warning are latch	All Warnings Are Latched En/Dis	ENABL/DISBL		DISBL	

**Note:** dis = disable

## 4.2.4 Engine

<b>04.01.ENGINE START OPTIONS (Engine-&gt;Starting options)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Horn prior to start	Audible Alarm Prior To Starting	ENABL/DISBL	DISBL		
002.Number of start attempts	Number Of Start Attempts	1	10	3	
003.Cranking time	Cranking Time	1	99	5	Sec
004.Crank rest time	Crank Rest Time	5	99	10	Sec
005.Pickup fail delay	Pickup Sensor Fail Delay	0.1	10.0	3.0	Sec

<b>04.02.ENG.CRANK DISCONNECT(Engine-&gt;Crank disconnect)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Generator frequency	Generator Frequency	10.0	75.0	30.0	Hz
002.Engine speed	Engine RPM	100	6000	500	RPM
003.Generator volt	Generator Voltage	60 (dis)	600	300	V~
004.Alternator charge volt	Charge Alternator Voltage	6.0 (dis)	30.0	dis	V---
005.Oil pressure enable/disable	Oil Pressure Enable/Disable	ENABL/DISBL	DISBL		
006.Oil pressure value	Oil Pressure Value	1.0	30.0	1.0	BAR
007.Check oil press. before start	Check Oil Pressure Before Start	ENABL/DISBL	ENABL		

<b>04.03.ENGINE SPEED SETS (Engine-&gt;Speed settings)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Nominal speed	Nominal Speed	500	5000	1500	RPM
002.Under speed shutdown	Under Speed Shutdown	500(dis)	5000	dis	RPM
003.Under speed prealarm	Under Speed Prealarm	500(dis)	5000	dis	RPM
004.Under speed reset	Under Speed Prealarm Reset	500	5000	500	RPM
005.Over speed shutdown	Over Speed Shutdown	500(dis)	5000	dis	RPM
006.Over speed prealarm	Over Speed Prealarm	500(dis)	5000	dis	RPM
007.Over speed reset	Over Speed Prealarm Reset	500	5000	500	RPM
008.Shutdown delay time	Speed Shutdown Delay Time	0.0	10.0	2.0	Sec

<b>04.04.ENGINE PLANT BATTERY (Engine-&gt;Plant battery)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Under volt	Undervolts Warning	6.0(dis)	30.0	10.0	V---
002.Under volt reset	Undervolts Warning Reset	6.0	30.0	10.5	V---
003.Under volt delay	Undervolts Delay	0.0	9.9	2.0	Sec
004.Over volt	Undervolts Warning	6.0(dis)	30.0	30.0	V---
005.Over volt reset	Overvolts Warning Reset	6.0	30.0	29.5	V---
006.Over volt delay	Overvolts Delay	0.0	9.9	2.0	Sec
007.Alternator charge warning	Charge Alternator Warning	6.0(dis)	30.0	dis	V---

**Note:** dis = disable

<b>04.05.CANBUS ECU (Engine-&gt;CanBus ECU)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Baud rate</b>	Baud Rate: 0 - 20 1 - 50 2 - 100 3 - 125 4 - 250 5 - 500 6 - 800 7 - 1.000	0	7	4	kBaud
<b>002.J1939 ECU type</b>	J1939 ECU Type Selection: 0 - Disable 1 - Standard 2 - Volvo EMS1 3 - Volvo EMS2 4 - Volvo EMS2b 5 - Volvo EDC3 6 - Volvo EDC4 7 - Deutz EMR2 8 - Deutz EMR3 9 - Perkins 1300 10 - Perkins ADEM3 11 - Perkins ADEM4 12 - Scania S6 13 - MAN MFR 14 - Cummins ISB 15 - Cummins CM570 16 - Cummins CM850 17 - Cummins CM2150E 18 - Cummins CM2250 19 - Detroit DDEC 20 - John Deere 21 - MTU ADEC 22 - MTU ECU8 23 - MTU ECU8 SAM 24 - Yuchai	0(dis)	24	dis	
<b>003.Device address</b>	Device Address	0	255	17	
<b>004.SPN version</b>	SPN version	1	3	1	
<b>005.ECU remote control</b>	ECU Remote Control	ENABL/DISBL		ENABL	
<b>006.Speed control enable</b>	Speed Control	ENABL/DISBL		ENABL	
<b>007.Oil pressure control enable</b>	Oil Pressure Control	ENABL/DISBL		DISBL	
<b>008.Temperature control enable</b>	Coolant Temp. Control	ENABL/DISBL		DISBL	
<b>009.Speed set point</b>	Speed Set Point Selection	1500 / 1800		1500	RPM
<b>010.Speed correction</b>	Speed Correction Value	0	100	50	%

**Note:** dis = disable

<b>04.06.CANBUS ERROR SET (Engine-&gt;CanBus error set)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.CAN fault actions</b>	Can Fault Actions: 0- Disable 1- Warning Non-Latching 2- Warning 3- Electrical Trip 4- Shutdown	0(dis)	4	0	
<b>002.CAN fault activation</b>	Can Fault Activation: 0- Active From Starting 1- Active From Safety On 2- Always Active	0	2	0	
<b>003.CAN fault delay</b>	Can Fault Delay	3	250	10	Sec
<b>004.Amber warning actions</b>	J1939 Amber Warning Lamp Actions: 0- Disable 1- Warning Non-Latching 2- Warning 3- Electrical Trip 4- Shutdown	0(dis)	4	0	
<b>005.Amber warning activation</b>	J1939 Amber Warning Lamp Activation: 0- Active From Starting 1- Active From Safety On 2- Always Active	0	2	2	
<b>006.Amber warning delay</b>	J1939 Amber Warning Lamp Delay	0	250	2	Sec
<b>007.Red stop actions</b>	J1939 Red Stop Lamp Actions: 0- Disable 1- Warning Non-Latching 2- Warning 3- Electrical Trip 4- Shutdown	0(dis)	4	0	
<b>008.Red stop activation</b>	J1939 Red Stop Lamp Activation: 0- Active From Starting 1- Active From Safety On 2- Always Active	0	2	2	
<b>009.Red stop delay</b>	J1939 Red Stop Lamp Delay	0	250	2	Sec

**Note:** dis = disable



<b>04.07.ENGINE MAINTENANCE (Engine-&gt;Maintenance)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Running hours interval</b>	Running Hours Interval	0(dis)	9999	5000	Hour
<b>002.Maintenance date interval</b>	Maintenance Date Interval	0(dis)	12	6	Month
<b>003.Engine stop when maintenance</b>	Shutdown When Maintenance Is Due	ENABL/DISBL		DISBL	
<b>004.Engine running hour</b>	Engine Running Hour	0	30000	0	
<b>007.Maintenance okay</b>	Maintenance Okay	YES/NO		NO	

<b>04.08.TEST MODE (Engine-&gt;Test mode)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Disable/enable select</b>	Test Mode Selection	ENABL/DISBL		ENABL	

<b>04.09.EXERCISE (Engine-&gt;Exercise)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Disable/enable select</b>	Exercise Disable or Enable	DISBL/ENABL		DISBL	
<b>002.Start time on monday</b>	Exercise Start Time on Monday	0.00	23.59	0.00	H.Min
<b>003.Stop time on monday</b>	Exercise Stop Time on Monday	0.00	23.59	0.00	H.Min
<b>004.Start time on tuesday</b>	Exercise Start Time on Tuesday	0.00	23.59	0.00	H.Min
<b>005.Stop time on tuesday</b>	Exercise Stop Time on Tuesday	0.00	23.59	0.00	H.Min
<b>006.Start time on wednesday</b>	Exercise Start Time on Wednesday	0.00	23.59	0.00	H.Min
<b>007.Stop time on wednesday</b>	Exercise Stop Time on Wednesday	0.00	23.59	0.00	H.Min
<b>008.Start time on thursday</b>	Exercise Start Time on Thursday	0.00	23.59	0.00	H.Min
<b>009.Stop time on thursday</b>	Exercise Stop Time on Thursday	0.00	23.59	0.00	H.Min
<b>010.Start time on friday</b>	Exercise Start Time on Friday	0.00	23.59	0.00	H.Min
<b>011.Stop time on friday</b>	Exercise Stop Time on Friday	0.00	23.59	0.00	H.Min
<b>012.Start time on saturday</b>	Exercise Start Time on Saturday	0.00	23.59	0.00	H.Min
<b>013.Stop time on saturday</b>	Exercise Stop Time on Saturday	0.00	23.59	0.00	H.Min
<b>014.Start time on sunday</b>	Exercise Start Time on Sunday	0.00	23.59	0.00	H.Min
<b>015.Stop time on sunday</b>	Exercise Stop Time on Sunday	0.00	23.59	0.00	H.Min

<b>04.10.ENGINE GENERAL (Engine-&gt;General)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Fuel selection</b>	Engine Fuel Selection	0-GAS 1-DIESEL 2-GASOLINE		1-DIESEL	
<b>002.Stop solenoid time</b>	Stop Solenoid Time	1	99	20	Sec
<b>003.Ignition delay</b>	Ignition Delay	1	99	5	Sec
<b>004.Gas valve delay</b>	Gas Valve Delay	1	99	5	Sec
<b>005.Minimum ignition speed</b>	Minimum Ignition Speed	10	1500	200	RPM
<b>006.Choke time</b>	Choke Time	0.0	30.0	0.8	Sec

**Note:** dis = disable

## 4.2.5 Inputs

<b>05.01.SENDER INPUTS (Inputs-&gt;Sender inputs)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Oil pressure unit</b>	Oil Pressure Unit	BAR/PSI/KPA		BAR	
<b>002.Oil pressure input type</b>	Oil Pressure Input Type	0 - Not Used (Disable) 1 - Digital NC 2 - Digital NO 3 - VDO 5 BAR 4 - VDO 7 BAR 5 - VDO 10 BAR 6 - DATCON 5 BAR 7 - DATCON 7 BAR 8 - MURPHY 7 BAR 9 - User Configured		0 (dis)	
<b>003.Oil pressure prealarm</b>	Oil Pressure Pre-Alarm	0.0 (dis)	30.0	1.2	BAR
<b>004.Oil pressure reset</b>	Oil Pressure Pre-Alarm Reset	0.0	30.0	1.4	BAR
<b>005.Oil pressure shutdown</b>	Oil Pressure Shutdown	0.0	30.0	1.0	BAR
<b>006.Temperature unit</b>	Coolant Temp. Unit	°C/°F		°C	
<b>007.Temperature input type</b>	Coolant Temperature Input Type	0 - Not Used (Disable) 1 - Digital NC 2 - Digital NO 3 - VDO 120 °C 4 - VDO 150 °C 5 - DATCON 6 - MURPHY 7 - PT100 8 - User Configured		0 (dis)	
<b>008.Temperature sensor break</b>	Temp. Sensor Break	0 - Disable 1 - Enable From Safety On (3min. delayed) 2 - Always Enable		0 (dis)	
<b>009.High temperature prealarm</b>	High Temp. Pre-Alarm	0 (dis)	300	90	°C
<b>010.High temperature reset</b>	High Temperature Pre-Alarm Reset	0	300	88	°C
<b>011.High temperature shutdown</b>	High Temp. Shutdown	0	300	95	°C
<b>012.Low temperature warning</b>	Low Temp. Warning	0 (dis)	70	0 (dis)	°C
<b>013.Heater control ON</b>	Coolant Heater Control On	0 (dis)	300	0 (dis)	°C
<b>014.Heater control OFF</b>	Coolant Heater Control Off	0	300	45	°C
<b>015.Water pump on time</b>	Water Pump On Time	0	9999	5	Sec
<b>016.Water pump off time</b>	Water Pump Off Time	0	9999	5	Sec
<b>017.Conf. AI1 unit</b>	Conf. Analog Input-1 Unit	BAR/PSI/KPA/°C/°F/%/Lt		%	
<b>018.Conf. AI1 type</b>	Configurable Analog Input-1 Type	0 - Not Used (Disable) 1 - Digital NC 2 - Digital NO 3 - VDO OHM (10-180) 4 - VDO TUBE (90-0) 5 - US OHM (240-33) 6 - EMS OHM (0-190) 7 - FORD (73-10) 8 - User Configured		0 (dis)	
<b>019.Conf. AI1 low prealarm</b>	Configurable Analog Input-1 Low Pre-Alarm	0 (dis)	3000	0 (dis)	%

020.Conf. AI1 low reset	Configurable Analog Input-1 Low Reset	0	3000	60	%
021.Conf. AI1 low shutdown	Configurable Analog Input-1 Low Shutdown	0 (dis)	3000	0 (dis)	%
022.Conf. AI1 high prealarm	Configurable Analog Input-1 High Pre-Alarm	0 (dis)	3000	0 (dis)	%
023.Conf. AI1 high reset	Configurable Analog Input-1 High Reset	0	3000	90	%
024.Conf. AI1 high shutdown	Configurable Analog Input-1 High Shutdown	0 (dis)	3000	0 (dis)	%
025.Conf. AI1 control ON	Configurable Analog Input-1 control ON	0 (dis)	3000	0 (dis)	%
026.Conf. AI1 control OFF	Configurable Analog Input-1 control OFF	0	3000	75	%
027.Conf. AI2 unit	Conf. Analog Input-2 Unit	BAR/PSI/KPA/°C/°F/%/Lt			°C
028.Conf. AI2 type	Configurable Analog Input-2 Type	0 - Not Used (Disable) 1 - Digital NC 2 - Digital NO 3 - VDO 120 °C 4 - VDO 150 °C 5 - DATCON 6 - MURPHY 7 - PT100 8 - User Configured			0 (dis)
029.Conf. AI2 low prealarm	Configurable Analog Input-2 Low Pre-Alarm	0 (dis)	300	0 (dis)	°C
030.Conf. AI2 low reset	Configurable Analog Input-2 Low Reset	0	300	60	°C
031.Conf. AI2 low shutdown	Configurable Analog Input-2 Low Shutdown	0 (dis)	300	0 (dis)	°C
032.Conf. AI2 high prealarm	Configurable Analog Input-2 High Pre-Alarm	0 (dis)	300	0 (dis)	°C
033.Conf. AI2 high reset	Configurable Analog Input-2 High Reset	0	300	90	°C
034.Conf. AI2 high shutdown	Configurable Analog Input-2 High Shutdown	0 (dis)	300	0 (dis)	°C
035.Conf. AI2 control ON	Configurable Analog Input-2 control ON	0 (dis)	300	0 (dis)	°C
036.Conf. AI2 control OFF	Configurable Analog Input-2 control OFF	0	300	75	°C

**Note:** dis = disable

<b>05.02.SENDER LINEARISATION</b> ( <i>Inputs-&gt;Sender linearisation</i> )		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Oil pressure sender 1	Oil Pressure Sender Point-1	0	1300	15	R
002.Oil pressure 1	Oil Pressure Point-1	0.0	30.0	0.0	BAR
003.Oil pressure sender 2	Oil Pressure Sender Point-2	0	1300	31	R
004.Oil pressure 2	Oil Pressure Point-2	0.0	30.0	1.0	BAR
005.Oil pressure sender 3	Oil Pressure Sender Point-3	0	1300	49	R
006.Oil pressure 3	Oil Pressure Point-3	0.0	30.0	2.0	BAR
007.Oil pressure sender 4	Oil Pressure Sender Point-4	0	1300	66	R
008.Oil pressure 4	Oil Pressure Point-4	0.0	30.0	3.0	BAR
009.Oil pressure sender 5	Oil Pressure Sender Point-5	0	1300	85	R
010.Oil pressure 5	Oil Pressure Point-5	0.0	30.0	4.0	BAR
011.Oil pressure sender 6	Oil Pressure Sender Point-6	0	1300	101	R
012.Oil pressure 6	Oil Pressure Point-6	0.0	30.0	5.0	BAR
013.Oil pressure sender 7	Oil Pressure Sender Point-7	0	1300	117	R
014.Oil pressure 7	Oil Pressure Point-7	0.0	30.0	6.0	BAR
015.Oil pressure sender 8	Oil Pressure Sender Point-8	0	1300	132	R
016.Oil pressure 8	Oil Pressure Point-8	0.0	30.0	7.0	BAR
017.Oil pressure sender 9	Oil Pressure Sender Point-9	0	1300	149	R
018.Oil pressure 9	Oil Pressure Point-9	0.0	30.0	8.0	BAR
019.Oil pressure sender 10	Oil Pressure Sender Point-10	0	1300	178	R
020.Oil pressure 10	Oil Pressure Point-10	0.0	30.0	10.0	BAR
021.Temperature sender 1	Temperature Sender Point-1	0	1300	579	R
022.Temperature 1	Temperature Point-1	0	300	28	°C
023.Temperature sender 2	Temperature Sender Point-2	0	1300	404	R
024.Temperature 2	Temperature Point-2	0	300	35	°C
025.Temperature sender 3	Temperature Sender Point-3	0	1300	342	R
026.Temperature 3	Temperature Point-3	0	300	40	°C
027.Temperature sender 4	Temperature Sender Point-4	0	1300	250	R
028.Temperature 4	Temperature Point-4	0	300	50	°C
029.Temperature sender 5	Temperature Sender Point-5	0	1300	179	R
030.Temperature 5	Temperature Point-5	0	300	60	°C
031.Temperature sender 6	Temperature Sender Point-6	0	1300	136	R
032.Temperature 6	Temperature Point-6	0	300	70	°C
033.Temperature sender 7	Temperature Sender Point-7	0	1300	103	R
034.Temperature 7	Temperature Point-7	0	300	80	°C
035.Temperature sender 8	Temperature Sender Point-8	0	1300	77	R
036.Temperature 8	Temperature Point-8	0	300	90	°C
037.Temperature sender 9	Temperature Sender Point-9	0	1300	67	R
038.Temperature 9	Temperature Point-9	0	300	95	°C
039.Temperature sender 10	Temperature Sender Point-10	0	1300	63	R
040.Temperature 10	Temperature Point-10	0	300	98	°C
041.Conf. AI1 sender 1	Conf. Analog Input-1 Sender Point-1	0	1300	10	R
042.Conf. AI1 value 1	Conf. Analog Input-1 Point-1	0	3000	0	%
043.Conf. AI1 sender 2	Conf. Analog Input-1 Sender Point-2	0	1300	30	R
044.Conf. AI1 value 2	Conf. Analog Input-1 Point-2	0	3000	11	%
045.Conf. AI1 sender 3	Conf. Analog Input-1 Sender Point-3	0	1300	50	R
046.Conf. AI1 value 3	Conf. Analog Input-1 Point-3	0	3000	22	%
047.Conf. AI1 sender 4	Conf. Analog Input-1 Sender Point-4	0	1300	70	R
048.Conf. AI1 value 4	Conf. Analog Input-1 Point-4	0	3000	33	%
049.Conf. AI1 sender 5	Conf. Analog Input-1 Sender Point-5	0	1300	90	R
050.Conf. AI1 value 5	Conf. Analog Input-1 Point-5	0	3000	44	%

051.Conf. AI1 sender 6	Conf. Analog Input-1 Sender Point-6	0	1300	110	R
052.Conf. AI1 value 6	Conf. Analog Input-1 Point-6	0	3000	55	%
053.Conf. AI1 sender 7	Conf. Analog Input-1 Sender Point-7	0	1300	130	R
054.Conf. AI1 value 7	Conf. Analog Input-1 Point-7	0	3000	66	%
055.Conf. AI1 sender 8	Conf. Analog Input-1 Sender Point-8	0	1300	150	R
056.Conf. AI1 value 8	Conf. Analog Input-1 Point-8	0	3000	77	%
057.Conf. AI1 sender 9	Conf. Analog Input-1 Sender Point-9	0	1300	170	R
058.Conf. AI1 value 9	Conf. Analog Input-1 Point-9	0	3000	88	%
059.Conf. AI1 sender 10	Conf. Analog Input-1 Sender Point-10	0	1300	190	R
060.Conf. AI1 value 10	Conf. Analog Input-1 Point-10	0	3000	100	%
061.Conf. AI2 sender 1	Conf. Analog Input-2 Sender Point-1	0	1300	579	R
062.Conf. AI2 value 1	Conf. Analog Input-2 Point-1	0	300	28	°C
063.Conf. AI2 sender 2	Conf. Analog Input-2 Sender Point-2	0	1300	404	R
064.Conf. AI2 value 2	Conf. Analog Input-2 Point-2	0	300	35	°C
065.Conf. AI2 sender 3	Conf. Analog Input-2 Sender Point-3	0	1300	342	R
066.Conf. AI2 value 3	Conf. Analog Input-2 Point-3	0	300	40	°C
067.Conf. AI2 sender 4	Conf. Analog Input-2 Sender Point-4	0	1300	250	R
068.Conf. AI2 value 4	Conf. Analog Input-2 Point-4	0	300	50	°C
069.Conf. AI2 sender 5	Conf. Analog Input-2 Sender Point-5	0	1300	179	R
070.Conf. AI2 value 5	Conf. Analog Input-2 Point-5	0	300	60	°C
071.Conf. AI2 sender 6	Conf. Analog Input-2 Sender Point-6	0	1300	136	R
072.Conf. AI2 value 6	Conf. Analog Input-2 Point-6	0	300	70	°C
073.Conf. AI2 sender 7	Conf. Analog Input-2 Sender Point-7	0	1300	103	R
074.Conf. AI2 value 7	Conf. Analog Input-2 Point-7	0	300	80	°C
075.Conf. AI2 sender 8	Conf. Analog Input-2 Sender Point-8	0	1300	77	R
076.Conf. AI2 value 8	Conf. Analog Input-2 Point-8	0	300	90	°C
077.Conf. AI2 sender 9	Conf. Analog Input-2 Sender Point-9	0	1300	67	R
078.Conf. AI2 value 9	Conf. Analog Input-2 Point-9	0	300	95	°C
079.Conf. AI2 sender 10	Conf. Analog Input-2 Sender Point-10	0	1300	63	R
080.Conf. AI2 value 10	Conf. Analog Input-2 Point-10	0	300	98	°C

<b>05.03.CONF. INPUT-X (Inputs-&gt;Conf. input-x)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Dis,user conf.or list</b>	0- Disable 1- User Configured 2- Select From List	0(dis)	2	In1,2,3=2 In4,5=2 Others=1	
<b>002.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	In1=1 Others=0	
<b>003.Indication</b>	If User Configured 0- Status 1- Warning Non-Latching 2- Warning Latching 3- Electrical Trip 4- Shutdown	0	4	0	
<b>004.Activation</b>	If User Configured 0- Active From Starting 1- Active From Safety ON 2- Always Active	0	2	2	
<b>005.Select from list</b>	If Select From List 0-Remote Start On Load 1-Remote Start Off Load 2-Auxiliary Mains Fail 3-Generator Breaker Open/Close 4-Simulate Horn Reset Button 5-Simulate Alarm Reset Button 6-Simulate Auto Button 7-Simulate Test Button 8-Simulate Manual Button 9-Simulate Start Button 10-Simulate Stop Button 11-Generator Closed Auxiliary 12-Generator Load Inhibit 13-Mains Closed Auxiliary 14-Mains Load Inhibit 15-Auto Restore Inhibit 16-Auto Start Inhibit 17-Panel Lock 18-Scheduled Runs(Exercise) Inhibited 19-Remote Inhibit 20-Force Break Transfer 21-Force No-break Transfer 22-Force Soft Transfer 23-Force Parallel Operation 24-Mains Breaker Open/Close 25-Emergency Stop (for only input-1) 25-Low Oil Pressure (for only input-4) 25-High Temperature (for only input-5) 26-Low Oil Level (for only input-4) 26-Emergency Stop No-Latching (for only input-1)	0	In1,4=26 In5=25 Others=24	In1=25 In2=13 In3=11 In4=25 In5=25	
<b>006.Active delay</b>	Input active delay	0	250	0	Sec

**Note-1** : x = 1(input-1), 2(input-2), 3(input-3), 4(input-4), 5(input-5), 6(input-6), 7(input-7), 8(input-8), 9(input-9), 10(input-10), 11(input-11), or 12(input-12)

**Note-2** : dis = disable

<b>05.15.CONF. INPUT-13 (Inputs-&gt;Conf. input-13)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Input type</b>	0- Disable 1- User Configured (Digital) 2- Select From List (Digital) 3- Cabin Temperature (Anolog)	0(dis)	3	1	
<b>002.Polarity</b>	If Input Type is Digital 0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>003.Indication</b>	If Input Type is User Configured 0- Status 1- Warning Non-Latching 2- Warning Latching 3- Electrical Trip 4- Shutdown	0	4	0	
<b>004.Activation</b>	If Input Type is User Configured 0- Active From Starting 1- Active From Safety On 2- Always Active	0	2	2	
<b>005.Select from list</b>	If Select From List 0-Remote Start On Load 1-Remote Start Off Load 2-Auxiliary Mains Fail 3-Generator Breaker Open/Close 4-Simulate Horn Reset Button 5-Simulate Alarm Reset Button 6-Simulate Auto Button 7-Simulate Test Button 8-Simulate Manual Button 9-Simulate Start Button 10-Simulate Stop Button 11-Generator Closed Auxiliary 12-Generator Load Inhibit 13-Mains Closed Auxiliary 14-Mains Load Inhibit 15-Auto Restore Inhibit 16-Auto Start Inhibit 17-Panel Lock 18-Scheduled Runs(Exercise) Inhibited 19-Remote Inhibit 20-Force Break Transfer 21-Force No-break Transfer 22-Force Soft Transfer 23-Force Parallel Operation 24-Mains Breaker Open/Close	0	24	18	
<b>006.Active delay</b>	Input active delay (If Input Type is Digital)	0	250	5	Sec
<b>007.Cabin temp.low prealarm</b>	Cabin temperature low prealarm	-50(dis)	100	dis	°C
<b>008.Cabin temp.low reset</b>	Cabin temperature low prealarm reset	-50	100	0	°C
<b>009.Cabin temp.low shutdown</b>	Cabin temperature low shutdown	-50(dis)	100	dis	°C
<b>010.Cabin temp.high prealarm</b>	Cabin temperature high prealarm	-50(dis)	100	dis	°C
<b>011.Cabin temp.high reset</b>	Cabin temperature high prealarm reset	-50	100	0	°C
<b>012.Cabin temp.high shutdown</b>	Cabin temperature high shutdown	-50(dis)	100	dis	°C

**Note:** dis = disable

<b>05.16.CONF. EXP. INPUT-X (Inputs-&gt;Conf. exp. input-x)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Dis,user conf.or list</b>	0- Disable 1- User Configured 2- Select From List	0(dis)	2	1	
<b>002.Hardware type</b>	0-> -Ve (Switched To Battery -) 1-> +Ve (Switched To Battery +)	0	1	0	
<b>003.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>004.Indication</b>	If User Configured 0- Status 1- Warning Non-Latching 2- Warning Latching 3- Electrical Trip 4- Shutdown	0	4	0	
<b>005.Activation</b>	If User Configured 0- Active From Starting 1- Active From Safety On 2- Always Active	0	2	2	
<b>006.Select from list</b>	If Select From List 2-Auxiliary Mains Fail 3-Generator Breaker Open/Close 4-Simulate Horn Reset Button 5-Simulate Alarm Reset Button 6-Simulate Auto Button 7-Simulate Test Button 8-Simulate Manual Button 9-Simulate Start Button 10-Simulate Stop Button 11-Generator Closed Auxiliary 12-Generator Load Inhibit 13-Mains Closed Auxiliary 14-Mains Load Inhibit 15-Auto Restore Inhibit 16-Auto Start Inhibit 17-Panel Lock 18-Scheduled Runs(Exercise) Inhibited 19-Remote Inhibit 20-Force Break Transfer 21-Force No-break Transfer	2	21	2	
<b>007.Active delay</b>	Input active delay	0	250	5	Sec

**Note-1** : x = 1(exp. input-1), 2(exp. input-2), 3(exp. input-3), 4(exp. input-4), 5(exp. input-5), 6(exp. input-6), 7(exp. input-7) or 8(exp. input-8)

**Note-2** : dis = disable



## 4.2.6 Outputs

06.01.CONF. OUTPUT-1 (Outputs->Conf. output-1)		Min	Max	Default	Unit
001.Polarity	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
002.Function	0-NOT USED 1-AIR FLAP CONTROL 2-ALARM RESET 3-AUDIBLE ALARM 4-AUTO START INHIBIT 5-AUXILIARY MAINS FAILURE 6-BATTERY HIGH VOLTAGE 7-BATTERY LOW VOLTAGE 8-CALLING FOR SCHEDULED RUN(EXERCISE) 9-CAN ECU POWER 10-CAN ECU STOP 11-CHARGE ALTERNATOR FAILURE 12-COMMON ALARM 13-COMMON ELECTRICAL TRIP ALARM 14-COMMON SHUTDOWN ALARM 15-COMMON WARNING ALARM 16-COOLING FAN AFTER START 17-COOLING FAN AFTER STOP 18-COOLANT TEMPERATURE HIGH PRE-ALARM 19-COOLANT TEMPERATURE HIGH SHUTDOWN 20-COOLING DOWN TIMER IN PROGRESS 21-CRANK RELAY ENERGISED 22-DELAYED ALARMS ACTIVE 23-DIGITAL INPUT-1 ALARM 24-DIGITAL INPUT-2 ALARM 25-DIGITAL INPUT-3 ALARM 26-DIGITAL INPUT-4 ALARM 27-DIGITAL INPUT-5 ALARM 28-DIGITAL INPUT-6 ALARM 29-DIGITAL INPUT-7 ALARM 30-DIGITAL INPUT-8 ALARM 31-DIGITAL INPUT-9 ALARM 32-DIGITAL INPUT-10 ALARM 33-DIGITAL INPUT-11 ALARM 34-DIGITAL INPUT-12 ALARM 35-DIGITAL INPUT-13 ALARM 36-EXPANSION INPUT-1 ALARM 37-EXPANSION INPUT-2 ALARM 38-EXPANSION INPUT-3 ALARM 39-EXPANSION INPUT-4 ALARM 40-EXPANSION INPUT-5 ALARM 41-EXPANSION INPUT-6 ALARM 42-EXPANSION INPUT-7 ALARM 43-EXPANSION INPUT-8 ALARM 44-EARTH FAULT 45-EMERGENCY STOP 46-FAIL TO START ALARM 47-FAIL TO STOP ALARM 48-CONF. A11 CONTROL 49-FUEL RELAY ENERGISED 50-GAS ENGINE IGNITION OUTPUT 51-GENERATOR AT REST 52-GENERATOR AVAILABLE 53-GENERATOR CLOSED AUXILIARY 54-GENERATOR FAILED TO CLOSE 55-GENERATOR FAILED TO OPEN 56-GENERATOR HIGH FREQUENCY PRE-ALARM 57-GENERATOR HIGH FREQUENCY SHUTDOWN 58-GENERATOR HIGH VOLTAGE PRE-ALARM 59-GENERATOR HIGH VOLTAGE SHUTDOWN 60-GENERATOR LOAD INHIBIT 61-GENERATOR LOW FREQUENCY PRE-ALARM 62-GENERATOR LOW FREQUENCY SHUTDOWN 63-GENERATOR LOW VOLTAGE PRE-ALARM 64-GENERATOR LOW VOLTAGE SHUTDOWN 65-GENERATOR STOPPING 66-GENERATOR OPEN BREAKER 67-HORN OUTPUT LATCHED 68-HORN OUTPUT PULSED 69-LAMP TEST 70-CONF. A12 CONTROL 71-LOSS OF MAGNETIC PICK-UP SPEED SIGNAL 72-LOW TEMPERATURE 73-MAINTENANCE DUE ALARM 74-MAINS CLOSED AUXILIARY 75-MAINS FAILED TO CLOSE 76-MAINS FAILED TO OPEN 77-MAINS FAILURE 78-MAINS HIGH FREQUENCY 79-MAINS HIGH VOLTAGE 80-MAINS LOAD INHIBIT 81-MAINS LOW FREQUENCY 82-MAINS LOW VOLTAGE 83-MAINS OPEN BREAKER 84-NO LOADING COMMAND 85-OIL PRESSURE LOW PRE-ALARM 86-OIL PRESSURE LOW SHUTDOWN 87-CONF A11 HIGH PRE-ALARM 88-CONF A11 HIGH SHUTDOWN 89-OVER CURRENT PRE-ALARM 90-OVER CURRENT 91-OVER POWER PRE-ALARM 92-OVER POWER SHUTDOWN 93-OVERSPD PRE-ALARM 94-OVERSPD SHUTDOWN 95-PANEL LOCK 96-PRE-HEAT(during preheat timer) 97-PRE-HEAT(until end of cranking) 98-PRE-HEAT(until end of warming) 99-PRE-HEAT(until end safety on) 100-REMOTE START PRESENT 101-REMOTE STOP DELAY IN PROGRESS 102-SHORT CIRCUIT 103-SMOKE LIMITING 104-STARTING ALARM 105-STARTING ALARMS ARMED 106-STOP RELAY ENERGIZED 107-SYSTEM IN AUTO MODE 108-SYSTEM IN MANUAL MODE 109-SYSTEM IN STOP MODE 110-SYSTEM IN TEST MODE 111-UNDER CURRENT PRE-ALARM 112-UNDER CURRENT 113-UNDER POWER PRE-ALARM 114-UNDER POWER SHUTDOWN 115-UNDERSPEED PRE-ALARM 116-UNDERSPEED SHUTDOWN 117-WAITING FOR GENERATOR 118-RESERVED 119-LOAD SUPPLY FROM GENERATOR 120-LOAD SUPPLY FROM MAINS 121-CONFIGURABLE ANALOG INPUT 1 LOW PRE-ALARM 122-CONFIGURABLE ANALOG INPUT 1 LOW SHUTDOWN 123-CONFIGURABLE ANALOG INPUT 2 LOW PRE-ALARM 124-CONFIGURABLE ANALOG INPUT 2 LOW SHUTDOWN 125-CONFIGURABLE ANALOG INPUT 2 HIGH PRE-ALARM 126-CONFIGURABLE ANALOG INPUT 2 HIGH SHUTDOWN 127-CHOKE ACTIVE 128-REMOTE CONTROL ACTIVE 129-REVERSE POWER 130-CABIN TEMPERATURE LOW PRE-ALARM 131-CABIN TEMPERATURE LOW SHUTDOWN 132-CABIN TEMPERATURE HIGH PRE-ALARM 133-CABIN TEMPERATURE HIGH SHUTDOWN 134-HEATER CONTROL 135-REMOTE OUTPUT 136-UNBALANCE LOAD 137-WATER PUMP 138-RESERVED 139-SYNCHRONIZATION FAIL 140-LOAD SHEDDING CONTROL-1 141-LOAD SHEDDING CONTROL-2 142-LOAD SHEDDING CONTROL-3 143-LOAD SHEDDING CONTROL-4 144-LOAD SHEDDING CONTROL-5 145-GOVERNOR MAXIMUM LIMIT ALARM 146-AVR MAXIMUM LIMIT ALARM 147-MAINS ROCOF ALARM 148-MAINS VECTOR SHIFT ALARM 149-MAINS UNDER VOLTAGE COIL 150-GENERATOR UNDER VOLTAGE COIL 151-SPEED DOWN PULSE OUTPUT 152-SPEED UP PULSE OUTPUT 153-VOLTAGE DOWN PULSE OUTPUT 154-VOLTAGE UP PULSE OUTPUT	0	154	49	

<b>06.02.CONF. OUTPUT-2 (Outputs-&gt;Conf. output-2)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	21	

<b>06.03.CONF. OUTPUT-3 (Outputs-&gt;Conf. output-3)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	68	

<b>06.04.CONF. OUTPUT-4 (Outputs-&gt;Conf. output-4)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	9	

<b>06.05.CONF. OUTPUT-5 (Outputs-&gt;Conf. output-5)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	12	

<b>06.06.CONF. OUTPUT-6 (Outputs-&gt;Conf. output-6)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	75	

<b>06.07.CONF. OUTPUT-7 (Outputs-&gt;Conf. output-7)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	54	

<b>06.08.CONF. OUTPUT-8 (Outputs-&gt;Conf. output-8)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	83	

<b>06.09.CONF. OUTPUT-9 (Outputs-&gt;Conf. output-9)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	66	

<b>06.11.CONF. EXP. OUTPUT-1 (Outputs-&gt;Conf. exp. Output-1)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	12	

<b>06.12.CONF. EXP. OUTPUT-2 (Outputs-&gt;Conf. exp. output-2)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	12	

<b>06.13.CONF. EXP. OUTPUT-3 (Outputs-&gt;Conf. exp. Output-3)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	12	

<b>06.14.CONF. EXP. OUTPUT-4 (Outputs-&gt;Conf. exp. Output-4)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	12	

<b>06.15.CONF. EXP. OUTPUT-5 (Outputs-&gt;Conf. exp. Output-5)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	12	

<b>06.16.CONF. EXP. OUTPUT-6 (Outputs-&gt;Conf. exp. Output-6)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	12	

<b>06.17.CONF. EXP. OUTPUT-7 (Outputs-&gt;Conf. exp. Output-7)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	12	

<b>06.18.CONF. EXP. OUTPUT-8 (Outputs-&gt;Conf. exp. output-8)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Polarity</b>	0- Normally Open (Close To Activate) 1- Normally Close (Open To Activate)	0	1	0	
<b>002.Function</b>	The same as Configurable Output-1 options	0	154	12	

## 4.2.7 Timers

<b>07.01.START TIMERS (Timers-&gt;Start timers)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Mains transient delay</b>	Mains Transient Delay	0.0	20.0	2.0	Sec
<b>002.Mains fail start delay</b>	Mains Fail Start Delay	0	9999	0	Sec
<b>003.Remote start delay</b>	Remote Start Delay	0	3600	4	Sec
<b>004.Pre-heat</b>	Pre-Heat	0	250	3	Sec
<b>005.Pre-heat bypass</b>	Pre-Heat Bypass	0	250	0	Min
<b>006.Safety on delay</b>	Safety On Delay	0	99	5	Sec
<b>007.Warming up time</b>	Warmup Time	0	250	3	Sec
<b>008.Horn duration</b>	Horn Duration	0 (dis)	999	60	Sec
<b>009.Charge excitation time</b>	Charge Excitation Time	0	99(cont)	15	Sec
<b>010.Cooling fan time</b>	Cooling Fan Time	0	250	180	Sec
<b>011.Idle mode time</b>	Idle Mode Time (Smoke Limiting)	0 (dis)	3600	dis	Sec
<b>012.Idle mode time off</b>	Idle Mode Time Off (Smoke Limiting Off)	0	250	5	Sec

<b>07.02.STOPPING TIMERS (Timers-&gt;Stopping timers)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Mains return delay</b>	Mains Return Delay	0	3600	5	Sec
<b>002.Remote stop delay</b>	Remote Stop Delay	0	250	4	Sec
<b>003.Cooling time</b>	Cooling Time	0 (dis)	3600	60	Sec
<b>004.Fail to stop delay</b>	Fail To Stop Time	15	99	30	Sec

**Note:** dis = disable                      cont = continuous

## 4.2.8 Expansion Modules

08.01.IO (1-8) MODULE ( <i>Expansion modules-&gt;IO (1-8)</i> )		Min	Max	Default	Unit
001.Disable/enable select	Exp. I/O Module Selection	ENABL/DISBL		DISBL	

08.02.DIAL-UP( <i>Expansion modules-&gt;Dial-up</i> )		Min	Max	Default	Unit
001.Disable/enable select	Exp. Dial-up Module Selection	ENABL/DISBL		ENABL	
002.Call back selection	Call Back Selection	ENABL/DISBL		DISBL	

08.04.GPRS MODULE ( <i>Expansion modules-&gt;GPRS</i> )		Min	Max	Default	Unit
001.Disable/enable select	Expansion GPRS Module Selection	0-DISABLE 1-GPRS SERVER 2-GPRS CLIENT 3-SMS		1-GPRS SERVER	
002.Call back selection	Call Back Selection	ENABL/DISBL		DISBL	
003.Cell info refresh rate	Cell info refresh rate	0(dis)	999	15	Min
004.Location data	Location data	ENABL/DISBL		DISBL	
005.Location warning	Location warning	1(dis)	999	1(dis)	Km

08.05.GPRS WEB MODULE ( <i>Expansion modules-&gt;GPRS Web</i> )		Min	Max	Default	Unit
001.Disable/enable select	GPRS-Web Module Selection	ENABL/DISBL		ENABL	

## 4.2.9 Synchronization

09.01.GOVERNOR CONTROL ( <i>Synchronization-&gt;Governor control</i> )		Min	Max	Default	Unit
001.Frequency control	Frequency Control Selection: 0- Disable 1- Analogue 2- Digital (Up/Down)	0	2	1	
002.Manual frequency set	Manual Frequency Set	30.0	75.0	50.0	Hz
003.Minimum output value	Minimum Output Value	0.0	100.0	25.0	%
004.Maximum output value	Maximum Output Value	0.0	100.0	75.0	%
005.Initial value	Initial Output Value	0.0	100.0	50.0	%
006.Output direction	0- Positive 1- Negative	0	1	0	
007.Proportional	Proportional	0.00	99.99	5.58	
008.Integral	Integral	0.00	99.99	0.30	
009.Derivative	Derivative	0.00	99.99	0.01	
010.Frequency control start	Frequency Control Start Value	10.0	80.0	43.0	Hz
011.Frequency control delay	Frequency Control Start Delay	0	999	3	Sec
012.Frequency control ramp	Frequency Control Ramp Value	0.10	60.00	2.50	Hz/s
013.Frequency set value offset	Frequency Set Value Offset	0.00	0.50	0.12	Hz
014.Maximum output limit actions	Maximum Output Limit Actions: 0- Disable, 1- Warning, 2- Electrical Trip, 3- Shutdown.	0(dis)	3	0(dis)	
015.Max.output limit act.dely time	Max. Output Limit Act. Delay Time	0	99	2	Sec
017.Up/Down pulse period	Speed Up/Down Pulse Period	0.1	10.0	1.0	Sec
018.Up/Down pulse time	Speed Up/Down Pulse Time	0.01	5.00	0.50	Sec
019.Up/Down frequency deadband	Up/Down Frequency Deadband	0.02	9.99	0.08	Hz

**Note:** dis = disable

<b>09.02.AVR CONTROL (Synchronization-&gt;AVR control)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Voltage control</b>	Voltage Control Selection: 0- Disable 1- Analogue 2- Digital (Up/Down)	0	2	1	
<b>002.Manual voltage set</b>	Manual Voltage Set	60	440	400	V~
<b>003.Minimum output value</b>	Minimum Output Value	0.0	100.0	37.5	%
<b>004.Maximum output value</b>	Maximum Output Value	0.0	100.0	62.5	%
<b>005.Initial value</b>	Initial Output Value	0.0	100.0	50.0	%
<b>006.Output direction</b>	0- Positive 1- Negative	0	1	0	
<b>007.Proportional</b>	Proportional	0.00	99.99	3.24	
<b>008.Integral</b>	Integral	0.00	99.99	0.30	
<b>009.Derivative</b>	Derivative	0.00	99.99	0.01	
<b>010.Voltage control start</b>	Voltage Control Start Value	60	440	300	V~
<b>011.Voltage control delay</b>	Voltage Control Start Delay	0	999	5	
<b>012.Voltage control ramp</b>	Voltage Control Ramp Value	1.00	99.99	5.00	%/s
<b>013.Maximum output limit actions</b>	Maximum Output Limit Actions: 0- Disable, 1- Warning, 2- Electrical Trip, 3- Shutdown.	0(dis)	3	0(dis)	
<b>014.Max.output limit act.dely time</b>	Max. Output Limit Act. Delay Time	0	99	2	Sec
<b>016.Up/Down pulse period</b>	Voltage Up/Down Pulse Period	0.1	10.0	1.0	Sec
<b>017.Up/Down pulse time</b>	Voltage Up/Down Pulse Time	0.01	5.00	0.50	Sec
<b>018.Up/Down voltage deadband</b>	Up/Down Voltage Deadband	0.10	9.99	1.00	%

<b>09.03.PF CONTROL (Synchronization-&gt;PF control)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.PF control</b>	Power Factor Control	ENABL/DISBL		DISBL	
<b>002.Proportional</b>	Proportional	0.00	99.99	3.24	
<b>003.Integral</b>	Integral	0.00	99.99	0.30	
<b>004.Derivative</b>	Derivative	0.00	99.99	0.01	
<b>005.PF control ramp</b>	PF Control Ramp Value	0.01	99.99	3.00	%/s
<b>006.PF control set</b>	Power Factor Control Set Value	-1.00	1.00	1.00	

<b>09.05.LOAD SHARE CONTROL (Synchronization-&gt;Load share control)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Generator kW rating</b>	Generator kW Rating	1	9999	120	kW
<b>002.Generator kVAr rating</b>	Generator kVAr Rating	1	9999	90	kVAr
<b>007.Active power control ramp</b>	Active Power Control Ramp	0.10	99.99	3.00	%/s

<b>09.06.SYNCHRON CONTROL (Synchronization-&gt;Synchron control)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>002.Maximum voltage difference</b>	Maximum Voltage Difference	0	50	5	V~
<b>003.Positive frequency difference</b>	Positive Frequency Difference	0.02	0.49	0.20	Hz
<b>004.Negative frequency difference</b>	Negative Frequency Difference	-0.49	0.00	-.18	Hz
<b>005.Maximum positive phase angle</b>	Maximum Positive Phase Angle	0.0	60.0	2.0	°
<b>006.Maximum negative phase angle</b>	Maximum Negative Phase Angle	-60.0	0.0	-5.0	°
<b>007.Relay closing time</b>	Contacting Closing Time	40	300	60	msec
<b>008.Maximum synchronization time</b>	Maximum Synchronization Time	0	999	80	Sec
<b>009.Synchron dwell time</b>	Synchronization Dwell Time	0.0	25.0	0.0	Sec

**Note:** dis = disable

<b>09.08.LOAD SHEDDING CONTROL (Synchronization-&gt;Load shed.conf)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Number of outputs in control</b>	Number of outputs in control	0(dis)	5	0(dis)	
<b>002.Number of outputs at start</b>	Number of outputs at start	0	5	0	
<b>003.Trip level</b>	Trip level	0	100	80	%
<b>004.Return level</b>	Return level	0	100	40	%
<b>005.Trip Delay</b>	Trip Delay	0	3600	5	Sec
<b>006.Return delay</b>	Return delay	0	3600	5	Sec

<b>09.10.BREAKER&amp;LOAD CONT. (Synchronization-&gt;Breaker&amp;load cont)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Breaker transition mode</b>	Breaker Transition Mode Selection: 0- Break 1- No break 2- Soft 3- Parallel	0	3	0	
<b>002.No break transition time</b>	No break transition time	0.0	25.0	0.5	Sec
<b>003.Load control mode</b>	Load Control Mode Selection: 0- Import Power 1- Export Power 2- Constant Power	0	2	0	
<b>004.Load control set</b>	Load Control Set	1	9999	100	kW
<b>005.Load control hysteresis</b>	Load Control Hysteresis	0	9999	20	kW
<b>006.Import power start delay</b>	Import Power Start Delay	0	999	5	Sec
<b>007.Import power stop delay</b>	Import Power Stop Delay	0	999	5	Sec
<b>012.Soft transition high limit</b>	Soft Transition High Limit	0	100	90	%
<b>013.Soft transition low limit</b>	Soft Transition Low Limit	0	100	10	%
<b>014.Soft transition timeout</b>	Soft Transition Timeout	0	999	30	Sec

<b>09.11.MAINS DECOUPLING (Synchronization-&gt;Mains decoupling)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Vector shift set</b>	Vector Shift Set Value	0(dis)	30	8	°
<b>002.Rocof (df/dt) set</b>	Rocof (df/dt) Set Value	0.4(dis)	9.9	5.0	Hz/s
<b>003.Rocof (df/dt) delay</b>	Rocof (df/dt) Delay	0.0	9.9	0.8	Sec
<b>004.Mains decoupling actions</b>	Mains Decoupling Actions: 0- Warning 1- Electrical Trip 2- Auxiliary Mains Failure	0	2	1	
<b>005.Mains decoupling control delay</b>	Mains Decoupling Control Delay	0.0	999.9	1.0	Sec

**Note:** dis = disable

## 4.2.10 Logic Controller

<b>10.01.CONF. AUXILIARY FLAGS (Logic controller-&gt;Conf. auxiliary flags)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Auxiliary flag-1:</b>	Auxiliary Flag-1 Configuration	<i>Logic Controller</i>		0	
<b>002.Auxiliary flag-2:</b>	Auxiliary Flag-2 Configuration	<i>Logic Controller</i>		0	
<b>003.Auxiliary flag-3:</b>	Auxiliary Flag-3 Configuration	<i>Logic Controller</i>		0	
<b>004.Auxiliary flag-4:</b>	Auxiliary Flag-4 Configuration	<i>Logic Controller</i>		0	
<b>005.Auxiliary flag-5:</b>	Auxiliary Flag-5 Configuration	<i>Logic Controller</i>		0	
<b>006.Auxiliary flag-6:</b>	Auxiliary Flag-6 Configuration	<i>Logic Controller</i>		0	
<b>007.Auxiliary flag-7:</b>	Auxiliary Flag-7 Configuration	<i>Logic Controller</i>		0	
<b>008.Auxiliary flag-8:</b>	Auxiliary Flag-8 Configuration	<i>Logic Controller</i>		0	
<b>009.Auxiliary flag-9:</b>	Auxiliary Flag-9 Configuration	<i>Logic Controller</i>		0	
<b>010.Auxiliary flag-10:</b>	Auxiliary Flag-10 Configuration	<i>Logic Controller</i>		0	
<b>011.Auxiliary flag-11:</b>	Auxiliary Flag-11 Configuration	<i>Logic Controller</i>		0	
<b>012.Auxiliary flag-12:</b>	Auxiliary Flag-12 Configuration	<i>Logic Controller</i>		0	
<b>013.Auxiliary flag-13:</b>	Auxiliary Flag-13 Configuration	<i>Logic Controller</i>		0	
<b>014.Auxiliary flag-14:</b>	Auxiliary Flag-14 Configuration	<i>Logic Controller</i>		0	
<b>015.Auxiliary flag-15:</b>	Auxiliary Flag-15 Configuration	<i>Logic Controller</i>		0	
<b>016.Auxiliary flag-16:</b>	Auxiliary Flag-16 Configuration	<i>Logic Controller</i>		0	

<b>10.02.CONFIGURE OUTPUTS (Logic controller-&gt;Configure outputs)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Configurable output-1:</b>	Configurable Output-1 Configuration	<i>Logic Controller</i>		0	
<b>002.Configurable output-2:</b>	Configurable Output-2 Configuration	<i>Logic Controller</i>		0	
<b>003.Configurable output-3:</b>	Configurable Output-3 Configuration	<i>Logic Controller</i>		0	
<b>004.Configurable output-4:</b>	Configurable Output-4 Configuration	<i>Logic Controller</i>		0	
<b>005.Configurable output-5:</b>	Configurable Output-5 Configuration	<i>Logic Controller</i>		0	
<b>006.Configurable output-6:</b>	Configurable Output-6 Configuration	<i>Logic Controller</i>		0	
<b>007.Configurable output-7:</b>	Configurable Output-7 Configuration	<i>Logic Controller</i>		0	
<b>008.Configurable output-8:</b>	Configurable Output-8 Configuration	<i>Logic Controller</i>		0	
<b>009.Configurable output-9:</b>	Configurable Output-9 Configuration	<i>Logic Controller</i>		0	

<b>10.03.CONFIG. EXP. OUTPUTS (Logic controller-&gt;Config. exp. outputs)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Config. expansion output-1:</b>	Config. Exp. Output-1 Configuration	<i>Logic Controller</i>		0	
<b>002.Config. expansion output-2:</b>	Config. Exp. Output-2 Configuration	<i>Logic Controller</i>		0	
<b>003.Config. expansion output-3:</b>	Config. Exp. Output-3 Configuration	<i>Logic Controller</i>		0	
<b>004.Config. expansion output-4:</b>	Config. Exp. Output-4 Configuration	<i>Logic Controller</i>		0	
<b>005.Config. expansion output-5:</b>	Config. Exp. Output-5 Configuration	<i>Logic Controller</i>		0	
<b>006.Config. expansion output-6:</b>	Config. Exp. Output-6 Configuration	<i>Logic Controller</i>		0	
<b>007.Config. expansion output-7:</b>	Config. Exp. Output-7 Configuration	<i>Logic Controller</i>		0	
<b>008.Config. expansion output-8:</b>	Config. Exp. Output-8 Configuration	<i>Logic Controller</i>		0	

<b>10.04.CONF. LOGIC FUNCTIONS (Logic controller-&gt;Conf. logic functions)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
<b>001.Start request in auto:</b>	Start Request In Auto Configuration	<i>Logic Controller</i>		0	
<b>002.Stop request in auto:</b>	Stop Request In Auto Configuration	<i>Logic Controller</i>		0	
<b>004.Changed mode to auto:</b>	Changed Mode To Auto Configuration	<i>Logic Controller</i>		0	
<b>005.Changed mode to test:</b>	Changed Mode To Test Configuration	<i>Logic Controller</i>		0	
<b>006.Changed mode to manual:</b>	Changed Mode To Man Configuration	<i>Logic Controller</i>		0	
<b>007.Changed mode to stop:</b>	Changed Mode To Stop Configuration	<i>Logic Controller</i>		0	
<b>008.Informed mains interruption:</b>	Informed Mains Interrupt Configuration	<i>Logic Controller</i>		0	

<b>10.05.CONFIGURE TIMERS (Logic controller-&gt;Configure timers)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Timer-1 hour	Timer-1 Hour	0	23	8	Hour
002.Timer-1 minute	Timer-1 Minute	0	59	0	Min
003.Timer-1 second	Timer-1 Second	0	59	0	Sec
004.Timer-2 hour	Timer-2 Hour	0	23	17	Hour
005.Timer-2 minute	Timer-2 Minute	0	59	0	Min
006.Timer-2 second	Timer-2 Second	0	59	0	Sec
007.Active day	Active Day	1	31	1	
008.Active hour	Active Hour	0	23	12	Hour
009.Active minute	Active Minute	0	59	0	Min
010.Active second	Active Second	0	59	0	Sec
011.Monday disable/enable	Monday Disable/Enable	ENABL/DISBL		ENABL	
012.Tuesday disable/enable	Tuesday Disable/Enable	ENABL/DISBL		ENABL	
013.Wednesday disable/enable	Wednesday Disable/Enable	ENABL/DISBL		ENABL	
014.Thursday disable/enable	Thursday Disable/Enable	ENABL/DISBL		ENABL	
015.Friday disable/enable	Friday Disable/Enable	ENABL/DISBL		ENABL	
016.Saturday disable/enable	Saturday Disable/Enable	ENABL/DISBL		DISBL	
017.Sunday disable/enable	Sunday Disable/Enable	ENABL/DISBL		DISBL	

<b>10.06.LOGIC CONTROLLER GENERAL (Logic controller-&gt;General)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Register set-1	Register Set-1 Value	-9999	9999	100	
002.Register set-2	Register Set-2 Value	-9999	9999	100	
003.Register set-3	Register Set-3 Value	-9999	9999	100	
004.Register set-4	Register Set-4 Value	-9999	9999	100	
005.Register set-5	Register Set-5 Value	-9999	9999	100	
006.Register set-6	Register Set-6 Value	-9999	9999	100	
007.Register set-7	Register Set-7 Value	-9999	9999	100	
008.Register set-8	Register Set-8 Value	-9999	9999	100	

## 4.2.11 User Adjustment

<b>11.04.BATTERY&amp;CHRG GEN.VOL (User adjustment-&gt;Battery&amp;chrg gen.vol)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Battery volt offset	Battery Voltage Offset	-5.0	5.0	0	V <sub>---</sub>
002.Generator charge volt offset	Charge Generator Voltage Offset	-5.0	5.0	0	V <sub>---</sub>

<b>11.05.SENDER INPUTS OFFSET (User adjustment-&gt;Sender inputs offset)</b>		<b>Min</b>	<b>Max</b>	<b>Default</b>	<b>Unit</b>
001.Oil Pressure offset	Oil Pressure Offset	-2.0	2.0	0.0	BAR
002.Temperature offset	Coolant Temperature Offset	-20	20	0	°C
003.Conf. AI1 offset	Configurable Analog Input-1 Offset	-200	200	0	%
004.Conf. AI2 offset	Configurable Analog Input-2 Offset	-20	20	0	°C



## 5. Specifications

<b>Equipment use</b>	: Electrical control equipment for generating sets.
<b>Housing &amp; Mounting</b>	: 276 mm x 189 mm x 45 mm. (including connectors). Plastic housing for panel mounting.
<b>Panel Cut-Out</b>	: 223mm x 162mm.
<b>Protection</b>	: IP65 at front panel.
<b>Weight</b>	: Approximately 0,82 Kg.
<b>Environmental rating</b>	: Standard, indoor at an altitude of less then 2000 meters with non-condensing humidity.
<b>Operating/Storage Temperature</b>	: -20°C to +70°C / -30°C to +80°C
<b>Operating/Storage Humidity</b>	: 95 % max. (non-condensing)
<b>Installation Over Volt. Category</b>	: II Appliances, portable equipment
<b>Pollution Degree</b>	: II, Normal office or workplace, non conductive pollution
<b>Mode of Operation</b>	: Continuous.
<b>DC Battery Supply Voltage</b>	: 8 to 32 V <sub>DC</sub> (Peak: 36 V <sub>DC</sub> ). Max. operating current is 860 mA.
<b>Cranking Dropouts</b>	: Battery voltage can be "0" VDC for max. 50 ms during cranking (battery voltage should be at least nominal voltage before cranking).
<b>Battery Voltage Measurement</b>	: 8 to 32 V <sub>DC</sub> , Accuracy: 1 % FS, Resolution: 0,1 V
<b>Mains Voltage Measurement</b>	: 5 to 300 VAC Ph-N, 5 to 99.9 Hz. Accuracy: 1 % FS, Resolution: 1 V.
<b>Mains Frequency</b>	: 5 to 99.9Hz (min. 20 VAC Ph-N) Accuracy: 0,25 % FS, Resolution: 0,1 Hz.
<b>Generator Voltage Measurement</b>	: 5 to 300 VAC Ph-N, 5 to 99.9 Hz. Accuracy: 1 % FS, Resolution: 1 V.
<b>Generator Frequency</b>	: 5 to 99.9Hz (min. 20 VAC Ph-N) Accuracy: 0,25 % FS, Resolution: 0,1 Hz.
<b>Magnetic Pickup Input</b>	: 35 to 10000 Hz (1 to 35 volts peak continuously). Accuracy: 0,25 % FS.
<b>CT secondary</b>	: 5A.
<b>Governor Output</b>	: +/-10V <sub>DC</sub> , Accuracy: 0.1%, Resolution: 12bit, Isolation:1000V <sub>DC</sub>
<b>AVR Output</b>	: +/-10V <sub>DC</sub> , Accuracy: 0.1%, Resolution: 12bit, Isolation:1000V <sub>DC</sub>
<b>Charge Generator Excitation</b>	: 210mA @12V, 105mA @24V. Nominal 2.5W.
<b>Charge Gen. Vol. Measurement</b>	: 8 to 32 V <sub>DC</sub> , Accuracy: 1 % FS, Resolution: 0,1 V.
<b>Sender Measurement</b>	: 0 to 1300 ohm, Accuracy: 1 % FS, Resolution: 1 ohm.
<b>Cabin Temp. Measurement</b>	: -50 to +100 °C, Accuracy: 1 % FS, Resolution: 1 °C.
<b>Communication interface</b>	: USB programming and communication port, CanBus communication with 1939 ECU, Ethernet, RS485.
<b>Optional Expansion I/O Module</b>	: Expansion I/O module including 8 inputs and 8 outputs.
<b>Optional Comm. Modules</b>	: GSM/GPRS and Web Server modules.
<b>Relay Outputs</b>	: Generator contactor output 8A at DC supply voltage Mains contactor output 8A at DC supply voltage
<b>Transistor Outputs</b>	: Fuel or Configurable output-1 15A at DC supply voltage Crank or Configurable output-2 15A at DC supply voltage Configurable output-3,4,5,6,7,8,9 1A at DC supply voltage
<b>Approvals</b>	: <b>EMC</b> , <b>CE</b>

## 6. Other Informations

### **Manufacturer Information:**

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