Written in Feb, 2010

User' s manual for Generator Control Unit

GCU®(GENERATOR CONTROL UNIT)

MODEL : DG4

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ENGINE GENERATOR CONTROL ENTERPRISE

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Cautions for your safety

1. Please be well informed of user's manual and drawings of the product in order to operate safely
2. Please follow all safety instructions to prevent potential accidents and dangers
3. There are two types of cautions; "Warning" and "Caution", where each meaning are as follow:

⚠ Warning	Potential injury or death may arise in case of violation of safety instructions
⚠ Caution	Potential injury or product damage may arise in case of violation of safety instructions

4. Meanings of picture signals appear in the manuals are as follow:

⚠	Please be careful as it may cause product damage
⚠	Please be careful as it may cause electrocution

5. Please keep this manual close to the product

⚠ Warning

1. Please do not perform wiring work when power is on or in operation as it may cause electrocution.
2. Please do not disassemble the product even when power is off, as the charging current inside the product may still cause electrocution.
3. Please do not touch with wet hands as it may cause electrocution.
4. Please do not touch when sheath of electric wire is damaged as it may cause electrocution.
5. Please do grounding of electric wire to prevent electrocution.

⚠ Caution

1. Please permit a correct power supply to prevent product damage and fire
2. Please be sure no foreign substances enter into the product as they may cause short circuit or fire.
3. Please connect wire with correct load to input and output sockets to prevent product damage and fire.
4. Please connect wire as instructed to prevent product damage and fire.
5. Only technicians or properly trained personnel may use this product as irrational use of this product may cause injuries or damages to the product and devices connected to the product.
6. As this product comprises of electrical components, please separate the product before performing the test which requires high voltage such as inner voltage test or insulation resistance test.
7. Please use fuse and electric wire with correct capacity to prevent fire.
8. Please hold this product firmly as it is used for engine generator with high vibration.
9. Please make sure there are no untangled parts before installation.

1. Outline

GCU-DG4 is a diesel engine generator controller with digital instrumentation function and digital protective relay.

2. Product Features

2.1. Increased visibility with larger display
2.2. Easy to use with simplified and condensed setting
2.3. Digital protective relay function (OVR, OCR, UVR)
2.4. RPM, OPG, WTG, DCV, ETM gauges and OTG for Korean use
2.5. Ability to use commercial power or non-electrical interface with automatic operating signal
2.6. Over speed, over current test switch
2.7. Engine warm-up plug for small engine
2.8. Warning alert sound.
2.9. Stop Solenoid anti burn out design
2.10. High-capacity relay interface for start, stop (15A), ACB input, and block (15A)

3. Specification and Functions

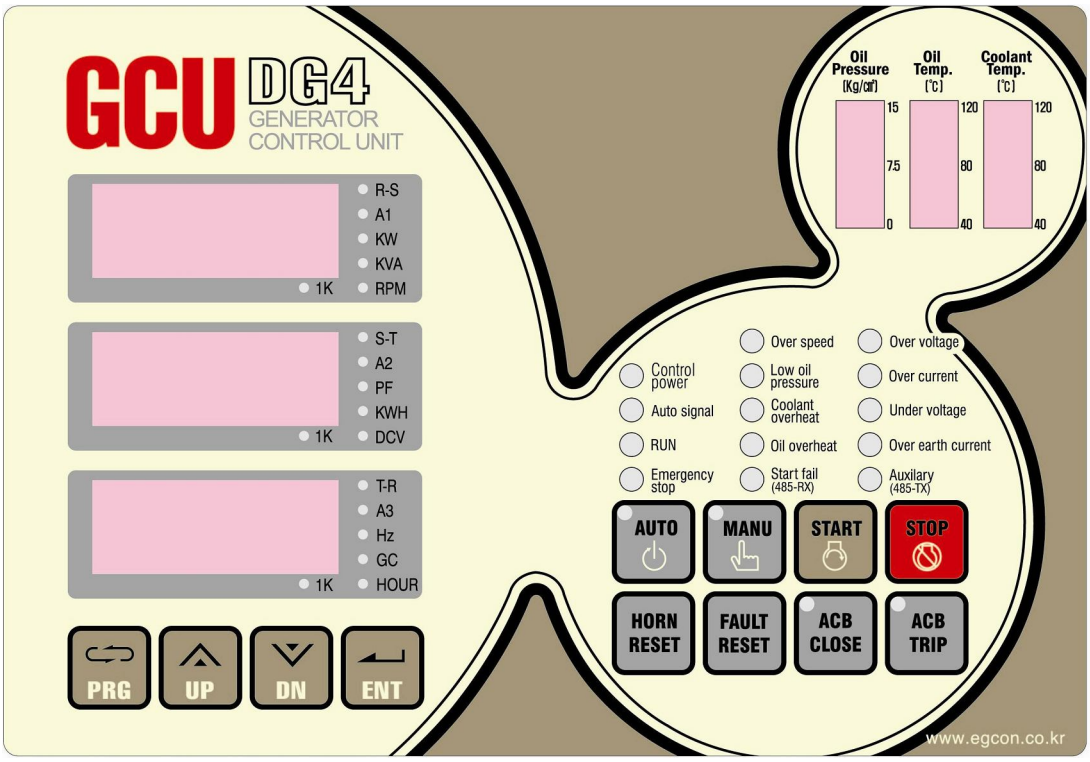
3.1. Control power supply: 8 ~ 35Vdc, Power consumption: Below 5W on idle, 360W maximum
3.2. Speed sensor: MPU detection 0 ~ 7,000 Hz , 3 ~ 20 Vac
3.3. Commercial power detection: Max. 500Vac, 3 sides 4 lines and platform
3.4. Automatic operation signal: Selection between non-electrical interface and commercial power
3.5. Generated power instrumentation, range and accuracy: 3 sides 4 lines

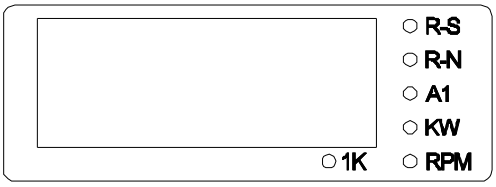
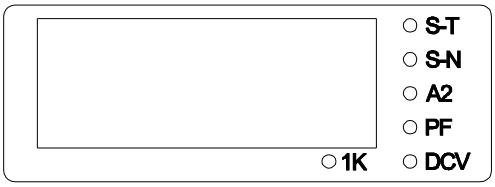
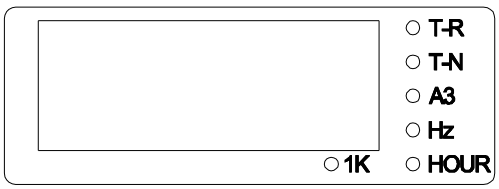
Order	Instrumented Item	Range	Accuracy
1	L-L (Line Voltage)	30 ~ 500Vac	± 1%
2	L-N (Phase Voltage)	10 ~ 300Vac	± 1%
3	A (Line Current)	0 ~ 6.5A	± 1%
4	Hz (Frequency)	45 ~ 65Hz	± 1%
5	PF (Power Factor)	-0.3 ~ +0.3	± 1%
6	kW(Active Electricity Power)	0 ~ 999999kW	± 1%

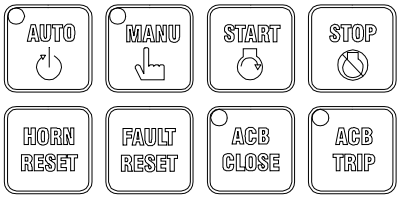
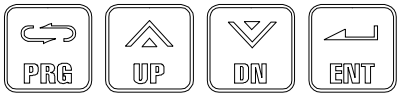
4. Conditions of Use

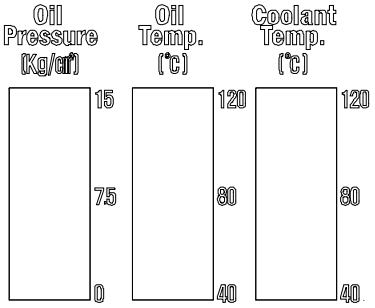
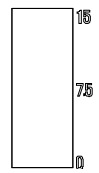
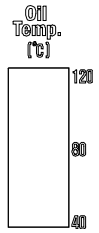
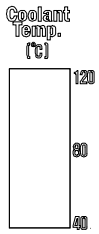
4.1. Operating temperature: -10° ~ 40°C
4.2. Storage temperature: -24° ~ 45°C
4.3. Relative humidity: 0% ~ 90% non-congelation
4.4. Vibration: amplitude-0.35mm, frequency-0~30Hz
4.5. Maximum operating altitude: 3,000m
4.6. Maximum storage altitude: 4,500m
4.7. Install product indoor with no dust and salt

5. Functions of Control Switches



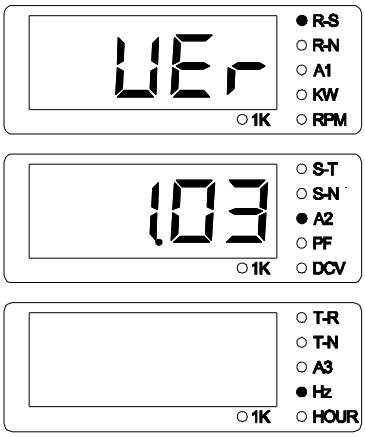
(1) Meter Order	
	R-S : Shows R-S line voltage when light is on R-S : Shows R-N phase voltage when light is on A1 : Shows R phase current when light is on kW : Shows active electricity power when light is on RPM : Shows the speed of generator when light is on 1K : Light turns on when phase R current is measured above 1000A
	S-T : Shows S-T line voltage when light is on S-N : Shows S-N phase voltage when light is on A2 : Shows S phase current when light is on pF : Shows power factor when light is on DCV : Shows the voltage of battery when light is on 1K : Light turns on when S phase current is measured above 1000A
	T-R : Shows T-R line voltage when light is on T-N : Shows T-N phase voltage when light is on A3 : Shows T phase current when light is on Hz : Shows the frequency of generator when light is on HOUR : Shows operating hour of generator when light is on 1K : Light turns on when T phase current is measured above 1000A

(2) Operation Switches		(3) Setup Switches	
			
AUTO	Sets to automatic operating mode (When the button is pushed the light turns on and sets to automatic mode)	PRG	Stop mode and manual mode. You can change settings when generator is stopped.
MANU	Sets to manual operating mode (When the button is pushed the light turns on and sets to manual mode)	UP	Increase setting value. Check values on measurement screen when in operation
START	Generator starter switch upon manual mode	DN	Decrease setting value. Check values on measurement screen when in operation
STOP	Generator stop switch upon manual mode	ENT	Save and quit
HORN RESET	Buzzer stop switch when breakdown detected. Function of LAMP TEST upon OFF mode		
FAULT RESET	Breakdown reset button		
ACB CLOSE	Input of circuit breaker when on manual mode. Flicker is on during waiting time for the input on automatic mode		
ACB TRIP	Block circuit breaker when on manual mode. Flicker is on during waiting time for the block on automatic mode		

(4) Engine Gauge		(5) Lamp		
		Control power Auto signal RUN Emergency stop Over speed Low oil pressure Coolant overheat Oil overheat Start fail (485-RX) Over voltage Over current Under voltage Over earth current Auxilary (485-TX)		
	Oil Pressure Gauge (OPG) range of 0 ~ 15kg/㎠	Control power Auto signal RUN Emergency stop	Control Power : Automatic Signal : Operation : Emergency Stop :	Light Turns on upon DC power input Light turns on when commercial power is normal. Flicker is on during waiting time for starting and cooling-off period. Light turns on when generator is operating Light turns on upon input of emergency stop
	Oil Temperature Gauge (OTG) range of 40~120℃	Over speed Low oil pressure Coolant overheat Oil overheat Start fail (485-RX)	Over Speed : Low Oil Pressure : High temperature of Coolant : Excessive Temperature of Lubricant : Start Failure :	Light turns on upon excessive speed. Flicker is on during the detection of excessive speed breakdown. Light turns on upon low oil pressure. Flicker is on during the detection of low oil pressure. Light turns on upon high temperature of coolant. Flicker is on during the detection of excessive temperature of coolant. Light turns on upon excessive temperature of lubricant. Flicker is on during the detection of excessive temperature of lubricant. Light turns on when excessive voltage relay is in operation. Flicker is on during the detection of excessive current.
	Coolant(Water) Temperature Gauge (WTG) range of 40 ~ 120℃	Over voltage Over current Under voltage Over earth current Auxilary (485-TX)	Over voltage : Over current : Low Voltage : Grounding : Preparation :	Light turns on when excessive voltage relay is in operation. Flicker is on during the detection of excessive voltage. Light turns on when excessive current relay is in operation. Flicker is on during the detection of excessive current. Light turns on when low current relay is in operation. Flicker is on during the detection of low voltage. Light turns on upon grounding relay is in operation. Light turns on upon input of reserve breakdown detection.

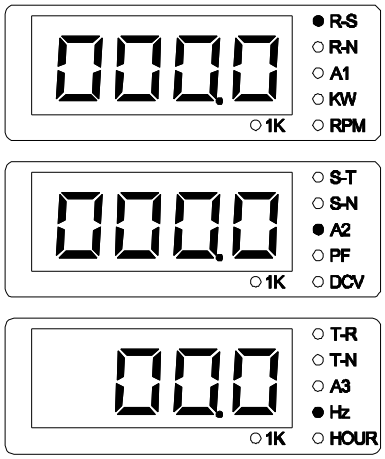
6. Meter Display

(0)



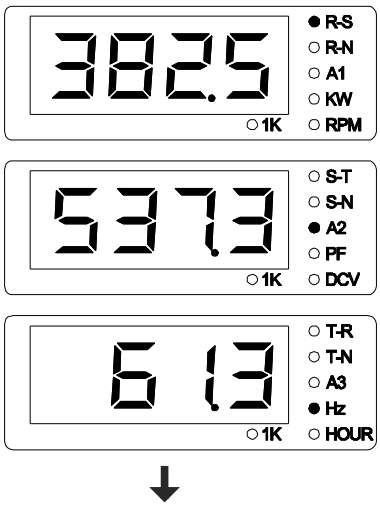
1. Version Display
2. Display is on for 5 sec with buzzer sound upon input of power(BP+, BP-), then goes to the initial display.

(1)



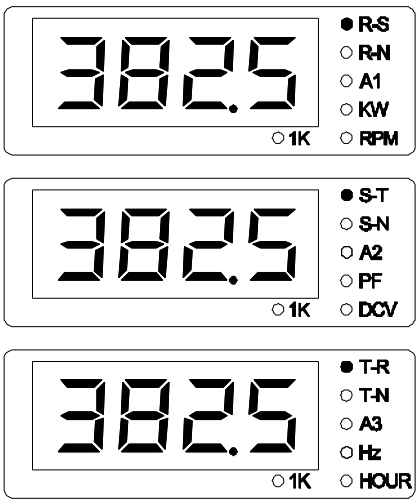
1. Initial display

(2)



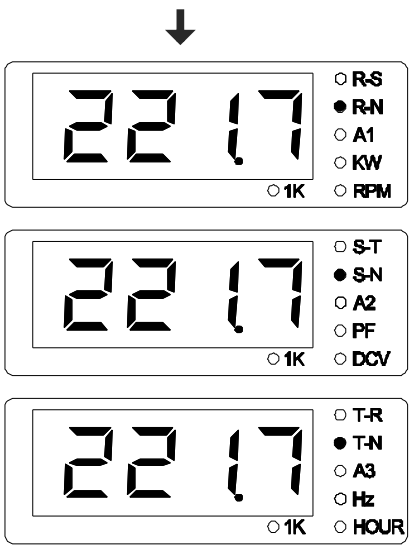
1. Displays R-S phase voltage. S phase current and frequency of generator.
2. Pressing <UP> button takes display to display (7) and pressing <DOWN> takes to next display.
3. Pressing <DOWN> button takes to next display.

(3)



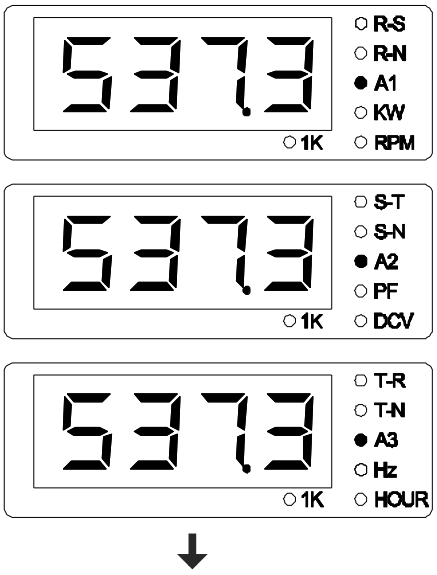
1. Displays line voltage of generator.

(4)



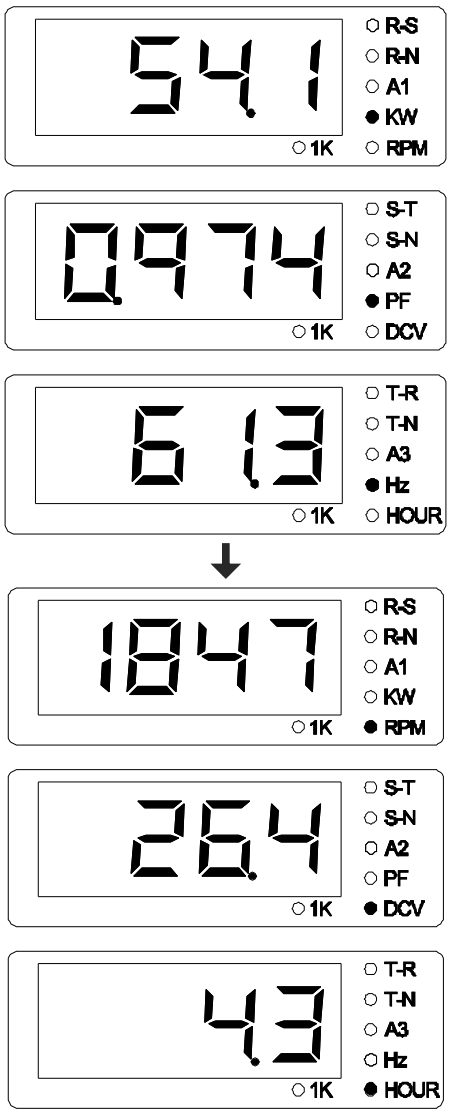
1. Displays phase voltage of generator.

(5)



1. Displays current of generator.

(6)



1. Displays current of generator.

(7)

1. Displays speed of revolution, operation hours of the generator and battery's voltage.
2. Every number in First decimal place of the operation hours indicates 6 min.
3. Pressing <UP> button takes to the prior display.
4. Pressing <DOWN> button takes to display (3).

7. Structure

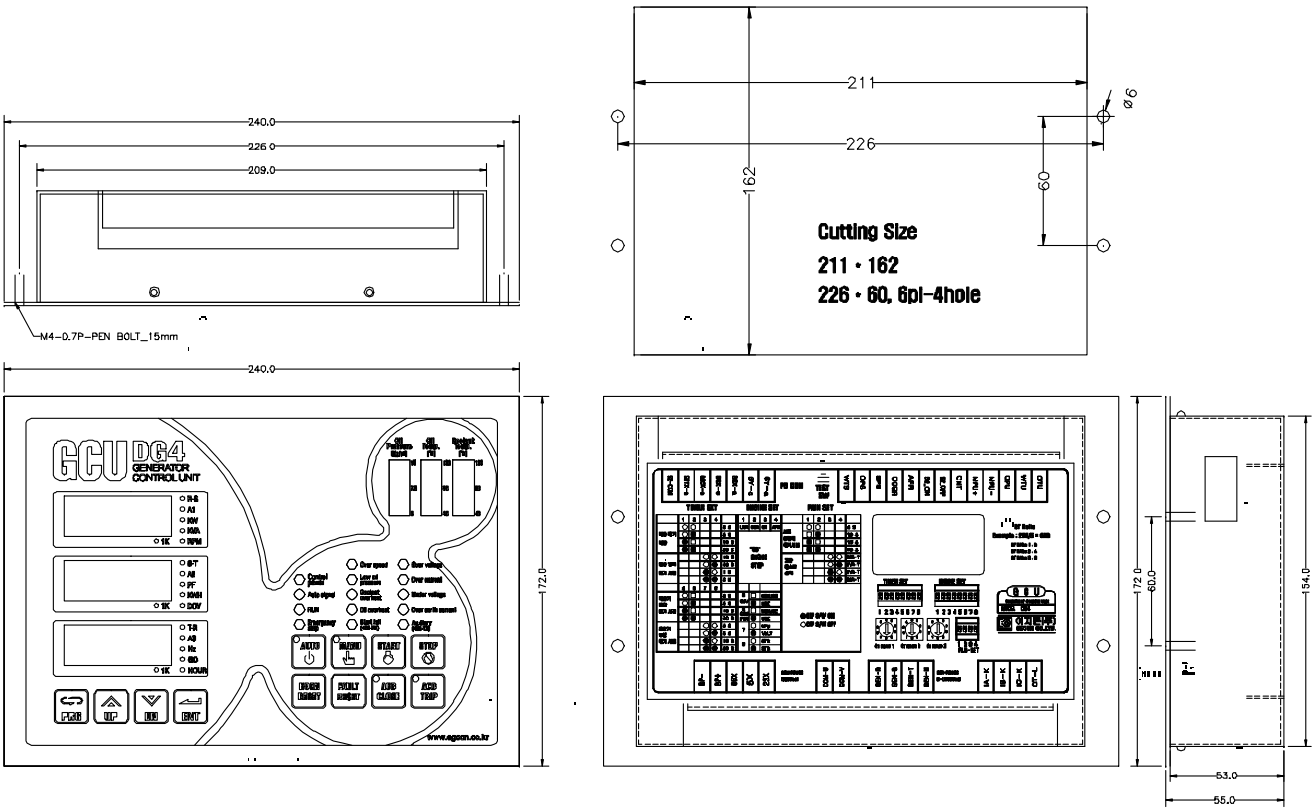
7.1. Dimension : W240 * H172 * D58 (mm).

7.2. Cut-out : W211 * H162(mm)

7.3. Mounting Holes : W226 * H60(mm), 6pi -4H

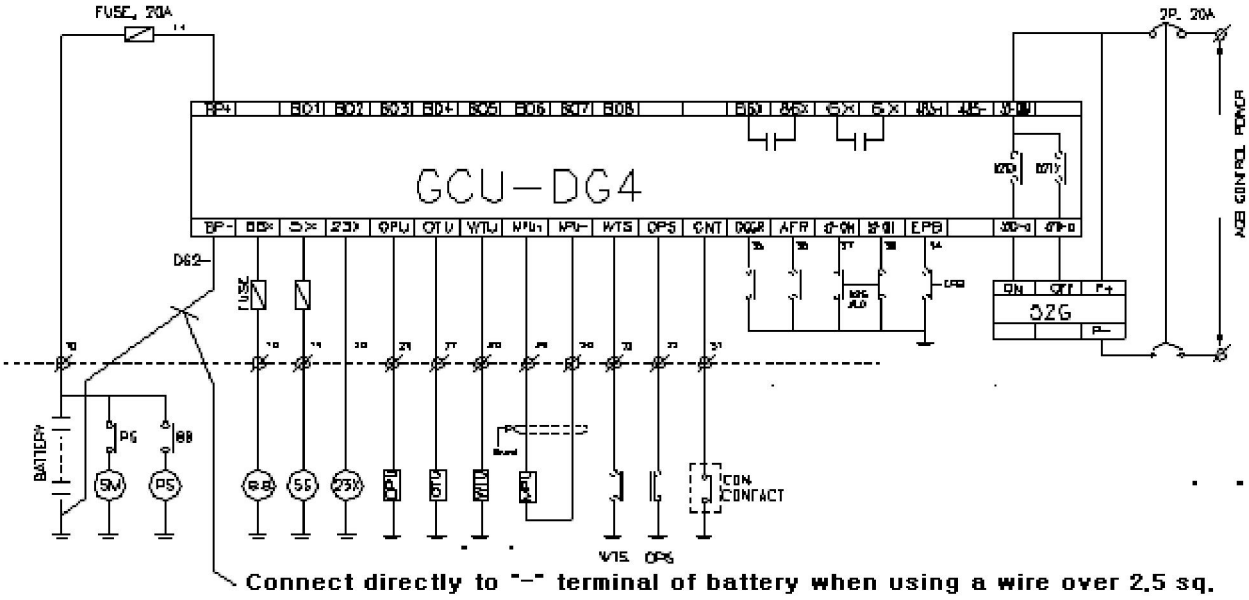
7.4. Weight : About 1.2kg (including case)

7.5. Outward drawing



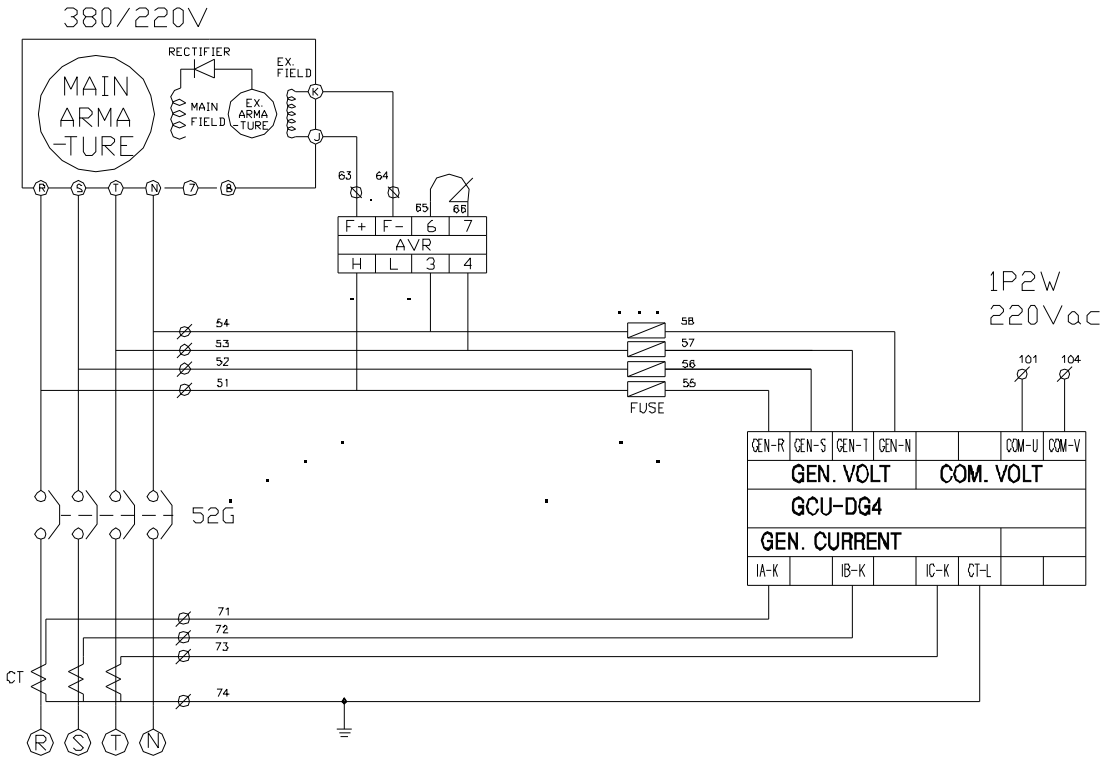
8. Preparation before use

8.1 Connect circuits into input/output sockets of GCU-DG4 referring to circuit diagram 1 and 2.



[회로도 1]

⚠ Warning	● Voltage of power supply and current has to be identical to avoid voltage indication error. ● CNT socket need not be connected when directly inputting commercial power for detection of power outage signal.



[Circuit Diagram 2]

8.2 Please adjust settings of GCU-DG4 to fit the generator

⚠ Caution	If settings are adjusted differently from the generator problems will arise during the operation. Especially with wrong [8 GEAR] setting, human accident may arise due to the failure to detect excessive speed. Please be sure to inquire the manufacturer of the engine the number of ring gear.

▶ Settings

[1. ENGINE SET Switch] --> [5. OTU] : Whether to use oil temperature gauge

[6. COM PWR] : Whether to directly connect commercial power

[7. Method of detecting generator speed] : VOLT, MPU

- VOLT : Detect generator speed from voltage of generator
- MPU : Detect generator speed using Magnet Pick Up sensor

[8. Engine operation method] : ETS, ETR

[2. CT RATIO] : CT setting

CT Ratio 1, CT Ratio 2, CT Ratio 3 usage setting

When using CT 1000/5 : CT Ratio 1 - 2, CT Ratio 2 - 0, CT Ratio 3 - 0 setting

Set values by Dividing CT 1000 by 5

When CT setting is different it displays different current value and voltage value

[3. OPT, WTG gauge setting] --> set according to the settings menu

9. Regulator

9.1. TEST SW : Breakdown test button set to breakdown test selection

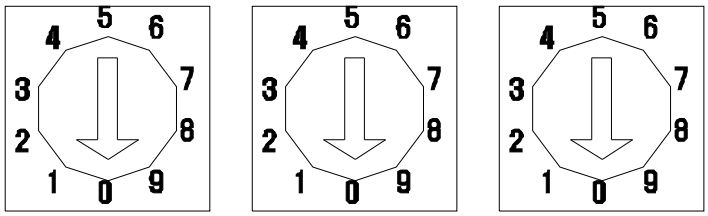
When this button is pressed it becomes the selected breakdown test regardless the actual breakdown

9.2. TIMER DIP S/W

DIP S/W number	1	2	3	4	
Waiting time for starting	○	○			3 Sec
	○	●			5 Sec
	●	○			10 Sec
	●	●			30 Sec
Waiting time for engine cool down			○	○	10 Sec
			○	●	30 Sec
			●	○	1 Min
			●	●	3 Min
DIP S/W number	5	6	7	8	
Waiting time for block circuit breaker	○	○			3 Sec
	○	●			5 Sec
	●	○			10 Sec
	●	●			30 Sec
Waiting time for input of circuit breaker			○	○	3 Sec
			○	●	5 Sec
			●	○	10 Sec
			●	●	30 Sec

○ : DIP S/W OFF, ● : DIP S/W ON

9.3. CT Settings



CT RAtio 1 CT RAtio 2 CT RAtio 3

● When using 1000/5 :

Set CT Ratio 1 - 2, CT Ratio 2 - 0, CT Ratio 3 - 0 by dividing 1000 by 5.

● When using 300/5 CT :

Set CT Ratio 1 - 0, CT Ratio 2 - 6, CT Ratio 3 - 0 by dividing 300 by 5.

9.4. ENGINE SET DIP S/W

DIP S/W Order	Function	Description	
1	UVR (Low Voltage Relay)	●	Generator Stop
		○	Generator in operation
2	OCR (Over Current Relay)	●	Generator Stop
		○	Generator in operation
3	GR (Grounding Relay)	●	Generator Stop
		○	Generator in operation
4	AFR (Reserve Breakdown Input)	●	Generator Stop
		○	Generator in Operation
5	OTU (Lubricant temperature gauge)	●	Use oil temperature gauge
		○	Do not use oil temperature gauge
6	COM PWR (Commercial Power)	●	Use commercial power outage detection
		○	Use commercial power outage detection
7	VOLT	●	Detect generator RPM with voltage
	MPU	○	Detect generator RPM with MPU
8	ETS	●	ETS : Supply power to solenoid upon stop
	ETR	○	ETR : Supply power to solenoid during operation

○ : DIP S/W OFF, ● : DIP S/W ON

9.5. RUN SET

DIP S/W Order	1	2	3	4	
Waiting time for start stabilization	○	○			5 Sec
	○	●			10 Sec
	●	○			15 Sec
	●	●			20 Sec
Breakdown Test Selection			○	○	OSS-T(Over Speed)
			○	●	OVR-T(Over Voltage)
			●	○	UVR-T(Under Voltage)
			●	●	OCR-T(Over Current)

10. Connection Terminals and Capacity

Terminals Name	Description	Rated Capacity
BP+, BP-	Input of control power	DC 8~35V , 15A
88x	Start output	BP+ voltage output, Max 15A
5x	Stop output	BP+ voltage output, Max 15A
23x	Preheating output	BP+ voltage output, Max 15A
COM-U, COM-V	Input of commercial power	1/2W, 220Vac
GEN-R,S,T,N	Input of generator power	3P4W, 380/220Vac
IA-K, CT-L	Input of L, K of R in generator CT	5Aac
IB-K, CT-L	Input of L, K of S in generator CT	5Aac
IC-K, CT-L	Input of L, K of T in generator CT	5Aac
52-COM, 52TX-a	ACB blocking interface	Dry contact , AC250V, 15A (2sec)
52-COM, 52CX-a	ACB blocking interface	Dry contact, AC250V, 15A (2sec)
86X-c, 86X-a	Breakdown display interface	Dry contact , AC250V, 10A
6X-c, 6X-a	Engine operation display interface	Dry contact , AC250V, 10A
WTS	Input of high temperature switch	NORMAL OPEN , connect DC-
OPS	Input of oil pressure switch	NORMAL CLOSE, connect DC-
EPB	Input of emergency stop switch	NORMAL OPEN , connect DC-
OCGR	Input of over voltage relay	NORMAL OPEN , connect DC-
AFR	Input of potential breakdown	NORMAL OPEN , connect DC-
52-ON, 52-OFF	Input of ACB block signal	Connect DC-
CNT	Automatic operation interface	Operate when connecting DC- in AUTO mode
MPU+, MPU-	Input of magnetic pickup(MPU)	Shiel cable must be grounded
OPU	Input of oil pressure sensor	Use VDO oil pressure sensor
WTU	Input of coolant temperature	VDO and Dongnam Corporation, please refer to the standard
OTU	Input of oil temperature sensor	VDO and Dongnam Corporation, please refer to the standard

11. Signals and Marks

- GCU : GENERATOR CONTROL UNIT
- ETS : Supplying power to solenoid when stopped
- ETR : Supplying power to solenoid when in operation
- 86X : Breakdown indicating relay
- 6X : Operation indicating relay
- 23X : Preheating relay
- 52G : ACB
- SM : Starting motor
- PS : Pinion solenoid
- 88 : Start assistant magnet
- IDLE SPEED : Lowest speed of engine without the assistance of engine starting motor
- MPU : MAGNETIC PICKUP
- RPM : Rotating speed indicator
- 5S : Stop solenoid
- 88X : Start output relay
- EPB : Emergency stop button
- OPU : Oil pressure sensor
- OTU : Oil temperature sensor
- WTU : Coolant temperature sensor
- OPS : Oil pressure switch
- WTS : Coolant temperature switch

12. Manual Operation

12.1. Set to manual mode by using manual selection button.

12.2. Press start button to start engine

(1) Check engine stop method if only starting motor operates and engine does not start.

(2) When engine starts it displays RPM and oil pressure measurement in OPG

(3) If actual engine speed differs from RPM please stop the engine and correctly input value in environment setting menu <8. GEAr>. (The number of ring gear depends on the manufacturer of engine)

(4) Starter motor circuit is blocked above IDLE SPEED

(5) When starting engine the starter motor rotates for the duration set in <12. crH> even with no IDLE SPEED signal input.

(6) If engine operates normally and IDLE SPEED signal is entered RUN lamp will be lit and 6X will be in operation

(7) If oil pressure detected during IDLE SPEED and waiting time for start stabilization is below the oil pressure entered in environment setting menu <2. oPU>, engine will stop and detect low oil pressure breakdown.

(8) If there is no IDLE SPEED signal and oil pressure switch is working, the starter motor output will be blocked and engine will operate normally.

12.3. Engine stop

(1) Engine will stop upon pressing stop button

(2) Engine will stop when pressed EPB or engine protection circuit(over speed, over temperature, low oil pressure) or protection circuit(OVR) is in operation while the engine is operating normally.

- Operating output is blocked immediately when engine is stopped in ETR
- Stoppage output is blocked after the duration entered in environment setting menu <13. St-t> in ETS. If engine does not stop due to stoppage output is too short, adjust the stoppage output time and re-test.

13. Automatic Operation

13.1. Set operation mode to <ATO>

13.2 When commercial power is in outage engine (CNT socket CLOSE) operates after waiting time for the start.
13.3 When commercial power is in outage and it is returned before SDT time, engine will not start and SDT time will be initialized.
13.4 When commercial power is in outage, battery "+" output will come from 23X (engine preheating output) and will be blocked above IDLE SPEED.
13.5 When start output does not reach IDLE SPEED, GCU repeats starting for the duration of time entered in <12. crH>. If not starting after third try it recognizes as engine breakdown and stops starting engine.
13.6 RUN LAMP is on when engine operates normally.
13.7. When there is normal detection of generated power supply ACB will be input after waiting time.
13.8. When commercial power is returned (CNT socket OPEN) during normal operation of engine, engine will stop after blocking ACB and preparing for re-outage during the waiting time of engine cool down.
13.9. If commercial power is in outage (CNT socket CLOSE) while engine cools down, engine cool down time will be initialized and ACB will be input immediately.

14. Engine Generator Protection Device Operation Test(Identical for Both Manual and Automatic Operation)

14.1. Operates in the case of breakdown and warning (▶When protection device is in operation, it is possible to RESET only after performing buzzer stop).

14.2 EPB (EMERGENCY PUSH BUTTON) Emergency stop test
(1) Check if engine starts, RUN lamp of GCU is on and check whether correct RPM is showing.
(2) Push EPB.
(3) Emergency stop lamp and buzzer sound will be on and engine will stop.
(4) Press buzzer stop, release EPB and press RESET.

14.3. Over speed test (OVER SPEED)
▶ Since it is dangerous to increase engine RPM, perform test by changing the over speed detection value.
▶ Change OVER SPEED value below the normal speed in setting menu <1. oSS>. By doing this, GCU will recognize the normal speed as over speed. Be sure to bring values back to normal after the test.
▶ Test by pressing over speed test switch
(1) Start engine.
(2) Check if RUN lamp of GCU is on and RPM.
(3) Recognizes over speed and over speed lamp blinks during the waiting time for setting. After waiting time for setting over speed lamp will be on, buzzer will sound and engine will stop.
(4) By pressing buzzer stop and performing RESET, it brings back to normal.

14.4 Low oil pressure test (OPS - LOW OIL PRESSURE)
(1) When setting with oil pressure switch:
  1) Start engine.
  2) Check if RUN lamp of GCU is on and RPM.

3) Ground OPS socket.
4) Low oil pressure lamp will blink during the setting time and after the setting time oil pressure lamp will be on, buzzer will sound and engine will stop.
5) Press buzzer stop and RESET.

(2) When setting with oil pressure sensor

1) Start engine.
2) Check if RUN lamp of GCU is on and RPM.
3) Ground OPS socket.
4) Low oil pressure lamp will blink during the setting time and after the setting time oil pressure lamp will be on, buzzer will sound and engine will stop.
5) Press buzzer stop and RESET.

14.5. Coolant over temperature test (WTS - HIGH WATER TEMPERATURE)

(1) When setting with over temperature switch

1) Start engine.
2) Check if RUN lamp of GCU is on and RPM.
3) Ground WTS socket.
4) Coolant over temperature lamp will blink during the setting time and after the setting time coolant over temperature lamp will be on, buzzer will sound and engine will stop.
5) Press buzzer stop and RESET.

(2) When setting with temperature sensor

1) Start engine.
2) Check if RUN lamp of GCU is on and RPM.
3) Ground WTU socket.
4) Coolant over temperature lamp will blink during the setting time and after the setting time coolant over temperature lamp will be on, buzzer will sound and engine will stop.
5) Press buzzer stop and RESET.

14.6 Lubricant over temperature test (WTS - HIGH WATER TEMPERATURE)

1) Start engine.
2) Check if RUN lamp of GCU is on and RPM.
3) Ground OTU socket.
4) Coolant over temperature lamp will blink during the setting time and after the setting time coolant over temperature lamp will be on, buzzer will sound and engine will stop.
5) Press buzzer stop and RESET.

14.7 Start failure test (OVER CRANKING [operating only in automatic mode])

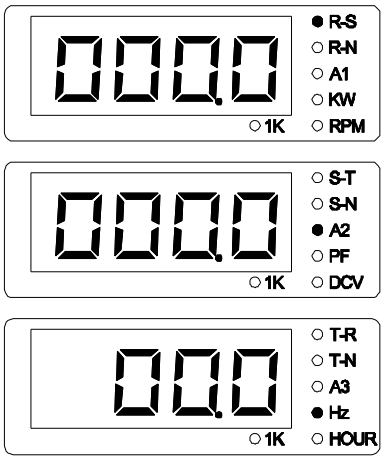
1) Change to automatic mode and make sure engine does not start.
2) Cut commercial power or ground CNT socket.
3) Start output after SDT time.
4) OCL lamp will be on and buzzer will sound after repeating 7-second start and 7-second stop three times.
5) LCD display will show OVER CRANK ERROR_MESSAGE.
6) Press buzzer stop and RESET.
7) Remove the setting which made engine not to start and bring settings back to normal.

14.8 The rest failure tests are similar as above.

15. Modification of Environment Settings

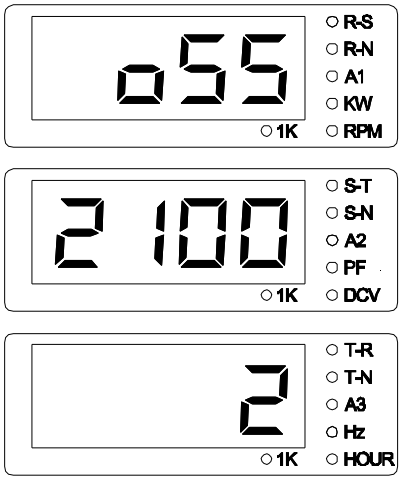
15.1. Change of Environment Setting Mode

(1)



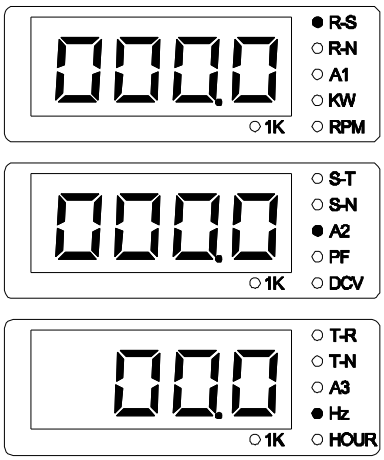
1. Press PRG button when generator(in stop mode or manual mode) is stopped.
2. Takes you settings mode.

(2)



1. Settings mode
2. Over speed setting mode

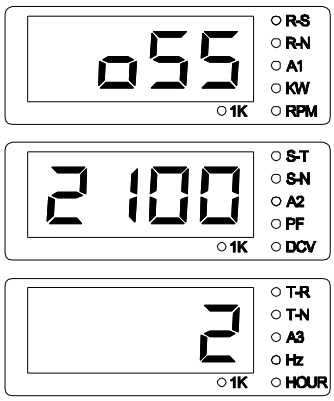
(3)



1. When setting is completed, press PRG again to return to operation display.

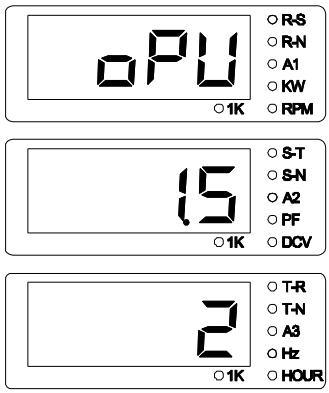
15.2. Description of Environment Settings

(1)



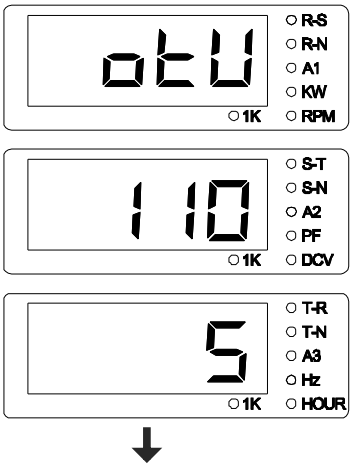
1. Over speed setting menu
2. Number 2100 will blink in the second line of the display when pressed <ENT>.
3. Change setting value by using <UP> and <DOWN>.
4. Press <ENT>.
5. Number 2 will blink in the third line.
6. Change setting values by using <UP> and <DOWN>.
7. Changed setting will be saved when pressed <ENT>.
8. Over speed setting range 1000 ~ 2500 RPM
9. Waiting time setting range 1 ~ 60 sec

(2)



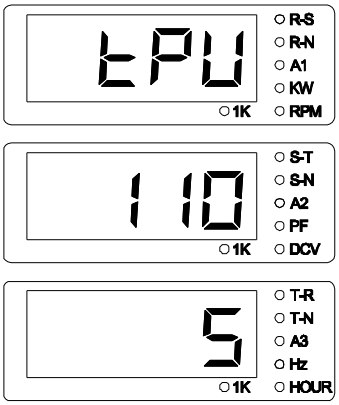
1. Lubricant pressure setting menu
2. Number 1.5 will blink in the second line of the display when pressed <ENT>.
3. Change setting values by using <UP> and <DOWN>.
4. Press <ENT>.
5. Number 2 in the third line of the display will blink.
6. Change setting values by using <UP> and <DOWN>.
7. Changed setting will be saved when pressed <ENT>.
8. Oil pressure setting range 0.9 ~ 9.9 ㎏/㎠
9. Waiting time setting range 1 ~ 60 sec

(3)



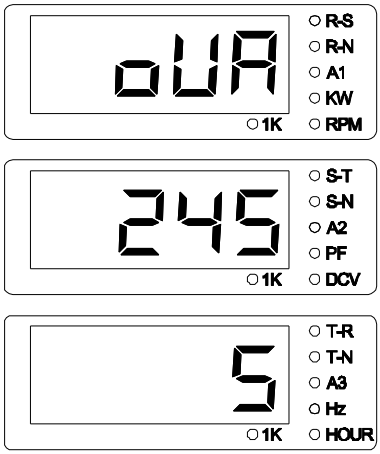
1. Lubricant temperature setting menu
2. Number 110 will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>.
4. Press <ENT>.
5. Number 5 in the third line of the display will blink.
6. Change setting values by using <UP> and <DOWN>.
7. Changed setting will be saved when pressed <ENT>.
8. Oil Temperature setting range 50 ~ 110℃
9. Waiting time setting range 1 ~ 60 sec.

(4)



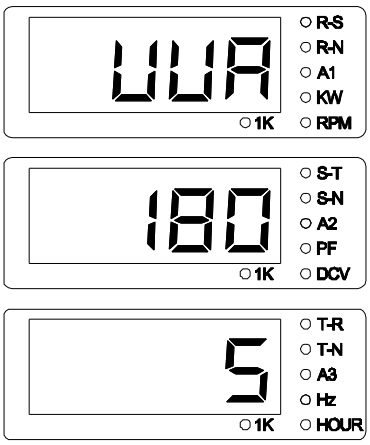
1. Over current setting menu.
2. Number 180 will blink in the second line of the display when pressed <ENT>.
3. Change setting values by using <UP> and <DOWN>.
4. Press <ENT>.
5. Number 5 in the third line of the display will blink.
6. Change setting values by using <UP> and <DOWN>.
7. Changed setting will be saved when pressed <ENT>.
8. Over current setting range 50 ~ 110℃
9. Waiting time setting range 1 ~ 60 sec.

(5)



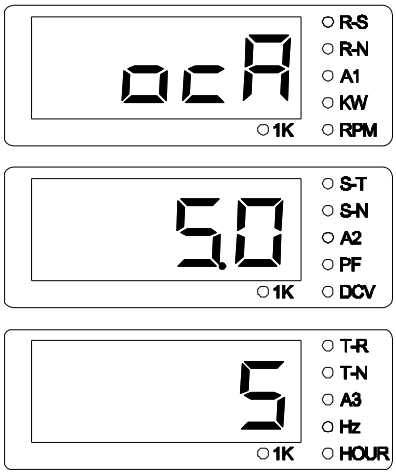
1. Over voltage setting menu.
2. Number 245 will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Press <ENT>
5. Number 5 in the third line of the display will blink.
6. Change setting values by using <UP> and <DOWN>
7. Changed setting will be saved when pressed <ENT>.
8. Over voltage setting range 90 ~ 300Vac
9. Waiting time setting range 1~60 seconds

(6)



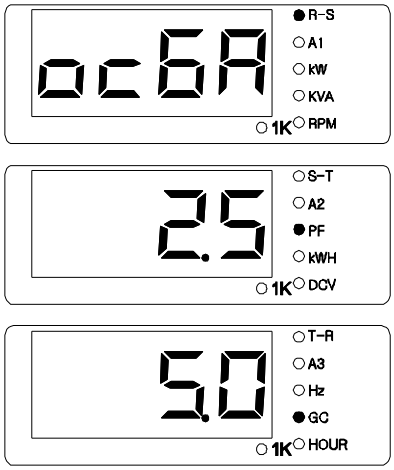
1. Low voltage setting menu
2. Number 180 will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Press <ENT>
5. Number 5 in the third line of the display will blink.
6. Change setting values by using <UP> and <DOWN>
7. Changed setting will be saved when pressed <ENT>.
8. Over voltage setting range 80 ~ 220Vac
9. Waiting time setting range 1~60 seconds

(7)



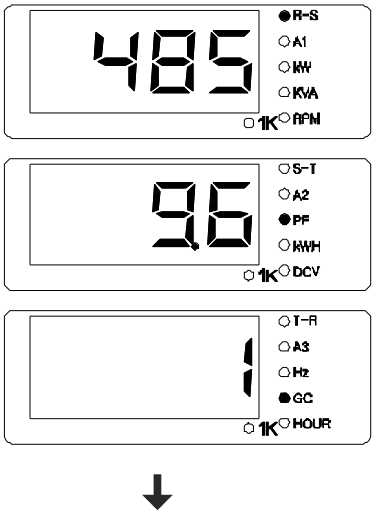
1. Over current setting menu
2. Number 180 will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Press <ENT>
5. Number 5 in the third line of the display will blink.
6. Change setting values by using <UP> and <DOWN>
7. Changed setting will be saved when pressed <ENT>.
8. Over current setting range 2.0~ 6.5A
9. Waiting time setting range 1~60 seconds

(8)



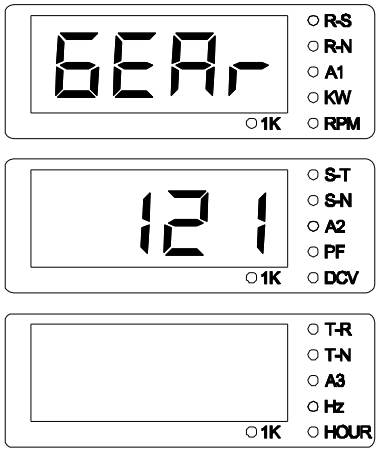
1. Ground over current setting menu
2. Number "2.5" will blink in the second line of display when <ENT> is pressed.
3. Change setting values by using <UP> and <DOWN>
4. Press <ENT>
5. Number "5.0" in the third line of the display will blink.
6. Change setting values by using <UP> and <DOWN>.
7. Changing will complete when <ENT> is pressed.
8. Setting range of ground over current : 0.2 ~ 5.0A
9. Setting range of waiting time : 0.1 ~ 6.0 초.

(9)



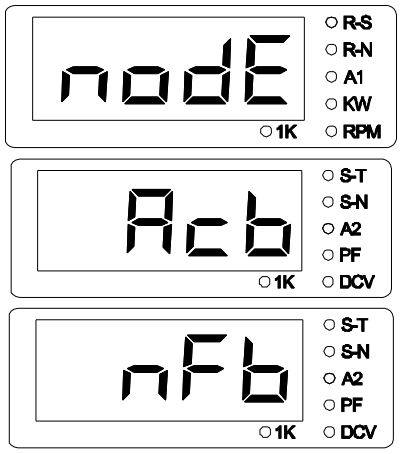
1. RS485 communication setting menu
2. Number 9.6 will blink in the second line of display when <ENT> is pressed.
3. Change setting value by using <UP> and <DOWN>.
4. Press <ENT>.
5. Number "1" will blink in the third line of display.
6. Change setting value using <UP> and <DOWN>.
7. Changing will complete when <ENT> is pressed.
8. Setting communication speed : - 9600 <9.6>
   - 19200 <192>
   - 38400 <384>
9. Setting range of address : 1 ~ 32

(10)



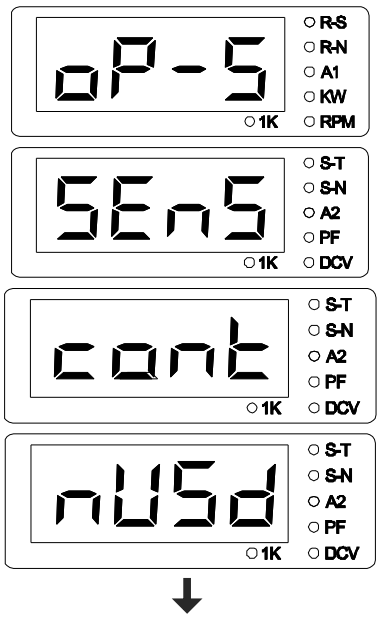
1. Number of gears setting menu
2. Number 121 will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Changed setting will be saved when pressed <ENT>.
5. Number of gears setting range: 1 ~ 250EA

(11)



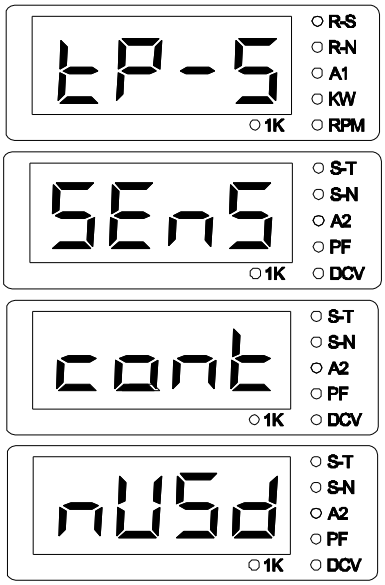
1. Control mode setting menu
2. <Acb> will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Changed setting will be saved when pressed <ENT>.
5. <Acb> : ACB control mode
6. <nFb> : MCCB control mode

(12)



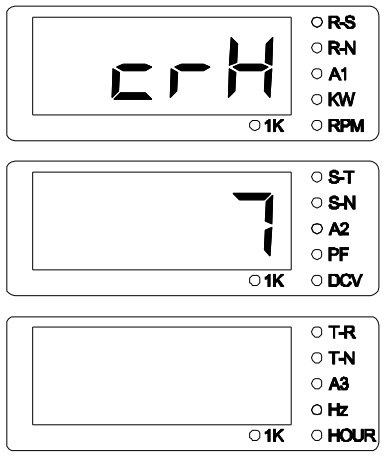
1. Oil pressure failure detection method setting menu
2. <SEnS> will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Changed setting will be saved when pressed <ENT>.
5. <SEnS> : Use oil pressure sensor
6. <cont> : Use oil pressure switch
7. <nUSd> : Use neither

(13)



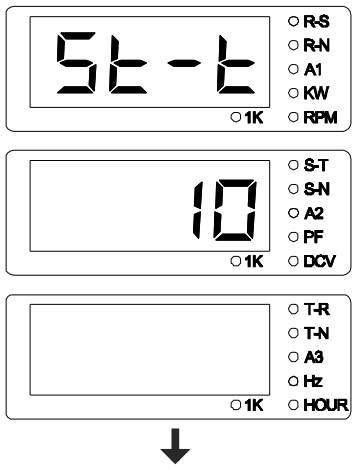
1. Coolant failure detection method setting menu
2. <SEnS> will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Changed setting will be saved when pressed <ENT>.
5. <SEnS> : Use oil pressure sensor
6. <cont> : Use oil pressure switch
7. <nUSd> : Use neither

(14)



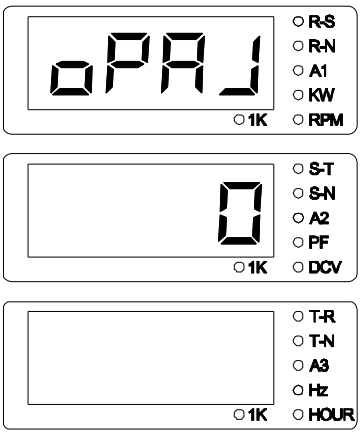
1. Start output time setting
2. Number 7 will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Changed setting will be saved when pressed <ENT>.
5. Start output setting range: 1 ~ 60 seconds

(15)



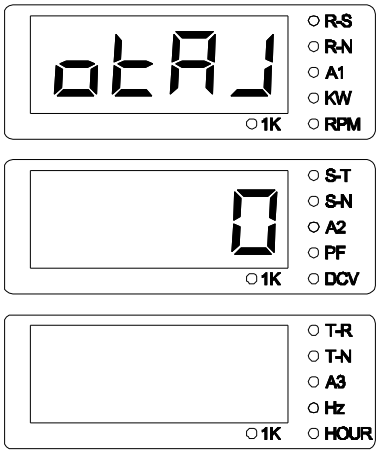
1. Stop output time setting
2. Number 10 will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Changed setting will be saved when pressed <ENT>.
5. Start output setting range: 1 ~ 60 seconds

(16)



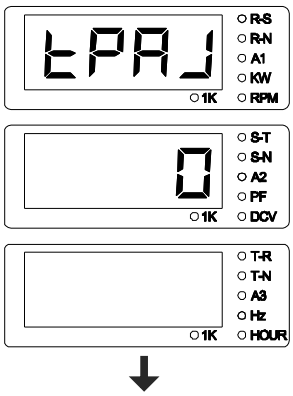
1. Oil pressure gauge value revision setting
2. Number 0 will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Changed setting will be saved when pressed <ENT>.
5. Revision value range : -4.0 ~ 4.0㎏/㎠

(17)



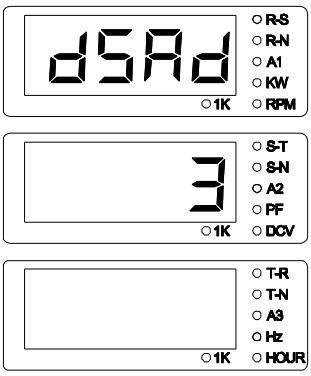
1. Lubricant temperature gauge value revision setting
2. Number 0 will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Changed setting will be saved when pressed <ENT>.
5. Revision value range : -40 ~ 40℃

(18)

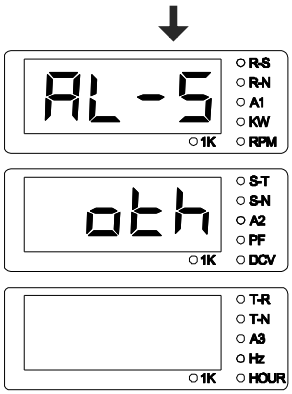


1. Coolant temperature gauge value revision setting
2. Number 0 will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Changed setting will be saved when pressed <ENT>.
5. Revision value range : -40 ~ 40℃

(19)

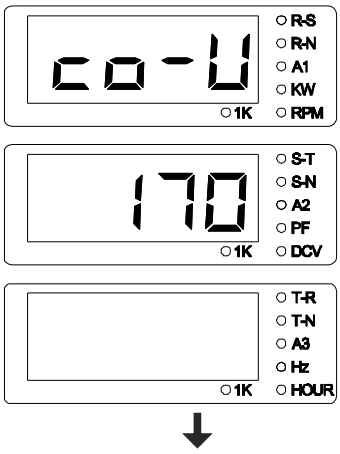


1. Menu used when testing in the factory



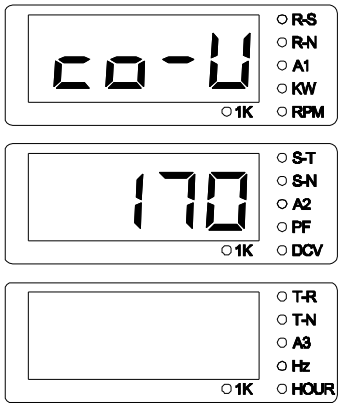
1. Menu used when testing in the factory

(20)



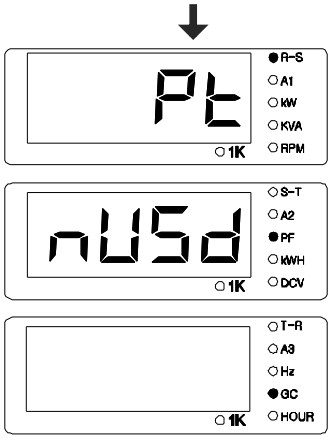
1. Commercial power low voltage setting menu
2. Number 170 will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Changed setting will be saved when pressed <ENT>.
5. Low voltage setting range : 170 ~ 220Vac

(21)



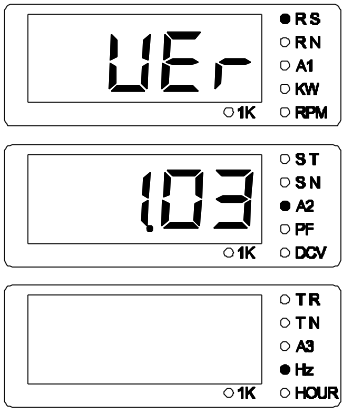
1. Commercial power low voltage setting menu
2. Number 170 will blink in the second line of the display when pressed <ENT>
3. Change setting values by using <UP> and <DOWN>
4. Changed setting will be saved when pressed <ENT>.
5. Low voltage setting range : 170 ~ 220Vac

(22)



1. PT ratio setting menu(for high voltage)
2. <nUSd> of second line will blinks when <ENT> key is pressed.
3. Change setting values by using <UP> and <DOWN>.
4. <3300> : set when applying 3300 V
   - PT ratio uses 3P4W, 3300V-190/√3
5. <6600> : set when applying 6600 V
   - PT ratio uses 3P4W, 6600V-190/√3

(23)



1. Displays program version

16. Specification Table for GCU-DG4 Compatible Gauge Sensor

VDO OPU			Dongnam Corp. - WTU,OTU	
psi	bar	Impedance Value(Ω)	Temp.℃	Impedance Value(Ω)
0	0	10.00	30	170.00
15	1	27.00	35	135.00
30	2	44.00	40	110.00
45	3	61.00	45	92.00
60	4	78.00	50	78.00
75	5	95.00	55	66.00
90	6	112.00	60	56.00
105	7	129.00	65	47.00
120	8	146.00	70	41.00
135	9	163.00	75	35.00
150	10	180.00	80	32.00
165	11	197.00	85	28.03
175	12	208.33	90	24.05
190	13	225.33	95	20.08
205	14	242.33	100	16.10
			105	12.10
			110	8.10
			115	4.10
			120	0.10

17. Number of Ring Gears in Major Engines in the World

Engine Manufacturer	Engine Model	Number of Ring Gears	Engine Manufacturer	Engine Model	Number of Ring Gears
JOHN DEERE	3179D	142	CATERPILLAR	D399	183
	4039D	142		DG399	183
	6059T	129		G298	183
	6059TA	129		D379	183
PERKINS	2006TWG2	158		G379	183
	2006TG2A	158		G342	151
	2006TTAG	175		DB58	123
Daewoo Heavy Industries & Machinery Ltd	C2240	108		0846	156
	DC24	108		D349	151
	DB33	122		D348	151
	DB58	122		D346	151
	DB33	129		D34	152
	P034TI	129		3306	156
	DB58	129		DE12T(I)	152
	D1146(T)	146		G333	156
	P86TI	146		D2840L,(E)	160
	2156	146		3406	113
	2366	146		3409	113
	DE12T	152		3412	136
	P126TI	152	CUMMINS	NT855G6	118
	D2848L,(E)	160		L10	118
	D2842L,(E)	160		6BT56G	159
	D2840L,(E)	160		4BT39G	159
	P158LE	160		KT19G	142
	P180LE	160		KT50	159
	P222LE	160	Hyundai	D6AZ	143
				D6BR	129

18. Cause of Breakdown and Solutions

Symptom	Cause	Solution
When there is no power (No vision in LCD display)	DC circuit breaker is open	Close DC circuit breaker
	DC fuse is disconnected	Replace fuse with the same capacity
	Wrong wiring	Correct wiring referring to the circuit diagram
	Flat battery	Recharge battery at least 5 hours
Cannot start (starter motor is not working)	Flat battery	Recharge battery at least 5 hours
	Breakdown of start-assistant magnet	Replace start-assistant magnet
	Breakdown of starter motor	Replace starter motor
	Wrong or no wiring.	Correct wiring by referring to the circuit diagram
When cannot start (starter motor is working)	Breakdown of pre-heating plug	Replace pre-heating plug
	Wrong ENGINE TYPE setting in environment settings	Correctly select ETR and ETS by inquiring the engine manufacturer
When cannot start (stops soon after the start)	Wrong PICK-UP SETTING in environment settings	Correctly enter number of ring gears by inquiring the engine manufacturer
	Wrong or no OPG wiring	Correct wiring by referring to the circuit diagram
OPG alarm upon the start	Wrong or no OPG wiring	Correct wiring by referring to the circuit diagram
	Wrong OPS MODE setting in environment settings	Correctly set OPS MODE
	Did not use correct sensor	OPU must use products from VDO
Inaccurate RPM of generator	Wrong PICK-UP SETTING in environment settings	Correctly enter number of ring gears by inquiring the engine manufacturer
No light in GEN. RUN lamp while generator is in operation.	Wrong or no wiring of PICK-UP	Correct wiring by referring to the circuit diagram
	Wrong or no wiring of generator voltage GEN.VOLT socket	Correct wiring by referring to the circuit diagram
Inaccurate voltage value	Wrong CT RATIO setting in environment settings	Enter correct CT ratio of CT used
	Generator voltage input and CT input are different	Correct wiring by referring to the circuit diagram
Indication of power factor is not normal	Second wiring of CT is wrong	Correct wiring by checking polarity of CT and referring to circuit diagram
No automatic operation of generator upon commercial power outage	Wrong COMP POWER setting in environment settings	Select whether to receive input of CNT socket by commercial power outage signal or by directly detect voltage of commercial power and arrange corresponding circuit.
No input of ACB	The generator voltage is measured lower than UVR value.	Adjust AVR so that generator voltage is measured normally.

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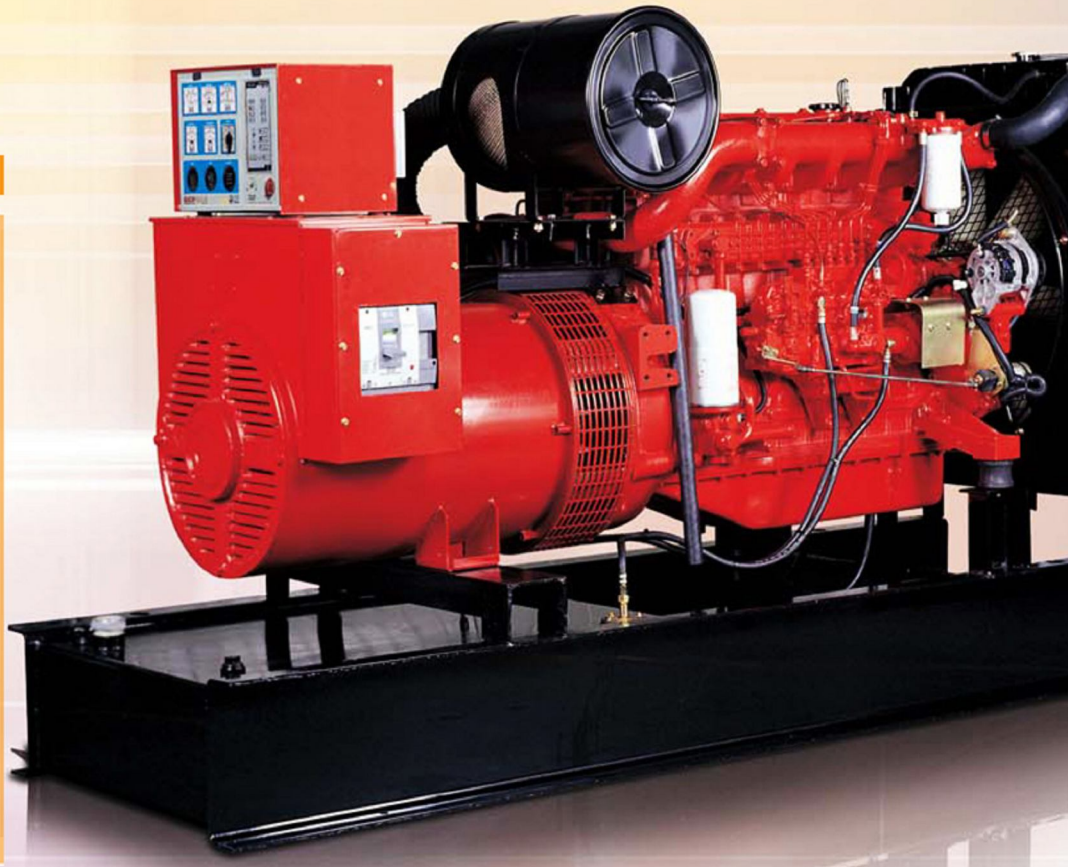

PRODUCTS ITEM

- □ AVR / 자동전압조정기
- □ ABC / 자동밧데리충전기
- □ GCU / 발전기기제어장치
- □ ECU / 엔진제어장치
- □ ESD / 엔진속도검출기
- □ EPD / 엔진보호장치
- □ SCR / 동기검출기
- □ BCU / ACB 제어장치
- □ ACU / ATS 제어장치
- □ MPU / 속도검출센서
- □ GCP / 발전기 운전반
- □ ECP / 엔진 운전반
- □ ATS / ATS 운전반
- □ FGP / 별치형 운전반

AVR
MODEL : 635/631

ABC
MODEL : SMP

ABC
MODEL : SMF

ECU
MODEL : DG1

GCU
MODEL : MP2

DMM
MODEL : 961

ACU
MODEL : MP3

ETS
MODEL : Y, B TYPE

이지콘(주)

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