

NeoGCP 20

User Manual

Rev. A



CAUTION

1. The method of RPM measuring is encouraged MPU to avoid damage of start motor when DOOSAN's engine is used.
2. If MPU and oil press. switch are not used on cranking generator up, start motor have the possibility of being damaged due to not building generated voltage up.

■ The Method for MPU Setting

Items	Details
MAGNETIC PICKUP	1.Press the [MENU] button for more than 3 seconds. 2.Press the [ENTER] button after [GENSET] select. 3.Press the [ENTER] button after [MAGNETIC PICKUP] select by using [▼] button. 4.Choose [ENABLE] and press [ENTER].
TEEEH(FACTOR)	1.Press the [MENU] button for more than 3 seconds. 2.Press the [ENTER] button after [GENSET] select. 3.Press the [ENTER] button after [TEETH(FACTOR)] select by using [▼] button. 4.Input the suitable teeth number of gear and press [ENTER].
Usage selection of Oil press. switch	1.Press the [MENU] button for more than 3 seconds. 2.Press the [ENTER] button after [GENSET] select. 3.Press the [ENTER] button after [OP-CHECK ON CRANK] select by using [▼] button. 4.Choose [ENABLE] and press [ENTER].
CRANKING-OK RPM	1.Press the [MENU] button for more than 3 seconds. 2.Press the [ENTER] button after [SEQUENCE] select. 3.Press the [ENTER] button after [CRANKING-OK RPM] select by using [▼] button. 4.Choose the suitable rpm which cut start motor off and press [ENTER].

■ Teeth Number of Engine made by DOOSAN

Gear teeth	Model name
129	DB33, PO34TI, DB58
140	D1146, D1146T
146	PO86TI
152	P126TI-3, P126TI, P126TI-II
160	P158LE-III, P158LE, P158LE-1, P158LE-2, P180LE-II, P158LE, P222LE-1, P222LE, P222LE-II, P222FE-II

※ This caution is requested by Doosan Commercial Engine. Damaged start motor due to neglecting this caution can't be serviced free of charge by Doosan Commercial Engine.

Contents

1. General Information	5
1.2. What is NeoGCP 20?	5
1.2. Feature	5
1.3. Figure	5
1.4. Specification	6
2. Control Buttons and LED indicator	7
2.1. Control Buttons	7
2.2. LED indicator	7
3. LCD Display	8
3.1. Booting Screen.....	8
3.2. Main Screen	8
3.3. Warning Screen.....	9
3.4. Menu Selection Screen	9
3.5. Parameter Setting Screen.....	9
4. Wire Specification and Cutting size	10
4.1. Wire Specification.....	10
4.2. Cutting Size	10
5. Function of Terminal Block	11
5.1. [1], [2] Vdc ±	12
5.2. [3], [4] MAIN L, N.....	12
5.3. [5] ~ [8] GEN PT U, V, W, N	13
5.4. [9], [10] MPU ±	13
5.5. [11] ~ [20] Digital Input	13
5.6. [21] ~ [36] Digital Output	14
5.7. [37] ~ [41] Sensor Input	14
5.8. [42] ~ [45] GEN CT U, V, W, N.....	15
6. Menu Configuration	16

6.1. GENSET.....	16
6.2. SEQUENCE.....	21
6.3. PROTECTION.....	24
6.4. INPUT CONFIG.....	25
6.5. OUT CONFIG.....	29
7. CALIBRATION	35
7.1. PROTECTION TEST.....	35
7.2. ALARM HISTORY.....	35
7.3. SYSTEM CHECK.....	35
8. COMMUNICATION SETTING	37
8.1. MODBUS PROTOCOL.....	37
8.2. REQUEST (04h).....	37
8.3. COMMAND (05h).....	37
8.4. DEFINES FOR COMMUNICATION	38
9. Warning List and Alarm Grade setting	39
10. Addition of D/I or D/O	40
11. SPECIFICATION OF PROTECTION RELAY	41
11.1. Feature.....	41
11.2. Feature of OVR, UVR (definite-time)	41
11.3. Feature of OCR (definite-time, inverse)	41

1. General Information

1.1. What is NeoGCP 20?

- NeoGCP 20 (Neo Generator Control Panel 20) is a microprocessor based complete generator control unit for single operation.

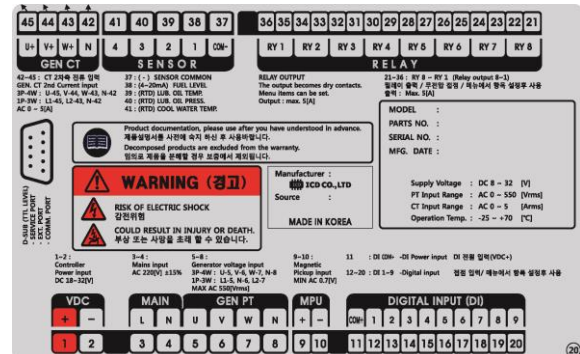
1.2. Feature

- By using 4 x 20 LCD, convenient tuning related parameters
- Operation mode : [MANUAL], [AUTO], [EM'CY]
- AMF (Auto Mains Failure) function using a single phase or UVR contact.
- Differentiated protection of three stage for engine and motor : Warning, Trip, Shut down
- Support for Modbus Protocol 04h, 05h
- Settable 9 input contacts and 8 output relays.

1.3. Figure



< The front of NeoGCP 20 >



< Back of NeoGCP 20 >

1.4. Specification

Dimensions (mm)	240(L) × 178(W) × 53.5(H)	Operating Temp.	-20 ~ 70 °C
Weight	About 862 g	Maximum CT current input	0 ~ 5 [A]
Supply voltage range	8 ~ 32 Vdc	Maximum PT Voltage input	Max AC 550 [Vrms]
Maximum Power	4.8 W	Mains input voltage	AC 220 [Vrms] or

2. Control Buttons and LED indicator

2.1. Control Buttons

- The control buttons are used to tune related parameters.

Items	Details
Arrow Buttons	<ul style="list-style-type: none"> - [▲], [▼] are used to change the generator information at 3rd and 4th line on the main screen. - [▲], [▼] are used to move cursor on the menu selection screen. - [◀], [▶] are used to change position of cursor on the parameter setting screen.
ENTER	- The [ENTER] key is used to select menu on the menu selecting screen and to save the generator parameters on the menu selecting screen.
MENU	<ul style="list-style-type: none"> - If the [MENU] key is pushed for more than three seconds, the LCD screen will be changed to the menu selecting screen. - When you need to go back to the main screen, push the [MENU] key. - When returning to the main screen without released warning, it will be go back to the main screen to use it.
ALARM	<ul style="list-style-type: none"> - The [ALARM] key is used to check status of LED. - If warnings occurs, it will be changed to the warning screen to use it. - When warnings occur more than two cases, press the [ALARM] button to confirm warnings in sequence.
RESET	<ul style="list-style-type: none"> - When warnings occur, press the [RESET] button to return to the main screen. - You can turn warnings off to press it, if these warnings released.
CLOSE	- When closing circuit breaker, use it on [MANUAL].
TRIP	- When tripping circuit breaker, use it on [MANUAL].
AUTO	- When choosing [AUTO], use it..
MANU.	- When choosing [AUTO], use it.
START	- When starting generator on [MANUAL], use it.
STOP	- When stopping generator on [MANUAL], use it.

2.2. LED indicator

- LED on the face of the controller is used to indicate a condition of alarm and operation.

Items	Color	Details
FAULT	Red	Occurring fault (Shut down, Trip), LED turn on.
WARNING	Red	Occurring warning, LED turn on.
MANUAL	Orange	Selecting [MANUAL] mode, LED turn on. If not, turn off. When [STOP] or [CHECK] in [MANUAL] mode, LED flicker on and off.
AUTO	Orange	Selecting [AUTO] mode, LED turn on. If not, turn off. When [STOP] or [CHECK] in [AUTO] mode, LED flicker on and off.
EM'CY RUN	Orange	When [EM'CY RUN] mode by external signal, LED turn on.
REMOTE	Orange	Connecting with communicated device, LED turn on.
RUNNING	Orange	Running, LED turn on.
BREAKER CLOSE	Red	Closing circuit breaker, LED turn on.
BREAKER TRIP	Green	Tripping circuit breaker, LED turn on.

3. LCD Display

3.1. Booting Screen

- If the controller is supplied with DC power, you can see the booting screen.
- It displays serial number, firmware version.

```

===== NeoGCP20 =====
S/N: NFI0000
Ver: 6.00
www.eicd.co.kr
    
```

< Booting screen >

3.2. Main Screen

- The main screen appears after the controller finishes booting
- The main screen displays major parameters of generator operation.
- By using [▲], [▼] buttons, You can change parameters to be shown at 3rd and 4th line.

```

[MANUAL]          READY
 500kW    380V    945A
FREQ:60.0    RPM:1800
kW %: 100    BAT:24.0
    
```

< Frequency, RPM, Power, Battery Voltage >

```

[MANUAL]          READY
 500kW    380V    945A
kVA: 625    kvar: 375
P.F: +0.80
    
```

< Active Power, Reactive Power, Power factor >

```

[MANUAL]          READY
 500kW    380V    945A
R-S: 380V    S-T: 380V
T-R: 380V
    
```

< Line Voltage >

```

[MANUAL]          READY
 500kW    380V    945A
R-N: 220V    S-N: 220V
T-N: 220V
    
```

< Phase Voltage >

```

[MANUAL]          READY
 500kW    380V    945A
R:    945A    S:    945A
T:    945A
    
```

< Electric Current >

```

[MANUAL]          READY
 500kW    380V    945A
C.T: 75°C    O.T: 90°C
O.P: 5.0bar  F.L: 80%
    
```

< Coolant Temp., Oil Temp., Oil Press., Fuel Level >

```

[MANUAL]          READY
 500kW    380V    945A
RUN HOUR:          0.34
kW HOUR:          1.91
    
```

< Cumulative Running Hour, Cumulative Power >

```

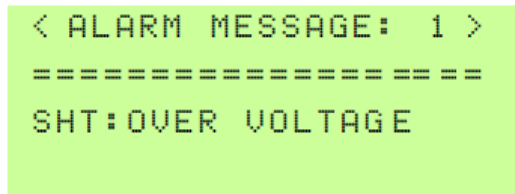
[MANUAL]          READY
 500kW    380V    945A
IN : 12345678
OUT: 12345678
    
```

< Digital Input, Digital Output >

3.3. Warning Screen

3.3.1. Confirmation Warning

- When an alarm set point is set for warning, screen will be automatically changed with alarm message.



< Alarm Message >

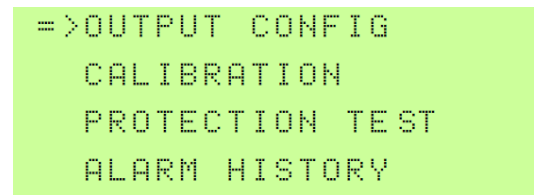
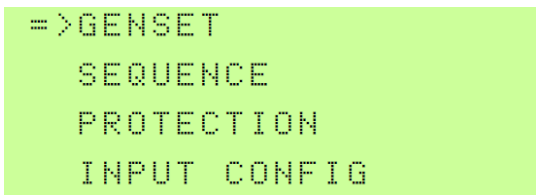
- The rightward number of alarm message denotes amount of warnings.
- When warnings occur, press the [RESET] button to return to the main screen.
- When warnings occur more than two cases, press the [ALARM] button to confirm warnings in sequence.

3.3.2. Cancelation Warning

- You can turn warnings off to press the [RESET] button, if warnings released.
- When warnings are not released, to press the [MENU] button can be changed from the warning screen to the main screen.

3.4. Menu Selection Screen

- To enter the menu selection screen press the [MENU] button for more than three seconds.
- You can select menu by using [▲], [▼] button. And then press the [ENTER] button to enter the parameter setting screen.



< Menu Selection Screen >

3.5. Parameter Setting Screen

- Choose menu which you want to be changed by using [▲], [▼] buttons. And then press the [ENTER] button.
- If cursor is blinking, you can move the cursor right and left by using [◀], [▶] button. And [▲], [▼] button will change parameters.
- Finally, you have to press the [ENTER] button to save value which want to be changed.

4. Wire Specification and Cutting size

4.1. Wire Specification

- All of digital inputs and outputs are connected with pluggable terminal block.

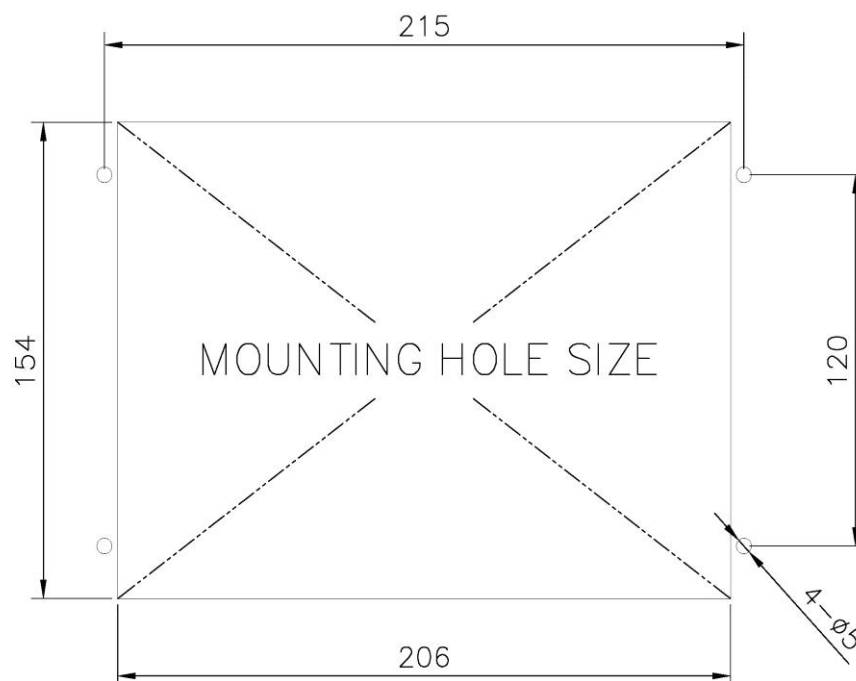


〈 Pluggable Terminal Block 〉

- For noise suppression, it is recommended that all low-current wires be separated from all high current wire.
- Wire specification is same as followings.

Wire SQ	0.34 ~ 2.5 mm ²
Solid (AWG)	12 ~ 24
Strained cable (AWG)	12 ~ 24
Screw size	M3
Pin terminal Length	6 ~ 7 mm

4.2. Cutting Size



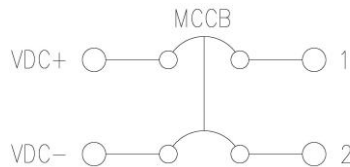
5. Function of Terminal Block

No.	Items	Details
1	VDC+	Power supply for controller 8~32 [Vdc]
2	VDC-	
3	MAIN L	Common used power input 220 [Vac] ± 15%
4	MAIN N	
5	GEN PT U	Generated power input Max 550 [Vac] 1P-3W, 3P-3W, 3P-4W
6	GEN PT V	
7	GEN PT W	
8	GEN PT N	
9	MPU+	Magnetic Pick-up sensor input. Min 0.7 [Vac]
10	MPU-	
11	DI COM+	Power supply for D/I (Vdc+)
12	DI 1	
13	DI 2	
14	DI 3	
15	DI 4	
16	DI 5	
17	DI 6	
18	DI 7	
19	DI 8	
20	DI 9	

No.	Items	Details
45	GEN CT U+	Generated current input 0.2~10 [A], MAX 10 [A], Peak 1 [s] 3P-4W : U-45, V-44, W-43, N-42 1P-3W : L1-45, N-43, L2-42
44	GEN CT V+	
43	GEN CT W+	
42	GEN CT N	
41	SENSOR 4	Coolant temp. sensor (RTD)
40	SENSOR 3	Oil Press. sensor (RTD)
39	SENSOR 2	Oil temp. sensor (RTD)
38	SENSOR 1	Fuel level sensor (4~20mA)
37	SENSOR COM-	Sensor com- (Vdc-)
36	RELAY 1	RELAY Output signal output Max 250 [Vac], 24 [Vdc], 5 [A]
35		
34	RELAY 2	
33		
32	RELAY 3	
31		
30	RELAY 4	
29		
28	RELAY 5	
27		
26	RELAY 6	
25		
24	RELAY 7	
23		
22	RELAY 8	
21		

5.1. [1], [2] Vdc ±

- The controller should be supplied with 8~32 [Vdc] ranged power through No. [1] and [2].
- Significant inrush currents are possible when current is applied to the controller.
- The magnitude of the inrush current depends on the power source impedance.
- So we cannot specify the maximum inrush current. Circuit breaker must be used to avoid nuisance trips.

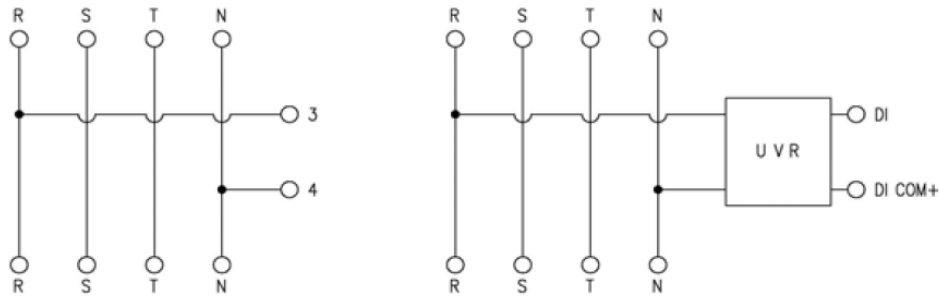


< Example for Circuit Breaker Installation >

5.2. [3] , [4] MAIN L, N

- No. [3], [4] check the common used power against a blackout.
- In [AUTO] operation, generator will turn on after predetermined [AUTO START DELAY] according to the voltage of common used power.
- Permitted value in range of 220 [Vac] ± 15% should be inputted to check for phase voltage of common used power.
- If the input value is different from the permitted value, you must use a PT (Potential Transformer) to change phase voltage of common used power.
- NeoGCP 20 decides on a blackout when phase voltage of common used power is under 30 [Vac].
- If over 30 [Vac], NeoGCP 20 regards as a normalcy.
- No. [3], [4] is only used in case of [BUS] which will be set it up at [MENU]→[GENSET]→[MAINS SENSING]. If [MAINS SENSING] is set [UVR] up, No. [3], [4] is not used.
- [UVR] should use on predetermined D/I port after changing parameter at [MENU]→[INPUT CONFIG].

Menu to be influenced	Set value	Details
[GENSET] → [MAINS SENSING]	[BUS]	No. [3], [4]
	[UVR]	D/I port to be set by user
[SEQUENCE] → [AUTO START DELAY]	0 ~ 600 [s]	Operation in [AUTO]
[SEQUENCE] → [AUTO STOP DELAY]	0 ~ 600 [s]	Operation in [AUTO]

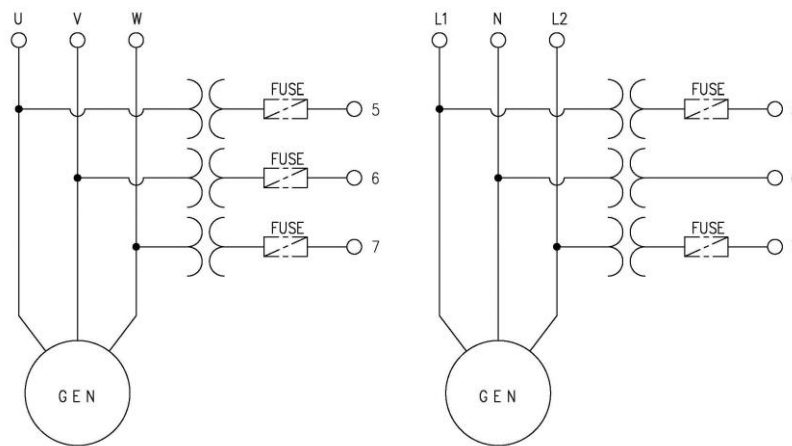


〈 Example for wiring about checking common used power 〉

5.3. [5] ~ [8] GEN PT U, V, W, N

- We check Max 550 AC [Vrms] ranged generated power through No. [5] ~ [8].
- In case of 1P-3W, wiring is to be L1-5, N-6, L2-7.
- In case of 3P-3W, wiring is to be U-5, V-6, W-7.
- In case of 3P-4W, wiring is to be U-5, V-6, W-7, N-8.
- If generated power excess AC 550 [Vrms], you must use PT (Potential Transformer).
- 2nd power of PT is not be supposed to excess AC 550 [Vrms].

Menu to be influenced	Set value	Details
[GENSET] → [PT RATIO]	1 ~ 99.99	PT ratio to be used



〈 GEN PT 결선 예시 〉

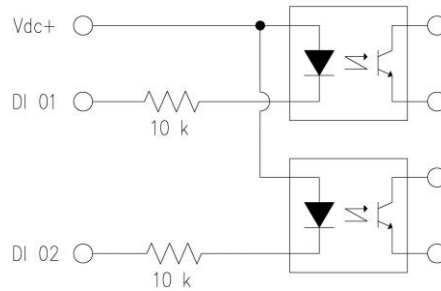
5.4. [9], [10] MPU ±

- No. [9], [10] are used to check for Min 0.7 [Vac] ranged magnetic pick-up sensor.
- If [GENSET]→[MAGNETIC PICKUP] set [ENABLE] up, we use [9], [10].
- If [GENSET]→[MAGNETIC PICKUP] set [DISABLE] up, we does not use [9], [10].

Menu to be influenced	Set value	Details
[GENSET] → [MAGNETIC PICKUP]	[ENABLE]	To be used [9], [10] for MPU
	[DISABLE]	GEN PT is used for checking RPM

5.5. [11] ~ [20] Digital Input

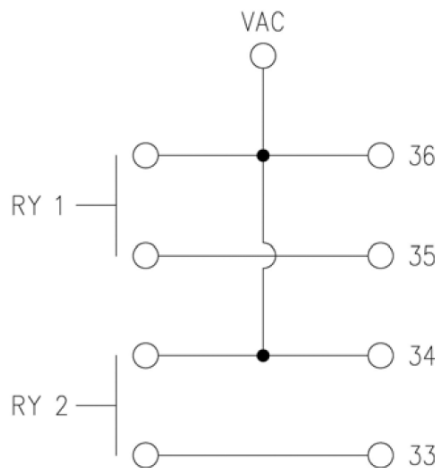
- [Vdc+], Common power of digital input, should be supplied through No. [11]
- If [Vdc-] is supplied through [12] ~ [20], we can recognize relevant input-signal.
- For the details of digital input, please refer to [6.4 INPUT CONFIG].



< Circuit diagram for digital input >

5.6. [21] ~ [36] Digital Output

- User can send predetermined signal through [21] ~ [36].
- Capacity of contact point from [RELAY 1] to [RELY 8] is 250 [Vac], 24 [Vdc], Max 5 [A].
- If you need external relay, you should consider capacity of contact point.
- For the details of digital output, please refer to [6.5 OUTPUT CONFIG].



< Circuit diagram for digital output >

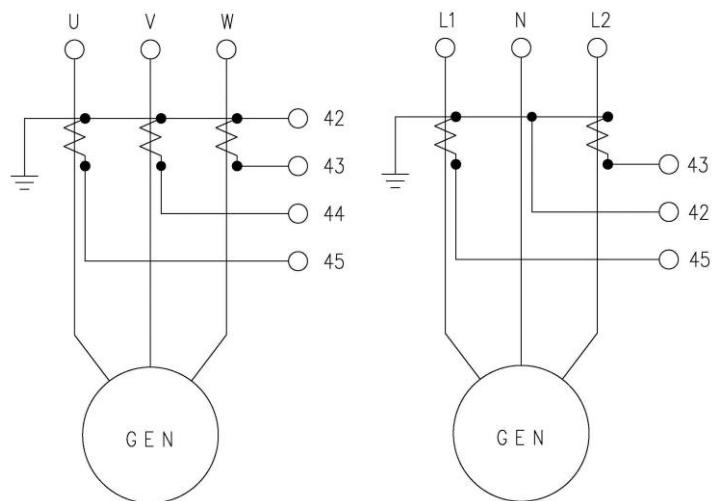
5.7. [37] ~ [41] Sensor Input

- [37] should be supplied with [Vdc-] for sensor-common.
- [38] should be supplied with 4 ~ 20 [mA] ranged fuel level sensor.
- [39] should be supplied with RTD oil temp. sensor.
- [40] should be supplied with RTD oil press. sensor.
- [41] should be supplied with RTD coolant temp. sensor.

5.8. [42] ~ [45] GEN CT U, V, W, N

- Generated current is checked through [42] ~ [45].
- In case of 1P-3W, wiring is to be L1-45, N-43, L2-42.
- In case of 3P-3W or 3P-4W, wiring is to be U-45, V-44, W-43, N-42.
- Checkable minimum current is 0.2 [Arms], maximum current is 10 [Arms] for 1 [s].
- Setting should be changed according to CT(Current Transformer).

Menu to be influenced	Set value	Details
[GENSET] → [CT RATIO]	From used CT	[42] ~ [45]



< Example for GEN CT >

6. 메뉴 설정

6.1. GENSET

- [GENSET] can set up basic conditions about generator.
- Some items could be set during only stop sequence.

Items	Details
GEN kW	Input rated power [kW].
GEN FREQUENCY	Input rated frequency [Hz]. We check rated frequency [Hz] on [BUILD-UP] sequence.
GEN VOLTAGE	Input rated voltage [V]. We check rated voltage [V] on [BUILD-UP] sequence.
GEN CURRENT	Input rated current [A].
PT RATIO	Input the ratio of PT. In case PT is not attached, [PT RATIO] is 1.00
CT RATIO	Input the ratio of CT.
SOLENOID TYPE	Select governor type. 1) [STOP SOLENOID] : Stop solenoid (on : fuel cut off) 2) [FUEL SOLENOID] : Electronic governor (on : fuel supply)
BREAKER TYPE	Select main circuit breaker type : [MCCB] or [ACB]
MAGNETIC PICKUP	Sensing method of engine speed [RPM] 1) [ENABLE] : MPU, 2) [DISABLE] : Gen frequency
TEETH(FACTOR)	In case of [MAGNETIC PICKUP]→[ENABLE], input the number of engine gear teeth. In case of [MAGNETIC PICKUP]→[DISABLE], input 30 that is minimum value which is based on 4 poles AC alternator.
MAINS SENSING	Sensing method of common used voltage 1) [BUS] : Phase voltage, 2) [UVR] : UVR contact
OCR TYPE	Select type of over current relay. 1) [CONSTANT] : Definite time OCR, 2) [INVERSE] : Inverse time OCR
MCCB TRIP	Select trip function of MCCB. 1) [ENABLE] : MCCB TRIP coil, 2) [DISABLE] : Not available
BREAKER AUX CHECK	Select aux. contact of MCCB 1) [ENABLE] : Used, 2) [DISABLE] : Not used
OP-CHECK ON CRANK	Check engine oil pressure switch (Normal close contact) before generator start. 1) [ENABLE] : Used, 2) [DISABLE] : Not used Signal of low oil press. should be inputted to start generator.
COOL TEMP SENDER	Select coolant water temp. sensor 1) [DISABLE] : Not used 2) [DAEWOO] : Doosan's sensor 3) [VDO] : VDO's sensor
COOL TEMP SWITCH	Select type of coolant water temp. switch 1) [N/O] : Normal open, 2) [N/C] : Normal close
OIL PRESS SENDER	Select type of engine oil press. sensor. 1) [DISABLE] : Not used, 2) [VDO] : VDO's sensor
OIL PRESS SWITCH	Select type of low engine oil press. switch. 1) [N/O] : Normal open, 2) [N/C] : Normal close
OIL TEMP SENDER	Select type of engine oil press. Sensor. 1) [DISABLE] : Not used, 2) [DAEWOO] : Doosan's sensor
FUEL LEVEL SENDER	Select fuel oil lever sensor 1) [DISABLE] : Not used, 2) [ENABLE] : Used

Items	Details
CONTROL MODE	Select control method for generator operation. 1) [LOCAL + REMOTE] : Be used to start LOCAL and REMOTE site 2) [LOCAL MODE] : Be used to start on LOCAL site only 3) [REMOTE MODE] : Be used to start on REMOTE site only
COMM. ADDRESS	Set communication environment by communicator It's value can be set up during [RUNNING] operation.
COMM. BAUDRATE	
COMM. PARITY	
COMM. PROTOCOL	
GENERATOR ROTATION	Select rotation direction of motor. 1) CW : Clockwise, 2) CCW : Counterclockwise
GENERATOR WIRING	Select wiring method of motor. 1) 1P-3W, 2) 3P-4W

6.1.1. GEN kW

- You should set the rated power of generator up.
- Settable range : 0 ~ 5000 [kW]

6.1.2. GEN FREQUENCY

- You should set the rated frequency of generator up.
- Settable range : 40 ~ 60 [Hz]

6.1.3. GEN VOLTAGE

- You should set the rated voltage of generator up.
- Settable range : 110 ~ 6600 [V]

6.1.4. GEN CURRENT

- You should set the rated current of generator up.
- Settable range : 5 ~ 9999 [A]

Computational methods of the rated current
Rated current [A] = Rated power [kW] ÷ {1.732 × rated voltage [V] × 1000 × Power factor (cosθ)}

6.1.5. PT RATIO

- You could set the ratio of PT up.
- Settable range : 1 ~ 99.99
- If rated voltage exceed AC 550 [Vrms], you must use PT.
- 2nd voltage of PT is to be rated voltage.
- Ex.) 1st voltage of PT : 6600 [V] (generated voltage)

2nd voltage of PT : 110 [V] (input voltage of the controller)

영향을 받는 메뉴	설정
[GENSET] → [GEN VOLTAGE]	110 [V]
[GENSET] → [PT RATIO]	60.0 (= 6600/110)

6.1.6. CT RATIO

- You should set the ratio of CT up.
- Settable range : 5/5 ~ 9999/5

6.1.7. SOLENOID TYPE

- You should set a type of governor.
- Settable items : STOP SOLENOID, FUEL SOLENOID

Menu to be influenced	Details
[OUTPUT CONFIG] → D/O setting	Contact point to be used must set [SOLENOID] up.

6.1.8. BREAKER TYPE

- You could set a type of circuit breaker.
- Settable items : MCCB, ACB

Items	Menu to be influenced	Details
MCCB	[GENSET] → [MCCB TRIP]	Decide to use trip coil of MCCB
	[GENSET] → [BREAKER AUX CHECK]	Decide to use aux. contact of MCCB.
ACB	[GENSET] → [BREAKER AUX CHECK]	Decide to use aux. contact of ACB.

6.1.9. MAGNETIC PICKUP

- You should decide to use the magnetic pick-up sensor.
- Settable items : ENABLE, DISABLE

MPU setting	Menu to be influenced	Details
ENABLE	[GENSET] → [TEETH(FACTOR)]	Input teeth of gear.
	[GENSET] → [OIL PRESS SWITCH]	Decide to use oil press. switch.
	[GENSET] → [OP-CHECK ON CRANK]	Decide to use oil press. switch on [CRANK].
	[GENSET] → [CRANK-OK RPM]	Decide to cut RPM of [Start Motor] off.
DISABLE	[GENSET] → [TEETH(FACTOR)]	Input 30 as teeth of gear.
	[GENSET] → [OIL PRESS SWITCH]	Decide to use oil press. switch.
	[GENSET] → [OP-CHECK ON CRANK]	Decide to use oil press. switch on [CRANK].

6.1.10. TEETH(FACTOR)

- You should input the teeth number of gear.
- Settable range : 0 ~ 500

6.1.11. MAINS SENSING

- You could choose a checking method of common used power.
- Settable items : BUS, UVR

Items	Menu to be influenced	Details
BUS	-	Use No. [3], [4] for status of common used power.
UVR	[INPUT CONFIG] → D/I setting	Set [UVR START] up to use for contact point.

6.1.12. OCR TYPE

- You could choose a type of overcurrent relay.
- Settable items : CONSTANT(definite-time), INVERSE(inverse-time)

Items	Menu to be influenced	Details
CONSTANT	[PROTECTION] → [OVER CURRENT DELAY]	Set delay time up.
INVERSE	[PROTECTION] → [OVER CURRENT LEVER]	Set lever up. (Refer to 11.3)

6.1.13. MCCB TRIP

- You could choose to use the trip coil of MCCB.
- Settable items : ENABLE, DISABLE

Items	Menu to be influenced	Details
ENABLE	[OUT CONFIG] → D/O setting	Set [BREAKER TRIP] up to use for relay-out

6.1.14. BREAKER AUX CHECK

- You could choose to use the auxiliary contact of circuit breaker.
- Settable items : ENABLE, DISABLE

Breaker type	Items	Details
ACB	ENABLE	Check for status of breaker according to aux. contact. Switch LED of breaker according to aux. contact.
	DISABLE	Not use
MCCB	ENABLE	Check for status of breaker according to aux. contact. Switch LED of breaker according to aux. contact.
	DISABLE	Not use

6.1.15. OP-CHECK ON CRANK

- You could choose to check for the oil press. switch when start motor crank generator up.
- Settable items : ENABLE, DISABLE

Items	Details
ENABLE	To output [START MOTOR] must be inputted the signal of low oil press. switch.

6.1.16. COOL TEMP SENDER

- You could choose to use what kind of coolant temp. sensor.
- Settable items : DISABLE, VDO, DAEWOO

6.1.17. COOL TEMP SWITCH

- You could choose to use what type of coolant temp. switch.
- Settable items : N/O, N/C

6.1.18. OIL PRESS SENDER

- You could choose to use the oil press. sensor.
- Settable items : DISABLE, VDO

6.1.19. OIL PRESS SWITCH

- You could choose to use what type of oil press. switch..
- Settable items : N/O, N/C

6.1.20. OIL TEMP SENDER

- You could choose to use what kind of oil temp. sensor.
- Settable items : DISABLE, DAEWOO

6.1.21. FUEL LEVEL SENDER

- You could choose to use the fuel level sensor.
- Settable items : ENABLE, DISABLE

6.1.22. CONTROL MODE

- You could choose to use what kind of control mode.
- Settable items : LOCAL+REMOTE, LOCAL, REMOTE

6.1.23. COMM. ADDRESS

- You could choose a communicated address.
- Settable items : 0 ~ 255

6.1.24. COMM. BAUDRATE

- You could choose a communicated baud rate.
- Settable items : 9600, 19200, 38400 [bps]

6.1.25. COMM. PARITY

- You could choose a communicated parity.
- Settable items : 설정 : EVEN, ODD, NONE

6.1.26. COMM. PROTOCOL

- You could choose a communicated protocol.
- Settable items : STANDARD MODBUS, NeoGCP 20 MODBUS, GIMAC-II Plus

6.1.27. GENERATOR ROTATION

- You should choose a rotated direction of generator.
- Settable items : CW, CCW

Items	Details
CW	Clockwise
CCW	Counterclockwise

6.1.28. GENERATOR WIRING

- You should choose a wiring method of generator.
- Settable items : 1-PHASE, 3-PHASE

6.2. SEQUENCE

- In [SEQUENCE] you could set up how to operate generator.
- Some items could be set during only stop sequence.

Items	Details
AUTO START DELAY	Time to delay the signal of [START] when a blackout in [AUTO]. Settable time : 0 ~ 600 [s]
AUTO STOP DELAY	Time to delay the signal of [STOP] when a normalcy in [AUTO]. Settable time : 0 ~ 600 [s]
PRE-GLOW TIME	Time to hold [PRE-GLOW] relay-out, before [CRANK-ON]. Settable time : 0 ~ 60 [s]
CRANK-ON TIME	Time to hold [START MOTOR] relay-out when [CRANK-ON]. Settable time : 1 ~ 9 [s]
CRANK-WAIT TIME	Time to check for building the generated voltage up. Settable time : 0 ~ 60 [s] After [CRANK-ON TIME] is consumed, [START MOTOR] relay-out is stopped. But during [CRANK-WAIT TIME], the controller waits for building the generated voltage up.
CRANK-REST TIME	Time to rest between [CRANK-ON] and [CRANK-OFF], when cranking is failed in [AUTO]. Settable time : 5 ~ 60 [s]
CRANK-REPEAT (AUTO)	The number to be repeated [CRANK-ON] in [AUTO]. Settable time : 1 ~ 9 [times] [FAIL TO START] will occur if generator is not crank up until the number of [CRANK-REPEAT].
CRANKING-OK RPM	RPM to cut [START MOTOR] relay-out off when [CRANK-ON]. Settable range : 100 ~ 1200 [RPM]
IDLE TIME	Time to be operated [IDLE RUNNING] before [BUILD-UP]. Settable time : 0 ~ 60 [s]
BUILD-UP DELAY	Time to wait for building generated voltage, rpm and frequency up. Settable time : 5 ~ 600 [s] [FAIL TO START] will occur if generated voltage, rpm and frequency are not build up until [BUILD-UP DELAY].
ACB CLOSE DELAY	Time to delay [BREAKER COLSE] relay-out when using ACB In [AUTO]. Settable time : 0 ~ 60 [s]
COOLDOWN TIME	Time to cool generator off in [AUTO] Settable time : 0 ~ 600 [s]
STOP-HOLD TIME	Time to hold [STOP] Settable time : 5 ~ 30 [s]

6.2.1. Order to operate generator

- Order to operate generator in normal is as followings.

Order	Items	Details
1	[READY]	[READY] status for a blackout.
2	[PRE-GLOW]	[PRE-GLOW] relay output before [START MOTOR] relay output.
3	[CRANK-ON]	Crank generator up over [START MOTOR] relay-out.
4	[CRANK-OFF]	Wait for [CRANK-REST TIME] when cranking is failed.
5	[BUILD-UP]	Wait for building up generated voltage, rpm and frequency.
6	[RUNNING]	Normal status able to be closed breaker.
7	[COOLDOWN]	Cooldown status
8	[STOP]	Stopped status

6.2.2. Conditions for [READY] Status

- To be [READY] status should be satisfied two conditions as followings.

Items	Condition	Status Message	
RPM	0 [rpm]	CHECK-RPM	CHECK-ALL
Oil Press. Switch	Low oil press. Condition	CHECK-OPS	

※ If only [GENSET] → [OP-CHECK ON CRANK] is [ENABLE], check oil press. switch.

- If even one of two conditions is not satisfied, LED that is selected as present operation flicker.
Ex, [AUTO]

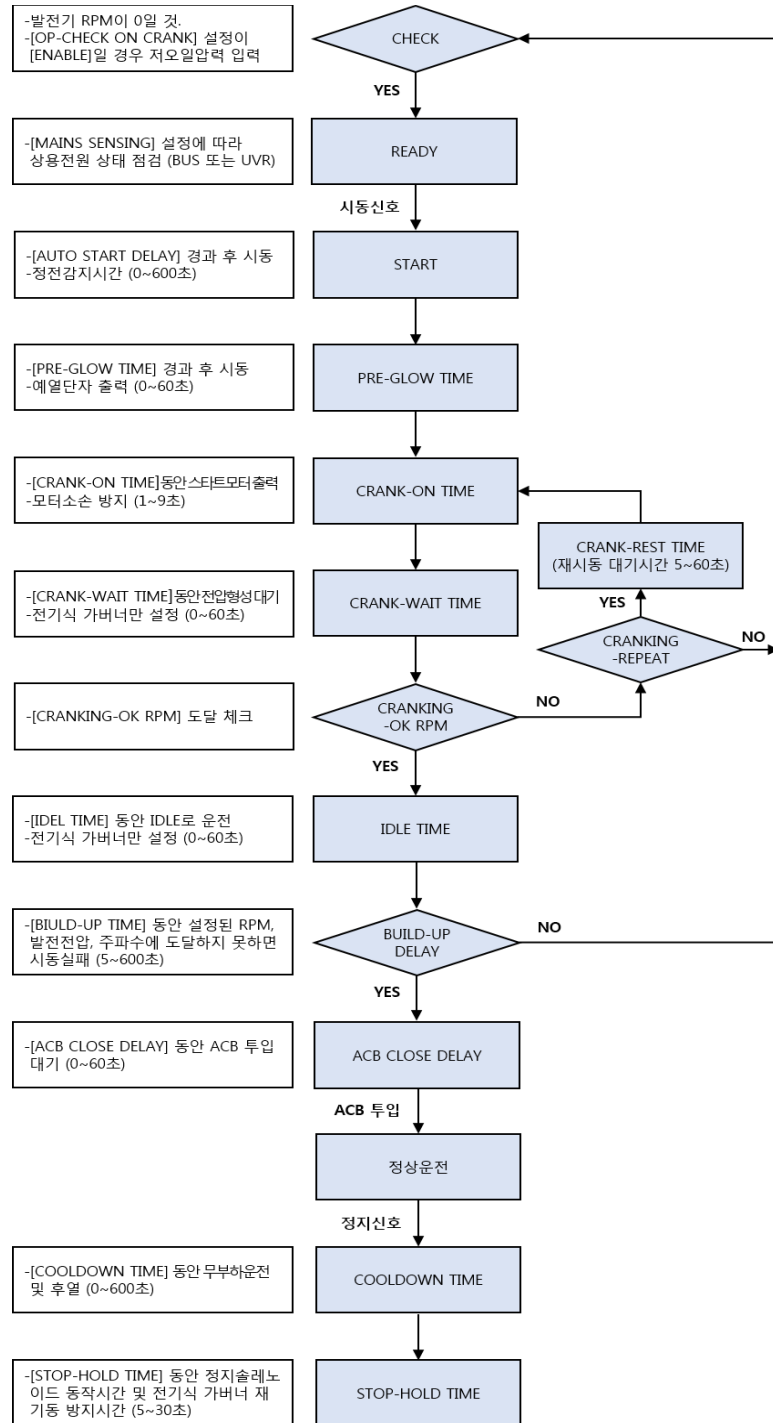
6.2.3. [MANUAL] Operation

- [START], [STOP], [COLSE] and [TRIP] buttons can control by manual.
- [COOLDOWN TIME] is not applied.
- [MANUAL] is displayed on LCD, LED for [MANUAL] turn on.
- When [BREAKER TYPE] is ACB, normal process is as followings.

Order	Button	설명
1	[MANUAL]	Must be [MANUAL] operation
2	[START]	Generator will start.
3	[COLSE]	Breaker will be closed only [RUNNING] status.
4	[TRIP]	Breaker will be opened after [RUNNING] status.
5	[STOP]	Generator will stop.

6.2.4. [AUTO] Operation

- [START], [STOP], [COLSE] and [TRIP] buttons can not control by manual.
- [AUTO] is displayed on LCD, LED for [AUTO] turn on.
- When [BREAKER TYPE] is ACB, normal process is as followings.



〈 Example for [AUTO] Operation 〉

6.2.5. [EM'CY] Operation

- If [EM'CY RUN] is inputted, [EM'CY] which is same as [AUTO] will be operated.
 - [EM'CY] is displayed on LCD, LED for [EM'CY] turn on.
 - [EM'CY] operation will turn off when [EM'CY RUN] input is interrupted.
- If [EM'CY] operation turn off, return to previous operation mode.

6.3. PROTECTION

- In [SEQUENCE] you could set up how to protect generator.
- Some items could be set during only stop sequence.

Items	Details	
OVER VOLTAGE	Set overvoltage range up.	100 ~ 120 [%]
OVER VOLTAGE DELAY	Set overvoltage delay up.	0.5 ~ 30.0 [s]
OVER VOLTAGE ALARM	Set overvoltage alarm up.	TRIP / SHUTDOWN
UNDER VOLTAGE	Set undervoltage range up.	80 ~ 100 [%]
UNDER VOLTAGE DELAY	Set undervoltage delay up.	0.5 ~ 30.0 [s]
UNDER VOLTAGE ALARM	Set undervoltage alarm up.	TRIP / SHUTDOWN
OVER CURRENT	Set overcurrent range up.	101 ~ 200 [%]
OVER CURRENT DELAY	Set overcurrent delay up when [CONSTANT].	0.5 ~ 30.0 [s]
OVER CURRENT LEVER	Set overcurrent lever up when [INVERSE].	0.1 ~ 1.2
OVER CURRENT ALARM	Set overcurrent alarm up.	TRIP / SHUTDOWN
OVER FREQ.	Set overfrequency range up.	100 ~ 120 [%]
OVER FREQ. DELAY	Set overfrequency delay up.	0.5 ~ 30.0 [s]
OVER FREQ. ALARM	Set overfrequency alarm up.	TRIP / SHUTDOWN
UNDER FREQ.	Set underfrequency range up.	80 ~ 100 [%]
UNDER FREQ. DELAY	Set underfrequency delay up.	0.5 ~ 30.0 [s]
UNDER FREQ. ALARM	Set underfrequency alarm up.	TRIP / SHUTDOWN
OVER SPEED	Set overpeed range up.	0 ~ 4000 [RPM]
OVER SPEED DELAY	Set overpeed delay up.	0.1 ~ 1.0 [s]
UNDER SPEED	Set underspeed range up.	0 ~ 4000 [RPM]
UNDER SPEED DELAY	Set underspeed delay up.	0.5 ~ 60.0 [s]
LOW COOL TEMP	Set low temp. of coolant up.	-20 ~ 50 [°C]
HIGH COOL TEMP W	Set high temp. of coolant up. (WARNING)	0 ~ 150 [°C]
HIGH COOL TEMP S	Set high temp. of coolant up. (SHUTDOWN)	0 ~ 150 [°C]
LOW OIL PRESS W	Set low press. of oil up. (WARNING)	0.0 ~ 9.9 [bar]
LOW OIL PRESS S	Set low press. of oil up. (SHUTDOWN)	0.0 ~ 9.9 [bar]
HIGH OIL TEMP	Set high temp. of oil up.	0 ~ 150 [°C]
HIGH OIL TEMP ALARM	Set alarm grade of high oil temp..	WARNING / TRIP / SHUTDOWN
LOW FUELLEVEL	Set low level of fuel.	0 ~ 50 [%]
LOW FUELLEVEL ALARM	Set alarm grade of low fuel-level.	WARNING / TRIP / SHUTDOWN
HIGH BAT.VOLTAGE	Set high voltage of battery.	6 ~ 40 [V]
LOW BAT.VOLTAGE	Set low voltage of battery.	6 ~ 40 [V]
OIL PRESS DEAD TIME	Time to delay low oil press. check on [CRANK-ON]	0 ~ 30 [초]
SHORT CIRCUIT TRIP	Set short circuit current up.	DISABLE / ENABLE
SC TRIP CURRENT	Set alarm grade of short circuit current up.	6 ~ 10 [A]

6.4. INPUT CONFIG

- In [INPUT CONFIG] you could set up digital input contact of user.
- Some items could be set during only stop sequence.

Items	Details	
INPUT (DI) 1	Set up D/I contact.	Refer to below chart for catalog.
INPUT (DI) 2		
INPUT (DI) 3		
INPUT (DI) 4		
INPUT (DI) 5		
INPUT (DI) 6		
INPUT (DI) 7		
INPUT (DI) 8		
INPUT (DI) 9		
USER ALARM 1 TEXT	Modify alarm message of [USER ALARM] (by using [▲], [▼] buttons to change characters.)	
USER ALARM 2 TEXT		
USER ALARM 3 TEXT		

- Lists to be usable are as followings.

D/I List	Details	Delay [s]	Alarm Grade			
			SHT	TRP	WRN	
BREAK AUX	Breaker auxiliary contact	-	-	-	-	Always
UVR START	Contact for UVR start	-	-	-	-	Always in [AUTO]
EM'CY RUN	Contact for Emergency run	-	-	-	-	Always
EM'CY STOP	Contact for Emergency stop	-	○	○	○	Always
COOL TEMP S/W	Coolant temp. switch	0~600	○	-	-	Running
OIL PRESS S/W	Oil press. Switch	0~600	○	-	-	Running
USER ALARM 1	Contact for user alarm 1	0~600	○	○	○	Always
USER ALARM 2	Contact for user alarm 2	0~600	○	○	○	Always
USER ALARM 3	Contact for user alarm 3	0~600	○	○	○	Always
DMPR ALARM	Damper alarm	0~600	○	○	○	Always
NO CHARGING	No charging	0~600	○	○	○	Running
OCGR	OCGR	0~600	○	○	○	Always
OVGR	OVGR	0~600	○	○	○	Always
SGR	SGR	0~600	○	○	○	Always
FIELD OCR	Field OCR	0~600	○	○	○	Always
FUEL LEVEL LOW	Low level for fuel	0~600	○	○	○	Always
FUEL LEVEL HIGH	High level for fuel	0~600	○	○	○	Always
OIL TEMP S/W	Oil temp. switch	0~600	○	○	○	Always
OVER VOLTAGE	Overvoltage	0~600	○	○	-	Always
UNDER VOLTAGE	Undervoltage	0~600	○	○	-	Always
OVER CURRENT	Overcurrent	0~600	○	○	-	Always
OVER SPEED	Overspeed	0~600	○	-	-	Always
FAIL TO START	Failure for start	0~600	○	-	-	Always

6.4.1. BREAK AUX

- You could use as auxiliary contact of breaker that was set only normal-open.

Menu to be influenced	Items	Details
[GENSET] → [BREAKER AUX CHECK]	[ENABLE]	When Using breaker aux. contact

6.4.2. UVR START

- In [AUTO] you could use as start contact for generator.
- Generator will turn on when contact is inputted, if not, it will turn off.

Menu to be influenced	Items	Details
[GENSET] → [MAINS SENSING]	[UVR]	Contact for start in [AUTO]
[SEQUENCE] → [AUTO START DELAY]	0 ~ 600 [s]	Time to delay start in [AUTO]
[SEQUENCE] → [AUTO STOP DELAY]	0 ~ 600 [s]	Time to delay stop in [AUTO]

6.4.3. EM'CY RUN

- You could use as start contact of emergency run that was set only normal-open.
- Generator will turn [EM'CY RUN] on when contact is inputted, operation sequence is same as [AUTO].
- If contact is interrupted, generator will turn off. And return to previous operation mode.

6.4.4. EM'CY STOP

- You could use as stop contact of emergency situation that was set only normal-open.
- If contact is inputted, generator will immediately turn off.
- If load is connected, generator will immediately turn off after breaker is opened.

6.4.5. COOL TEMP S/W

- You could use as temp. switch of coolant.
- When warnings occurs, generator will shut down after predetermined time During [BUILD-UP] ~ [COOLDOWN].

Menu to be influenced	Items	Details
[GENSET] → [COOL TEMP SWITCH]	[N/O] or [N/C]	Set type up of switch.

6.4.6. OIL PRESS S/W

- You could use as press. switch of oil.
- When warnings occurs, generator will shut down after predetermined time During [BUILD-UP] ~ [COOLDOWN].

Menu to be influenced	Items	Details
[GENSET] → [OIL PRESS SWITCH]	[N/O] or [N/C]	Set type up of switch.

6.4.7. USER ALARM 1 ~ 3

- You could use as user alarm that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).
- User can change text of message

Menu to be influenced	Items	Details
[GENSET] → [INPUT CONFIG] → [USER ALARM TEXT]	User setting	Text change

6.4.8. DMPR ALARM

- You could use as damper alarm that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).

6.4.9. NO CHARGING

- You could use as charging alarm that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).
- It will operate Only [RUNNING] status.

6.4.10. OCGR

- You could use as OCGR contact that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).

6.4.11. OVGR

- You could use as OVGR contact that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).

6.4.12. SGR

- You could use as SGR contact that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).

6.4.13. FIELD OCR

- You could use as field OCR contact that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).

6.4.14. FUEL LEVEL LOW

- You could use as low level contact of fuel that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).

6.4.15. FUEL LEVEL HIGH

- You could use as high level contact of fuel that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).

6.4.16. OIL TEMP S/W

- You could use as switch for oil temp. that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).

6.4.17. OVER VOLTAGE

- You could use as overvoltage contact that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).

6.4.18. UNDER VOLTAGE

- You could use as undervoltage contact that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).

6.4.19. OVER CURRENT

- You could use as overcurrent contact that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).

6.4.20. OVER SPEED

- You could use as overspeed contact that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).

6.4.21. FAIL TO START

- You could use as start failure contact that was set only normal-open.
- User can set up alarm delay and alarm grade (SHT or TRP or WRN).

6.5. OUT CONFIG

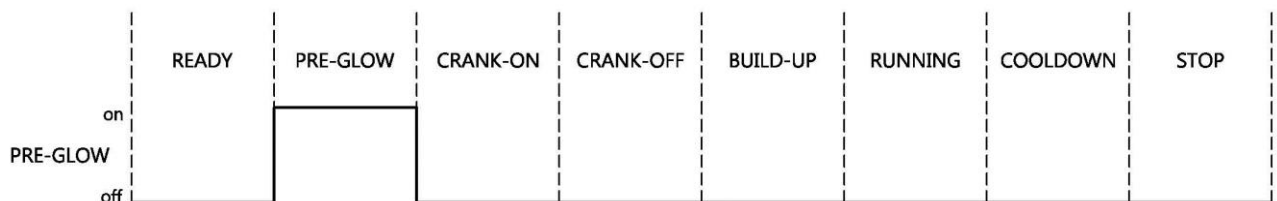
- In [OUT CONFIG] you could set up digital output contact of user.
- Some items could be set during only stop sequence.

PRE-GLOW	Pre-glow	EM'CY RUN MODE	Emergency operation
START MOTOR	Start motor	ALARM BUZZER	Buzzer
SOLENOID	Solenoid	ALARM RESET	Alarm reset
IDLE SPEED	IDLE speed	OVER VOLTAGE	Overvoltage
ENGINE RUNNING	Engine running	UNDER VOLTAGE	Undervoltage
RATED SPEED	Rated speed	OVER CURRENT	Overcurrent
BREAKER CLOSE	Breaker close	OVER FREQUENCY	Overfrequency
BREAKER TRIP	Breaker trip	OCGR	OCGR
ATS-GEN	ATS control	OVGR	OVGR
MAINS ON	Common used power on	SGR	SGR
MAINS OFF	Common used power off	FIELD OCR	Field OCR
UVR ON	UVR on	OVER SPEED	Overspeed
UVR OFF	UVR off	HIGH COOL TEMP	High coolant temp.
BUS ON	BUS on	LOW OIL PRESS	Low oil press.
BUS OFF	BUS off	FAIL TO START	Failure to start
GEN START	Gen. start	ENGINE FAULT	Engine fault
GEN RUNNING	Gen. running	DAMP SHUTDOWN	Damper shut down
ALL ALARM	All alarm	LOW FUEL LEVEL	Low level of fuel
TRIP OR SHUTDOWN	Trip or shut down	HIGH FUEL S/W	High level switch of fuel
SHUTDOWN ALARM	Shut down	LOW FUEL S/W	Low level switch of fuel
MANUAL MODE	Manual operation	IDLE INVERSE	Inverse signal of idle
AUTO MODE	Auto operation		

6.5.1. PRE-GLOW

- This item is used when you need to warm generator up in [PRE-GLOW].
- If signal of start is inputted in [READY], [PRE-GLOW] will be outputted during [PRE-GLOW TIME] before [CRANK-ON].

Menu to be influenced	Items	Details
[SEQUENCE] → [PRE-GLOW TIME]	0 ~ 60 [s]	Time to last output of [PRE-GLOW].

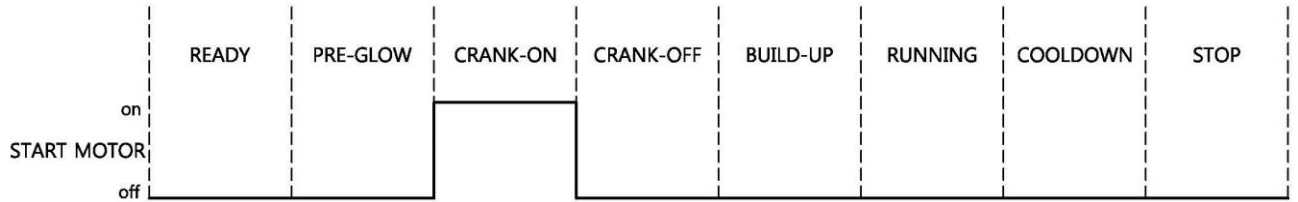


〈 Output of [PRE-GLOW] according to sequence 〉

6.5.2. START MOTOR

- This item is used as output for start motor in [CRANK-ON].

Menu to be influenced	Items	Details
[SEQUENCE] → [CRANK-ON TIME]	1 ~ 9 [s]	Time to last output of [START MOTOR].

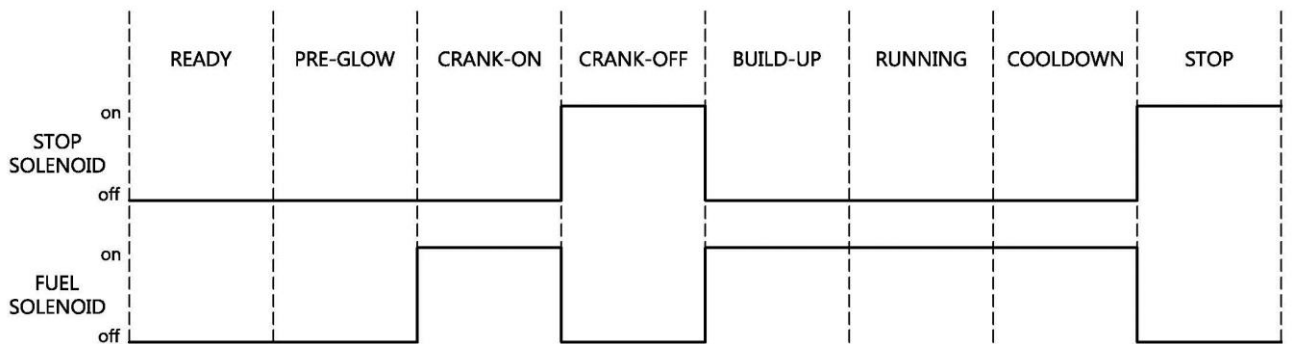


〈 Output of [START MOTOR] according to sequence 〉

6.5.3. SOLENOID

- This item is used as output for solenoid

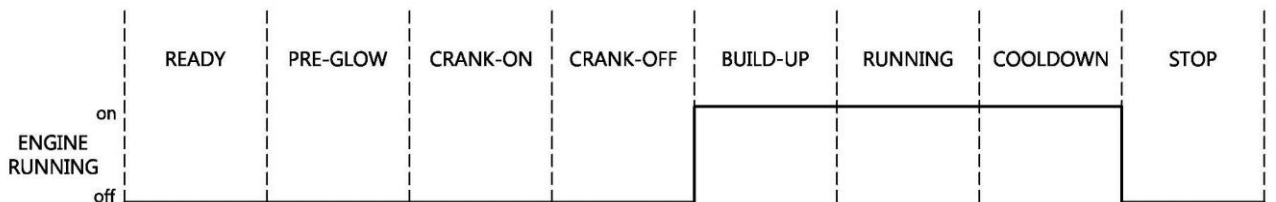
Menu to be influenced	Items	Details
[GENSET] → [SOLENOID TYPE]	STOP or FUEL	Refer to [6.1.7. SOLENOID TYPE]



〈 Output of [SOLENOID] according to sequence 〉

6.5.4. ENGINE RUNNING

-This item is used as output in [BUILD UP], [RUNNING] and [COOLDOWN].



〈 발전기 Output of [ENGINE RUNNING] according to sequence 〉

6.5.5. IDLE SPEED

- This item is used as output for idle speed in [CRANK-ON] and [BUILD UP], if [IDLE TIME] is not zero.

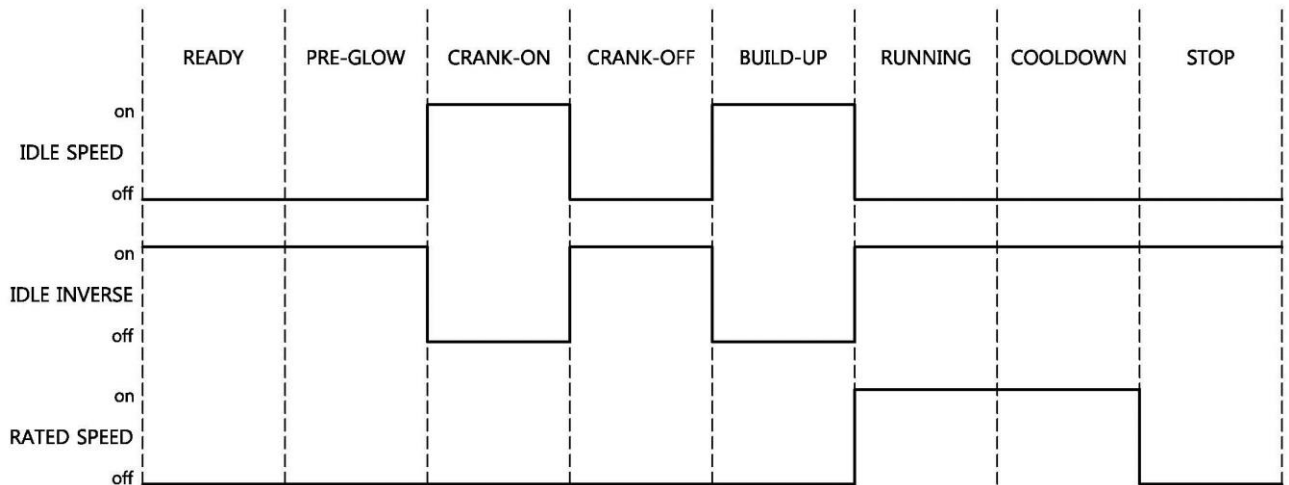
Menu to be influenced	Items	Details
[SEQUENCE] → [IDLE TIME]	0 ~ 60 [s]	Time to last output of [IDLE SPEED].

6.5.6. IDLE INVERSE

- This item is inversely operated with [IDLE SPEED].

6.5.7. RATED SPEED

- This item is used as output for rated speed in [BUILD UP], [RUNNING] and [COOLDOWN].
- If [IDLE SPEED] is not in [BUILD UP], [RATED SPEED] will output.



< Output of [IDLE SPEED], [IDLE INVERSE] and [RATED SPEED] >

6.5.8. BREAKER CLOSE

- If warnings not occur, this item is used as output of breaker close in [RUNNING]. (It lasts 5 seconds.)
- If [BREAKER TYPE] is ACB, it will operate by pushing [CLOSE] button in [MANUAL].
- If [BREAKER TYPE] is ACB, it will automatically operate after predetermined time in [AUTO], [EM'CY].

Menu to be influenced	Items	Details
[GENSET] → [BREAKER TYPE]	ACB	It work only when ACB.
[SEQUENCE] → [ACB CLOSE DELAY]	0 ~ 60 [s]	Time to delay output of [CLOSE]

6.5.9. BREAKER TRIP

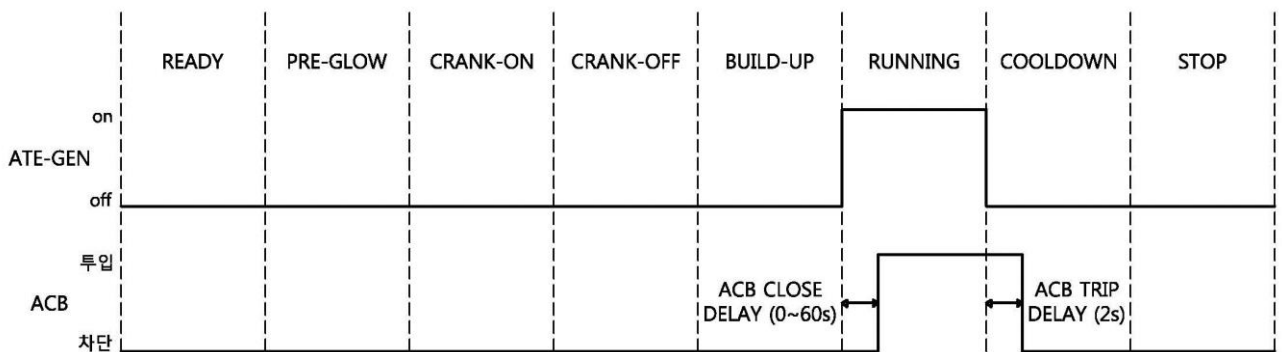
- This item is used as output of breaker trip in [RUNNING], [COOLDOWN], [STOP]. (It lasts 5 seconds.)
- If [BREAKER TYPE] is ACB, it will operate by pushing [TRIP] button in [MANUAL].
- If [BREAKER TYPE] is ACB, it will automatically operate in [AUTO], [EM'CY].
- If [BREAKER TYPE] is MCCB, [BREAKER TRIP] will only outputted when [MCCB TRIP] is [ENABLE].

Menu to be influenced	Items	Details
[GENSET] → [MCCB TRIP]	ENABLE	It only works when mccb trip is enable.

6.5.10. ATS-GEN

- This item is used as contact for ATS (Automatic Transfer Switch) in [RUNNING].
- When [OUTPUT CONFIG] is set [ATS-GEN] up, [TRIP] is delayed for fixed two seconds in [COOLDOWN].
- In above the delayed time of [COOLDOWN TIME] is fixed at least two seconds.

Menu to be influenced	Items	Details
[SEQUENCE] → [ACB CLOSE DELAY]	0 ~ 60 [s]	Time to be delayed for [TRIP] in [AUTO]



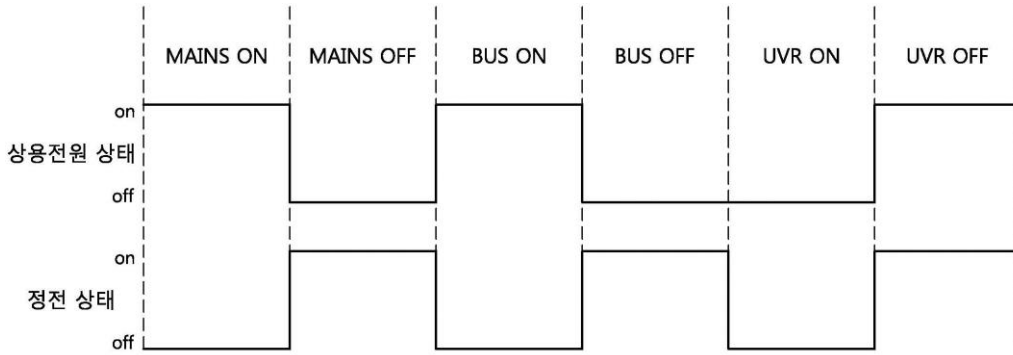
〈 Example for [ATS-GEN] in case of [ACB] 〉

6.5.11. MAINS ON/OFF, BUS ON/OFF, UVR ON/OFF

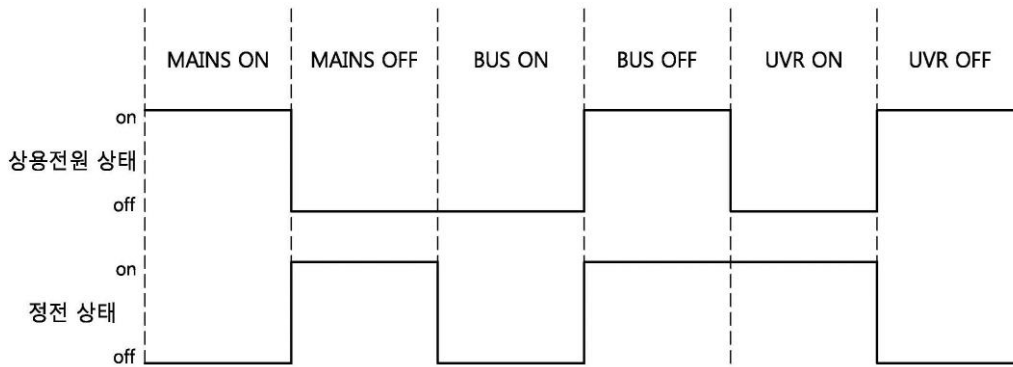
- This item is used as output for common used power.

Menu to be influenced	Items	Details
[GENSET] → [MAINS SENSING]	[BUS] or [UVR]	Selection from user.

- If [MAINS SENSING] is set [BUS] up, it will be outputted as only [UVR OFF] in case of [UVR].
- If [MAINS SENSING] is set [UVR] up, it will be outputted as only [BUS OFF] in case of [BUS].



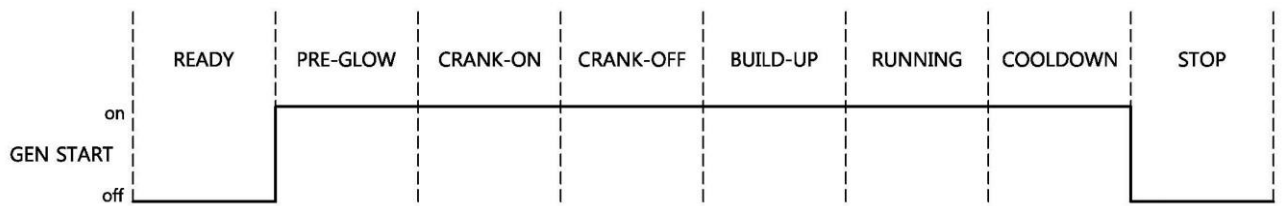
< Example for outputs when [MAINS SENSING] is set [BUS] up >



< Example for outputs when [MAINS SENSING] is set [UVR] up >

6.5.12. GEN START

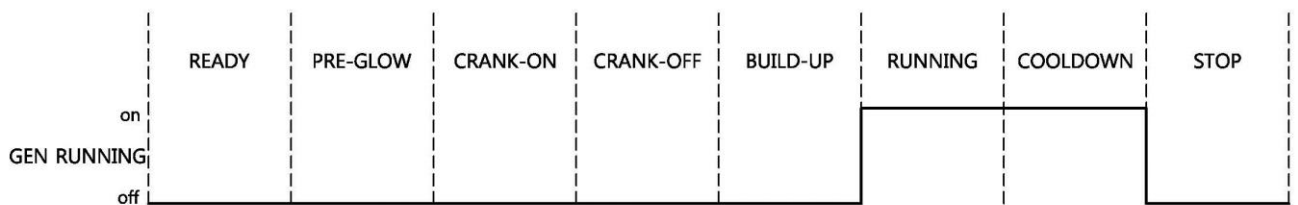
- [PRE-GLOW] 상태부터 [COOLDDOWN] 상태까지 발전기 기동 상태 출력 점점으로 사용합니다.



< 발전기 상태에 따른 [GEN START] 출력 >

6.5.13. GEN RUNNING

- This item is used as output from [PRE-GLOW] to [COOLDDOWN].



< Output of [GEN START] according to sequence >

6.5.14. ALL ALARM

- This item is used as output when alarm occur.

6.5.15. TRIP OR SHUTDOWN

- This item is used as output when trip or shut down alarm occur.

6.5.16. SHUTDOWN ALARM

- This item is used as output when shut down alarm occur.

6.5.17. MANUAL MODE, AUTO MODE, EM'CY RUN MODE

- This item is used as output about selected operation mode.

6.5.18. ALARM BUZZER

- This item is used as output for buzzer when alarm occur. It lasts 10 seconds.
- If warnings are not released, it will be only outputted to each kind of first warning.

6.5.19. ALARM RESET

- This item is used as output for alarm reset while reset signal is inputted.

6.5.20. 경고 상황 출력

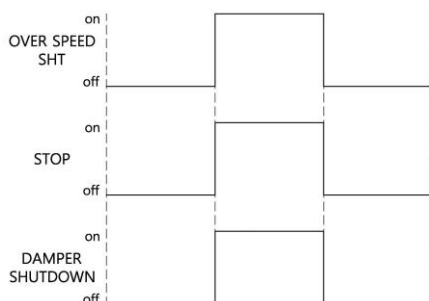
- When below warnings occur, suitable contact will be outputted.
- [OVER VOLTAGE], [UNDER VOLTAGE], [OVER CURRENT], [OVER FREQUENCY], [OCGR], [OVGR], [SGR]
- [FIELD OCR], [OVER SPEED], [HIGH COOL TEMP], [LOW OIL PRESS], [FAIL TO START], [LOW FUEL LEVEL]
- [HIGH FUEL S/W], [LOW FUEL S/W]

6.5.21. ENGINE FAULT

- This item is used as significant fault of engine in case of [OVER SPEED], [COOL TEMP S/W], [OIL PRESS S/W] and [FAIL TO START].

6.5.22. DAMPER SHUTDOWN

- This item is used as damper shut down contact when using damper.
- It will be outputted only when [STOP] and shutdown due to [OVER SPEED].



< Conditions of [DAMPER SHUTDOWN] output >

7. CALIBRATION

- Digital output could be adjusted by being changed value of gain and offset.
- These items could be set at any time.

Items	Details	Settable range
PT R-S GAIN	R-S line voltage	0.001 ~ 9.999
PT S-T GAIN	S-T line voltage	
PT T-R GAIN	T-R line voltage	
CT R GAIN	R phase voltage	
CT S GAIN	S phase voltage	
CT T GAIN	T phase voltage	
BAT. VOLTAGE GAIN	Battery voltage	-200 ~ 200
COOL TEMP OFFSET	Sensor input	
OIL PRESS OFFSET		
OIL TEMP OFFSET		
FUEL LEVEL OFFSET	Fuel level sensor	0.001 ~ 9.999
FUEL LEVEL GAIN		

7.1. PROTECTION TEST

- Protection test could be done at any time without changing setting.

항목	설명	Remarks
OVER VOLTAGE TEST	OVR	
UNDER VOLTAGE TEST	UVR	
OVER CURRENT TEST	OCR	
OVER SPEED TEST	OVER SPEED	

```
[PROTECTION TEST]
>OVER VOLTAGE
  PUSH ENTER TO TEST
```

< PROTECTION TEST Screen >

7.2. ALARM HISTORY

- You could see recoded alarms up to 100 and on-off time of start motor.

```
[ALARM HISTORY] 010
  RUN HOUR:000000.34
->CLICK DOWN 01/02
  SHT:OVER VOLTAGE
```

```
[ALARM HISTORY] 011
  START MOTOR ON/OFF
>ON-OFF TIME: 05.00
```

< ALARM HISTORY Screen >

7.3. SYSTEM CHECK

- You will check statuses of the controller as followings.

```
[SYSTEM CHECK]
>S/N:NFI00000
>Ver:5.56
```

< Serial Number and Firmware version >

```
[SYSTEM CHECK]
>COMM RX,TX STATUS
  RX:000000000000000000
  TX:000000000000000000
```

< Communication Status >

```
[SYSTEM CHECK]
>PT A/D,INT STATUS
  0000 / 0000 / 0000
  0000 / 0000
```

< Voltage Status >

```
[SYSTEM CHECK]
>CT A/D,INT STATUS
  0000 / 0000 / 0000
  0000 / 0000
```

< Current Status >

```
[SYSTEM CHECK]
>MPU STATUS
      RPM: 000000
  HIGH-MPU: 000000
```

< MPU Status >

```
[SYSTEM CHECK]
>MAINS INPUT STATUS
  BUS-LOW : 00000
  BUS-HIGH: 00000
```

< Common Used Power Status >

```
[SYSTEM CHECK]
>SENSOR STATUS
  0000 / 0000 / 0000
  0000 / 0000
```

< Sensor Status >

8. COMMUNICATION SETTING

- If you need communication with external device, RS485 communication is possible through D-SUB 9 PIN port backside of the controller.
- In this case special converter which is sailing from us should use.

8.1. MODBUS PROTOCOL

Items	Details
ADDRESS	0 ~ 255
BAUDRATE	9600, 19200, 38400 [bps]
DATA BIT	8 [bit]
STOP BIT	1 [bit]
PARITY	NONE, EVEN, ODD
PACKET INTERVAL	Over 500 [ms]
BYTE INTERVAL	Within 50 [ms]

8.2. REQUEST (04h)

Address	Items	Byte	Scale	Address	Items	Byte	Scale
30001	R-N Phase voltage [V]	2	1	30016	Coolant temp. [°C]	2	Sign
30002	S-N Phase voltage [V]	2	1	30017	Oil press. [bar]	2	/10
30003	T-N Phase voltage [V]	2	1	30018	Oil temp. [°C]	2	Sign
30004	R-S Line voltage [V]	2	1	30019	Fuel level [%]	2	1
30005	S-T Line voltage [V]	2	1	30020	Battery voltage [V]	2	/10
30006	T-R Line voltage [V]	2	1	30021	Integrating wattmeter (Point)	2	/36
30007	R Current [A]	2	1	30022	Integrating wattmeter	4	1
30008	S Current [A]	2	1	30024	Running Hour (Point)	2	/60
30009	T Current [A]	2	1	30025	Running Hour	4	1
30010	RPM [rpm]	2	1	30027	LED status	2	1
30011	Frequency [Hz]	2	/10	30028	Sequence	2	1
30012	Active power [kW]	2	1	30029	SHUTDOWN alarm	4	1
30013	Apparent power [kVA]	2	1	30031	BREAKER TRIP alarm	4	1
30014	Reactive power [kvar]	2	1	30033	WARNING alarm	4	1
30015	Power factor [P.F]	2	/100				

8.3. COMMAND (05h)

주소	항목	VALUE
00001	Stop	1
00002	Start	1
00003	Alarm reset	1
00005	Manual operation	1
00006	Auto Operation	1
00009	BRK Close	1
00010	BRK Trip	1

8.4. DEFINES FOR COMMUNICATION

- Defines of LED status

BIT	30027
0	Trip or shutdown
1	Manual
2	Auto
3	Emergency run
4	Remote
5	Running
6	Close
7	Trip
8	Warning

- Defines of sequence

VALUE	30028
0	READY
1	PRE-GLOW
2	CRANK-ON
3	CRANK-REST
4	BUILD-UP
5	RUNNING
6	COOLDOWN
7	STOP

- Defines of alarms (30029, 30031, 30033)

Bit	30029	30031	30033	Bit	30029	30031	30033
0		Oversvoltage	Low cool temp.	16	Aux. alarm 8	Oil temp. switch	No charging
1	Undervoltage	Undervoltage	High cool temp.	17	Aux. alarm 9	RESERVED	OCGR
2	Overcurrent	Overcurrent	Low oil press	18	No charging	RESERVED	OVGR
3	Overfreq.	Overfreq.	High bat. vol.	19	OCGR	RESERVED	SGR
4	Underfreq.	Underfreq.	Low bat. vol.	20	OVGR	RESERVED	Field OCR
5	Overspeed	High oil temp.	Speed sensor fault	21	SGR	RESERVED	Fuel level switch
6	Underspeed	Low fuel level	Cool. Sensor fault	22	Field OCR	RESERVED	Oil temp. switch
7	Em'cy stop	Aux. alarm 7	Oil press. Sensor fault	23	Fuel level switch	RESERVED	RESERVED
8	Fail to start	Aux. alarm 8	Oil temp. sensor fault	24	Oil temp. switch	RESERVED	RESERVED
9	High cool temp.	Aux. alarm 9	Fuel level sensor fault	25	RESERVED	RESERVED	RESERVED
10	Low oil press.	No charging	MCB fault	26	Fuel level switch	RESERVED	RESERVED
11	Cool temp. switch	OCGR	High oil temp.	27	Oil temp. switch	RESERVED	RESERVED
12	Low oil press. Switch	OVGR	Low fuel level	28	RESERVED	RESERVED	RESERVED
13	High oil temp.	SGR	Aux. alarm 7	29	RESERVED	RESERVED	RESERVED
14	Low fuel level	Field OCR	Aux. alarm 8	30	RESERVED	RESERVED	RESERVED
15	Aux. alarm 7	Fuel lever switch	Aux. alarm 9	31	RESERVED	RESERVED	RESERVED

9. Warning List and Alarm Grade setting

Warning message	Alarm Grade			Operated sequence	Term
	SHT	TRP	WRN		
OVER VOLTAGE	○	○		Always	User setting
UNDER VOLTAGE	○	○		RUNNING	User setting
OVER CURRENT	○	○		Always	User setting
OVER FREQUENCY	○	○		Always	User setting
UNDER FREQUENCY	○	○		RUNNING	User setting
OVER SPEED	○			Always	User setting
UNDER SPEED	○			RUNNING	User setting
EMERGENCY STOP	○			Always	Immediately
FAIL TO START	○			CRANK-ON~BUILD-UP	Immediately
COOL TEMP LOW			○	Always	1 [s]
COOL TEMP HIGH	◎		◎	RUNNING~COOLDOWN	1 [s]
OIL PRESS LOW	◎		◎	RUNNING~COOLDOWN	1 [s]
COOL TEMP S/W	○			RUNNING~COOLDOWN	1 [s]
OIL PRESS S/W	○			RUNNING~COOLDOWN	1 [s]
OIL TEMP HIGH	○	○	○	RUNNING~COOLDOWN	1 [s]
NO CHARGING	○	○	○	RUNNING~COOLDOWN	User setting
FUEL LEVEL LOW	○	○	○	Always	10 [s]
BAT.VOLTAGE HIGH			○	Always	10 [s]
BAT.VOLTAGE LOW			○	Always	10 [s]
MPU SENDER			○	BUILD-UP~COOLDOWN	5 [s]
COOL TEMP SENDER			○	Always	5 [s]
OIL PREE SENDER			○	Always	5 [s]
OIL TEMP SENDER			○	Always	5 [s]
FUEL LEVEL SENDER			○	Always	5 [s]
BREAKER AUX FAIL			○	Always	Immediately
S-CIRCUIT TRIP	◎			Always	Immediately
AUX.ALARM7	○	○	○	Always	User setting
AUX.ALARM8					
AUX.ALARM9					
OCGR					
OVGR					
SGR					
FIELD OCR					
LOW FUEL S/W					
OIL TEMP S/W					

○ :: Duplication is impossible / ◎ : Duplication is impossible

10. Addition of D/I or D/O

- If you need to add D/I or D/O, You should use extension module from us.
- Fixed D/I and D/O of extension module are as followings.

D/I	Details
D/I 1	[MANUAL]
D/I 2	[AUTO]
D/I 3	[GEN START]
D/I 4	[GEN STOP]
D/I 5	[BREAKER CLOSE]
D/I 6	[BREAKER TRIP]
D/I 7	[ALARM RESET]

D/O	Details
D/O 1	[OVER VOLTAGE]
D/O 2	[UNDER VOLTAGE]
D/O 3	[OVER CURRENT]
D/O 4	[OVGR], [OCGR], [SGR]
D/O 5	[OVER SPEED]
D/O 6	[COOL TEMP HIGH] or [COOL TEMP S/W]
D/O 7	[OIL PRESS LOW] or [OIL PRESS S/W]
D/O 8	[FAIL TO START]

11. SPECIFICATION OF PROTECTION RELAY

11.1. Feature

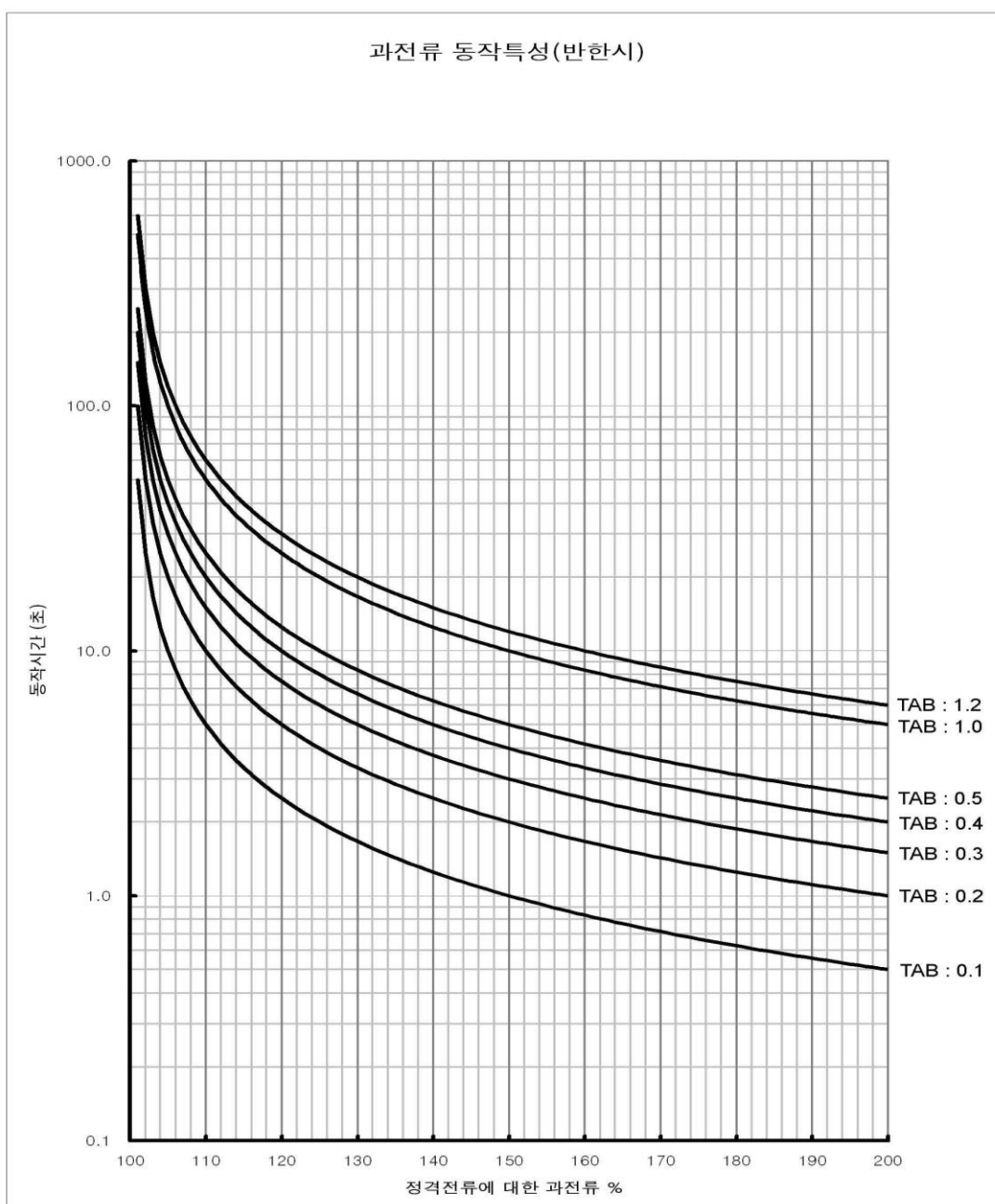
- Setting value tolerance : ± 5 [%]
- Setting time tolerance : $t < 4$ [s] : ± 0.2 [s] , $t \geq 4$ [s] : ± 5 [%]

11.2. Feature of OVR, UVR (definite-time)

- Sensing voltage range : Max 550 [Vrms]

11.3. Feature of OCR (definite-time, inverse)

- Sensing current range (2nd current of CT) : Max 10 [A]



〈 OCR curve at inverse type 〉