DPU Series

Features

- Fast response speed and high accuracy by high-speed CPU
- Accurate feedback control (static current, static voltage, static power) by RMS measurement
- Phase control and zero-crossing cycle control (fixed/variable cycle) method for various load control
- Protects inner circuit by built-in rapid fuse
- Remote monitoring and remote control Supports Modbus RTU protocol by RS485 communication
- Built-in customizable 6 digital inputs
- Basic variable alarm outputs; current error, heater part (parts of heater break detection), etc.
- Supports multi input of control input signal (current, voltage, potentionmeter, etc)
- Enables to install control part separately
- Applicable load: all loads such as super kanthal, platinum, molybdenum, carbon, halogen lamp, chrome, nickel, etc.

CE

⚠ **Please read "Safety Considerations" in operation manual before using this unit.**

Ordering Information

DPU	1	2	A	—	025	R

Option

R	RS485 communication
D	Remote Display Unit
A	Remote Display Unit + RS485 communication
N	No option

Rated current capacity

025	25A	200	200A
040	40A	250	250A
050	50A	350	350A
070	70A	400	400A
080	80A	500	500A
100	100A	600	600A
120	120A		
150	150A		
180	180A		

Size

	1-phase	3-phase
A	0 to 70A	0 to 50A
B	80 to 200A	70 to 200A
C	250 to 350A	
D	400 to 600A	
E	Option	

Power supply

1	110VAC
2	220VAC
3	380VAC
4	440VAC

Control phase

1	1-phase
3	3-phase

Item

DPU	Digital Power Controller Unit

Digital Thyristor Power Controller

■ Size type

◎ 1-phase
(unit: mm)

Size	Current capacity	W	H	D	P1	P2	Allowable cable thickness
A	0 to 70 A	97	260	170	82	150	Min. AWG 4
B	80 to 200 A	140	280	174	127	150	Min. AWG 4/0
C	250 to 350 A	213	338	179	193	200	Min. AWG 300MCM
D	400 to 600 A	278	418	212	261	200	Min. AWG 500MCM

◎ 3-phase
(unit: mm)

Size	Current capacity	W	H	D	P1	P2	Allowable cable thickness
A	0 to 50A	140	306	200	127	150	Min. AWG 4
B	70 to 200A	213	365	217	195	200	Min. AWG 4/0
C	250 to 350A	278	450	227.5	261	200	Min. AWG 300MCM
D	400 to 600A	427	528	275.5	405	330	Min. AWG 500MCM

Specifications

Series	DPU	
Number of phases	1-phase	3-phase
Power supply	110VAC∼ / 220VAC∼ / 380VAC∼ / 440VAC∼ (FAN and control power 220VAC∼ 50/60Hz separately)	
Allowable voltage	90 to 110% of rated voltage	85 to 115% of rated voltage
Rated frequency	50/60Hz (auto recognition), allowable frequency range: ±2Hz	
Min. load current	1A	
Output range	Phase control: 5 to 98%, Z.C. control: 0 to 100%	
Control method[1]	• Phase control: Normal control (Non-Feedback), static voltage/static current/static power control (Feedback) • Cycle control (Z.C.): Fixed cycle control, Variable cycle control • ON/OFF control (Z.C.)	
Load	• Phase control: resistance load, inductive load • ON/OFF, Cycle control: resistance load	
Power consumption	Max. 7W (except FAN operation power)	Max. 10W (except FAN operation power)
Display method	• Display value and SV display: 7-segment 4-digit • Status display: 4 LED • Display value percentage display: 11 LED Bar	• Display value and SV display: 7-segment 4-digit • Status display: 6 LED • Display value percentage display: 11 LED Bar
Output accuracy	• Static voltage feedback control: Within ±3% F.S. of rated voltage (within variable ±10% F.S. of rated voltage) • Static current feedback control: Within ±3% F.S. of rated voltage (within variable 1 to 10 times of rated resistance) • Static power feedback control: Within ±3% F.S. of rated voltage (within variable ±10% F.S. of rated voltage and within variable 1 to 10 times of rated resistance) • Normal control: within ±10% F.S. of rated voltage	
Set method	By front keys, By communication	
Control input	• Auto: 4-20mA / 0-20mA / 0-5VDC⎓ / 1-5VDC⎓ / 0-10VDC⎓ / voltage pulse (0/12VDC⎓ (24VDC⎓)) / no-voltage input (ON/OFF) / communication input (RS485) • Manual: inside 10kΩ adjuster, outside 3 to 10kΩ adjuster (min. 2W)	
Digital input(DI)	AUTO/MAN switching, RUN/STOP switching, RESET, Output holding, SP setting (SP1 to 6)	
Display content	Control input, load voltage, load current, load power, load resistance, power supply frequency	
Min. display output	Min. 2.5% of rated voltage/current	
Option output	RS485 communication output (Modbus RTU method), [max. 32 units]	
Dielectric strength	2,000VAC 50/60Hz for 1 min (between input terminal and power terminal)	
Vibration	0.75mm amplitude at frequency of 5 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours	
Insulation resistance	Over 200MΩ (at 500VDC megger)	
Noise immunity	±2kV the square wave noise (pulse width 1μs) by the noise simulator	
Environ-ment	Ambient temperature	-10 to 50℃, storage: -20 to 80℃
	Ambient humidity	5 to 90%RH, storage: 5 to 90%RH
Approval	CE	

Weight[2]	• A size
	  : Approx. 3.2kg
	    (approx. 3.0kg)
	• C size
	  : Approx. 12.1kg
	    (approx. 11.0kg)
		• B size
		  : Approx. 5.6kg
		    (approx. 3.0kg)
		• D size
		  : Approx. 19.3kg
		    (approx. 11.0kg)
		
		• A size
		  : Approx. 7.6kg
		    (approx. 6.5kg)
		• C size
		  : Approx. 21.1kg
		    (approx. 20.0kg)
		
		• B size
		  : Approx. 13.0kg
		    (approx. 11.5kg)
		• Approx. size
		  : Approx. 35.7kg
		    (approx. 30.8kg)

※ 1. Variable cycle control is only for 1-phase model.
※ 2. The weight includes packaging. The weight in parenthesis is for unit only.
※ Environment resistance is rated at no freezing or condensation.
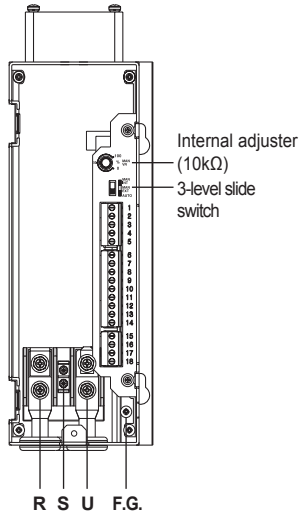
DPU Series

Connections

■ 1-phase

● A Size
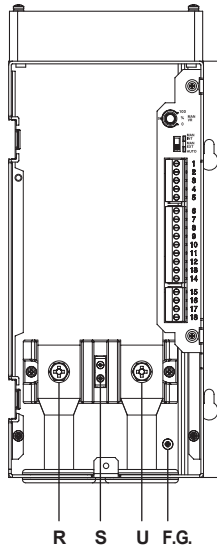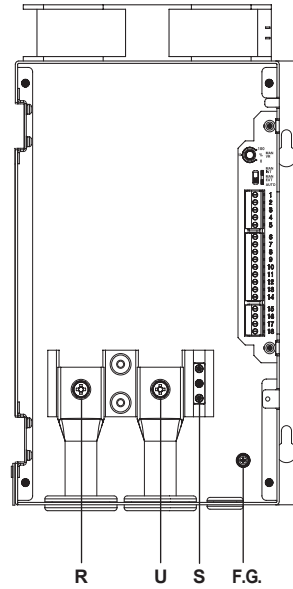
Internal adjuster
(10kΩ)
3-level slide
switch

R S U F.G.

● B Size

R   S   U F.G.

● C Size

R   U   S   F.G.

● D Size

R   S   U   F.G.

+
1−5V
0−5V
0−10V
Voltage input
−

+
Voltage
ON/OFF
−

ON/OFF Input

4−20mA +
0−20mA −

External
VR
(3−10kΩ)

① V IN
② I IN
③ COM
④ VR IN
⑤ VR EXC
⑥ RUN/STOP
⑦ AUTO/MAN
⑧ DI−1
⑨ DI−2
⑩ DI−3
⑪ COM1

⑫ RS485(+)
⑬ RS485(−)
⑭ RS485(G)

⑮
⑯ AL1
250VAC 1A 1a
RESISTIVE LOAD
⑰
⑱ AL2

F.G.

R
FUSE
R
AC POWER IN
S
S
U
Load

- Do not mix noise to input cable.
  It is recommended to use shield cable,
  twisted cable as input cable for effective noise.
- If there is possible to affect inductive noise,
  it is recommended to use shielded cable at
  high-frequency power for effective noise.
- DI input switch should be for low current and
  ON resistance should be max. 20Ω (including
  cable resistance).
- DI input terminals are COM, DI-1 to 3, RUN,
  AUTO.
- For remote display unit option model,
  use connection cable as our standard cable.
- When connecting ⑥, ⑪ , it operates as
  MANUAL. When connecting, ⑥, ⑦, ⑪,
  it operates AUTO.

Autonics

Digital Thyristor Power Controller
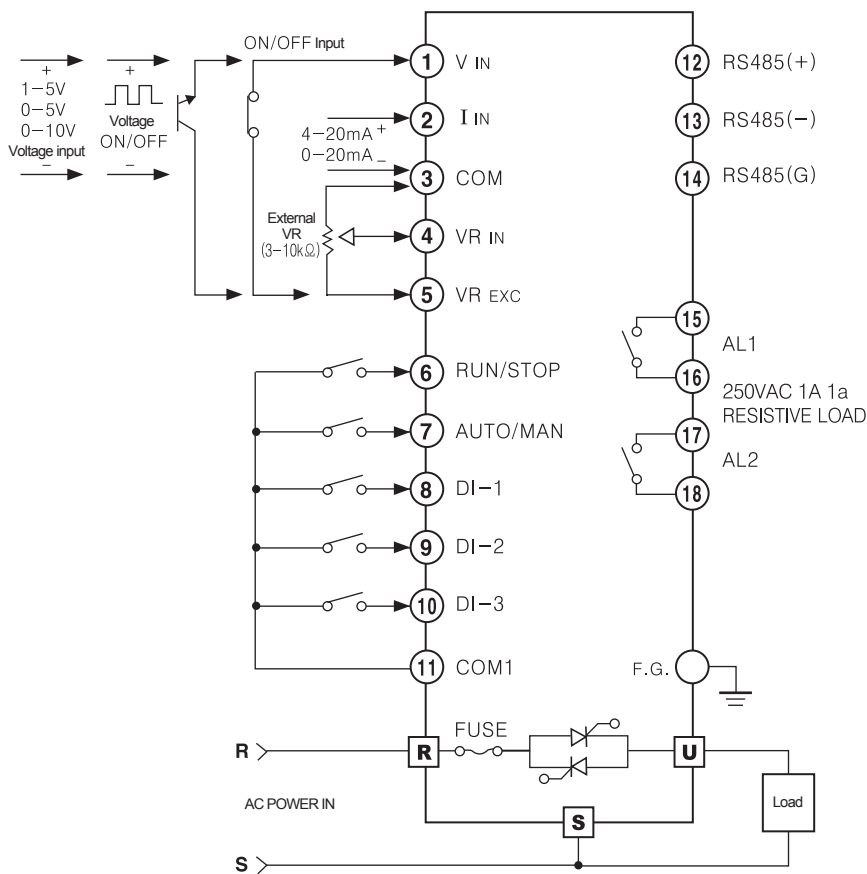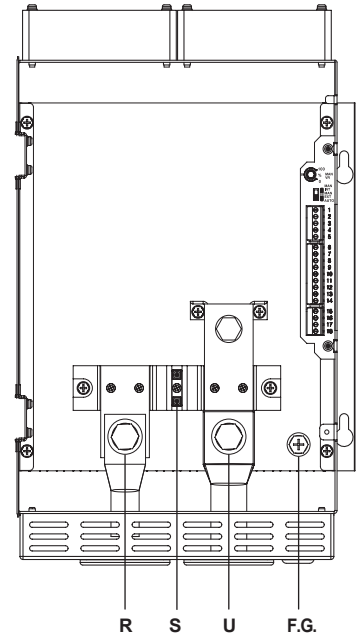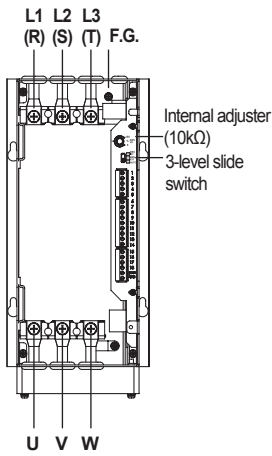
■ 3-phase

● A Size

● B Size

● C Size

● D Size

L1 (R) L2 (S) L3 (T) F.G.

Internal adjuster (10kΩ)
3-level slide switch

U V W

① V IN

② I IN

③ COM

④ VR IN

⑤ VR EXC

⑥ RUN/STOP

⑦ AUTO/MAN

⑧ DI-1

⑨ DI-2

⑩ DI-3

⑪ COM1

⑫ RS485(+)

⑬ RS485(-)

⑭ RS485(G)

⑮ ⑯ AL1 250VAC 1A 1a RESISTIVE LOAD

⑰ ⑱ AL2

⑲ ⑳ Control Power 220VAC 50/60Hz

F.G.

ON/OFF Input

1-5V
0-5V
0-10V
Voltage input

Voltage ON/OFF

4-20mA
0-20mA

External VR (3-10kΩ)

R FUSE U Load
S FUSE V Load
T W Load

- Do not mix noise to input cable.
  It is recommended to use shield cable, twisted cable as input cable for effective noise.
- If there is possible to affect inductive noise, it is recommended to use shielded cable at high-frequency power for effective noise.
- DI input switch should be for low current and ON resistance should be max. 20Ω (including cable resistance).
- DI input terminals are COM, DI-1 to 3, RUN, AUTO.
- For remote display unit option model, use connection cable as our standard cable.
- When connecting ⑥, ⑪ , it operates as MANUAL. When connecting, ⑥, ⑦, ⑪, it operates AUTO.
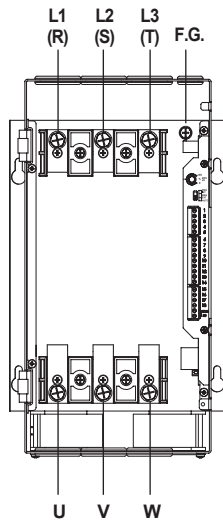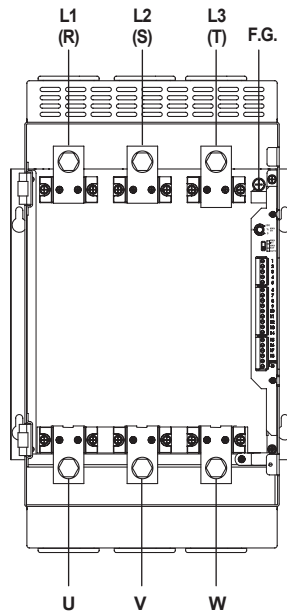
Autonics

Dimensions

■ **1-phase**

(unit: mm)

● **A Size: DPU1□A-25 / 40 / 50 / 70**

※ 25A, 40A, 50A are not attached a fan.
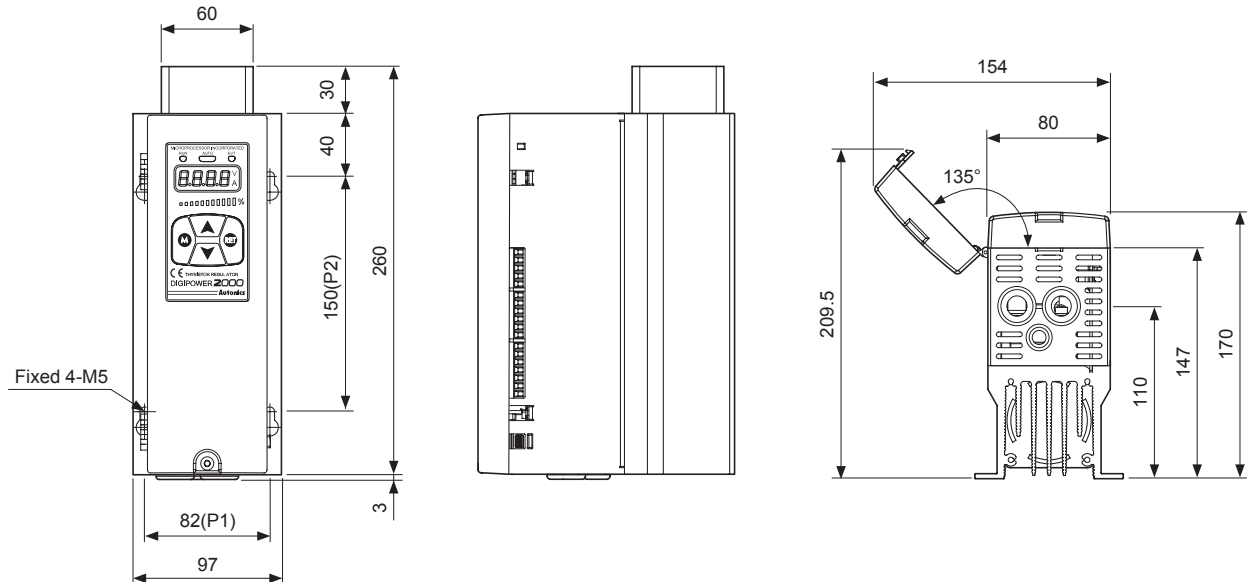
● **B Size: DPU1□B - 80 / 100 / 120 / 150 / 180 / 200**
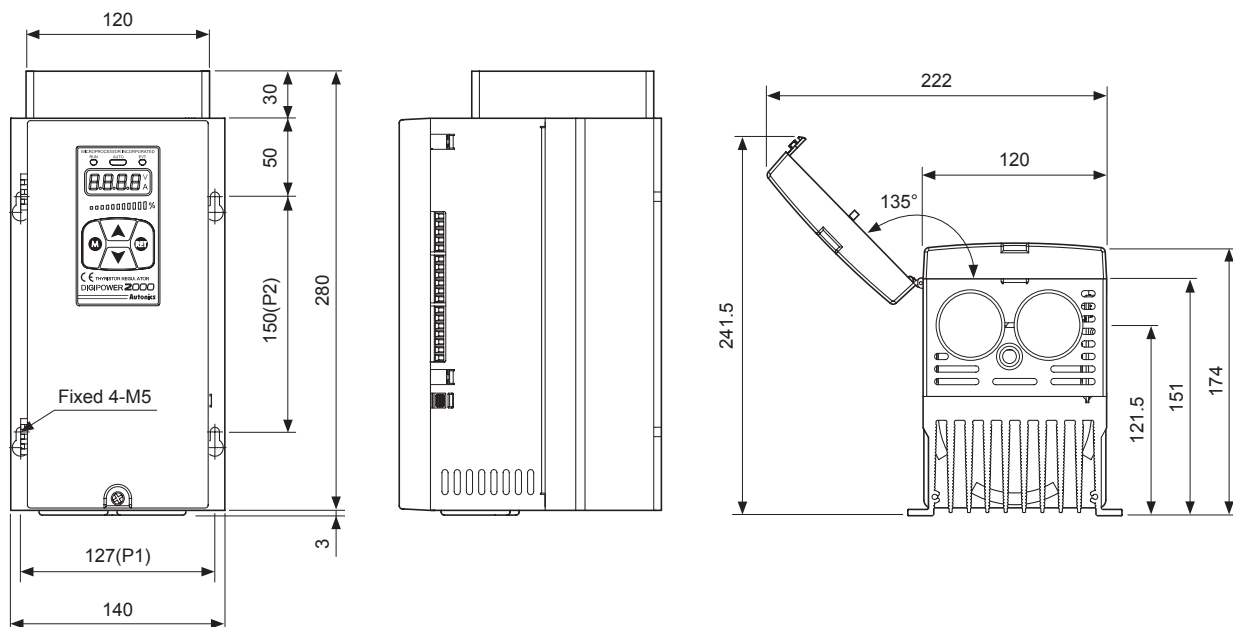
Digital Thyristor Power Controller

● **C Size: DPU1☐C - 250 / 350**
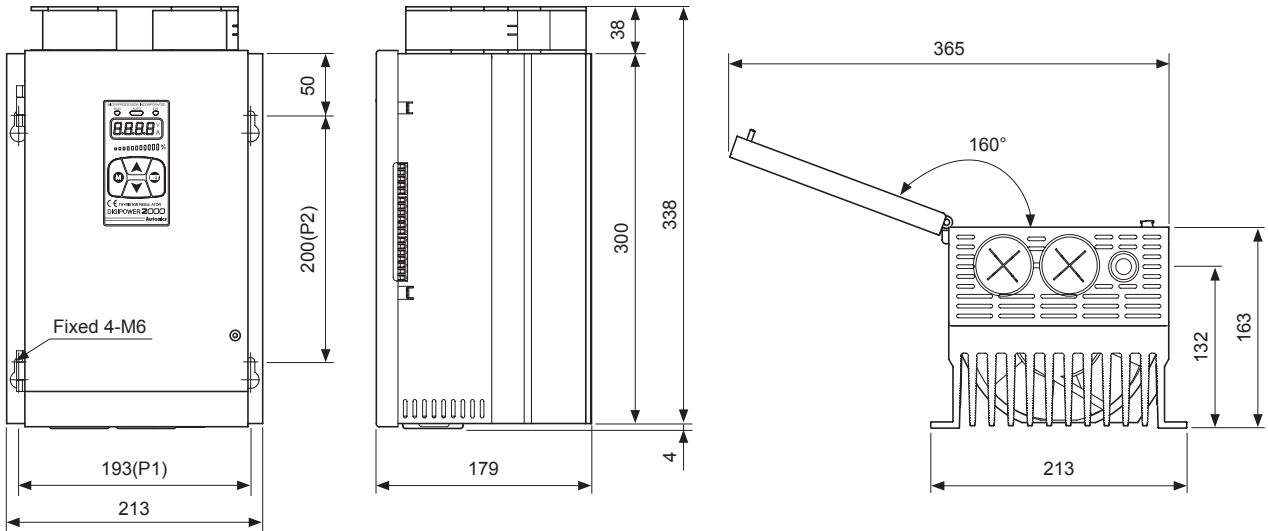
Fixed 4-M6

38
50
200(P2)
300
338
4
193(P1)
213
179
365
160°
132
163
213

● **D Size: DPU1☐D - 400 / 500 / 600**

Fixed 4-M6

38
40
200(P2)
280
345
418
4
261(P1)
278
90
212
494
160°
156
195
250
278
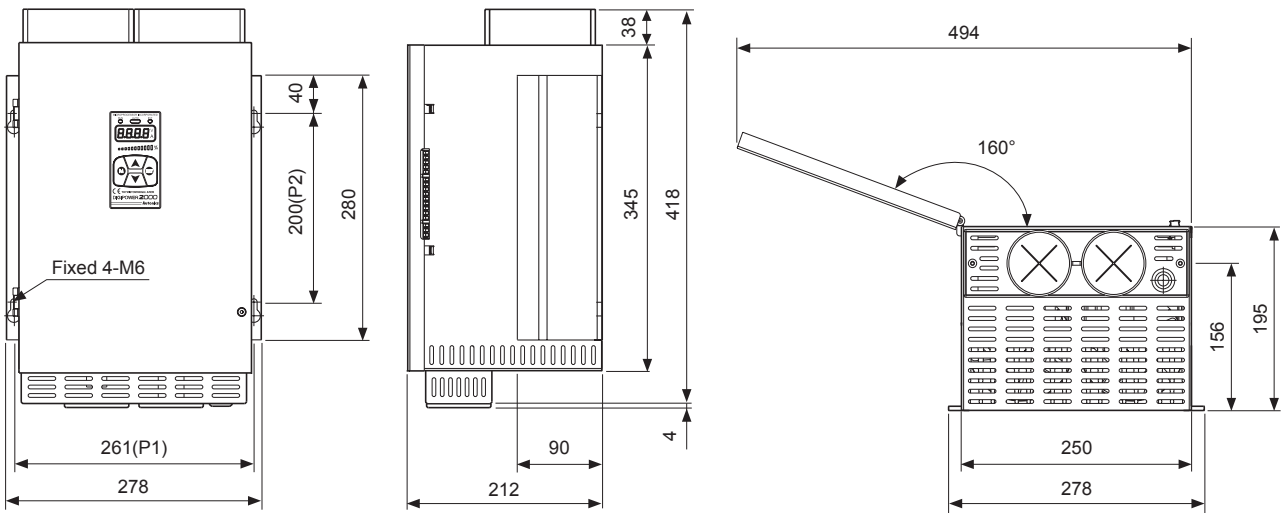
DPU

DPUS

◎ **In case of remote display unit + RS485 communication option,**
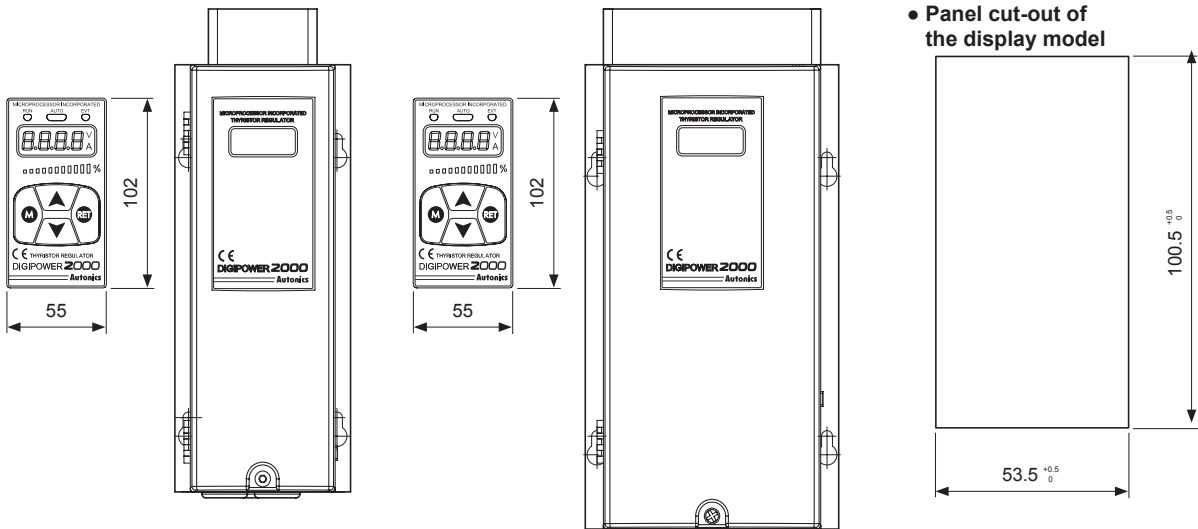
102
55
102
55

● **Panel cut-out of the display model**

100.5 $^{+0.5}_{0}$
53.5 $^{+0.5}_{0}$

※ It is recommended for remote panel cable to use max. 5 m to prevent noise. (Check the length when ordering it.)

■ **3-phase** (unit: mm)

● **A Size: DPU3□A - 25 / 40 / 50**

150(P2)
306
Fixed 4-M5
63.5
26
127(P1)
140

182

235.6
160°
239
200
138

● **B Size: DPU3□B - 70 / 80 / 100 / 120 / 150 / 180 / 200**

40
200(P2)
280
365
Fixed 4-M6
43.1
195(P1)
213

199

364
160°
278
217
176
183

◎ **In case of remote display unit + RS485 communication option,**

● **Panel cut-out of the display model**

102
55

DIGIPOWER 2000
Autonics

$100.5^{+0.5}_{0}$
$53.5^{+0.5}_{0}$

※ It is recommended for remote panel
  cable to use max. 5 m to prevent noise.
  (Check the length when ordering it.)

● C Size: DPU3☐C - 250 / 350

Fixed 4-M6

● D Size: DPU3☐D - 400 / 500 / 600

Fixed 4-M8

DPU Series

Unit Description

<1-phase>

<3-phase>
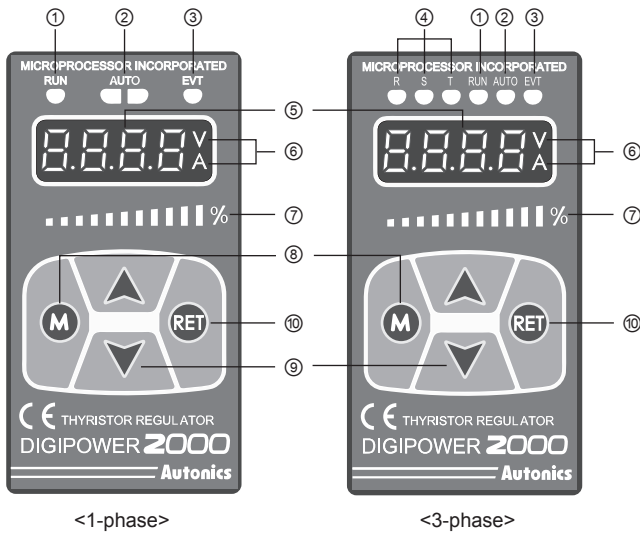
① RUN indicator: Turns ON in RUN, turns OFF in STOP

② AUTO indicator: Turns ON in AUTO, turns OFF in MANUAL

③ EVT indicator
: Turns ON in Digital Input (DI-1 to 3) ON, flashes in alarm output

④ R, S, T indicators
: Turns ON differently by displayed value in display part
E.g.) When R, S turn ON, it displays voltage between R-S line

⑤ Display part
: Displays selected display value content in RUN mode,
displays parameter and set value in SET mode

⑥ V, A indicators
: The V indicator turns ON when displaying voltage.
The A indicator turns ON when displaying current.
The V, A indicators turn ON when displaying power.
The V, A indicators turn OFF when displays resistance and input value.

⑦ Bar display
: Turns ON as 0 to 100% ratio for selected display value

⑧ **M** key
: Used to enter parameter mode, monitoring mode and to move between parameters
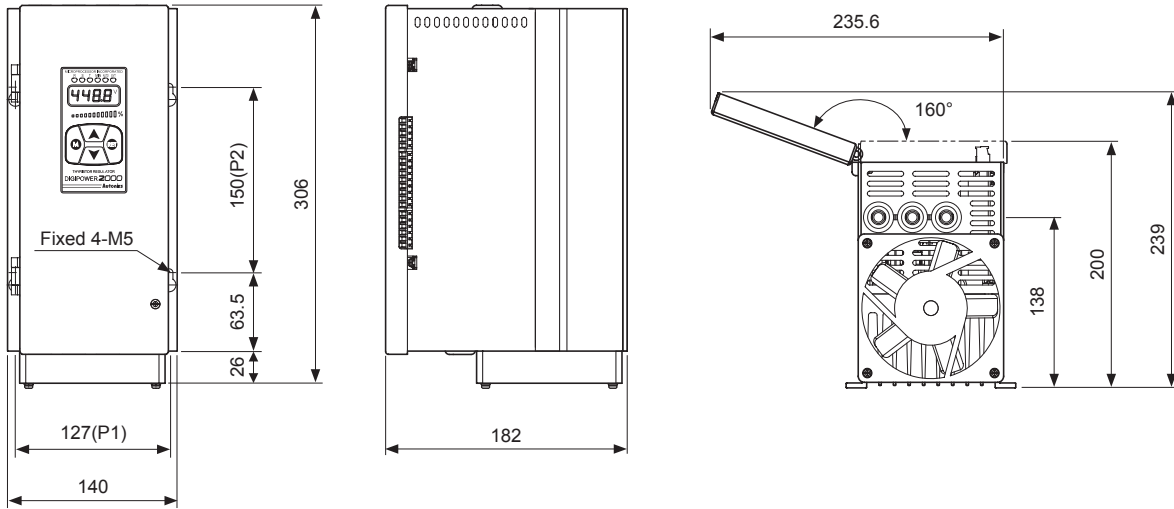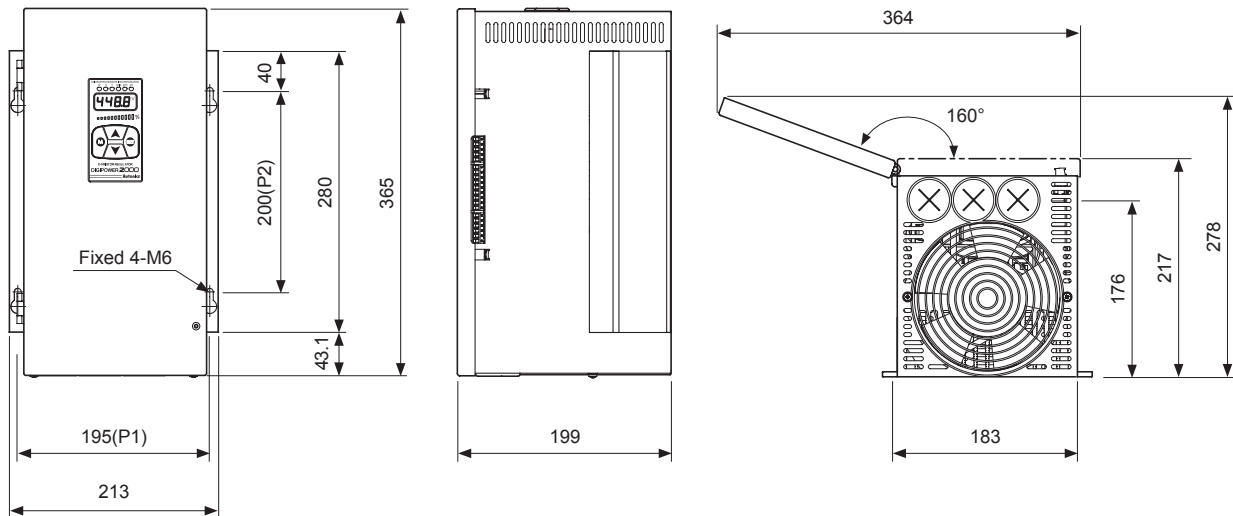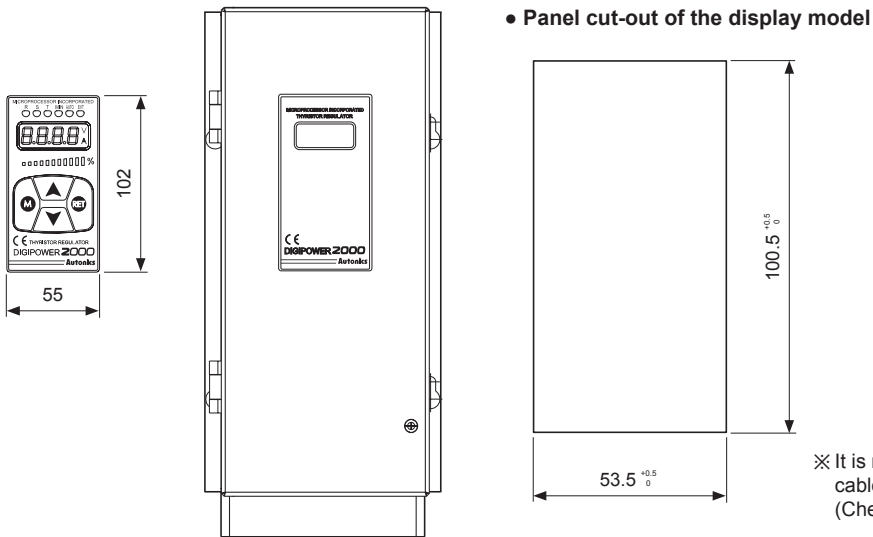
⑨ ▲ ,▼ key: Used to move setting modes and to set parameters.

⑩ **RET** key: Used to return to RUN mode from SET mode

Control Input

■ Input type

Type					Parameter
AUTO input	Analog input	Current	4-20mA	Input impedance 100Ω	4-20
			0-20mA		0-20
		Voltage	1-5VDC	Input impedance 25Ω	1-5
			0-5VDC		0-5
			0-10VDC		0-10
	ON/OFF input	Voltage pulse	0/12VDC		SSr
		No-voltage pulse	ON/OFF	—	
	Com. input	RS485	—	—	Con
MANUAL input	Internal adjuster	10kΩ	—	—	—
	External adjuster	3 to 10kΩ	—	—	—

■ Input selection

In AUTO input, select it at control input type[In-P] at setting mode1.

In MANUAL input, set output slope manual adjustment [A-GA] in operating mode as OFF and select the input by the inside 3-level slide switch.

◎ **Output slope manual adjustment [A-GA] as oFF : Select the input by the inside 3-level slide switch**

Type		Description
MAN INT MAN EXT AUTO	MAN INT	Adjust output slope with the inside adjuster
	MAN EXT	Adjust output slope with an outside adjuster
	AUTO	No function

■ AUTO/MANUAL selection by terminal input(DI) [terminal 7 and 11]

When the AUTO/MAN terminal input is ON(close), it is AUTO input operation. When it is OFF(open), it is MAN(manual) input operation.

When the AUTO/MAN terminal input is OFF(open) (MANUAL operation), only INT or EXT input selected by the 3-level slide switch is available.

Functions

■ SOFT START [St-t]

When controlling the load which has inrush current (platinum, molybdenum, tungsten, infrared lamp, etc) in power ON, or when control input changes rapidly, it prevents the load to increase output gradually within the set time. Set the time for soft start.

Regardless of control method setting (phase control or cycle control), it operates as phase control.

Set the time to reach output from 0 to 100%.

It operates when it is RUN mode from STOP status after supplying power or reset. When it reaches to the target output value, soft start function ends.

Soft start set time (t) is the time up to 100% increase of output applied to load. When the final target output value is 50%, taken time to reach is t/2.

Reaching time to the final target output value = Target output (%)× t

※ E.g.) SOFT START time: 25 sec, final target output: 80%
0.8×25 = 20 sec

• Setting range: 0 to 100 sec (0 sec: not using this function)

Autonics
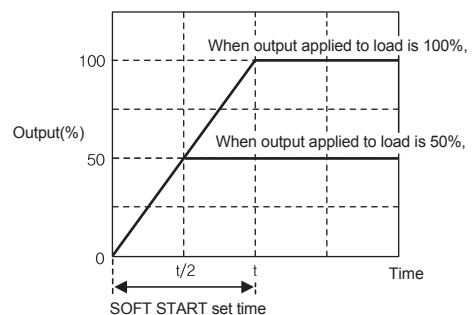
■ **Start limit [5-Ln] and start limit time [5-Lt]**

When power is ON, changing to RUN status from STOP status, or alarm reset, set limit output value and time to prevent the inrush current or error current.

Regardless of control method setting (phase control or cycle control), it operates as phase control.

• Setting range for start limit: 0 to 110% of output

• Setting range for start limit time: 0 to 100 sec
  (0 sec: not using this function)

• A: SOFT START function ends
• B: SLOW UP function ends
• C: SLOW DOWN function ends
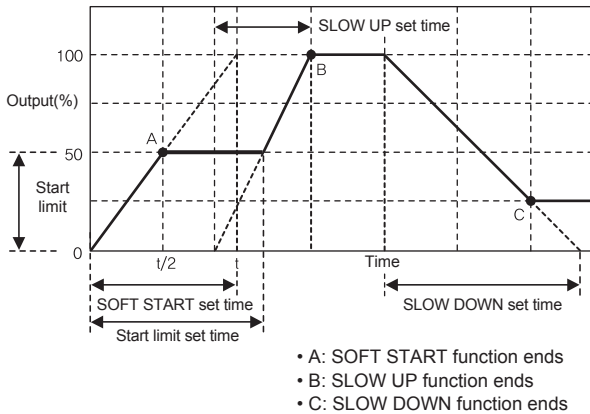
■ **SLOW UP / SLOW DOWN [UP-t / dn-t]**

It is same purpose as soft start function. Soft start starts only one time at first but slow up/slow down function start during operation.

Regardless of control method setting (phase control or cycle control), it operates as phase control.

When it reaches to the target output value, slow up/slow down functions end.

• Setting range: 0 to 999 sec
  (0 sec: not using this function)

• A: SOFT START function ends
• B: SLOW UP function ends
• C: SLOW DOWN function ends
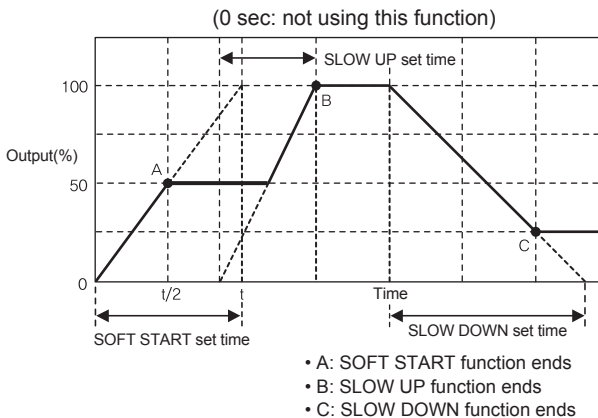
■ **Output slope setting [SLoP]**

This function is to set output changed ratio by control input from 0.00 to 1.00 range.

• Output value when setting slope: Input(%)×Slope value
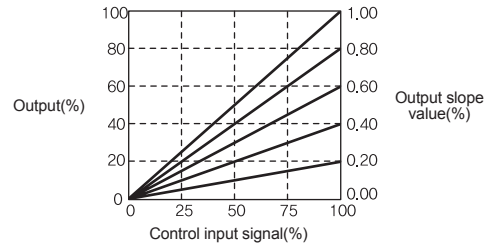
■ **Output slope manual adjustment [A-GA]**

This function is to adjust manually (inside or outside adjuster) output value ratio for control input.

When AUTO operation and output slope manual adjustment [A-GA] is set as ON, [SLoP] is not able to set.

It displays slope value by the inside or outside adjuster input.
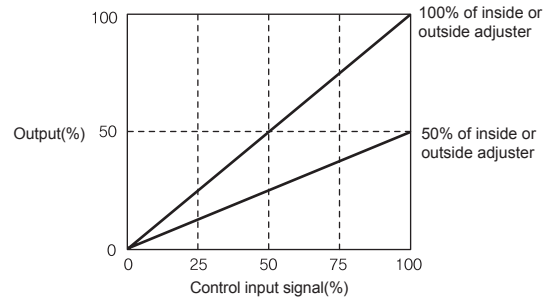
◎ **Output slope manual adjustment [A-GA] as on
 : Set output slope by the inside 3-level slide switch**

Type		Description
MAN INT MAN EXT AUTO	MAN INT	Adjust output slope with the inside adjuster
	MAN EXT	Adjust output slope with an outside adjuster
	AUTO	No function

■ **BASE-UP [b-UP]**

This function is to add base-up set value to input signal.
It is available only when output low-limit value is 0%.
It is limited by start limit value at initial start.

• Setting range: BASE-UP SV(%) < Output high-limit value

• Output value for BASE-UP setting
  : Input(%)×Slope value+ BASE-UP SV
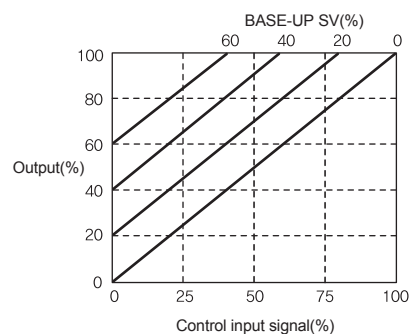
DPU Series

■ Output high limit value [H-oL], Output low limit value [L-oL]

This function is to limit output range to protect load.

• Setting range: 0 to 110%
(Output low limit value < Output high limit value)
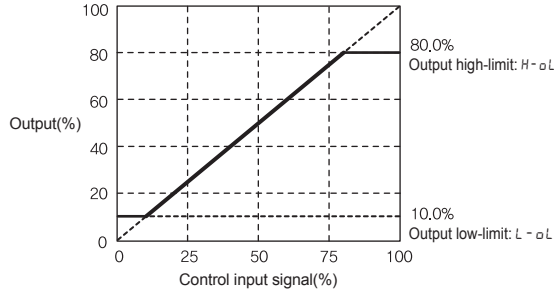
■ Current limit [C-Lm]

It operates when normal, static voltage, static current mode of phase control.

When using the load which has high inrush current, it restrains the current to protect thyristor.

Especially, in case of voltage feedback, only voltage current, it may over the rated current of thyristor because current flows by resistance value of the load. To prevent over the rated current, limit the current.

• Setting range: 0 to 110% of rated current
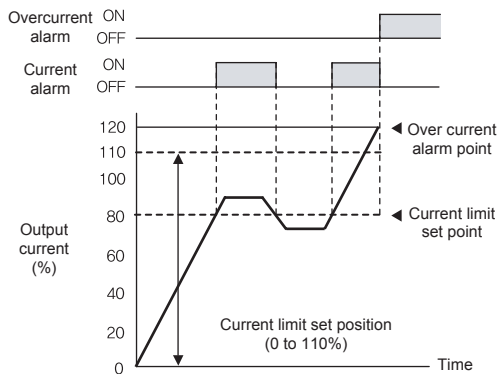
■ Digital input(DI)

Below functions are available by terminal input.

Digital input has five terminals; AUTO/MANUAL terminal, RUN/STOP terminal, and DI-1 to 3 terminals.

Select the function for each input terminal of DI-1 to 3.
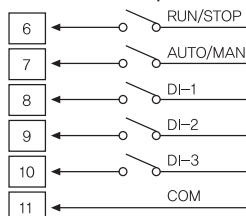
◎ AUTO/MANUAL selection [terminal 7 and 11]

Select AUTO(close)/MANUAL(open) input by terminal input.

AUTO mode controls output according to control input as analog input (voltage, current) or ON/OFF input (including SSR pulse input).

MANUAL mode controls according to control input as the inside adjuster adjustment or an outside adjuster adjustment.

When selecting AUTO (close), the front AUTO indicator turns ON or selecting MANUAL(open), the front AUTO indicator turns OFF.

◎ RUN/STOP switching [terminal 6 and 11]

Select RUN(close)/STOP(open) operation status by terminal input.

RUN mode operates as the set contents by control input. STOP mode is standby status.

When selecting RUN(close), the front RUN indicator turns ON or selecting STOP(open), the front RUN indicator turns OFF.

◎ Digital input(DI-1 to DI-3) setting [terminal 8, 9, 10 and 11(COM)]

Select the each function for each digital input at parameters [di-1, di-2, di-3].

When setting ON(close) to DI input, the front EVT indicator turns ON or setting OFF(open), the front EVT indicator turns OFF.

As below, there are 6 functions to select.

※ SP m is available only in di-1.
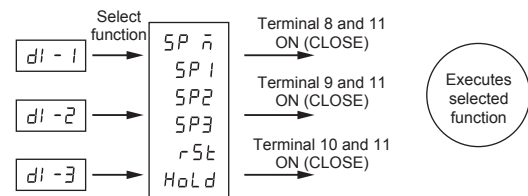
● **RESET [rSt]**

After selecting RESET function, turn digital input ON(close) and open, this unit resets and re-starts.

● **HOLD [HoLd]**

After selecting HOLD function and digital input is ON(close), output and display value of this unit is hold. (it operates hold when digital input maintains ON(close) status.)

● **Single SP [SP1, SP2, SP3]**

Set [SP1, SP2, SP3] to each digital input for output to reach to the relevant SP.

It is available to set individually at [di-1, di-2, di-3], and duplicated setting is allowed.
When setting SP1, SP1 is displayed in operating mode, same as SP2 and SP3.

When this function is not set, the parameters to set SP in operating mode are not displayed.

※E.g.)

di-1	di-2	di-3	Operating Mode SP value set parameter
SP1	SP2	SP3	SP1 (e.g.: 20%)
			SP2 (e.g.: 40%)
			SP3 (e.g.: 60%)
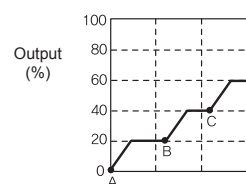
• A: When di-1 is ON
• B: When di-2 is ON
• C: When di-3 is ON

● **Multi SP [5P ᄆ]**

It is available to set total 6 SPs and to control output depending on 3 digital inputs' setting.

This function is selectable only in [dI - I]. When selecting [5P ᄆ] at [dI - I], [dI - 2 , dI - 3] parameters are not displayed.

When selecting [5P ᄆ] at [dI - I], 6 parameters to set SPs are displayed in operating mode.

(5P I , 5P2 , 5P3 , 5P4 , 5P5 , 5P6)

※E.g.)

※ ○: Close, ×: Open

	dI - I	dI -2	dI - 3	Operating Mode SP value set parameter
A	○	×	×	5P I (e.g.: 20%)
B	×	○	×	5P2 (e.g.: 40%)
C	○	○	×	5P3 (e.g.: 60%)
D	×	×	○	5P4 (e.g.: 80%)
E	○	×	○	5P5 (e.g.: 100%)
F	×	○	○	5P6 (e.g.: 0%)
G	○	○	○	──

※ A, B, C, D, E, F : Close/Open status of Digital Input

■ **Proportional and integral constant set of feedback control**

Proportional Integral Control:

This is the combination of proportional control and integral control. Proportional control operates soft control without overshoot and hunting for the set value. Integral control modifies offset automatically to reach the set value stably.

The optimal values of proportional constant and integral constant are set as factory defaults. When changing proportional constant and integral constant, it may cause response delay in feedback control or overshoot or hunting.

◎ **Proportional constant set [P]**

It compensates error from the target value proportionally.

If proportional constant value is small, response is fast and it may cause overshoot or hunting. If proportional constant value is big, response is slow.

• Setting range: 0(0%) to 2000(100%)

◎ **Integral constant set [I]**

It compensates cumulative error from the target value.

The set integral constant is the time when proportional value and integral value are equal.

If integral constant value is small, response is fast and it may cause overshoot or hunting. If integral constant value is big, response is slow.

• Setting range: 0.1 to 999.9 sec

※ P , I parameters are displayed when control mode is static voltage, static current, static power mode in phase control.

■ **Input correction [I ᄂ-b]**

It compensates the offset between actual input value and measured input value.

• Setting range: -99.9 to 99.9%

※E.g.) Input type is 4-20mA,

When 4mA is applied and the input monitor value displays, set [I ᄂ-b] as -0.5 and the input monitor value displays as 0.0%.
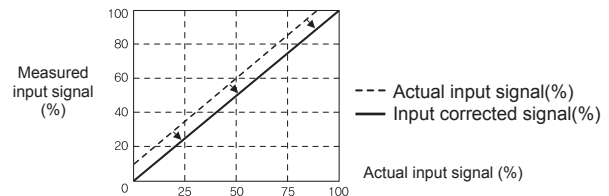
■ **Input slope correction [5PAᄂ]**

It compensates the gain of the measured 100% input for actual 100% input value.

• Setting range: -99.9 to 99.9%

※E.g.) Input type is 4-20mA,

When 20mA is applied and the input monitor value displays 99.5%, set [5PAᄂ] as 0.5 and the input monitor value is 100.0%.
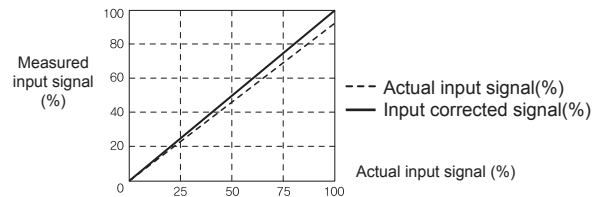
■ **Display value content selection [dI5P]**

You can select display value content for the display part in RUN mode.

• Display range
  - 1-phase: [Ld-U], [AᄆP], [YᄂF], [ᄃEF]
  - 3-phase: [U-ᄂ], [ᄂ-Y], [Y-U], [LA-U], [LA-ᄂ], [LA-Y], [YᄂF], [ᄃEF]

■ **Bar graph content selection [bAᄃ]**

You can select display value content for the bar graph.

• Display range
  - 1-phase: [Ld-U], [AᄆP], [YᄂF], [ᄃEF]
  - 3-phase: [U-ᄂ], [ᄂ-Y], [Y-U], [LA-U], [LA-ᄂ], [LA-Y], [YᄂF], [ᄃEF]

■ **Load resistance display method [$drES$]**

This function is for display load resistance [rES] into a percentage in monitoring mode when disconnecting the parallel load. You can select this value as increase rate of load resistance [UP] or as decrease rate of number of loads [$down$].

※Decrease rate of number of loads [$down$] displays correct decrease rate only when the connected each load resistance is same.

E.g.)Each of R_1 to R_{10} is 10Ω and load resistance (R) is 1Ω, When disconnecting R_1 to R_5,
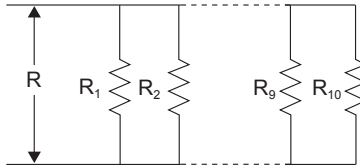
① Increase rate of load resistance[UP]

It is based on 100% of load resistance (R), 1Ω. When disconnected R_1 to R_5, load resistance is 2 Ω and load resistance [rES] in monitoring mode displays 200%.

② Decrease rate of number of loads [$down$]

It is based on 100% of 10 loads(R_1 to R_{10}). When disconnected R_1 to R_5, the number of load are 5(R_6 to R_{10}) and load resistance [rES] in monitoring mode displays 50%.

■ **Alarm**

Alarm	Parameter	Operation	Clear alarm
Overcurrent alarm	$o-C$	※1	·Re-supply the power. ·RESET(RET key) ·Switch to STOP mode
Overvoltage alarm	$o-u$		
Fuse break alarm	$FUSE$		
Heatsink overheat alarm	$tEmP$		
Element error alarm	SCr		
Heater break alarm	Hbt	Continues operation	Automatically cleared within the setting range

※1: For 1-phase model, output stops.
For 3-phase model, when 1-phase break, it maintains output and when 2-phase break, it stops output.

■ **Lock [$Lock$]**

This function is to limit parameter set value check and change.

Set this parameter lock function to enter setting mode1. When setting this parameter lock as $LoC2$ or $LoC3$, only parameter lock is displayed in setting mode 1.

Parameter	oFF	$LoC1$	$LoC2$	$LoC3$
Operating Mode set group	●	●	●	◖
Setting Mode 2 set group	●	●	◖	◖
Setting Mode 1 set group	●	◖	○	○

●:Enable to check and set, ◖:Enable to check/Disable to set,
○: Disable to check

■ **Heater disconnection alarm [$Hb-A$]**

When load resistance display method is set as [UP], it is over the set value, this alarm occurs.

[$H-bt$] and display value flashes for 2 sec in turn in the display part and EVT lamp flashes for 0.5 sec.

Even though heater disconnection alarm occurs, control operation continues.

It is cleared automatically when the value is below the SV of heater disconnection alarm value.

◎ **Heater disconnection alarm value setting [$Hb-u$]**

Regardless of control method (phase control, cycle control), it operates. For the accurate operation, over 10% of control output (phase control, cycle control) and over 30% of rated current are required.

• Setting range: 10 to 500%

Hysteresis of heater disconnection alarm is fixed as 1% for ON/OFF interval.

E.g.)When SV for heater disconnection alarm is 50%, alarm turns ON at 50%, alarm turns OFF at 49%.
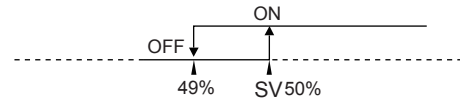
■ **Full load auto recognition [$F-Ld$]**

When operating load recognition function, it outputs 100% for 3 sec. Do not use this unit to the device which has problem 100% output of load.

Set [$F-Ld$] as on in setting mode 1 [$St-1$] group and press the Ⓜ key, load auto recognition function operates. According to secular changes of the load, execute this function regularly.

※Be sure that when auto recognition starts, it operates 100% output for 3 sec.

※Caution

Do not execute this function as on without profession's consultations. When executing this function, voltage, current outputs fully. Be sure that it may cause damage to the load.

When using special load using low voltage and high current such as (super)tantalum, SiC, molybdenum, tungsten, etc, it may cause heater break alarm [$H-bt$]. This alarm does not have problem in operation but it occurs when it does not detect the load when using as low voltage. Set the below notes to clear the alarm.

Note>When using special load such as (super) tantalum, SiC, molybdenum, tungsten, $H-bt$ alarm clear method:

·Set load resistance display method [$drES$] as UP in setting mode 1 [$St-1$].

·Set heater break alarm value [$Hb-u$] as 500 in setting mode 2 [$St-2$].

Digital Thyristor Power Controller

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Monitoring Mode

Monitoring mode can monitor measured several physical quantities of this unit, not set parameters.

■ 1-phase

RUN mode

Ⓜ 1 sec

※ 1. **P** : Press any key among ▲ , ▼.

※ To return RUN mode, press the Ⓡ key at any parameter, or not to operate any keys in 30 sec.

Input value	`In`	**P** ※1	`100.0`	For ON/OFF input, or SSR pulse input, it displays 0 or 100. • Setting range: Within 0.0 to 100.0%
Load voltage	`Ld-u`	**P**	`220.0` V	Monitors measured voltage at load within the rated voltage range.
Load current	`Ld-A`	**P**	`50.0` A	Monitors measured current at load within the rated current range.
Load power	`WW`	**P**	`10.00` VA	Monitors measured power at load within the rated power range.
Load resistance	`rES`	**P**	`50`	Displays measured resistance at load for initial set resistance as percentage
Power frequency	`FrEq`	**P**	`60.00`	Displays frequency of power

■ 3-phase

RUN mode

Ⓜ 1 sec

※ 1. **P** : Press any key among ▲ , ▼.

※ To return RUN mode, press the Ⓡ key at any parameter, or not to operate any keys in 30 sec.

Input value	`In`	**P** ※1	`0.0`	For ON/OFF input, or SSR pulse input, it displays 0 or 100. • Setting range: Within 0.0 to 100.0%
Voltage between U-V line	`U-u`	**P**	`0.0` V	
Voltage between V-W line	`u-W`	**P**	`0.0` V	Monitors measured voltage at load within the rated voltage range.
Voltage between W-U line	`W-U`	**P**	`0.0` V	
U-phase load current	`LA-U`	**P**	`0.0` A	
V-phase load current	`LA-u`	**P**	`0.0` A	Monitors measured current at load within the rated current range.
W-phase load current	`LA-W`	**P**	`0.0` A	
Load power	`WW`	**P**	`0.00` VA	Monitors load power output at 3-phase.
Load resistance	`rES`	**P**	`0.0`	Displays `LLLL` , 10 to 500%, `HHHH` .
Power frequency	`FrEq`	**P**	`0.00`	Displays frequency of power within 45.0 to 65.0Hz range

DPU Series

Parameter Mode

■ **Operating Mode [oP]**

※ 1. **P** : Press any key among ▲ , ▼.

※ To return RUN mode, press the **RET** key at any parameter, or not to operate any keys in 30 sec

※ ▭▭▭ : This parameter may or may not appear, depending on the other parameter settings.

RUN mode

M 3 sec

| Operating mode | oP | Displays operating mode. |

M

| Soft start time | St-t | **P** →※1→ 50 | Set soft start time.
• Setting range: 0 to 100 sec |

M

| Start limit | 5-Lm | Set limit output value.
• Setting range: 0 to 110% |

M

| Start limit time | 5-Lt | Set start limit time.
• Setting range: 0 to 100 sec |

M

| Output slope manual adjustment | A-GA | Set output slope manual adjustment. on ◀▲▼▶ oFF |

M

| Output slope | 5LoP | Set output change ratio by control input.
• Setting range: 0.00 to 1.00%
※Not displayed when output slope manual adjustment [A-GA] is ON. |

M

| Base up | b-UP | Set base-up value.
• Setting range: 0 to 100% |

M

| Slow up | UP-t | Set slow-up time.
• Setting range: 0 to 999 sec
※Not displayed when C-md mode is set as cycle control. |

M

| Slow down | dn-t | Set slow-down time.
• Setting range: 0 to 999 sec
※Not displayed when C-md mode is set as cycle control. |

M

| Output low-limit value | L-oL | Set output low-limit.
• Setting range: 0 to 110% |

M

| Output high-limit value | H-oL | Set output high-limit.
• Setting range: 0 to 110% |

M

| Current limit | C-Lm | Set current limit value.
• Setting range: 0 to 110% |

M

| Setting point 1 | 5P 1 |

M

| Setting point 2 | 5P2 | • Setting range: 0 to 100%
※ Displayed only when di-1 to di-3 of 5t-1 mode is set 5P m or 5P 1 to 5P3. |

M

| Setting point 3 | 5P3 |

M

| Setting point 4 | 5P4 |

M

| Setting point 5 | 5P5 | • Setting range: 0 to 100%
※ Displayed only when di-1 of 5t-1 is set 5P m. |

M

| Setting point 6 | 5P6 |

M

| Proportional constant | P | Set proportional constant.
• Setting range: 1 to 2000
※ Displayed only for static voltage, static current, static power in phase control. |

M

| Integral constant | I | Set integral constant.
• Setting range: 0.1 to 999.9
※ Displayed only for static voltage, static current, static power in phase control. |

M

Digital Thyristor Power Controller

A. Recorders

B. Indicators

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E. Thyristor Power Controllers

F. Pressure Transmitters

G. Temperature Transmitters

H. Accessories

■ Setting Mode 1

※ 1. **P**: Press any key among ▲ , ▼.

※ If there is no operation any keys in 30 sec, it returns to RUN mode.

※ Press the 🔄 key when entering 5ᵗ-1 setting mode in any parameters, it moves to 5ᵗ-1.
Press the 🔄 key once more, it returns to RUN mode.

※ When setting [LoCᵏ] as LoC2 or LoC3, and entering 5ᵗ-1, it displays only [LoCᵏ] parameter.

※ ⌐⎯⌐ : This parameter may or may not appear, depending on the other parameter settings.

RUN mode

Ⓜ 3 sec

Operating Mode — oP

Setting Mode 1 — 5ᵗ-1 — Displays setting mode 1.

Control input type — In-P — **P** → 4-20 — Select input type.

Control method — C-ᵐd — Select control method.
※ Variable cycle control[u-CY] is only for 1-phase model.

PA ⟷ u-Fb ⟷ C-Fb ⟷ Y-Fb ⟷ F-CY ⟷ u-CY ⟷ onoF

DI-1 function — dI-1
DI-2 function — dI-2
DI-3 function — dI-3

Select digital input.
※ Multi SP function [SPᵐ] is available only in dI-1.

SPᵐ ⟷ SP1 ⟷ SP2 ⟷ SP3 ⟷ rSt ⟷ HoLd

Input correction — In-b — Set input correction value.
• Setting range: -99.9 to 99.9%

Input slope correction — SPAn — Set input slope correction value.
• Setting range: -99.9 to 99.9%

Display value content — dISP — Select display value content.

1-phase: Ld-u ⟷ AᵐP ⟷ ᵏY ⟷ rEF

3-phase: U-u ⟷ u-Y ⟷ Y-U ⟷ LA-U
rEF ⟷ ᵏY ⟷ LA-Y ⟷ LA-u

Bar graph content — bAr — Select bar graph display content.

Load resistance display method — drES — Select display method of load resistance value.

doᵏn ⟷ UP

Full load auto recognition — F-Ld — Select full load auto recognition enable/disable.

oFF ⟷ on

※ Displayed only for RS485 communication option model.

Com. address — Addr — Set communication address.
• Setting range: 1 to 99

Com. speed — bAUd — Select communication speed (baud rate).

48 ⟷ 96 ⟷ 192 ⟷ 384

Com. write — Coᵐᵏ — Select communication write enable/disable.
(EnA: Enables to write, dISA:Disables to write)

EnA ⟷ dISA

Lock — LoCᵏ — Select lock function.

oFF ⟷ LoC1 ⟷ LoC2 ⟷ LoC3

DPU

DPUS

DPU Series

■ **Setting Mode 2**

※ 1. P : Press any key among ▲ , ▼.

※ If there is no operation any keys in 30 sec, it returns to RUN mode.

※ Press the RET key when entering 5ᴸ-2 setting mode in any parameters, it moves to 5ᴸ-2.
Press the RET key once more, it returns to RUN mode.

※ When setting [ᴸₒᴸᵇ] as ᴸₒᴸ2 or ᴸₒᴸ3, and entering 5ᴸ-2, it displays only [ᴸₒᴸᵇ] parameter.

RUN mode

M 3 sec

Operating Mode   Setting Mode 1   Setting Mode 2

| ₒP | 5ᴸ-1 | 5ᴸ-2 |

Displays setting mode 2.

M

Overcurrent alarm value

| ₒᴸ-ᵤ | P ※1 | 120 |

Set alarm value for overcurrent.
• Setting range: 0 to 120%

M

Overcurrent delay time

| ₒᴸ-ᴸ |

Set alarm delay time for overcurrent.
• Setting range: 0 to 100 sec

M

Overcurrent alarm CH

| ₒᴸ-ℛ |

Select overcurrent alarm channel.

| nₒn | ⟷ | ℛᴸ1 | ⟷ | ℛᴸ2 |

M

Overvoltage alarm value

| ₒᵤ-ᵤ |

Select alarm value for overvoltage.
• Setting range: 0 to 120% for 1-phase model, 0 to 300% for 3-phase model

M

Overvoltage delay time

| ₒᵤ-ᴸ |

Set alarm delay time for overvoltage.
• Setting range: 0 to 100 sec

M

Overvoltage alarm CH

| ₒᵤ-ℛ |

M

Fuse break alarm CH

| FU5E |

Select each alarm channel.

| nₒn | ⟷ | ℛᴸ1 | ⟷ | ℛᴸ2 |

M

Heat sink overheating alarm CH

| HEℛᴸ |

M

Element error alarm CH

| 5ᴸr |

M

Heater break alarm value

| Hᵇ-ᵤ |

Set alarm value for heater break.
• Setting range: 10 to 500%

M

Heater break alarm CH

| Hᵇ-ℛ |

Select heater break alarm channel.

| nₒn | ⟷ | ℛᴸ1 | ⟷ | ℛᴸ2 |

M

Heater disconnect alarm delay time

| Hᵇ-ᴸ |

Set heater disconnect alarm delay time.
※Heater disconnect alarm delay time [Hᵇ-ᴸ] is displayed in only 1-phase model.
• Setting range: 0, 1, 2, 3, 5, 10, 20, 30 sec

M

Autonics

Digital Thyristor Power Controller

A. Recorders

B. Indicators

C. Converters

D. Controllers

E. Thyristor Power Controllers

F. Pressure Transmitters
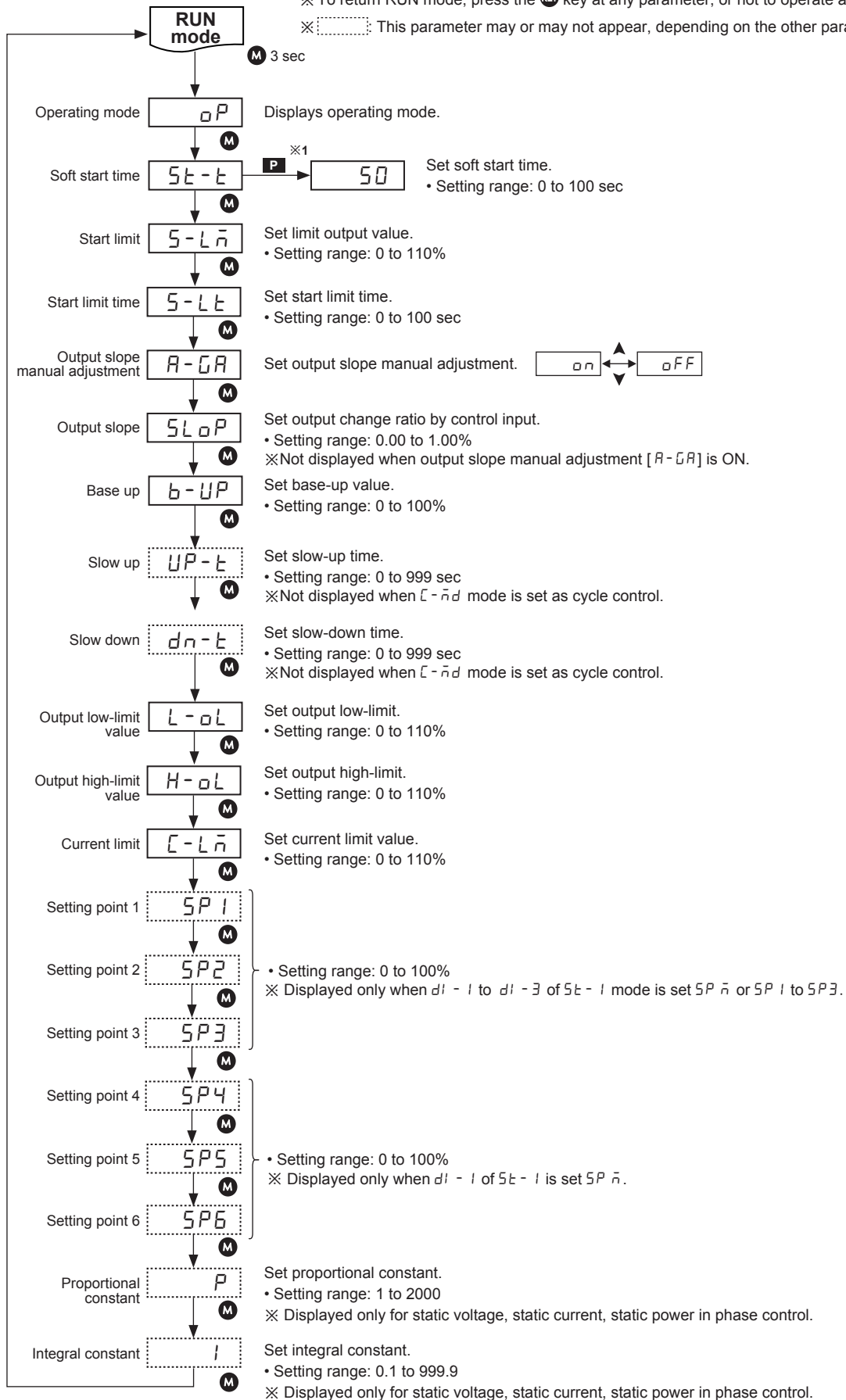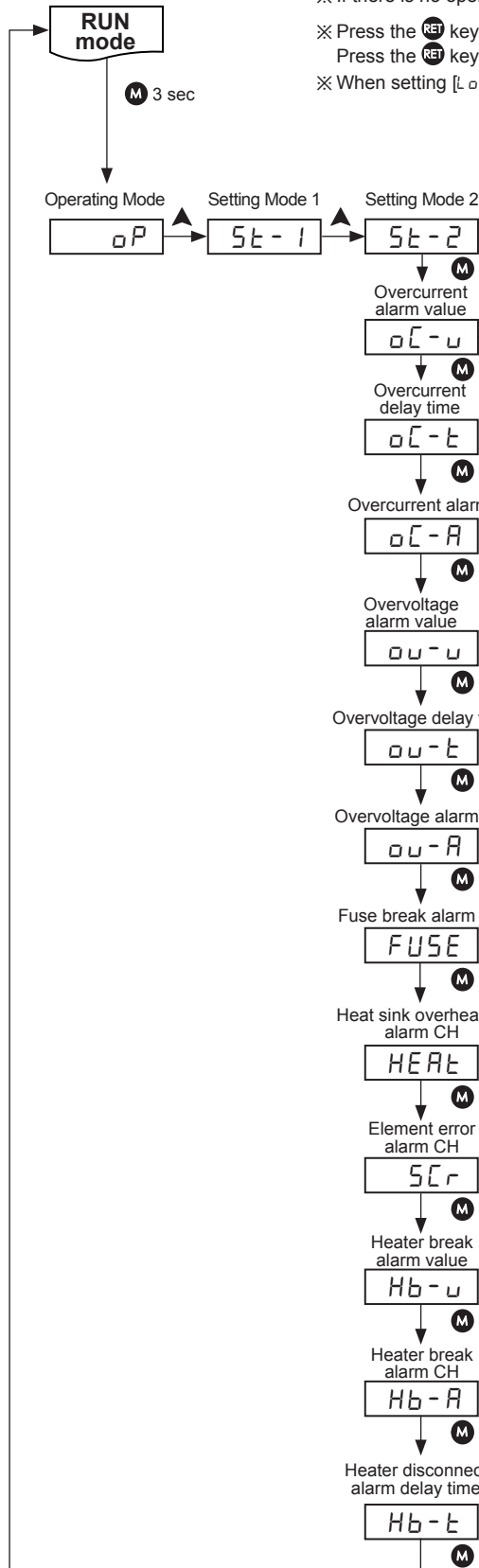
G. Temperature Transmitters

H. Accessories

Factory Default

■ Operating Mode

Parameter	Default	Parameter	Default	Parameter	Default	Parameter	Default
St-t	0000	b-UP	000.0	C-Lm	110.0	SP5	000.0
S-Lm	110.0	UP-t	0003	SP1	000.0	SP6	000.0
S-Lt	0000	dn-t	0003	SP2	000.0	P	0150
A-GA	oFF	L-oL	000.0	SP3	000.0	I	020.0
SLoP	1.000	H-oL	110.0	SP4	000.0		

■ Setting Mode 1

Parameter	Default	Parameter	Default	Parameter	Default	Parameter	Default
In-P	4-20	In-b	000.0	bAr (1-phase)	u	ComY	EnA
C-md	PA	SPAn	000.0	bAr (3-phase)	U-u	LoCX	oFF
dI-1	SP m	dISP (1-phase) Ld-u		F-Ld	oFF		
dI-2	SP1	dISP (3-phase) U-u		Addr	0001		
dI-3	SP1	drES	down	bAUd	384		

■ Setting Mode 2

Parameter	Default	Parameter	Default	Parameter	Default	Parameter	Default
oC-u	110.0	ou-u	110.0	FUSE	AL1	Hb-u	010.0
oC-t	0005	ou-t	0005	HEAt	AL1	Hb-A	AL2
oC-A	AL1	ou-A	AL1	SCr	AL1	Hb-t	30

Communications

■ Communication specification

Protocol	Modbus RTU
Connection type	RS485
Application standard	Compliance with EIA RS485
Max. connection	32 units (address: 01 to 64)
Synchronization method	Asynchronous
Communication method	2-wire half duplex
Communication distance	Max. 800m
Communication speed	4800, 9600, 19200, 38400bps
Communication response wait time	5 to 99ms
Start bit	1bit (fixed)
Data bit	8bit (fixed)
Parity bit	Even (fixed)
Stop bit	2-bit (fixed)

■ Function code format

◎ Function code 3(0×03) = Read holding registers

● **Request** (Master → Slave)

0×01	0×03	0×00	0×00	0×00	0×16	××	××
Add.	Com-mand	Start add.		Number of data		CRC 16	
		High	Low	High	Low	High	Low

● **Response** (Slave → Master)

0×01	0×03	0×10	0×03	0×E8	...	0×03	0×E8	××	××
Add.	Response command	Number of data	1st data		...	16th data		CRC 16	
			High	Low	...	High	Low	High	Low

● **Error** (Slave → Master)

0×01	0×83	××	××	××
Address	Response command	Exception code	CRC 16	

◎ Function code 4(0×04) = Read input registers

● **Request** (Master → Slave)

0×01	0×04	0×00	0×00	0×00	0×10	××	××
Add.	Com-mand	Start add.		Number of data		CRC 16	
		High	Low	High	Low	High	Low

● **Response** (Slave → Master)

0×01	0×04	0×10	0×03	0×E8	...	0×03	0×E8	××	××
Add.	Response command	Number of data	1st data		...	16th data		CRC 16	
			High	Low	...	High	Low	High	Low

● **Error** (Slave → Master)

0×01	0×84	××	××	××
Address	Response command	Exception code	CRC 16	

◎ Function code 6(0×06) = Write single registers

● **Request** (Master → Slave)

0×01	0×06	0×00	0×00	0×03	0×E8	××	××
Add.	Com-mand	Address		Number of data		CRC 16	
		High	Low	High	Low	High	Low

● **Response** (Slave → Master)

0×01	0×06	0×00	0×00	0×03	0×E8	××	××
Add.	Response Command	Address		Data		CRC 16	
		High	Low	High	Low	High	Low

● **Error** (Slave → Master)

0×01	0×86	××	××	××
Address	Response command	Exception code	CRC 16	

◎ **Function code 16(0×10) = Write multiple registers**

● **Request** (Master → Slave)

0×01	0×10	0×00	0×00	0×00	0×10	0×20	××	××
Add.	Com-mand	Start add.		Number of data		Number of byte	CRC 16	
		High	Low	High	Low		High	Low

● **Response** (Slave → Master)

0×01	0×10	0×00	0×00	0×03	0×E8	××	××
Add.	Response command	Start add.		Number of data		CRC 16	
		High	Low	High	Low	High	Low

● **Error** (Slave → Master)

0×01	0×90	××	××	××
Address	Response Command	Exception code	CRC 16	

※ Exception code

·0×01: Not supported command code

·0×02: Starting address of required data and transmittable address are different.

·0×03: The number of required data is over than the number of transmittable data.

·0×04: Transmittable data does not process properly.

■ Address mapping table

◎ **Input registers [1-phase]**

Address	Item	Factor
300001(0000)	Output voltage	*0.1
300002(0001)	Load current	*0.1
300003(0002)	Power	*0.1
300004(0003)	Load resistance	*0.1
300005(0004)	Power frequency	*0.01
300101(0064)	Product No. H	00
300102(0065)	Product No. L	00
300103(0066)	Hardware version	10
300104(0067)	Software version	10
300105(0068)	Model name 1	"DP"
300106(0069)	Model name 2	"2-"
300107(006A)	Model name 3	"00"
300108(006B)	Model name 4	" "
300109(006C)	Model name 5	" "
300110(006D)	Model name 6	" "
300111(006E)	Model name 7	" "
300112(006F)	Model name 8	" "
300113(0070)	Model name 9	" "
300114(0071)	Model name 10	" "
300115(0072)	Reserved	Reserved
300116(0073)	Reserved	Reserved
300117(0074)	Reserved	Reserved
300118(0075)	Coil start address	0
300119(0076)	Coil quantity	0
300120(0077)	Input start address	0
300121(0078)	Input quantity	0
300122(0079)	Holding reg start address	0
300123(007A)	Holding reg quantity	32
300124(007B)	Input reg start address	0
300125(007C)	Input reg quantity	5

◎ **Input registers [3-phase]**

Address	Item	Factor
300001(0000)	Load voltage between U-V line (Vrms)	*0.1
300002(0001)	Load voltage between V-W line (Vrms)	*0.1
300003(0002)	Load voltage between W-U line (Vrms)	*0.1
300004(0003)	U-phase load current (Arms)	*0.1
300005(0004)	V-phase load current (Arms)	*0.1
300006(0005)	W-phase load current (Arms)	*0.1
300007(0006)	Power	*0.01
300008(0007)	Load resistance (% display for initial load)	*0.1
300009(0008)	Power frequency	*0.01
300101(0064)	Product No. H	00
300102(0065)	Product No. L	00
300103(0066)	Hardware version	10
300104(0067)	Software version	10
300105(0068)	Model name 1	"DP"
300106(0069)	Model name 2	"2-"
300107(006A)	Model name 3	"00"
300108(006B)	Model name 4	" "
300109(006C)	Model name 5	" "
300110(006D)	Model name 6	" "
300111(006E)	Model name 7	" "
300112(006F)	Model name 8	" "
300113(0070)	Model name 9	" "
300114(0071)	Model name 10	" "
300115(0072)	Reserved	Reserved
300116(0073)	Reserved	Reserved
300117(0074)	Reserved	Reserved
300118(0075)	Coil start address	0
300119(0076)	Coil quantity	0
300120(0077)	Input start address	0
300121(0078)	Input quantity	0
300122(0079)	Holding reg start address	0
300123(007A)	Holding reg quantity	32
300124(007B)	Input reg start address	0
300125(007C)	Input reg quantity	5

Digital Thyristor Power Controller

■ Address mapping table

◎ Holding registers [1-phase]

Address	Item	Factor
400001(0000)	Reference value	* 0.1(1 to 1000)
400002(0001)	Start time	0 to 99
400003(0002)	Start limit	* 0.1(1 to 1000)
400004(0003)	Soft start time	0 to 99
400005(0004)	Output high-limit	* 0.1(1 to 1100)
400006(0005)	Output low-limit	* 0.1(1 to 1000)
400007(0006)	Remote SP1	* 0.1(1 to 1000)
400008(0007)	Remote SP2	* 0.1(1 to 1000)
400009(0008)	Remote SP3	* 0.1(1 to 1000)
400010(0009)	Remote SP4	* 0.1(1 to 1000)
400011(000A)	Remote SP5	* 0.1(1 to 1000)
400012(000B)	Remote SP6	* 0.1(1 to 1000)
400013(000C)	Slow up time	0 to 99
400014(000D)	Slow Stop time	0 to 99
400015(000E)	Current limit	* 0.1(1 to 2000)
400016(000F)	Over current value	* 0.1(1 to 1100)
400017(0010)	Over current time	0 to 99
400018(0011)	Over voltage value	* 0.1(1 to 1100)
400019(0012)	Over voltage time	0 to 99
400020(0013)	Load detector alarm value	* 0.1(1 to 2000)
400021(0014)	Display selected contents	0 to 3
400022(0015)	Bar graph's content	0 to 3
400023(0016)	Control integer KP value	0 to 9999
400024(0017)	Control integer KI value	* 0.1(1 to 999.9)
400025(0018)	Control method	0 to 6
400026(0019)	Digital input 1	0 to 4
400027(001A)	Digital input 2	0 to 4
400028(001B)	Digital input 3	0 to 4
400029(001C)	Auto ref input selector	0 to 3
400030(001D)	Load resistance display method	0 to 1
400031(001E)	Operation status	Bit0... Fault Bit1... I-OC Bit2... Over current Bit3... Over volt Bit4... Over temp Bit5... Fuse cut Bit6... Phase loss Bit7... Load open Bit8... Over SCR Bit9... Over Freq Bit10... Run/Stop Bit11... Auto/Manual Bit12... EMS Power Bit13... Not Load
400032(001F)	Output slope (%)	*0.001(0 to 1.000)
400033(0020)	Output (%) for input 0%	*0.01(0 to 1000)
400034(0021)	Input correction	*0.1(-999 to 999)
400035(0022)	Input slope correction	*0.1(-999 to 999)
400036(0023)	Overcurrent alarm output	0 to 2 (*1)
400038(0025)	Overvoltage alarm output	
400039(0026)	Fuse break alarm output	
400040(0027)	Frequency error alarm output	0 to 2
400041(0028)	Heatsink overheat alarm output	
400042(0029)	Element error alarm output	
400044(002B)	Heater break alarm output	

■ Address mapping table

◎ Holding registers [3-phase]

Address	Item	Parameter	Factor	
400001(0000)	Reference value	$I\,n$	0.0 to 100.0 (*0.1)	
400002(0001)	Start time	$5E-E$	0 to 100 (*1)	
400003(0002)	Start limit	$5-L\bar{n}$	0.0 to 110.0 (*0.1)	
400004(0003)	Start limit time	$5-LE$	0 to 100 (*1)	
400005(0004)	Output high-limit	$H-oL$	0.0 to 110.0 (*0.1)	
400006(0005)	Output low-limit	$L-oL$	0.0 to 110.0 (*0.1)	
400007(0006)	Remote SP1	$5P\,I$	0.0 to 100.0 (*0.1)	
400008(0007)	Remote SP2	$5P2$	0.0 to 100.0 (*0.1)	
400009(0008)	Remote SP3	$5P3$	0.0 to 100.0 (*0.1)	
400010(0009)	Remote SP4	$5P4$	0.0 to 100.0 (*0.1)	
400011(000A)	Remote SP5	$5P5$	0.0 to 100.0 (*0.1)	
400012(000B)	Remote SP6	$5P6$	0.0 to 100.0 (*0.1)	
400013(000C)	Slow up time	$UP-E$	0 to 999 (*1)	
400014(000D)	Slow down time	$dn-E$	0 to 999 (*1)	
400015(000E)	Current limit	$C-L\bar{n}$	0.0 to 110.0 (*0.1)	
400016(000F)	Over current value	$oC-u$	0.0 to 120.0 (*0.1)	
400017(0010)	Over current time	$oC-E$	0 to 100 (*1)	
400018(0011)	Over voltage value	$ou-u$	0.0 to 300.0 (*0.1)	
400019(0012)	Over voltage time	$ou-E$	0 to 100 (*1)	
400020(0013)	Heater break value	$Hb-u$	10.0 to 500.0 (*0.1)	
400021(0014)	Display selected contents	$dI5P$	0 to 7 (*1)	0: U-V 1: V-W 2: W-U 3: LA-U 4: LA-V 5: LA-W 6: KW 7: REF
400022(0015)	Bar graph's content	bAr		
400023(0016)	Proportional value	P	1 to 2000 (*1)	
400024(0017)	Integral value	I	0.1 to 999.9 (*0.1)	
400025(0018)	Control method	$C-\bar{n}d$	1 to 6 (*1)	1: F-CY 2: ONOF 3: PA 4: V-FB 5: C-FB 6: W-FB
400026(0019)	Digital input 1	$dI-I$	0 to 5 (*1)	0: SP-M 1: SP-1 2: SP-2 3: SP-3 4: RST 5: HOLD
400027(001A)	Digital input 2	$dI-2$	1 to 5 (*1)	1: SP-1 2: SP-2 3: SP-3 4: RST 5: HOLD
400028(001B)	Digital input 3	$dI-3$		
400029(001C)	Control input type	$I\,n-P$	0 to 6 (*1)	0: 4-20 1: 0-20 2: 1-5 3: 0-5 4: 0-10 5: SSR 6: COM
400030(001D)	Load resistance display method selection	$drE5$	0 to 1(*1)	0: DOWN 1: UP
400031(001E)	Operation status	$-$		Bit0... Fault Bit1... I-OC Bit2... Over current Bit3... Over volt Bit4... Over temp Bit5... Fuse cut Bit6... Phase loss Bit7... Load open Bit8... Over SCR Bit9... Over Freq Bit10... Run/Stop Bit11... Auto/Manual Bit12... EMS Power
400032(001F)	Output slope	$5LoP$	0.000 to 1.000 (*0.001)	
400033(0020)	Base up setting	$b-UP$	0.0 to 100.0 (*0.1)	
400034(0021)	Input correction	$I\,n-b$	-99.9 to +99.9 (*0.1)	
400035(0022)	Input slope correction	$5PAn$	-99.9 to +99.9 (*0.1)	
400036(0023)	Overcurrent alarm output	$oC-A$	0 to 2 (*1)	0: NON 1: AL1 2: AL2
400038(0025)	Overvoltage alarm output	$ou-A$		
400039(0026)	Fuse break alarm output	$FU5E$		
400041(0028)	Heatsink overheat alarm output	$HEAE$		
400042(0029)	Element error alarm output	$5Cr$		
400044(002B)	Heater break alarm output	$Hb-A$		

Proper Usage

- Do not use the unit outdoors. Failure to follow this instruction may result in electric shock or shorten the life cycle of the unit.

- Caution for usage (Do not install this unit at the following places.)

  The place where ambient temperature is over -10 to 50℃ range.

  The place where ambient humidity is over 5 to 90%RH.

  The place where temperature changes are rapid and there is dew condensation.

  The place where there is corrosive gas (especially oil gas, ammonia, etc), or flammable gas.

  The place where there is vibration or shock to the unit.

  The place where there is water, oil, drug, or steam.

  The place where there is lots of dust and dirt, salinity, or iron.

  The place where big inducement malfunction, static, or magnetism noise occurs easily.

  The place where there is direct ray of the sun.

  The place where thermal heat builds up by radiant heat.

  Do not open the cover automatically to move this unit.

- Installations

  Tighten this unit with bolts as accessories on the panel.

  If water enters this unit, you must inspect this unit. It may cause short circuit, or a fire.

  When installing this unit, use safety protections such as safety shoes, and helmet, etc and be sure that the safety.

  Be sure that not to put the legs or sit on this unit.

- Temporary storage

  Fix this unit with transportation screws to store this unit temporarily.

  Store this unit as below environments.

  The place where there is no dregs, flammable gas, explosive gas (SO_2, H_2SO, etc).

  The place where there is no vibration, shock.

  The place where there is no steam or not too much hot humidity (95%RH).

  The place where it is not extreme low temperature (below -20℃).

- Caution for wiring

  Do not use empty terminals during wiring I/O to other usage.

  Consider a countermeasure for lots of noises.

- Cleaning

  In cleaning the unit, use dry cloth.

  Do not use organic solvent.

  Turn off the power to clean this unit.