Single-Phase / 3-Phase Digital Power Controllers

DPU1 / DPU3 Series

INSTRUCTION MANUAL

TCD220050AE

Autonics

Thank you for choosing our Autonics product.
Read and understand the instruction manual and manual thoroughly before using the product.
For your safety, read and follow the below safety considerations before using.
For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
Keep this instruction manual in a place where you can find easily.
The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.
Follow Autonics website for the latest information.

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow instructions may result in serious injury or death.

01. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.(e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
Failure to follow this instruction may result in personal injury, economic loss or fire.
02. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.
Failure to follow this instruction may result in explosion or fire.
03. Install on a device panel, and ground separately.
Failure to follow this instruction may result in fire or electric shock.
04. Do not connect, repair, or inspect the unit while connected to a power source.
Failure to follow this instruction may result in fire or electric shock.
05. Do not disassemble or modify the unit.
Failure to follow this instruction may result in fire or electric shock.
06. Check 'Connections' before wiring.
Failure to follow this instruction may result in fire.

⚠ Caution Failure to follow instructions may result in injury or product damage.

01. Use the unit within the rated specifications.
Failure to follow this instruction may result in fire or product damage.
02. Use a dry cloth to clean the unit, and do not use water or organic solvent.
Failure to follow this instruction may result in fire or electric shock.
03. Keep the product away from metal chip, dust, and wire residue which flow into the unit.
Failure to follow this instruction may result in fire or product damage.
04. Since leakage current still flows right after turning off the power or in the output OFF status, do not touch the load terminal.
Failure to follow this instruction may result in electric shock.
05. Since leakage current still flows right after turning off the power or in the output OFF status, do not touch the load terminal.
Failure to follow this instruction may result in burn due to high temperature of the surface.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- Use the product, after 3 sec of supplying power.
- Before use, set the mode and function according to the specification. Since changing the mode / parameter during operation may result in malfunction, set the mode and function after disconnecting load output.
- Re-supply the power to the unit after 3 sec of turning off the power. Failure to follow this instruction may result in malfunction.
- To ensure the reliability of the product, install the product on the panel or metal surface vertically to the ground.
- Install the unit in the well ventilated place.
- While supplying power to the load or right after turning off the power of the load, do not touch the body and heat sink. Failure to follow this instruction may result in a burn due to the high temperature.
- Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
- Do not wire to terminals which are not used.
- Use twisted pair wire for communication line.
- Do not use near the equipment which generates strong magnetic force or high frequency noise.
- Since inter element can be damaged when using with coil load, inductive load, etc., the inrush current must be under the rated load current.
- To prevent product malfunction due to noise, wire power, control input, communication, and load cables separately.
- For stable operation, use shield wire for control, alarm, and communication wires. Use a ferrite core on the shield wire to cope with EMC.
- This unit may be used in the following environments.
  - Indoors (in the environment condition rated in 'Specifications')
  - Altitude max. 2,000 m
  - Pollution degree 2
  - Installation category III

Ordering Information

This is only for reference, the actual product does not support all combinations.
For selecting the specified model, follow the Autonics website.

DPU ❶ ❷ ❸ - ❹ ❺ - ❻

❶ Control phase
1: Single-phase
3: 3-phase

❷ Power supply
1: 110 VAC
2: 220 VAC
3: 380 VAC
4: 440 VAC
5: 480 VAC

❸ Size (rated current capacity)

	DPU1	DPU3
A	0 to 70 A	0 to 50 A
B	80 to 200 A	70 to 200 A
C	250 to 350 A	
D	400 to 600 A	

❹ Rated current capacity
Number: Rated current capacity (unit: A)

❺ Option
R: RS485 communication
D: Remote display
A: Remote display + RS485 communication
N: None

❻ [3-phase control model] Control (FAN) power
No mark: 220 VAC
A: 115 VAC

Product Components

- Product
- Bolt × 4
- Instruction manual
- Terminal × 1

Software

Download the installation file and the manuals from the Autonics website.

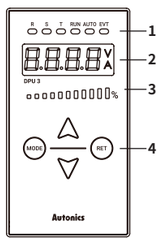
■ DAQMaster

It is the comprehensive device management program for Autonics' products, providing parameter setting, monitoring and data management.

Manual

For proper use of the product, refer to the manuals and be sure to follow the safety considerations in the manuals.
Download the manuals from the Autonics website.

Display



1. Indicator

Indicator	Color	Descriptions
R / S / T	Green	[DPU3 model] Turns ON by display value of display part E.g.) R, S ON → R-S line voltage display
RUN	Green	Turns ON for RUN, turns OFF of STOP
AUTO	Green	Turns ON for AUTO, turns OFF of MANUAL
EVT	Red	Turns ON for Digital input ON, flashes for alarm output ON

2. Display part (red)
- RUN mode: Displays depending the front display setting
- Setting mode: Displays parameter and setting value
- Unit indicator

Indicator	Descriptions
V	Turns ON for voltage display
A	Turns ON for current display
V + A	Turns ON for power display, turns OFF for resistance and input value display

3. Output BAR (green)
Turns on the current output (voltage / current / power) in a ratio of 0 to 100 % relative to the input.

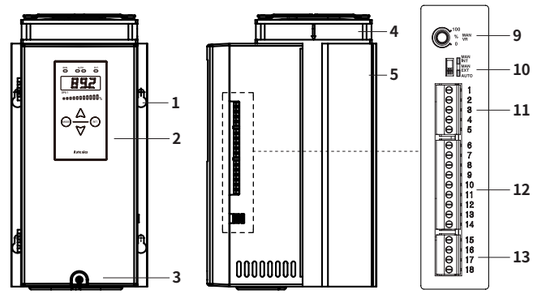
4. Setting keys

Key	Descriptions
[MODE]	To enter monitoring / operation setting 1, 2 mode and to move between parameters
[▲ / ▼]	To move setting modes and to set parameters.
[RET]	To return to RUN mode from monitoring / operation setting 1, 2 / alarm setting mode

Unit Descriptions

- Configurations may vary by model depending on supported specifications.

■ DPU1 Series



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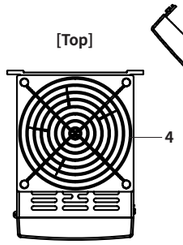

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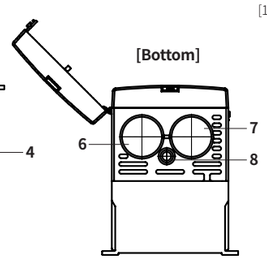
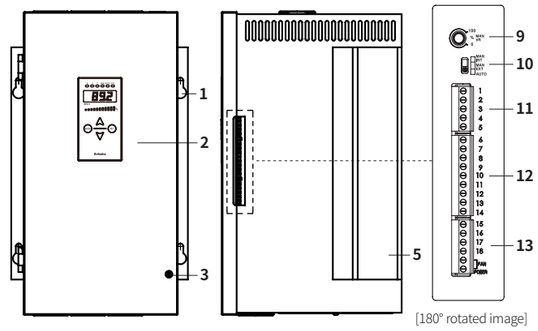


■ DPU3 Series



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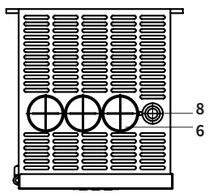

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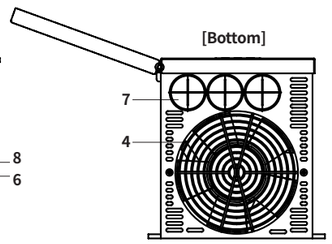


1. Mounting holes
2. Display
3. Case screw
4. Cooling fan 01)
5. Heatsink
6. Load wiring input hole
7. Load wiring output hole
8. Ground wiring hole
9. Internal adjuster
10. AUTO / MANUAL select switch
11. Control input (voltage / current) connector
12. Control input (contact) / RS485 communication connector
13. DPU1: alarm output connector
DPU3: control power (FAN) / alarm output connector

01) DPU1 Series 25 / 40 / 50 A models do not have attached a Fan.

Specifications

Series	DPU1	DPU3
Control phase	Single-phase	3-phase
Rated frequency	50 / 60 Hz (auto recognition), allowable frequency range: ± 2 Hz	
Display method	4 digit 7 segment, Output BAR	
Indicators	Operation / manual control indicator (green) DI, alarm / unit (V, A) indicator (red)	R, S, T indicator (green) Operation / manual control indicator (green) DI, alarm / unit (V, A) indicator (red)
Auto control input	• Current 01): 4 - 20 mA, 0 - 20 mA • Voltage 02): 0 - 5 VDC⎓, 1 - 5 VDC⎓, 0 - 10 VDC⎓ • Contact (non-voltage): ON / OFF • Contact (voltage): 0 / 12 VDC⎓ (24 VDC⎓) • Communication: RS485	
Manual control input	Internal adjuster (10 kΩ), external adjuster (3 to 10 kΩ, ≥ 2 W)	
Digital input (DI)	AUTO / MAN selectable, RUN / STOP selectable, RESET, HOLD, Setting Point 1 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	
Certification	CE UK CA cULus	CE UK CA cULus EAC 03)
SCCR Rating	80 kA (UL certification)	

01) Input impedance = 100 Ω
02) Input impedance = 25 kΩ
03) Except DPU35□-□□ / DPU3□□-□□-A models

Control method	Phase control	Cycle control	ON / OFF control
Control mode	Normal / constant current feedback / constant voltage feedback / constant power feedback	Fixed cycle / variable cycle 01)	-
Applied load	Resistance / inductive load	Resistance load	Resistance load
Output range	0 to 98 %	0 to 100 %	0 to 100 %
Output accuracy of phase control	• Normal : Within ± 10 % F.S. of rated load voltage • Constant current feedback: Within ± 3 % F.S. of rated load current (within variable 1 to 10 times of rated resistance) • Constant voltage feedback: Within ± 3 % F.S. of rated load voltage (within variable ± 10 % F.S. of rated voltage) • Constant power feedback: Within ± 3 % F.S. of rated load power (within variable ±10% F.S. of rated power and within variable 1 to 10 times of rated resistance)		

01) DPU1 only

Series	DPU1	DPU3
Power supply	110 / 220 / 380 / 440 VAC∼ model	110 / 220 / 380 / 440 / 480 VAC∼ model
Allowable voltage range	90 to 110 % of power supply	85 to 115 % of power supply
Min. load current	1 A	
Control power supply	Included in power supply	115 / 220 VAC∼ model 50 / 60 Hz
Power consumption	≤ 40 W (control power, include FAN)	≤ 60 W (control power, include FAN)
Insulation resistance	≥ 200 MΩ (500 VDC⎓ megger)	
Dielectric strength	Between the charging part and the case: 3,000 VAC∼ 50 / 60 Hz for 1 min	
Vibration	0.75 mm double amplitude at frequency of 5 to 55 Hz in each X, Y, Z direction for 2 hours	
Noise immunity	±2 kV square wave noise (pulse width: 1 μs) by the noise simulator	
Ambient temp.	-10 to 50 °C, storage: -20 to 80 °C (no freezing or condensation)	
Ambient humidity	5 to 90 %RH, storage: 5 to 90 %RH (no freezing or condensation)	

Unit weight (packaged)	DPU1	DPU3
A	≈ 3.0 kg (≈ 3.2 kg)	≈ 6.5 kg (≈ 7.6 kg)
B	≈ 3.0 kg (≈ 5.6 kg)	≈ 11.5 kg (≈ 13.0 kg)
C	≈ 11.0 kg (≈ 12.1 kg)	≈ 20.0 kg (≈ 21.1 kg)
D	≈ 11.0 kg (≈ 19.3 kg)	≈ 30.8 kg (≈ 35.7 kg)

Communication Interface

■ RS485

Comm. protocol	Modbus RTU
Application standard	Compliance with EIA RS485
Max. connection	31-unit (address: 01 to 64)
Comm. synchronous method	Asynchronous
Comm. method	2-wire half duplex
Comm. distance	≤ 800 m
Comm. speed	4,800 / 9,600 / 19,200 / 38,400 (default) bps
Comm. response time	5 to 99 ms
Data bit	8-bit (fixed)
Parity bit	Even (fixed)
Stop bit	1-bit (fixed)

Initial Display When Power is ON

- When power is supplied, after all display will flash for 1 sec, device version > rated voltage > rated current are displayed sequentially. After this, enter into RUN mode.
- Example of DPU□2A-050□ model,

	1. Display part	2. Device version	3. Rated voltage	4. Rated current	5. RUN mode
DPU1	0.0.0.0	dP20	220	50	100.3
DPU3	0.0.0.0	dP30	220	50	100.3

Alarm

- Parameter setting is available to set alarm delay time, alarm channel, etc.
- For details on parameter setting, refer to the product manual.

Alarm	Display	Operation	Alarm release [01]
Overcurrent	o-C	Stop (SCR OFF)	• Re-supply power. • Press [RET]. [02] • Switch to STOP mode
Overvoltage	o-u		
Fuse break [03]	FUSE	• DPU1: Stop (SCR OFF) • DPU3: when 1-phase break, it maintains output when 2-phase break, it stops output.	
Heatsink over heat	tEnP	Stop (SCR OFF)	
SCR error [03]	SCr		
Heater break	H-bA	Continues operation	Automatically released within the setting range
Phase loss [04]	PL	Stop (SCR OFF)	• Re-supply load input power. • Re-supply power.

01) If the alarm occurrence condition is not removed, the alarm is re-occur even if the alarm release method is applied.
02) The power is reapplied.
03) If the alarm is not released after power is applied again, replace the fuse or check whether the SCR element is abnormal.
04) DPU3 only

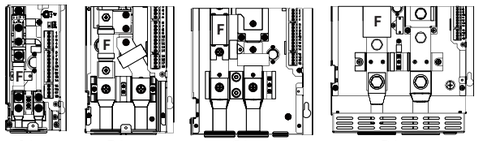
Replacement of Fuse

- To prevent accident, replace a fuse every two years.
- Must turn off the power before removing the fuse.
- If using a fuse not supplied by Autonics, the performance of the product is not guaranteed. When replacing the fuse, use a fuse of the recommended specification.

■ Fuse position

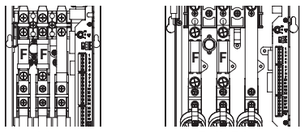
- After loosening the case screws, there is a fuse on the side of the product.

[DPU1]



A type B type C type D type

[DPU3]



A type B, C, D type

- Among R, S, T inputs, R and S have a built-in fuse, but T does not have an internal fuse. If a fuse is required, install a fuse of the following or equivalent performance outside the product separately.

Device size	Fuse fixed bolt	
	DPU1	DPU3
A	M5	M6
B	M8	
C	M8	
D	M12	

■ Fuse recommended specifications

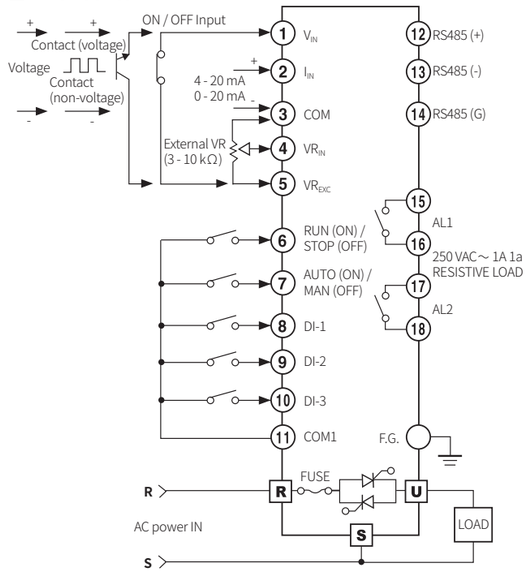
- Rated short circuit test is evaluated as a recommended fuse.

Rated load current [A]	DPU1		DPU3	
	Rec. fuse	Manufacturer	Rec. fuse	Manufacturer
25	50FE	BUSSMANN	50FE	BUSSMANN
40	63ET		63ET	
50	80ET		80ET	
70	100FE		170M1367	
80	660GH-125	HINODE	170M1368	
100	660GH-160		170M1369	
120	660GH-160		170M1369	
150	660GH-200		170M1370	
180	660GH-250		170M1370	
200	660GH-250		170M1372	
250	170M2620	BUSSMANN	170M2620	
350	170M2621		170M2621	
400	A60X500-4(TA)	MERSEN	170M3471	
500	A60X600-4(TA)		170M4466	
600	A60X600-4(TA)		170M4466	

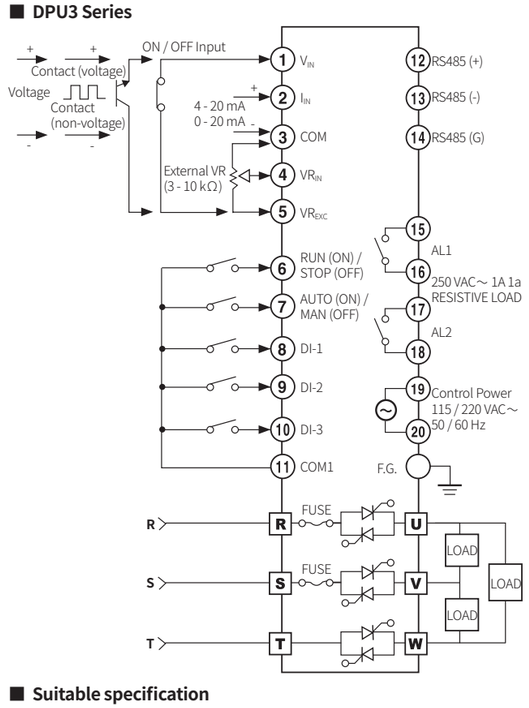
Connections

- Terminal configuration by model may differ depending on the supported spec.

■ DPU1 Series



■ DPU3 Series



■ Suitable specification

- The following connectors can be used with equivalent or substitute.

Connector type	Connector configuration		Manufacturer
	DPU1	DPU3	
Control input (current, voltage)	TS 05 515B	TS 05 515B	ANYTEK
Alarm output / control power (DPU3)	TS 04 515B	TS 06 515B	
Control input (contact) / RS485 communication	TS 09 515B	TS 09 515B	

Cautions during Wiring

- DI input switch: For low current, ON resistance: 20Ω or less (including wiring resistance).
- Do not arbitrarily replace the display - main body connector of the remote display model.
- For crimp terminals of load input/output connectors, use the following UL approved terminals. Be sure to use crimp terminals with an insulating sleeve (tube).

Device size	DPU1/3 wire thickness	Crimp terminal spec.	Bolt tightening torque
A	≥ 25 mm²	25-S6 (1)	5.6 to 6.0 Nm
B	≥ 95 mm²	95-8 (1)	13.6 to 14.5 Nm
C	≥ 2 × 70 mm²	70-8 (2)	13.6 to 14.5 Nm
D	≥ 2 × 185 mm²	185-12 (2)	47.0 to 50.0 Nm

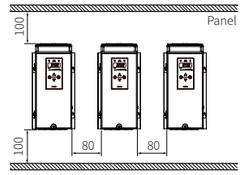
Cautions during Installation

High Temperature Caution
While supplying power to the load or right after turning off the power of the load, do not touch the body and heatsink. Failure to follow this instruction may result in a burn due to the high temperature.

■ Mount space

- When installing multiple power controllers, keep space between power controllers for heat radiation.
  Horizontal: ≥ 80 mm, vertical: ≥ 100 mm

- Unit: mm



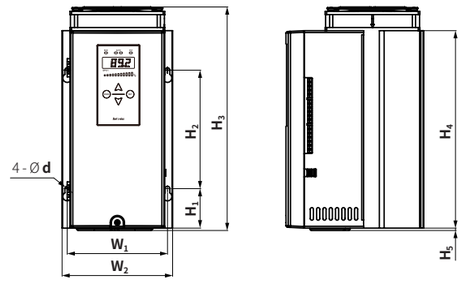
Dimensions

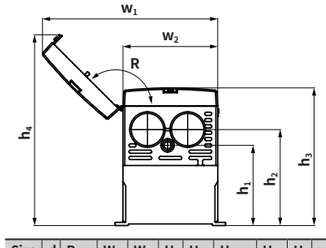
- Unit: mm, For the detailed drawings, follow the Autonics website.

■ DPU1 Series

- The figure is based on the B size.





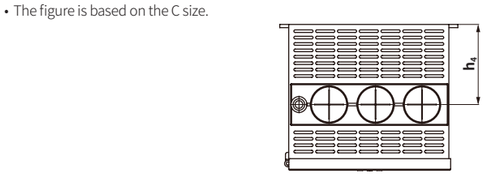


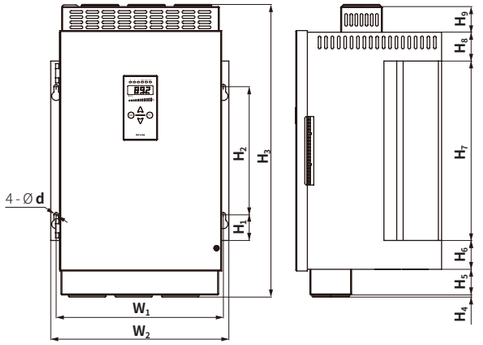
Size	d	R	W_1	W_2	H_1	H_2	H_3	H_4	H_5	w_1	w_2	h_1	h_2	h_3	h_4
A	6	135°	82	97	40	150	233 [01]	230	3	154	80	90	110	170.3	209.5
B	6	135°	127	140	50	150	283	250	3	222	120	101.5	121.5	174	241.5
C	7	160°	193	213	50	200	342	300	4	368	185.6	131	132	179	244
D	7	160°	261	278	40	200	422	380	4	497	252.7	138	156	212	296

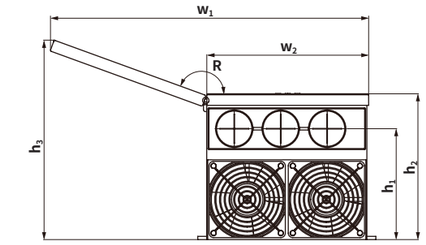
01) Rated current capacity 70 A model: 263

■ DPU3 Series

- The figure is based on the C size.





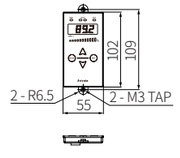


Size	d	W_1	W_2	H_1	H_2	H_3	H_4	H_5	H_6	H_7	H_8	H_9
A	6	127	140	63.5	150	309	$H_4 + H_5 = 29$		$H_6 + H_7 + H_8 = 277$			-
B	7	195	213	40	200	367	3.5	-	40	280	40	-
C	7	261	278	40	200	457	3.3	40	45	280	45	40
D	8.5	405	427	66.5	330	536	4	32.5	$H_6 + H_7 + H_8 + H_9 = 495.5$			

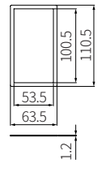
Size	R	w_1	w_2	h_1	h_2	h_3	h_4
A	160°	244	122.6	138	200	239	116
B	160°	366	185.6	176	217	278	126
C	160°	497	252.6	173	227.5	311	125
D	160°	755	385.6	204.5	275.5	405	204.5

■ Remote display

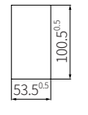
- Unit



- Plate



- Panel cut-out



Mode Setting

RUN

- [MODE] 1 sec → **Monitoring mode** [RET] →
- [MODE] 3 sec → **Operation setting 1 mode** [RET] →
- [MODE] 3 sec + [▲/▼] → **Operation setting 2 mode** [RET] 2 times →
- [MODE] 3sec + [▲/▼] 2 times → **Alarm setting mode** [RET] 2times →

RUN

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Autonics