High Performance Display Units : RS485 / + Pt Input

DS / DA Series

PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.

The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Features

- Simple wiring without soldering
  - multi-stage connection using expansion connectors or ribbon cables.
  - power supply and data wiring required on base unit only.
- Various input options
  - Serial input
  - Dynamic Parallel input
  - RS485 communication (Modbus) input (Master, Slave)
  - RS485 communication (Modbus) time sync display
  - PT temperature sensor input
  - PT temperature sensor + RS485 communication input
- Expandable up to 24 units with multi-stage connection
- Available in various sizes: 16 mm, 22.5 mm, 40 mm, 60 mm
- High luminance LED display
- Various unit display plates (switchable) with flashing or ON/OFF options
- Various display types
  - 7-segment display and 16-segment
  - Red and green display types
  - Display 64 characters (0 to 9, A to Z, 27 symbols, decimal point)

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 to use.**
    Failure to follow this instruction may result in fire.
04. **Do not connect, repair, or inspect the unit while connected to a power source.**
    Failure to follow this instruction may result in fire.
05. **Check 'Unit Descriptions' before wiring.**
    Failure to follow this instruction may result in fire.
06. **Do not disassemble or modify the unit.**
    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.
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.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- 12 - 24 VDC⎓ model power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
- Keep away from high voltage lines or power lines to prevent inductive noise. In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at input signal line.
  Do not use near the equipment which generates strong magnetic force or high frequency noise.
- 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 I

Ordering Information

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

D	❶	❷	-	❸	❹

❶ Display method
S: 7-segment

❷ Character size
22: W 20 × H 33 mm
40: W 40 × H 60 mm
60: W 60 × H 96 mm

❸ Display color
R: Red

❹ Input method (basic unit)
R: Pt temperature sensor input
RT: Pt temperature sensor input + RS485 communication output

Product Components

- Product× 1
- 22 mm Cap (left-right 1 set)× 1
- Instruction manual× 1
- 22 mm Connector × 1

Sold Separately

- Expansion unit (DS□-RE)
  : select the same size/display color of basic unit (available to mix the display method)
- 22 mm Middle bracket (BK-D22R)
- 22 mm Unit-display unit (DU22-□)

Specifications

Model	D□22-□□	D□40-□□	D□60-□□
Display color	Red		
Power supply	12 - 24 VDC⎓		
Permissible voltage range	90 to 110 % of rated voltage		
Current consumption (red)	≤ 25 mA	≤ 55 mA	≤ 65 mA
Current consumption (green)	≤ 20 mA	≤ 40 mA	≤ 45 mA
Character size (W×H)	11.2 × 22.5 mm	22.4 × 40 mm	33.6 × 60 mm
Noise immunity	±500 V the square wave noise (pulse width: 1 μs) by the noise simulator		
Ambient temperature	-10 to 55 °C, storage: -25 to 65 °C (no freezing or condensation)		
Ambient humidity	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)		
Protection structure	IP40 (front part)		
Certification	CE UK EAC		
Weight (packaged) 01)	≈ 17 g (≈ 58 g)	≈ 28 g (≈ 63 g)	≈ 60 g (≈ 110 g)

01) The package weight of 16 mm / 22 mm expansion unit varies, it based on 3 packages.
16 mm: ≈ 77 g / 22 mm: ≈ 92 g

Model	DS□-RR	DS□-RRT
Input method	Pt temperature sensor	Pt temperature sensor
Output	-	RS485 communication
Input sensor	DPt100Ω, JPt 100Ω	
Display character (range)	-50.0 to 400.0 °C or -58.0 to 752.0 °F • Display accuracy: F.S.± 0.5 %	
Max. number of multi-stage	4-unit (except unit-display unit)	

Communication Interface

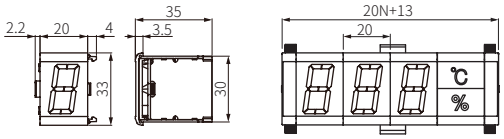
■ RS485

Protocol	Modbus RTU
Application standard	Compliance with EIA RS485
Max. connections (setting address)	8 units (01 to 08)
Comm. type	Two-wire half duplex
Comm. distance	Max. 800 m
Comm. speed	9600, 38400 bps
Comm. response time	5 ms (fixed)
Start bit	1 bit (fixed)
Data bit	8 bits (fixed)
Parity bit	NONE (fixed)
Stop bit	1 bit (fixed)

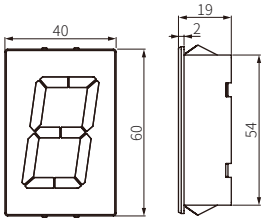
Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.
- N: number of units

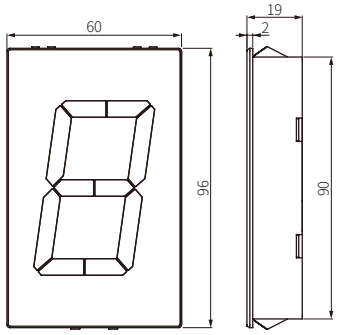
■ 22 mm size



■ 40 mm size

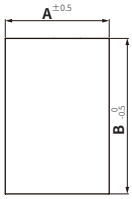


■ 60 mm size



■ Panel cut-out

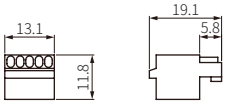
- Panel thickness: 1.5 to 4 mm



Model	A	B
22 mm	20N+11	31
40 mm	40N-2	55
60 mm	60N-3	91

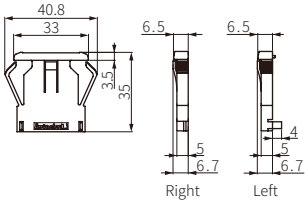
■ Connector

- 22 mm size



■ Cap

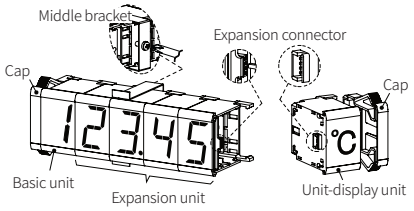
- 22 mm size



Connection of Units

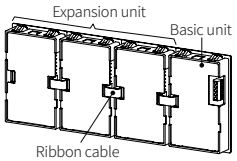
■ 22 mm size

- Connect a basic unit, expansion units, a unit-display unit from the left and connect the caps the end of right and left.
- Use the middle bracket (sold separately) to protect deflection when connecting over 7 units. Use one middle bracket per 7 units. (tightening torque: ≤ 0.5 N m)

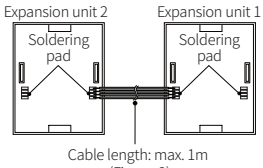


■ 40 / 60 mm size

- Connect expansion connectors of units using a ribbon cable. (Figure 1)
- If the distance between expansion units is far as (Figure 2), you can connect the cable at the soldering pad. To use a soldering pad, remove the protection cover which only expansion units have.
- See 'Removing Protection Cover of Expansion Unit' to detach the cover.



(Figure 1)

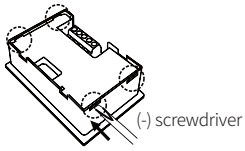


(Figure 2)

Removing Protection Cover of Expansion Unit

Press the connection parts (4-point) of the protection cover at the top/bottom of the 40 / 60 mm expansion unit with (-) screwdriver and the protection cover is removed. To operate the function set switches, you should remove the protection cover on the rear part.

⚠ Caution: Before removing the protection cover, power must be turned OFF.



Software

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

■ DAQMaster

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

Example Programs

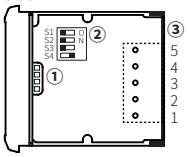
Download the various example programs from the Autonics website.

Unit Descriptions

- Temperature sensor input + RS485 communication output model support S5 / J1 to J4 switch, 6 and 7 of the input terminal.
- Activate Zero Blanking function automatically.

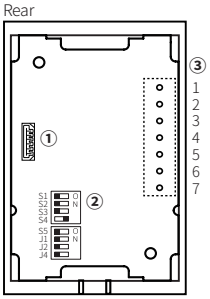
■ 22 mm size

Side



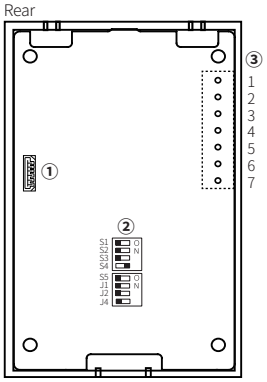
■ 40 mm size

Rear



■ 60 mm size

Rear



① **Expansion connector** Using for connecting expansion unit. See 'Connection of Units.'

② **Function set switches** Basic unit only

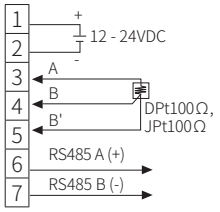
No.	Switch OFF (■□)	Switch ON (□■)	Function	Default
S1	DPt100Ω	JPt100Ω	Temperature sensor	OFF
S2	°C	°F	Temperature unit	OFF
S3	10^2	10^1	Integer display	OFF
S4	Not used	Use	Decimal point	ON
S5	9600 bps	38400 bps	Comm. speed (bps)	OFF

	1	2	···	7	8	
J1	ON	OFF	...	ON	OFF	Comm. address: OFF
J2	OFF	ON		ON	OFF	
J4	OFF	OFF		ON	OFF	

③ **Input terminal** Basic unit only

No.	Code	Function
1	VCC	12 - 24 VDC⎓
2	GND	0 V
3	A	Pt temperature sensor A input
4	B	Pt temperature sensor B input
5	B'	Pt temperature sensor B input
6	A (+)	RS485 A (+) output
7	B (-)	RS485 B (-) output

- Connections



- The basic unit supplies the power for expansion unit and the unit-display unit and DATA input.
- For the 22 mm size model, connect the connector to the input terminal.

Error

Display		Description	Troubleshooting
o	(1 unit)	Flashes when input sensor is disconnected or sensor is not connected.	Check input sensor status.
oP	(2 units)		
oPn	(3 units)		
H		Flashes when measured value is higher than input range.	The error is released when input is within the rated input range.
L		Flashes when measured value is lower than input range.	

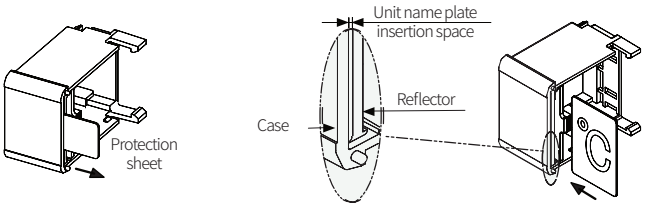
Sold Separately: 22 mm Unit-display Unit (DU Series)

- This unit is for displaying unit by inserting a name plate.
- Name plate type
  - Single: °C / °F / sec / min / h / g / kg / mm / cm / m / rpm / % / ppm / pcs / pH / A / V/ W / VA
  - Dual-stage (top-bottom): °C -°F / °C - %
- Select the same size with the basic / expansion unit.

■ Name plate insertion

Remove the protection sheet and insert the name plate at between the case and the reflector.

⚠ Caution: Be sure to insert it with the correct direction.



■ Input data chart

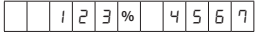
- The unit-display unit does not use the upper bit over D4. (Don't care: X)
- It is only available to use the unit-display unit with Serial 5-bit, Parallel Dynamic 1 input when connecting the unit-display unit at the right side and turning ON. Do not input data to the unit-display unit.

Unit-display unit		High 2-bit / Low 4-bit			
D5	D4	D3	D2	D1	D0
X	X				
No unit		L	L	L	L
Top-bottom OFF		L	L	L	H
Top-bottom ON		L	L	H	L
Top ON		L	L	H	H
Bottom ON		L	H	L	L
Top-bottom flashing		L	H	L	H
Top flashing		L	H	H	L
Bottom flashing		L	H	H	H
If the data is not for the unit-display unit, it maintains former state.		H	L	L	L
		H	L	L	H
		H	L	H	L
		H	L	H	H
		H	H	L	L
		H	H	L	H
		H	H	H	L
		H	H	H	H

■ Zero Blanking

• Using the unit-display unit

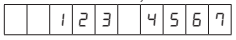
If sending unit data signal after data 1 (00123), it applies Zero Blanking function when displaying data 2 (04567).



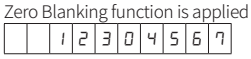
Do not transfer unit data to basic/expansion unit. Unit bit (D7) of unit data is only for unit. If transferring unit data to basic/expansion unit, unit bit (D7) displays the ignored data value. In this case, Zero Blanking does not operate normally.

• Not using the unit-display unit

No-unit data (HXXXLLLL) is used for data delimiter.
If sending no-unit data after data 1 (00123), it applies Zero Blanking function to display data 2. In this case, transmitted data should be added no-unit data to the display digits.

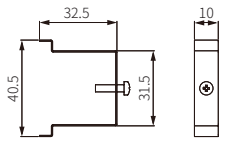


If it does not send no-unit data, it displays data 1 (00123) and data 2 (04567) as one data. Zero Blanking function is applied to data 1 only.



Sold Separately: 22 mm Middle Bracket (BK-D22R)

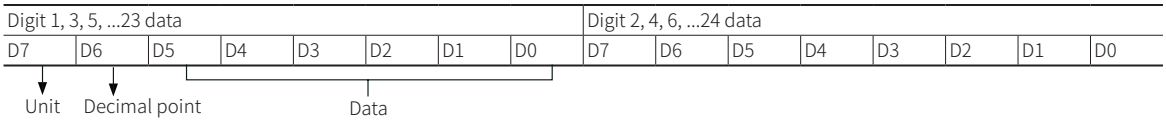
- Unit: mm, For the detailed drawings, follow the Autonics website.



RS485 Communication Modbus Address Mapping

■ Data format

• Decimal point, unit are displayed when 'H'.



■ Product information

No (Address)	Func	R/W	Parameter	Description	Default	Note
					DS□-RRT	DS□-RRT
300001 to 300100	04	R	Reserved			
300101 (0064)	04	R	–	Product number H		
300102 (0065)	04	R	–	Product number L		
300103 (0066)	04	R	–	Hardware version		
300104 (0067)	04	R	–	Software version		
300105 (0068)	04	R	–	Model name 1		DSxx-RRT
300106 (0069)	04	R	–	Model name 2	'xx'	
300107 (006A)	04	R	–	Model name 3	'-R'	
300108 (006B)	04	R	–	Model name 4	'RT'	
300109 (006C)	04	R	–	Model name 5	0	
300110 (006D) to 300114 (0071)	04	R	–	Model name 6 to 10	0	-

• The below Series are automatically recognized RS485 master mode.

No (Address)	Func	R/W	Parameter	Description	Default						Note
					CT	MP5	MT4	TK	TX	TM	THD	
300105 (0068)	04	R	–	Model name 1	'CT'	'MP'	'MT'	'TK'	'TX'	'TM'	'TH'	Series name
300106 (0069)	04	R	–	Model name 2	'6M'	'5W'	'4W'	'4M'	'4'	'2'	'D'	
300107 (006A)	04	R	–	Model name 3	'-2'	'-4'	'DV'	'14'	'S'	' '	' '	
300108 (006B)	04	R	–	Model name 4	'PT'	'1X'	'-8'	'RR'	'14'	' '	' '	

■ [Temperature sensor input + RS485 communication output model] Monitoring data

No (Address)	Func	R/W	Parameter	Description	Default	Note
301001 (03E8)	04	R	–	°C temperature (-500 to 4000)	–	×10 data
301002 (03E9)	04	R	–	°F temperature (-580 to 7520)	–	×10 data
301003 to 301100	04	R	–	Reserved		