

# Autonics INTELLIGENT DISPLAY UNIT (RS485 Communication Input) DS/DA-T Series INSTRUCTION MANUAL



Thank you for choosing our Autonics products. Please read the following safety considerations before use.

## Safety Considerations

- Please observe all safety considerations for safe and proper product operation to avoid hazards.
- Safety considerations are categorized as follows.
- Warning** Failure to follow these instructions may result in serious injury or death.
- Caution** Failure to follow these instructions may result in personal injury or product damage.
- The symbols used on the product and instruction manual represent the following.
- symbol represents caution due to special circumstances in which hazards may occur.
- Warning**
- 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, fire, or economic loss.
- Do not disassemble or modify the unit. Please contact us if necessary.
- Failure to follow this instruction may result in fire.

## Caution

- Do not use the unit outdoors. Failure to follow this instruction may result in shortening the life cycle of the unit or product malfunction.
- Use the unit within the rated specifications. Failure to follow this instruction may result in shortening the life cycle of the unit.
- Do not use water or oil-based detergent when cleaning the unit. Use dry cloth to clean the unit. Failure to follow this instruction may result in fire.
- Do not use the unit where flammable or explosive gas, humidity, direct sunlight, radiant heat, vibration, or impact may be present. Failure to follow this instruction may result in fire or explosion.
- Keep dust and wire residue from flowing into the unit. Failure to follow this instruction may result in fire or product damage.

## Model

1) Basic unit		2) Expansion unit	
Model	Display method	Model	Display method
DS16-T	7-segment	DS16-E	7-segment
DS22-T	7-segment	DS22-E	7-segment
DS40-T	16-segment	DS40-E	16-segment
DS60-T	16-segment	DS60-E	16-segment

## Connection of Units

**1) DS16/DS22**

- Connect a basic unit, expansion units, a unit-display unit from the left and connect the caps the end of right and left.
- The middle bracket (sold separately) helps to protect deflection when connecting over 7 units. Use one middle bracket per 7 units.
- The basic unit supplies the power for expansion units and the unit-display unit and DATA input.

**2) D\_40/D\_60**

Connect expansion connectors of units using a ribbon cable (accessory) as (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.

## Removing Protection Cover

To operate the function set switch of the D\_40, D\_60 models, you should remove the protection cover. Press the connection parts (4-point) of the protection cover at the top/bottom of the product with a flat-head screwdriver and the protection cover is removed.

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

## Comprehensive Device Management Program [DAQMaster]

Item	Minimum specifications
System	IBM PC compatible computer with Pentium III or above
Operations	Windows 98/NT/XP/Vista/7/8/10
Memory	256MB+
Hard disk	1GB+ of available hard disk space
VGA	Resolution: 1024×768 or higher
Others	RS232C serial port (9-pin), USB port

DAQMaster is able to display I/O source value, unit, and user setting value. For more information, please refer to the DAQMaster user manual. Visit our website (www.autonics.com) to download DAQMaster program.

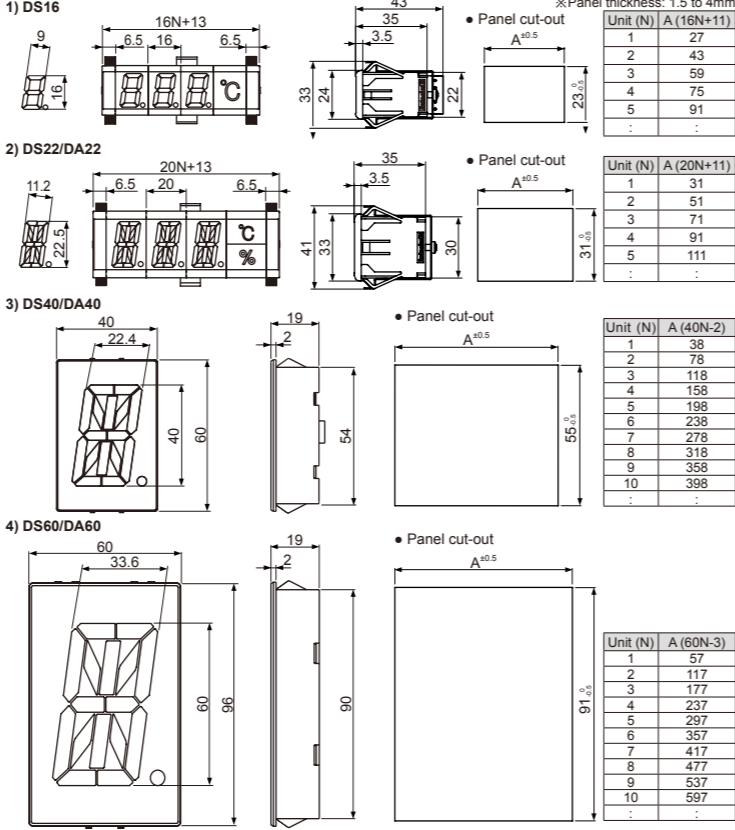
\*The above specifications are subject to change and some models may be discontinued without notice.

## Specifications

Model	Basic unit	DS16-T	D_22-T	D_40-T	D_60-T
Expansion unit	DS16-E	D_22-E	D_40-E	D_60-E	
Input method	RS485 communication (Modbus protocol)				
Display color	Red, green (selectable by model)				
Power supply	12-24VDC				
Allowable voltage range	90 to 110% of rated voltage				
Current consumption	Red type	Max. 20mA	Max. 25mA	Max. 55mA	Max. 65mA
	Green type	Max. 15mA	Max. 20mA	Max. 40mA	Max. 45mA
Character size	W9×H16mm	W11.2×H22.5mm	W22.4×H40mm	W33.6×H60mm	
Display character	Displays 64 types of character and sign (0 to 9, A to Z, 27 signs, dot)				
Max. connection	24 units				
Noise immunity	±500V the square wave noise (pulse width: 1μs) by the noise simulator				
Environment	Ambient temp.	-10 to 55°C, storage: -25 to 65°C			
	Ambient humi.	35 to 85%RH, storage: 35 to 85%RH			
Accessory	Basic unit	Right/Left cap: 1	Right/Left cap: 1	Connector: 1	
	Expansion unit	Ribbon cable (50mm): 1			
Approval	CE				
Weight*	Basic unit	Approx. 52g (approx. 12g)	Approx. 58g (approx. 17g)	Approx. 63g (approx. 28g)	Approx. 110g (approx. 60g)
	Expansion unit	Approx. 77g (approx. 12g)*2	Approx. 92g (approx. 17g)*2	Approx. 63g (approx. 28g)	Approx. 110g (approx. 60g)

- \*1: The weight includes packaging. The weight in parenthesis is for unit only.
  - \*2: The weight represents a pack of 3 units. The weight in parenthesis is for 1 unit only.
  - Environment resistance is rated at no freezing or condensation.
- ### RS485 communication specifications
- | Mode                 | Slave                        | Master                      | Mode                | Slave                       | Master |
|----------------------|------------------------------|-----------------------------|---------------------|-----------------------------|--------|
| Comm. protocol       | Modbus RTU with 16-bit CRC   | Modbus RTU with 16-bit CRC  | Comm. distance      | Max. 800m                   |        |
| Connection type      | RS485                        | RS485                       | Comm. speed         | 4800, 9600, 19200, 38400bps |        |
| Application standard | Compliance with EIA RS485    | Compliance with EIA RS485   | Comm. response time | 5ms, 20ms                   |        |
| Max. connection      | 31 units (address: 01 to 32) | 1 unit (address: 01(fixed)) | Start bit           | 1-bit (fixed)               |        |
| Comm. type           | Two-wire half duplex         | Two-wire half duplex        | Data bit            | 8-bit (fixed)               |        |
|                      |                              |                             | Parity bit          | None (fixed)                |        |
|                      |                              |                             | Stop bit            | 1-bit (fixed)               |        |

## Dimensions



## Unit-display Unit

This unit is for displaying unit by inserting a name plate. It has only 16, 22 sizes. (sold separately)

**1) Unit name plate type**

It provides unit-printed name plates as an accessory. You can select the desired unit name plate and insert this plate. (Single-stage unit name plate: 19 types, Dual-stage unit name plate: 2 types)

Model	Color	Size
Single-stage unit name plate	Red	16mm DU16-R
	Green	16mm DU16-G
Dual-stage unit name plate	Red	22mm DU22-R
	Green	22mm DU22-G

**2) Unit name plate insertion**

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

**Caution:** Be sure about the correct insert direction.

## Unit Description and Function Setting

Only the basic unit model has the function set switch and the input terminal. The DS16, D\_22 models have them at the side, and the D\_40, D\_60 models have them at the rear.

**1) Expansion connector**

Using for connecting units. Refer to "Connection of units".

**2) Function set switches**

**3) RS485 Slave mode (JP1) (Open)**

No.	Switch OFF ( )/ON ( )	Function
S1	5ms / 20ms	Comm. response time
S2	4800 / 9600 / 19200 / 38400	Comm. speed selection (bps)
S3		Comm. speed selection (bps)
J1 to J16	1 2 31 32	Comm. address selection

**4) RS485 Master mode (JP1) (Short)**

No.	Switch OFF ( )/ON ( )	Function
S1	Manual setting / Auto setting	Series setting method
S2	4800 / 9600 / 19200 / 38400	Comm. speed selection (bps)
S3		Comm. speed selection (bps)
J1 to J8	CT6 MP5 MT4 TK/TX TM2 TM4 THD	Series selection (manual setting)
J1 to J8	CT6 MP5 MT4 TK/TX TM2 TM4 THD	Series selection (manual setting), Not using the highest digit
J16	No / Yes	Unit-display unit

**Input terminal**

No.	Code	Function	No.	Code	Function
1	VCC	12-24VDC	4	A(+)	RS485 A (+)
2	GND	0V	5	B(-)	RS485 B (-)
3					

\*Refer to "RS485 Master Mode".

\*For D\_22-T connect the connector to input terminal.

## RS485 Master Mode

Connect the unit and the specified Autonics device which supports Master mode for displaying current value without PC/PLC. The specified Autonics devices are connected by auto or manual setting. Display may be varied by connection setting. Refer to the below examples.

**1) Supported Autonics device for RS485 Master mode**

Only for RS485 communication output model of the below series.

Item	Series
Temperature controller/sensor	TK, TX, TM2, TM4, THD
Counter/Timer	CT4, CT6
Pulse meter	MP5
Panel meter	MT4

**2) Example of display**

In case of manual connection setting, the highest digit may be not used.

**CT6 Series (using 6-digit)**

**MP5 Series (using 5-digit)**

**TM4 Series (4CH connection, using unit-display unit)**

**THD Series (using unit-display unit)**

## RS485 Slave Mode (Data Input Method)

E.g.: Displays 10H38M (10 hour 38 minute)

Comm. address: 1, Comm. speed: 9600bps, Data bit: 8-bit, Start/Stop bit: 1-bit, Parity bit: None

**Query (Master)**

Slave Address	Function	Starting Address	No. of Register
01H	10H	00H	04H

**Response (Slave)**

Slave Address	Function	Starting Address	No. of Register	Error Check (CRC16)
01H	10H	00H	04H	C1H CAH

Zero Blanking ON

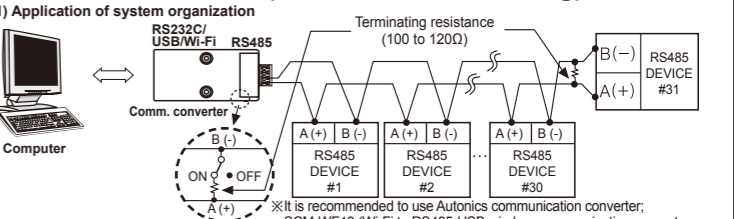
## RS485 Slave Mode (Input Data Chart)

If there is no input data after supplying the power, the basic unit displays ' '.

DS Series (7-segment)				DA Series (16-segment)				DU Series (unit)		High 2-bit				Low 4-bit			
D5	D4	D3	D2	D5	D4	D3	D2	D5	D4	D3	D2	D1	D0	D3	D2	D1	D0
0	0	G	W	0	0	G	W	No unit		L	L	L	L	L	L	L	L
1	H	X	Y	1	H	X	Y	Upper-Lower OFF		L	L	L	L	L	L	L	L
2	I	Y	Z	2	I	Y	Z	Upper-Lower ON		L	L	L	L	L	L	L	L
3	J	Z	.	3	J	Z	.	Upper ON		L	L	L	L	L	L	L	L
4	K	.-	0	4	K	.-	0	Lower ON		L	L	L	L	L	L	L	L
5	L	(	8	5	L	(	8	Upper-Lower flashes		L	L	L	L	L	L	L	L
6	M	)	9	6	M	)	9	Upper flashes		L	L	L	L	L	L	L	L
7	N	.	0	7	N	.	0	Lower flashes		L	L	L	L	L	L	L	L
8	O	0	1	8	O	0	1			H	L	L	L	L	L	L	L
9	P	0	2	9	P	0	2			H	L	L	L	L	L	L	L
A	Q	0	3	A	Q	0	3			H	L	L	L	L	L	L	L
B	R	0	4	B	R	0	4			H	L	L	L	L	L	L	L
C	S	0	5	C	S	0	5			H	L	L	L	L	L	L	L
D	T	0	6	D	T	0	6			H	L	L	L	L	L	L	L
E	U	0	7	E	U	0	7			H	L	L	L	L	L	L	L
F	V	0	8	F	V	0	8			H	L	L	L	L	L	L	L
G	W	0	9	G	W	0	9			H	L	L	L	L	L	L	L
H	X	0	0	H	X	0	0			H	L	L	L	L	L	L	L
I	Y	0	1	I	Y	0	1			H	L	L	L	L	L	L	L
J	Z	0	2	J	Z	0	2			H	L	L	L	L	L	L	L
K	.-	0	3	K	.-	0	3			H	L	L	L	L	L	L	L
L	(	0	4	L	(	0	4			H	L	L	L	L	L	L	L
M	)	0	5	M	)	0	5			H	L	L	L	L	L	L	L
N	.	0	6	N	.	0	6			H	L	L	L	L	L	L	L
O	0	0	7	O	0	0	7			H	L	L	L	L	L	L	L
P	0	0	8	P	0	0	8			H	L	L	L	L	L	L	L
Q	0	0	9	Q	0	0	9			H	L	L	L	L	L	L	L
R	0	0	0	R	0	0	0			H	L	L	L	L	L	L	L
S	0	0	1	S	0	0	1			H	L	L	L	L	L	L	L
T	0	0	2	T	0	0	2			H	L	L	L	L	L	L	L
U	0	0	3	U	0	0	3			H	L	L	L	L	L	L	L
V	0	0	4	V	0	0	4			H	L	L	L	L	L	L	L
W	0	0	5	W	0	0	5			H	L	L	L	L	L	L	L
X	0	0	6	X	0	0	6			H	L	L	L	L	L	L	L
Y	0	0	7	Y	0	0	7			H	L	L	L	L	L	L	L
Z	0	0	8	Z	0	0	8			H	L	L	L	L	L	L	L
.	0	0	9	.	0	0	9			H	L	L	L	L	L	L	L
0	0	0	0	0	0	0	0			H	L	L	L	L	L	L	L
1	0	0	1	1	0	0	1			H	L	L	L	L	L	L	L
2	0	0	2	2	0	0	2			H	L	L	L	L	L	L	L
3	0	0	3	3	0	0	3			H	L	L	L	L	L	L	L
4	0	0	4	4	0	0	4			H	L	L	L	L	L	L	L
5	0	0	5	5	0	0	5			H	L	L	L	L	L	L	L
6	0	0	6	6	0	0	6			H	L	L	L	L	L	L	L
7	0	0	7	7	0	0	7			H	L	L	L	L	L	L	L
8	0	0	8	8	0	0	8			H	L	L	L	L	L	L	L
9	0	0	9	9	0	0	9			H	L	L	L	L	L	L	L
Blank	Blank	Blank	Blank	Blank	Blank	Blank	Blank			H	L	L	L	L	L	L	L

\*1: If this data is not for the unit-display unit, it maintains former state.

## RS485 Slave Mode (Communication Setting)



## RS485 Slave Mode (Data Input Method)

**Display data**

No. (Address)	Func.	R/W	Parameter	Parameter name	Description	Setting range	Default
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