DRW171157AA

Autonics

INTELLIGENT DISPLAY UNIT

(RS485 Synchronous Communication Type for Time Display)

DS-C 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

1. **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 fire, personal injury, or economic loss.
2. **Install on a device panel to use.**
   Failure to follow this instruction may result in fire.
3. **Do not connect, repair, or inspect the unit while connected to a power source.**
   Failure to follow this instruction may result in fire.
4. **Check 'Unit description and function setting' before wiring.**
   Failure to follow this instruction may result in fire.
5. **Do not disassemble or modify the unit.**
   Failure to follow this instruction may result in fire.

⚠ Caution

1. **Use the unit within the rated specifications.**
   Failure to follow this instruction may result in fire or product damage.
2. **Use dry cloth to clean the unit, and do not use water or organic solvent.**
   Failure to follow this instruction may result in fire.
3. **Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
   Failure to follow this instruction may result in fire or explosion.
4. **Keep metal chip, 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

Model	Display method	Size
DS22-□C	7 Segment	W20×H33mm
DS40-□C		W40×H60mm
DS60-□C		W60×H96mm

2) Expansion unit

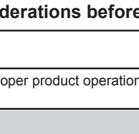
Model	Display method	Size	Model	Display method	Size
DS22-□E	7 Segment	W20×H33mm	**DA22-□E**	16 Segment※1	W20×H33mm
DS40-□E		W40×H60mm	**DA40-□E**		W40×H60mm
DS60-□E		W60×H96mm	**DA60-□E**		W60×H96mm

※1: Use 16 Segment expansion unit for displaying delimiter for hour/min./sec. and 'M' character for AM/PM.

※□ indicates color: R(Red), G(Green)

■ Remove of Protection Cover

To operate the function set switch of the DS40, DS60 models, you should remove the protection cover.
Press the connection parts (4 points) 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.**

■ Device Synchronized Time Transfer Program [World Clock]

World Clock is time synchronization program for DS-C Series. You can check the desired world time zone or set summer time.
For more information, please refer to the World Clock user manual.
Visit our website (www.autonics.com) to download World Clock.

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

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

※**Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).**

■ Specifications

Model		DS22-□C	DS40-□C	DS60-□C
		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. 25mA	Max. 55mA	Max. 65mA
	Green type	Max. 20mA	Max. 40mA	Max. 45mA
Character size		W11.2×H22.5mm	W22.4×H40mm	W33.6× H60mm
Time display		World local time, 12/24-hour, summer time supported		
The number of max. multi-stage connection		10 units		
Noise resistance		±500V the square wave noise (pulse width: 1μs) by the noise simulator		
Environment	Ambient temp.	-10 to 55℃, storage: -25 to 65℃		
	Ambient humi.	35 to 85%RH, storage: 35 to 85%RH		
Accessory	Basic unit	Right/Left cap: 1 Connector: 1	—	
	Expansion unit	—	Ribbon cable (50mm) : 1	
Protection structure		IP40 (front part)		
Approval		CE		
Weight※1	Basic unit	Approx. 58g (approx. 17g)	Approx. 63g (approx. 28g)	Approx. 110g (approx. 60g)
	Expansion unit	Approx. 92g (approx. 17g)※2	Approx. 63g (approx. 28g)	Approx. 110g (approx. 60g)

※1: The weight includes packaging. The weight in parentheses is for unit only.

※2: This is 3 units' weight as packaging unit and the weight in parentheses is only unit weight.

※Environment resistance is rated at no freezing or condensation.

●RS485 communication specifications

Comm. protocol	Modbus RTU with 16-bit CRC	Comm. speed	4800, 9600, 19200, 38400bps
Connection type	RS485	Comm. response time	5ms (fixed)
Application standard	Compliance with EIA RS485	Start bit	1-bit (fixed)
Comm. address	226 (fixed)	Data bit	8-bit (fixed)
Comm. type	Two-wire half duplex	Parity bit	None (fixed)
Comm. distance	Max. 800m	Stop bit	1-bit (fixed)

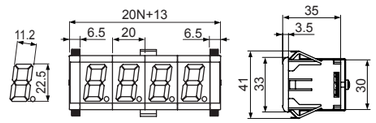
■ Dimensions

(unit: mm)

※N: The number of units

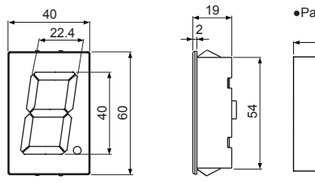
※Panel thickness: 1.5 to 4mm

1) DS22



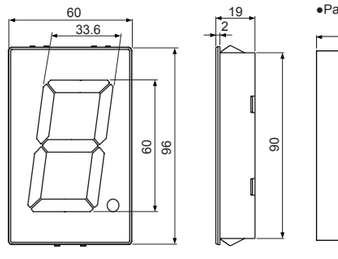
Unit (N)	A (20N+11)
1	31
2	51
3	71
4	91
5	111
:	:

2) DS40



Unit (N)	A (40N-2)
1	38
2	78
3	118
4	158
5	198
6	238
7	278
8	318
9	358
10	398
:	:

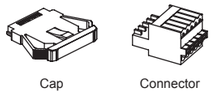
3) DS60



Unit (N)	A (60N-3)
1	57
2	117
3	177
4	237
5	297
6	357
7	417
8	477
9	537
10	597
:	:

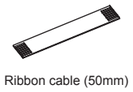
4) Accessory

●D□22



Cap Connector

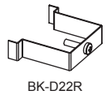
●D□40/D□60



Ribbon cable (50mm)

5) Sold separately (middle bracket)

●D□22



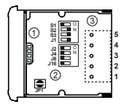
BK-D22R

■ Unit Description and Function Setting

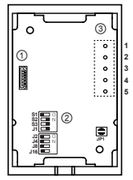
Only the basic unit model has the function set switch and the input terminal.
The DS22 models have them at the side, and the DS40, DS60 models have them at the rear.

①Expansion connector
Using for connecting units.
Refer to '■ Connection of units'

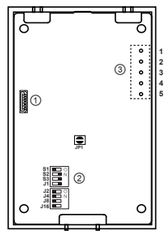
●DS22-□C



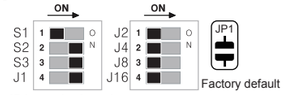
●DS40-□C



●DS60-□C



②Function set switches



●JP1 terminal setting

JP1	Delimiter for hour/min./sec.
(Open)	Sign [:] (using 16 segment expansion unit)
(Short)	Period [.] (using 7 segment expansion unit)

●Switch setting

No.	Switch OFF (■)/ON (□)	Function
S1	24-hour 12-hour	12/24-hour setting
S2 S3	4800 9600 19200 38400 S2 S3	Comm. speed selection (bps)
J1 to J16	UTC -12:00 / UTC -11:00 / UTC +11:00 / UTC +12:00 J1 J2 J4 .... J8 J16	World time zone selection※1

※1: Refer to '■ World Time Zone'.

③Input terminal

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

※For DS22-□C connect the connector to input terminal.

■ World Time Zone

※Select the desired world time zone by function set switches (J1 to J16).

※If communication is not connected when supplying the power, the unit displays the set local time zone.

No.	Switch OFF(■): 0 ON(□): 1					Time Zone	Location
	J1	J2	J4	J8	J16		
0	0	0	0	0	0	UTC-12:00	International Date Line West
1	0	0	0	0	1	UTC-11:00	Coordinated Universal Time -11
2	0	0	0	1	0	UTC-10:00	Hawaii
3	0	0	0	1	1	UTC-09:00	Alaska
4	0	0	1	0	0	UTC-08:00	Pacific Time(US&Canada), Baja California
5	0	0	1	0	1	UTC-07:00	Mountain Time(US&Canada), Arizona, Chihuahua, La Paz, Mazatlan
6	0	0	1	1	0	UTC-06:00	Guadalajara, Mexico City, Monterrey, Saskatchewan, Central America, Central Time(US&Canada)
7	0	0	1	1	1	UTC-05:00	Eastern Time(US&Canada), Indiana(East), Bogota, Lima, Quito, Rio Branco, Chetumal
8	0	1	0	0	0	UTC-04:00	Atlantic Time(Canada), Asuncion, Georgetown, La Paz, Manaus, San Juan, Cuiaba
9	0	1	0	0	1	UTC-03:30	Newfoundland
10	0	1	0	1	0	UTC-03:00	Greenland, Montevideo, Buenos Aires, Brasilia, Santiago, Salvador, Cayenne, Fortaleza
11	0	1	0	1	1	UTC-02:00	Coordinated Universal Time -02
12	0	1	1	0	0	UTC-01:00	Cabo Verde Is., Azores
13	0	1	1	0	1	UTC 00:00	Coordinated Universal Time, Dublin, Edinburgh, Lisbon, London, Monrovia, Reykjavik, Casablanca
14	0	1	1	1	0	UTC+01:00	Belgrade, Bratislava, Budapest, Ljubljana, Prague, Brussels, Copenhagen, Madrid, Paris, Windhoek, Sarajevo, Skopje, Warsaw, Zagreb, West Central Africa, Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna
15	0	1	1	1	1	UTC+02:00	Damascus, E.Europe, Beirut, Athens, Bucharest, Amman, Jerusalem, Istanbul, Cairo, Kaliningrad, Tripoli, Harare, Pretoria, Helsinki, Kyiv, Riga, Sofia, Tallinn, Vilnius
16	1	0	0	0	0	UTC+03:00	Nairobi, Moscow, St. Petersburg, Volgograd, Minsk, Baghdad, Kuwait, Riyadh
17	1	0	0	0	1	UTC+03:30	Tehran
18	1	0	0	1	0	UTC+04:00	Baku, Abu Dhabi, Muscat, Yerevan, Izhevsk, Samara, Tbilisi, Port Louis
19	1	0	0	1	1	UTC+04:30	Kabul
20	1	0	1	0	0	UTC+05:00	Ashgabat, Tashkent, Ekaterinburg, Islamabad, Karachi
21	1	0	1	0	1	UTC+05:30	Sri Jayawardenepura, Chennai, Kolkata, Mumbai, New Delhi
22	1	0	1	1	0	UTC+05:45	Kathmandu
23	1	0	1	1	1	UTC+06:00	Novosibirsk, Dhaka, Astana
24	1	1	0	0	0	UTC+06:30	Yangon(Rangoon)
25	1	1	0	0	1	UTC+07:00	Bangkok, Hanoi, Jakarta, Krasnoyarsk
26	1	1	0	1	0	UTC+08:00	Beijing, Chongqing, Hong Kong, Urumqi, Ulaanbaatar, Irkutsk, Kuala Lumpur, Singapore, Taipei, Perth
27	1	1	0	1	1	UTC+09:00	Seoul, Yakutsk, Osaka, Sapporo, Tokyo
28	1	1	1	0	0	UTC+09:30	Darwin, Adelaide
29	1	1	1	0	1	UTC+10:00	Guam, Port Moresby, Magadan, Brisbane, Vladivostok, Canberra, Melbourne, Sydney, Hobart
30	1	1	1	1	0	UTC+11:00	Solomon Is., New Caledonia, Chokurdakh
31	1	1	1	1	1	UTC+12:00	Coordinated Universal Time +12, Anadyr, Petropavlovsk-Kamchatsky, Auckland, Wellington, Fiji

■ Display Example of Delimiter For Hour/Min./Sec.

Delimiter for hour/min./sec.		Displaying 24-hour	Displaying 12-hour※1
Sign [:] (using 16 seg. expansion unit)	Hour/Min.	18:30	PM 6:30
	Hour/ Min./Sec.	18:30:15	PM 6:30:15
Period [.] (using 7 seg. expansion unit)	Hour/Min.	18.30.	PM 6.30
	Hour/ Min./Sec.	18.30.15	PM 6.30.15

※Use 16 Segment expansion unit for 'M' character for AM/PM when displaying 12 hours time.

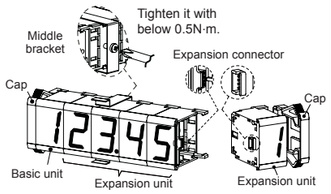
■ Connection of Units

1) D□22

●Connect a basic unit, expansion units from the left and connect the caps the end of right and left.

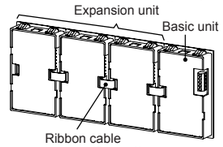
●The middle bracket (sold separately) helps to protect deflection when connecting over 7 units. Use one middle bracket per 7 units.

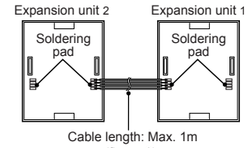
●The basic unit supplies the power for expansion units and DATA input.



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.

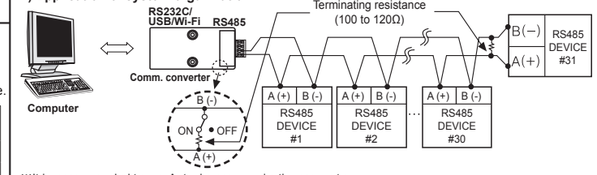




※You can use both the 7 segment model and the 16 segment model mixed.

■ Communication Setting

1) Application of system organization



※It is recommended to use Autonics communication converter;
SCM-WF48 (Wi-Fi to RS485·USB wireless communication converter, sold separately), SCM-US48I (USB to RS485 converter, sold separately), SCM-38I (RS232C to RS485 converter, sold separately).
Please use twist pair wire for RS485 communication.

2) Modbus Address Mapping

No(Address)	Func	R/W	Description	Setting range
400001 (0000)	0x90	W	UTC universal time	Hour (high byte), Min. (low byte)
400002 (0001)	0x90	W		Sec. (high byte), 1/100 sec. (low byte)
400003 (0002)	0x90	W	Summer time	· Configuration: 1-byte (summer time setting) +1-byte (summer time setting) · Summer time setting: local code (5-bit)※1 +summer time (3-bit)
400004 (0003)	0x90	W		
400005 (0004)	0x90	W		
400006 (0005)	0x90	W		
400007 (0006)	0x90	W		
400008 (0007)	0x90	W		· Available up to max. 16 locals
400009 (0008)	0x90	W		· For displaying summer time, transfer the local data and summer time data also. E.g.) Seoul +1 hour (0b01001010)
400010 (0009)	0x90	W		

Summer time	+30 min.	+1 hour	-1 hour	-30 min.
3-bit	001 (1)	010 (2)	011 (3)	100 (4)

※1: For local code (5-bit), refer to '■ World Time Zone'.

■ Cautions during Use

1. Follow instructions in 'Cautions during Use'.
   Otherwise, It may cause unexpected accidents.
2. 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
3. Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
4. 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.
5. This unit may be used in the following environments.
   ①Indoors (in the environment condition rated in 'Specifications')
   ②Altitude max. 2,000m
   ③Pollution degree 2
   ④Installation category I

■ Major Products

■ Photoelectric Sensors
■ Fiber Optic Sensors
■ Door Sensors
■ Door Side Sensors
■ Area Sensors
■ Proximity Sensors
■ Pressure Sensors
■ Rotary Encoders
■ Connector/Sockets
■ Switching Mode Power Supplies
■ Control Switches/Lamps/Buzzers
■ I/O Terminal Blocks & Cables
■ Stepper Motors/Drivers/Motion Controllers
■ Graphic/Logic Panels
■ Field Network Devices
■ Laser Marking System (Fiber, Co_2, Nd:YAG)
■ Laser Welding/Cutting System
■ Temperature Controllers
■ Temperature/Humidity Transducers
■ SSRs/Power Controllers
■ Counters
■ Timers
■ Panel Meters
■ Tachometers/Pulse (Rate) Meters
■ Display Units
■ Sensor Controllers

Autonics Corporation
http://www.autonics.com

■ **HEADQUARTERS:**
18, Bansong-ro 513beon-gil, Haeundae-gu, Busan, South Korea, 48002
TEL: 82-51-519-3232
■ **E-mail:** sales@autonics.com

DRW171157AA