Digital Amplifier Detachable Photoelectronic Sensor

OPTEX FA

D2SA Series

Laser Type Amplifier Unit

D2SA-M□	D2SA-M□3
D2SA-S□	D2SA-S□1
D2SA-M□-M8	D2SA-S□-M8

Instruction Manual

● Thank you for purchasing DSA Series. We hope you are fully satisfied with this product and enjoy its performance.
● Carefully read this instruction manual and keep it for future reference.

Safety Precautions

Carefully read and understand the safety precautions before operation.
The important information is provided to protect your health and property.
Do not apply any other installing or operating procedure other than that described in this manual.

■ Meaning of Safety Symbols

⚠ WARNING	Indicates a possible hazard that may result in death, serious injury, or serious property damage if the product is used without observing the stated instructions.
⚠ CAUTION	Indicates a possible hazard that may result in personal injury or property damage if the product is used without observing the stated instructions.

Mandatory Requirements

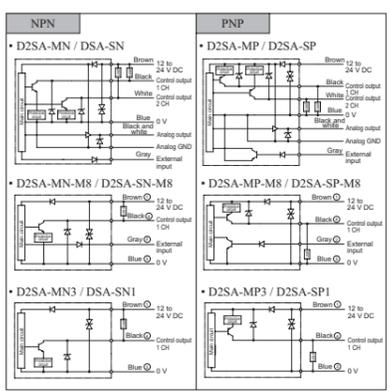| ⚠ WARNING	● This product is not an explosion-proof construction. Do not use the product under flammable, explosive gas or liquid environment. ● Do not use the product in water. ● Do not disassemble, repair, or convert the product. Failure to do this may cause failure, fire, or electric shock. ● Operate within the rated range.

This product cannot be used as a safety device to protect human body.

Operational Precautions

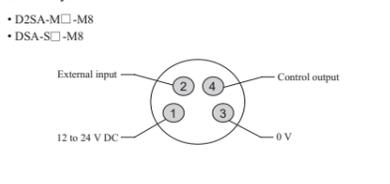| ⚠ CAUTION	● Use the specified sensor head to connect this product. Any use other than specified will cause accident or product damage.
	● It is dangerous to wire or attach/remove the connector with the power on. Make sure to turn off the power before operation.
	● Make sure to use the product with the protective cover attached and closed.
	● Installing in the following places may result in malfunction:
	  1. A dusty or steamy place
	  2. A place generating corrosive gas
	  3. A place directly receiving scattering water or oil.
	  4. A place suffered from heavy vibration or impact.
	● The product is not designed for outdoor use.
	● Do not use the sensor in transient state after power on (approx. 100 ms).
	● Do not wire with the high voltage cable or the power line. Failure to do this will cause malfunction by induction or damage.
	● The sensor performance or digital display values may depend on the individual units or the condition of detected product.

Specification

Model	Advanced Model (2CH)		Standard Model (1CH)	
	Base unit	Handset	Base unit	Handset
Cable type	D2SA-M(N/P)	D2SA-S(N/P)	D2SA-M(N/P)3	D2SA-S(N/P)1
M8 connector type	-	-	D2SA-M(N/P)-M8	D2SA-S(N/P)-M8
Adaptable sensor head	DS Series			
Power source, voltage	12 - 24 V DC ± 10 % including a ripple			
Consumption current	45 mA or less / 24 V			
Response time	60μs/500μs/2ms (Fast/Standard/Long)			
Control output	NPN / PNP Open collector Load current: 100 mA or less Residual voltage:1.8 V or less			
Indicator light	Laser emission indicator light: Green, Output Indicator light: Green (1-2CH) Teaching indicator light: Red Channel indicator light: Green (1-2CH)			
Digital display	7 segment 4 digit display			
Timer function	OFF, On delay, Off delay, One-shot			
Timer time	1 ms - 9 s			
Mutual interference prevention function	Yes: Up to 4 machines			
Output method	Light on / Dark on Switching type in the function			
Analog output	Current output:4 - 20 mA		-	
Setting input/output	External input setting (teaching, synchronizing input, floodlight off, counter reset) Output setting (2CH output + Alarm output)	External input setting (teaching, synchronizing input, floodlight off, counter reset) 	External input setting (teaching, synchronizing input, floodlight off, counter reset) * Settable only with D2SA-M□-M8	
Operating temperature/humidity	-25 to +55°C / 35 to 85 % RH (No freezing)			
Store temperature/humidity	-40 to +70°C / 35 to 85 % RH (No condensation)			
Shock resistance	10 to 55 Hz Double amplitude 1.5 mm 2 hours for each direction of X, Y, and Z			
Protective category	IP50			
Material	PC: Case and cover			
Weight (including the cable)	Cable type: 65 g M8 connector type: 30 g			

*1 Operating temperature may differ according to the number of connection.
Set as follows:
1 - 3 machines(s): -25 to +55°C
4 - 8 machines(s): -25 to +50°C * When not using analog output.
● Base units and handsets of the advanced or standard models can be connected with any combination.
However, some combination may be restricted. For details, contact our Customer Service.

Input/Output Schematic

NPN

・D2SA-MN / DSA-SN

・D2SA-MN-M8 / DSA-SN-M8

・D2SA-MN3 / DSA-SN1

PNP

・D2SA-MP / D2SA-SP

・D2SA-MP-M8 / D2SA-SP-M8

・D2SA-MP3 / D2SA-SP1

* D2SA-S□ / D2SA-S□1 of the handset do not have power wires (brown, blue) as they receive the power supply from the base unit.

■ Pin layout

・D2SA-M□-M8
・DSA-S□-M8

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   (2) (4)      Control output
   (1) (3)
12 to 24 V DC   0 V
                External input
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Each Part

No.	Name	Function
①	Laser emission indicator light	Turns on while the amplifier is powered.
②	1 CH output indicator light	Turns on when the output of 1 CH is ON.
③	2 CH output indicator light	Turns on when the output of 2 CH is ON.
④	Main monitor (Red)	Displays light intensity, function, and the number of counts.
⑤	Sub monitor (Green)	Displays the threshold, function selection, and the number of counts.
⑥	Teaching mode indicator light	Turns on in the Teaching mode.
⑦	Valid channel indicator light (1 CH)	Keeps turning ON when the monitor display value, adjustment, and the function setting are valid to 1 CH.
⑧	Valid channel indicator light (2 CH)	Keeps turning ON when the monitor display value, adjustment, and the function setting are valid to 2 CH.
⑨	UP button	RUN mode: Displays or changes the threshold.
	DOWN button	Function mode: Selects the function or changes the numerical values.
⑩	Mode button	RUN mode: Switches to the Function mode. (0.5 s ≧) Function mode: Fix the selection.
⑪	Teaching button	RUN mode: Switches the channel. Function mode: Returns to RUN mode or performs scaling. Set mode: Run the teaching.
⑫	SET/RUN selection switch	Switches between Teaching mode and RUN mode.

Adjustment

The available teaching depends on "5.3 Detection Mode setting." Refer to below:

Stn (Standard detection)	All teachings are valid.
hd⌐ / hd⌐ (Edge detection)	No teaching are valid.
dIFF (Differential detection)	Only one point teaching is valid.

■ Setting Maximum Sensitivity

SET RUN — Switch to SET.

1Pt — Select the one-point teaching.

1Pt — Press the teaching button.

1Pt good —

SET RUN — Switch to RUN.

The threshold flashes and the display returns to normal.

■ One Point Teaching

SET RUN — Switch to SET.

1Pt — Select the one point teaching.

1Pt — Press the teaching button.

1Pt good —

SET RUN — Switch to RUN.

The threshold flashes and the display returns to normal.

Transmission type
Regressive Reflection type: Perform adjustment when there is an object.

Reflection type: Perform adjustment when there is no object.

■ Two Points Teaching

SET RUN — Switch to SET.

2Pt 1Pt — Select the two points teaching.

2Pt 1Pt — 1st point: Press the teaching button.

2Pt 2Pt — 2nd point: Press the teaching button.

2Pt good —

SET RUN — Switch to RUN.

The threshold flashes and the display returns to normal.

Reflection type
1st: Perform adjustment when there is an object.
2nd: Perform adjustment with the background without object.

Set the threshold at the center between the 1st and the 2nd points.

■ Auto Teaching

SET RUN — Switch to SET.

Auto Strt — Select the auto teaching.

Auto Strt — Start: Press the teaching button.

Auto StoP — End: Press the teaching button.

Auto good —

SET RUN — Switch to RUN.

The threshold flashes and the display returns to normal.

Reflection, Transmission, Regressive Reflection Type
Start and End: Perform adjustment while the object is passing.

■ Zone Teaching

SET RUN — Switch to SET.

ZonE — Select the zone teaching.

ZonE — Press the teaching button.

ZonE good —

SET RUN — Switch to RUN.

The threshold flashes and the display returns to normal.

Reflection type: Perform adjustment with the background without object, and when there is an object.

Set the zone (detection range) to ±10 % against the amount of received light.

■ Teaching Transparent Object

SET RUN — Switch to SET.

gLAS —

gLAS — Press the teaching button.

gLAS good —

SET RUN — Switch to RUN.

The threshold flashes and the display returns to normal.

Rotating reflection type: Perform when there is no object.

Reflection side of reflector

Set the threshold to -10 % against the amount of received light.

■ Teaching Length Measurement

Valid only when the length measurement function is set. Allows to determine the size or the length of object.

* Not displayed on the teaching mode menu unless the application of length measurement is selected in the detection mode setting.
* Teaching length measurement or length measurement mode does not measure the actual length of object accurately.

SET RUN — Switch to SET.

Lnth SEt — SET: Press the teaching button.

Lnth In — IN: Press the teaching button.

Lnth good —

SET RUN — Switch to RUN.

The upper limit flashes and the display returns to normal.

Transmission Type (In length measurement)
SET: Press the teaching button when there is no object with the flood light and the light receiver facing each other.

IN: Press the teaching button when there is an object.

■ Manual Adjustment

Pressing the UP/DOWN button in the RUN mode flashes the threshold. It indicates that adjustment is possible. Adjust to any value using the UP/DOWN button.

When using the zone teaching, the threshold of upper/lower limit can be set individually.

①Normal
300 350 — Automatically returns to the normal display 5 seconds after completion of the setting (no operation).

②When using zone teaching
Setting Lower Limit (Far)
FAr — 100 30 — Automatically returns to the normal display 5 seconds after completion of the setting (no operation).

Setting Upper Limit (Near)
nEAr — 100 150 —

* No operation state for 5 seconds during setting automatically returns the display to normal as well.

■ Error Display in Teaching

An error message is displayed in the event of error during adjustment.
Refer to the table below for readjustment.

Err1	Indicates shortage of light intensity or no difference of light intensity.
Err2	Indicates a sampling error in teaching of a moving object.
Err3	Indicates a calculation error.
not cPLt	Indicates that the teaching is interrupted.

Function Setting

[○] Press the mode button.

1. Operation setting
L--d L on — Select an operation mode.
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of Operation setting.
| L on | ON when light comes in. |
| d on | ON when light is blocked. |
* The timer can be set individually for 1CH and 2CH.

2. Response speed setting
rESP Long — Select a response speed.
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of Response speed setting.
Long	High accuracy setting 2 ms
Stnd	Standard setting 500 μs
FASt	Fastest setting 60 μs

3. Timer setting
tlEr oFF — Select a timer and the time.
Select by using [UP/DOWN] and fix by [T]. OFF moves to the TOP of Timer setting and others move to the Timer setting.
oFF	Timer off
oFdy	Off delay timer
ondy	On delay timer
SHot	One shot timer

Timer Time Setting 1-9000 (1 ms - 9 s)
[UP/DOWN] is for time changing, [T] is for digit change, and [T] is to fix. The screen returns to Timer setting TOP.
oFdy 0001
* The timer can be set individually for 1CH and 2CH.
* Parallel use of On delay timer and Off delay timer in the same channel same channel is not possible.

4. Sensitivity correction setting
tunE on — Correct to the optimal value when sensitivity is not enough.
Tune on using [T]. The progressing status is displayed in chart. After the end, the screen returns to the TOP of Sensitivity correction.
| on | Tune on the sensitivity correction. |
| oFF | Tune off the sensitivity correction. |
* Settings are only for tuning on (on) or tuning off (OFF).

5. Detailed setting (Expert mode)
EPrt — [T] Moves to the Detailed setting menu. → [A]

6. Initialization setting (Initial reset)
rSEt no — Initialize all settings.
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of Initialization setting.
| no | Not initialize |
| yES | Initialize |
Initializing changes all settings to the factory default.

7. End of setting
EIt — [T] Returns to the normal display.

■ Precautions for Function Setting

* Some function settings automatically delete the invalid settings or settings, of which concomitant use is not allowed, from the displayed items. This does not indicate any failure.
* Some functions are not incorporated or not settable to D2SA-M□3 /D2SA-S□1 /D2SA-M□-M8/D2SA-S□-M8.
* Hold down the operation button for approx. 0.3 seconds if not especially specified.
* Analog output and Analog setting is available when response time setting is "Long" or "Standard".
* The sub monitor starts flashing when each setting selection becomes settable.
* The monitor in use of the counter displays "U" when the up-counter is selected, and displays "d" when the down-counter is selected.
* For functions other than Operation setting and Timer setting, both settings of 1 CH and 2 CH are changed when the setting of each function is modified.
* The "all setting" described in 5.8 to 5.10 is reflected only on the amplifier unit connected to the right side from the cable connector of operated amplifier unit.

[A]

5.1 Zero-reset setting
OrSt oFF — Set the displayed value on the main monitor to "0."
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of Zero reset setting.
| oFF | Turn off Zero reset. |
| on | Turn on Zero reset. |

5.2 Display setting
dISP dIg — Select a display method of normal main sub monitor.
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of Display setting.
dIg	Displayed in numeric display.
bAr	Displayed in bar display.
Pct	Displayed in percent (%) display.
cnt	Displayed in normal count display.
tcnt	Displayed in total count display.
oFF	No display.
"cnt" or "tcnt" can be select only when the counter function is valid.

5.3 Detection mode setting
PrcS Stnd — Select a detection method from the list below:
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of Detection mode setting.
Stn	Sets to the normal detection.
hd⌐	Sets to the rising edge detection.
hd⌐	Sets to the trailing edge detection.
dIFF	Sets to the differential detection.
Lnth	Detects for length measurement.
* Make sure to connect two amplifier units before differential detection.

5.4 Counter setting
cnt oFF — Select counter function ON/OFF and increasing/decreasing direction of value.
Select by using [UP/DOWN] and fix by [T]. OFF moves to the TOP of Counter setting, and the others to number of count setting.
oFF	Counter off
uP	Sets the count value to the increasing direction.
dnc	Sets the count value to the decreasing direction.
Number of count setting 0 - 9999999
[UP/DOWN] is for count change, [T] is for digit change, and [T] is to fix. The screen returns to the Timer Setting TOP.
E000 0020

5.5 Output setting
out n-n — Select an output method of 1CH and 2CH.
Select by using [UP/DOWN] and fix by [T]. The screen moves to the TOP of Output setting.
| n-n | 1, 2CH: Control output |
| n-A | 1CH: Control output, 2CH: Alarm output |
* D2SA-M□3/D2SA-S□1/D2SA-M□-M8/D2SA-S□-M8 do not allow these settings.

5.6 External input setting
InP tch — Select an assignment of external input.
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of External input setting.
tch	Sets to the external teaching input.
LoFF	Sets to the laser off input.
Sync	Sets to the synchro input. (available only in case of length measurement function)
crSt	Sets to the counter value reset input.
hrSt	Sets to the hold reset input.
*D2SA-M□3/D2SA-S□1/D2SA-M□-M8/D2SA-S□-M8 do not allow these settings.
*External teaching can be available in several teachings which are chosen by appropriate adjusting methods.

5.7 Analog function setting
AnLg — [T] Moves to the analog function detail menu. → [D]

5.8 All copy setting
coPY no — Copy the setting to the connected amplifier units.
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of All copy setting.
| no | Does not copy. |
| yES | Makes copy. |
TIP: The key-locked amplifier unit setting is not modified.

[B]

5.9 All zero-reset setting
AL ono — Set the displayed value on the main monitor of connected amplifier units to 0.
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of All zero-reset setting.
| no | Does not perform Zero-reset. |
| yES | Performs all zero-reset. |
TIP: The key-locked amplifier unit is not reset.

5.10 All one point teaching setting
AL tno — A single unit operates the teaching of all connected amplifier units.
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of All one-point teaching setting.
| no | Does not perform teaching. |
| yES | Performs all one point teaching. |
TIP: The key-locked amplifier unit does not perform teaching.

5.11 Length measurement standard value setting
LrEF oFF — Select a width of flood line of sensor head.
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of Length measurement standard value setting.
| oFF | Turns off the setting. |
| 3000 | Sets to 3000. |
Valid only for DSTA-200/DSTA-200-M8.

5.12 End of Detail Setting (Expert mode)
EIt — [T] Returns to the TOP of Detail Setting (Expert mode).

[D]

5.7.1 Analog output setting
Aout oFF — Select either read out or turn off the analog output.
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of Analog output setting.
| oFF | Turns off. |
| out | Reads out. |

5.7.2 Span setting
SPAn 4 A — Set the slant of output.
Select by using [UP/DOWN] and fix by [T]. The screen moves to each detail setting.
| 4 A | Set 4 mA. |
| 20 A | Set 20 mA. |
Slant setting
[UP/DOWN] is for slant change, [T] is for digit change, and [T] is to fix. The screen returns to the TOP of Span setting.
A 0000 20 A 0000
After end of 4A setting, the screen moves to 20A setting.
* Full scale of the default is as follows:
Transmission, Regressive reflection, or Reflection type: 0 - 4000 (Amount of received light)
Transmission type and in setting length measurement: 0 - 3000 (Received light = Line width)

5.7.3 Output clamp hold setting
cLP cLP — Set a measurement value slant when measurement is impossible.
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of Output clamp hold setting.
| cLP | Set the output to approx. 24 mA. |
| hold | Hold just before measurement becomes impossible. |

5.7.4 Average counter setting
Acnt 1 — Select a number of times of sampling.
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of Average counter setting.
| 1 | Set. |
| ⌇ 2048 | Average counter 1/4/8/16/32/64/128/256/512/1024/2048 |

5.7.5 Hold setting
hoLd oFF — Select a hold state.
Select by using [UP/DOWN] and fix by [T]. The screen returns to the TOP of Hold setting.
oFF	Normal measurement
PEA	Peak hold
btt	Bottom hold
P-P	Peak to Peak hold

5.7.6 End of Analog function setting
EIt — [T] Returns to the TOP of Analog function setting.

Switching Channel

Pressing the [T] button during the RUN mode allows switching. At the same time the channel indicator light switches.

1000 1200 ⇄ 2000 2200

* D2SA-M□3/D2SA-S□1/D2SA-M□-M8/D2SA-S□-M8 cannot be switched as they have a single output (1CH).

Returning to Normal Display with One Button

Pressing the [T] button for 2 seconds or more in setting each function enables to return to the normal display (RUN mode) without using Eit (Exit).
* Invalid while setting the timer time, number of count, or span slant.
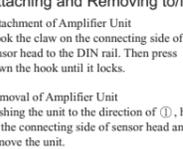
Key Lock

Cancels all the operations. Useful to prevent accidental operation.

Hold down the [UP/DOWN] buttons for 2 seconds or more simultaneously in the RUN mode. Operate in the same way to cancel as well.

In locking
Loc 300

When cancelled
uLoc 300

TIP: During key lock, no command such as all teaching/copy is accepted from other sensors.

Reset "Peak/ Bottom hold"

Peak/Bottom hold can be reset by operating with amplifier itself at the time of analog output.

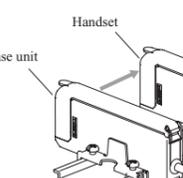SET RUN — Confirm the position of "SET/RUN" switch is snapped to "RUN" side. Move the position to "SET" side and return to "Run" side again.

Setting Amplifier Unit

■ Attaching and Removing to/from DIN rail

○Attachment of Amplifier Unit
Hook the claw on the connecting side of sensor head to the DIN rail. Then press down the hook until it locks.

○Removal of Amplifier Unit
Pushing the unit to the direction of ①, hold up the connecting side of sensor head and remove the unit.

■ Expansion of Amplifier Unit

Slide and hook up each amplifier units to DIN rail. And fix it with End units from the both sides.

As many as 8 units can be combined with the relay connector.

⚠ CAUTION
* Make sure to turn off the power before operation. * Make sure to use the DIN rail and the end unit (BEF-BE01-W190) in expanding the amplifier unit. * After expansion, make sure to check the operating temperature (See "Specification"). * To avoid short of connecting terminal, protection cover need to be attached to ones which are not in use. * Do not remove the combined units all together from DIN rail.

Connecting Sensor Head

Open the protective cover and plug the connector into the amplifier unit with the lock lever facing up.
Make sure that it clicks.
When removing, hold down the lock lever and pull out the connector.
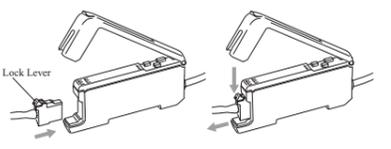
⚠ CAUTION
* Do not attach any sensor head other than the specified one (DS Series). * When removing the connector, do not pull on the cable. Failure to do so will break the cable or damage the product.

Dimensional drawing

(Unit: mm)

・D2SA-M□
・D2SA-M□3
・D2SA-S□
・D2SA-S□1

・D2SA-M□-M8
・D2SA-S□-M8
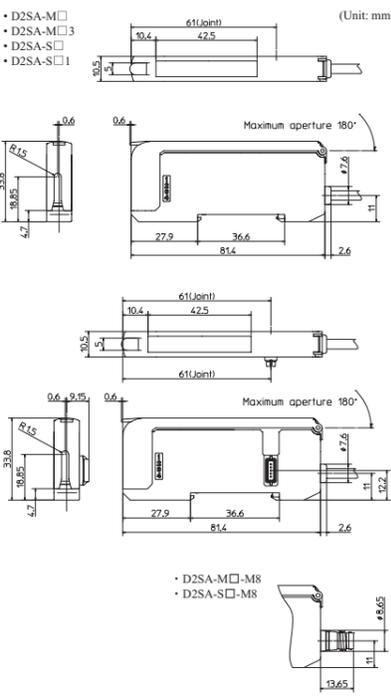
Options

End Unit
BEF-BE01-W190 (2 pcs)

● The product specification may change without notice for improvement.
● For any inquiry, please contact the manufacture/vendor below.

OPTEX FA CO., LTD.

OPTEX FA

Digital Amplifier Detachable Photoelectronic Sensor

D2SA Series

Laser Type Amplifier Unit

D2SA-M□S
D2SA-M□3S
D2SA-M□S-M8

Instruction Manual

● Thank you for purchasing DSA Series. We hope you are fully satisfied with this product and enjoy its performance.
● Carefully read this instruction manual and keep it for future reference.

Safety Precautions

Carefully read and understand the safety precautions before operation.
The important information is provided to protect your health and property.
Do not apply any other installing or operating procedure other than that described in this manual.

■ Meaning of Safety Symbols

⚠ **WARNING** Indicates a possible hazard that may result in death, serious injury, or serious property damage if the product is used without observing the stated instructions.

⚠ **CAUTION** Indicates a possible hazard that may result in personal injury or property damage if the product is used without observing the stated instructions.

Mandatory Requirements

⚠ **WARNING**
● This product is not an explosion-proof construction. Do not use the product under flammable, explosive gas or liquid environment.
● Do not use the product in water.
● Do not disassemble, repair, or convert the product. Failure to do this may cause failure, fire, or electric shock.
● Operate within the rated range.

This product cannot be used as a safety device to protect human body.

Operational Precautions

⚠ **CAUTION**
● Use the specified sensor head to connect this product. Any use other than specified will cause accident or product damage.
● It is dangerous to wire or attach/remove the connector with the power on. Make sure to turn off the power before operation.
● Make sure to use the product with the protective cover attached and closed.
● Installing in the following places may result in malfunction:
  1. A dusty or steamy place
  2. A place generating corrosive gas
  3. A place directly receiving scattering water or oil.
  4. A place suffered from heavy vibration or impact.
● The product is not designed for outdoor use.
● Do not use the sensor in transient state after power on (approx. 100 ms).
● Do not wire with the high voltage cable or the power line. Failure to do this will cause malfunction by induction or damage.
● The sensor performance or digital display values may depend on the individual units or the condition of detected product.

Specification

		Advanced Model (2CH)	Standard Model (1CH)
Model			
Cable type		D2SA-M(N/P)S	D2SA-M(N/P)3S
M8 connector type		-	D2SA-M(N/P)S-M8
Adaptable sensor head		DS Series	
Power source, voltage		12 - 24 V DC ± 10 % including a ripple	
Consumption current		45 mA or less / 24 V	
Response time		60μs/500μs/2ms (Fast/Standard/Long)	
Control output		NPN / PNP Open collector Load current: 100 mA or less Residual voltage:1.8 V or less	
Indicator light		Laser emission indicator light: Green, Output indicator light: Orange (1/2CH) Teaching indicator light: Red Channel indicator light: Green (1/2CH)	
Digital display		7 segment 8 digit display	
Timer function		OFF, On delay, Off delay, One-shot	
Timer time		1 ms - 9 s	
Output method		Light on / Dark on Switching type in the function	
Analog output		Current output:4 - 20 mA	-
Setting input/output		External input setting (teaching, synchronizing input, floodlight off/counter reset) Output setting (2CH output + Alarm output)	External input setting (teaching, synchronizing input, floodlight off, counter reset) * Settable only with DSA-M□S-M8
Operating temperature/humidity		-25 to +55°C / 35 to 85 % RH (No freezing)	
Store temperature/humidity		-40 to +70°C / 35 to 85 % RH (No condensation)	
Shock resistance		10 to 55 Hz Double amplitude 1.5 mm 2 hours for each direction of X, Y, and Z	
Protective category		IP50	
Material		PC: Case and cover	
Weight (including the codes)		Cable type: 65 g M8 connector type: 30 g	

* The button function varies in each mode: RUN mode, Function mode, and SET mode.
* D2SA-M□3S/D2SA-M□S-M8 are 1 output (1 CH) type. ③ and ⑧ do not turn on.The channel switching of ⑫ also becomes invalid.

Input/Output Schematic

NPN	PNP
• D2SA-MNS	• D2SA-MPS
• D2SA-MNS-M8	• D2SA-MPS-M8
• D2SA-MN3S	• D2SA-MP3S

■ Pin layout

• D2SA-M□-M8

Each Part

No.	Name	Function
①	Laser emission indicator light	Turns on while the amplifier is powered.
②	1 CH output indicator light	Turns on when the output of 1 CH is ON.
③	2 CH output indicator light	Turns on when the output of 2 CH is ON.
④	Main monitor (Red)	Displays light intensity, function, and the number of counts.
⑤	Sub monitor (Green)	Displays the threshold, function selection, and the number of counts.
⑥	Teaching mode indicator light	Turns on in the Teaching mode.
⑦	Valid channel indicator light (1 CH)	Keeps turning ON when the monitor display value, adjustment, and the function setting are valid to 1 CH.
⑧	Valid channel indicator light (2 CH)	Keeps turning ON when the monitor display value, adjustment, and the function setting are valid to 2 CH.
⑨	UP button	RUN mode: Displays the counts.
⑩	DOWN button	Function mode: Select the function or changes the numerical values.
⑪	Mode button	RUN mode: Switches to the Function mode. (0.5 s ≧) Function mode: Fix the selection.
⑫	Teaching button	RUN mode: Switches the channel. Function mode: Returns to RUN mode or performs scaling.
⑬	SET/RUN selection switch	Switches between Teaching mode and RUN mode.

Adjustment

The available teaching depends on "5.3 Detection Mode setting." Refer to below:

S t n (Standard detection)	All teachings are valid.
h d ⌐ / h d ⌐ (Edge detection)	No teaching are valid.
d I F F (Differential detection)	Only one point teaching is valid.

■ Setting Maximum Sensitivity

SET ⇄ RUN Switch to SET.

◁▷▲▽ Select the one-point teaching.
`1 P t`

T Press the teaching button.
`1 P t`

`1 P t   good`

SET ⇄ RUN Switch to RUN.

The threshold flashes and the display returns to normal.

Transmission type
Regressive Reflection type: Perform adjustment when there is an object.

Reflection type: Perform adjustment when there is no object.

■ One Point Teaching

SET ⇄ RUN Switch to SET.

◁▷▲▽ Select the one point teaching.
`1 P t`

T Press the teaching button.
`1 P t`

`1 P t   good`

SET ⇄ RUN Switch to RUN.

The threshold flashes and the display returns to normal.

Set the threshold to +□% against the amount of received light.
(Depends on the response speed setting.)

FaSt +15%
Stnd +5%
Long +1%

■ Two Points Teaching

SET ⇄ RUN Switch to SET.

◁▷▲▽ Select the two points teaching.
`2 P t   1 P t`

T 1st point: Press the teaching button.
`2 P t   1 P t`

T 2nd point: Press the teaching button.
`2 P t   2 P t`

`2 P t   good`

SET ⇄ RUN Switch to RUN.

The threshold flashes and the display returns to normal.

Reflection type
1st: Perform adjustment when there is an object.

2nd: Perform adjustment with the background without object.

Set the threshold at the center between the 1st and the 2nd points.

■ Auto Teaching

SET ⇄ RUN Switch to SET.

◁▷▲▽ Select the auto teaching.
`Auto Strt`

T Start: Press the teaching button.
`Auto Strt`

T End: Press the teaching button.
`Auto StoP`

`Auto good`

SET ⇄ RUN Switch to RUN.

The threshold flashes and the display returns to normal.

Reflection, Transmission, Regressive Reflection Type
Start and End: Perform adjustment while the object is passing.

■ Zone Teaching

SET ⇄ RUN Switch to SET.

◁▷▲▽ Select the zone teaching.
`ZonE`

T Press the teaching button.
`ZonE`

`ZonE good`

SET ⇄ RUN Switch to RUN.

The threshold flashes and the display returns to normal.

Reflection type: Perform adjustment with the background without object, and when there is an object.

Reflection type: Perform adjustment with the background without object.

Set the zone (detection range) to ±10 % against the amount of received light.

Near
Upper limit
10%
10%
Lower limit
Far
Zone

■ Teaching Transparent Object

SET ⇄ RUN Switch to SET.

◁▷▲▽
`g L A S`

T Press the teaching button.
`g L A S`

`g L A S  good`

SET ⇄ RUN Switch to RUN.

The threshold flashes and the display returns to normal.

Rotating reflection type: Perform when there is no object.

Reflection side of reflector
-10%
Threshold

Set the threshold to -10 % against the amount of received light.

■ Teaching Length Measurement

Valid only when the length measurement function is set. Allows to determine the size or the length of object.

* Not displayed on the teaching mode menu unless the application of length measurement is selected in the detection mode setting.
* Teaching length measurement or length measurement mode does not measure the actual length of object accurately.

SET ⇄ RUN Switch to SET.

T SET: Press the teaching button.
`Lnth SEt`

T IN: Press the teaching button.
`Lnth In`

`Lnth good`

SET ⇄ RUN Switch to RUN.

The upper limit flashes and the display returns to normal.

Transmission Type (In length measurement)
SET: Press the teaching button when there is no object with the flood light and the light receiver facing each other.

IN: Press the teaching button when there is an object.

■ Manual Adjustment

Pressing the UP/DOWN button in the RUN mode flashes the threshold. It indicates that adjustment is possible. Adjust to any value using the UP/DOWN button.

When using the zone teaching, the threshold of upper/lower limit can be set individually.

① Normal
◁▷▲▽
`300  350`

◁▷▲▽
`100   30`

Automatically returns to the normal display 5 seconds after completion of the setting (no operation).

② When using zone teaching
Setting Lower Limit (Far)
◁▷
`FAr`

Setting Upper Limit (Near)
◁▷
`nEAr`

◁▷▲▽
`100  150`

Automatically returns to the normal display 5 seconds after completion of the setting (no operation).

* No operation state for 5 seconds during setting automatically returns the display to normal as well.

■ Error Display in Teaching

An error message is displayed in the event of error during adjustment. Refer to the table below for readjustment.

E r r 1	Indicates shortage of light intensity or no difference of light intensity.
E r r 2	Indicates a sampling error in teaching of a moving object.
E r r 3	Indicates a calculation error.
n o t c P L t	Indicates that the teaching is interrupted.

Function Setting

Press the mode button.

1. Operation setting
`L - - d L o n`
TOP ◁▷▲▽
Select an operation mode.
Select by using ◁▷▲▽ and fix by T. The screen returns to the TOP of Operation setting.
| L o n | ON when light comes in. |
| d o n | ON when light is blocked. |
* The timer can be set individually for 1CH and 2CH.

2. Response speed setting
`rESP Long`
TOP ◁▷▲▽
Select a response speed.
Select by using ◁▷▲▽ and fix by T. The screen returns to the TOP of Response speed setting.
Long	High accuracy setting 2 ms
Stnd	Standard setting 500 μs
FASt	Fastest setting 60 μs

3. Timer setting
`tIEr oFF`
TOP ◁▷▲▽
Select a timer and the time.
Select by using ◁▷▲▽ and fix by T. OFF moves to the TOP of Timer setting and others move to the Timer setting.
o F F	Timer off
o F d y	Off delay timer
o n d y	On delay timer
S H o t	One shot timer

Timer Time Setting 1-9000 (1 ms - 9 s)
◁▷▲▽ is for time changing. T is for digit change, and T is to fix. Then the screen returns to Timer setting TOP.
`o F d y  0001`
* The timer can be set individually for 1CH and 2CH.
* Parallel use of On delay timer and Off delay timer in the same channel same channel is not possible.

4. Sensitivity correction setting
`t u n E o n`
TOP ◁▷▲▽
Correct to the optimal value when sensitivity is not enough.
Tune on using T. The progressing status is displayed in bar chart. After the end, the screen returns to the TOP of Sensitivity correction.
| o n | Tune on the sensitivity correction. |
| o F F | Tune off the sensitivity correction. |
* Settings are only for tuning on (ON) or tuning off (OFF).

5. Detailed setting (Expert mode)
`EPrt`
TOP → T → Moves to the Detailed setting menu. → A

6. Initialization setting (Initial reset)
`rSEt no`
TOP ◁▷▲▽
Initialize all settings.
Select by using ◁▷▲▽ and fix by T. The screen returns to the TOP of Initialization setting.
| n o | Not initialize |
| y E S | Initialize |
Initializing changes all settings to the factory default.

7. End of setting
`E I t`
T Returns to the normal display.

■ Precautions for Function Setting

* Some function settings automatically delete the invalid settings or settings, of which concomitant use is not allowed, from the displayed items. This does not indicate any failure.
* Some functions are not incorporated or not settable to D2SA-M□3S /D2SA-M□S-M8.
* Hold down the operation button for approx. 0.3 seconds if not especially specified.
* Analog output and Analog setting is available when response time setting is "Long" or "Standard".
* The sub monitor starts flashing when each setting selection becomes available.
* The monitor in use of the counter function displays "U" when the up-counter is selected, and displays "d" when the down-counter is selected.
* For functions other than Operation setting and Timer setting, both settings of 1 CH and 2 CH are changed when the setting of each function is modified.

A

5.1 Zero-reset setting
`OrSt oFF`
TOP ◁▷▲▽
Set the displayed value on the main monitor to "0."
Select by using ◁▷▲▽ and fix by T. The screen returns to the TOP of Zero reset setting.
| o F F | Turn off Zero reset. |
| o n | Turn on Zero reset. |

5.2 Display setting
`dISP dIg`
TOP ◁▷▲▽
Select a display method of normal main sub monitor.
Select by using ◁▷▲▽ and fix by T. The screen returns to the TOP of Display setting.
d I g	Displayed in numeric display.
b A r	Displayed in bar display.
P c t	Displayed in percent (%) display.
c n t	Displayed in normal count display.
t c n t	Displayed in total count display.
o F F	No display.
"cnt" or "tcnt" can be select only when the counter function is valid.

5.3 Detection mode setting
`PrcS Stnd`
TOP ◁▷▲▽
Select a detection method from the list below:
Select by using ◁▷▲▽ and fix by T. The screen returns to the TOP of Detection mode setting.
S t n	Sets to the normal detection.
h d ⌐	Sets to the rising edge detection.
h d ⌐	Sets to the trailing edge detection.
L n t h	Detects for length measurement.

5.4 Counter setting
`cnt oFF`
TOP ◁▷▲▽
Select counter function ON/OFF and a increasing/decreasing direction of count.
Select by using ◁▷▲▽ and fix by T. OFF moves to the TOP of Counter setting, and the others to number of count setting.
o F F	Counter off
u P	Sets the count value to the increasing direction.
d n c	Sets the count value to the decreasing direction.

Number of count setting 0 - 9999999
◁▷▲▽ is for count change, T is for digit change, and T is to fix. The screen returns to the Timer Setting TOP.
`E000 0020`

5.5 Output setting
`out n - n`
TOP ◁▷▲▽
Select an output method of 1CH and 2CH.
Select by using ◁▷▲▽ and fix by T. The screen returns to the TOP of Output setting.
| n - n | 1, 2CH: Control output |
| n - A | 1CH: Control output, 2CH: Alarm output |
* D2SA-M□3S/D2SA-M□S-M8 do not allow these setting.

5.6 External input setting
`InPt tch`
TOP ◁▷▲▽
Select an assignment of external input.
Select by using ◁▷▲▽ and fix by T. The screen returns to the TOP of External input setting.
t c h	Sets to the external teaching input.
L o F F	Sets to the laser off input.
S y n c	Sets to the synchro input. (available only in use of length measurement function)
c r S t	Sets to the counter value reset input.
h r S t	Sets to the hold reset input.
* D2SA-M□3S do not allow these setting.
* External teaching can be available in several teachings which are chosen by appropriate adjusting methods.

5.7 Analog function setting
`A n L g`
TOP ◁▷▲▽
Moves to the analog function setting detail menu. → D

C B

5.11 Length measurement standard value setting
`LrEF oFF`
TOP ◁▷▲▽
Select a width of flood line of sensor head.
Select by using ◁▷▲▽ and fix by T. The screen returns to the TOP of Length measurement standard value setting.
| o F F | Turns off the setting. |
| 3000 | Sets to 3000. |
Valid only for DSTA-200/DSTA-200-M8.

5.12 End of Detail Setting (Expert mode)
`E I t`
TOP ◁▷▲▽
T Returns to the TOP of Detail Setting (Expert mode).

D

5.7.1 Analog output setting
`Aout oFF`
TOP ◁▷▲▽
Select either read out or turn off the analog output.
Select by using ◁▷▲▽ and fix by T. The screen returns to the TOP of Analog output setting.
| o F F | Turns off. |
| o u t | Reads out. |

5.7.2 Span setting
`SPAn 4 A`
TOP ◁▷▲▽
Set the slant of output.
Select by using ◁▷▲▽ and fix by T. The screen moves to each detail setting.
| 4 A | Set 4 mA. |
| 2 0 A | Set 20 mA. |

Slant setting
◁▷▲▽ is for slant change, T is for digit change, and T is to fix. The screen returns to the TOP of Span setting.
`4  A:0000   20 A:0000`
After end of 4A setting, the screen moves to 20A setting.
* Full scale of the default is as follows:
Transmission, Regressive reflection, or Reflection type: 0 - 4000 (Amount of received light)
Transmission type and in setting length measurement: 0 - 3000 (Received light - Line width)

5.7.3 Output clamp hold setting
`cLP cLP`
TOP ◁▷▲▽
Select a measurement value state when measurement is impossible.
Select by using ◁▷▲▽ and fix by T. The screen returns to the TOP of Output clamp hold setting.
| c L P | Set the output to approx. 24 mA. |
| h o L d | Hold just before measurement becomes impossible. |

5.7.4 Average counter setting
`A c n t  1`
TOP ◁▷▲▽
Select a number of times of sampling.
Select by using ◁▷▲▽ and fix by T. The screen returns to the TOP of Average counter setting.
| 1 | Set. |
| 2048 | Average counter 1/4/8/16/32/64/128/256/ 512/1024/2048 |

5.7.5 Hold setting
`hoLd oFF`
TOP ◁▷▲▽
Select a hold state.
Select by using ◁▷▲▽ and fix by T. The screen returns to the TOP of Hold setting.
o F F	Normal measurement
P E A	Peak hold
b t t	Bottom hold
P - P	Peak to Peak hold

5.7.6 End of Analog function setting
`E I t`
TOP ◁▷▲▽
T Returns to the TOP of Analog function setting.

■ Switching Channel

Pressing the T button during the RUN mode allows switching. At the same time the channel indicator light switches.

`1000 1200` ⇄ T ⇄ `2000 2200`

* D2SA-M□3S/D2SA-M□S-M8 cannot be switched as they have a single output (1CH).

■ Returning to Normal Display with One Button

Pressing the T button for 2 seconds or more in setting each function enables to return to the normal display (RUN mode) without using Eit (Exit).

* Invalid while setting the timer time, number of count, or span slant.

■ Key Lock

Cancels all the operations. Useful to prevent accidental operation.

Hold down the ◁▷▲▽ buttons for 2 seconds or more simultaneously in the RUN mode. Operate in the same way to cancel as well.

In locking
`Loc  300`

When cancelled
`uLoc  300`

■ Reset "Peak/ Bottom hold"

Peak/Bottom hold can be reset by operating with amplifier itself at the time of analog output.

SET ⇄ RUN Confirm the position of "SET/RUN" switch is snapped to "RUN" side. Move the position to "SET" side and return to "Run" side again.

Setting Amplifier Unit

■ Attaching and Removing to/from DIN rail

○ Attachment of Amplifier Unit
Hook the claw on the connecting side of sensor head to the DIN rail. Then press down the hook until it locks.

○ Removal of Amplifier Unit
Pushing the unit to the direction of ①, hold up the connecting side of sensor head and remove the unit.
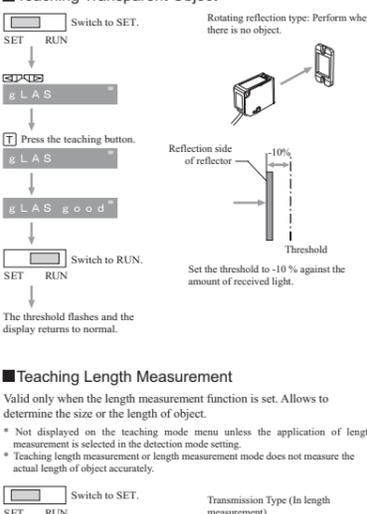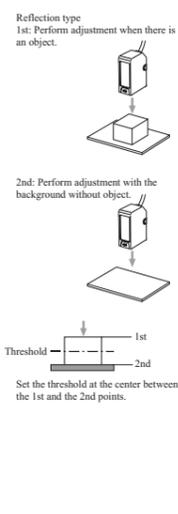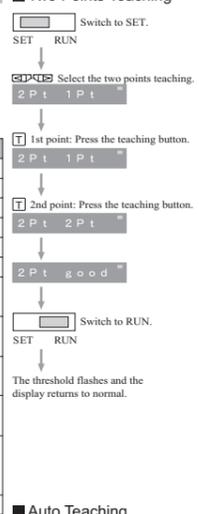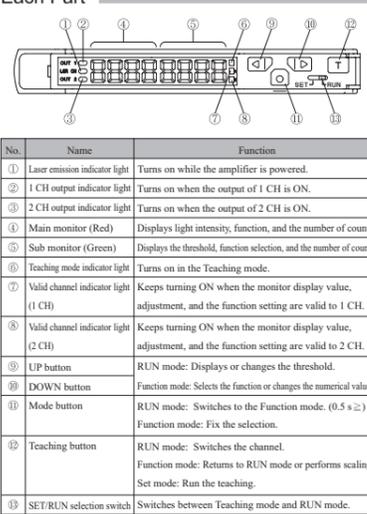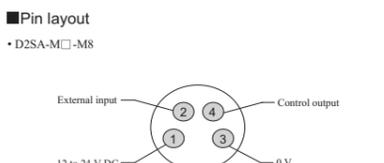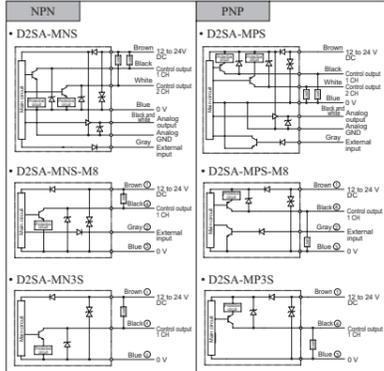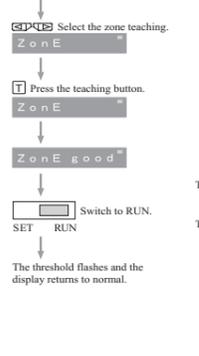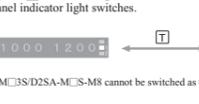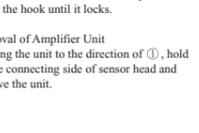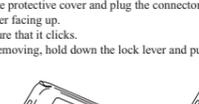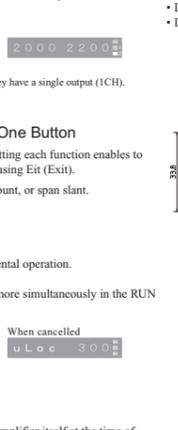
Connecting Sensor Head

Open the protective cover and plug the connector into the amplifier unit with the lock lever facing up.
Make sure that it clicks.
When removing, hold down the lock lever and pull out the connector.

Lock Lever

⚠ **CAUTION**
• Do not attach any sensor head other than the specified one (DS Series).
• When removing the sensor, do not pull on the cable.
  Failure to do so will break the cable or damage the product.

Dimensional drawing

(Unit: mm)

• D2SA-M□S
• D2SA-M□3S

Maximum aperture 180°

• D2SA-M□S-M8

Options

End Unit
BEF-BE01-W190 (2 pcs)