



## Display and Buttons

### Switching display

Display shows as follows according to its mode

Operating (RUN mode)	Setup	Teaching
It shows as example when it's actually detecting object. It goes to this mode after power up Ex.) <b>200 100</b> Sensing Threshold level	It switches to this Setup mode by pressing "MODE" button over 3 seconds. Ex.) <b>L--d L on</b> Function Setup Value	It switches to this Teaching mode by pressing "TEACH" button over 3 seconds. Ex.) <b>2Pt 1Pt</b> Mode of teaching

### Buttons

Buttons work as follows according to its mode

Buttons	Operating (RUN mode)	Setup / Teaching
	Adjust (+ UP)	Change the Setup function and mode of Teaching
	Adjust (- DOWN)	
	Switch to Setup mode	Set the setup
	Switch to Teaching mode	Execute Teaching

## Setup menu

### Basic menu

These are basic menu that to be setup before using.  
Please refer Expert menu for further setup function.

Display	Menu	Function
<b>L--d</b>	Output mode	Switch Light ON and Dark ON
<b>rESP</b>	Response speed	Set response speed
<b>dELy</b>	Timer/Delay	Set Timer and Delay
<b>Eprt</b>	Expert mode	Enter to Expert mode (refer Expert menu)
<b>rSEt</b>	Initialize	Initialize setup to default
<b>End</b>	Exit	Exit setup mode

### Expert menu

These are menu for function that setup in detail.  
Expert menu is available from "Eprt" in Basic menu.

Display	Menu	Function
<b>0rSt</b>	Zero reset	Set main display to 0 (zero).
<b>diSP</b>	Display mode	Set display mode for operating (RUN mode)
<b>Eco</b>	Eco mode	Set Eco mode
<b>turn</b>	Rotation	Rotate the display 180 degree
<b>HyS</b>	Hysteresis	Specify hysteresis percentage
<b>PrCS</b>	Detection mode	Set detection mode (edge/level)
<b>cnt</b>	Counter	Switch ON/OFF Counter and specify UP/DOWN direction
<b>InPt</b>	External input	Set function of external input
<b>coPy</b>	Copy setup	Copy setup to sensors interconnected
<b>AL 0</b>	All Zero Clear/Reset	Set all display of sensors interconnected to Zero "0"
<b>Atch</b>	All Teaching	Execute Teaching on every sensor interconnected
<b>ASc</b>	ASC	Set ON/OFF ASC (Automatic Sensitivity Control)
<b>Spor</b>	Emitter Power	Specify Emitter power
<b>LocL</b>	Lock level	Specify level of Key Lock
<b>SAuE</b>	Save	Save the current setup
<b>End EPrt</b>	Exit	Exit expert menu
<b>Loc</b>	Lock	Lock buttons (refer useful function)

### Teaching menu

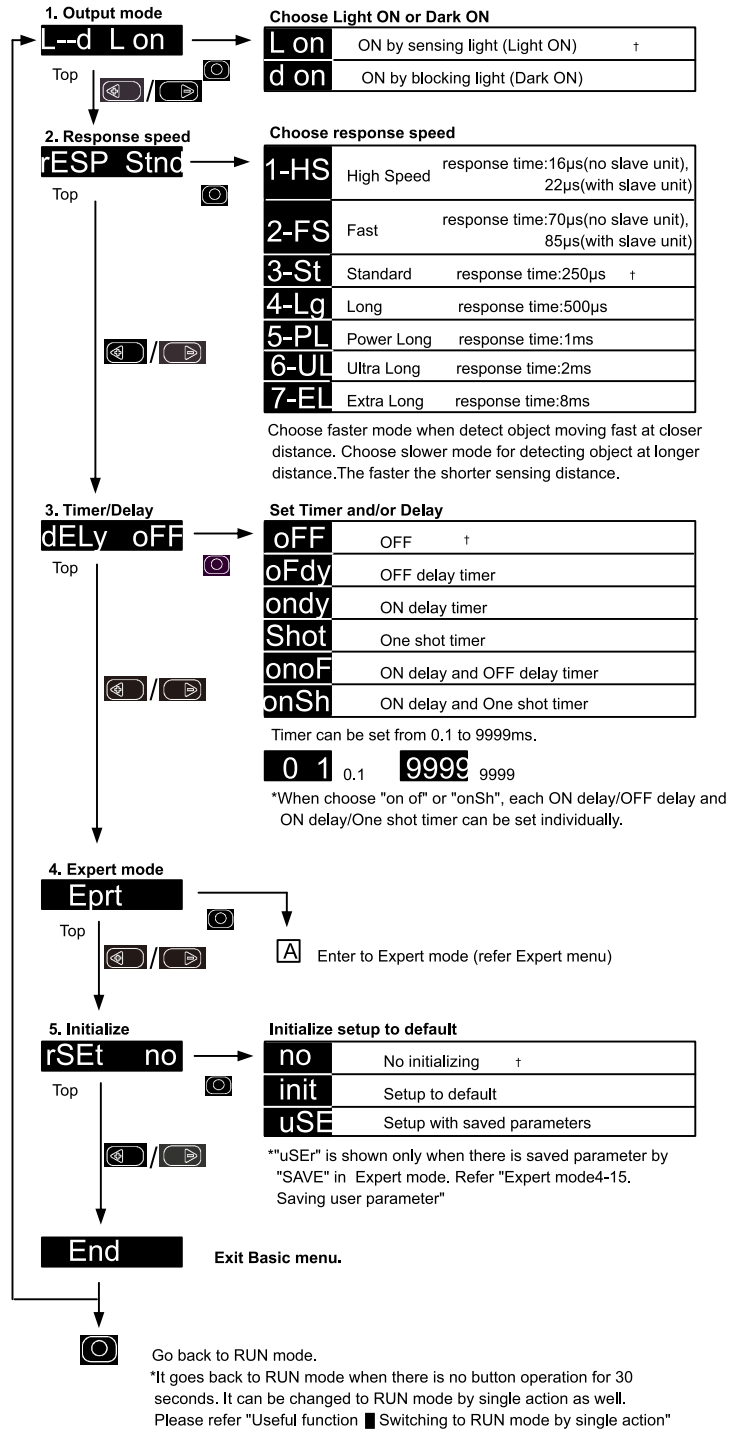
Threshold level can be set by these menu.  
Please refer "Teaching".

Display	Menu	Function
<b>2Pt</b>	2 Point Teaching	Set the threshold at the center between with object and without object.
<b>1Pt</b>	1 Point Teaching	Set the threshold at minimum level that can detect object stably with.
<b>thru</b>	Through Teaching	Set the threshold at around 90% of sensing level without object for through beam application.
<b>ZonE</b>	Zone Teaching	Set the threshold at around sensing level $\pm 10\%$ .
<b>Auto</b>	Automatic Teaching	Set the threshold at the center between maximum and minimum level.
<b>P-t</b>	Percent Teaching	Threshold can be set any percentage.
<b>0P-t</b>	Zero % Teaching	Set the threshold at any percentage and execute zero reset.
<b>End tEch</b>	End of Teaching	Exit Teaching mode.

## Basic setup

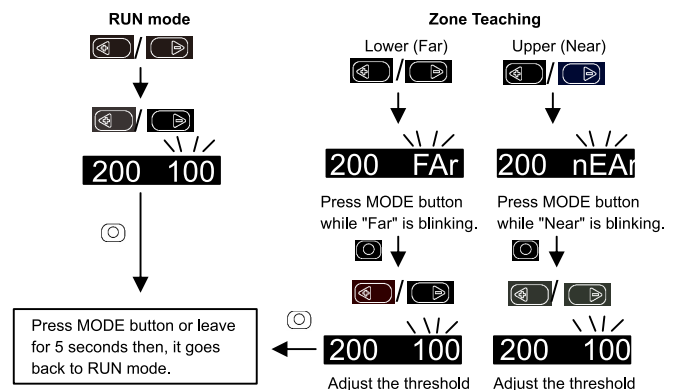
Press "MODE" button over 3 sec.

Choose the setup value by and . Define the setup by and go back to top of each menu. "+" is default value.



## Setup Threshold manually

At RUN mode, press or then, threshold display blinks that shows it can be adjusted. Adjust the threshold by or . You can adjust upper and lower threshold when it's Zone Teaching mode.



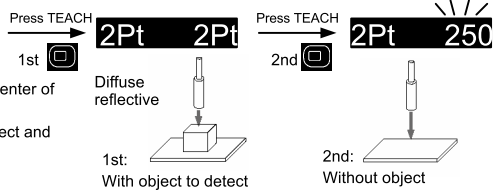
# Teaching

Press TEACH button for 3 seconds.

Choose Teaching mode by pressing or . Then, press to confirm. When Teaching is done, it goes back to RUN mode after the threshold blinks. You can refer current sensing level by pressing MODE while teaching.

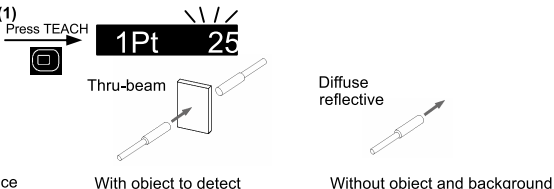
## 1. 2 point Teaching

**2Pt 1Pt**  
Top  
Threshold is set at center of 1st and 2nd level.  
Teach twice with object and without object.



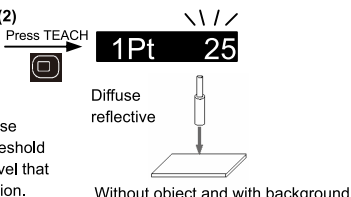
## 2. 1 point Teaching (1)

**1Pt**  
Top  
Threshold is set at minimum level that enable stable detection.  
Good for long distance



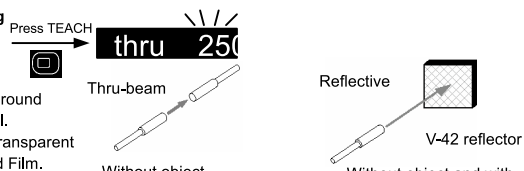
## 3. 1 point Teaching (2)

**1Pt**  
Top  
Teaching with only background for diffuse reflective mode. Threshold is set at minimum level that enable stable detection.



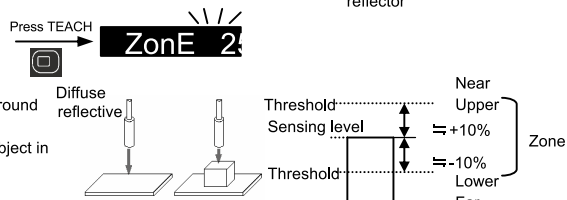
## 4. Through Teaching

**thru**  
Top  
Threshold is set at around 90% of sensing level.  
Good for detecting transparent object like Glass and Film.



## 5. Zone Teaching

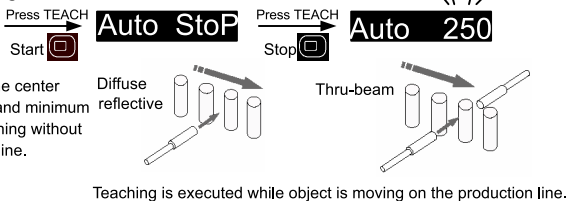
**Zone**  
Top  
Threshold is set at around sensing level  $\pm 10\%$ .  
Good for detecting object in the area specified.



Teaching to be done with object or with only background.  
\*When Zone teaching is done with only background, threshold level will be set at around  $\pm 10\%$  from the background.

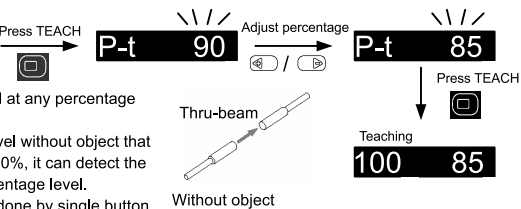
## 6. Automatic Teaching

**Auto Strt**  
Top  
Threshold is set at the center between maximum and minimum level. Good for teaching without stopping production line.



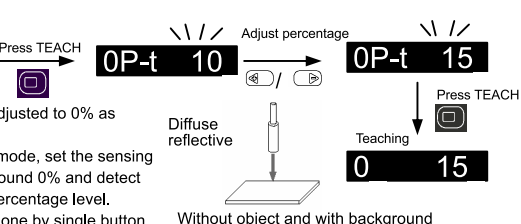
## 7. Percent Teaching

**P-t 90**  
Top  
You can set threshold at any percentage adjusted.  
By setting sensing level without object that block the beam as 100%, it can detect the level as relative percentage level.  
Re-Teaching can be done by single button action while RUN mode. Refer "Useful function" "Fitting in".



## 8. Zero percent Teaching

**OP-t 10**  
Top  
Set any percentage adjusted to 0% as threshold.  
For diffuse reflective mode, set the sensing level with only background 0% and detect the level as relative percentage level.  
Re-Teaching can be done by single button action while RUN mode. Refer "Useful function" "Fitting in".



## End tEch

**Exit the Teaching mode**  
By pressing TEACH button, it goes back to RUN mode.

# Expert mode

Setup parameters for further function.

From **A** "Basic menu"

Choose the setup value by and . Define the setup by and go back to top of each menu. "+" is default value.

## 4-1. Zero reset

**OrSt oFF**

### Set main display to 0 (zero)

**oFF** No action †  
**on** Reset the main display

Reset the sensing level shown on the main display to zero and shift the threshold shown on the sub display as much as the main display shifted. This function is not active when percent mode and edge detection mode.

## 4-2. Display mode

**diSP dig**

### Choose display mode from following three

**dig** Digital mode † Ex.) **200 22**  
Sensing level Threshold

**bAr** Bar display mode Ex.) **|||||**  
Bar increases according to sensing level from right

**Pct** Percent mode Ex.) **100 110**  
"\_" means it's percentage Sensing level Threshold  
100% 110%

## 4-3. Eco mode

**Eco oF**

### Set Eco mode

**oFF** No action †

**diSP** Power off sub display (green) and darken main display (red).  
This will work 20 seconds after the setup.  
Double emitting cycle.  
Actual response time will be doubled as well.

**ALL** Power off sub display, darken main display and double emitting cycle. Actual response time will be doubled as well. Brightness of the display will be changed 20 seconds after the setup.

Current consumption of "Eco ALL" will be 30% less than "Eco oFF".

## 4-4. Rotation

**turn oFF**

### Rotate the display 180 degree

**oFF** No action † Ex.) **turn oFF**

**on** Rotate the display Ex.) **4000 00**

This is effective when you have to mount the sensor opposite direction.

## 4-5. Hysteresis

**HvS P**

### Set Hysteresis percentage

**P 5** † Set from 1% to 40%

**P 1** ~ **P 40**  
1% 40%

Set the hysteresis according to the condition. When it's unstable because of chattering, set bigger percentage. When to detect slight difference, set smaller percentage.

## 4-6. Detection mode

**PrcS Stn**

### Set Detection mode

**Stnd** Detect by sensing level †

**nd %** Detect UP edge

**hd7** Detect Down edge

**diFF** Differential mode

### Set filter level for edge detection

**FiLt 1000** 1,000 Hz †

**FiLt 200** 200 Hz

**FiLt 50** 50 Hz

**FiLt 20** 20 Hz

**FiLt 5** 5 Hz

Faster  
↑ ↓  
speed of edge detection  
Slower

### Edge detection mode:

Detect changes of sensing level in a certain period.  
"Detect UP edge" : Detect the sensing level increasing  
"Detect Down edge" : Detect the sensing level decreasing  
\*Only Automatic Teaching can be executed when edge detection is activated.

\*Percent display mode is unavailable when edge detection is activated.

\* Only CH1 can be set Edge detection for the 2 output type (D3RF-TDM/S).

\*Hysteresis will be fixed to 1% when Edge detection is active.

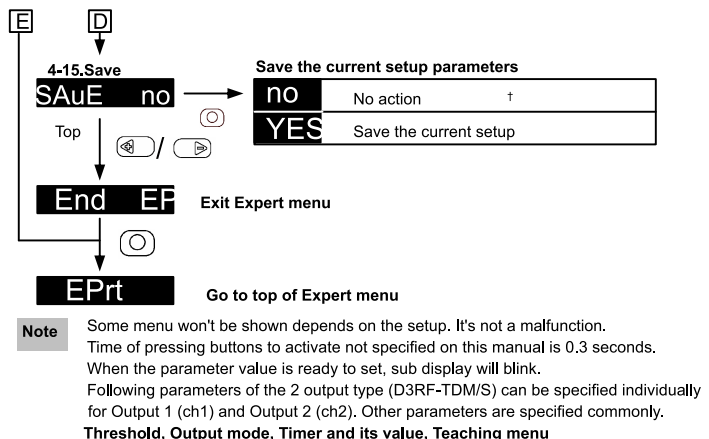
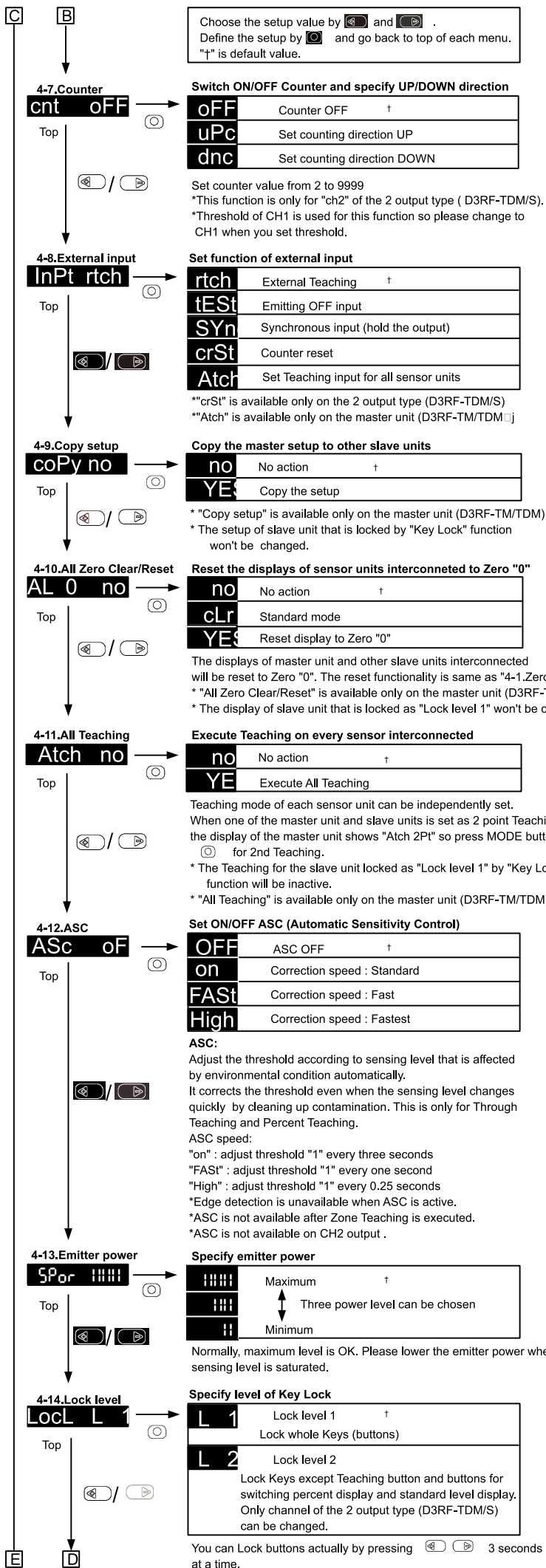
\*Edge detection won't work correctly when the sensing level is saturated or there is no light received.

\*Filter to be "Slower" to detect sensing level that swings slower.

### Differential mode:

It detects difference of sensing level from the sensor unit next to it at master side. The display shows "1024" when sensing levels are same. When the sensing level is smaller than the sensor unit at master side, the display shows smaller value than "1024". When its bigger, the display shows bigger value than "1024".

\* Differential mode is available only for the slave unit (D3RF-TS/TDS).



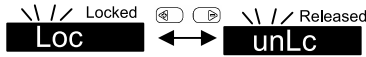
### Useful function

**Switch channel (only for the 2 output type D3RF-TDM/S)**  
Press button then, the channel number will be blinking and switch to the channel.



Threshold of CH2 will be copied to CH1 under following condition after external teaching. This is useful when you want to set single threshold level to both CH1 and CH2.  
- ASC and Edge detection are inactive.  
- Teaching mode of CH1 is same as CH2.  
- Display is showing level of CH2.  
\*You can switch channel from any setup menu.

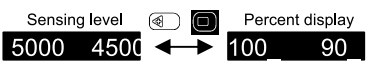
**Key Lock**  
Make the buttons unavailable to prevent operation mistake. Press for 3 seconds to Lock buttons at a time while RUN mode. Do same to cancel it..



You can choose a Lock level from two in "Expert mode 4-14.Lock level".

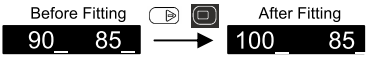
**Switching to RUN mode by single action**  
By pressing button for 3 seconds in setup menu while sub display is not blinking,

it switches to RUN mode without going through "End".  
**Switching to percent display by single action**  
Press and buttons at a time then, the display switches to percent display.



You can setup this function at "Expert mode 4-2.Display mode" as well. Do same to get back to standard display mode.

**Fitting in (set sensing level to "100%" / "0%")**  
When "Percent Teaching" or "Zero % Teaching" is chosen in Teaching menu, you can set the sensing level to "100%" or "0%" by pressing and buttons at a time. This is effective when detection get unstable.



### Error

Following are error messages when error occurred while Teaching. Please try again accordingly.

Err1	Sensing level is not enough
Err2	Sensing level is saturated
Err3	Dif ference of sensing level between two points