Fiber Optic Sensor

PFD RG□

INSTRUCTION MANUAL

We appreciate you for purchasing HanYoung NUX Co., Ltd product.Before using the product you have purchased, check to make sure that it is exactly what you ordered. Then, please use it following the instructions below.

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Safety Information

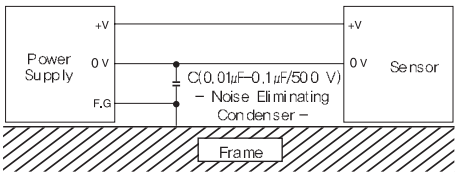
Before you use, read safety precautions carefully, and use this product properly. The precautions described in this manual contains important conterts related with safety; therefore, please follow the instructions accordingly. The precautions are composed of DANGER, WARNING and CAUTION.

⚠ Warning

- To prevent defection or malfunction of this product, supply proper power voltage in accordance with the rating.
- Since this product is not designed with explosion-protective structure, do not use it at any place with flammable or explosive gas.
- Remove this product while the power is off. Otherwise, it may cause malfunction or electric shock.

⚠ Caution

- The contents of this manual may be changed without prior notification.
- If you use the product with methods other than specified by the manufacturer, there may be bodily injuries or property damages.
- Avoid continuously switching the power source On and Off.
- Use a dry cloth to wipe off the substance when cleaning the lens or cases. Never use thinner or organic solvents.
- Do not use this product at any place with much dust, vibration or impact.
- Before inserting power source, make sure that the circuit wiring is properly connected.
- In the case of wiring loaded inductors such as DC Relay and others to output, use diode, varistor and others to prevent surge.
- To avoid malfunction caused by noise, do not put high voltage or power line with sensor wire in a same conduit.
- Make its wiring be shorter as possible and wire extension shall be within 30 m.
- Do not apply a strong tension to the fiber optic cable.
- Do not curve the fiber optic cable over tolerable bending.
- Do not make any scratch on the cable.
- Consider the fact that the sensing distance may be varied in accordance with the size, color, surface condition, material, glossy, non-glossy or others of a sensing object.
- Prevent strong disturbance light such as sunlight and others which directly enter into the directional angle of the sensor by putting a glare shield.
- In the case of using multiple sensors (more than 2 sensors), there is a possibility of malfunction caused by mutual interference so, for Through-Beam type, sensors shall be installed in a divergent way or there shall be proper distance between them.
- When using the Switching Power Supply as the power source, earth the Frame Ground (F.G) terminal and be sure to connect the noise-eliminating condenser between 0 V and F.G.



※ If you do not follow the contents described in the safety information then it is possible to be a cause of the product's malfunction so please follow them.

Suffix code

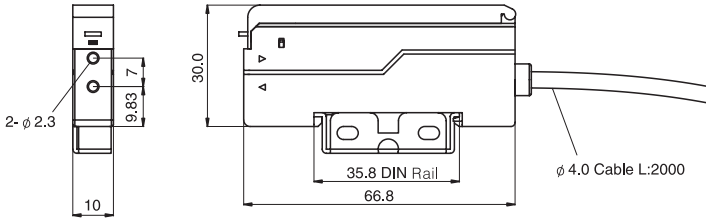
Model	Code	Information
PFD	□□□	10 bit A/D, 4Digit display
Light source	R	Red LED
Use	G	General purpose(MARK)
	M	Multi type(MARK / RPM / COUNTER)
External output	N	NPN Open collector
	P	PNP Open collector

Specification

Type		Digit Display
Model	NPN	PFD-RGN
	PNP	PFD-RGP
Power supply voltage		12 - 24 V d.c ±10 % (Ripple less than 10 %)
Current consumption		max 50 ㎃
Output	Control	NPN/PNP open collector output, max 100 ㎃ (max. 30 V d.c)
	Stable	
External Input		Teaching
Indicator range		0 ~ 1,000
Output		Light On / Dark On Output NORMAL, ON DELAY, OFF DELAY, ONE Shot Time Output
On/Off Delay		1 ~ 9,999 ㎳
OneShot Time		1 ~ 9,999 ㎳
Light source/Wavelenght		Infrared lightening / 660 ㎚
Protection Circuit		Built in the reversed power supply connection protective circuit and output short protective circuit
Response time		max 0.7 ㎳
Varation rate		max 10 %
LED		7 contacts state indicating LED, 7 segments LED 4 digits
Sensitivity adjustment		Auto teaching/Manual setting by using the set button
Additional functions		Adjustable brightness, 180° rotation display Display time setting, Lock function
Ambient illumination		Sunlight : max 10,000 Lux, Incandescent lamp : max 3,000 Lux
Ambient temperature		-10 ~ 55 ℃ (Surrounding storage temperature : -25 ~ 70 ℃)
Ambient humidity		35 ~ 85 % R.H. (With no condensation)
Vibration resistance		10 - 55 Hz double amplitude 1.5 ㎜ for 2 hours each in X, Y and Z directions
Shock resistance		500 ㎨, 3 times each in X, Y and Z directions
Dielectric strength		1000 V a.c, 50/60 Hz for 1 min
Insulation resistance		min 20 MΩ (500 Vd.c between the code and case, between the adjustment switch and case)
Connection method		Code extended type, Code length : 2 m, No. of lines : 5P, Thickness : Ø4㎜, DIN rail installation structure
Accessory		Bracket

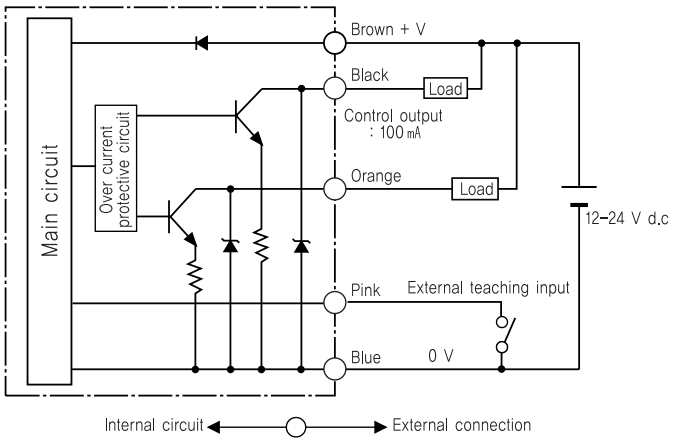
Dimension

Unit : mm

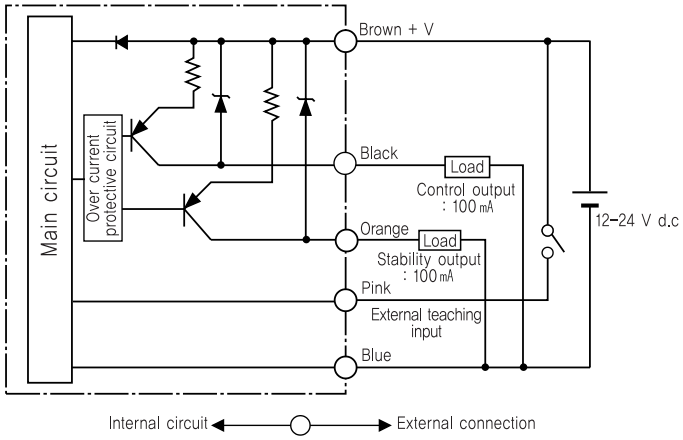


Wiring circuit

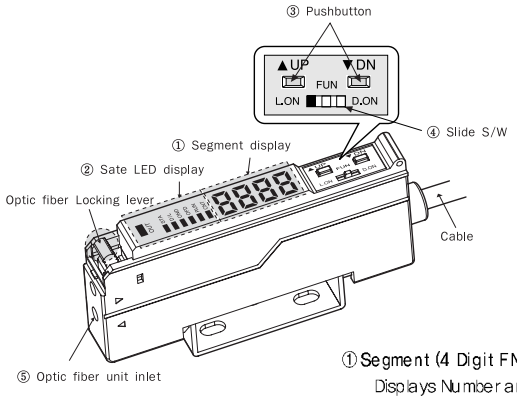
■ NPN type



■ PNP type



Name of parts

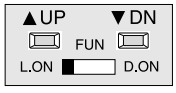


① Segment (4 Digit FND) Display
Displays Number and Letter such as the amount of light entering, mode, error message, set up values, and set up items

② LED Display (State)
Displays the state of Fiber Sensor
- OUT : Output status(OUT1)
- STB : Stable area indicator(OUT2)
- ON : Lights on when On Delay or One shot time are set at the Output
- OFD : Lights on when Off Delay is set at the Output

③ Push Button (▲UP, ▼DN)
Function change and value set up at each executive mode (L.ON, D.ON, FUN)

④ Slide S/W (L.ON, D.ON, FUN)
Sets up executive modes and priority operation at all functions
- L.ON / D.ON : General Fiber Sensor Operation Mode
- FUN : Various Additional Function Set Up Mode



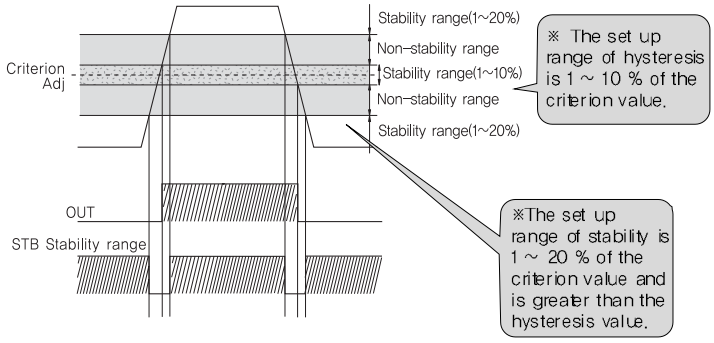
Parameter 1 : Sensor Manual Sensitivity Set Up group
Parameter 2 : Sensor Output Mode Set Up group
Parameter 4 : Additional Function Set Up group

- L.ON : Light ON Mode
- D.ON : Dark ON Mode

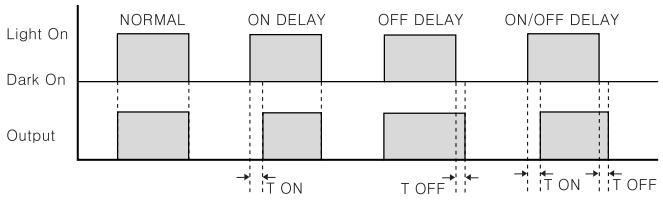
※ Caution: Refer to the Parameter Chart for the Detailed Set Up and function of FUN

⑤ Fiber Optic Unit Input Hole External Diameter : Ø2.2 mm Fiber unit

Depending on receiving level, OUT and STB operation



Delay time setting and output operation



Sensitivity adjustment

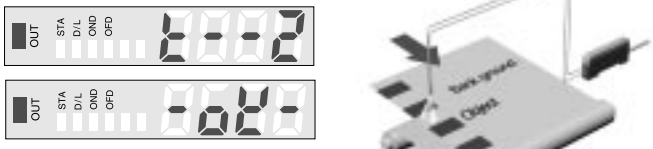
■ 2 Points teaching

It is teaching an object and background separately.
* 2 points teaching is possible to control sensitivity adjustment regardless of object or background.

① Set the slide switch to D.ON or L.ON.

② ▲- Press UP button and indicates "t-1"
(Place a fiber unit on an object)

③ ▲- Press UP button again (Place a fiber unit to background)
Indicates "t-2" and then "_OK_"
(Finish setting and return to the operation mode)



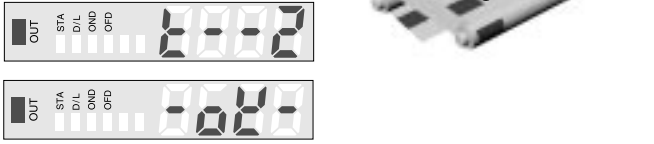
■ 1 Point teaching

It is teaching a boundary between an object and background.

① Set the slide switch to D.ON or L.ON.
(Place an object at the detecting area.)

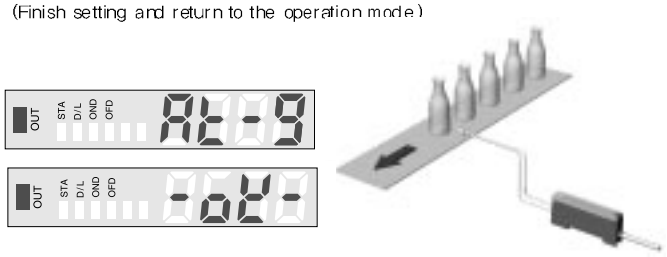
② ▲- Press UP button and indicates "t-1"
(Place a fiber unit to a boundary between an object and background.)

③ ▲- Press UP button again. (Finish setting and return to the operation mode)
Indicates "t-2" and then "_OK_".



■ Auto teaching (For a moving object)

① Set the slide switch to D.ON or L.ON.
(Pass the object through the detecting area.)
② ▼– Press DN button and indicates "t–9" and then "_OK_"
(Finish setting and return to the operation mode.)



※ Note) When auto teaching is done at the Run mode, GAIN(1–1) and ADJ(1–2) will be automatically changed.

■ Parameter page list and initial default value

	Manual sensitivity setting (Basic input setting)		Sensor output setting (RUN MODE ONLY)		Subsidiary function setting	
	1 Group	Set value	2 Group	Set value	4 Group	Set value
1	GAIN	8	–	–	LOCK	DS
2	ADJUST	500	ON DELAY	OFF	BRIGHT	7
3	HYSTERESIS	10	OFF DELAY	OFF	BRIGHT TIME	OFF
4	STABILITY	11	ONE SHOT	OFF	DISPLAY 180	0
5	–	–	TIME INPUT S/W	AUTO	DEFAULT	–
6	–	–	CHANNEL	CH1	–	–

※ How to operate

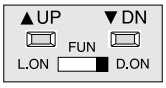
Press the ▲• button instantly	Press the ▼• button instantly
Press the ▲– button firmly	Press the ▼– button firmly

■ 180° Rotation display

(Changed from FUN mode[4–4])

0° setting 

180° setting 



Parameter

■ Parameter 1 group(Manual sensitivity Setup)

Move to Group 1 ▲• in FUN mode 

Parameter menu and display	Explannation	Range	Setting KEY
1-1 GAIn GAIN ▲FU Move to parameter 2 Group	Set up 8 levels of amplifying rate for the amplifying circuit of the light receiver.	1(min) ~ 8(max)	▼• : ▲• : Setting value change
1-2 AdJ ADJUST	Set up the sensitivity (criterion value)	5 – 995	▲– : Setting done/return
1-3 HSt HYSTERESIS	Set up GAP of the criterion at the time of deciding the presence of sensing object.	1 ~ 10 %	
1-4 Stb STABILITY	Set up the Stability area at the time of deciding the presence of sensing object.	1 ~ 10 % HYSTERESIS	

1) Move to the next parameter group by pressing ▲• when the parameter is displayed.
2) Current mode and current set up condition is displayed when moving the parameter.
3) Set up can be changed by firmly pressing on to ▼– for long time.
4) Just move the Slide S/W to L.ON or D.ON to move to the executive mode after completing the set up

■ Parameter 2 group(Sensor output Setup)

Move to Group 2 ▲• in FUN mode 

Parameter menu and Display	Explannation	Range	Setting KEY
▲• ▼– Move to parameter 4 Group 2-2 on d ON_Delay 2-3 oFFd OFF_Delay 2-4 onES ONE Shot Time 2-5 E-in E-IN 2-6 CHAn CHANNEL	Setup Out1 ON–Delay time	9999 ms	▼• ▲• : Setting value change ▲– : Setting done/return
	Setup Out1 OFF–Delay time		
	Setup ONE Shot output time		
	Setup outer IN–Port function(If input is over 1sec, it will run)	None 1–TE : 1point teaching AUTO : Auto teaching	
	Change frequency to prevent mutual interference of sensors	CH1 ch1 frequency CH2 ch2 frequency	▼• : Setting value change ▲– : Setting done/return

1) Move to the next parameter group by pressing ▲• when the parameter is displayed.
2) Current mode and current set up condition is displayed when moving the parameter.
3) Set up can be changed by firmly pressing on to ▼– for long time.
4) Just move the Slide S/W to L.ON or D.ON to move to the executive mode after completing the set up.

※ Parameter 3group (Counter/RPM setting) function is only available with the model PFD–RM□

■ Parameter 4 group(Subsidiary function Setup)

Move to Group 4 ▲• in FUN mode 

Parameter menu and Display	Explannation	Range	Setting KEY
4-1 LoCK Lock ▲FU ▼FU Move to parameter 1 Group 4-2 brit Bright 4-3 br_t Bright Time 4-4 diSP Display 180 4-5 Init Default	FUN mode lock (refer to 5)	En : Enable dS : Disable	▼• ▲• : setting value change ▲– : setting done/return
	Brightness setting and FND brightness control	[1–7]stages	
	Bright Time setting Bright keeping time	OFF, 5, 10, 15, 20, 30 sec 1, 2, 3, 4 min	
	Display rotation (180 rotation)	0 : normal 180 : 180 rotation	
	Default setting (initial value setting)	Ent	

1) Move to the next parameter group by pressing ▲• when the parameter is displayed.
2) Current mode and current set up condition is displayed when moving the parameter.
3) Set up can be changed by firmly pressing on to ▼– for long time.
4) Just move the Slide S/W to L.ON or D.ON to move to the executive mode after completing the set up
5) LOCK Release Method : Press ▲• ▲• ▼• ▲• ▲• ▼• in order

Fiber optic cable

■ FIBER OPTIC CABLE

Internal diameter : I. External diamete : E.

MODEL			APPEARANCE	SPECIFICATION	Ambient temperature	Length of cable
Through TYPE	Standard TYPE	GT-4310-2	Free 	• Hood: M4×0.7(P) • Core: Ø1 • E.: Ø2.2 • Permitted radius of flexural: 30R • Detection distance : 150 ㎜	−30 − 70 ℃	2 m
	Standard TYPE (Round type)	GTR-2910-2	Free 	• Hood: Ø2.9 • Core: Ø1 • E.: Ø2.2 • Permitted radius of flexural: 30R • Detection distance : 150 ㎜		
	Standard TYPE	GT-4M10-2	Free 	• Hood: M4×M2.6 • Core: Ø1 • E.: Ø2.2 • Permitted radius of flexural: 30R • Detection distance : 150 ㎜		
	Standard TYPE (Small)	GT-3005-2	Free 	• Hood: M3×0.5(P) • Core: Ø0.5 • E.: Ø1 • Permitted radius of flexural: 1R • Detection distance : 30 ㎜		
	Standard TYPE (Small Round type)	GTR-1505-2	Free 	• Hood: Ø1.5 • Core: Ø0.5 • E.: Ø1.25 • Permitted radius of flexural: 15R • Detection distance : 30 ㎜		
	SUS TUBE TYPE	GTS3-4005-2	Free 	• Hood: M4×0.7(P) • Core:Ø0.5 • E.:Ø2.2 • SUS Tube Length: Ø1×70 mm • Permitted radius of flexural: 30R • Detection distance : 30 ㎜		
	Standard TYPE	GT-3075-2	Free 	• Hood:M3×0.5(P) • Core:Ø0.75 • E.:Ø1.25 • Permitted radius of flexural: 20R • Detection distance : 50 ㎜		
Reflection TYPE	Standard TYPE	GR-6210-2	Free 	• Hood: M6×0.75(P) • Core: Ø1 • E.: Ø2.2 • Permitted radius of flexural: 30R • Detection distance : 40 ㎜	−30 − 70 ℃	2 m
	Standard TYPE	GR-6410-2	Free 	• Hood: M6×1(P) • Core: Ø1 • E.: Ø2.2 • Permitted radius of flexural: 30R • Detection distance : 40 ㎜		
	Standard TYPE	GR-4205-2	Free 	• Hood: M4×Ø2.5 • Core: Ø0.5 • E.: Ø1.25 • Permitted radius of flexural: 15R • Detection distance : 10 ㎜		
	Standard TYPE (Small)	GR-3005-2	Free 	• Hood: M3×0.5(P) • Core: Ø0.5 • E.: Ø1.25 • Permitted radius of flexural: 15R • Detection distance : 10 ㎜		
	Standard TYPE (Round type)	GRR-3005-2	Free 	• Hood: Ø3 • Core: Ø0.5 • E.: Ø1.25 • Permitted radius of flexural: 15R • Detection distance : 10 ㎜		
	SUS TUBE TYPE	GRS3-4005-2	Free 	• Hood:M6×1(P) • Core:Ø0.5 • E.:Ø2.2 • Permitted radius of flexural: Fiber:10R, SUS:10 • SUS Tube Length:Ø1.5×70 mm • Detection distance : 10 ㎜		
	SUS TUBE TYPE	GRS2-6005-2	Free 	• Hood:M6×1(P) • Core:Ø0.5 • E.:Ø2.2 • Permitted radius of flexural: Fiber:15R, SUS:10 • SUS Tube Length:Ø1.5×35 mm • Detection distance : 10 ㎜		
	Co-axial TYPE	GR-62X5-2	Free 	• Hood:M6×0.75(P) • Emitter Fiber Core:Ø1×1 • Permitted radius of flexural:30R • Receiver Fiber Core:Ø0.265×16 • E.:Ø2.2 • Detection distance : 40 ㎜		
Surface detection TYPE	Liquid TYPE	GL-635-05	Free 	• Skin:Ø6.35(PFA Tube) • E.: Ø1.25 • PFA Tube Length: 500 mm • Permitted radius of flexural: 30R	−40 − 80 ℃	2 m
	Liquid TYPE	GL-635-1	Free 	• Skin:Ø6.35(PFA Tube) • E.: Ø1.25 • PFA Tube Length: 1000 mm • Permitted radius of flexural: 30R		1.5 m
Fiber Unit Protective Tube	GST − 310			• Fiber Unit Protective tube (shock, cut, vibration, ..) • SUS Flexible I. : 3 mm • SUS Flexible E. : 4.6 mm	−40 − 150 ℃	1 m
	GST − 410			• Fiber Unit Protective tube • SUS Flexible I. : 4 mm • SUS Flexible E. : 5.8 mm		
	GST − 610			• Fiber Unit Protective tube • SUS Flexible I. : 5.5 mm • SUS Flexible E. : 7.5 mm		

Cautious) The sensing distance is being measured under the maximum durability by using the fiber amp of PFD series.

※ Cautious) This is the lists of fiber units currently on sale.