

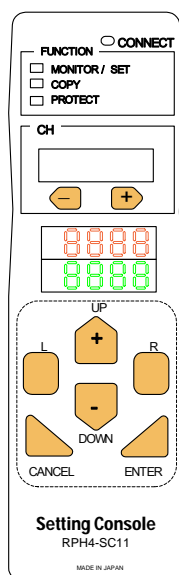


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Model RPH4-SC11

Hand Held Blanking Control

Instruction Manual





WARNING

RPH4-SC11 must be managed and used only by qualified persons.

Operation by un-qualified persons could create a hazardous condition which may lead to a loss of safety function.

After the changing the setting of the sensor, a start-up check must be conducted. Normal operation can only be allowed after safety is confirmed.

In order prevent access to a dangerous area, a fixed barrier guard must be placed in fixed blanked areas.

Failure to do so may result in serious injury.

Use of floating blanking function involves a change of the safety distance. Always recalculate and re-measure the safety distance to confirm that it meets the applicable standards, after the change. Failure to do so may cause the machine to fail to stop before an operator reaches a dangerous area, and may result in serious injury.

A change of the setting can only be done under observance of laws/ standards which are related to safe operation of the product.



CAUTION

Do not connect the RPH4-SC11 to any equipment other than for what it intended to be used with.

PRECAUTIONS IN USING THE PRODUCT

When the product is used under the circumstances or environment stated below, ensure adherence to limitations of the ratings and functions.

Also, take countermeasures for safety precautions as a system.

1. Use under the circumstances or environment which are not described in this instruction sheet.
2. Use for the equipment which requires higher level of safety, such as nuclear devices, railroad, aircrafts, vehicles, combustion devices, medical equipment, space development technology devices and amusement machinery.

Precaution on Safety

- **Indications and their meanings for safe use**

In order to use the product safely, adhere to the following precautions. The items indicated here are very important to your safety, be sure to observe them at all times. Indications and their meanings are as follows.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates prohibited actions.

Notice
Do not connect to voltage exceeding the stated values. Doing so may cause damage to the product.
Do not expose the RPH4-SC11 to water on the product. Doing so may cause damage to the product.

Correct Usage
Always power OFF the sensor when connecting or disconnecting the RPH4-SC11.
When RPH4-SC11 is not in use, disconnect it from the sensor.

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1 DESCRIPTION

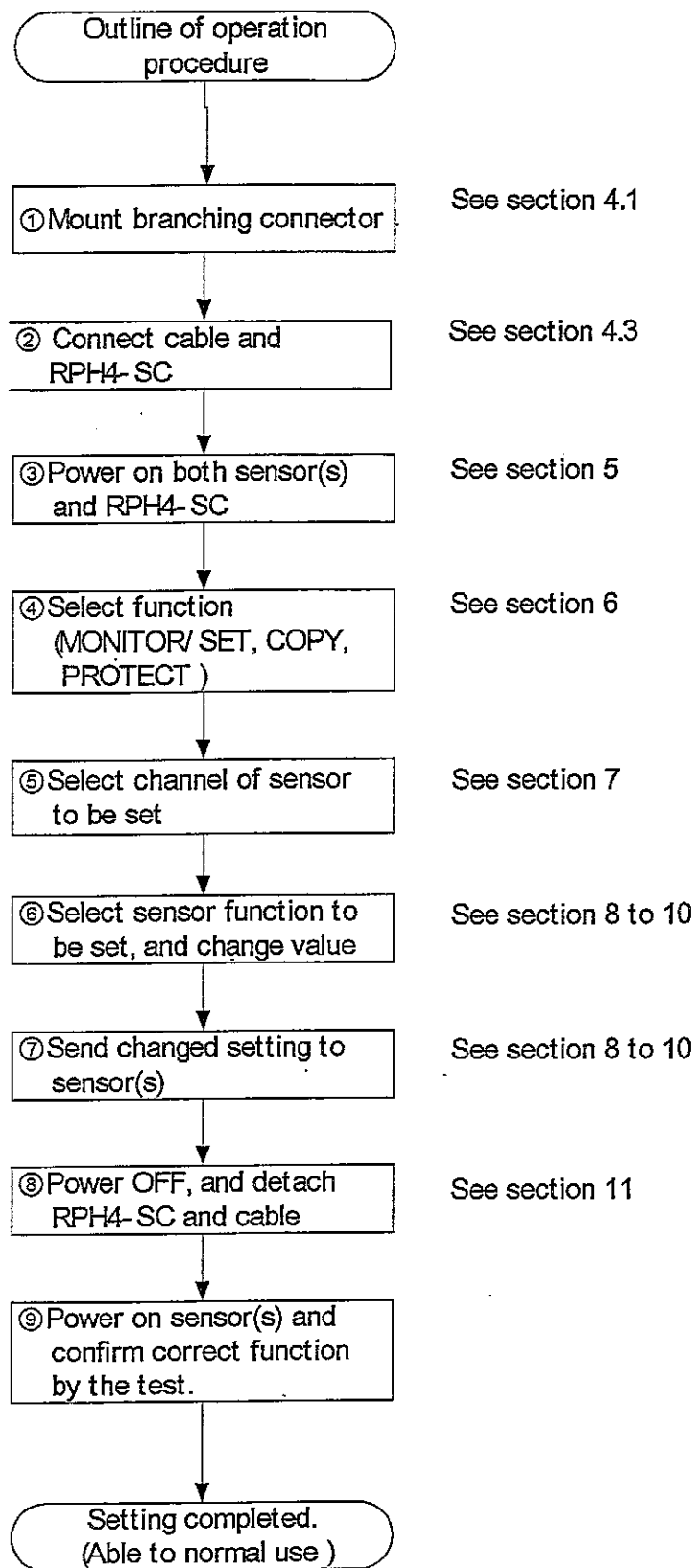
The Setting console Model RPH4-SC11 (hereafter referred to as RPH4-SC) can be connected to Safety Light Curtain Model RPH-4 Series. The RPH4-SC allows you to change or monitor the setting of these sensors.

Available setting functions are as follows;

Function	Setting
Monitor/Set	• Fixed blanking
	• Floating blanking
	• Auxiliary output
	• External indicator output
	• External device monitoring
	• Start interlock
	• Restart interlock
	• Setting initialization
	• ID setting
Copy	• Upload
	• Download
	• Bank lock
Protect	• Setting lock
	• Change password

Outline of operation procedure is as shown in the following flow

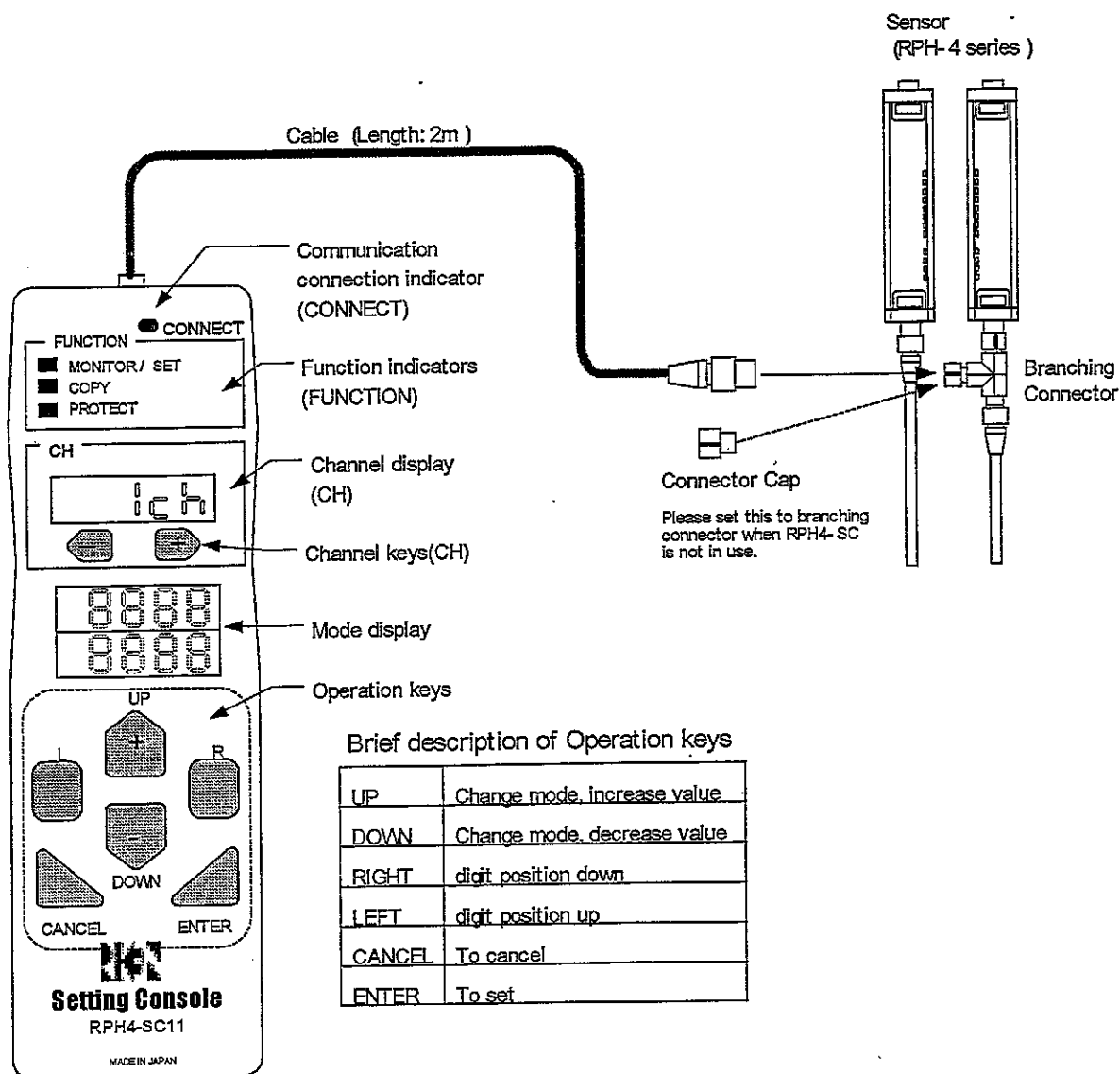
chart.



2 RATING

Models		RPH4-SC11
Items		
Applicable sensor		RPH-4 Series
Communication method		Specified method
Communication connecting method		RS-485
Power supply		24VDC \pm 10% (share sensor's power supply)
Current consumption		55mA maximum
Ambient temperature (during operation)		-10°C to 55°C (with no freezing)
Ambient temperature (during storage)		-25°C to 65°C
Ambient humidity		25 to 85%RH (with no condensation)
Insulation resistance		20M Ω min. (at 500VDC)
Dielectric strength voltage		1,000VAC at 50/60Hz for 1min.
Material	Case	ABS
	Window	Polycarbonate
Weight		Approx. 87g (without accessories) Approx. 360g (when packed)
Accessories		Branching connector, Cable (2m), Connector cap, Instruction manual

3 NOMENCLATURE



3.1 Communication connection indicator (CONNECT)

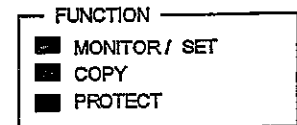
This indicator will light up when RPH4-SC is connected to the sensor.

RPH4-SC cannot be used when this indicator is not lit.



3.2 Function indicators (FUNCTION)

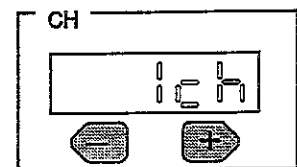
The indicator of the function being set is lit.



3.3 Channel display(CH) and channel keys

Using +/- keys, select sensor to be set by RPH4-SC.

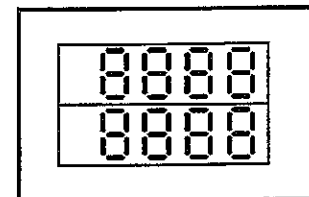
Number of selected channel appears on display.



3.4 Mode display

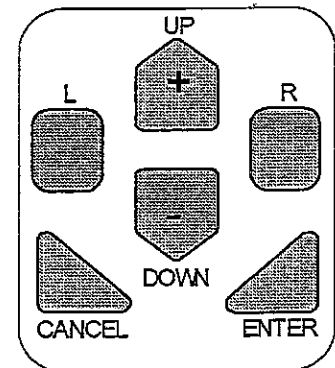
Displays function and value when making a setting.

Basically the top row indicates Setting function and the bottom row Setting value.



3.5 Operation keys

Used for mode change, setting and canceling.

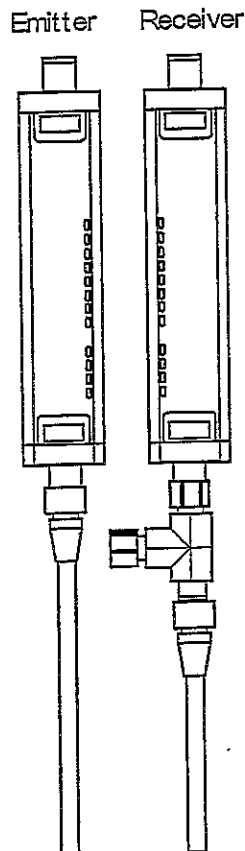


4 WIRING/CONNECTION

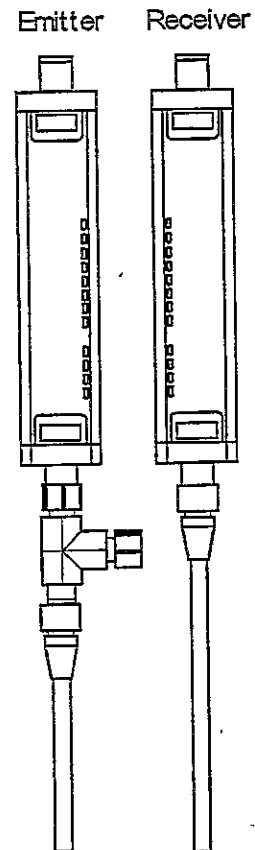
4.1 Mounting branching connector

Mount a branching connector to sensor. The connector can be mounted either on emitter or receiver.

When mounted on receiver
emitter

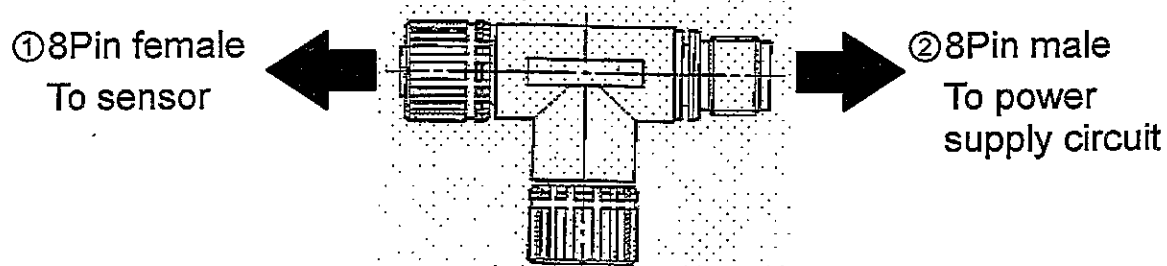


When mounted on

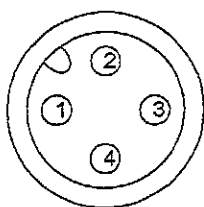


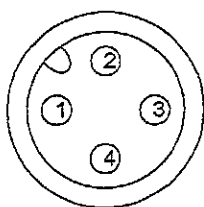
Branching
connector

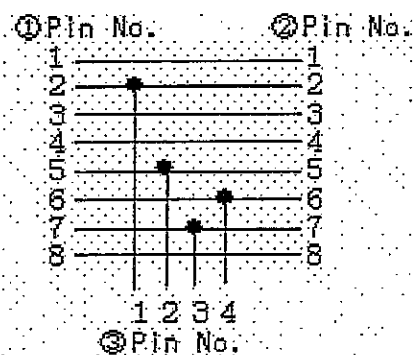
4.2 Diagram for Wiring of Branching Connector



③ 4Pin female
To RPH4-SC



Front View	Pin No.	Signal
	1	+24 V (24VDC)
	2	RS-485(A)
	3	0V
	4	RS-485(B)

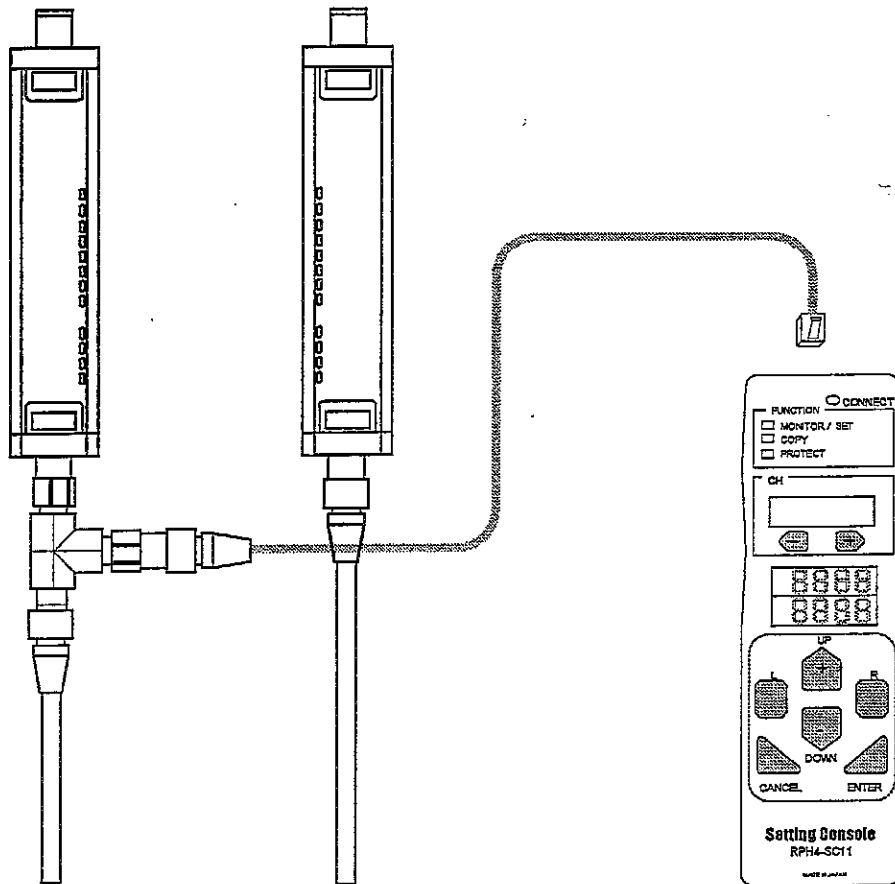


<Note>

The RPH4-SC receives its power from the sensor. Select a power supply with sufficient current to allow for the additional consumption of the RPH4-SC (55mA maximum).

4.3 Connecting RPH4-SC

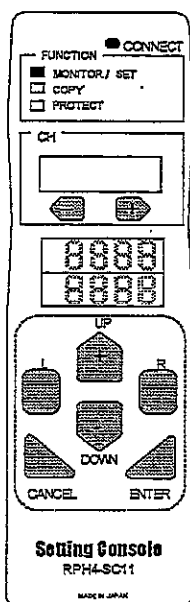
Insert M12 connector of the cable into Branching connector and the other end into the RPH4-SC.



<Note>

1. Do not connect 2 or more RPH4-SC to one pair of sensor. Normal operation cannot be achieved.
2. When RPH4-SC is not in use, the cable and RPH4-SC must be removed and Branching connector must be covered with connector cap. Without the connector cap, water resistance cannot be maintained.
3. When connecting or disconnecting the RPH4-SC, be sure that the power is OFF.

5 POWER ON



Power supply of RPH4-SC is shared with that of the sensor.

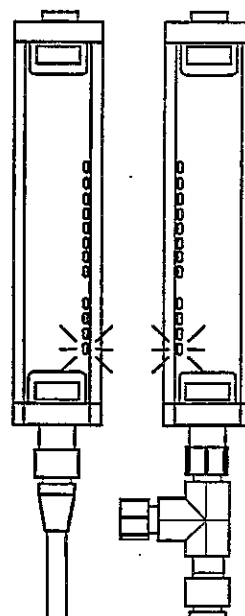
The RPH4-SC turns ON with the power supply of the sensor.

When the RPH4-SC power is ON, it confirms its connection to sensor. When connection is succeeded, it displays as follows;

- Communication connecting indicator is lit.
- Displays RPH4-SC's model and version in mode display (for 1 second)
- Displays connected sensor model in mode display, (for 1 second)

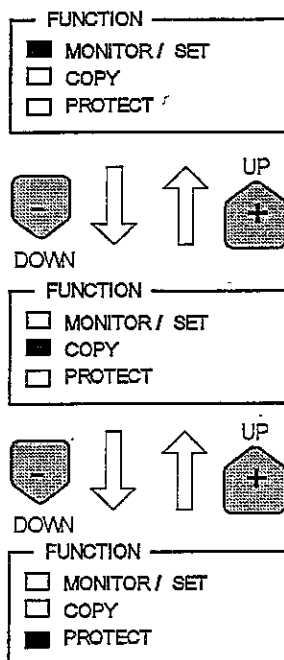
<Note>

1. When RPH4-SC power is ON, the state of sensor becomes as follows.
 - The safety output of RPH-4 is OFF.Also, indicators located at bottom (see fig. on right) are flashing.
2. Do not disconnect the RPH4-SC during power ON-state. Malfunction may result.



6 FUNCTION SELECTION

1. Using [UP][DOWN] keys, select the function. Display of selected function flashes.
2. Function selecting method is shown below.



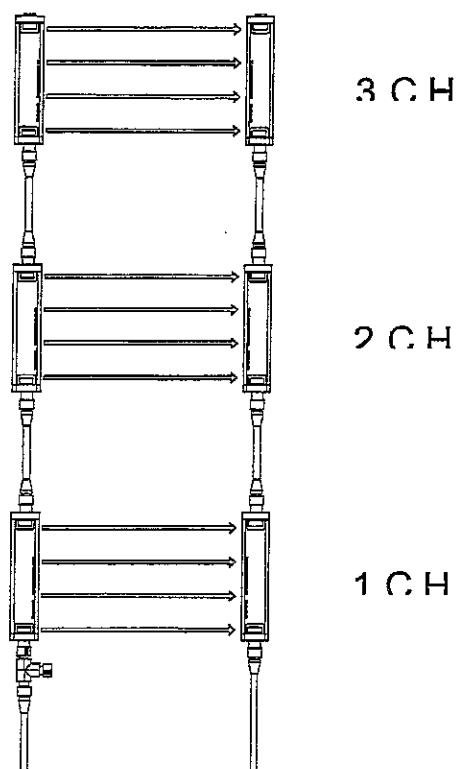
3. By pressing [ENTER] when the selected function is displayed, editing of selected function becomes possible. The indicator of the function selected will light.
4. For editing method of each function, please refer to the item of respective function.
 - Monitor/Set Section8 (page15)
 - Copy Section9 (page31)
 - Protect Section10 (page36)

7 CHANNEL SELECTION

When changing the setting of the sensor with the RPH4-SC, select the channel in order to determine which sensor is to be set.

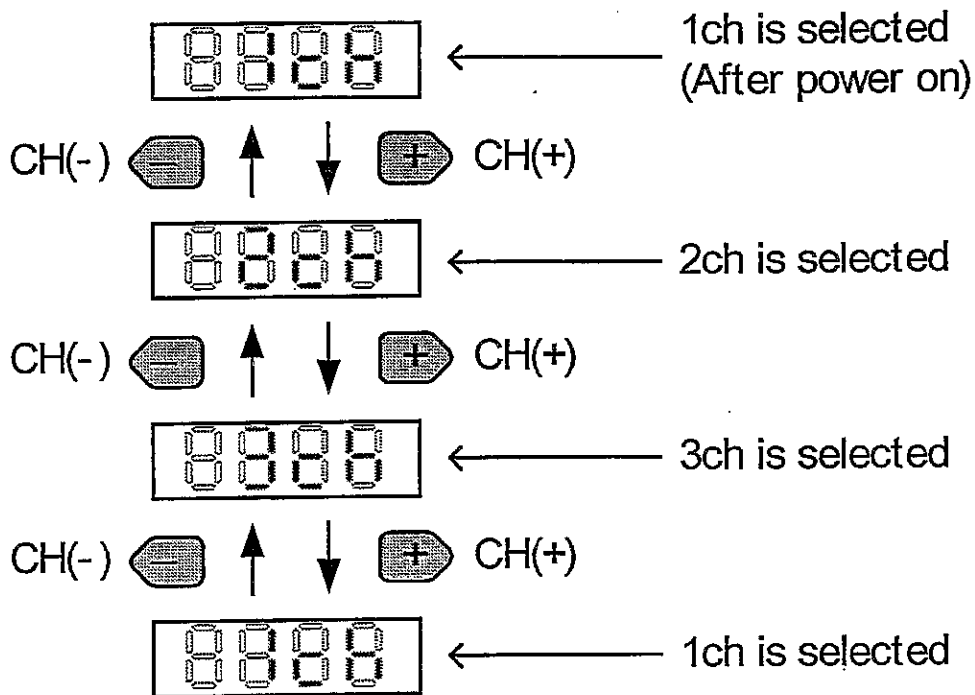
Selecting channel (CH) method is as follows;

When series connected, the closest sensor to the extension cable becomes 1CH and the second closest becomes 2CH.



Channel Numbers in Series Connection

Changing selected channel when connected to three sensors



The indicator will be displayed as illustrated below, depending on which function is to be set. This indicates that a setting item is to be proceeded to all the sensors.



<Note>

If the channel is changed while making a setting, content of the setting will be cancelled.

8 MONITOR/SET



WARNING

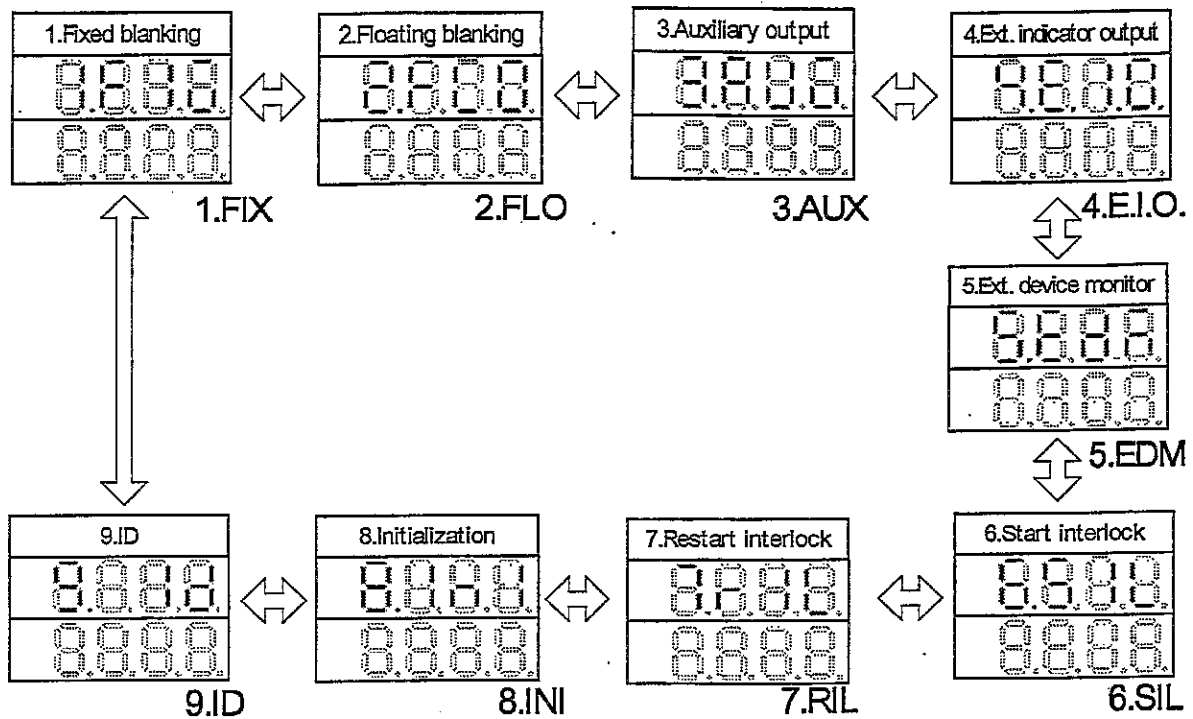
After the changing the setting of the sensor, a start-up check must be conducted. Normal operation can only be allowed after safety is confirmed.

A change of the setting can only be done under observance of laws/standards which are related to safe operation of the product.

This function enables the monitoring of current set values and functions of the sensor. When a set value is changed, content of the change is reflected on sensor. The value which is indicated first in each category is the current set value.

The method of change into each mode is as illustrated below.
By pressing [ENTER] key when the selected function is displayed, editing of selected function becomes possible.

↔ [UP][DOWN]Key



<Common Note for MONITOR/SET function>

1. Edited value will not become active if NOT "SEND" to sensor, nor "Function Valid (1.Fun-on)" is not selected.
2. "Loc" may display if "Setting lock" or "Setting limitation" has been set. See clause 10.1.

8.1 Fixed blanking

WARNING

In order prevent access to a dangerous area, a fixed barrier guard must be placed in fixed blanked areas.
Failure to do so may result in serious injury.

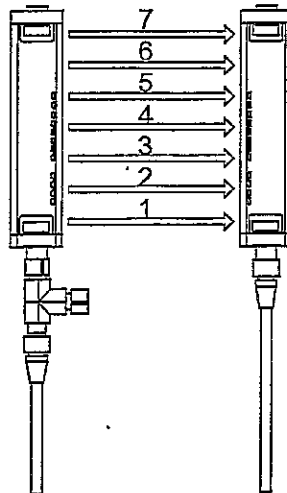
Fixed blanking function partly voids detection zone of sensor. Entrance of object into invalid detection zone does not change output status.

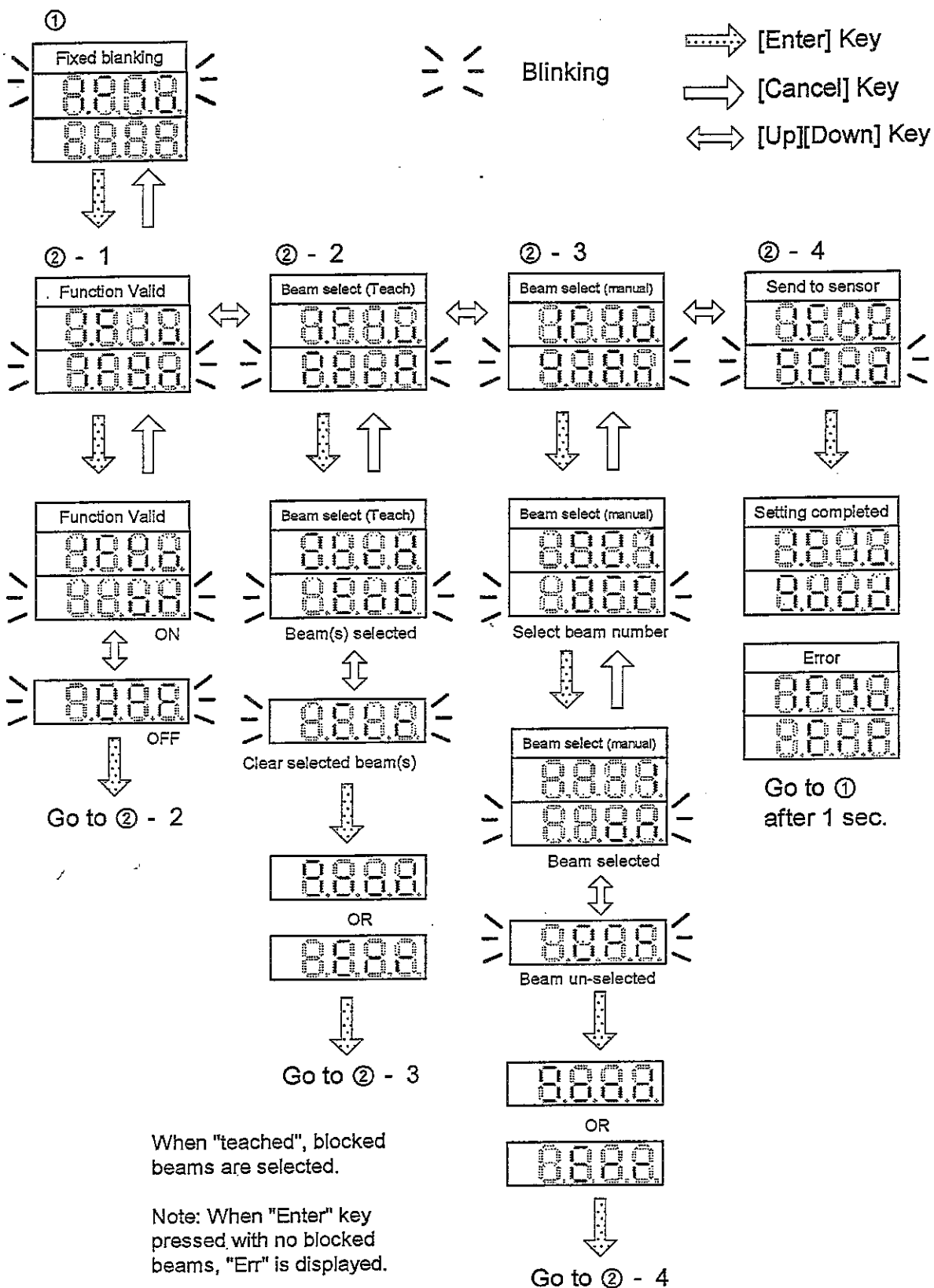
There are two ways to choose which zone is to be blanked.

1. Teaching :Block beams which are to be selected.
2. Manual :Select beam number first, and then choose blanked/not blanked for each selected beam.

<Note>

1. "Err" will be displayed when taught with no beams are blocked.
2. Beams are numbered as follows;





8.2 Floating blanking

WARNING

Use of floating blanking function involves a change of the safety distance. Always recalculate and re-measure the safety distance to confirm that it meets the applicable standards, after the change. Failure to do so may cause the machine to fail to stop before an operator reaches a dangerous area, and may result in serious injury.

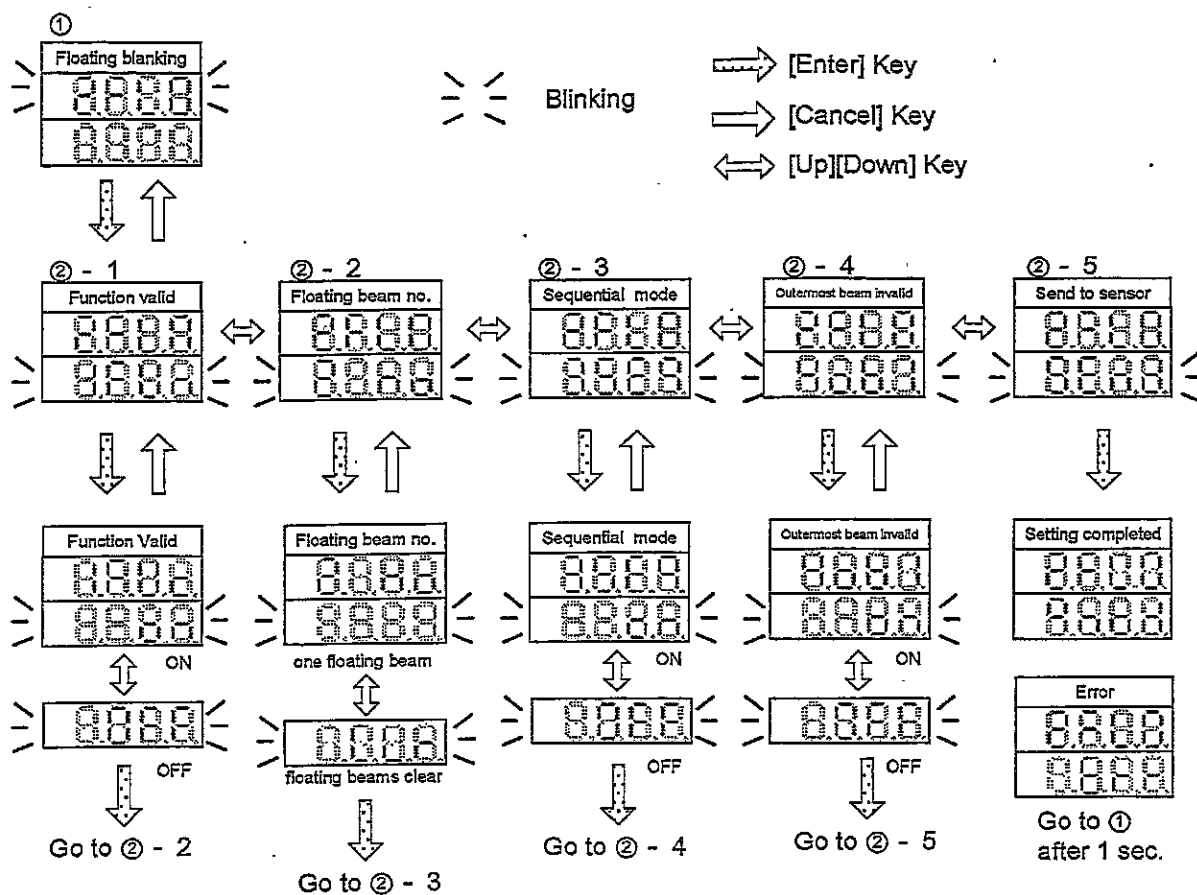
Floating blanking function allows the output to remain ON when beams of the sensor are interrupted anywhere in the field.

Floating can be set for 1 beams only.

Sequential beam mode enables floating blanking when blocked beams are consecutive.

Outermost beam invalid mode excludes outermost beams from floating blanking.

When this mode is valid, the output will turn OFF if one of the outermost beams is blocked, even if floating blanking is active.



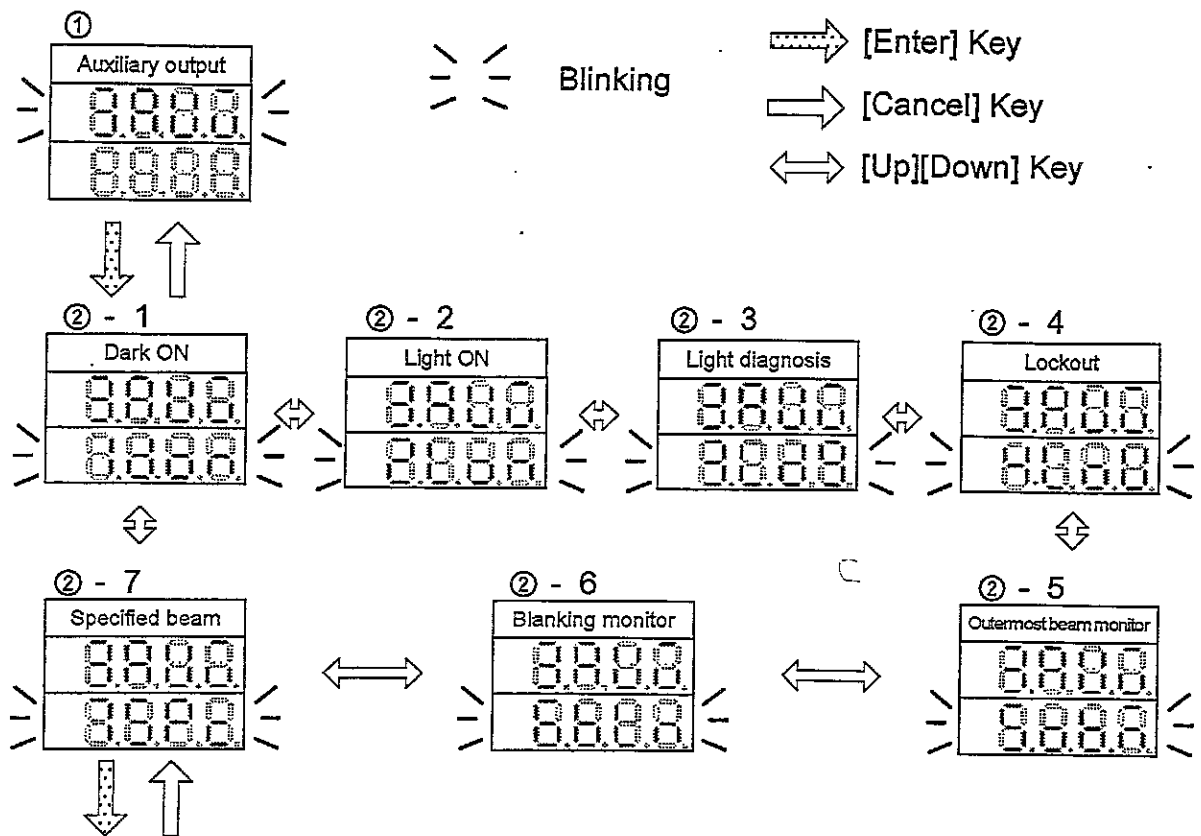
8.3 Auxiliary output

This is a non-safety related output used to display a status.
This output cannot be used for the purpose of safety.

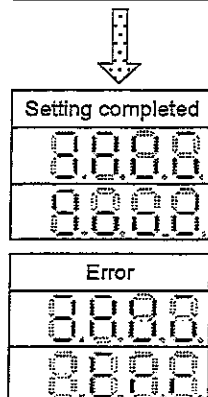
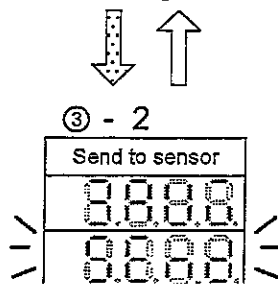
This can be selected to the following output;

1. Dark ON
2. Light ON
3. Light diagnosis
4. Lockout
5. Outermost beam monitoring
6. Blanking monitoring
7. Specified beam

For detail of each output, please refer to ANNEX1 INDEX.

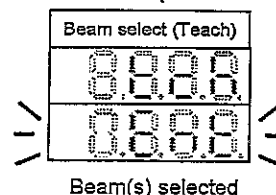


(Only when ② - 7 is selected, go to ③ - 1)



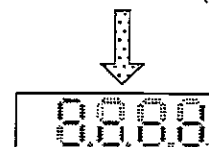
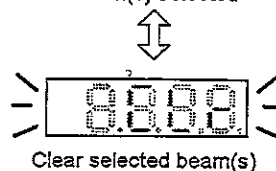
Go to ①
after 1 sec.

③ - 1 (from ② - 7)



When "tached", blocked beams are selected.

Note: When "Enter" key pressed with no blocked beams, "Err" is displayed.



Go to ③ - 2
after 1 sec.

8.4 External indicator output

This is a non-safety related output which can be connected to an optional indicator.

Applicable only to the models which can be connected in series.

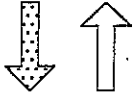
8.5 External device monitoring

This function can detect malfunction of external device which controls hazardous area of machine. (e.g. contact welding)

The determination time can be set in respect to the response time of relay being used.

The setting time must be between 100ms to 600ms and can be set in 5ms increments.

①



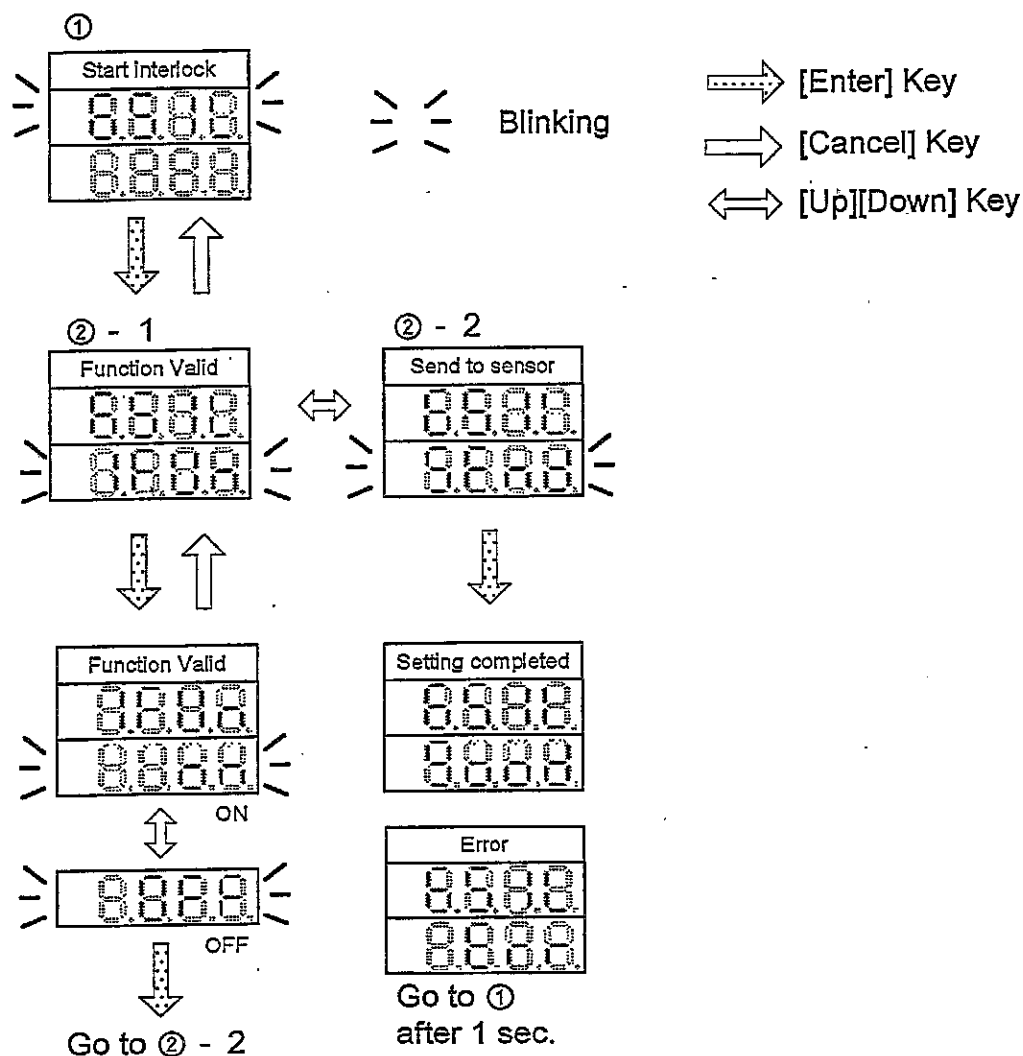
② - 1

8.6 Start interlock

When this function is ON, the outputs remain in the OFF-state (i.e. interlock state) after power ON. Interlock state can be released by a manual reset when there are no obstructions in the detection zone.

<Note>

This function is valid only when using manual reset mode. When in auto reset mode, the start interlock function is automatically disabled.



8.7 Restart interlock

When this function is ON, the outputs remain in their OFF-state (i.e. interlock state) when sensor is interrupted. Interlock state can be released by a manual reset when there are no obstructions in the detection zone.

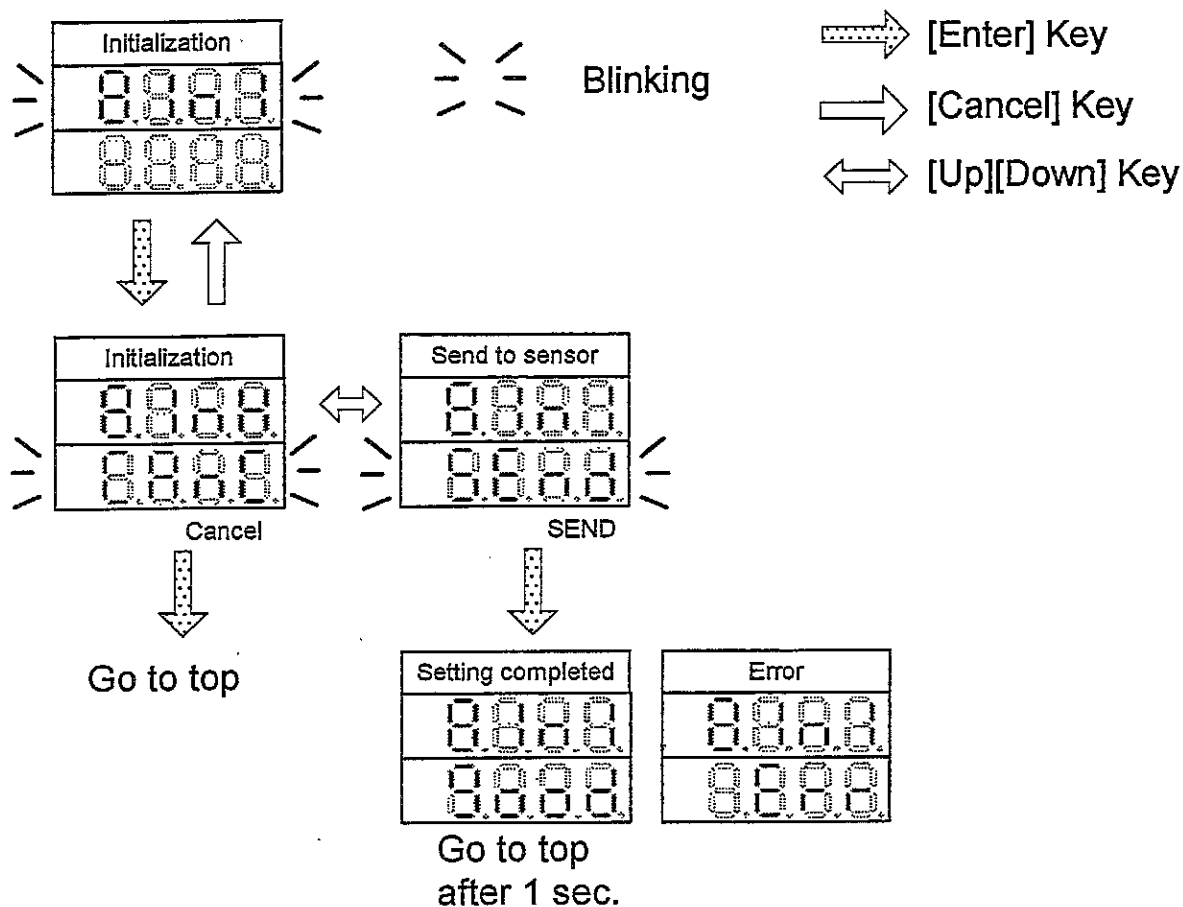
For operation, please refer to clause 8.6 Start interlock.

<Note>

This function is valid only when using manual reset mode. When in auto reset mode, the start interlock function is automatically disabled.

8.8 Setting initialization

This function returns the sensor setting to their default value.



Default value of each function

Function	RPH-4
Fixed blanking	Invalid
Floating blanking	Invalid
Auxiliary output	Dark ON
External indicator output	Light ON
External device monitoring	Valid
Start interlock	Valid

Restart interlock	Valid
-------------------	-------

<Note>

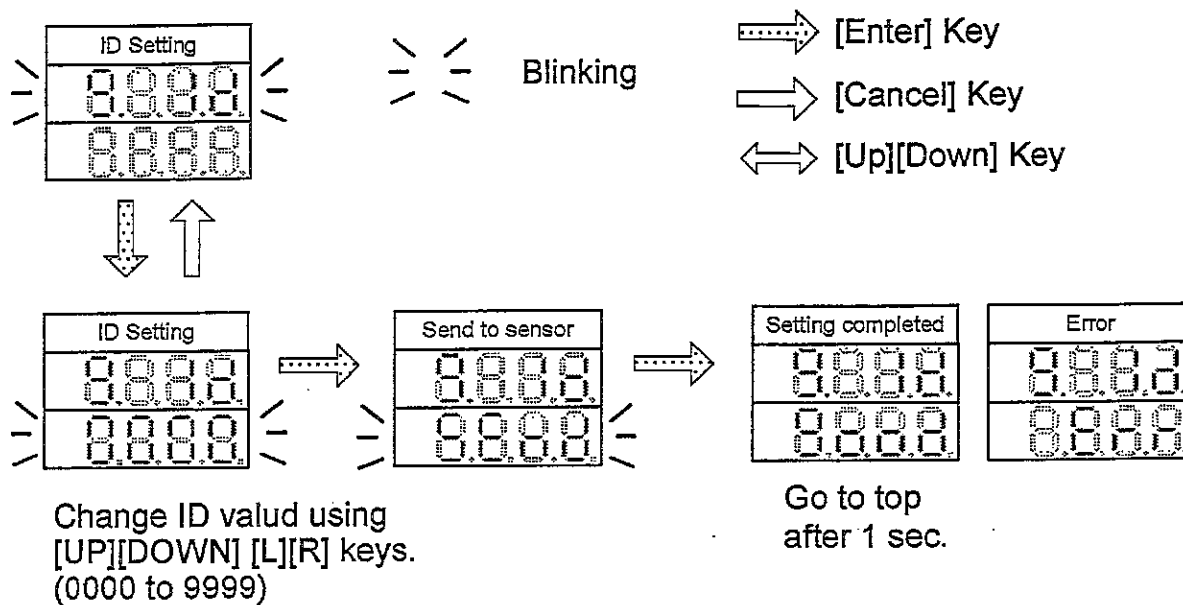
ID setting will not be changed by Initialization Setting.

8.9 ID setting

ID number can be set specific to each sensor.

The possible setting number range is between 0000 and 9999.

(Default will be 0000)



9 COPY

This function allows you to copy settings of one sensor and transfer them to another sensor. The settings which can be changed in Monitor/Set mode, will be copied. (Including ID)

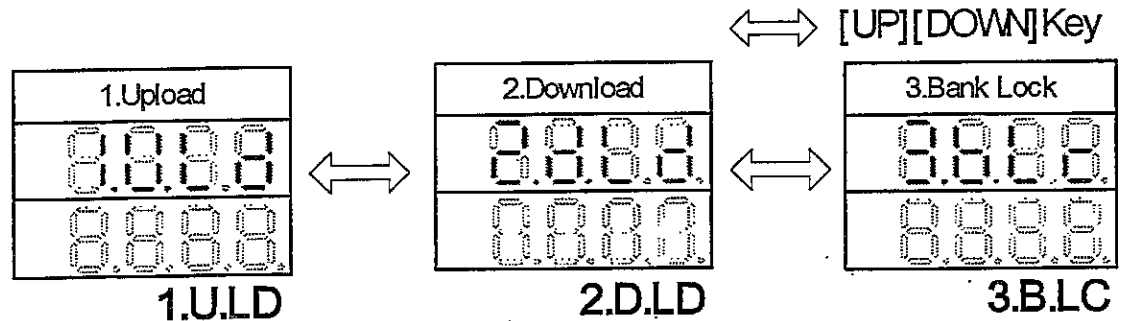
Inside the RPH4-SC are banks of the memory to store the date of sensor. The data will not be deleted in case of power OFF since the data in the bank is stored in EEPROM.

Bank lock setting protects data from being deleted by mistake.

The number of banks are listed below. Each bank can store setting data of one sensor.

RPH-4 : 1

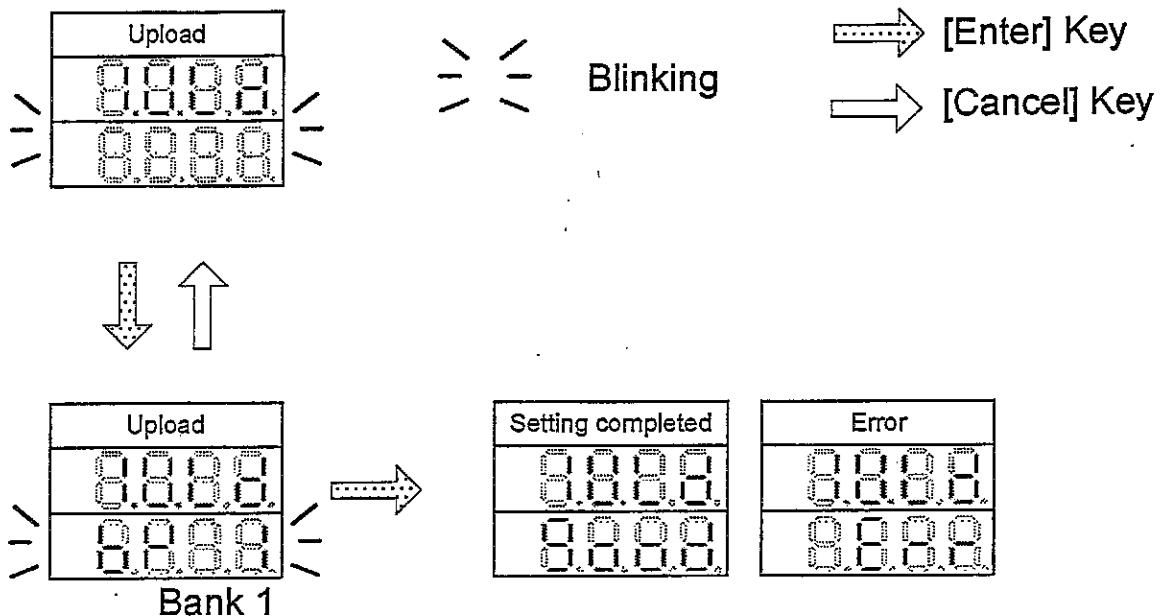
Switch modes are illustrated below;



9.1 Upload (Copy Sensor data to RPH4-SC)

Copy the setting data of one sensor to the bank of RPH4-SC.
Select <1.U.Ld> and press [ENTER] key.

The illustration below shows that setting data from the sensor is stored into bank 1 of RPH4-SC.



Select bank number using
[UP][DOWN] keys.

Note: RPH-4 has only
Bank1

9.2 Download (Copy RPH4-SC data to Sensor)



WARNING

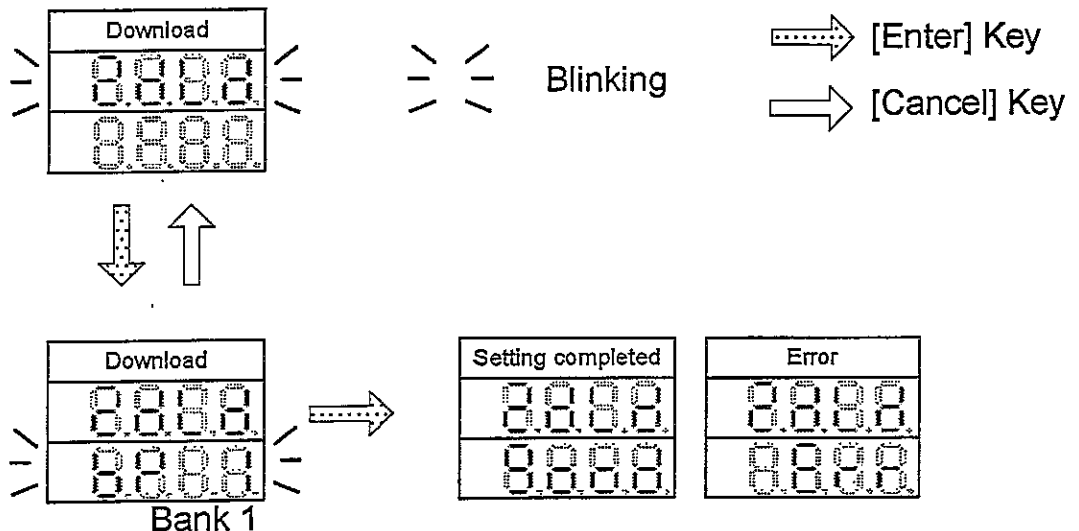
After the changing the setting of the sensor, a start-up check must be conducted. Normal operation can only be allowed after safety is confirmed.

A change of the setting can only be done under observance of laws/ standards which are related to safe operation of the product.

Copy the setting data of one sensor stored in the bank of RPH4-SC to another sensor.

<Note>

1. Copying to sensor with different detection capability (or beam gap) is not possible.



Select bank number using [UP][DOWN] keys.

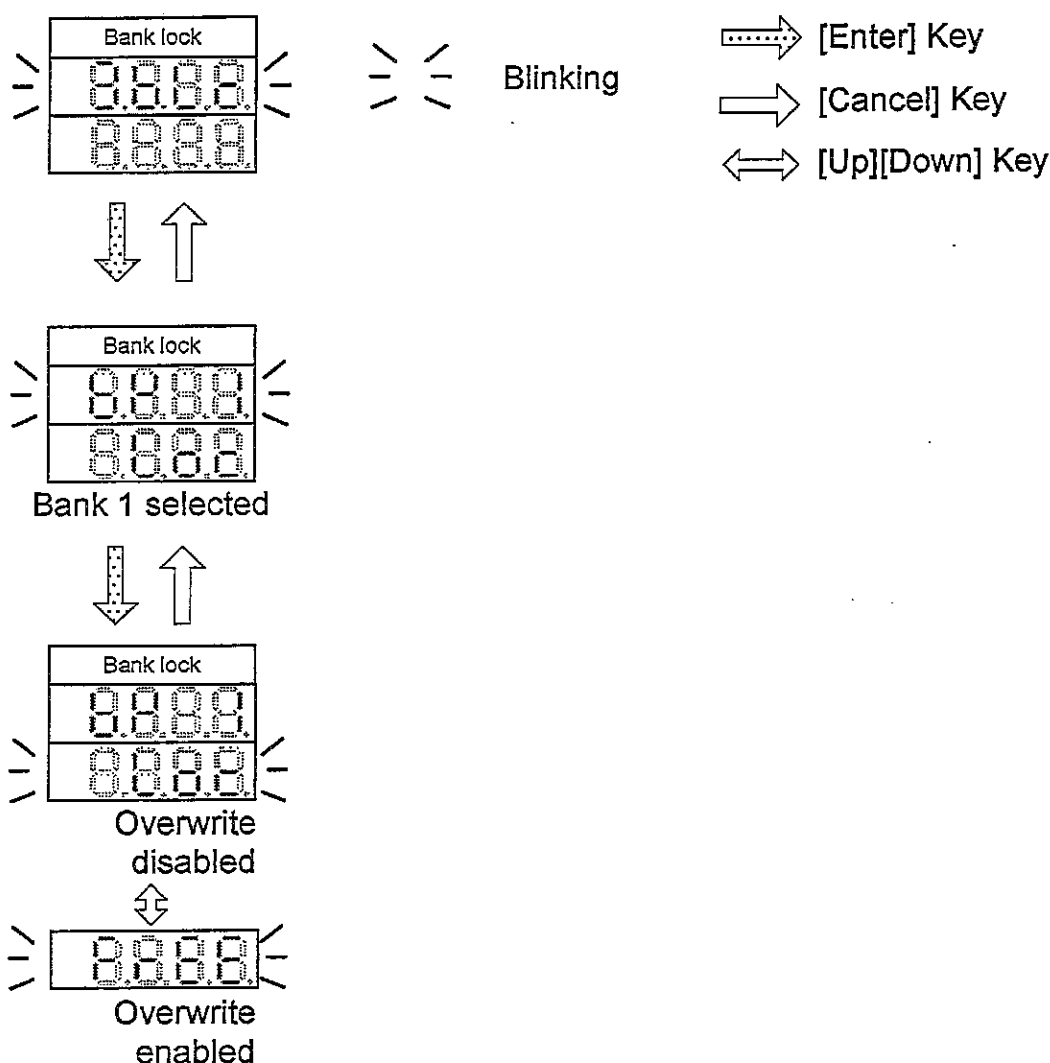
Note: RPH4-SC has only Bank1

9.3 Bank Lock (Prohibit overwriting to bank data)

To prohibit overwriting to a bank that has been stored with the setting data of the sensor, select this function by following means;

Select <3.b.Lc>, then press [ENTER] key to enter Bank lock mode.

Select the bank with [UP][DOWN] keys and set to either prohibit writing <Loc> or permit writing <FrEE> with [ENTER] key.



<Note>

The Locked bank cannot be selected when uploading the setting data. (The bank is not displayed.)

10 PROTECT



WARNING

RPH4-SC must be managed and used only by qualified persons. Operation by un-qualified persons could create a hazardous condition which may lead to a loss of safety function.

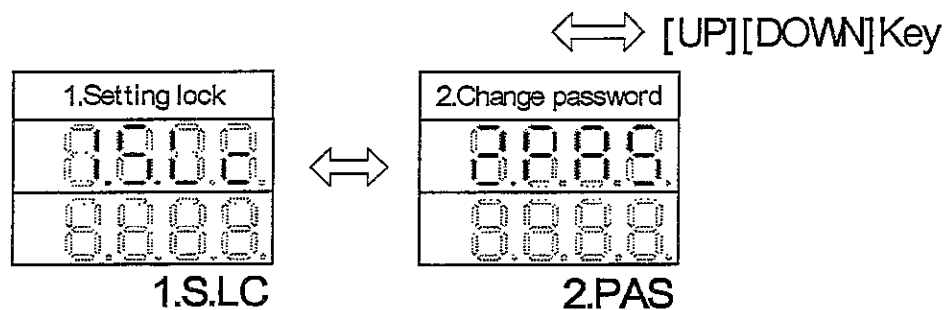
This mode enables the lock function which disallows setting changes without a password, setting limitations can also be set to restrict the changes that can be made.

<Note>

This function resides with the RPH4-SC and not the sensor. If the RPH4-SC is not protected, it could enable un-authorized persons to change the setting of the sensors.

We strongly recommend, to set "Protect" to all purchased RPH4-SCs.

Switching modes is illustrated below;



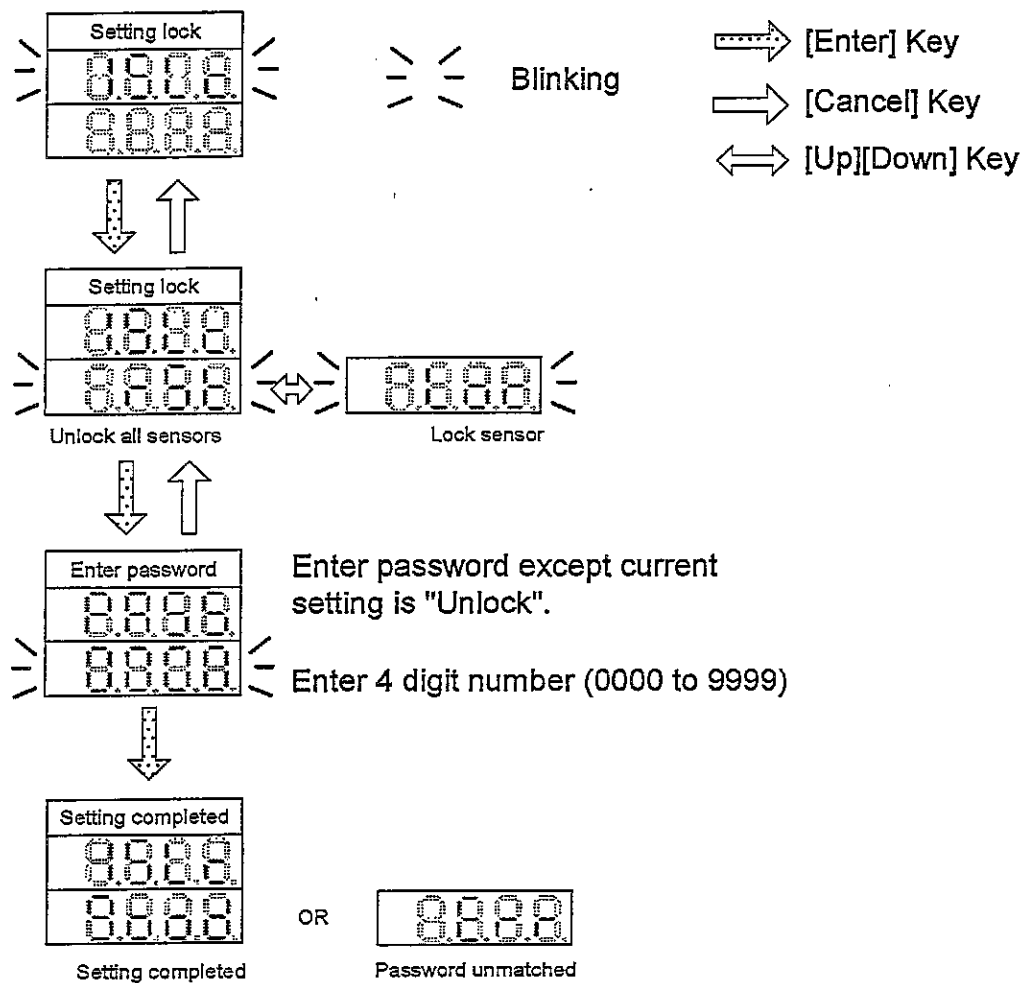
10.1 Setting lock

Prohibit setting change.

A password (4 digit number) is required to change locked status.

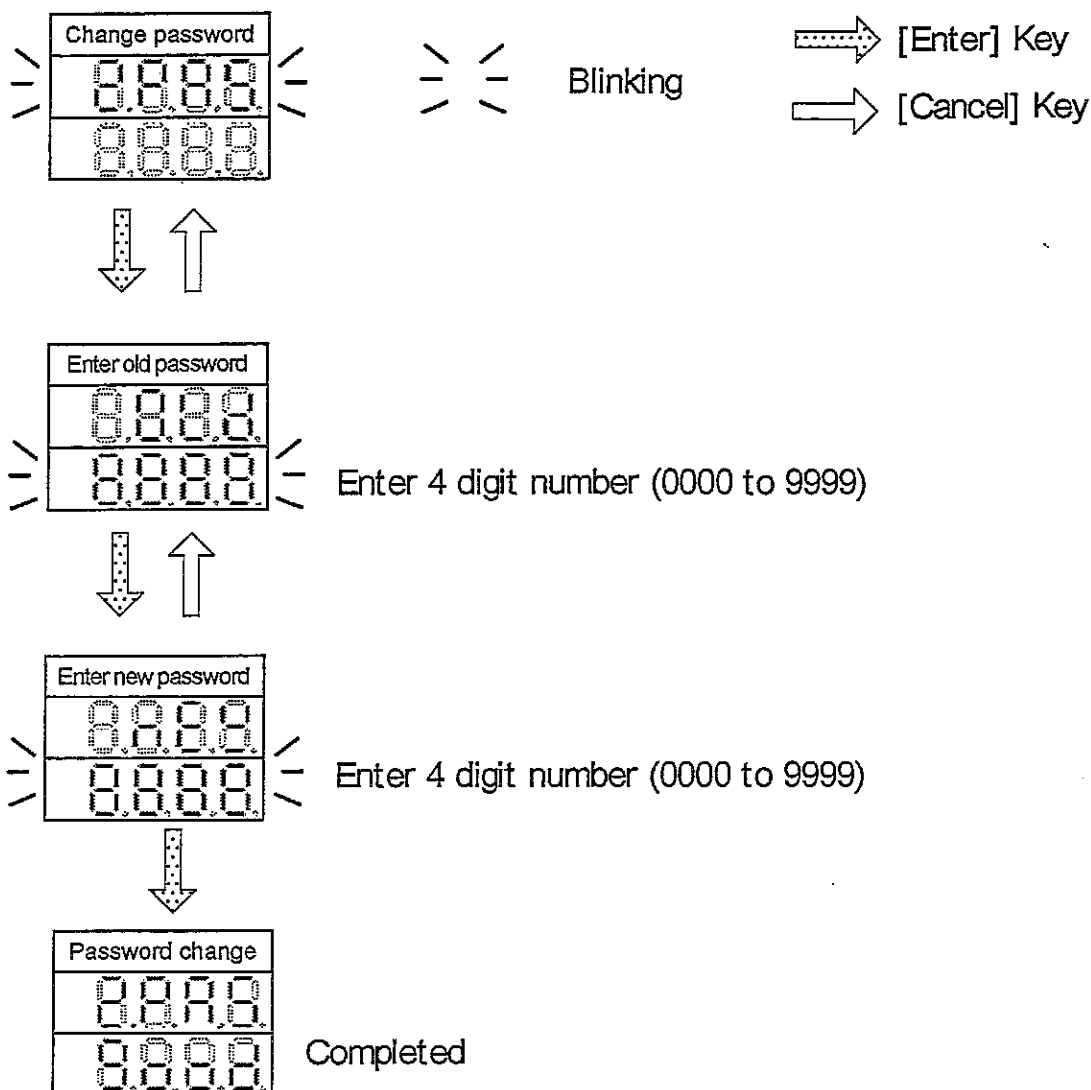
When locked, the following is prohibited;

- Sending to sensor in Set/Monitor function
- Download to sensor in Copy function



10.2 Change password

Change password (4 digit number) to release setting lock.
The default value is "0000".



<Usage>

We strongly recommend to use with password other than "0000", and with Setting lock function. This will prevent unauthorized setting change by un-qualified person.

<Note >

Please remember changed password.

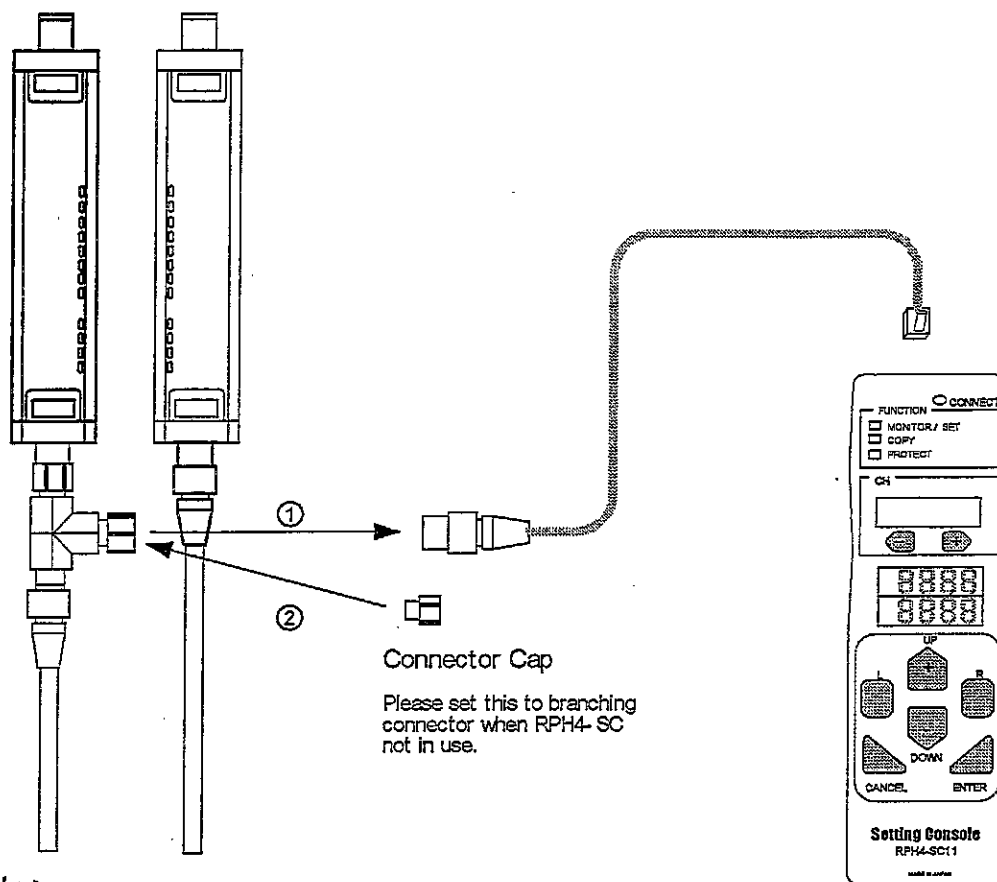
If you forget, please contact RIKEN OPTECH.

11 DISCONNECT RPH4-SC

After the setting has completed, be sure to disconnect cable and RPH4-SC before normal use.

Operation procedure;

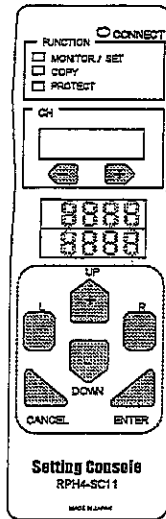
1. Disconnect RPH4-SC and cable from branching connector.
2. Attach connector cap to branching connector.
(Without the connector cap, water resistance cannot be maintained.)



<Note>

Be sure that the machine power is OFF when disconnecting. Disconnecting with the power ON may cause the RPH4-SC to malfunction.

12 ERROR CODES



"Err" may appear on the display indicating an error. Please refer to the table below for detail of the error codes.



Error code

Code	Description of error	Remedy
C001	Sensor Model error Sensors with different model are series connected.	Match all the sensor models to be connected in series.
C002	Sensor connection error Communication error occurred during connecting to sensor.	Confirm correct wiring.
C003	Communication error during connection	Confirm that there are no unloosen connector, terminals or excessive noise does not exists.
C004	EEPROM error	Contact

	EEPROM data has been corrupted.	RIKEN OPTECH.
C005	Sensor connection error	The connected sensor is not RIKEN product.
C010 and others	RPH4-SC destructed	Contact RIKEN OPTECH

13 TROUBLESHOOTING

1. RPH4-SC is not powered ON.

Cause: 1. Cable or branching connector is not correctly mounted.

2. Capacity of power supply is not enough.

Remedy: 1. Mount correctly (see section 4)

2. Use power supply with enough capacity.

2. Communication connection indicator of RPH4-SC will not lit, or "not conn" is displayed.

Cause: RPH4-SC has powered on after sensor has powered on.

Remedy: Power on both RPH4-SC and sensor simultaneously.

3. Test indicator and/or blanking indicator of sensor flashed or lit.

Cause: Normal condition. When communicating with RPH4-SC, sensor becomes above condition.

Remedy: After setting completed, disconnect RPH4-SC and then power on sensor.

4. "none" is displayed for bank number, when uploading.

Cause: Bank lock function is set for all banks.

Remedy: Unlock the bank. (see clause 9.3)

5. Unable to send to sensor; "Loc" is displayed

Cause: 1. Setting lock or 2. Setting limitation has been set.

Remedy: Unlock above function before sending. (see clause 10.1.

6. "Err" is displayed when teaching

Cause: Teaching is not completed with no blocked beam.

Remedy: Teach with one or more beams blocked.

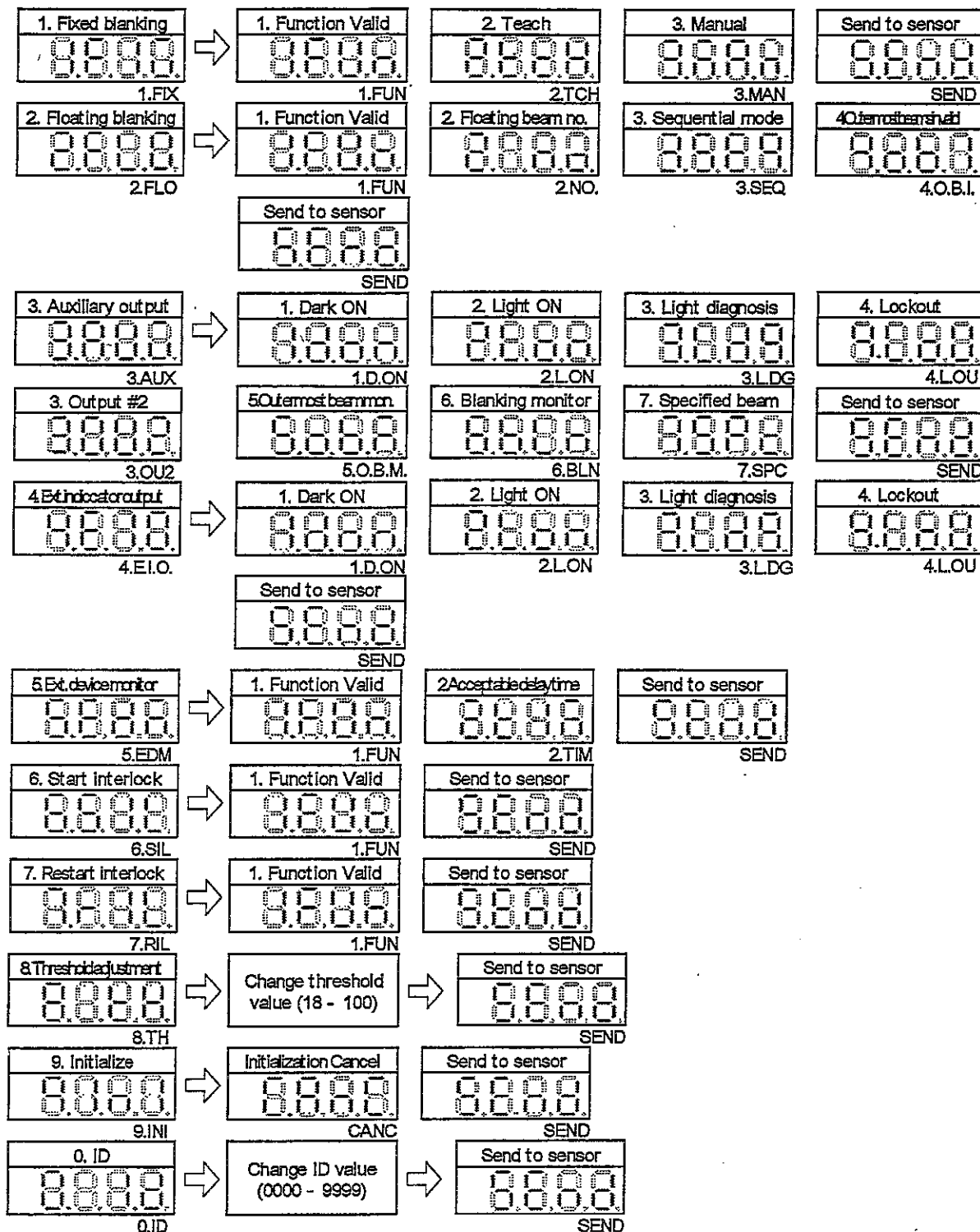
ANNEX1 INDEX

	Terms	Explanation
1	Auto reset mode	Interlock function is invalid in this mode. This mode can be selected with wiring interlock selection input and reset input. This mode voids all, despite the setting value of start/restart interlock function.
2	Auxiliary output	Non-safety related output used to display a status. This output cannot be used for the purpose of safety.
3	Blanking monitoring output (Auxiliary output, output2)	Output ON when the blanked beam becomes light reception-state, when the fixed blanking function is valid.
4	External indicator output	Non-safety related output which can be connected to an optional indicator. Applicable only to the models which can be connected in series.
5	External device monitoring	This function can detect malfunction of external device which controls hazardous area of machine. (e.g. contact welding)
6	Fixed blanking function	Partly voids detection zone of sensor. Entrance of object into blanked detection zone does not change output condition. Fixed blanking function becomes invalid when blanked zone becomes light reception-state. Fixed blanking function becomes valid again, after power has reset.
7	Floating blanking function	This function allows the output to remain ON when beams of the sensor are interrupted anywhere in the field. Floating can be set for 1 to 3 beams.
8	ID	Indicates numbers 0000 to 9999 which can be set specific to each sensor.
9	Light diagnosis (Auxiliary output, Ext. indicator)	Output ON when unstable condition lasts for 3 seconds or more. Can detect deterioration of optical performance caused by dirty optical surface, displacement of beams or deterioration of LED. "Unstable condition" indicates that the light level remains within +/-20% of threshold value.
10	Lockout output (Auxiliary output, Ext. indicator)	Output ON when the sensor is in lockout condition (i.e. mode which detects abnormality and stop the sensing function).
11	Manual reset mode	Interlock function is valid in this mode. This mode can be selected by wiring interlock selection input and reset input.
12	Max. number of fixed beams (Protect)	Maximum number of beams which can be blanked by fixed blanking function. Beams exceeding this number cannot be set blanked.
13	Max. number of fixed zones (Protect)	Maximum number of set of beam(s) which can be blanked by fixed blanking function. One zone is defined as blanked beam(s) which is surrounded by not-blanked beams.
14	Max. number of floating	Maximum number of beams which can be set by floating

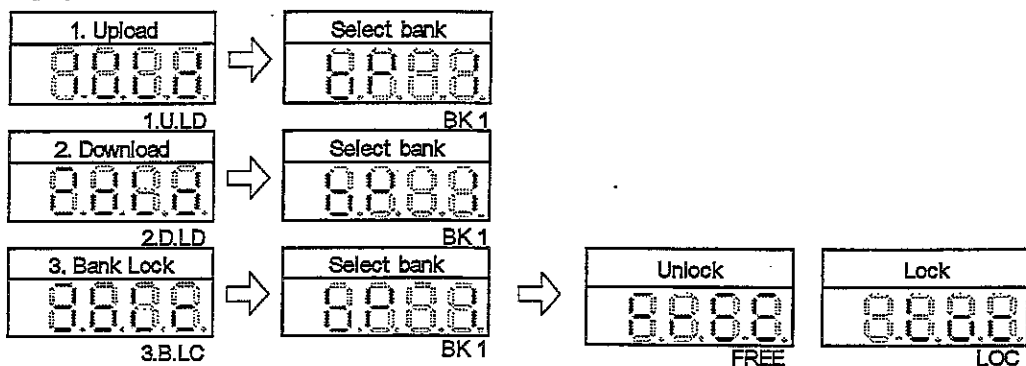
	Terms	Explanation
	beams (Protect)	blanking function. Floating beams exceeding this number cannot be set.
15	Outermost beam invalid (Floating blanking)	This mode excludes outermost beams from floating blanking. When this mode is valid, the output will turn OFF if one of the outermost beams is blocked, even if floating blanking is active.
16	Outermost beam monitoring output (Auxiliary output,)	Output ON when only outermost beam(s) is/are interrupted.
17	Restart interlock function	Outputs remain in the OFF-state (i.e. interlock state) when sensor is interrupted. Interlock state can be released by a manual reset when there are no obstructions in the detection zone. This function is valid only when using manual reset mode.
18	Sequential beam mode (Floating blanking)	This mode enables floating blanking when blocked beams are consecutive.
19	Specified Beam (Auxiliary output)	Output ON when any of specified beams are blocked. When this signal is selected, it is necessary to specify beam.
20	Start interlock function	Outputs remain in the OFF-state (i.e. Interlock state) after power ON. Interlock state can be released by a manual reset when there are no obstructions in the detection zone. This function is valid only when using manual reset mode.

ANNEX2 FUNCTION LIST (Indication)

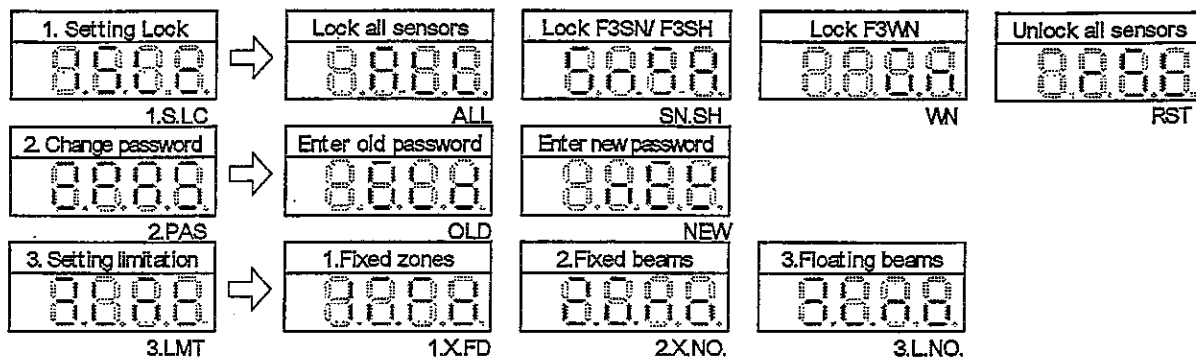
-MONITOR/SET



-COPY



-PROTECT



→ [ENTER] Key

<Note>

Items which are not displayed exist according to connected sensor type.

ANNEX3 FUNCTION LIST (according to sensor type)

RPH-4

Function	Sensor CH	Mode display (Top row)		Mode display (Bottom row)	
SET/ MONITOR	ALL	Fixed blanking	Function	Valid/Invalid	
	1 ~ 3		Teach	Teaching/Clear	
			Manual	Valid/Invalid(Set each beam)	
	ALL	-	Send to sensor		
	ALL	Floating blanking	Function	Valid/Invalid	
	1 ~ 3		Floating Beam	1/Clear	
			Sequential beam	Valid/Invalid	
			Outermost beam invalid	Valid/Invalid	
	ALL	-	Send to sensor		
	ALL	Auxiliary output	Setting value	L-on/D-on/Light diagnosis/ Lockout/Outermost beam/ Specified beam/Blanking	
			-	Send to sensor	
		External indicator output	Setting value	L-on/D-on/Light diagnosis/ Lockout	
			-	Send to sensor	
		External device Monitoring	Function	Valid/Invalid	
			Setting time	100 to 600ms ; every 5ms	
			-	Send to sensor	
		Start interlock	Function	Valid/Invalid	
			-	Send to sensor	
		Restart interlock	Function	Valid/Invalid	
			-	Send to sensor	
		Initialization		Cancel/Send to sensor	
		ID setting	Setting value	0000 to 9999	
			-	Send to sensor	
COPY	1 ~ 3	Upload		Bank number	
	1 ~ 3	Download		Bank number	
	-	Bank lock	Bank number	LOCK/FREE	
PROTECT	-	Setting lock	Lock object	RPH-4 series	
			Input password	Input 4 digit number	
	-	Change password	Old password	Input 4 digit number	
			New password	Input 4 digit number	

ANNEX4 FUNCTION SETTING CARD

FUNCTION		SETTING VALUE
Fixed blanking	Function	Valid/Invalid
	Blanked beam	(List selected beams)
Floating blanking	Function	Valid/Invalid
	Floating Beam	1/Clear
	Sequential beam	Valid/Invalid
	Outermost beam invalid	Valid/Invalid
Auxiliary output	Setting value	L-on/D-on/Light diagnosis/ Lockout/ Outermost beam/ Specified beam/Blanking
Ext. indicator output	Setting value	L-on/D-on/Light diagnosis/ Lockout
External device monitoring	Function	Valid/Invalid
	Acceptable delay time	ms (100 to 600ms)
Start interlock	Function	Valid/Invalid
Restart interlock	Function	Valid/Invalid
ID setting	Setting value	(0000 to 9999)