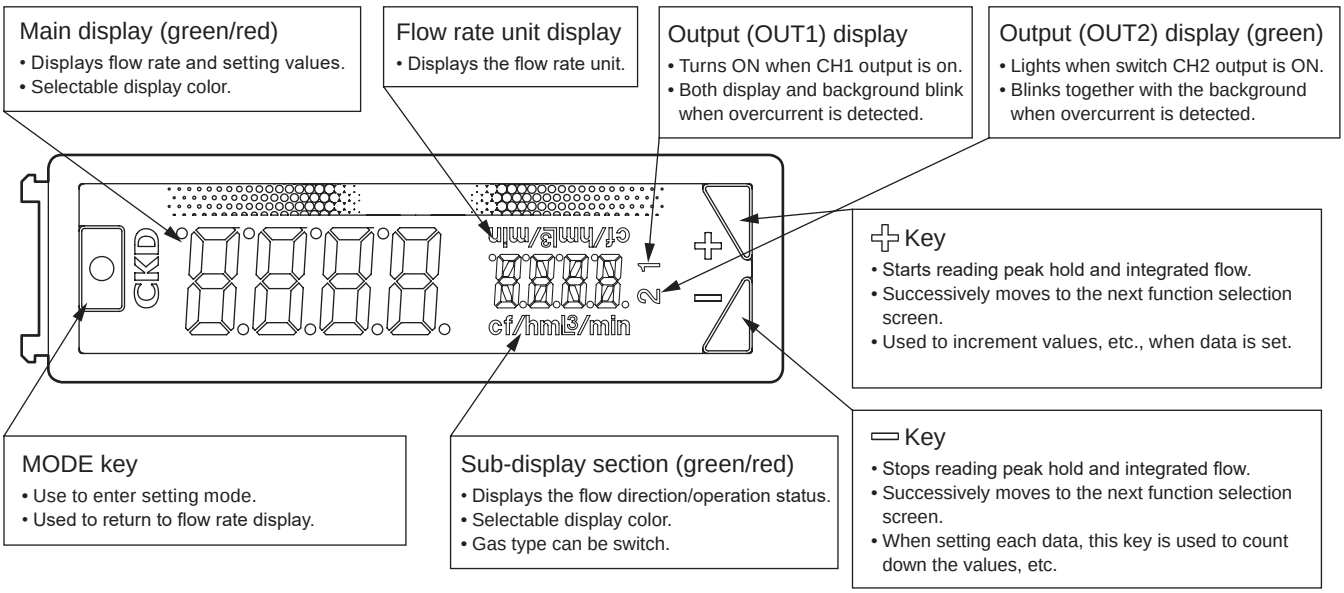
Names and functions of display/operation section (LCD display)

Names of display parts



Error code

Error code	Cause	Countermeasures
	The flow rate exceeds the flow rate display range.	Reduce the instantaneous flow rate value to within the flow rate range.
	Sensor has failed.	Confirm that the flow rate is within the flow rate range, and turn power ON again. If the error is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
	The flow rate is below the lower limit of the flow rate display range.	Increase the instantaneous flow rate value to within the flow rate range.
	Sensor has failed.	Confirm that the flow rate is within the flow rate range, and turn power ON again. If the error is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
	An error occurred during CPU processing.	Then turn power ON again. If the abnormality is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
	The zero adjustable range has been exceeded.	Make sure to set the flow rate to zero, and then perform the zero adjustment.
	An error occurred during EEPROM reading or writing operation.	Then turn power ON again. If the abnormality is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
	An error occurred during memory reading or writing.	Then turn power ON again. If the abnormality is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
	Sensor abnormality has occurred.	Then turn power ON again. If the abnormality is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
	Copying of settings failed.	Check connections and perform the operation again.
	Button operation is locked.	Release the lock before operating the buttons.
	A password is set.	Enter the set password. *Take care not to forget your password.
Blinking of output display (Switch output is not output)	The switch output's overcurrent protection circuit has operated.	Check whether load current exceeds the rating. Correctly connect, then turn the power ON again.

Names and functions of display/operation section (LCD display)

The functions and various settings are made during the normal flow rate display and during each mode.
Each mode is divided into a maintenance mode, SET mode and setting monitor mode according to the frequency of use.

● Normal operation (RUN mode)

Item	Explanation	Default setting
Instantaneous flow rate display	The instantaneous flow rate is displayed.	Display (measuring)
Peak hold function	Max. and min. values for the flow rate within a set interval are displayed.	Non-display (stopped)
CO_2 discharge display	By setting the power, discharge pressure, and flow rate of the compressor, as well as the power to CO2 conversion coefficient, you can learn how much CO2 is being discharged. (reference value obtained by calculation) This is available only when the gas type is set to air.	Non-display (stopped)
Integrating flow display	The integrated flow can be displayed. The switch output function includes a function to turn the switch ON/OFF at a level higher than the recommended cumulative value, and an integrated pulse function to output the pulse at a set cumulative value.	Non-display (measuring)

● SET Mode

No.	Item	Explanation	Default setting
F.01	Selection of CH1 operation	Select the CH1 setting. Switch output operation and integrated pulse can be set.	Without switch output
F.02	Selection of CH2 operation	Select the CH2 setting. Select whether to use CH2 as a switch output, or to use as an external input (integrated value reset/auto reference).	Without switch output
F.03	Integrating function settings	Whether to continuously acquire integrated flow values or set a time can be selected. Whether or not to hold that data also can be selected.	Continuous acquisition: Data hold OFF
F.04	Sub-screen display setting	Set the sub-display section's display method. The display can be switched to "flow direction", "reference state", "gas type", or "numbering display".	Flow direction
F.05	Display color setting	Set the display color. (red, green) The color for a normal display and for switch output ON can be set.	At normal: Green At switch ON: Red
F.06	Setting of flow rate direction (Bi-directional type)	Setting the flow rate direction. Setting available for bi-directional, one-side forward direction or one-side reverse direction.	Bi-direction
F.07	Display inversion function	The LCD display can be flipped vertically.	Standard display
F.08	Reference state setting	Whether to set standard state or reference state can be selected. Standard state (ANR): Converted into volumetric flow rate at 20°C, 1 barometric pressure, 65%RH (For gas types other than air: 20°C, 1 barometric pressure, 0% RH) Reference state (NOR): Converted into volumetric flow rate at 0°C, 1 barometric pressure, 0%RH	ANR
F.09	Unit setting (overseas models only)	The unit can be set. Can be selected from L/min and cf/h (cf/min).	Domestic model: L/min Overseas model: L/min
F.10	Display cycle setting	The digital display refresh cycle can be set in three stages from 0.25 sec to 1 sec. If the display flickers, it may be improved by setting a longer display refresh cycle.	0.25 sec
F.11	Analog output Setting response time	Set the response time. Analog output can be set in seven steps from 0.05 sec to approx. 1.50 sec. Chattering and mis-operation caused by sudden flow rate changes or noise are prevented.	0.05 sec
F.12	Numbering setting	Numbering can be set.	0000
F.13	Gas type switch	The measured gas can be switched. (Model with full scale flow rate of 200 L/min or below) (The gas type cannot be switched on an oxygen type.)	Air
F.14	Setting ECO mode	ECO mode can be set. If the buttons are not operated for approx. one minute, the ECO mode will activate and turn OFF the display's backlight. Current consumption can be reduced with this mode.	OFF
F.15	CO_2 discharge calculation setting	The CO_2 discharge calculation can be set. Set you compressor power, discharge pressure, flow rate, and CO_2 conversion coefficient.	• Power: 0.20 KW • Pressure : 0.10 MPa • Flow rate: 100 L/min • Conversion factor: 0.000 kg (CO_2) /kwh
F.16	Lock setting	The key lock and password methods can be set. Use these selectively depending on the working environment.	OFF
F.17	Peak hold setting	Whether to continuously acquire peak hold values or set a time can be selected. Whether or not to hold that data also can be selected.	Continuous acquisition: Data hold OFF

● Maintenance mode

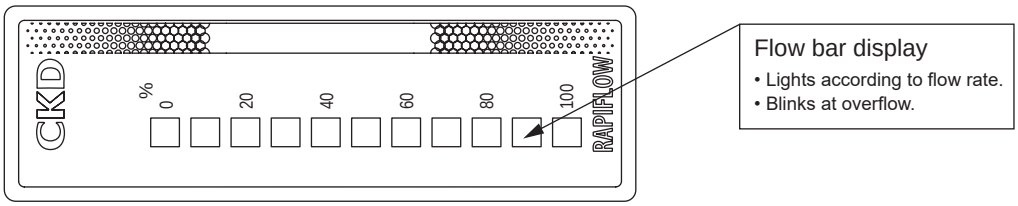
No.	Item	Explanation	Default setting
F.91	Forced output function	Use this function to forcibly turn the switch output ON and confirm the wiring connection or initial operation of the input device.	–
F.92	Zero adjustment	The zero point deviation is corrected.	Adjust value: 000
F.93	Setting copy function	Set values can be copied if the model supports copying between two FSM3's. (Copying is possible only between products with the same model No.)	–
F.99	Reset function	Returns settings to their default states.	–

● Setting monitor mode

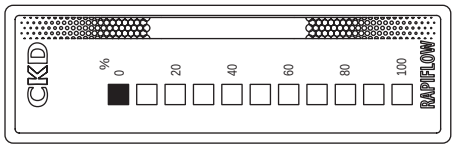
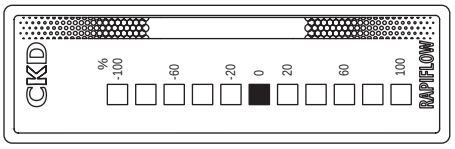
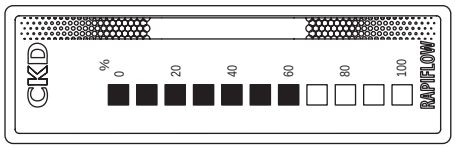
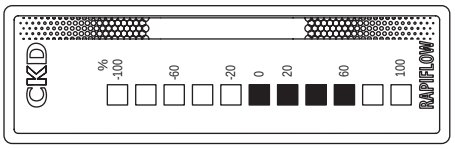
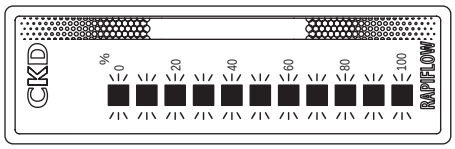
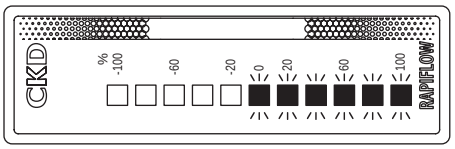
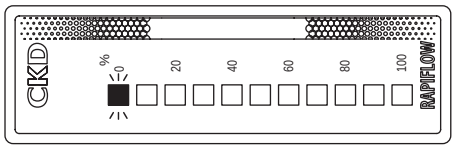
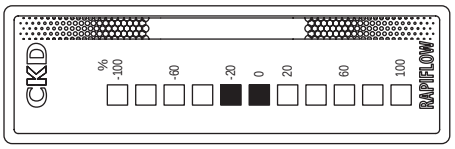
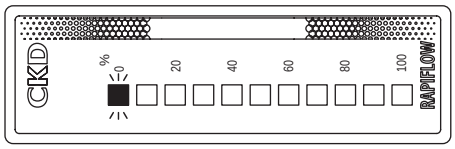
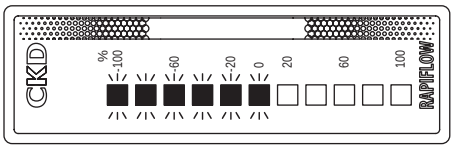
Item	Explanation	Default setting
Setting monitor function	Details set in the SET mode can be confirmed. (Setting details cannot be edited.)	–

Names and functions of display/operation section (bar display type)

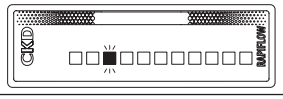
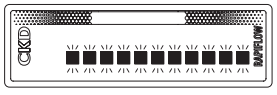
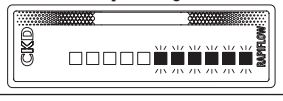
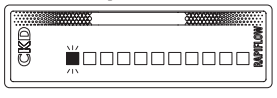
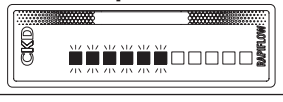
● Names of display parts



[Example] Display in the case of FSM3-B101□□□□□□□.

Flow rate	Uni-direction	Bi-directional
0%		
+60% (Forward direction)		
+110% (Forward direction) Blinks at overflow. *Blinks at +110% F.S. or more.		
−10% (Reverse direction)		
−110% (Reverse direction)		

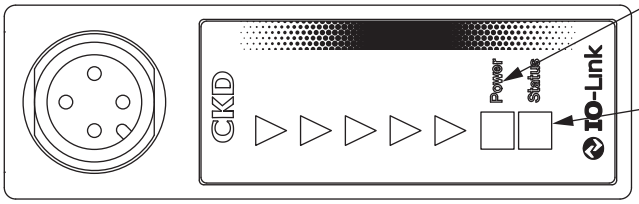
● Error code

Error code	Cause	Countermeasures
The third from left blinks 	An abnormality occurred during memory reading or writing.	Then turn power ON again. If the abnormality is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
[Uni-direction] All blink 	The flow rate exceeds the flow rate display range.	Reduce the instantaneous flow rate value to within the flow rate range.
[Bi-directional] The right half blinks 	Sensor failure	Confirm that the flow rate is within the flow rate range, and turn power ON again. If the error is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
[Uni-direction] The leftmost blinks 	The flow rate is below the lower limit of the flow rate display range.	Increase the instantaneous flow rate value to within the flow rate range.
[Bi-directional] The left half blinks 	Sensor failure	Confirm that the flow rate is within the flow rate range, and turn power ON again. If the error is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.

MEMO

Names and functions of display/operation section (IO-Link)

● IO-Link



Power lamp (green)
- Lights when power supply is ON.
- Blinks during IO-Link communication.

Status lamp (green, orange, red)
- Green ..... Lights when the flow rate is within the specified range.
- Orange .... On when the flow rate exceeds 100% F.S. and is 110% F.S. or below.
- Red..... On when the flow rate exceeds 110% F.S. Lights when an error occurs.

* The lamp turns off when the flow rate is under ±3% F.S.

● Communication specifications

Item	Details
Communication protocol	IO-Link
Communication protocol version	V1.1
Transmission bit rate	COM2 (38.4 kbps)
Port	Class A
Process data length (input)	4 bytes
Process data length (output)	0 byte
Min. cycle time	5 ms
Data storage	1 kbyte
SIO mode support	None

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Data name	MSB															LSB
	Instantaneous flow rate															
Data range	Refer to Table 1															
Format	Integer 16															

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Data name	Error	WARNING	-	-	-	-	Switch output		Vacant							
							2	1								
Data range	True/False															
Format	Boolean															

Data range (Table 1)

			005	010	020	050	100	200	500	101	201	501	102
Data range (□/min)	[B]	U	−50 to 550 mL	−100 to 1100 mL	−0.20 to 2.20 L	−0.50 to 5.50 L	−1.00 to 11.00 L	−2.0 to 22.0 L	−5.0 to 55.0 L	−10.0 to 110.0 L	−20 to 220 L	−50 to 550 L	−100 to 1100 L
		B	−550 to 550 mL	−1100 to 1100 mL	−2.20 to 2.20 L	−5.50 to 5.50 L	−11.00 to 11.00 L	−22.0 to 22.0 L	−55.0 to 55.0 L	−110.0 to 110.0 L	−220 to 220 L	−550 to 550 L	−1100 to 1100 L

* The data range changes when CO_2 is set as the gas type. Refer to page 38.
* Download the IO-Link configuration files (IODD) from the CKD website (https://www.ckd.co.jp/en/).

● Explanation of functions (IO-Link)

Item	Explanation	Default setting
Instantaneous flow rate display	The instantaneous flow rate is displayed.	–
Integrating flow display	Displays the integrating flow counted after indicating to start logging.	Stop
Instantaneous flow rate peak value display (Peak hold function)	Displays the maximum and minimum instantaneous flow rate values during the period between indicating to start logging and stop logging.	Stop
Error display	Displays the error details.	–
Warning display (WARNING)	Displays the warning details.	–
Power ON time display	Displays the total power ON time from the start of use. This time is not reset even if the power turns OFF. (Also not reset when using the reset setting)	–
Operation for switch output function	The switch output operation function can be set. This function can be used to monitor whether the flow rate is within the set range or monitor whether it exceeds the set flow rate.	Not set
Flow rate standard setting	The flow rate standard can be selected. Standard condition (ANR): Converted into volumetric flow rate at 20°C, 1 barometric pressure, 65% RH (For gas types other than air: 20°C, 1 barometric pressure, 0% RH) Standard condition (NOR): Converted into volumetric flow rate at 0°C, 1 barometric pressure, 0% RH	ANR
Gas type switch	The measured gas can be switched. (Model with full scale flow rate of 200 L/min or below. The gas type cannot be switched on an oxygen type)	Air
Change travel average (Setting response time)	The travel average when measuring can be set. The average can be set in seven steps from 50 msec to 1500 msec. Chattering and mis-operation caused by sudden flow rate changes or noise are prevented.	50msec
Lock setting	Parameter Lock can be set, which disables changing the parameters of the unit. Data Storage Lock can be set, which prohibits uploading and downloading set values to the master. (Parameter Lock and Data Storage Lock and be set simultaneously)	Not set
Zero adjustment	The zero point deviation is compensated. (within ±10% F.S.)	Not set
Data storage function	Uploading set values to the master and downloading set values from the master are possible. (Can be copied by the same model No.)	–
Reset function	Returns the settings to the factory settings. (Cannot reset while Parameter Lock is enabled)	–
Unit identification function	The model No., serial No. or other unit-unique information can be confirmed on the network.	–