I S O - 9 0 0 1

USER MANUAL

50mm Compact Hybrid Recorder

KRN50

Recorder & data logger in one

Major Feature

- 50mm direct thermal printing type recorders
- Excellent display and convenient setting by adopting of LCD dot matrix
- Data logger function
- 0.2% high accuracy multi input (RTD, TC, Analog)
- Recording 2 channels for graphic mode and digital mode
- A wide variety of I/O functions
- Compact design and light weight
- RS485 communication output (Modbus RTU protocol)

KONICS Co.,Ltd.

www.konics.com

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1. Introduction

Thank you very much for purchasing KONICS recorder KRN50.
This user manual introduces overall operation of recorder.
Please read this user manual for proper use before using this unit.

(E-Manual)
User is able to download from Konics web site (http://www.konics.com).

Notes

- This user manual may be changed without prior notice in order to improve the performance and function.
- We make an effort for the perfect user manual however nevertheless if you have any questions or need to modify anything, please do not hesitate to contact our headquarter as mentioned at the last page of this manual.

Revision.
1st Edition June. 1, 2009

2. Caution for safety

※ Please keep these instructions and review them before using this unit.
※ Please observe the following for safety.

⚠ **Warning**	Serious injury may result if instructions are not followed.
⚠ **Caution**	Product may be damaged, or injury may result if instructions are not followed.

※ The following is an explanation of the symbols used in the operation manual.

⚠ Injury or danger may occur under special conditions.

⚠ Warning

1. In case of using this unit with machinery (Nuclear power control, medical equipment, vehicle, train, airplane, combustion apparatus, entertainment or safety device etc), it is required to install fail-safe device.
   - It may cause serious damage, fire or human injury.
2. It must be mounted on panel.
   - It may give an electric shock.
3. Do not repair or check units during power on.
   - It may give an electric shock.
4. Please check the number of terminal before connecting a power line or measuring input.
   - It may cause a fire.
5. Do not disassemble or burn up because lithium battery is used for memory protection.
   - It may cause a explosion.
6. Do not touch terminals until 30 sec later after power off.
   - It may give an electric shock.

7. Please ground with F.G terminal only and ground wire should be over than AWG No.16(1.25㎟).
   - It may give an electric shock.
8. Do not put finger or any object into this product.
   - It may give an electric shock.
9. Do not disassemble and modify this unit, when it is required, please contact us. It may cause serious damage, fire or human injury.
   - It may cause serious damage, fire or human injury.

3. Caution for using

⚠ Caution

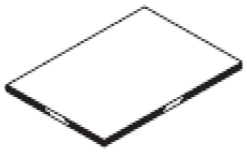
1. This unit shall not be used outdoors.
   - It may shorten the life cycle of the product or give an electric shock.
2. When connecting cable, No.20AWG(0.5㎟) should be used and screw bolt on terminal block with 0.74N.m to 0.90N.m strength.
   - It may cause malfunction or fire due to contact failure.
3. Please observe the rated specification.
   - It may shorten the life cycle of the product and cause a fire.
4. Do not use the load beyond rated switching capacity of relay contact.
   - It may cause insulation failure, contact melt, contact failure, relay broken etc.
5. Please mount the surge absorber to the coil if magnet contact is connected by relay contact output load.
   - It may cause malfunction.
6. In cleaning the unit, do not use water or an oil-based detergent.
   - It may cause an electric shock or a fire.
7. Do not use this unit in place where there are flammable or explosive gas, humidity, direct ray the sun, radiant heat, vibration, impact etc.
   - It may cause a fire or explosion.
8. Do not inflow dust or wire dregs into the unit.
   - It may cause a fire or mechanical problem.
9. Please wire properly after checking polarity of power.
   - It may cause a fire or explosion.
10. Please check the polarity or power before connecting temp. sensor.
    - It may cause malfunction.
11. Please check the connection before power on.
    - It may cause a fire.
12. Do not touch the terminal when testing pressure or insulation resistance.
    - It may cause an electric shock.
13. Please use insulation trans or noise filter if noise is large from power. Noise filter must be mounted to grounded panel etc. and wiring between noise filter output and power terminal should be short.
    - It may cause damage to product or malfunction by surge.

4. Product package

4.1 Accessory

– Please check accessories as follows after opening box.
If accessories have any damages or they are not in the box, please contact sales office.

Mounting Bracket
2EA



Manual
1EA

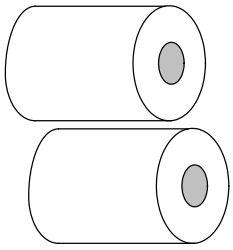
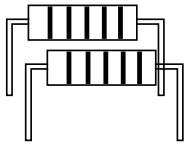


Chart paper
2EA



50Ω B class high-accuracy resistor(0.1%)
2EA

[Figure 4-1 Product package]

4.2 Ordering codes

KRN50	–	2	0	0	4	–	4	0
①		②	③	④	⑤		⑥	⑦

① Item/Series	KRN50	KONICS Thermal Line Recorder(50mm)
② The number of channel	1	1 Channel
	2	2 Channel
③ Ch1 Control output	0	None
④ Ch2 Control output	0	None
⑤ Alarm output	0	None
	2	Alarm output 2 EA ※1
	4	Alarm output 4 EA ※2
⑥ Option output	0	None
	4	Communication output (RS485)
⑦ Power supply	0	85 ~ 264VAC, 47 ~ 63Hz

		85 ~ 264VAC, 47 ~ 63Hz	
		None	Communication output (RS485)
1 Channel	Alarm 0 EA	KRN50-1000-00	KRN50-1000-40
	Alarm 2 EA	KRN50-1002-00	KRN50-1002-40
2 Channel	Alarm 0 EA	KRN50-2000-00	KRN50-2000-40
	Alarm 2 EA	KRN50-2002-00	KRN50-2002-40
	Alarm 4 EA	KRN50-2004-00	KRN50-2004-40

※1. In case of selection of 2 channel model, it is able to use 2 alarm outputs by means of alarm output of CH1. Therefore it is not possible that Ch1 has 1 alarm and Ch2 has 1 alarm separately.

※2. It is able to be selected in case of only 2 channel model.

5. Explanation for function and name of parts

5.1 Function

KRN50 recorder is able to measure Thermocouple, RTD, DC-voltage (1V,10V,50mV,200mV) DC-current(0~20mA,4~20mA) signal by total 2 input channels. Measured signal records by digital and graph type through setting a variety of recording speed.

Alarm

: Input 1 channel can have 2 alarm outputs. Alarm output is operating by a kinds of modes (None, Latch, Stand-by, Latch+Stand-by) through High limit, Low limit, Sensor break, Paper end function.
Alarm outputs by relay contact.

Recording

: Measured signal records by digital and graph type. Recording speed is able to set by 5sec~99min 59sec in case of digital mode (Numerical record) and by 10~960mm/h in case of graph mode. It has memo function recording data at the necessary time and is able to output time, date, alarm information, error message, parameter list and so on.

Display

: Measured value is indicated by number on LCD display and time, alarm, error information, etc. are displayed.

Communication Function

: It is able to use RS-485 communication and communication protocol uses ModBus RTU and communicates with the upper devices, PC or PLC.

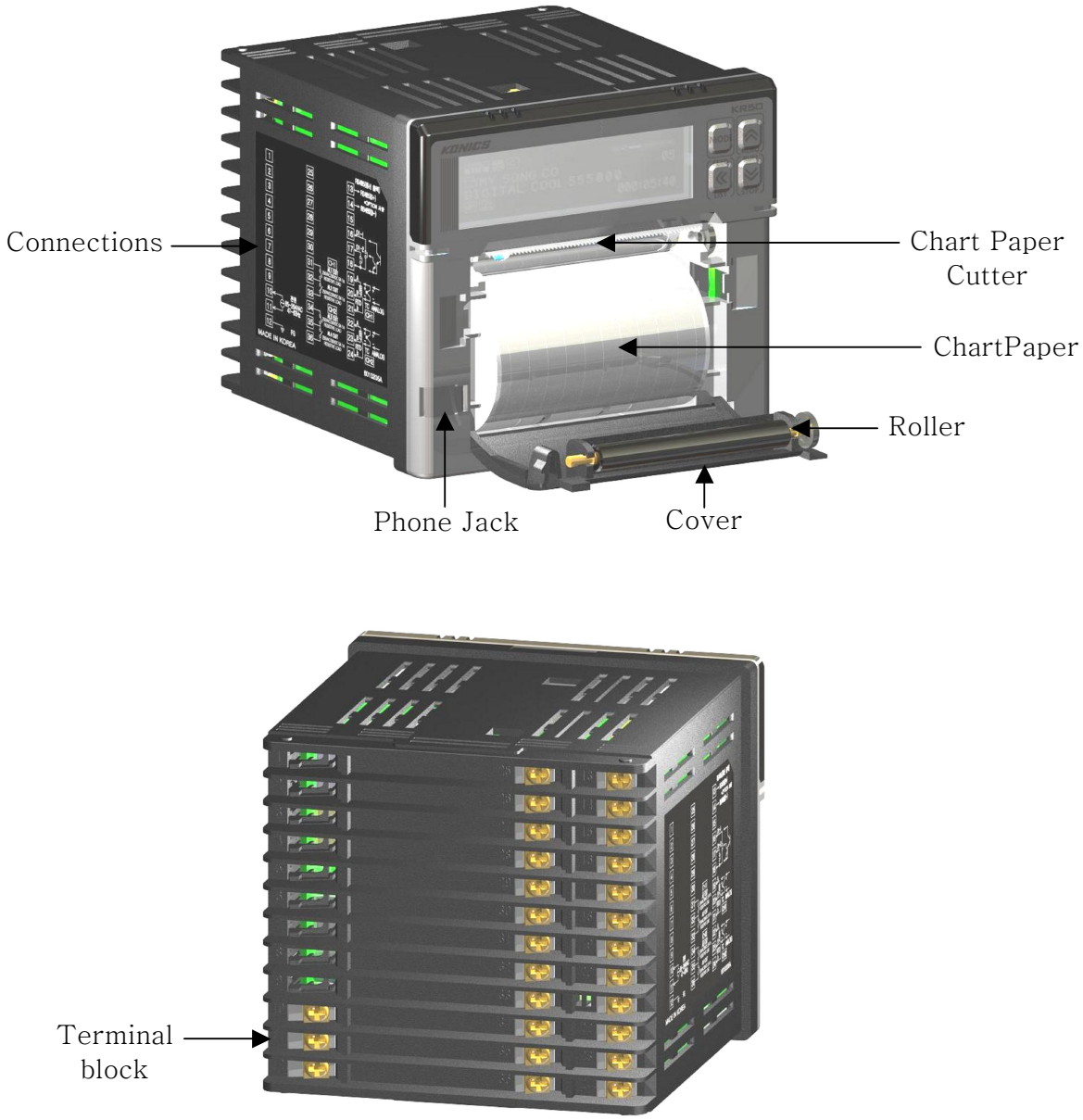
Data back-up

: It is similar to data logger function. In case of graph mode and 10mm/h recording speed, approx. 6-day-data is able to be saved in EEPROM memory. Therefore user can output the saved data from the memory by graph or digital type.
Also even though chart paper is exhausted all, data is able to be saved to the saving space according to recording speed.

Other function

: Feeding function and recording start/stop function are able to be used by front key or communication at the status of recording stop. Also recording reservation function is able to start or stop recording at the suitable time period user wants.

5.2 Part name



[Figure 5-1 Each part name]

5.3 Specifications

Series		KRN50 series
Model		KRN50-□00□-□0 (※ Refer to page no.6)
Power supply		85 ~ 264VAC 47/63Hz
Power consumption		Max. 34VA (264VAC 60Hz)
Display		LCD Dot Matrix Display (Resolution 128 X 32 Dot)
Input	RTD	JPT100Ω, DPT100Ω, DPT50Ω, CU100Ω, CU50Ω, Supplying current 420uA
	T/C	K, J, E, T, B, R, S, N, C, G, L, U, PLII
	Analog	・Voltage:-50.0~50.0mV, -199.0~200.0mV, -1.000~1.000V, -1.00~10.00V ・Current:0.00~20.00mA, 4.00~20.00mA ※ B class (0.1%) 50Ω high-accuracy resistor outside must be connected in case of current input
Event input	Contact input	Input ON: Max. 1kΩ OFF: Min. 100kΩ
	Non-contact input	Input ON: Remaining voltage Max. 1V OFF: Leakage current Max. 0.05mA
		Short circuit : Approx. 0.3mA
Indicating accuracy	RTD	±0.2% F.S. ±1 Digit(25±5℃), ±0.3% F.S. ±1 Digit(0~20℃,30~50℃), But, under -100℃ in T/C, ±0.4% F.S. ±1 Digit (In case of TC-K2, it has same accuracy with -200~1350℃ range at the basis of TC-K1) (※ Exception section of measuring accuracy for each sensor is as follows)
	T/C	
	Analog	
Recording accuracy		F.S.±0.5%
Alarm output		Relay contacting point capacity 250VAC/30VDC 3A 1a(Resistive load)
Alarm hysteresis		Set ON/OFF interval : within 1 ~ 999 Digit
Communication output		RS485 communication output (MODBUS RTU protocol type)
Setting method		Set by key
Sampling cycle		500ms/channel X 2 channels = 1000ms
Internal voltage		2300VAC 50/60Hz for a minute (Rechargeable terminal of another polarity)
Internal vibration		0.75mm amplitude at frequency of 10~55Hz in each of X, Y, Z directions for 1 hour
Life of relay		Electrical Contact Rating 10 x 10^4 operations minimum
Isolation resistance		Min. 100MΩ (500VDC Mega STD.)
Internal noise		±2kV the square wave noise(Pulse width : 1us) by the noise simulator
Ambient temperature		0 ~ 50℃ (at non-freezing status)
Storage temperature		- 20 ~ 60℃ (at non-freezing status)
Ambient humidity		35 ~ 85% R.H.
Terminal bolt		M3 screw Type Terminal
Weight		Approx. 700g(Body 470g (Including chart paper), Metal parts for installation)
Dimensions		W96 x H96 x L100 mm
Print	Method	Direct Thermal Line Print
	Limit of resolution	8dot/mm
	Total dot number	384dot/Line
	Life	50km
Recording	Paper	Thermal Direct Receipt Paper(57mm x 16m)
	Speed	10, 30, 60, 120, 240, 480, 960mm/hour
	Supplying paper type	Clamshell Type
	Language	Korean, English

※1. C(TT): Same temp.sensor as previous W5(TT) ※2. G(TT): Same temp.sensor as previous W(TT)

※3. Exceptional section of measuring accuracy for each sensor

J: -200≤T≤-100 ±2.7℃, R,S,C,G: 0≤T≤100 ±5.2℃

B: No accuracy regulation under 400℃ U,T: -200≤T≤-100 ±3.5℃ -100≤T≤400 ±2.5℃

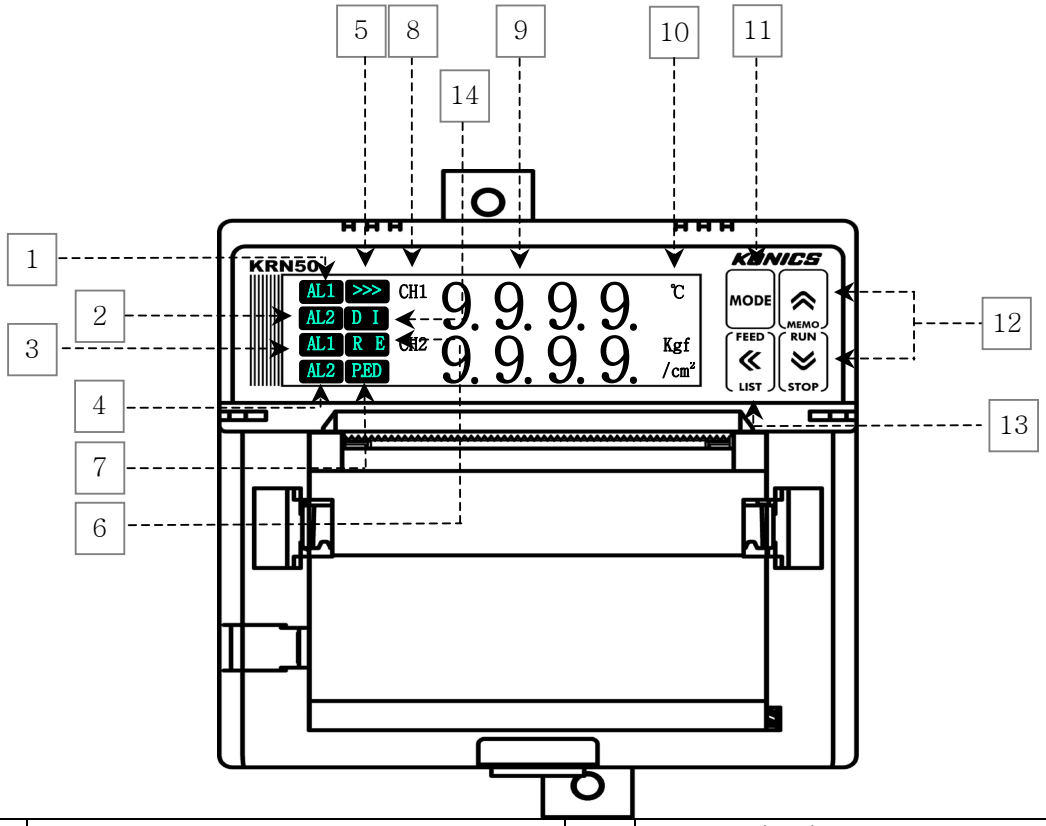
5.4 Input specifications and temp. range for sensor type

Input type				Display	Temp. range (℃)	Temp. range (℉)
Thermo Couple	K(CA) Chromel(+) Alunel(−)		1	TC−K1	−200 ~ 1350	−328 ~ 2462
			0.1	TC−K2	−199.9 ~ 999.9	−199.9 ~ 999.9
	J(IC) Iron(+) Constantan(−)		1	TC−J1	−200 ~ 800	−328 ~ 1472
			0.1	TC−J2	−199.9 ~ 800.0	−199.9 ~ 999.9
	E(CR) Chromel(+) Constantan(−)		1	TC−E1	−200 ~ 800	−328 ~ 1472
			0.1	TC−E2	−199.9 ~ 800.0	−199.9 ~ 999.9
	T(CC) Copper(+) Constantan(−)		1	TC−T1	−200 ~ 400	−328 ~ 752
			0.1	TC−T2	−199.9 ~ 400.0	−199.9 ~ 752.0
	B(PR) Platinum(30% Rhodium)(+) Platinum(15% Rhodium)(−)		1	TC− B	100 ~ 1800	212 ~ 3272
	R(PR) Platinum(13% Rhodium)(+) Platinum(−)		1	TC−R	0 ~ 1750	32 ~ 3182
	S(PR) Platinum(10% Rhodium)(+) Platinum(−)		1	TC−S	0 ~ 1750	32 ~ 3182
	N(NN) Ni−Cr−Si(+) Ni−Si−Mg(−)		1	TC−N	−200 ~ 1300	−328 ~ 2372
	C(TT) ※1 Tungsten(5% Rhodium)(+) Tungsten(26% Rhodium)(−)		1	TC−C	0 ~ 2300	32 ~ 4172
	G(TT) ※2		1	TC−G	0 ~ 2300	32 ~ 4172
	L(IC) Iron(+) Constantan(−)		1	TC−L1	−200 ~ 900	−328 ~ 1652
			0.1	TC−L2	−199.9 ~ 900.0	−199.9 ~ 999.9
	U(CC) Copper(+) Constantan(−)		1	TC−U1	−200 ~ 400	−328 ~ 752
			0.1	TC−U2	−199.9 ~ 400.0	−199.9 ~ 752.0
	Platinel II		1	TC−P	0 ~ 1390	32 ~ 2534
RTD	CU 50Ω		0.1	CU50	−199.9 ~ 200.0	−199.9 ~ 392.0
	CU 100Ω		0.1	CU100	−199.9 ~ 200.0	−199.9 ~ 392.0
	JIS	JPt 100Ω (3916)	1	JPT1	−200 ~ 600	−328 ~ 1112
		JPt 100Ω	0.1	JPT2	−199.9 ~ 600.0	−199.9 ~ 999.9
	DIN	DPt 50Ω	0.1	DPT50	−199.9 ~ 600.0	−199.9 ~ 999.9
		DPt 100Ω (385)	1	DPT1	−200 ~ 600	−328 ~ 1112
		DPt 100Ω	0.1	DPT2	−199.9 ~ 600.0	−199.9 ~ 999.9
Analog	Voltage	−50.0~50.0mV		50mV	−1999 ~ 9999 (Display range is different according to the decimal point.)	−1999 ~ 9999 (Display range is different according to the decimal point.)
		199.9~200.0mV		200mV		
		−1.000~1.000V		1V		
		−1.00~10.00V		10V		
	Current	0~20mA		0−20		
		4~20mA		4−20		

※1. C(TT) : Same temp.sensor as previous W5(TT)

※2. G(TT) : Same temp.sensor as previous W(TT)

5.5 Front display and setting key



1	CH 1-AL1 alarm output indicating lamp	8	Channel(CH) display
2	CH 1-AL2 alarm output indicating lamp	9	Processing value(PV) display
3	CH 2-AL1 alarm output indicating lamp	10	Unit display
4	CH 2-AL2 alarm output indicating lamp	11	Mode key
5	Recording start(>>>)/Recording stop(■) indicating lamp	12	Up/Down control and special function key
6	Recording reservation(RE) indicating lamp	13	Shift and special function key
7	Recording paper end(P.ED) indicating lamp	14	Digital input display

1) CH 1-AL1 alarm output indicating lamp : When AL1 of input channel 1 is on, indicated.
2) CH 1-AL2 alarm output indicating lamp : When AL2 of input channel 1 is on, indicated.
3) CH 2-AL1 alarm output indicating lamp : When AL1 of input channel 2 is on, indicated.
4) CH 2-AL2 alarm output indicating lamp : When AL2 of input channel 2 is on, indicated.
5) Recording start(>>>)/Recording stop(■) indicating lamp
   : When recording start (RUN), >>> is indicated,
   when recording stop (STOP), ■ is indicated.
6) Recording reservation(RE) indicating lamp
   : When recording reservation operates, RE is indicated.
7) Recording paper status(P.ED) indicating lamp
   : During recording (RUN), if chart paper is exhausted all, P.ED is indicated.
8) Channel(CH) display : Input channel number of processing value on PV display is indicated.
9) Processing value(PV) display
   : When RUN mode, processing value for relevant channel is indicated.
   When setting mode, parameter and mode setting value are indicated.

10) Unit display : Unit of relevant channel is indicated.
11) Mode key : Use it when entering into setting mode and changing SV of mode.
12) Up/Down control key
: Use it when moving parameter and increasing/decreasing digit value.
- ∧ Key : Digital memo operating key
- ∨ Key : Recording Run/Stop operating key

13) Shift key
: Use it when moving parameter to upper group or moving digit on setting mode.
- ≪ key : When STOP mode, it is used for paper feeding.
When RUN mode, it is used for printing parameter setting information.

14) Digital input display : The setting digital input function is indicated.

6. Mounting and wiring

6.1 Mounting

6.1.1 Mounting location

This recorder must be mounted at the satisfied location as following condition.

- Instrument Panel
This recorder is panel mounting type.
- Airy location
This recorder must be mounted in order to prevent from overheating (Using temp. range : 0~50℃) and follows the panel cut-out if mounting some recorders together.
- Minimum vibrating location
This recorder must be mounted at the minimum vibrating location where mechanism is not be influenced (Device related with print).

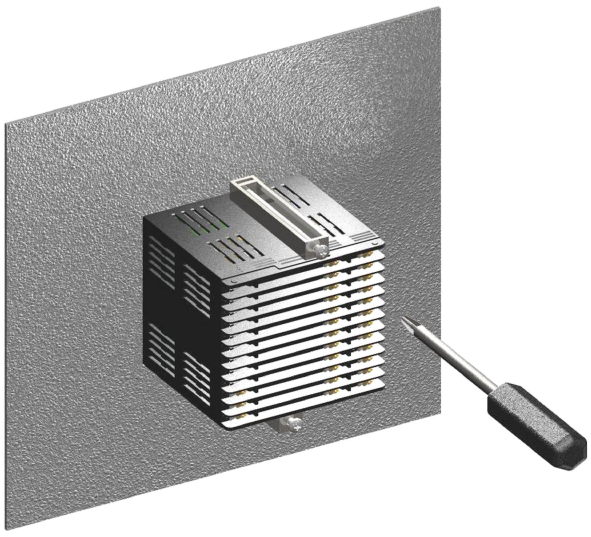
NOTE

- **If mounting at the location having sharply fluctuating temp. and measuring temp. by thermocouple sensor, measured data may cause an accidental error. Also if preheating to ambient temp. for over 30 min. before using, measured data will be precise.**
- **Chart paper may discolor if using the location having sharply fluctuating temp. and humidity.**

6.1.2 Panel mounting

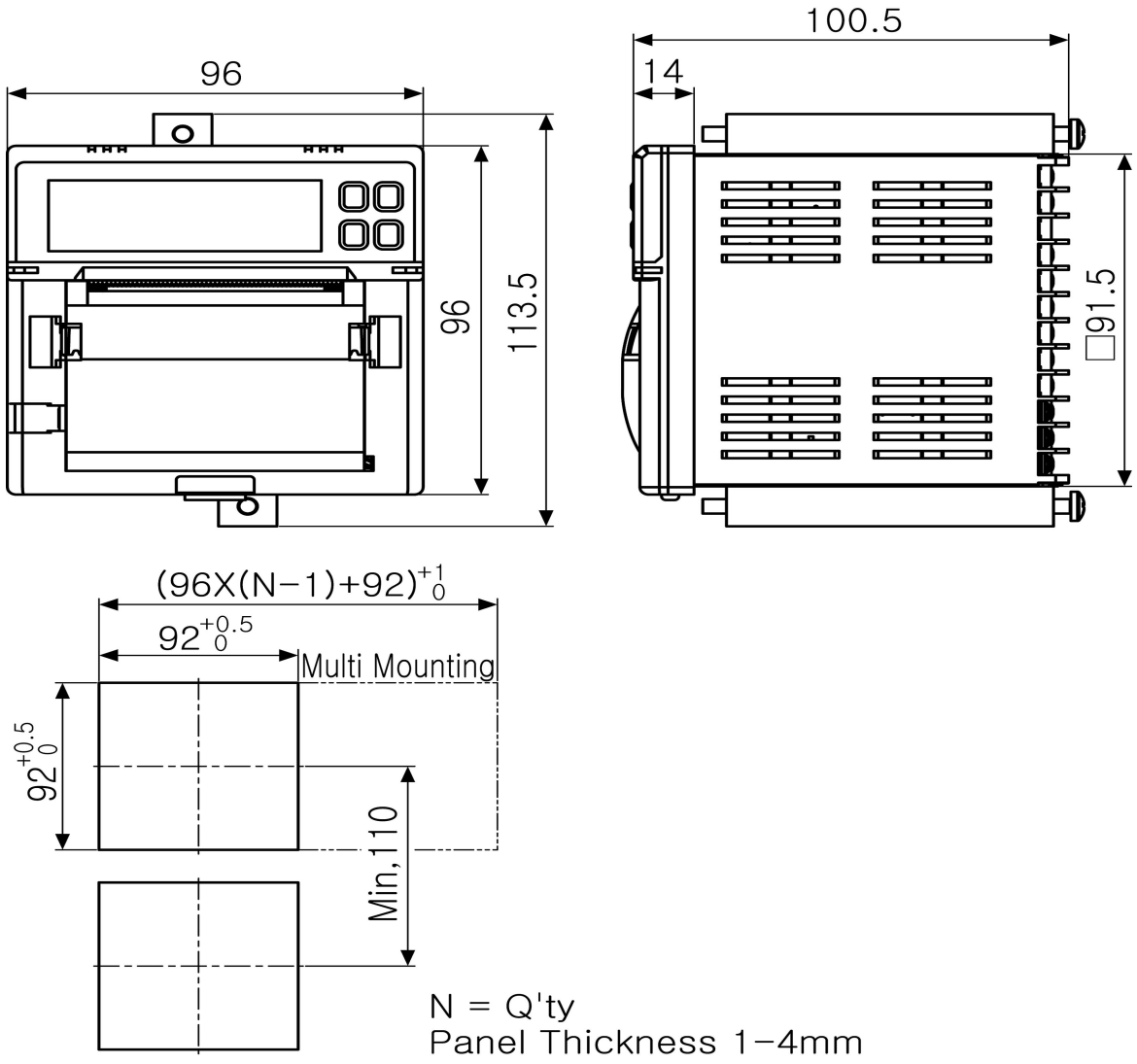
This recorder must be mounted to the panel of max. 4mm thickness.

1. Insert recorder to the panel.
2. Insert 2 fixed brackets to each bracket slots and fix them by approx. 0.3 N.m.



[Figure 6-1 Panel mounting]

6.1.3 Dimensions and panel cut-out



[Figure 6-2 Dimensions and panel cut-out]

6.2 Wiring

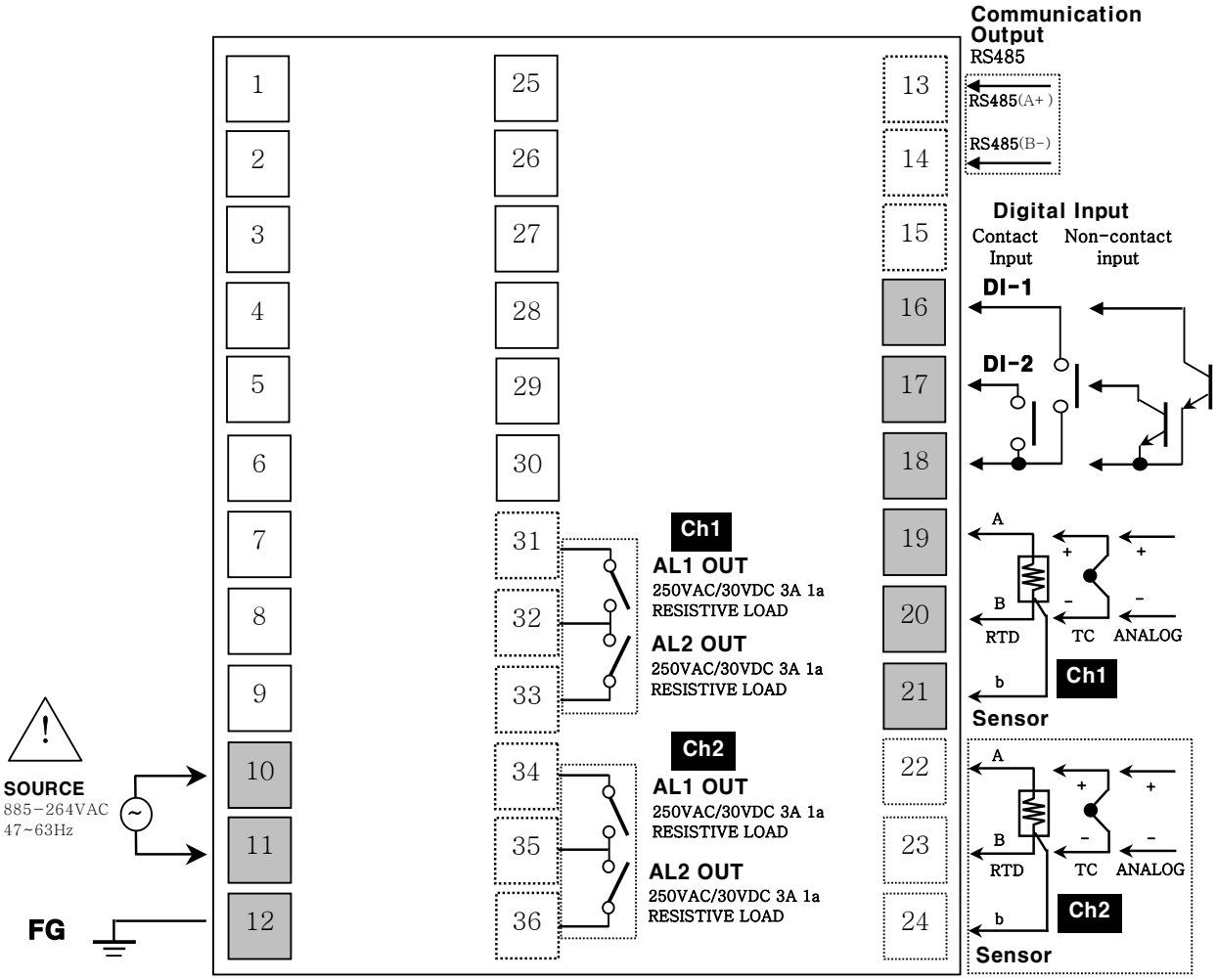
⚠ Warning

- Please connect wiring after power off in order to prevent from an electric shock.
- Please check input specifications in order to prevent from any damages.

NOTE

- If using only 1 channel in case of 2 channel model, please short-circuit the input channel (+,- input) not used in order to prevent from noise influence.
- If cable connected with recorder has strong power, it may cause damage to recorder or terminal block.

- Please be care of wiring as follows in order to prevent from noise.
  1. Input must be installed as far as possible from power line.
  2. Terminal wiring must be divided from high-voltage and high-current power line in order to prevent from electricity failure and self-induction noise. Also please avoid parallel wiring or same wiring with power line. It may be effective if dividing by means of pipe or duct or using shield cable or twist-pair cable.
  3. Same compensating wire must be used for precise measurement when thermocouple lead wire need to extend.
     If not, it may cause an accidental error.
     When RTD lead wire need to extend, please use it with small resistance value and be equal for resistive value to 3 lead wires.



[Figure 6-3 Connections]

※ Shaded terminals are in case of basic/standard model.
(For power supply, CH1 input, DI input)

※ Dotted-line terminals are in case of option model.
(For input, alarm output, communication output)

NOTE

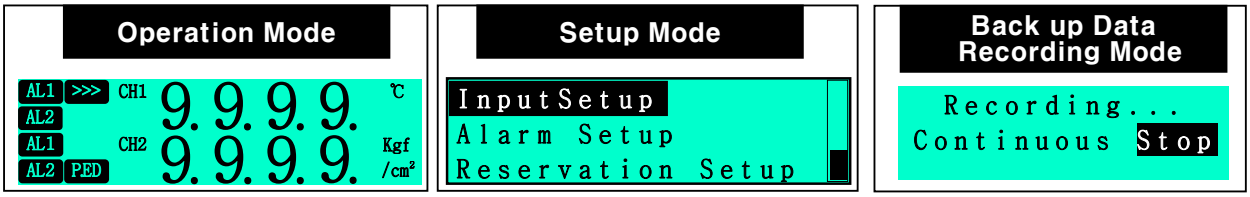
1. If using 2-wire RTD, please be short-circuit B, b terminals.
2. In case of current input, external 50Ω B class(0.1%) high-accuracy resistor must be connected.

7. General operation and parameter setting menu

7.1 Operation mode

Recorder has 3 kinds of operation modes.

- Common operation mode
  This mode operates when normal operation.
  This mode operates when power on.
- Setting mode
  This mode is to set the parameters as like input range, alarm, recording speed, etc. This mode is able to set even if operation does not stop on common operation mode.
- Backup data recording mode
  This mode is to record the saved data by means of data logger function. It is also unnecessary for operation stop.



[Figure 7-1 Display for each mode]

7.2 Operation procedure

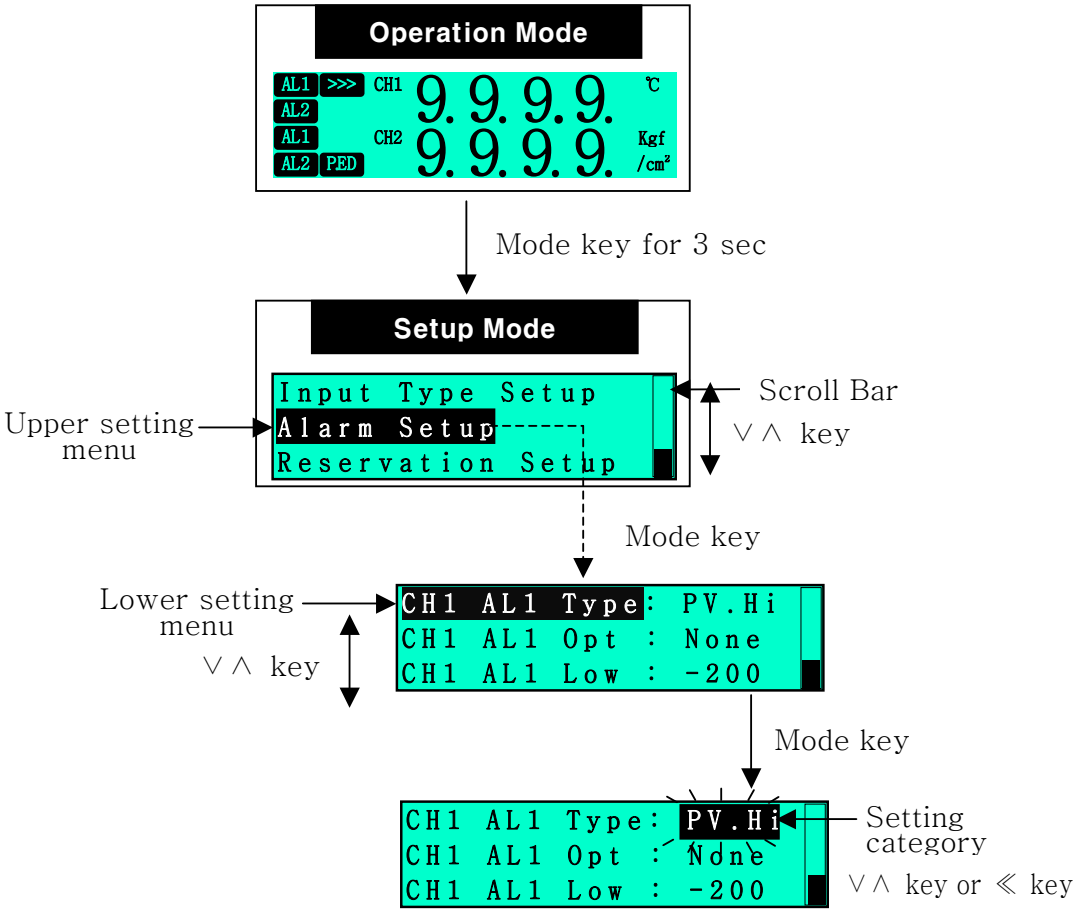
It is the introduction when this recorder operates initially.

- Ready to record
  Put chart paper in paper holder after cutting the glued part (When delivery, chart paper is installed in recorder). If necessary, change time and date (When delivery, they are set).
- Set input and relevant parameter
  Set relevant parameter according to input sensor.
  ・Set input type and alarm
  ・Set recording speed
- Record and display measuring value
  ・If necessary, press down key for recording Run / Stop.
  Also mode is able to be changed by measuring value display mode relevant key.

7.3 Setting key

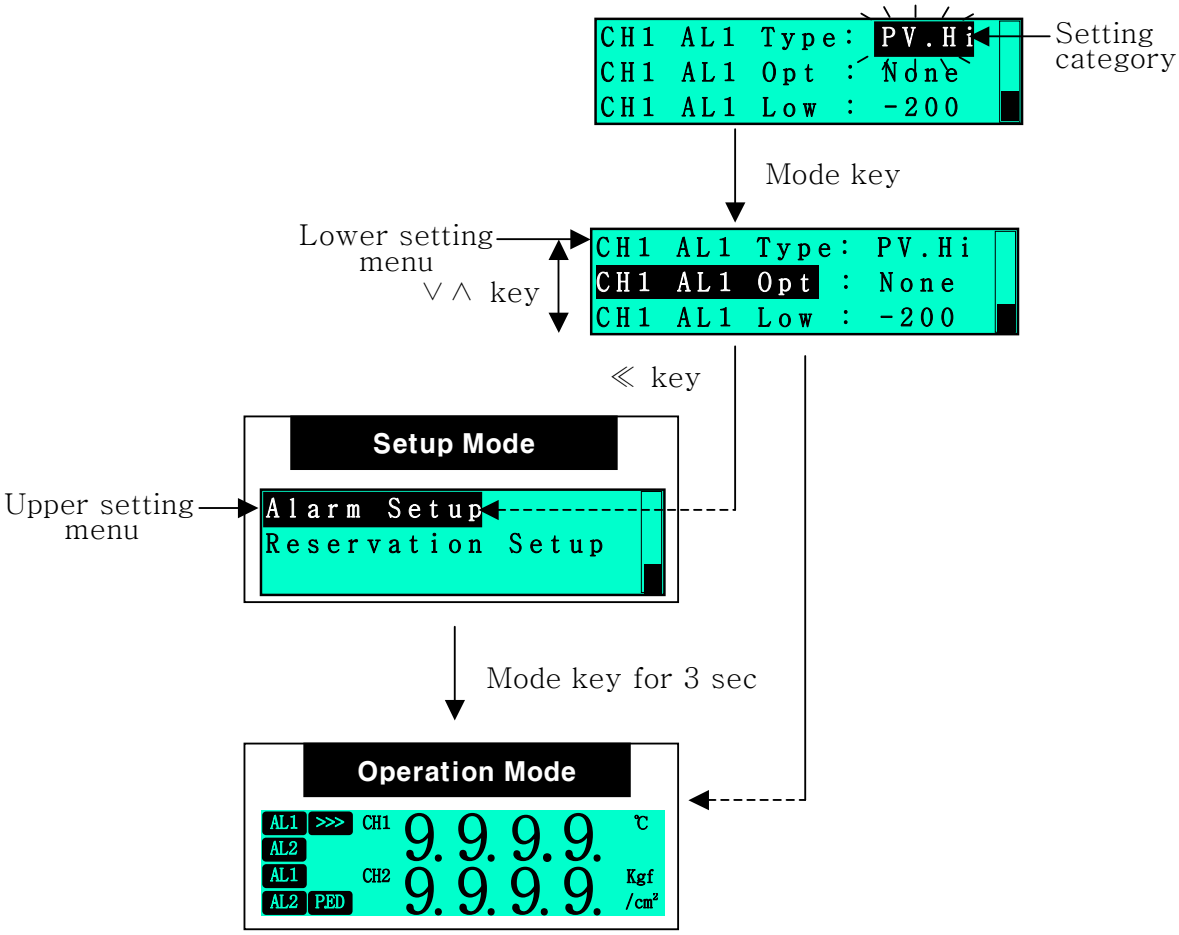
- Enter into the setting mode
  1. If press mode key for 3 sec, it enters into setting mode. After then the upper setting menu refer to figure 7-2 is indicating and the cursor is placed on relevant the upper setting menu. Scroll bar at the right side shows the rest of the setting menu.
  2. If moving from the upper setting menu to the next step menu, please use ∨,∧ key.
  3. If press mode key, it is able to move from the current menu to the lower setting menu. (For moving from the lower setting menu to the upper setting menu, please use ≪ key.)

4. If moving from the lower setting menu to the next step menu, please use ∨,∧ key.
5. If entering into the setting category at the lower setting menu, the cursor is flickering on the setting category. Then, user is able to change the setting category by means of ≪ or ∨,∧ key.

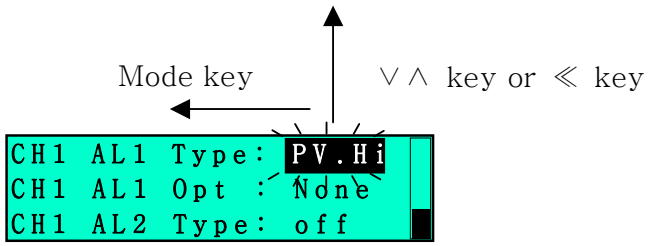


[Figure 7-2 Setting mode entrance display]

- Get out of the setting mode
  1. If press mode key after changing the setting category, setting value is saved and moving to the next lower setting menu.
  2. The lower setting menu is able to be selected by ∨,∧ key and if press ≪ key, moving to the upper setting menu.
  3. If press mode key for 3 sec when the cursor is placed at the lower setting menu, it is able to move to the setting mode from general operation mode and operate according to setting value.

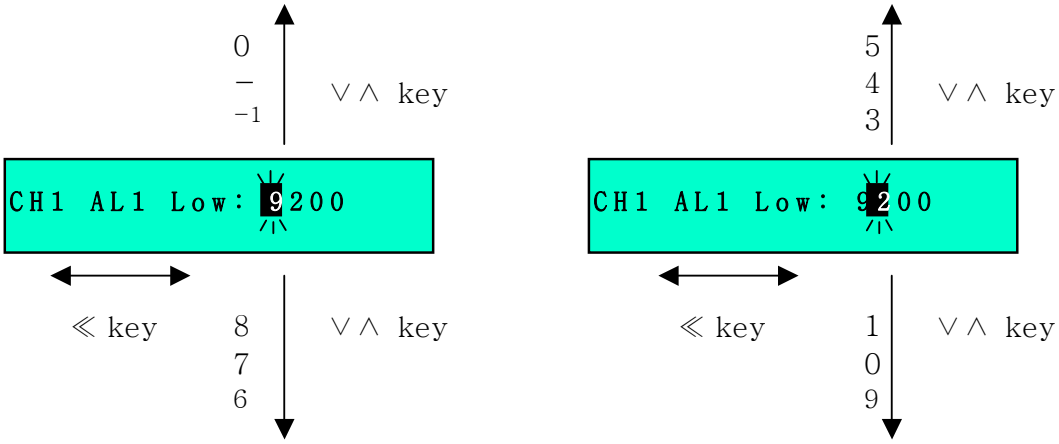


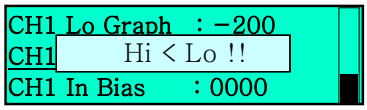
– Change the setting category
If press mode key after changing the setting category by ∨,∧ key, it is saved and moved to the setting menu.



– Insert setting value

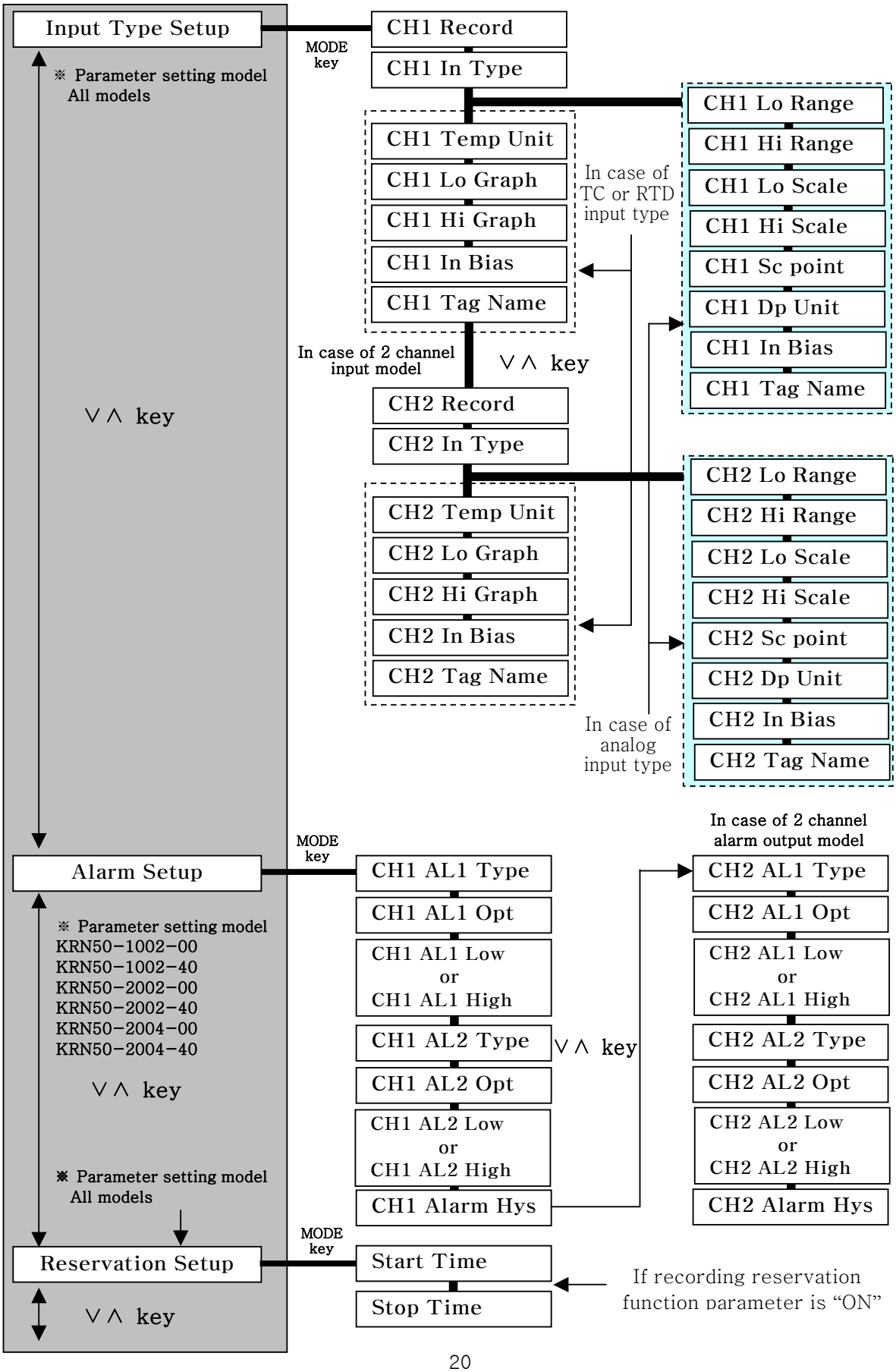
After moving the cursor to the position user wants to the left by ≪ key, it is able to change the value by ∨,∧ key. Especially the fourth position of number is able to change to either number or sign.

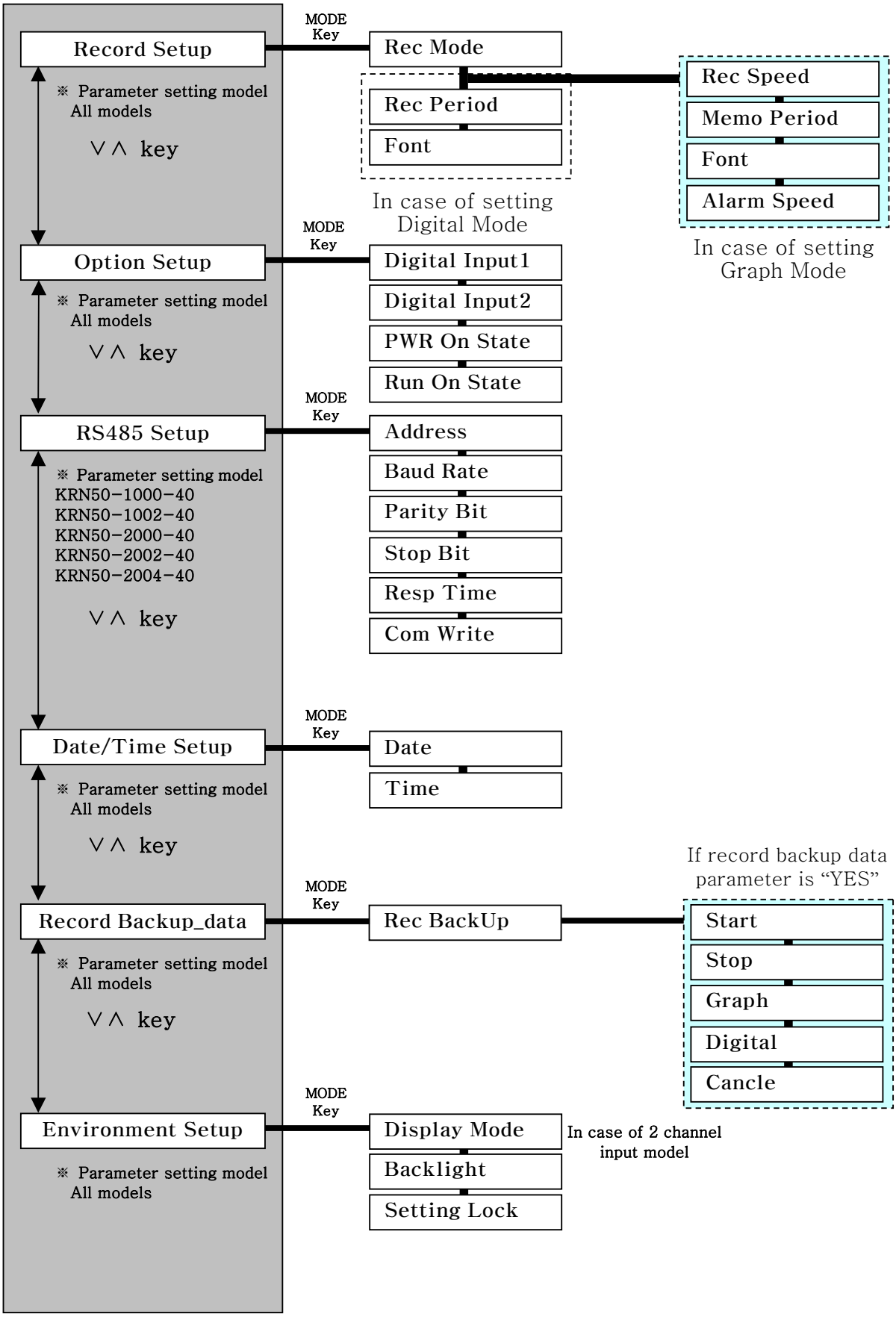




If press mode key at the status of wrong value and save it when changing setting value, it indicates Error code as above.
(Error code is referred to page no.54)

7.4 Parameter setting group




Record Setup
※ Parameter setting model
All models
∨∧ key
Option Setup
※ Parameter setting model
All models
∨∧ key
RS485 Setup
※ Parameter setting model
KRN50-1000-40
KRN50-1002-40
KRN50-2000-40
KRN50-2002-40
KRN50-2004-40
∨∧ key
Date/Time Setup
※ Parameter setting model
All models
∨∧ key
Record Backup_data
※ Parameter setting model
All models
∨∧ key
Environment Setup
※ Parameter setting model
All models
MODE Key
Rec Mode
Rec Period
Font
In case of setting Digital Mode
Rec Speed
Memo Period
Font
Alarm Speed
In case of setting Graph Mode
Digital Input1
Digital Input2
PWR On State
Run On State
Address
Baud Rate
Parity Bit
Stop Bit
Resp Time
Com Write
Date
Time
If record backup data parameter is "YES"
Rec BackUp
Start
Stop
Graph
Digital
Cancle
Display Mode
Backlight
Setting Lock
In case of 2 channel input model

8. Recording preparation

8.1 Setting and checking date/time

- This function is to set date(Year, Month, Day) and time(Hour, Min., Sec.) of recorder.
- When using recorder at the first time, user must check setting time because recording time follows setting time.
- When entering into parameter mode according to previous setting time, the entry time is indicated.

8.1.1 Current date [Date]

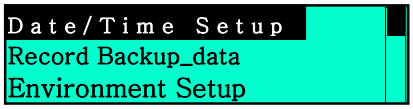
・Setting range : 00y01m01d ~ 99y12m31d(Unit :-)
・Day is set automatically.

8.1.2 Current time [Time]

・Setting range : 00:00:00 ~ 23:59:59

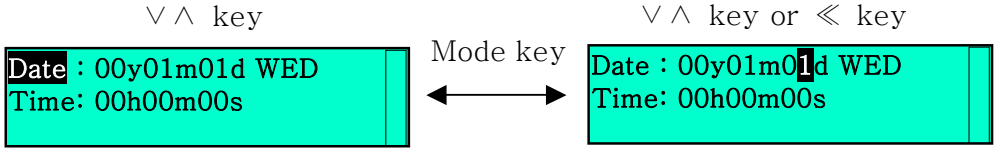
- Setting date and time

1. If press mode key for 3 sec, it enters into the upper setting menu.
2. If press mode key after selecting Date/Time Setup by ∨,∧ key, it enters into the lower setting menu from the upper setting menu.

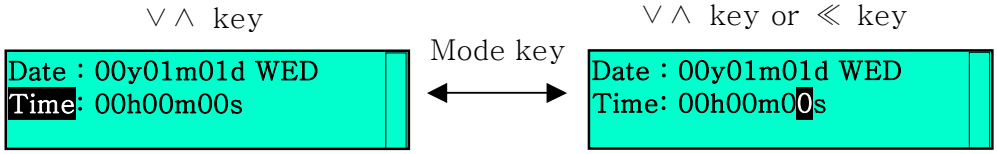


∨∧ key or Mode key

3. If press mode key after moving the cursor to Date by ∨,∧ key, it enters into the date setting category. Then if the cursor is flickering at the position for change, moving the cursor by ≪ key and setting the value by ∨,∧ key. After then if press mode key, setting value is saved. (Day is set automatically.)



4. Time setting method is same as no.3



9. Explanation for input function and setup

9.1 Input type setup

9.1.1 CH1,2 Record : ON, OFF [CH□ Record]

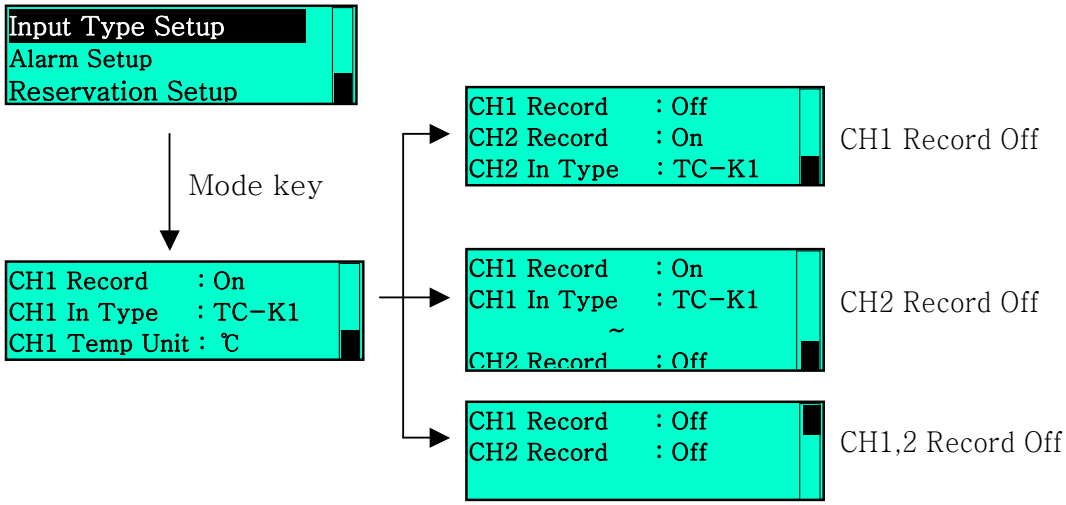
- For Ch1 and Ch2, this function is that user is able to select the channel to use for indicating PV on display and recording to chart paper.
- If using/recording the relevant channel, the mode of the relevant channel must be “On” however if not, it must be “Off”.

- If the mode of any channel is “Off”, this channel is not able to indicate channel indication and PV on display and to record anything.
- If the mode of any channel is “Off”, relevant input setting parameter of this channel is not indicated automatically.

NOTE

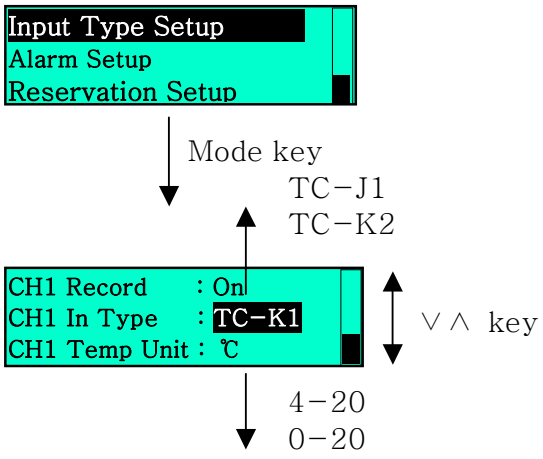
Regarding saved data by record backup, if CH1,2 Record : ON, OFF function is changed, previous record backup data is removed and start saving the data from the current modified time.
Therefore please be careful for setup.

- Setting range : On (Recording) / Off (Not Recording)
- Factory default : Off (Unit : -)



9.1.2 Input specifications and range [CH□ In Type]

- This recorder has multi input type and user voluntarily is able to select each input type for CH1 and CH2 separately.
  For example, CH1 : DPT1, CH2 : TC-K1
- Setting range : Refer to 5.4 Input specifications and temp. range for sensor type
- Factory default : TC-K1 (Unit : -)



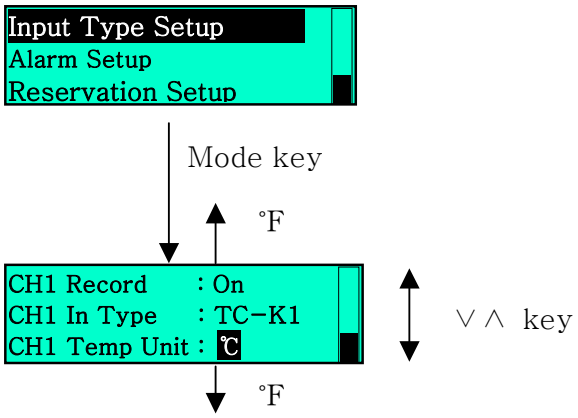
NOTE

**If changing input type, saved data by record backup is removed and it starts saving the data from the modified current time.
Therefore please be careful for setup.**

9.1.3 Temp. sensor input/scale setup

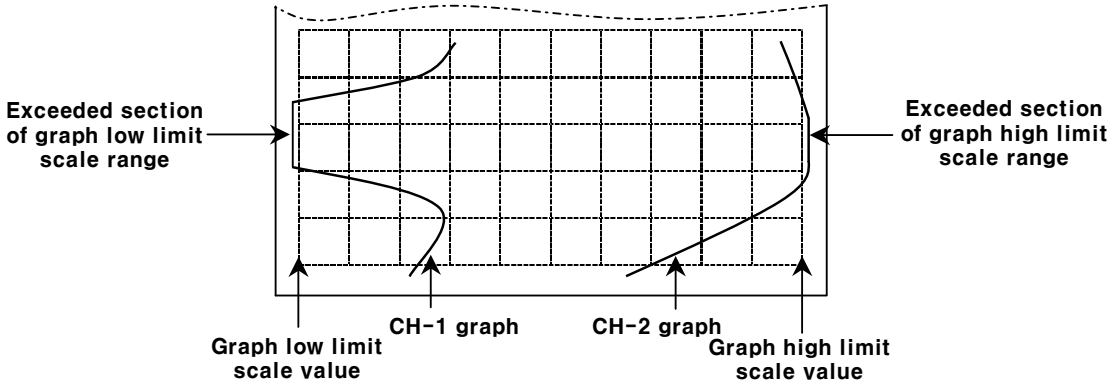
9.1.3.1 Temp. unit [CH□ Temp Unit]

- For temp. sensor input, using temp./indicating temp. unit is able to select to Celsius(℃) or Fahrenheit(℉) voluntarily.
- When temp. unit conversion (℃ ↔ ℉), PV value is changed according to unit conversion table.
- In case of analog input type, this parameter [CH□ Temp Unit] is not indicated.
- When temp. unit conversion, relevant bias value is initialized and parameter setting value excluding bias value holds previous setting value.
- Setting range : ℃ / ℉
- Factory default : ℃ (Unit : -)



9.1.3.2 Graph high/low limit scale

- In case of temp. sensor input (TC, RTD), this function is to set graph scale value for record to chart paper and user voluntarily is able to assign the recording range.
- If specified indicating section is recording in detail by graph curve, it is used.
- If the recording value exceeds graph high/low limit scale, it records on empty space of chart paper at the left/right side of graph (Approx. 1mm point) as following figure.
- In case of the recording start position of digital memo, even though graph high/low limit scale range is exceeded, actual value is recorded within high/low limit input range.



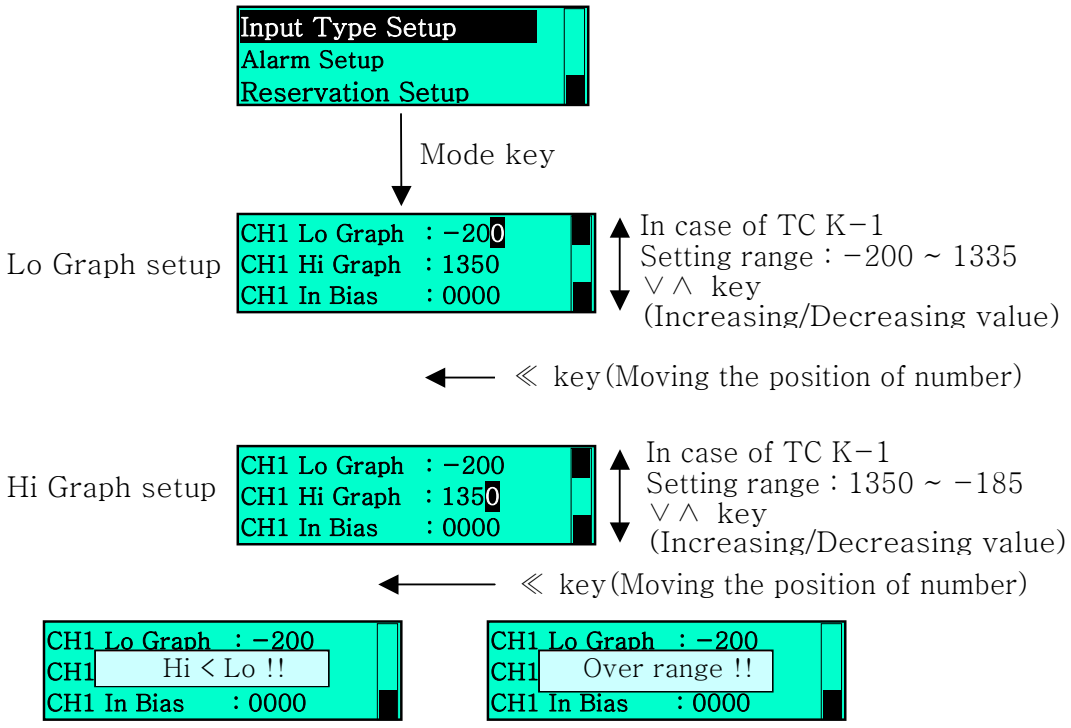
[Figure 9-1 Graph mode high/low limit recording range]

9.1.3.2.1 Graph low limit scale [CH□ Lo Graph]

- This function is to set graph low limit scale in recording range (or using range) according to input type.
- Setting range : Min. using range of sensor type ~ Graph high limit scale value [CH□ Hi Graph] – F.S 10%
- Factory default : –200 (Unit : Digit)
- In case of analog input type, parameter is not indicated.

9.1.3.2.2 Graph high limit scale [CH□ Hi Graph]

- This function is to set graph high limit scale in recording range (or using range) according to input type.
- Setting range : Graph low limit scale value [CH□ Lo Graph] + F.S 10% ~ Max. using range of sensor type
- Factory default : 1350 (Unit : Digit)
- In case of analog input type, parameter is not indicated.



When High / Low graph setup with wrong value and press mode key for save, error message is indicated as above.
(Refer to page no.54 Over Range, Hi < Lo) Then if press mode key again, it returns to previous value.

9.1.4 Analog input/scale

- In case of analog input type (Voltage, Current input), user is able to assign input range (High/Low limit input value) and this function is to support proper indication for user environment through scale value for assigned input range (High/Low limit input value) setup.
- Graph scale of chart paper is applied one–to–one according to setting scale value (High/Low limit scale value).

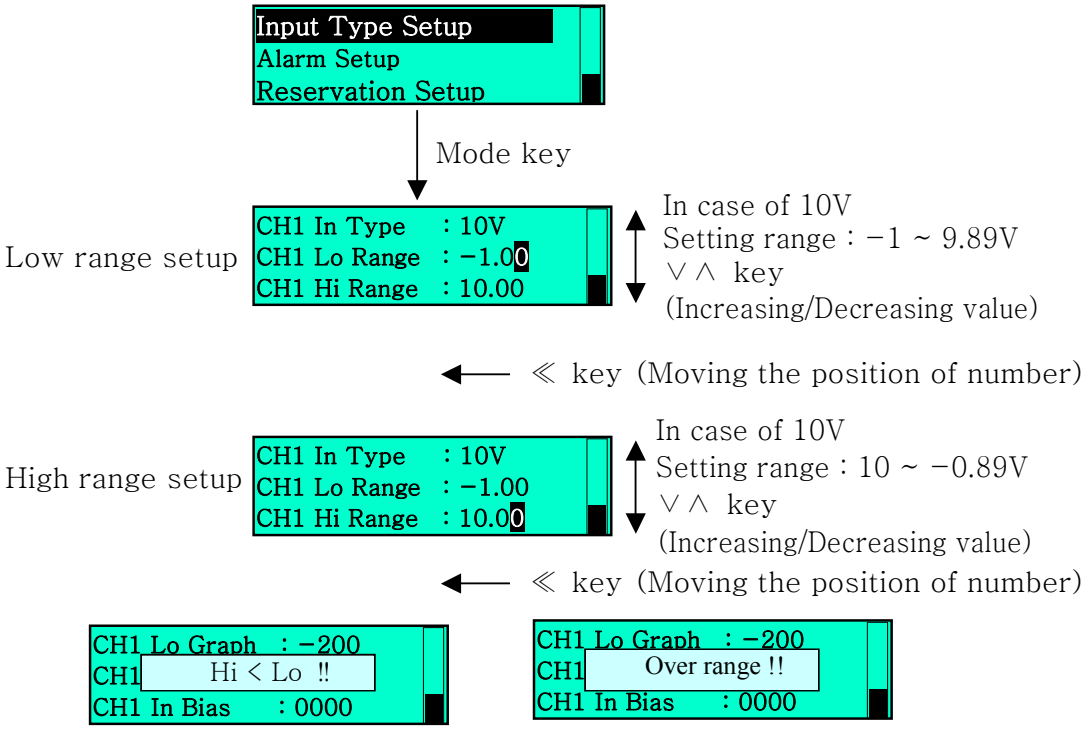
9.1.4.1 Low limit input range [CH□ Lo Range]

- This function is to assign and limit the actual using low limit input value within using range.
- Setting range : Min. using range ~ High limit input value [CH□ Hi Range] – F.S 10%
- Factory default : Min. using range (Unit : –)

9.1.4.2 High limit input range [CH□ Hi Range]

- This function is to assign and limit the actual using high limit input value within using range.
- Setting range : Low limit input value [CH□ Lo Range] + F.S 10% ~ Max. using range
- Factory default : Max. using range (Unit : –)

(Ex : If input is –1~10V and user needs 0~5V input range, user must set low limit input value : 0, high limit input value : 5.)



When High / Low graph setup with wrong value and press mode key for save, error message is indicated as above.
(Refer to page no.54 Over Range, Hi < Lo) Then if press mode key again, it returns to previous value.

9.1.4.3 Low limit scale [CH□ Lo Scale]

- In case of analog input type, this function is to set low limit scale value for assigned low limit input value at 9.1.4.1.
- Setting range : Within F.S range (–1999 ~ 9999/–199.9 ~ 999.9/–19.99 ~ 99.99/–1.999 ~ 9.999)
- Factory default : 0.0 (Unit : Digit)

9.1.4.4 High limit scale [CH□ Hi Scale]

- In case of analog input type, this function is to set high limit scale value for assigned high limit input value at 9.1.4.2.
- Setting range : Within F.S range
  (−1999 ~ 9999/−199.9 ~ 999.9/−19.99 ~ 99.99/−1.999 ~ 9.999)
- Factory default : 100.0 (Unit : Digit)
  (Ex : If assigned high/low limit input value at 9.1.4.1 ~ 9.1.4.2 is 0V ~ 5V and user needs –100~100 value, user must set low limit scale value : −100, high limit scale value : 100. Therefore if input value is 0V, PV indicates –100. If input value is 5V, PV indicates 100).

9.1.4.5 Scale decimal point [CH□ Sc Point]

- This function is to set the decimal point of high/low limit scale value and the decimal point of indication value (PV, SV, etc) is changed.
- Setting range : 0 / 0.0 / 0.00 / 0.000
- Factory default : 0.0 (Unit : −)

NOTE

1. In case of analog input and changing input type[CH□ In Type], scale value will be initialized to factory default.
2. If scale value for analog input is changed when input type [CH□ In Type] setup, previous record backup data is removed (Backup data time initialization) and start saving the data from the current modified time. Therefore please be careful for setup.

9.1.4.6 Display unit [CH□ Dp Unit]

- This function is to set the unit for record and display.
- If only input type parameter[CH□ In Type] is analog input, it is indicated.
- In case of analog input unit setup, it is different with temp. sensor therefore PV conversion according to unit conversion is not operated.
- Setting range

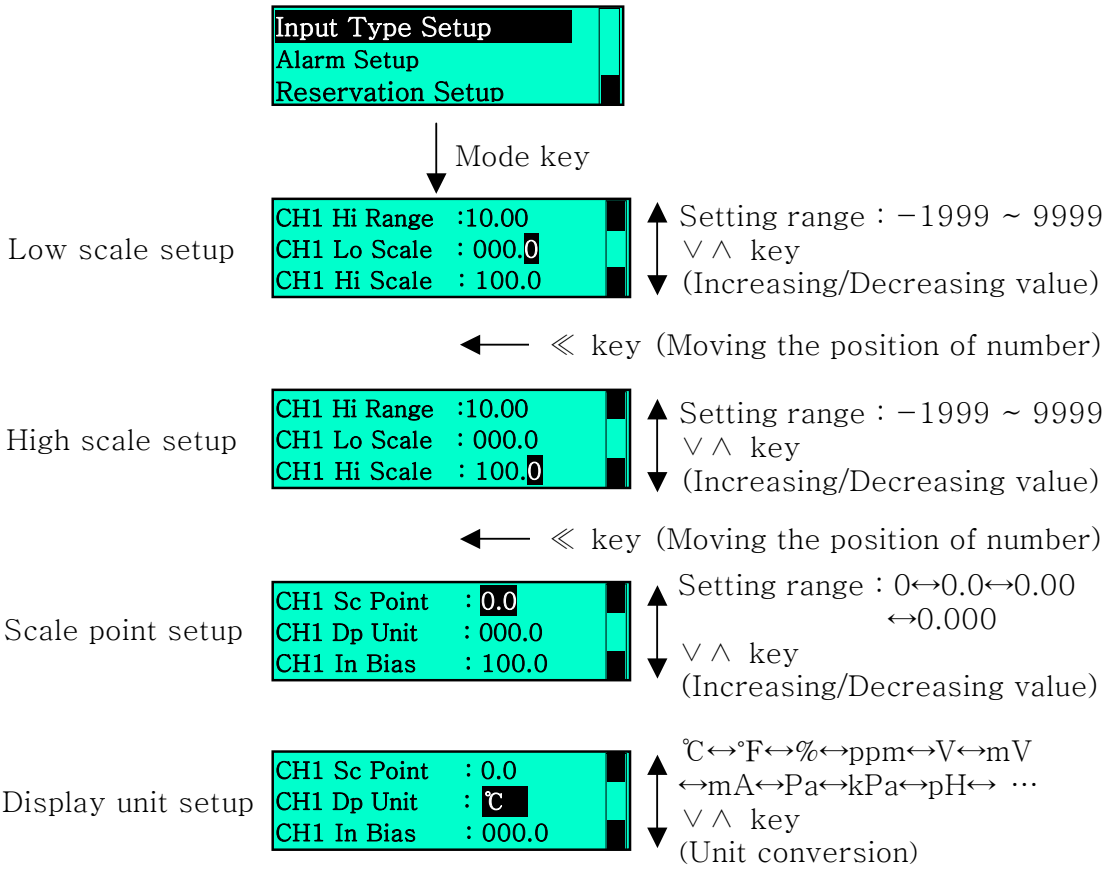
Display unit	℃	°F	%	ppm	V	mV	mA	Pa	kPa	pH
Parameter	℃	°F	%	ppm	V	mV	mA	Pa	kPa	pH

Display unit	psi	kgf/cm^2	m^3/h	mmHg	mmH$_2$O	us0~us9	None
Parameter	psi	kgf	m/h	mmHg	mmH2O	Use it if add user font unit	OFF

- Factory default : % (Unit : −)
- In case of temp. sensor input model, it is related with temp. unit setup function therefore this parameter [CH□ DP Unit] is not indicated.
- us0 ~ us9 is used to apply user font unit with 16X16 size(32byte) font.
- User font unit is written through RS485 communication.

NOTE

1. Please write user font by RS485 for correct writing after record stop by front key or communication,
2. When record backup if using total 10 user font units (us0 ~ us9), recent user font unit is indicated. For example, if previous us0 was # and changed to $ recently, when data output by record backup, previous data with # unit also records with recent unit $. Therefore one user font unit (us0 ~ us9) should be used for several units.

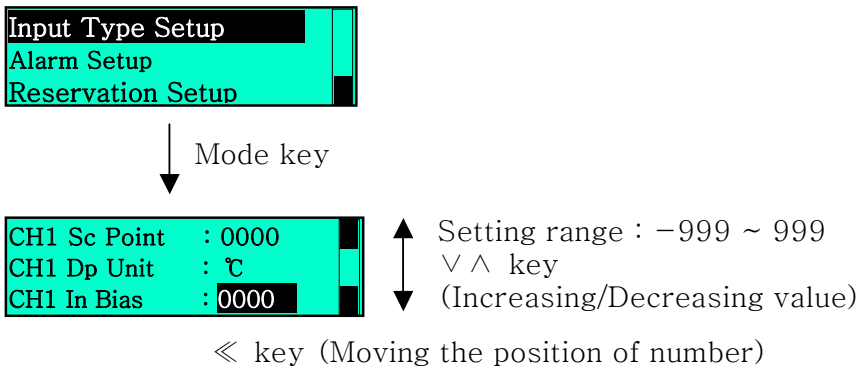


9.1.5 Input bias [CH□ In Bias]

- This function is to compensate an accidental error occurred by TC, RTD or analog input excluding product allowable error.
- If sensor is not able to connect with the position of additional measuring object, this function is to be compensated through calculation of the temp. deviation value between the temp. of sensor connected position and the measuring object temp.
- If applying input bias after measuring accidental error value for each sensor, it is able to measure temp. more precisely.
- When using input bias function, accidental error value should be measured and if measured accidental error value is not precise, it will be larger.

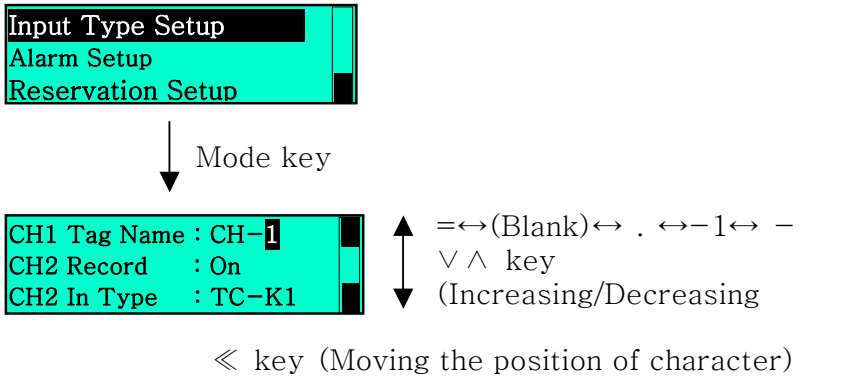
- Each channel is able to set for input bias.(CH1 In Bias, CH2 In Bias)
- In case of TC or RTD, if temp. unit conversion ℃ ↔ ℉ or input type change, bias value will be initialized to 0.
- Setting range : −999 ~ 999
- In case of TC or RTD input, bias value range is as follows
  Temp. range : (−200 ~1350), In Bias : −999 ~ 999
  Temp. range : (−199.9 ~999.9), In Bias : −99.9 ~ 99.9
- In case of analog input, bias value according to the decimal point of scale point is as follows
  Sc Point : 0 In Bias : −999 ~ 999
  Sc Point : 0.0 In Bias : −99.9 ~ 99.9
  Sc Point : 0.00 In Bias : −9.99 ~ 9.99
  Sc Point : 0.000 In Bias : −0.999 ~ 0.999
- Factory default : 0000 (Unit : Digit)

Ex) If actual temp. is 80℃ but display indicates 78℃, input bias value [CH□ Input Bias] should be set "2" for indicating 80℃.



9.1.6 Tag name [CH□ Tag Name]

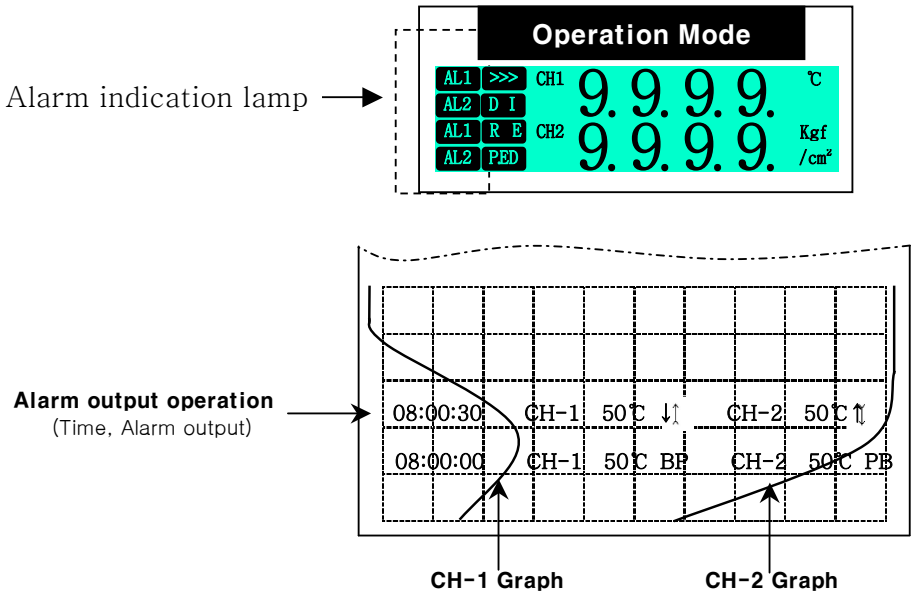
- This function is to set tag name for each channel when recording. However LCD display channel name is fixed to CH1, CH2.
- It is to set for each digit (4digit) in setting range and selected English is always capital letters.
- Setting range : = ↔(Blank)↔ . ↔−1↔ − ↔0↔1↔2↔3↔4↔5↔6↔7↔8↔9 ↔A↔B↔C↔D↔E↔F↔G↔H↔I↔J↔K↔L↔M↔N↔O↔P↔Q ↔R↔S↔T↔U↔V↔W↔X↔Y↔Z↔=
- Factory default : CH−□ (Unit : −)



10. Explanation for alarm function and setup

10.1 Alarm setup [Alarm Setup]

- Alarm output operates when temp. or scale value of object for control is much higher or lower.
- When each channel alarm output operation, relevant alarm indicating lamp(CH1=AL1, AL2 CH2=AL1, AL2) on display is lighting.
- During recording, when alarm operation, currect time, PV, alarm information (AL HI=↑, AL LO=↓, SBA=B, P.END=P) print to chart paper.
- HI, LO of AL1, AL2 in printed AL1(↑ ↓), AL2(↓ ↑) for classify AL1 and AL2 separately.



[Figure 10-1 Printing when alarm output operation]

10.1.1 Alarm operating mode [CH□ AL□ Type]

Mode	Alarm output operation	Description
Off	———	■ None
PV.Hi	OFF H ON PV 90 — High limit alarmtemp. (AL1.H) : Setting to 90 OFF H ON PV 110 — High limit alarm temp. (AL1.H) : Setting to 110	■ High limit alarm If PV is equal or higher than high limit alarm(AL1.H), output will be ON. Print on chart paper AL1= ↑ , AL2=
PV.Lo	ON H OFF PV 90 — Low limit alarm temp. (AL1.L) : Setting to 90 ON H OFF PV 110 — Low limit alarm temp. (AL1.L) : Setting to 110	■ Low limit alarm If PV is equal or lower than low limit alarm(AL1.L), output will be on. Print on chart paper AL1= ↓ , AL2=
SBA	When sensor break is detected, ON	■ Sensor Break Alarm Print on chart paper AL1= B , AL2= B
P.End	When chart paper is exhausted, ON	■ Paper end alarm Print on chart paper AL1= P , AL2= P “P” on chart paper is able to be checked when backup data output only.

- Factory default : CH□ AL1 Type(PV.Hi), CH□ AL2 Type(PV.Lo)

10.1.2 Alarm option [CH□ AL□ Opt]

Mode	Operating type	Description
None	General alarm	When reaching alarm value(variation), alarm output will be ON. When out of alarm range, alarm output will be OFF.
Latch	Latch function ※1	When reaching alarm value(variation), alarm output will be ON. Even though out of alarm range, alarm output will hold ON. (Alarm output hold)
StBy ※3	Standby sequence function ※2	When reaching alarm value(variation) after power on or changing alarm setup, alarm output will be not ON however reaching alarm value (variation) again, general alarm will be operated.
La+St ※3	Latch + Standby sequence function	Latch function and standby sequence function will be operated simultaneously.

- Factory default : None (Unit : -)
- If [CH□ AL□ Type] is changed to OFF mode, previous alarm operation will be OFF.

※1. - If user needs to cancel alarm latch function when current PV is out of the alarm range and when returning from sensor break alarm (SBA) or paper end alarm (P.End), please press ∨+∧ key for over 3 sec.
- When PV is higher than alarm value after alarm operation on the status of alarm latch, if alarm mode changes to Standby sequence function or Latch + Standby sequence function, alarm will be OFF.

※2. Prior condition : Standby sequence function is applied again if power on or alarm value change.

※3. If alarm output operation mode [CH□ AL□ Type] is SBA or P.End, it will be not applied and not indicated.

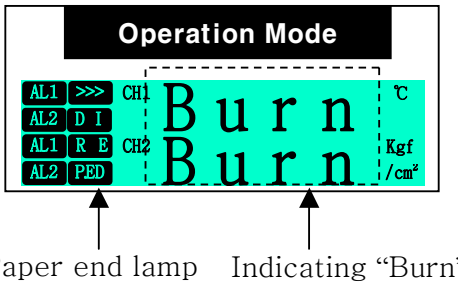
10.1.3 Sensor break alarm [SBA]

- If temp. sensor(TC, RTD) is not connected or it is disconnected during temp. control, alarm output will be ON.
- Sensor break is able to be checked through buzzer or other devices by means of external alarm contact.
- If alarm output operation mode sets to SBA, sensor break alarm will be operated.

※ 10V input is not applied for SBA.

10.1.4 Paper end alarm [P.End]

- During recording, if chart paper is exhausted, recording operation will be stopped and alarm output will be ON.
- When chart paper is replaced, alarm will be off automatically. (In case of general alarm)



10.1.5 Alarm temp. [CH□ AL□ Lo], [CH□ AL□ Hi]

- When alarm setting value setup according to relevant alarm output operation mode, alarm output will be operated.
- According to selection of alarm output operation mode [CH□ AL□ Type], relevant channel parameter [CH□ AL□ Lo], [CH□ AL□ Hi] is interlocked and indicated.

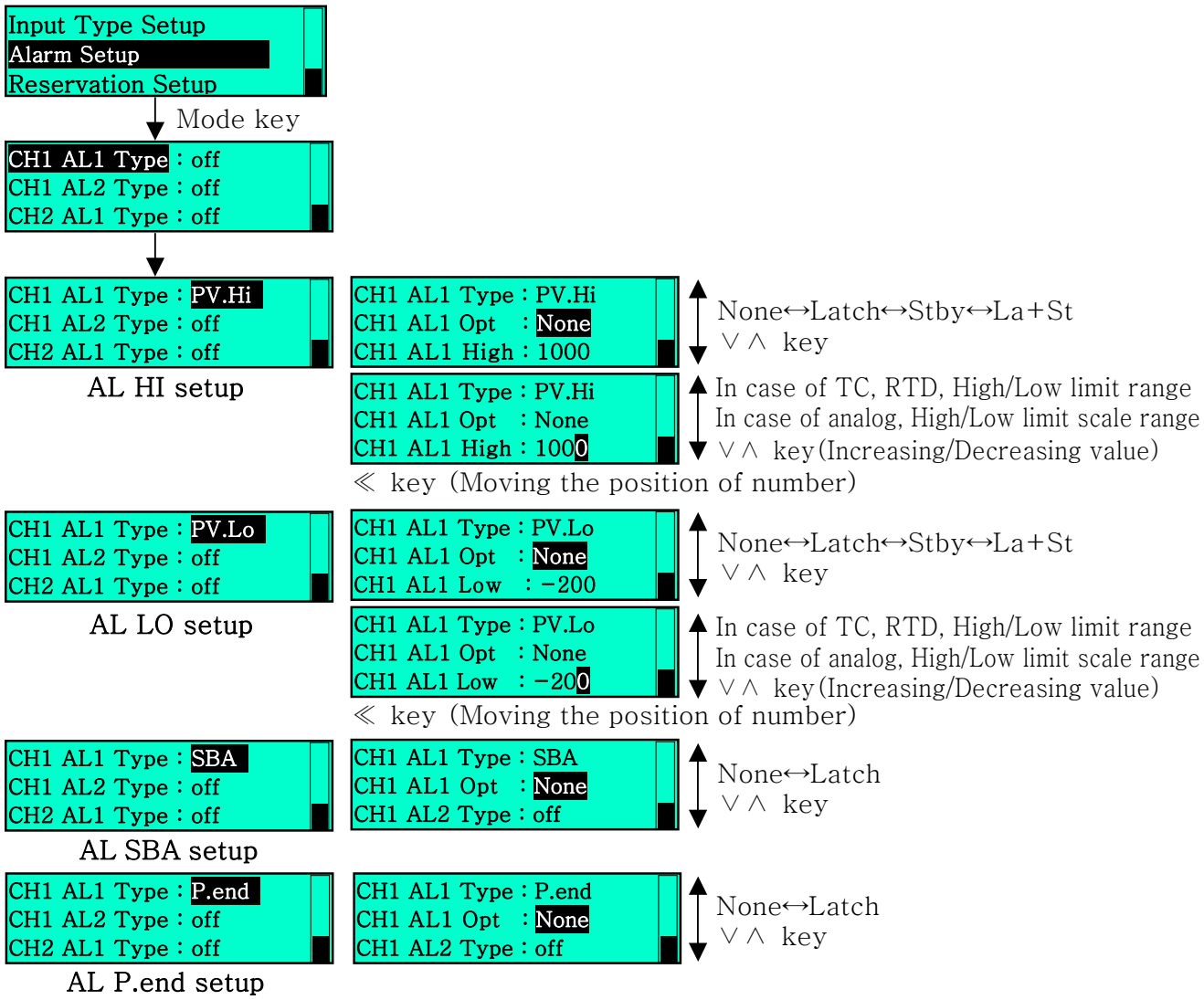
※ If selecting high limit alarm mode [PV.Hi], [CH□ AL□ High] is only indicated.

※ If selecting low limit alarm mode [PV.Lo], [CH□ AL□ Low] is only indicated.

※ If input type setup [CH□ In Type] is changed, [CH□ AL□ High] or [CH□ AL□ Low] value is changed to input range of input type setup [CH□ In Type] automatically.

※ If input type is TC or RTD and alarm temp. setup is selected to [CH□ AL□ Low], when burn operate by sensor open, alarm operation will be on.

- Alarm temp. setting range: Within using/indicating range for input type.
- Factory default : [CH□ AL□ Lo] : Low limit scale value
  [CH□ AL□ Hi] : High limit scale value (Unit : ℃/℉)

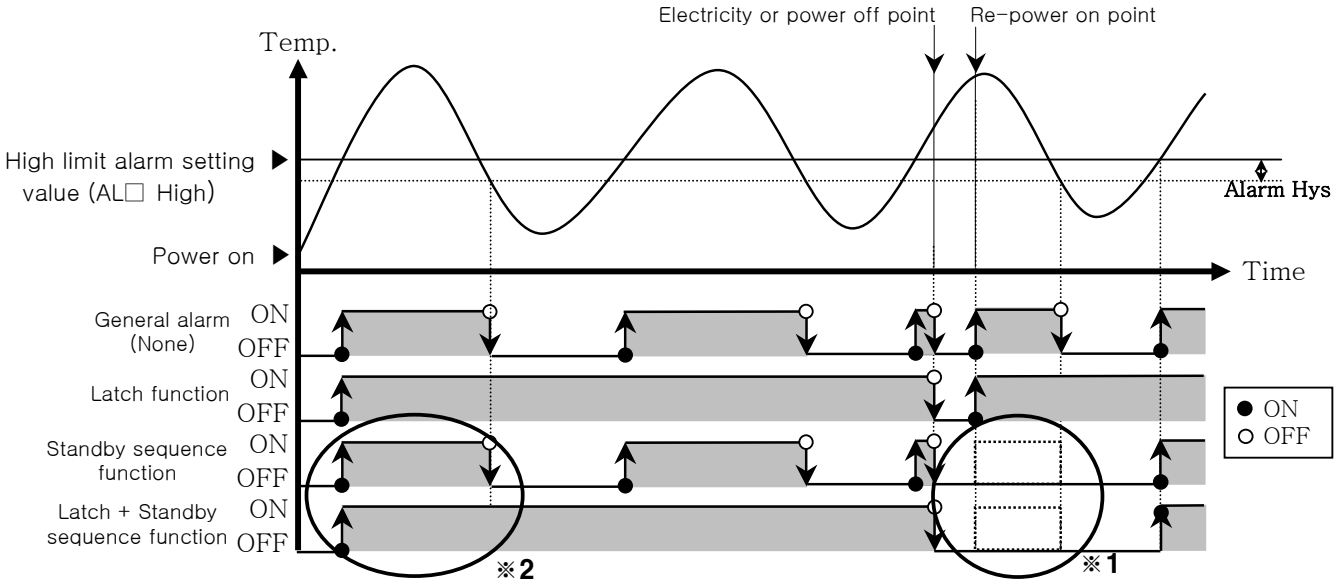


10.1.6 Alarm hysteresis [CH□ Alarm Hys]

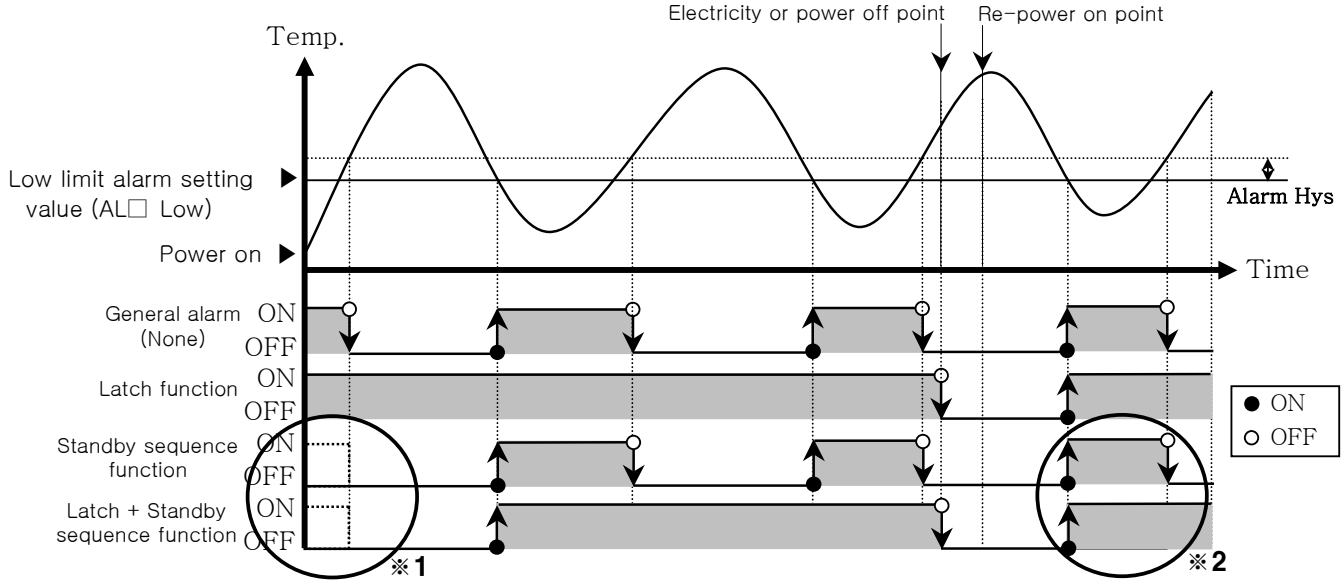
- As alarm output hysteresis, “Hysteresis” sets the interval between ON and OFF of alarm output.
- Setting range : 001 ~ 999 (Decimal point is placed same as input decimal point)
- Factory default : 001 (Unit : Digit)

10.1.7 Alarm example

10.1.7.1 High limit alarm [PV.Hi]



10.1.7.2. Low limit alarm [PV.Lo]



※ Standby sequence function

1) If only alarm output starts within relevant alarm condition range setting PV of the point of time of power on, the first alarm output does not operate and the second alarm output starts operating. (Refer to ※1)
2) However if alarm output starts out of relevant alarm condition range setting PV of the point of time of power on, the first alarm output starts operating same as general alarm. (Refer to ※2)
3) Application condition
   - When power on or changing alarm value, alarm output operation mode, alarm option.

※ Alarm latch function

1) Once alarm output is on, it will hold on even out of alarm output range. (Alarm output hold)
2) Cancellation condition
   - If need to cancel alarm latch function, please press ∨+∧ key for over 3 sec. after current PV is lower than alarm value.
   - If need to cancel alarm latch function by sensor break alarm(SBA) and paper end(P.End), please press ∨+∧ key for over 3 sec. after returning from SBA and P.End.

※ When changing alarm output operation mode

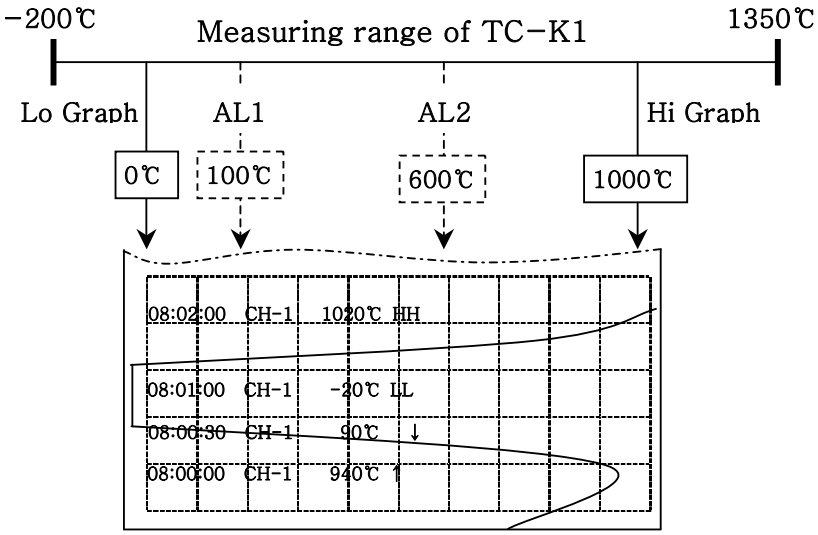
If alarm setting mode [CH□AL□Type] is changed, alarm setting value [CH□AL□High, Low] automatically is initialized to maximum value and minimum value.

※ When changing alarm output option

Alarm setting value holds as previously.

Example (1) Thermocouple Input

For setting mode of channel 1, Input type : TC-K1(-200~1350℃),
Hi/Lo graph range : 0~1000℃. and channel 2 : "Record off".
For alarm function of channel 1, AL1 Low : 100℃,
Alarm option : None / AL2 High : 600℃, Alarm option : None.
For record mode, Record mode : graph mode, Recording speed : 960mm/h,
Memo period : 1min. If setup is as above, recording will be as follows.



Enter into setting mode

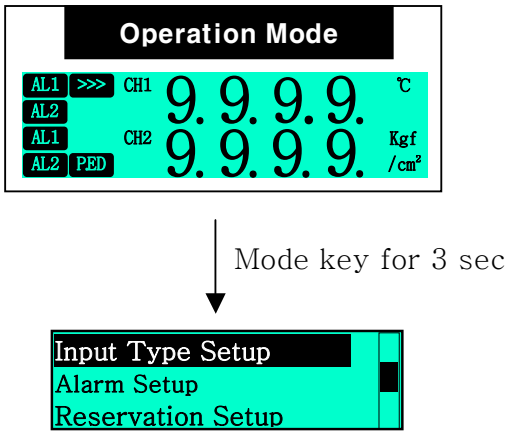
1. If press mode key for 3 sec, it enters into setting mode from operating mode.

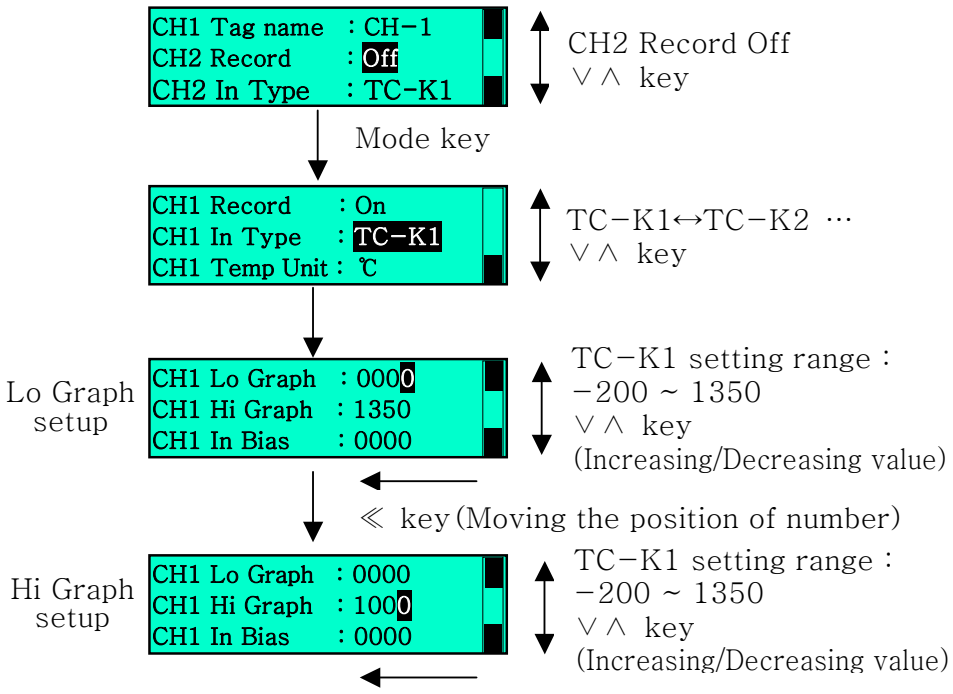
Input type setup

2. Enter into the lower menu from input type setup, the upper menu, by pressing mode key. If press mode key after moving to the lower menu of CH2 record, it enters into the setting category then set to "Off" and press mode key to get out of this menu.
   Also after moving to the lower menu of CH1 input type and entering into the setting category, set to "TC-K1" and press mode key to get out of this menu.

Input High/Low graph range setup

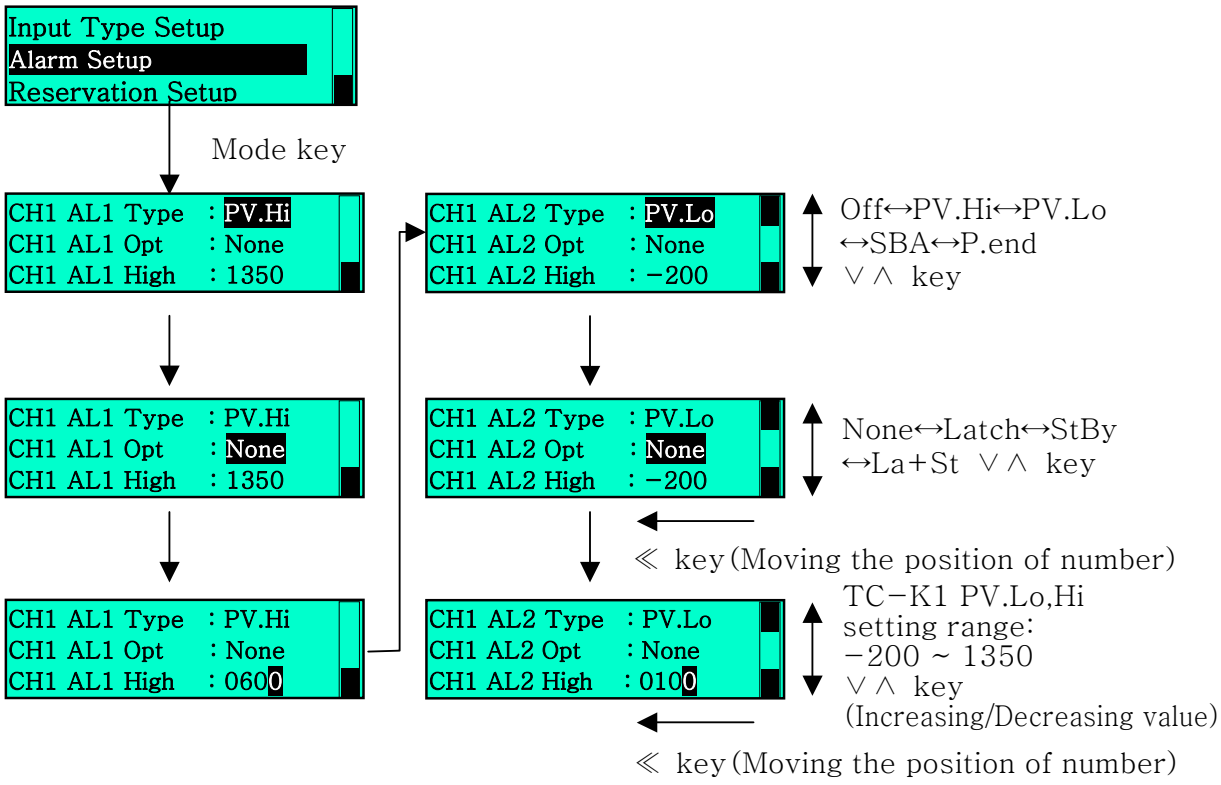
3. Set CH1 Lo Graph:0, CH1 Hi Graph:1000 at the lower menu of input type setup.





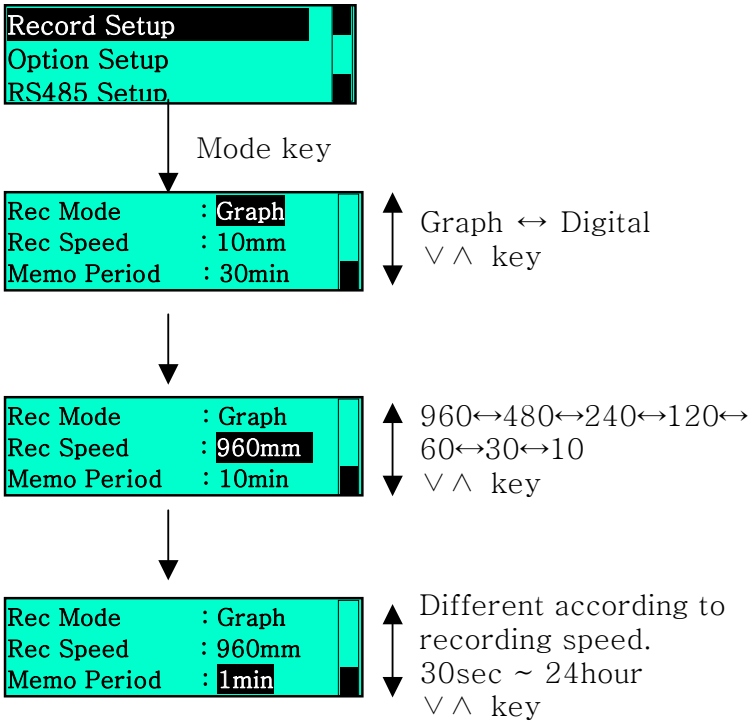
Alarm setup

4. After moving to the upper menu from the lower menu of input type setup and selecting alarm setup, press mode key to entering into the lower menu.
5. After setting AL1 type : PV.Hi and saving it by pressing mode key, set AL1 Opt : None, AL1 High : 600.
6. After setting AL2 type : PV.Lo and saving it by pressing mode key, set AL2 Opt : None, AL2 Low : 100.



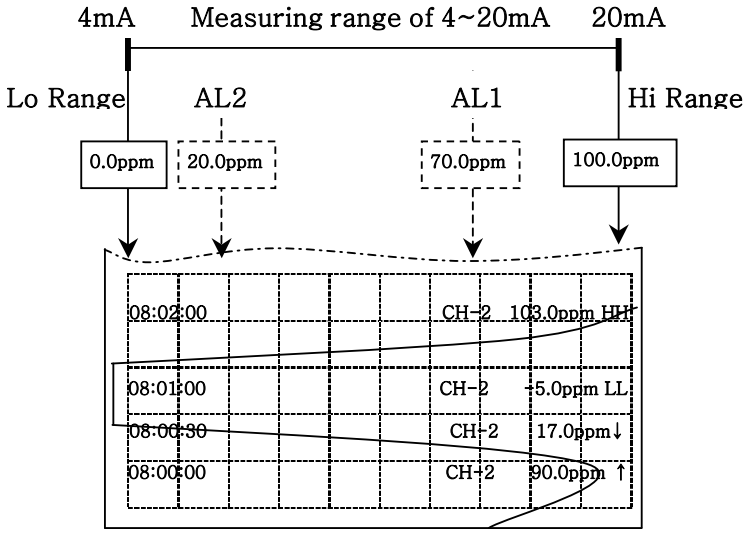
Record setup

7. After moving to the upper menu from the lower menu of alarm setup and selecting record setup, press mode key to entering into the lower menu.
8. Set Record mode : Graph, Rec speed : 960mm/h, Memo period : 1min.
9. After completing all setup, if press mode key for 3 sec, it moves to operating mode and processes as above setting value.



Example 2) 4 to 20mA input and unit

For setting mode of channel 2, Input type : 4~20mA type,
Lo, Hi scale : 0.0~100.0, Dp unit : ppm. and channel 1 : “Record off”.
For alarm function of channel 2, AL1 High : 70.0ppm,
Alarm option : None / AL2 Low : 20.0ppm, Alarm option : None.
For record mode, Record mode : graph mode, Recording speed : 960mm/h,
Memo period : 1min. (Record mode setup is same as Example 1)
If setup is as above, recording will be as follows.



Enter into setting mode

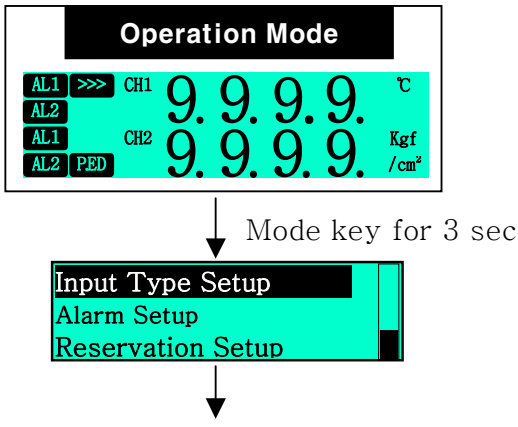
1. If press mode key for 3 sec, it enters into setting mode from operating mode.

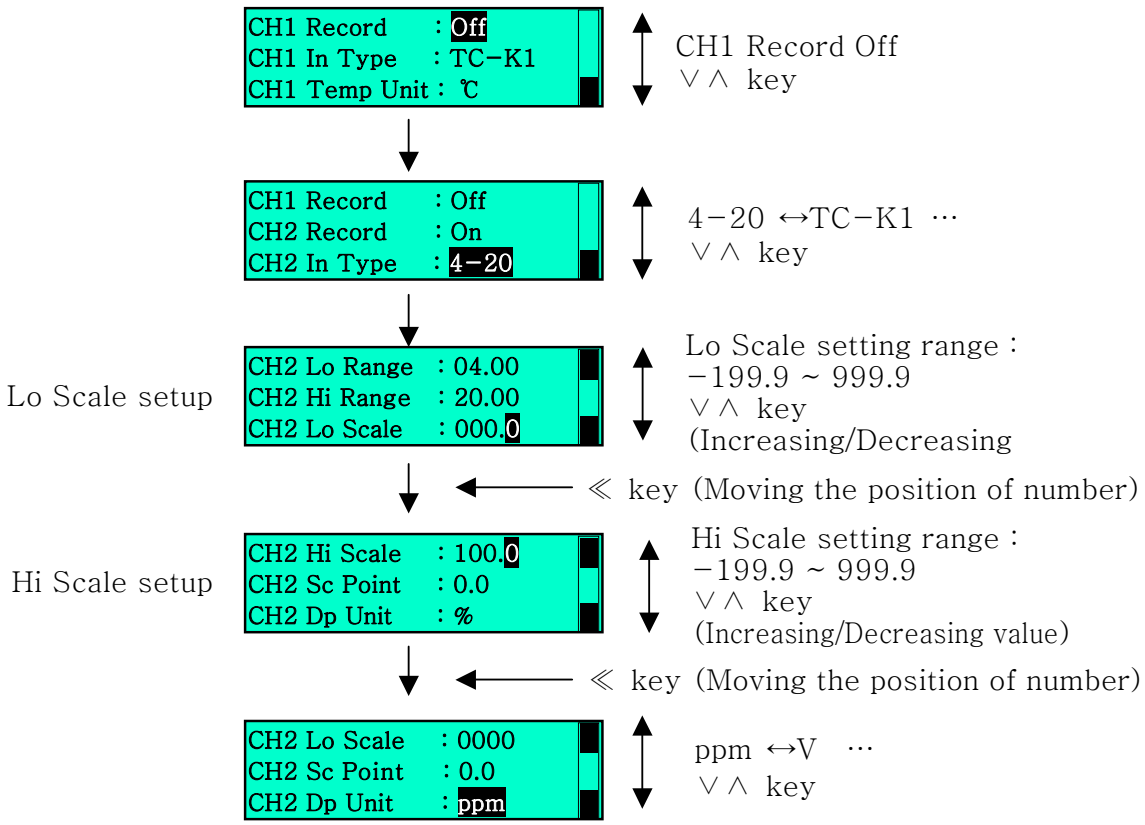
Input type setup

2. Enter into the lower menu from input type setup, the upper menu, by pressing mode key. If press mode key after moving to the lower menu of CH1 record, it enters into the setting category then set to “Off” and press mode key to get out of this menu.
   Also after moving to the lower menu of CH2 input type and entering into the setting category, set to “4~20mA” and set CH2 Dp unit to “ppm” and press mode key to get out of this menu.

Input High/Low scale setup

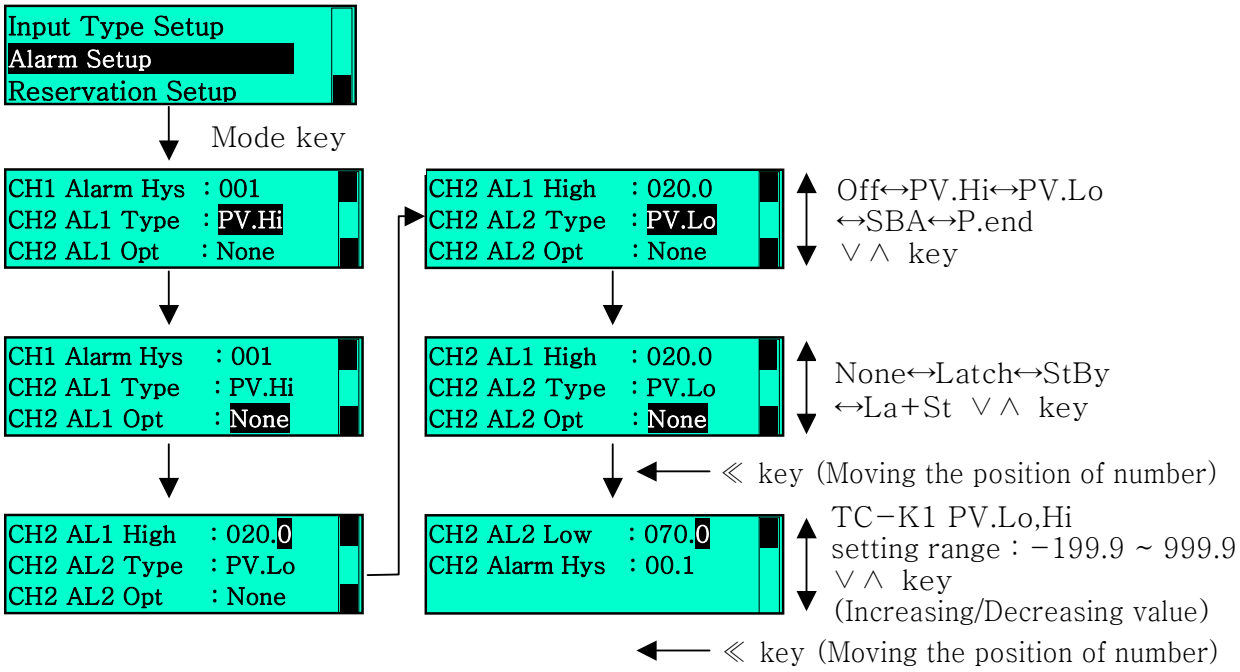
3. Set CH2 Lo Scale:000.0, CH3 Hi Scale:100.0 at the lower menu of input type setup.





Alarm setup

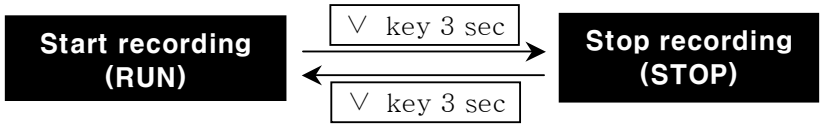
4. After moving to the upper menu from the lower menu of input type setup and selecting alarm setup, press mode key to entering into the lower menu.
5. After setting CH2 AL1 type : PV.Hi and saving it by pressing mode key, set AL1 Opt : None, AL1 High : 20.0.
6. After setting CH2 AL2 type : PV.Lo and saving it by pressing mode key, set AL2 Opt : None, AL2 Low : 70.0.



11. Explanation for recording function and setup

11.1 Recording Run/Stop

- Once record starts, current PV is printing to chart paper according to setting list print, record mode, speed, language parameter setup.
- If press ∨ key for over 3 sec, it operates "Recording Run or Stop" at the basis of current recording state.



- If DI-1 [Digital input 1] parameter sets "Run", it operates "Recording Short / Open" by means of external DI-1 terminals (No.16, 18).
  (※ If using DI-1, front key for recording run/stop does not operate.)
- When RUN, ">>>" lamp is lightening. When STOP, "■" lamp is lightening.
- Once power on, recording is able to Run or Stop automatically when re-power on after electricity failure or by user according to recording run/stop parameter (PWR On State).

11.2 Manual paper feeding [Feed]

- If press < key for over 3 sec at STOP state, chart paper is manually able to feed as fixed length (Approx. 10mm).
- If press < key continuously, chart paper is able to feed as fixed length every 3 sec.

NOTE

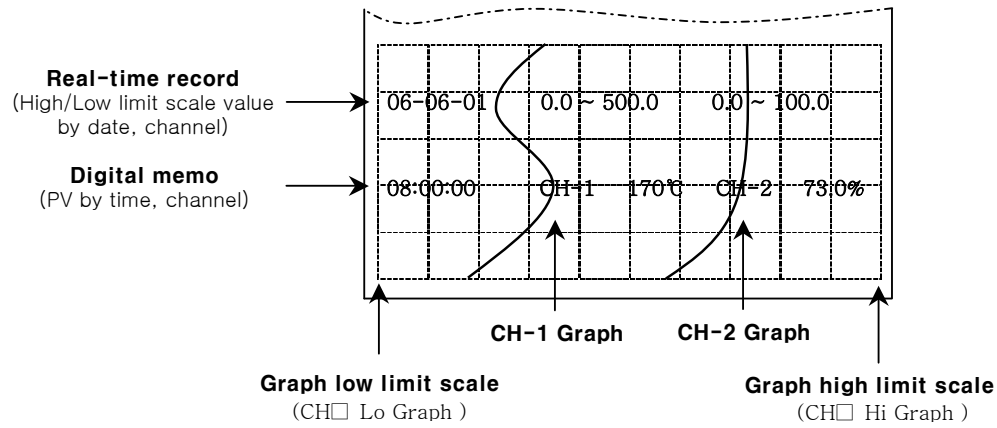
The latest record is placed behind of paper cutter at STOP state therefore cut the chart paper after manual paper feeding in order to check the latest record.

11.3 Recording mode [Rec Mode]

- This is to select the recording type to chart paper (Graph mode / Digital mode).
- Setting range : Graph / Digital
- Factory default : Graph (Unit : -)

11.3.1 Graph mode [Graph Mode]

- This mode is to record PV on chart paper by curved line graph.
- Current date(Year-Month-Day) and high/low limit scale value for relevant channels are recording every 1 hour.
- Current time(hh:mm:ss) and PV for relevant channels are recording according to digital memo period [Memo Period] setup.



[Figure 11-1 Print on graph mode]

11.3.1.1 Recording speed [Rec Speed]

- This function is to set recording speed and it is able to set by feeding length per hour.
- If only record mode [Record Mode] is graph mode[Graph], it is indicated.
- Setting range : 10 / 30 / 60 / 120 / 240 / 480 / 960
- Factory default : 10 (Unit : mm/h)

11.3.1.2 Digital memo period [Memo Period]

- Recording period for recording current time(hh:mm:ss) and PV for channel to chart paper is set by digital numeric on graph mode as figure 11-1.
- Setting range : Digital memo period setting range is limited according to recording speed as following table.
- Digital memo period is printing at the basis of regular time.

Ex 1) If digital memo period is 60 min and recording start time is "09:20", the first digital memo time recording is not "10:20" but "10:00" at the basis of regular time. Recording time (10:00 -> 11:00 -> 12:00 -> 13:00 -> Until recording end)

Ex 2) If digital memo period is 10 min and recording start time is "09:23", the first digital memo time recording is not "09:33" but "09:30" at the basis of regular time. Recording time (09:30 -> 09:40 -> 09:50 -> 10:00 -> Until recording end)

Ex 3) If digital memo period is 15 min and recording start time is "09:34", the first digital memo time recording is not "09:49" but "09:45" at the basis of regular time. Recording time (09:45 -> 10:00 -> 10:15 -> 10:30 -> 10:45 -> Until recording end)

- Factory default : 30 (Unit : min) (O:Setting-Able, X:Setting-Disable)

Recording speed (mm/h)	Digital memo period setting range (min)													
	None	30 sec	1 min.	5 min	10 min	15 min	30 min	1 hour	2 hour	3 hour	4 hour	8 hour	16 hour	24 hour
10	**OFF**	**X**	**X**	**X**	**X**	**X**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**
30	**OFF**	**X**	**X**	**X**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**
60	**OFF**	**X**	**X**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**
120	**OFF**	**X**	**X**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**
240	**OFF**	**X**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**
480	**OFF**	**X**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**
960	**OFF**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**

[Digital memo period setting range on graph mode]

11.3.1.3 Recording speed when alarm on [Alarm Speed]

- When alarm on or during alarm latch function, this function is to set recording speed and it is able to check the cause and details of alarm operation.
- It is able to check the change rate of PV before and behind alarm in detail because standard recording speed is able to be set faster than before.
- If changing recording speed, this parameter is automatically changed same as recording speed.
  However digital memo period is same as setting memo period.

Example) If Recording speed : 240mm/h, Memo period : 5min,
Alarm speed : 960mm/h,
when alarm does not operate, it records by 240mm/h but when alarm operates, it records by 960mm/h every 5min.

- Setting range : 10/ 30 / 60 / 120 / 240 / 480 / 960
- Factory default : 10 (Unit : mm)

NOTE

1. After recording speed is set differently when alarm on, when user does not realize the change of this parameter setting value, user is able to misunderstand therefore please be aware of this function when using it.
2. Regarding saved data by record backup, if record mode setup function (Rec mode, Rec period, Alarm speed) is changed, previous record backup data is removed(Backup data time initialization) and start saving the data from the current modified time. Therefore please be careful for setup.

11.3.2 Digital mode [Digital Mode]

- This mode is to record PV on chart paper by numeric and current time, PV for relevant channel are periodically recorded by printing/recording period setup [Rec period].
- Current time(Year-Month-Day) and high/low limit scale value are recorded every 24 hour period on digital mode.
- Current PV is recorded through digital memo function by means of front key(∧key+3sec), DI input terminal(DI-2+1sec) or communication.

00:02:00	CH-1	110℃	CH-2	75.0%
00:03:00	CH-1	110℃	CH-2	75.0%
00:01:00	CH-1	150℃	CH-2	75.0%
09-03-20	0 ~ 1000		0 ~ 500	
23:59:00	CH-1	150℃	CH-2	72.0%
23:58:00	CH-1	120℃	CH-2	70.0%
23:57:00	CH-1	80℃	CH-2	58.0%

[Figure 11-2 Print on digital mode]

11.3.2.1 Recording/Printing period [Rec Period]

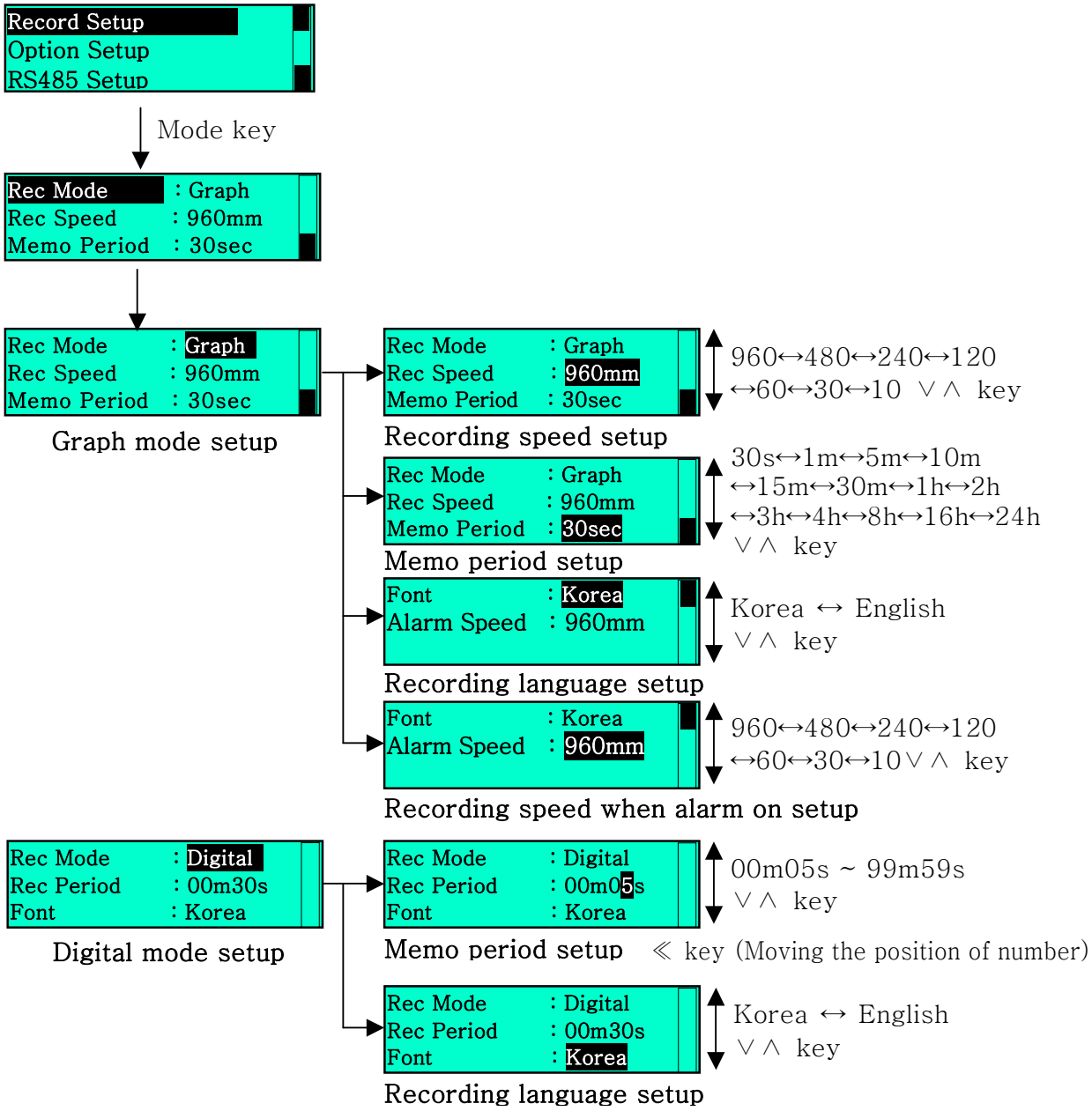
- It is to set period(min,sec) recording current date(hh:mm:ss) and PV for relevant channel by digital numeric.
- Setting range : 00m05s ~ 99m59s
- Factory default : 01m00s (Unit: Min.-m, Sec.-s)

11.3.3 Recording language [Font]

- This recorder is able to record in Korean and English and current date, high/low limit scale value and parameter list are recorded by setting language.
- Setting range : Korea / English
- Factory default : Korea (Unit : -)

Ex) Korea : 현재시간 2009년 03월 19일 12시 30분 00초

Ex) English : Date 03-19-2009 12:30:00



11.4 reservation record [Reservation]

- After user sets reservation time in advance, recording RUN and STOP automatically according to reservation time setting.

Ex) Record Setup — Record Mode: Digital, Record Speed: 5sec

Reservation Setup — Start Time: 12:00, Stop Time: 12:02

(Record Start) 12:00:00→12:00:05……12:01:55→12:02:00 (Record Stop)

- If reservation record parameter is "On", recording start time and stop time setup parameter is indicated and recording operates according to setting time.
- If returning to operating mode after setting reservation function on the setting mode, recording is stopped and the reservation record lamp (R E) is lighting on display.
- During reservation record, if re-power on due to electricity failure and the time of re-power on is within reserved time, recording continuously operates but if out of reserved time, recording is stopped.
- If parameter sets to "Off", record start time and stop time are not indicated.
- Setting range : Off (Reservation record - Not use),
  On (Reservation record - Use)
- Factory default : Off

NOTE

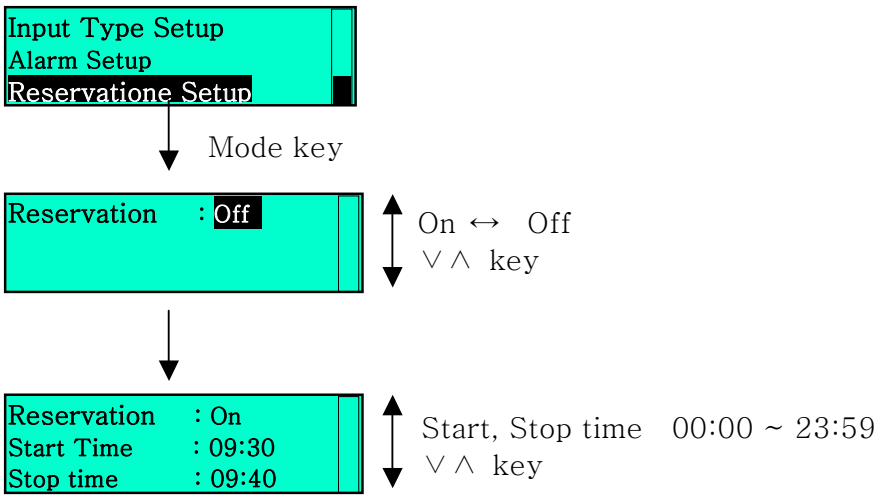
1. While recording by reservation record setup, recording RUN/STOP function by ∨key+3sec, DI-1 input terminal, communication does not operate however if not, recording RUN/STOP function by ∨key+3sec, DI-1 input terminal, communication is able to operate.
2. Start time must not be same as stop time and if setting it, "Time Set!!" message will be indicated on display.

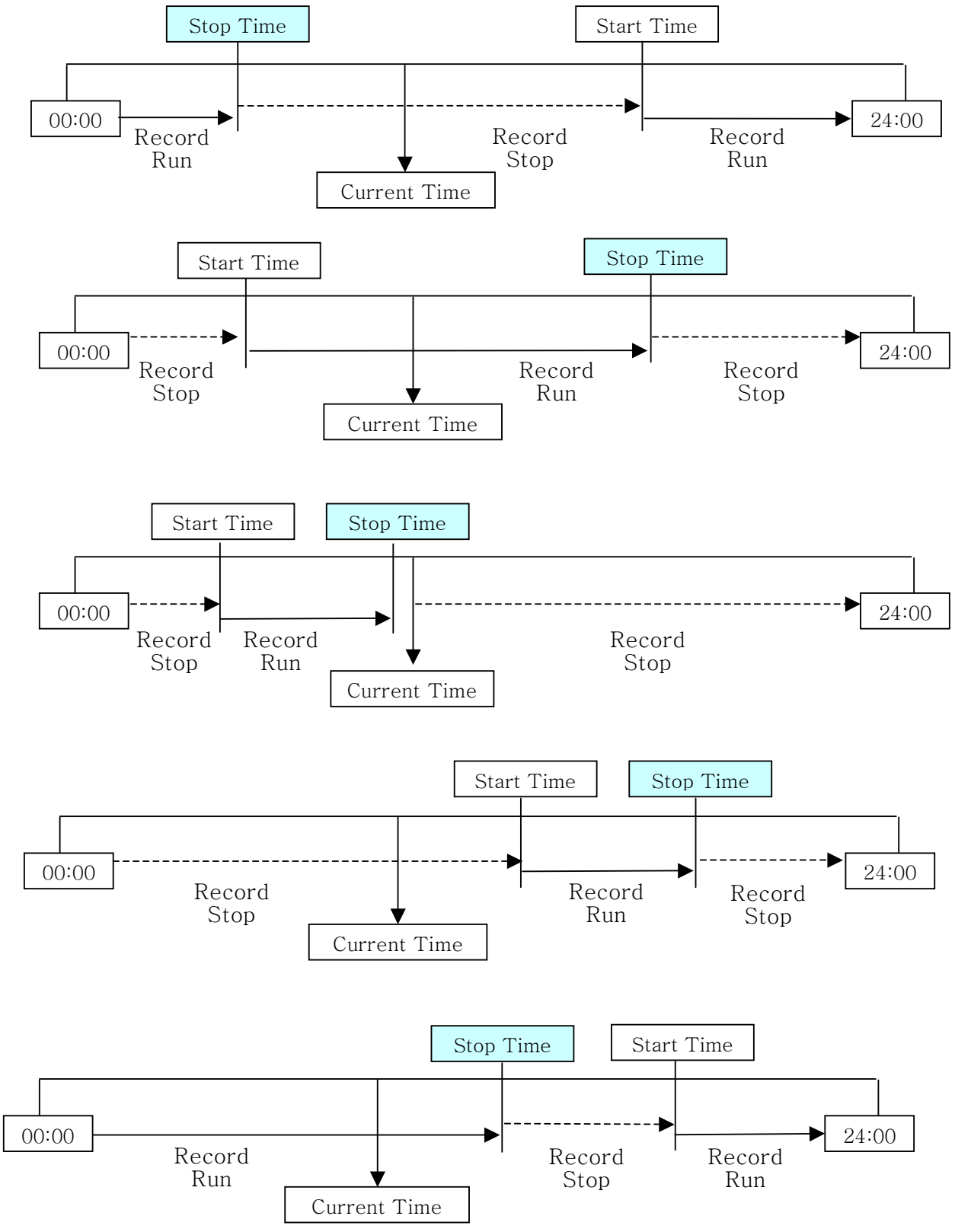
11.4.1 Recording start time [Start Time]

- Setting range : 00:00 ~ 23:59

11.4.2 Recording stop time [Stop Time]

- Setting range : 00:00 ~ 23:59





[Figure 11-3 Example for recording operation by reservation record]

11.5 External digital input function

11.5.1 Digital input 1 function [Digital Input 1]

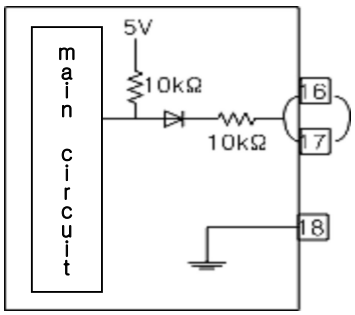
- This function is able to operate recording start by means of external digital input terminals (No.16, 18).
- If this mode sets “Run”, recording operates by recording period setup while external digital input terminal is short.
- When DI-1 function operates at the first time, recording after current time print as follows.
  - Current Time 2009y 03m 19d 12h 30m 00s - Korean
  - Date 03-19-2009 12:30:00 - English
- If this mode sets “Off”, no function operation.
- Setting range : Off / Run
- Factory default : Off (Unit : -)

NOTE

1. If using DI-1, front key for recording run/stop does not operate.
2. While recording by reservation record, DI-1 function is not able to operate and after reservation record stop, this function is able to operate.

11.5.2 Digital input 2 function [Digital Input 2]

- This function is able to operate recording start by means of external digital input terminals (No.17, 18). If this mode sets “Memo”, current time(hh:mm:ss) and PV for relevant channel are recorded at the time of inputting one signal to external digital input terminal.
- It is able to operate with Memo function by means of ∨ key+3sec together.
- If this mode sets “Off”, no function operates.
- Setting range : Off / Memo
- Factory default : Off (Unit : -)



[Figure 11-4 Internal circuit of external digital input]

NOTE

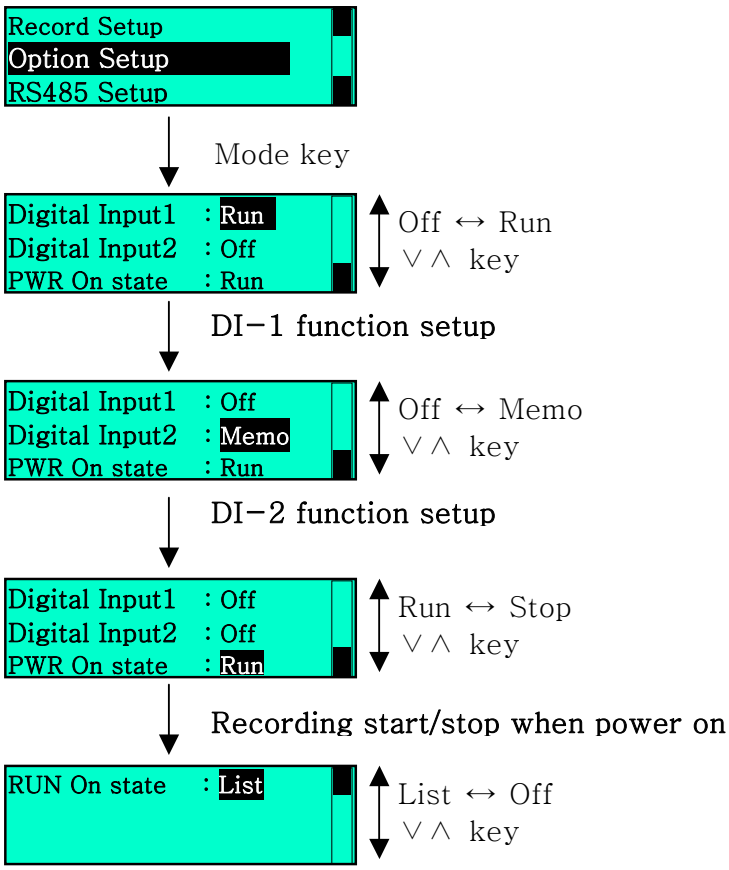
1. If applying voltage to terminal no.16 and 17, it may cause damage to input circuit or malfunction.
2. In case of no relay contact, it needs to use NPN open collector output type contact and in case of relay contact, it needs to use contact small current(0.2mA) is able to be flowed enough.

11.6 Recording start/stop when power on [PWR On State]

- This function is to set operating record when power on simultaneously. It is divided into Run and Stop.
- If setting reservation record, the time of power on is reservation record start time but if not, record stop will hold.
- Setting range : Run / Stop
- Factory default : Run (Unit : -)

11.7 Printing the setting list when record start [RUN On State]

- This function is to set printing the setting list when record start simultaneously. It is divided into List and Off.
- Setting range : List / Off
- Factory default : Off(Unit : -)



Printing the setting list when record start

11.8 Digital memo [Digital Memo]

- If press ∧ key for 3 sec during record, current time(hh:mm:ss) and PV for relevant channel are recording by digital numeric to chart paper. (Digital input 2 function is also as memo function, if digital input 2 function is setting on, memo function is able to be used by front key.)
- As memo function is only for one input, after press ∧ key for 3 sec, memo function operates. In order to operate memo function again, this function must be off and on by ∧ key again.

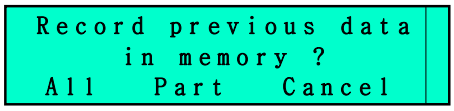
- Digital memo function is able to operate by means of external DI-2 input terminal (No.17, 18).
- If input has error “HHHH”, “LLLL”, “BURN” at the time of operating digital memo, each relevant channel records “HHHH”, “LLLL”, “BURN”.

11.9 Paper end function [Paper END]

- If chart paper is exhausted during record, recording operation will be stopped and paper end lamp (P.ED) will lighten.
- If alarm mode sets to paper end function, P.ED lamp will lighten and alarm output will be on simultaneously.
- When changing chart paper, if sensing chart paper, the unrecorded data of since the time of exhausting chart paper is able to be recorded and printed.

11.9.1 Explanation for data save, re-recording function and setup when chart is exhausted

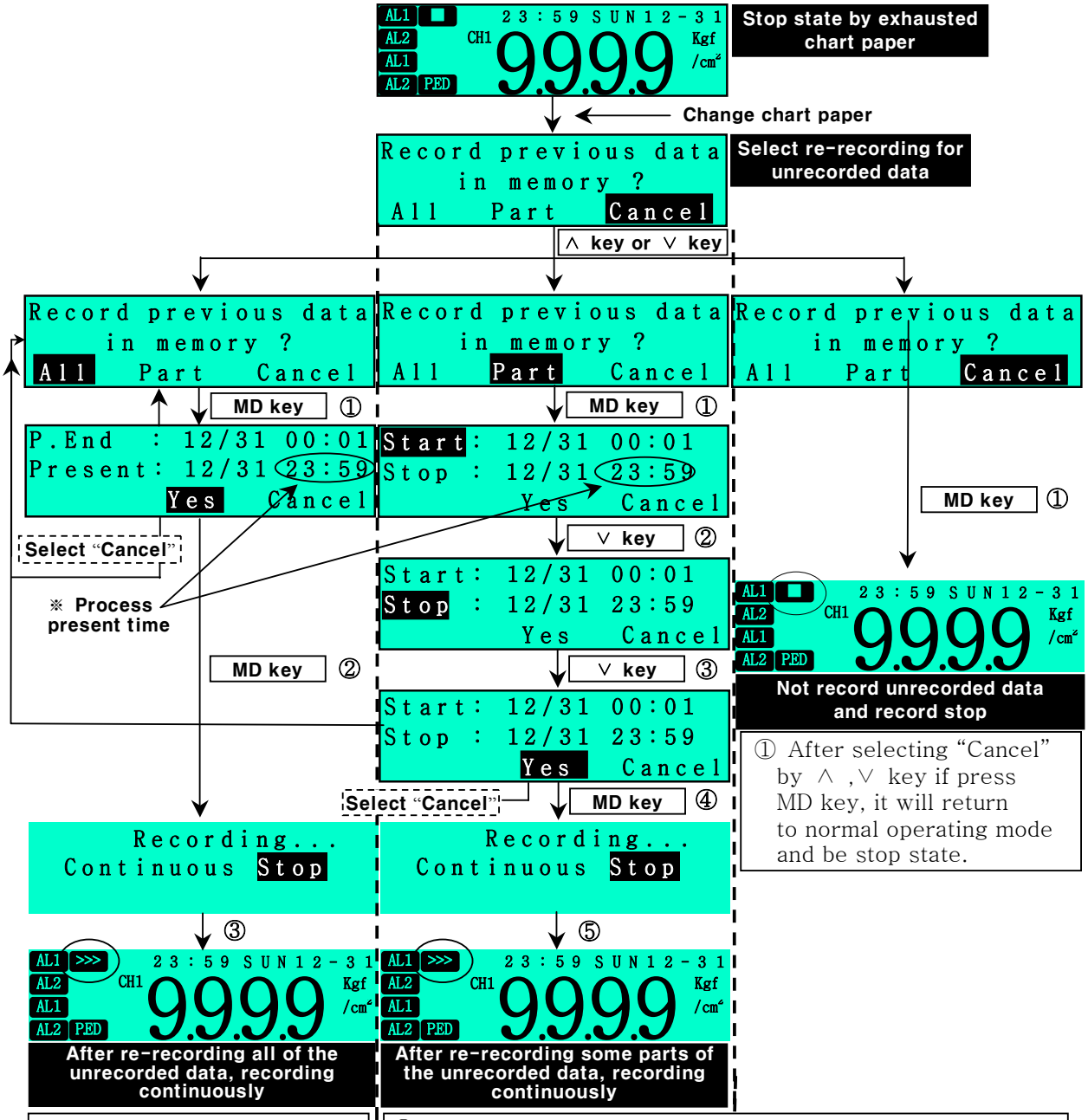
- This function is to record the data of after the time of exhausting chart paper if paper end function operates during run or stop.
- It is similar with data logger and recording data is able to be saved in the internal memory of the recorder.
- When changing chart paper, the following message is automatically indicated. Then user is able to select by ∧,∨ key whether recording the unrecorded data or not.



NOTE

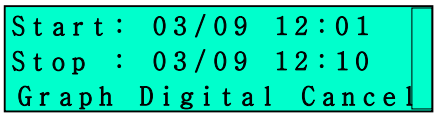
It records by current setting record mode (Digital mode or Graph mode). Therefore user is not able to change record setup of setting mode on P.END state.

- Recording/Printing type
  1) All : Recording/Printing all data saved in memory of from the time of paper end to current time.
  2) Part : Recording/Printing some parts of data saved in memory of from the time of paper end after user sets recording/printing time range (Start time/Stop time).
  3) Cancel : Not recording/printing data in memory and return to operating mode.
- Setting range : All / Part / Cancel (Unit : -)
- Factory default : Cancel
- If chart paper is exhausted during RUN state, it will be changed to STOP state automatically.
- When user changes chart paper, message for re-recording function about unrecorded data is indicated on display and user is able to select the recording range.

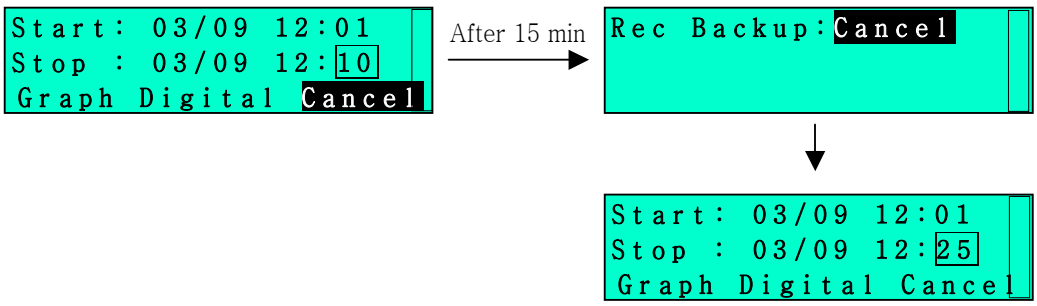

AL1 AL2 AL1 AL2 PED
23:59 SUN 12-31
CH1
9.9.9.9
Kgf /cm²
Stop state by exhausted chart paper
Change chart paper
Record previous data in memory ?
All Part Cancel
Select re-recording for unrecorded data
∧ key or ∨ key
MD key ①
P.End : 12/31 00:01
Present: 12/31 23:59
Yes Cancel
Start: 12/31 00:01
Stop : 12/31 23:59
Select "Cancel"
※ Process present time
∨ key ②
Stop : 12/31 23:59
MD key ②
∨ key ③
Select "Cancel"
MD key ④
Not record unrecorded data and record stop
① After selecting "Cancel" by ∧ ,∨ key if press MD key, it will return to normal operating mode and be stop state.
Recording...
Continuous Stop
③
⑤
After re-recording all of the unrecorded data, recording continuously
After re-recording some parts of the unrecorded data, recording continuously
① After selecting "All" by ∧ ,∨ key if press MD key, P.End and present time will be indicated. (Process present time.)
② After selecting "Yes" by ∧ ,∨ key, press MD key,
※ If selecting "Cancel", it will return to the upper step.
③ All data is recorded by the fastest recording speed. During recording"Recording··· Continuous Stop" message is indicated. Then if press MD key, recording will be finished and it will return to operating mode.
① After selecting "All" by ∧ ,∨ key if press MD key, the time of exhausting chart paper (Start) and present time (Stop) are indicated and start time is selected. (Present Time : Indicating process state)
② After setting start time (Start) by MD, <, ∧ ,∨ key, move to stop time (Stop) by ∧ key.
③ After setting stop time (Stop) by MD, <, ∧ ,∨ key, press MD key. (When setting stop time, present time process is stopped.)
※ If not seting stop time, it will record the data of until present time.
④ Select "Yes" and press MD key.
※ If selecting "Cancel", it will return to the upper step.
⑤ During recording, "Recording...Continuous Stop" message is indicated. Then, if press MD key, recording will be stopped and returned to operating mode automatically.

11.10 Backup data recording function [Rec Backup]

- This function is similar to data logger and data is able to be saved in internal memory of recorder.
- It is able to print selected all or part of data saved in fixed memory capacity at once.
- When entering into the setting mode, saving time as start time and stop time is indicated as following figure. Start time means backup start time and stop time means saving time of until present time.

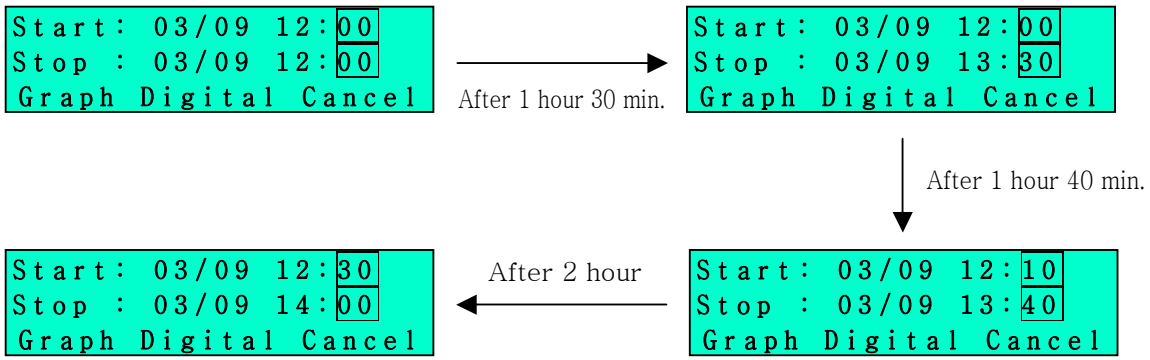


- Start time and stop time are fixed to be indicated for selecting favorable time period by user within saved time period on display for backup data saving time as above.
  Stop time is fixed to be indicated but saving time continuously updates in recorder.
  Therefore if user would like to print backup data after long time standby, printing it after setting to present time for stop time or printing with indicating it on display after cancel and entering into the setting mode again as following figure.



- As data saving capacity of this recorder is 11,000 ea, saving period is mentioned as next page according to recording mode.
- Backup data record applies graph and digital mode. However if backup data is printed by different recording mode from saved recording mode (for example, data is saved by digital mode but printing data by graph mode), print by voluntary recording time(in case of digital mode) or period (in case of graph mode).
- If backup data is saved by digital mode, the interval of saving backup data is different according to recording time.
  (for example, recording time of digital mode is set to 5 min., the interval of saving backup data is every 5 min. and stop time is changed every 5 min. as well.)
- If total record saving time is not passed as figure on the next page, start time is fixed but stop time is updated. However if total record saving time is passed, both start time and stop time are updated since then.

Ex) If graph mode, 960mm/h, total saving period is approx. 1 hour 30 min.

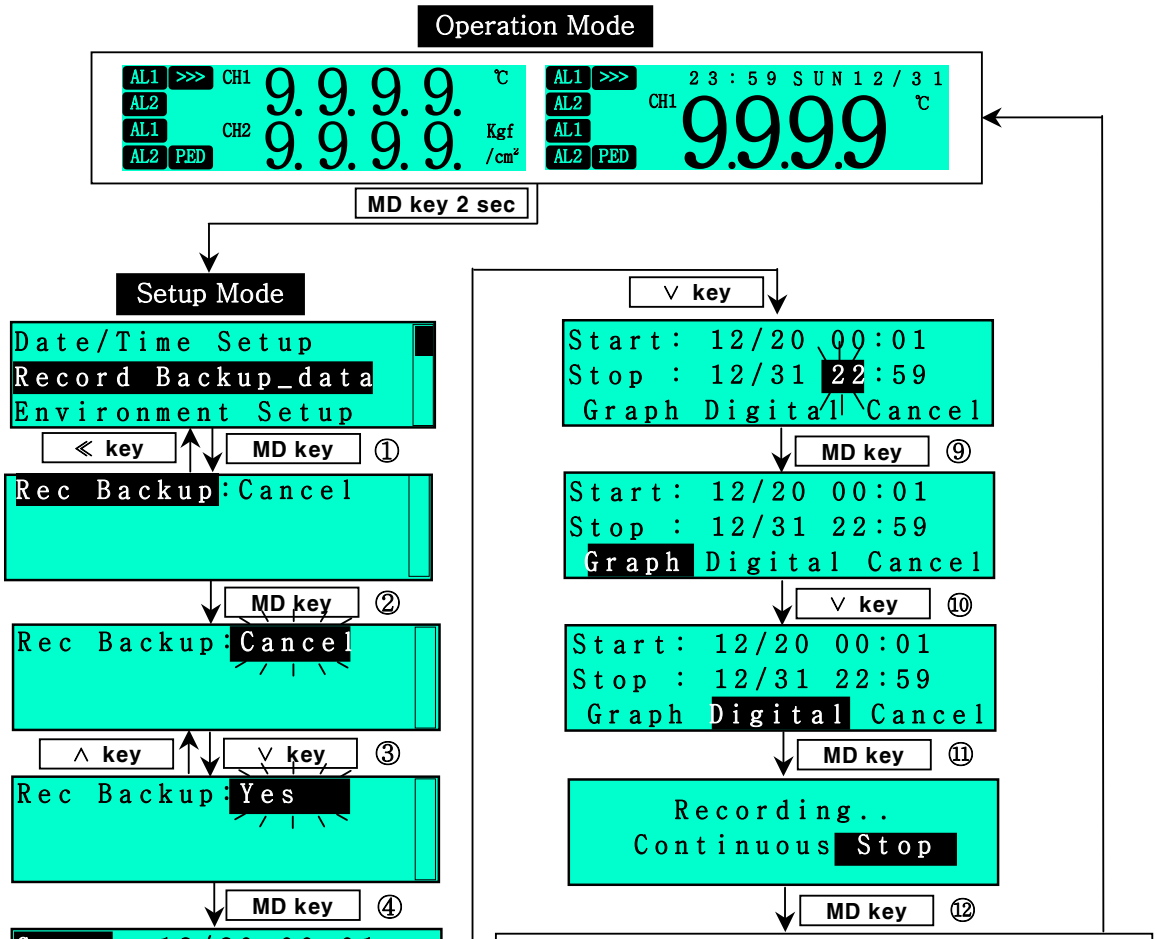


NOTE

1. When data print by record backup, reading PV function is only able to be used among communication functions.
2. When changing setup as following, previous backup data is removed and it starts saving since this time.
   Therefore please be careful when setup influenced to record backup data.
   - Record mode setup
     : When changing Rec mode, Rec period or Time, Alarm speed setting.
   - Input type setup
     : CH1 or 2 Record, CH1 or 2 In type,
     When analog input, CH1 or when changing 2 Lo,Hi scale setting
   - Date/ Time setup
     : When changing date or time setting

- Setting range : Cancel / Yes (Unit:-)
- Factory default : Cancel

Graph Mode Rec Speed	Interval of saving time for 1 data	Total record backup period
960mm/h	0.5 sec.	11000 x 0.5 sec. = Apporx 1hour 30 min.
480mm/h	1 sec.	Apporx 3 hour
240mm/h	2 sec.	Apporx 6 hour
120mm/h	4 sec.	Apporx 12 hour
60mm/h	8 sec.	Apporx 24 hour
30mm/h	16 sec.	Apporx 48 hour
10mm/h	48 sec.	Apporx 6 data (144 hour)
Digital Mode Rec Speed	Interval of saving time for 1 data	Total record backup period
5 sec.	5 sec.	11000 x 5 sec. = Apporx 15hour 20 min.
6 sec.	6 sec.	Apporx 18 hour 33 min.
~	~	~
1 min.	60 sec.	Apporx 7.6 data
~	~	~
60 min.	3600 sec.	Apporx 458 data
~	~	~
99 min. 59sec.	6000 sec.	Apporx 763 data



① If select “Record Backup_data” setting group by means of ∧,∨ key and press MD key after entering into setting mode, backup data recording parameter [Rec Backup] is selected.
② If press MD key, previous set value is flickering every 1 sec.
③ Select “Yes” by means of ∧,∨ key.
④ If press MD key after selecting “Yes”, start time and stop time of backup data saved in memory are indicated.
- Start time : The start time of saving data to memory.
- Stop time : The time of pressing MD key after selecting “Yes”.

(※ The range of start time and stop time are fluctuated because data is saved according record speed and cycle at the basis of internal memory capacity.)

⑤ If printing since the saving start time, press MD key for not changing setting value and press ∨ key for moving to stop time parameter.
(※ If user needs to change record start time, changing it after pressing MD key for entering into the state of changing setting value.)
⑥ When user needs to change record stop time, if press MD key, the unit of min. is flickering every sec.
(※ By means of ∧ or ∨ key)
⑦ When user needs to change the unit of hour, if press ≪ key, the unit of hour is flickering every sec.
⑧ Stop time is able to be set by means of ∧ or ∨ key.
⑨ If press MD key after setting stop time, it is able to set recording mode.
⑩ In case of record by digital mode, select “Digital” by means of ∧ or ∨ key.
⑪ Finally if press MD key, after recording the data set between start time and stop time by relevant recording mode with the fastest speed, returning to operating mode automatically.
⑫ “Recording··· Continuous Stop” message is indicated during record. Then when user needs to stop recording, if press MD key, it will be stopped and returned to operating mode automatically.

11.11 Parameter setting list print [List Print]

- This function is to record setting information of main parameter.
- During record, if press ≪ key for 3 sec., after recording setting information of each menu, recording PV again.
- Record parameter : Tag name, Input, Unit, Range, Scale, Alarm mode, Alarm setting value, Communication function
- When starting record, parameter setting information is able to be recorded according to printing the setting list parameter.

현재시간 09년03월10일 12시10분10초

※ 파 라 메 타 설 정 ※

	채널 1	채널 2
채널명칭	TEMP	HUMI
입력사양	TC-K1	mA
표시단위	℃	%
입력범위	-200~1350	4~20
기록범위	0~400	0~1000
경보1모드	HIGH	HIGH
경보설정값	300	900
경보2모드	LOW	LOW
경보설정값	150	700
통신기능	RS485	Modbus RTU

소형기록계 KRN50 www.konics.co.kr
A/S : 032-820-2422

Korea

DATE 03-10-2009 12:10:10

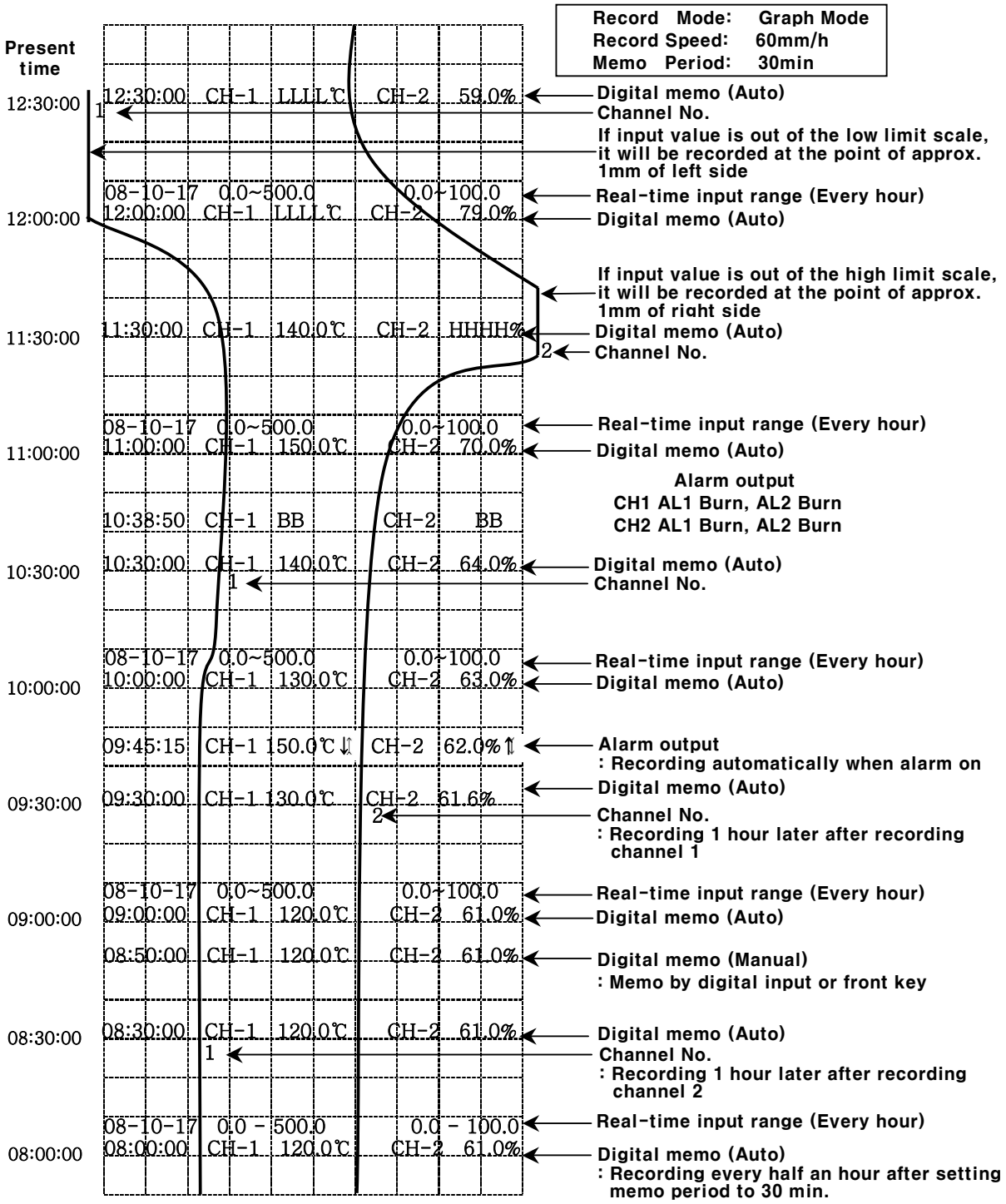
※ SETUP PARAMETER ※

	CH 1	CH 2
TAG NAME	TEMP	HUMI
INPUT	TC-K1	mA
UNIT	℃	%
RANGE	-200~1350	4~20
SCALE	0~400	0~1000
ALARM 1	HIGH	HIGH
VALUE	300	900
ALARM 2	LOW	LOW
VALUE	150	700
INTERFACE	RS485	Modbus RTU

Recorder KRN50 www.konics.co.kr
A/S : 82-32-820-2422

English

11.12 Explanation for printed chart paper



[Figure 11-5 Chart paper on graph mode]

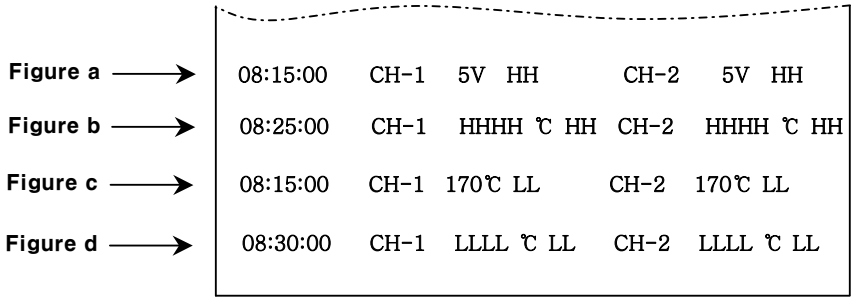
12. Explanation for display information function and setup

12.1 Self-diagnosis

- This function is to indicate the message for error state.

Massage	Description
HHHH	If input value is higher than using range, it will be flickering every 0.5 sec. → When input value is within using range, it will be automatically cancelled. In case of analog input : If full scale(F.S) of input range is within ±10%, it will indicate PV only on LCD display and it will record PV with either HH or LL simultaneously as following figure 11-6 (a). If full scale(F.S) of input range is out of ±10%, it will indicate and record HHHH, HH or LLLL, LL as following figure 11-6 (b). But in case of Hi < Lo setting, it will be indicated oppositely. Therefore in case of 0~20mA input and Hi scale=0, Lo scale=100, then if input is out of 20mA, it will indicate LLLL, not HHHH. (In case of 1V analog input, HHHH, LLLL do not operate.) In case of TC, RTD input : After setting HI,LO Graph value within sensor temperature range, if PV is out of HI,LO Graph value, it will indicate PV only on LCD display and it will record PV with either HH or LL simultaneously as following figure 11-6 (c). After setting HI,LO Graph value same as sensor temperature range, if PV is out of temperature range, it will indicate and record HHHH or LLLL as following figure 11-6 (d).
LLLL	If input value is lower than using range, it will be flickering every 0.5 sec. → When input value is within using range, it will be automatically cancelled. In case of analog or TC, RTD input, indicating will be same asabove. (In case of 1V analog input, HHHH, LLLL do not operate.)
BURN	If input except for 10V input is disconnected, it will be flickering every 0.5 sec. → When input is connected normally, it will be automatically cancelled.
Time Set!!	If time setup is fault for re-recording function by record backup or P.end, it will be indicated. If start time and stop time are same on reservation record function, it will be indicated. If press MD key, it will be cancelled and returned to previous setting state.
Over range!!	When setting HI,LO Graph or range on input type setup, if setting value is out of limit value, it will be indicated. If press MD key, it will be cancelled and returned to previous setting state.
Hi < Lo!!	When setting HI,LO Graph or range on input type setup, if setting value is Hi < Lo or it is not accurate with setting range introducing in this user manual, it will be indicated.(Ex, In case of TC-K1 and -200~1350℃, high limit scale value setting range is low limit scale value + F.S 10% ~ Max. using range for each sensor, -1350℃ ~ -185℃. Then if setting -186℃, "Hi < Lo !!" error message will be indicated.) If press MD key, it will be cancelled and returned to previous setting state.

- Relevant channel occurs error operation as above, above message will be indicated by relevant channel turn.
- HH or LL message will be indicated as figure 11-6, when alarm does not operate.



[Figure 11-6 Example of message on chart paper]

12.2 Display indicating mode

- In case of 2 channel model, display mode is divided by normal mode (2 channel mode or 1 channel autorotation) and manual mode.

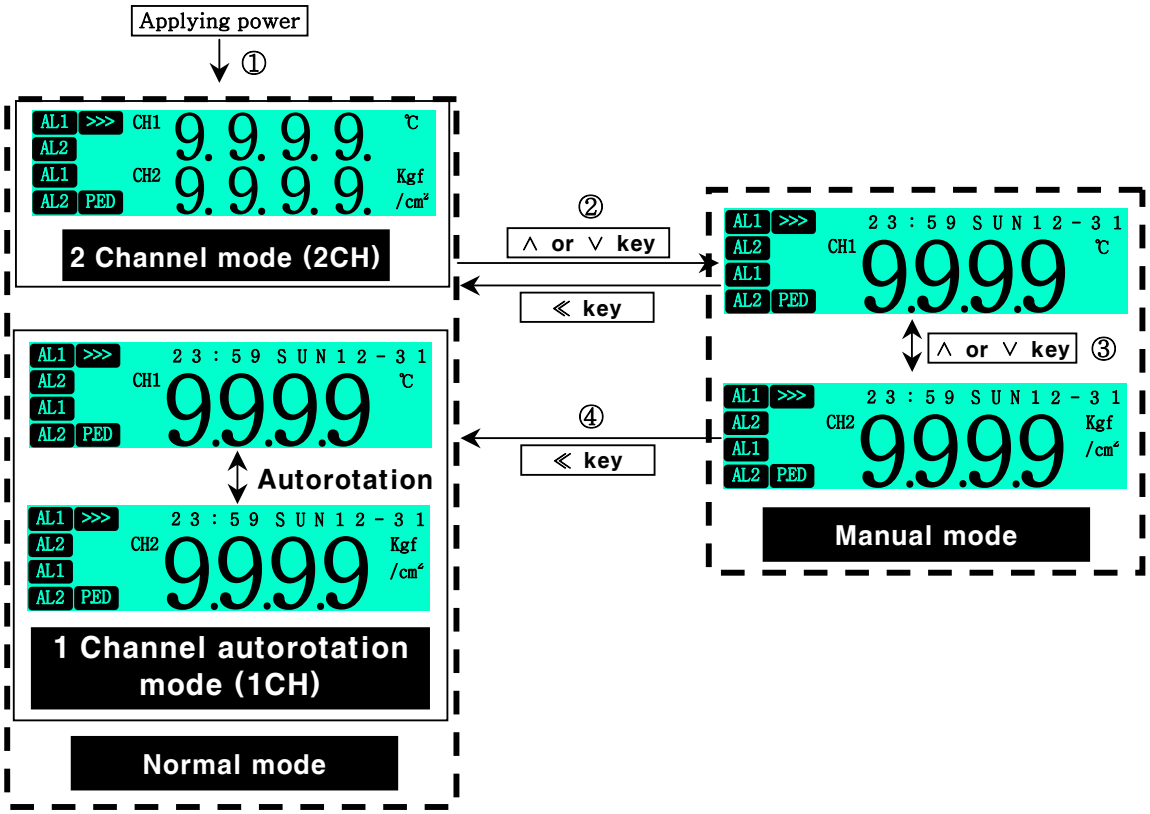
12.2.1 Display normal mode [Display Mode]

1) 2 Channel mode [2CH]
   - As indicating input value (PV) of 2 channel (CH1 and CH2) simultaneously, if setting display mode to 2 CH on environment setup, PV of CH1 is indicated at the top and PV of CH2 is indicated at the bottom simultaneously.

2) 1 Channel autorotation mode [1CH]
   - As indicating and rotating 1 channel by periods if setting display mode to 1 CH on environment setup, PV for each channel is automatically rotating and indicating by 2 sec. cycle.
     (Indicating CH1 for 2 sec. ↔ CH2 for 2 sec.)
   - If setting one channel record only
     [Input type setup group >> CH1 or CH2 Record "Off"],
     1 channel display mode is fixed and indicated.
   - Setting range : 2CH / 1CH (Unit : -)
   - Factory default : 2CH

12.2.2 Display manual mode

- User is able to select one channel manually by means of ∧ or ∨ key.
- Display mode conversion method is as follows.



① If applying power, it will be indicated by mode setup (2CH or 1CH) on display mode parameter.

② When user needs to indicate 1 channel by manual mode, if press ∧ or ∨ key, PV of CH1 will be indicated.

③ Each channel is able to be converted/selected by ∧ or ∨ key. (CH1 ↔ CH2)

④ If press << key on manual mode, it will be converted to normal mode.

※ When applying power or when returning after an electricity failure, it will be indicated by mode setup (2CH or 1CH) on display mode parameter automatically.

12.3 LCD backlight function [Backlight]

- This function is to set LCD backlight type and there are always lightening type and temporary lighting type.
- Always lightening type [Always] : It will lighten up during power on.
- Temporary lightening type [Temp] : It will lighten up for 30 sec. after power on and then automatically light down if no key input. During light down state, if operating front key, it will lighten automatically. If no key input for 30 sec after final front key operation, it will light down automatically.

13. Explanation for parameter lock function and setup [Setting Lock]

- This function is to restrict checking and changing parameter setting value.

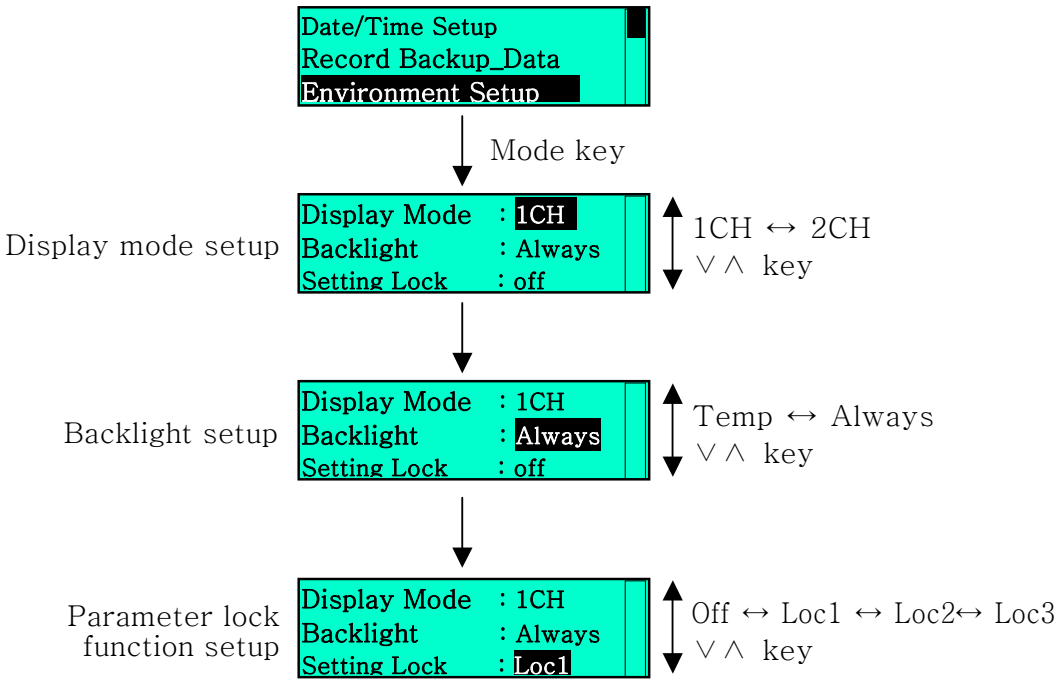
	OFF	Loc1	Loc2	Loc3
Alarm Setup Group Parameters Reservation Setup Group Parameters	●	●	●	◐
Input Setup Group Parameters Record Setup Group Parameters Option Setup Group Parameters RS485 Setup Group Parameters	●	●	◐	○
Date/Time Setup Group Parameters Record Backup_Data Group Parameters Environment Setup Group Parameters	●	◐	○	○

●: Checking & Setting – Enable, ◐: Checking – Enable / Setting – Disable,
○: Checking – Disable

- Even though selecting [Loc1],[Loc2],[Loc3], [Setting Lock] parameter will be always indicated and it will be changed.
- Factory default : Off (Unit : –)

NOTE

Even though setting parameter lock function up, parameter will be initialized by parameter initializing function.



14. Parameter initialization [Parameter Initialize]

- This function is to initialize all parameters in memory to factory default value.
- If press MD + << key for 5 sec. simultaneously, it will operate.

- If select setting value to "Yes" by ∧ or ∨ key and press MD key, all parameters will be initialized to factory default value and returned to operating mode.
- For factory default value for each setting, please refer to "16. Setting related ModBus address map, range, unit and factory default table".
- Setting range : Yes / No
- Factory default : No (Unit : -)

15. Explanation for communication function and setup

15.1 Communication

- This function is to set or monitor parameter by external upper system (PC, PLC, etc.) or transmit data to external equipment by communication.
- KRN50 recorder is able to communicate through back terminal or front phone jack. (In case of back terminal connection, please refer to [Figure 6-3 Connections].
- Front and back communication functions are not used simultaneously.

- In case of communication by front phone jack, please use USB To Serial(SCM-US) manufactured by Autonics corp.

NOTE

In case of not communication model (KRN50-1000...), it is able to communicate by front phone jack only.
However because it has not communication setup function, communication setting value is fixed as follows. Therefore please be careful.
Communication speed:9600, Communication response time:0.05sec,
Start bit:1bit, Stop bit:1bit, Parity bit=None

- Interface

Application Standard	EIA RS485 STD.
Max. connection unit	31 units (Address : 01 ~ 99)
Communication method	2-wire Half Duplex
Communication synchronous type	Asynchronous
Communication valid distance	Max. 1 Km
Communication speed	1200, 2400, 4800, 9600, 19200, 38400, 57600 bps
Communication response time	0.05~0.99 sec.
Start bit	1bit (Fix)
Stop bit	1 or 2bit
Parity bit	NONE, Odd, Even
Data bit	8bit (Fix)
Protocol	ModBus RTU

- At first, relative communication setup of KRN50 equalizes to the upper system.
- Double setup of communication address at the same line is not allowed.
- In case of communication cable, twist pair wire accurate for RS485 communication must be used.
- RS485 communication has the advantages as like fast transmitting speed, long communication valid distance, etc. however if communication line is not matched with impedance between driver, receiver of RS485, reflected waves are created. If connection length of this reflected waves is lengthened or if using multi-drop of I:N, it may cause transmission error therefore please be aware of that terminal resistor must be used to both end parts of network. (Terminal resistive value : 100~120Ω,1/4W)

15.2 Communication address [Address]
- Setting range : 01 ~ 99
- Factory default : 01 (Unit : -)

15.3 Communication speed (Bit Per Second) [Baud Rate]
- Setting range : 1200, 2400, 4800, 9600, 19200, 38400, 57600 bps
- Factory default : 9600bps (Unit : bps)

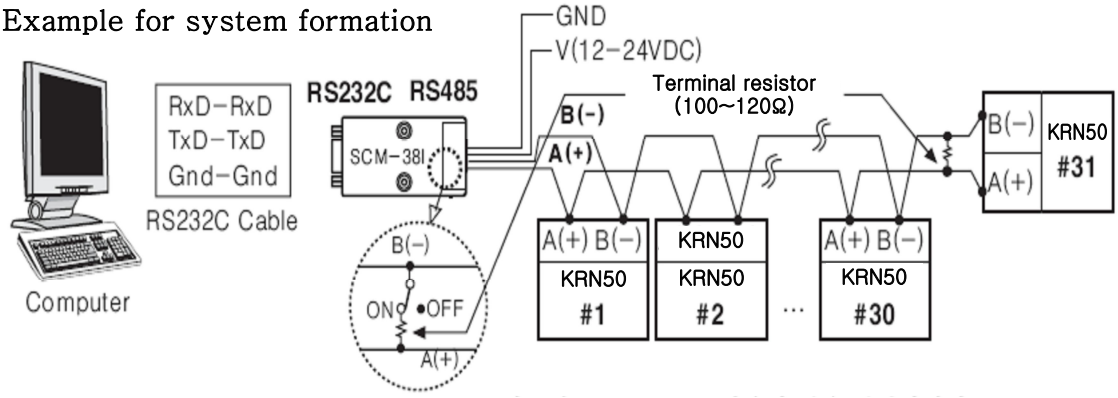
15.4 Parity Bit [Parity Bit]
- Setting range : None, Even, Odd
- Factory default : None

15.5 Stop Bit [Stop Bit]
- Setting range : 1,2
- Factory default : 2 (Unit : Bit)

15.6 Response time [Resp Time]
- Setting range : 0.05 ~ 0.99 sec
- Factory default : 0.05 (Unit : sec)

15.7 Communication writing enable/disable [Com Write]
- This function is to enable/disable change/write setting value of saved parameter in memory through communication (PC/PLC).
- Always reading setting value in parameter is available.
- Enable : Setting value of each parameter enables change/write.
- Disable : Setting value of each parameter disables change/write.
- Setting range : Enable / Disable
- Factory default : Enable (Unit : -)

◎ Example for system formation



※ Recommend to use SCM-38I manufactured by Autonics Corp. for RS232C ↔ RS485

※ Monitoring program of RS485 communication output is able to be downloaded from web site (www.konics.com).

16. Setting related ModBus address map, range, unit and factory default table

16.1 Alarm setup table [Alarm Setup]

Parameter	Addr	Description	Setting range	Unit	Factory default
CH1 AL1 Type	40101	CH1-AL1 operating mode	0: Off 1: PV.Hi 2: PV.Lo 3: SBA 4: P.End	-	PV.Hi
CH1 AL1 Opt	40102	CH1-AL1 option	0: None 1: Latch 2: StBy 3: La+St	-	None
CH1 AL1 Low ※1	40103	CH1-AL1 low limit setting value	Indicating range for relevant input type	Digit	-200
CH1 AL1 High ※1	40104	CH1-AL1 high limit setting value			1350
CH1 AL2 Type	40105	CH1-AL2 operating mode	0: Off 1: PV.Hi 2: PV.Lo 3: SBA 4: P.End	-	PV.Lo
CH1 AL2 Opt	40106	CH1-AL2 option	0: None 1: Latch 2: StBy 3: La+St	-	None
CH1 AL2 Low ※1	40107	CH1-AL2 low limit setting value	Indicating range for relevant input type	Digit	-200
CH1 AL2 High ※1	40108	CH1-AL2 high limit setting value			1350
CH1 Alarm Hys	40109	CH1 alarm hysteresis	001 ~ 999	Digit	001
CH2 AL1 Type ※2	40110	CH2-AL1 operating mode	0: Off 1: PV.Hi 2: PV.Lo 3: SBA 4: P.End	-	PV.Hi
CH2 AL1 Opt ※2	40111	CH2-AL1 option	0: None 1: Latch 2: StBy 3: La+St	-	None
CH2 AL1 Low ※1, ※2	40112	CH2-AL1 low limit setting value	Indicating range for relevant input type	Digit	-200
CH2 AL1 High ※1, ※2	40113	CH2-AL1 high limit setting value			1350
CH2 AL2 Type ※2	40114	CH2-AL2 operating mode	0: Off 1: PV.Hi 2: PV.Lo 3: SBA 4: P.End	-	PV.Lo
CH2 AL2 Opt ※2	40115	CH2-AL2 option	0: None 1: Latch 2: StBy 3: La+St	-	None
CH2 AL2 Low ※1, ※2	40116	CH2-AL2 low limit setting value	Indicating range for relevant input type	Digit	-200
CH2 AL2 High ※1, ※2	40117	CH2-AL2 high limit setting value			1350
CH2 Alarm Hys ※2	40118	CH2 alarm hysteresis	001 ~ 999	Digit	001

※ This setting group is indicated for alarm output model only.

※1. It indicates related with alarm output operating mode(AL□ Type) parameter setup.

- CH□ AL□ Type(Off, SBA or P.end) : CH□ AL□ Low, CH□ AL High parameters are not indicated.
- CH□ AL□ Type(PV.Hi) : CH□ AL□ High parameters are not indicated.
- CH□ AL□ Type(PV.Lo) : CH□ AL□ Low parameters are not indicated.

※2. It is indicated for 2 channel alarm output model only.

16.2 Reservation setup table [Reservation Setup]

Parameter	Addr	Description	Setting range	Unit	Factory default
Reservation	40070	Reservation record function On/Off	0: OFF 1: ON	–	Off
Start Time ※1	40071	Record starting hour	00:00 ~ 23:59	hh.mm	00:00
	40072	Record starting minute			
Stop Time ※1	40073	Record stopping hour	00:00 ~ 23:59		00:01
	40074	Record stopping minute			

※1. It is indicated if reservation record function is on only.

16.3 Input type setup table [Input Type Setup]

Parameter	Addr	Description	Setting range	Unit	Factory default
CH1 Record	40301	CH1 Use/No use	0: USE 1: NO USE	–	On
CH1 In Type	40302	CH1 input specification	0:TC-K1 1:TC-K2 2:TC-J1 3:TC-J2 4:TC-E1 5:TC-E2 6:TC-T1 7:TC-T2 8:TC-B 9:TC-R 10:TC-S 11:TC-N 12:TC-C 13:TC-G 14:TC-L1 15:TC-L2 16:TC-U1 17:TC-U2 18:TC-P 19:CU50 20:CU100 21:JPT1 22:JPT2 23:DPT50 24:DPT1 25:DPT2 26:A.mV1 27:A.mV2 28:A-V1 29:A-V2 30:A.mA1 31:A.mA2	–	TC.K1
CH1 Temp Unit ※1	40303	CH1 temp. unit	0:℃ 1: ℉	–	℃
CH1 Lo Graph ※1	40304	CH1 graph low limit scale value	※Refer to 9.1.3.2	Digit	-200
CH1 Hi Graph ※1	40305	CH1 graph high limit scale value			1350
CH1 Lo Range ※2	40306	CH1 low limit input value	※Refer to 9.1.4	–	–
CH1 Hi Range ※2	40307	CH1 high limit input value			–
	40308	None			
CH1 Lo Scale ※2	40309	CH1 low limit scale value	-1999 ~ 9999	Digit	000.0
CH1 Hi Scale ※2	40310	CH1 high limit scale value			100.0
CH1 Hi Scale Decimal Point ※2	40311	CH1 scale decimal point	0: 0 1: 0.0 2: 0.00 3: 0.000		0.0
CH1 DP Unit ※2	40312	CH1 record indicating unit	0:℃ 1:℉ 2:% 3:ppm 4:V 5:mV 6:mA 7:Pa 8:kPa 9:pH 10:psi 11:kgf/cm^2 12:m^3/H 13:mmHg 14:mmH$_2$O 15:User1 16:User2 17:User3 18:User4 19:User5 20:User6 21:User7 22:User8 23:User9 24:User0 25:OFF	–	%
CH1 In Bias	40313	CH1 input bias	-999 ~ 999	Digit	0000
CH1 Tag Name	40314	CH1 tag name □□□□	Front two word, Ex.)C H - 1	–	CH
	40315		Back two word, Ex.)C H - 1	–	-1
CH2 Record ※3	40319	CH2 Use/No use	0: USE 1: NO USE	–	On
CH2 In Type ※3	40320	CH2 input specification	With 40301 address set same	–	TC.K1
CH2 Temp Unit ※3	40321	CH2 temp. unit	0:℃ 1: ℉	–	℃
CH2 Lo Graph ※3	40322	CH2 graph low limit scale value	※Refer to 9.1.3.2	Digit	-200
CH2 Hi Graph ※3	40323	CH2 graph high limit scale value			1350
CH2 Lo Range ※3	40324	CH2 low limit input value	※Refer to 9.1.4	–	–
CH2 Hi Range ※3	40325	CH2 high limit input value			–
	40326	None			
CH2 Lo Scale ※3	40327	CH2 low limit scale value	-1999 ~ 9999	Digit	000.0
CH2 Hi Scale ※3	40328	CH2 high limit scale value			100.0
CH1 Hi Scale Decimal Point ※2	40329	CH2 scale decimal point	0:0, 1:0.0, 2:0.00, 3:0.000		0.0

CH2 DP Unit ※3	40330	CH2 record indicating unit	With 40311 address set same	–	%
CH2 In Bias ※3	40331	CH2 input bias	−999 ~ 999	Digit	0000
CH2 Tag Name ※3	40332 ~40333	CH2 tag name	With 40313~40314 same	–	CH−2

※1. It is indicated if input type is temp. sensor only.
※2. It is indicated if input type is analog type (voltage, current) only.
※3. It is indicated for 2 channel model only.

16.4 Record setup table [Record Setup]

Parameter	Addr	Description	Setting range	Unit	Factory default
Rec Mode	40080	Record mode	0: Graph 1: Digital	–	Graph
Rec Speed ※1	40081	Record speed	0:10, 1:30, 2:60, 3:120,4:240 5:480,6:960	mm/hour	10mm
Memo Period ※1	40082	Digital memo period	※Refer to 11.3.1.2	min	30min
Rec Period ※2	40083	Record period	※Refer to 11.3.2.1	m.s	01m00s
Rec Font	40084	Record font	0: Korea 1: English	–	Korea
Alarm Speed	40085	Record speed when alarm on	0:10, 1:30, 2:60, 3:120,4:240 5:480,6:960	mm/hour	10mm

※1. It is indicated if record mode is “Graph” only.
※2. It is indicated if record mode is “Digital” only.

16.5 Option setup table [Option Setup]

Parameter	Addr	Description	Setting range	Unit	Factory default
Digital Input 1	11	DI−1 function	0: Stop 1: Run	–	Off
Digital Input 2	12	DI−2 function	0: Off 1: Memo	–	Off
PWR On State	2	Record start/stop when applying power	0: Run 1: Stop	–	Run
Run On State	3	Record setting list On/Off during record	0: Off 1: List	–	List

16.6 RS485 setup table (Read Only) [RS485 Setup]

Parameter	Addr	Description	Setting range	Unit	Factory default
Address	40001	Communication address	01 ~ 99	–	01
Baud Rate	40002	Communication speed	0:1200 1:2400 2: 4800 3:9600 4:19200 5:38400 6:57600	bps	9600bps
Parity bit	40003	Parity bit	0:None 1:Odd 2: Even	–	None
Stop Bit	40004	Stop bit	0: 1 1: 2	Bit	2
Response Time	40005	Response time	50~990	msec	50
Com Write	40006	Communication write Enable/Disable	0: Enable 1: Disable	–	Enable

16.7 Date/Time setup table [Date/Time Setup]

Parameter	Addr	Description	Setting range/Unit	Factory default
Date	40052	Year	00~99	
	40053	Month	00~12	
	40054	Day	00~31	
Time	40055	Hour	00 ~ 23	
	40056	Minute	00 ~ 59	
	40057	Second	00 ~ 59	

16.8 Environment setup table [Environment Setup]

Parameter	Addr	Description	Setting range	Unit	Factory default
Display Mode	101	CH1 display mode	0: Off 1: On	–	2CH
	102	CH2 display mode	0: Off 1: On		
	103	Display normal mode ※1	0 : Indicating 2 channels 1 : 1 channel autorotation		
Setting Lock	40066	Setting lock function	0: Off 1: Loc1 2: Loc2 3: Loc3	–	Off
Backlight	40067	Backlight type	0: Temp 1: Always	–	Temp

※1. It is indicated for 2 channel mode only.

17. Other ModBus address map table

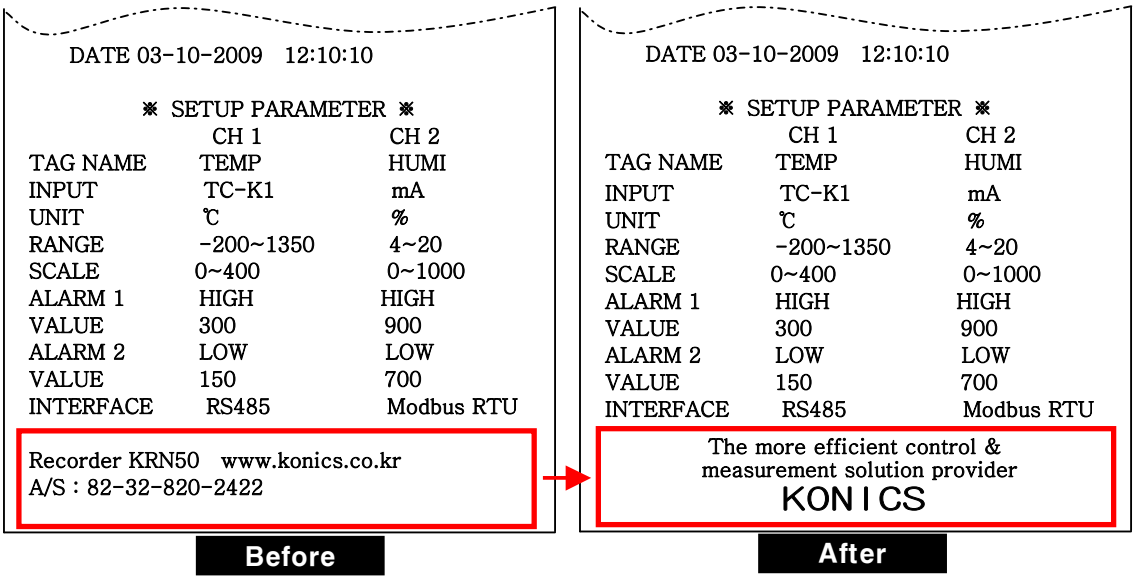
Addr	Description		Setting range	Factory default
1	Recording RUN/STOP		0:STOP 1: RUN	0
4	Parameter initialization ※1		0:OFF 1:ON	0
5	Memo		0:OFF 1:ON	0
51	Paper Feed		0:STOP 1:FEED	0
52	Paper List Print		0:STOP 1:PRINT	0
10001	Paper Status		0 : Paper 1 : Paper End	0
10101	CH1 AL1 Status		0 : CH1-AL1 off 1 : CH1-AL1 on	0
10102	CH1 AL2 Status		0 : CH1-AL2 off 1 : CH1-AL2 on	0
10103	CH2 AL1 Status		0 : CH2-AL1 off 1 : CH2-AL1 on	0
10104	CH2 AL2 Status		0 : CH2-AL2 off 1 : CH2-AL2 on	0
10301	DI1-Status		0: OFF 1: ON (Only when setting operation)	0
10302	DI2-Status		0: OFF 1: ON (Only when setting operation)	0
10401	BIT 1	CH-1 Status	0001 : HHHH 0010 : LLLL 0100 : BURN	
10402	BIT 2			
10403	BIT 3			
10404	BIT 4			
10405	BIT 1	CH-2 Status	0001 : HHHH 0010 : LLLL 0100 : BURN	
10406	BIT 2			
10407	BIT 3			
10408	BIT 4			
30001	CH1-PV			
30002	CH1-Decimal Point		0:0, 1:0.0, 2:0.00, 3:0.000	
30003	CH2-PV			
30004	CH2-Decimal Point		0:0, 1:0.0, 2:0.00, 3:0.000	
30101	Serial No H			
30102	Serial No L			
30103	Software Version			
30104	Hardware Version			
30105	Model Name1		"KR"	
30106	Model Name2		"N5"	
30107	Model Name3		"0- "	
30108	Model Name4		"X0 " X : Indicating for relevant model	
30109	Model Name5		"0X " X : Indicating for relevant model	
30110	Model Name6		" -X " X : Indicating for relevant model	
30111	Model Name7		"0 "	
30112	Model Name8		" "	
30113	Model Name9		" "	
30114	Model Name10		" "	

Addr	Description	Setting range	Factory default
30118	Coil Start Address	1	
30119	Coil Quantity	12	
30120	Input Start Address	10001	
30121	Input Quantity	15	
30122	Holding REG Start Address	30001	
30123	Holding REG Quantity	26	
30124	Input REG Start Address	40001	
30125	Input REG Quantity	154	
42001~16	User unit font0※2	User0(16 x 16size)	
42017~32	User unit font1※2	User1(16 x 16size)	
42033~48	User unit font2※2	User2(16 x 16size)	
42049~64	User unit font3※2	User3(16 x 16size)	
42065~80	User unit font4※2	User4(16 x 16size)	
42081~96	User unit font5※2	User5(16 x 16size)	
42097~112	User unit font6※2	User6(16 x 16size)	
420113~128	User unit font7※2	User7(16 x 16size)	
420129~144	User unit font8※2	User8(16 x 16size)	
420145~160	User unit font9※2	User9(16 x 16size)	
50001 ~ 52048	User Logo※3	384 x 80size	

※1. When initialization, setting value related with communication is also initialized therefore please be careful.

※2. Please refer to “9.1.4.6 Display unit”.
After creating user unit font (16 X 16 size) by means of the image editor and downloading it by means of KRN50 communication program, please set user unit font at the setting mode.

※3. When printing list, user logo prints as following. After creating logo (384 X 80 size) by means of the image editor and downloading it by means of KRN50 communication program and printing list, user is able to check it.



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