www.goldenrules.co.kr

Manual
MFC&MFM
(KC-2700 Series)

The nation's development item, 100% domestic goods,Patent **NO.** 10-1606497

Golden Rules

1장

2장

1. Safety Information and Technical Support

Throughout this book, we use caution and warning statements to call your attention to important information.

The above text appears with important information for your safety and to protect your equipment from damage.Pay attention to all performance precautions.Read and follow all cautionary warnings that apply to your application.Applies to your application.

Receiving system components

When you receive your Golden Rules MFC, carefully inspect the outer packaging for any shipping damage. If the box is damaged, notify your local carrier and submit a report to the factory or distributor.Remove the packing slip and ensure all ordered components are present. Ensure that any spare parts or accessories are not discarded with the packaging.Do not return the equipment to the factory without first contacting Golden Rules Customer Service.

Technical Support

If you experience problems with your flowmeter, review the configuration information for each step of the installation, operation, and setup procedures.Ensure that settings and adjustments are consistent with factory recommendations.For specific information and recommendations, see pages 21-22, Troubleshooting. If the problem persists after performing the troubleshooting procedures described on pages 21-22, contact Golden Rules by fax or email (see inside front cover).

For urgent telephone support, call (+82) 032-817-1240 between 9:00 AM and 5:00 PM PST.

When contacting technical support, please include the following information

- Flow range, serial number, and Golden Rules order number (all located on the meter nameplate).
- Software version (displayed at startup).
- Problem encountered and corrective action taken.
- Application information (fluid, pressure, temperature, and piping configuration).

2. Product Introduction

The Model KC-2700 Series (Mass Flow Controller & Meter) is a digital mass flow meter and controller. It is based on a digital device, transmitting analog sensor signals directly to a microprocessor. This ensures safe and accurate transmission of optimal signals, and by directly controlling proportional control valves and other display components, it offers superior precision compared to conventional analog-based flow meters, enabling its use in a wide range of applications.

This device consists of a sensor, base, laminar flow element, control board, and proportional control valve. The sensor, a key component, is specifically designed to accurately transmit gas mass, ensuring low sensitivity and excellent reproducibility. It offers two control methods: PID control and adaptive control. PID control is programmed based on a mathematical algorithm to find optimal conditions within a given environment, while adaptive control enhances responsiveness across the entire flow range, ensuring efficient and fast response.

Notably, the device features a display and operation buttons for easy flow rate reading and operation. Conditions can be quickly and easily adjusted even after prolonged inactivity or when external conditions, such as temperature or pressure, change rapidly. Other functions, such as the gas status within the device, forced valve opening, and error indication, can also be easily checked.

3. Notes

Installation Precautions

- Please check the product specifications before installation.
  - Fluid, power, and signal specifications (refer to the label attached to the case)
  - Wiring and fittings, fluid flow direction (refer to the "FLOW->" direction on the case and wiring precautions)
- Be careful not to allow foreign matter to enter the pipe, and secure the pipe to the floor to prevent deformation.
- We recommend installing a regulator to ensure a constant pressure supply upstream of the product
  - Supply gas by adjusting the pressure according to the manufacturer's specifications.
  - We recommend installing a filter and moisture removal device upstream of the product to prevent foreign matter or moisture from entering.
- We recommend installing separate shutoff valves at the front and rear of the pipe for future maintenance and inspection.
- Please disconnect power from the product until installation is complete.

Things to keep in mind when driving

- Please supply fluids that meet the specifications.

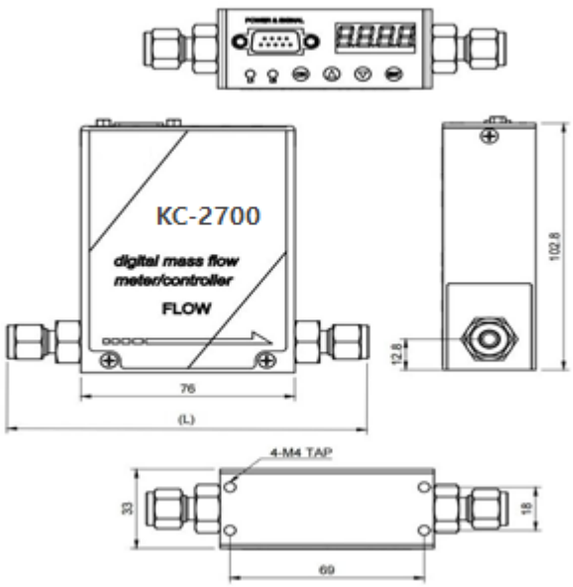
- Using fluids other than those specified may result in product damage, measurement errors, or fluid leakage.Be careful not to introduce foreign substances or moisture.- Introducing foreign substances other than the specified fluids may cause malfunction.Use within the allowable flow, pressure, and temperature ranges.When removing the product after use, be mindful of residual gas inside the product. If using explosive or corrosive gases, purge thoroughly before removing.Allow sufficient warm-up time (30-40 minutes) after powering on to ensure accurate measurements. Avoid touching the power supply if possible.When wiring, always turn off the power and use the rated power source.When using with high-voltage lines or devices that generate noise, take measures to prevent noise, such as grounding.

4. Product Specifications

Model	KC-2700	KC-2700W
Flow Ranges	10 SCCM ~ 30 SLM (N2 Equivalent)	200 SLM (H2 Equivalent)
Accuracy	≤ ±1.0% of Reading Scale (25 ~100% of Full Scale) ≤ ±0.25% of Full Scale (2 ~25% of Full Scale)	
Repeatability	≤ ±0.3% of Full Scale	
Linearity	≤ ±0.3% of Full Scale	
Control Range	2 ~ 100 % of Full Scale	
Control Valve Type	Normally Closed Proportional Valve	
Response Time	≤ 1.5 sec	
Pressure Resistance	980 kPa	
Leak Integrity	1 × 10^{-8} Pam ^{3}/s He	
Ambient Temperature	Within 5 ~ 50 ℃ (Accuracy Warranty: 15 ~ 35 ℃)	
Storing Temperature	50 ℃ (Max.)	
Display & Key	4 Digit - 7 Segment, Adjustable 4 Tact S/W, Without Display	
Power Supply	+15 VDC or +24 VDC / Max. 500 mA	
Analog Signal Inlet / Outlet	0 ~ 5 VDC (Option) 0 ~ 10 VDC (Option) 4 ~ 20 mA (Option) 0 ~ 20 mA (Option)	
Digital Interface	RS-485 / ModbusRTU	
Process Connections	1/8'' SWL (Option) 1/4'' SWL (Standard) 1/4'' VCR (Option) 1/2'' SWL (Option) 1/2'' VCR (Option)	1/4'' SWL (Standard) 1/4'' VCR (Option) 1/2'' SWL (Option) 1/2'' VCR (Option) 1'' SWL (Option)
Seal Type	H-NBR, FKM(VITON), FFKM(Kalrez)	
Material	SUS 316L	
Electrical Connections	Dsub-9pin Male SEMI Standard Reference pin arrangement	
Warm-up Time	20 min (Accuracy Warranty: 30 ~ 40 min)	

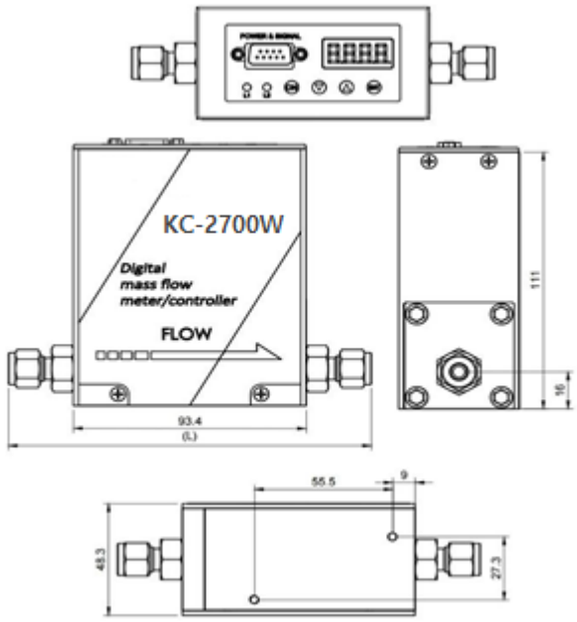
5. Product dimensions

5.1 KC-2700 DIMENSION.



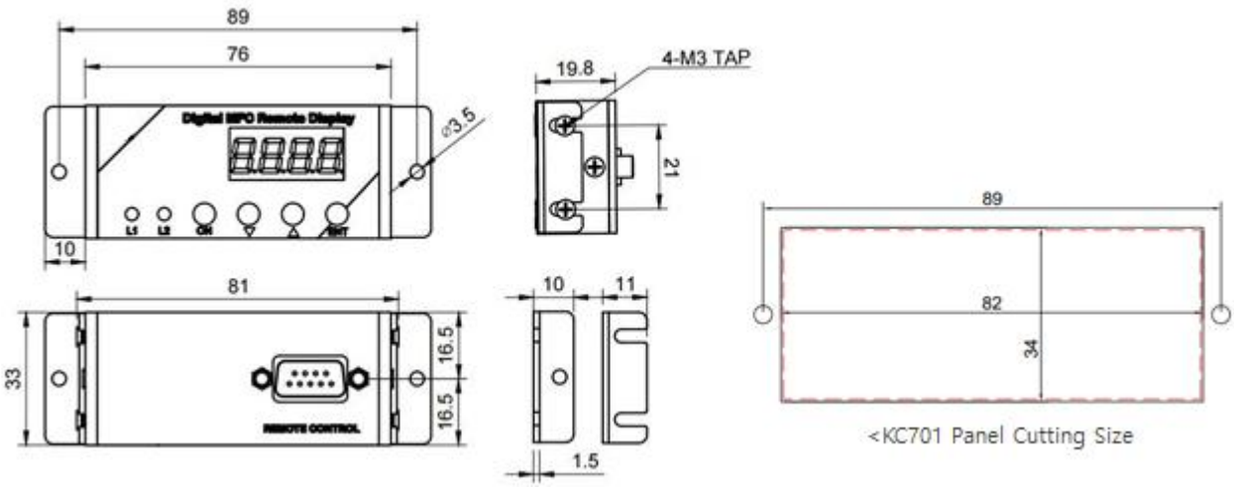
(L)	Size (mm)
1/8'' SWL	122.8
1/4'' SWL	127.4
1/4'' VCR	123.8
1/2'' SWL	134.2
1/2'' VCR	131.8

5.2 KC-2700W DIMENSION



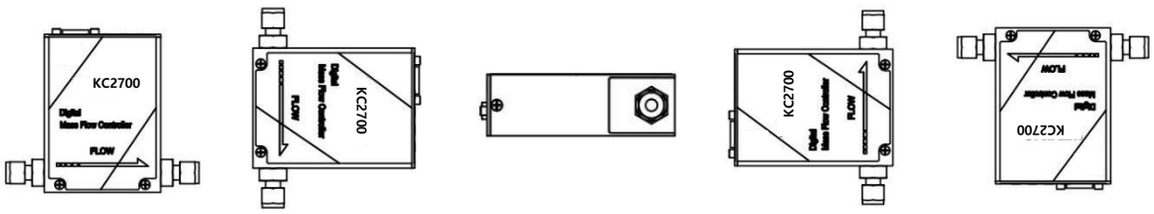
(L)	Size (mm)
1/4'' SWL	144.8
1/4'' VCR	141.2
1/2'' SWL	151.8
1/2'' VCR	149.0
1'' SWL	163.0

5.3 Remote Display (KC701) DIMENSION



6. Location and direction

When initially installing the MFC, the sensor's convection may cause the ZERO value to appear faintly. When ordering a micro-flow rate of 100 cc or less, please refer to the initial installation instructions below.



#1 #2 #3 #4 #5

Orientation

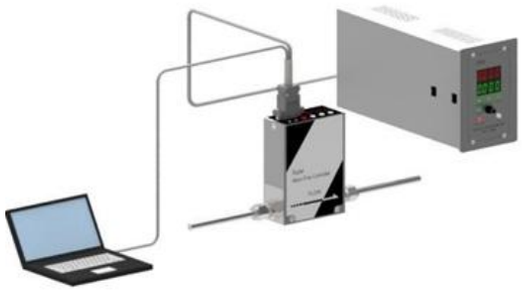
	Location #1	Location #2	Location #3	Location #4	Location #5
FLOW	Horizontal	Vertical	Horizontal	Vertical	Horizontal
MOUNT	Base Down	Inlet Up	Either Side Down	Inlet Down	Upside Down

7. Application

KC-2700 LT + Power Adapter & D-Sub (9Pin)

- **KC-2700 RT + KC701**

- **KC-2700 LT + Readout Unit**



- **KC-2700 RD + KC PU(Power Supply 4-8 Ch)**

8. Order Information

KC-2700	-	M/C	-	A	-	B	B	S	LT	-	#1	-	XXXX
①		②		③		④	⑤	⑥	⑦		⑧		⑨

① MODEL	
1	KC-2700
	KC-2700W

② METER / CONTROL	
M	Meter
C	Control
EC	(EXT) Control
EM	(Option) Meter Display

③ IN/OUT SIGNAL	
N	Non
A	0-5 VDC
B	0-10 VDC
C	4-20 mA
D	0-20 mA
EA	(EXT) 0-5V DC
EB	(EXT) 0-10V DC
EC	(EXT) 4-20mA
ED	(EXT) 0-20mA

④ POWER	
A	+15 VDC
B	+24 VDC

⑤ GAS CONNECTION	
A	1/8'' SWL
B	1/4'' SWL
C	1/4'' VCR
D	1/2'' SWL
E	3/8'' SWL
F	1'' SWL

⑥ MATERIAL	
A	Aluminum
S	SUS 316

⑦ DISPLAY	
LT	Local Top
LF	Local Front
RT	Remote (RD701)
RF	Remote (KRO-7000)

⑧ LOCATION/ORIENTATION	
#1	Location #1
#2	Location #2
#3	Location #3
#4	Location #4
#5	Location $5

⑨ SPECIAL REQUEST
Ex)
Gas Range G
as Pressure
Temperature
....

Installation

1. Environmental requirements

- Normal Operating Temperature Range

: 5 to 50 ℃

- Warm-up Time

: < 30 min

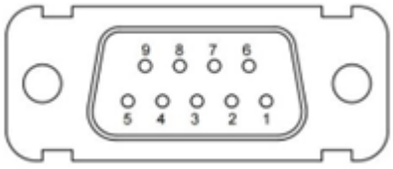
- Operating Humidity

: 0 to 95 %

- Use rated power: +15 ~ 24 VDC (Max. 500mA)
- System Grounding is required for smooth operation and human safety.
- Maintain cleanliness inside the product.

2. Interconnection

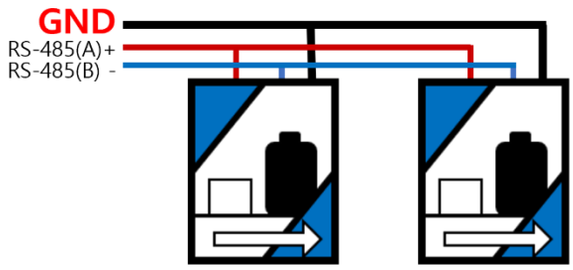
Power and Signal Pin Assignments



Model KC-2700 Connector - 9pin Male D-Sub Connector

Name	Pin No.	Function
0~5 VDC	1	Flow Signal Analog out (Option: 4~20mA)
GND	2	Analog GND
0~5 VDC	3	Set-Point Analog inlet (Option: 4~20mA)
Power	4	Power (+15 ~ +24VDC)
GND	5	Power GND
RS-485(B) -	6	RS-485 (B) -
RS-485(A) +	7	RS-485 (A) +
GND	8	Digital GND
Chassis GND	9	Chassis GND

3. Communication line wiring method



Please check the pin arrangement information and connect it appropriately, and be sure to connect the ground when wiring the communication line.

Precautions when using RS-485 communication

Please connect the connector pins correctly.

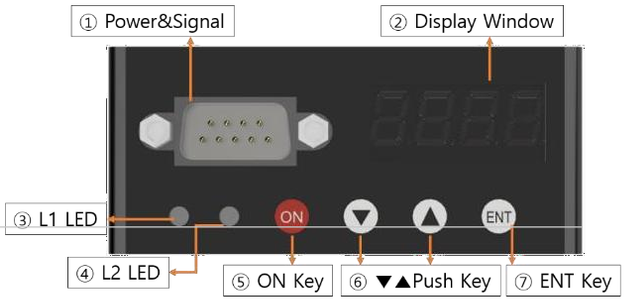
When using RS485 communication, connect and disconnect the device's connector only when the power is OFF. (Be sure to disconnect the device before connecting it.)

* Improper use may result in serious damage to the device.

4. Operation

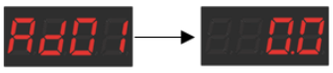
4.1 Display and Key Description

①	**Power &Signal**	Where to connect the power supply and external interfaces
②	**Display Window**	Displays all statuses of the KC-2700 Series
③	**L1 LED**	Control Indicator Lights Off [Local Control] Orange [Accumulation Control] Yellow [Analog Control] Red [Safety ON]
④	**L2 LED**	**Status Indicator Lights** Off [Flow OFF] Yellow [Flow ON PID Control] Orange [Flow ON Adaptive Control] - Yellow light when valve purge is activated in Function Red [Error Rate]
⑤	**ON Key**	Used to turn Flow ON or return to the home screen
⑥	**▼▲ Push Key**	Setpoint Value: Changes numerical values .Function: Changes the value of a function. (Press and hold to quickly change the numerical value.)
⑦	**ENT Key**	Go to each parameter and enter



4.1.1 Power-ON Screen and Initial Screen

When powering on for the first time, the communication address is displayed in the Display Window for 3 seconds, followed by the current flow rate. (To change the communication address: See 4.3.5 Address Select.)



통신주소 [초기화면] 현재 유량값

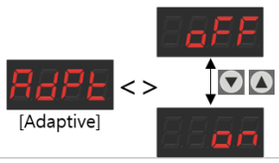
When connecting multiple MFCs via RS-485 communication, ensure that addresses are not duplicated and set the address input in Function. Function -> Control Mode: "Local" for communication and self-control.

4.1.2 Set-Point 입력하기

1>	 Home screen
2>	ENT Press the button once.
3>	 [SetPoint] [Set-Point screen] and [Flow rate value setting screen] light up alternately.
4>	▼▲ Use the buttons to set the flow rate value.
5>	After setting the values, pressing the ENT button again will return you to the initial screen.

4.1.3 Flow ON/OFF

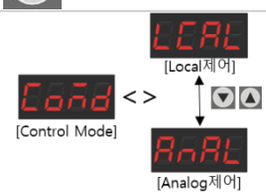
1>	 Home screen
2>	ON Press the button once.
3>	 When Flow ON is activated, the L2 LED lights up yellow or orange.The display window controls the flow rate according to the setpoint value and displays the flowing value.*PID control – L2 LED lights up yellow / Adaptive control – L2 LED lights up orange

*	PID control is a basic feature and is mandatory for control, but adaptive control is optiona l and can be selected in the Function section. 

NOTE

You can change the Set-Point even when Flow On is in effect. After changing the Set-Point, p ressing the "Ent" key will immediately control the changed Set-point value.

4.1.4 Analog input/output ON/OFF

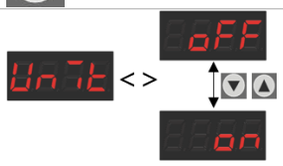
1>	[Press the button ▼ (6 sec) on the [Initial Screen] to enter Function mode.
2>	ENT Press the button once.
3>	 ON [Pressing the button in [Analog Control] mode will change to Analog Input/Output Co ntrol mode and return to the [Initial Screen].

4.1.5 Analog Input/Output Control

1>	 When using analog control, the L1 LED lights up yellow.
2>	ENT Pressing the button will take you to the Analog-Setpoint screen.
3>	 The [External Setting Signal Value] shown at this time is the analog signal calc ulation value compared to the full scale. For example, when the full scale is 1 00.0 and the external analog signal is 0~5VDC, 0.5 VDC -> "10.0" 1 VDC -> "20.0" 2.5 VDC -> "50.0" 5 VDC -> "100.0"
4>	ENT Pressing the button will return you to the [Home Screen].

4.1.6 Unit ON/OFF Setting

You can set the Function to display or not display the Unit and PID values on the [Initial Screen].

1>	Press the button (6 sec) on the [Initial Screen] to enter Function mode.
2>	ENT Press the button 7 times.
3>	 If you press the button while chan ENT to the desired value, it will change to that mode.

4.1.7 PID variable (Gain, Lead) input

Set the Unit setting to ON.

1>	ENT Press the button twice in the [Initial Screen] state.
2>	The current unit is displayed.  [현재 단위]
3>	ENT Press the button once to enter [Gain value input mode].
4>	 [Gain값 입력모드] [값 입력] After setting the value using the button, ENT pressing the button will set the value and move to the next screen. *Gain value: 0.01 ~ 100.0%
5>	 [Lead값 입력모드] [값 입력] After setting the value using the button, ENT pressing the button will set the value and return you to the [Initial Screen]. *Lead value: 0.01 ~ 100.0%

NOTE

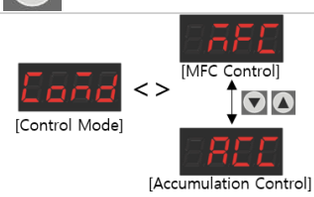
* Gain input is input based on the setpoint value, the slope of the current flow rate, the initial response speed, and other search times. If the value is too large, initial overshoot may occur, and if the hunting time is too small, time delay may occur.Lead input is input based on the response speed and other responsiveness. If the current flow rate deviates from the setpoint by a certain amount, oscillates, or is unstable, decrease the value. If the opposite occurs, increase the value.

CAUTION

PID values are factory-set to optimal settings. If possible, avoid changing them. Carefu lly review and adjust settings only when the following conditions apply:
Abrupt changes in the external environment (temperature, pressure)Internal conditions change due to prolonged storage or use
Flow rates are unstable

4.1.8 Accumulation Control ON/OFF

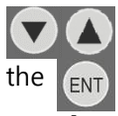
Accumulation function: Set the desired total flow rate and stop the operation when the set flow rate value is reached.

1>	▼ Press the button (6 sec) on the [Initial Screen] to enter Function mode.
2>	ENT Press the button twice.
3>	 Select [Accumulation Control] in [Control Mode] and ENT press the button to turn the accumulation function on. Select [MFC Control] and ENT press the button to turn the accumulation function off.

4.1.9 Setting the accumulated value

Set with the accumulation function turned ON..

1>	ENT Pressing the button once in the [Initial Screen] state will switch to the Set-Point setting screen.
2>	 [SetPoint] ▼ ▲ After entering the Set-Point (instantaneous value) using the ENT button and pressing the button, the value is set and you move to the next setting screen.
3>	The total value consists of eight digits, and is set separately for the upper four digits [ACC HIGH] and the lower four digits [ACC LOW]. For example, if the desired input value is "1254000," [ACC HIGH] would be set to "125" [ACC LOW] would be set to "4000."
4>	 [ACC HIGH] ▼ ▲ After entering the upper four digits of the accumulated value (####0000) usin g the ENT button and pressing the button, the value is set and the screen moves to the [ACC LOW] setting screen.

5>	 < >  [ACC LOW]  After entering the lower four digits of the accumulated value (0000####) using the ENT button and pressing the button, the value is set and you return to the [Initial S creen].

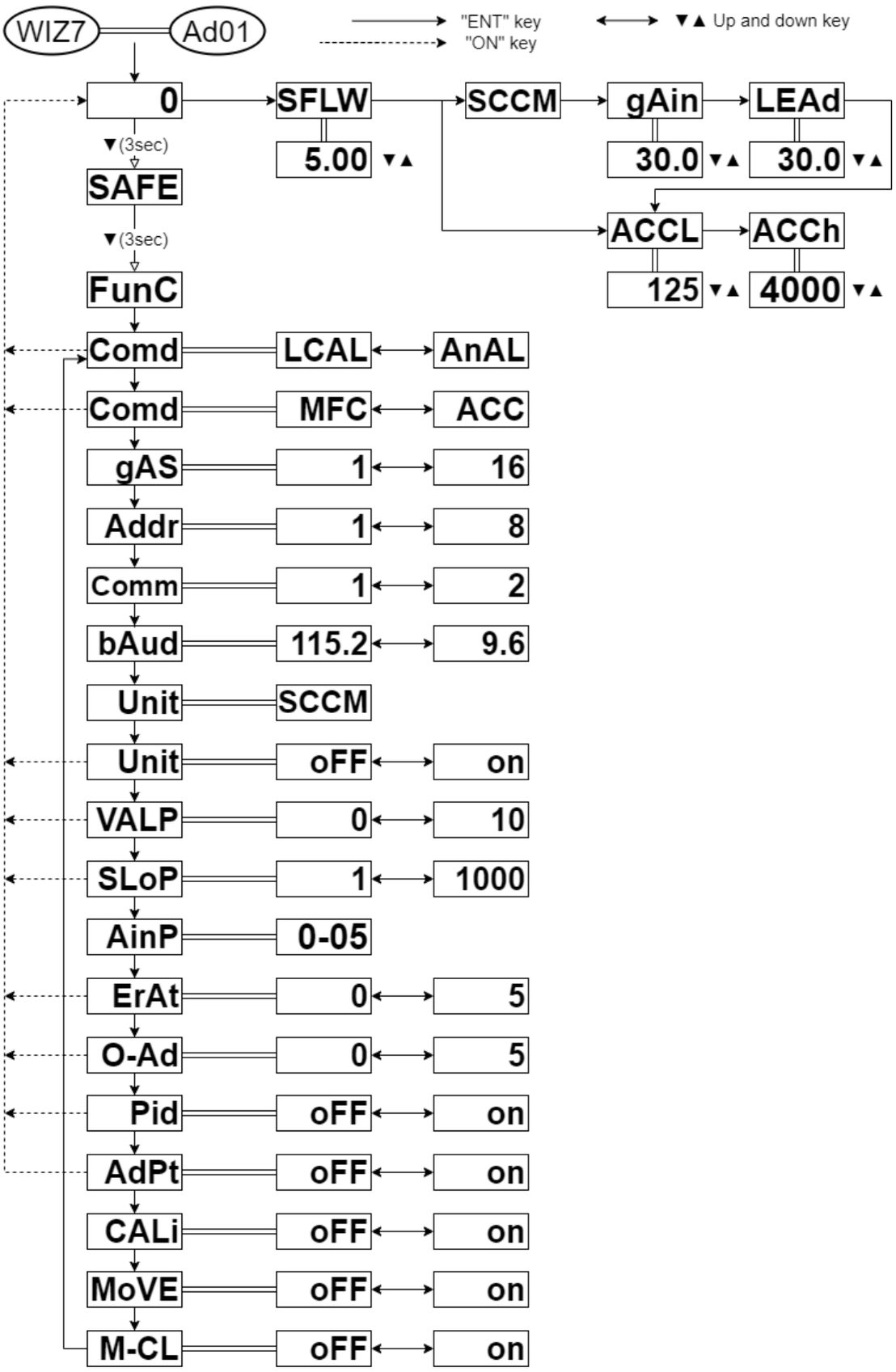
4.1.10 Displaying accumulated values

1>	 When you press the button, the L2 LED lights up and the current flow rate value (insta ntaneous value) is displayed in the Display Window.
2>	 Press the button once.
3>	 The L1 LED lights up yellow and the top four digits of the currently accumulate d value [ACC HIGH] are displayed.
4>	 Press the button once again.
5>	 The lower four digits of the current accumulated value [ACC LOW] are displayed.  Pressing the button returns to the [Initial Screen (Accumulation)].

4.1.11 Reset accumulated value

When the button (2 sec) is pressed in the Flow Off state, the Display Window will blink for a moment and then the accumulated value will be reset. 

4.2 SYSTEM FLOW CHART



4.3 SETUP MENU

4.3.1 Function (Setup Menu Display)

Front Display	
Function	Distinguish between Main Mode and Setup Mode.
Hardware Action	[From the [Home Screen], ▼ press and hold the button for 6 seconds. ENT Pressing the button will advance to the next menu (Control Mode 1).

4.3.2 Control Mode 1. Local/AnAL Select

Front Display	
Function	Local: Used for MFC device self-control and communication (RS-485) control. AnAL: Used for external analog input/output control (see 3.2.1 MFC Pin Assignment).
Hardware Action	ENT Press the button once in the Function (Setup Menu) to enter. In/Out Signal for Remote Control- MFC Pin Assignment 1, 2, and 3 pins: 0 to 5 VDC (4 to 20 mA) ENT Press the button to advance to the next menu (Control Mode 2).
Note	When reading an external set-point, the set-point value window on the front is displayed. When an external signal is input, the L2 LED lights up yellow and Flow is turned ON, controlling the flow. ON Pressing the button will return you to the [Home Screen] without changing any settings.

4.3.3 Control Mode 2. MFC/ACC Select

Front Display	
Function	MFC: MFC Control ACC: Accumulation Control Selection
Hardware Action	ENT Press the button once to enter Control Mode 1. Selecting the ACC function sets the accumulated value input function. ENT Pressing the button advances to the next menu.

4.3.4 Gas Select

Front Display	
Function	Displays the Options for GAS used in the device.
Hardware Action	In Control Mode2, ENT press the button once to enter. ENT Press the button again to proceed to the next menu (Address Select).
Note	You must request the value set when ordering the product. Increase/decrease key adjustments are not possible.

4.3.5 Function (Setup Menu Display)

Front Display	
Function	This refers to the unique number for each channel in serial communication (RS-485). This address is used in the communication protocol and is assigned when connecting multiple devices via RS-485 communication. A separate address must be entered for each device, and duplicate entries must be avoided.(Duplicate entries may cause product failure.)
Hardware Action	ENT Press the button once to enter the Gas Select Menu. ON Press the button for 5 seconds, and it will change to  indicating that operation is possible. Use the ▼▲ button to select the desired Address. ENT Press the button to set the value and proceed to the next menu (Communication Mode Select).

4.3.6 Communication Mode Select

Front Display	
Function	Change the communication mode .Comm1: Uses RS-485 serial communication mode. Comm2: Uses Modbus RTU Protocol mode.
Hardware Action	ENT Press the button once in Address Select to enter. ON Press and hold the button for 5 seconds to change to  enable operation. ▼▲ Use the button to select the desired communication mode. Pressing the button sets the value and proceeds to the next menu (Baud Rate Select). ENT

4.3.7 Baud Rate Select

Front Display	
Function	Set the communication speed when using serial communication (RS-485). 1152 (115200) -> 576 (57600) -> 560 (56000) -> 384 (38400) -> 192 (19200)-> 144 (14400) -> 96 (9600) Set all connected devices to the same communication speed.(Inputting different speeds may cause product malfunction.)
Hardware Action	Press the ENT button once in Communication Mode Select to enter.Press the ON button for 5 seconds to change to baud, enabling operation.Use the buttons to select the desired communication speed.Press the ENT button to set the value and move to the next menu (Unit Select).
Note	Default: 1152 (115200)

4.3.8 Unit Select

Front Display	
Function	Displays the flow unit used by the MFC. SCCM: Standard Cubic Centimeters per Minute = mL/Min SLM: Standard Liters per Minute = L/Min %: Percentage Other... This is specified when ordering a product and cannot be changed.
Hardware Action	Press the ENT button once to enter the Baud Rate Select Menu. Press the ENT button again to proceed to the next menu (Unit Display Select).

4.3.9 Unit Display Select

Front Display	
Function	Determines whether units are displayed on the main screen. ON: Displays units. OFF: Does not display units.
Hardware Action	Press the ENT button once to enter the Unit Mode Menu. Press the ENT button again to proceed to the next menu (Valve Purge).
Note	 Pressing the button will return you to the [Home Screen] without changing any settings.

4.3.10 Valve Purge Select

Front Display	
Function	The Valve Forced Purge function allows for input from 1 minute to a maximum of 10 minutes. This function applies voltage to the valve to open it to its maximum regardless of flow rate. This function may cause the valve to heat up if used for extended periods.
Hardware Action	Press the ENT button in the Unit Display Mode Menu to enter. Press the ENT button again to proceed to the next menu (Setpoint Slope).
Note	 Pressing the button will return you to the [Home Screen] without changing any settings.

4.3.11 Setpoint Slope Select

Front Display	
Function	This function allows you to adjust the slope time required to reach the initial setpoint. Values can range from 1 to 1000. Lower values result in faster resp onse times but more rapid changes in the graph slope. Conversely, higher va lues result in slower response times and more gentle slopes.
Hardware Action	Press the ENT button in the Valve Purge Mode menu to enter. Press the ENT button again to proceed to the next menu (Analog In/Out).
Note	ON Pressing the button will return you to the [Home Screen] without changi ng any settings.

4.3.12 Analog In/Out Select

Front Display	
Function	This function inputs external analog input/output signals.0-5 VDC (standard) / 0-10 VDC, 4-20 mA, 0-20 mA (optional)Power & Signal (9-pin male connec tor -> 1, 2, 3 pin input)
Hardware Action	Press the ENT button to enter the Valve Purge Mode menu. Pressing the EN T button again will advance to the next menu (Flow Error Rate Select).
Note	The value set when ordering a product cannot be changed.

4.3.13 Flow Error Rate Select

Front Display	
Function	If there is a difference between the current flow rate and the setpoint flow rate (SetPoint valu e), an error operation is indicated. (L2 LED lights up red) "0" -> Error Rate Off "1" -> Error operation is indicated if the error exceeds ±1%. "2" -> Error operation is indicated if the error exceeds ±2%. "3" -> Error operation is indicated if the error exceeds ±3%. "4" -> Error operation is indicated if the error exceeds ±4%. "5" -> Error operation is indicated if the error exceeds ±5%.
Hardware Action	Press the ENT button in the Analog In/Out menu to enter.Use the U p and down buttons to select the desired Error Rate. Press the ENT button to set the value and proceed to the next men u (Auto Zero Select).
Note	ON Pressing the button will return you to the [Initial Screen] without changing any settings.

4.3.14 Auto Zero Adjust Select

Front Display	
Function	기기 내 Sensor 의 Zero Setting 을 의미합니다. 충분한 Warm-up 후 진행하도록 하십시오.
Hardware Action	Flow Error Mode Menu 에서 ENT 버튼을 누르면 들어갑니다. ▼▲ 버튼을 이용하여 값을 설정합니다. ENT 버튼을 누르면 값이 설정되고 다음메뉴 (PID Display)로 진행합니다.
Note	ON 버튼을 누르면 설정변경없이 [초기화면]으로 돌아갑니다.

4.3.15 PID Display Select

Front Display	
Function	PID 값 메인 화면 표시 유무를 설정합니다. ON: PID 값을 표시합니다 (Gain, Lead) OFF: PID 값을 표시하지 않습니다.
Hardware Action	Auto Zero Mode Menu 에서 ENT 버튼을 누르면 들어갑니다. 다시 ENT 버튼을 누르면 다음 메뉴(Adaptive Select)로 진행합니다.
Note	ON 버튼을 누르면 설정변경없이 [초기화면]으로 돌아갑니다.

4.3.16 Adaptive Select

Front Display	
Function	Adaptive(적응제어) Control 의 사용유무를 설정합니다. ON: Adaptive Control ON OFF: Adaptive Control OFF
Hardware Action	PID Display Select Menu 에서 ENT 버튼을 누르면 들어갑니다. 다시 ENT 버튼을 누르면 다음 메뉴(Adaptive Select)로 진행합니다.
Note	ON 버튼을 누르면 설정변경없이 [초기화면]으로 돌아갑니다.

4.3.17 Calibration

Front Display	
Function	기기의 검교정 모드 ON-OFF 선택 화면입니다.
Hardware Action	Adaptive Select Menu 에서 ENT 버튼을 누르면 들어갑니다. 다시 ENT 버튼을 누르면 다음 메뉴(Adaptive Select)로 진행합니다.
Note	****검교정 필요 시 당사에 요청바랍니다.***

4.3.18 Move

Front Display	
Function	This mode changes the calibration data.On: Enters the calibration data select ion mode. Off: Skips without entering the selection mode.
Hardware Action	Press the ENT button in the Calibrate Menu to enter. Press the ENT button a gain to proceed to the next menu (Adaptive Select).
Note	**Please contact us if you need to use this feature.

4.3.19 Memory Clear

Front Display	
Function	Initializes the memory.(Resets the FunC settings to the factory defaults.) Be careful when using this function, as the entered values will be initialized.
Hardware Action	Press the ENT button in the Move Menu to enter. Press and hold the ON button for 10 seconds to change from M-CL to m-CL, allowing you to toggle on/off. Use the up and down buttons to select a value.Press the ENT button to set t he value and return to the Control Mode settings screen.

5. COMMUNICATION & PROTOCOL

For more information about communication, please refer to KC-2700 Series RS485 Serial Protocol instruments..

5.1 Comm1 : RS-485 Serial Protocol

Baud Rate	: 1152 bps (default value at product shipment: 115200)
Data Bit	: 8 Bit
Parity Bit	: None
Stop Bit	: 1 Stop Bit
Command and Data	: Hexa-code
Data Form	: (Address) (00) (Command) (High Data) (Low Data) (Delay time) ...
Receive Check Sum	: (High Data) + (Low Data) Ex) Oct (1750) -> Hex (03E8) Check Sum -> 03 + E8 = EB

Example

1)Address 1 Flow-value Reading Ex) 0100f8

2)Address 2 Flow-value Reading Ex) 0200f8

3) When turning it ON by sending Set-Value "1000" to Address 1...

Ex) 0100e003e8 (D.T) 0100f1

4) If you turn it OFF by sending Set-Value "0000" to Address 1...

Ex) 0100e00000 (D.T) 0100f0

5) When turning it ON by sending Set-Value "500" to Address 2...

Ex) 0200e001F4 (D.T) 0200f1

6) If you turn it OFF by sending Set-Value "0000" to Address 2...

Ex) 0200e00000 (D.T) 0200f0

7) When turning ON Address 1,2 while sending Set-Value "1000" at the same time...

Ex) 0100e003e8 (D.T) 0100f1 (D.T) 0200e003e8 (D.T) 0200f1

8) When turning ON Address 1,2,3,4 while sending set-value "500" at the same time...

Ex) 0100e001f4 --> check sum or after 300msec (D.T) ---> 0200e001f4 --> check sum or after 300msec (D.T) ---> 0300e001f4 --> check sum or after 300msec (D.T) ---> 0400e001f4 --> check sum or after 300msec (D.T) other commands... .

9) If you enter "99999999" as the accumulated value in Address 1...

Ex) 0100e605f5e0ff --> d.t → checksum confirmation or after 300ms d.t →

NOTE	D.T (Delay Time) -> 0.2sec

Assign the same baud rate and a different address to each MFC.
(Different baud rates and overlapping addresses may cause device malfunction.)
Excessively fast data transmission and reception speeds may cause malfunctions.
(Recommended Delay Time: 0.3 seconds)
(Address) (00) (Command) (High Data) (Low Data) **(Delay time)** (Address) (00) (Command)....

RS485		**Send Message**							**Receive Message**
0x=address		**PC -> Board**							**Board -> PC**
Flag	I.N	**Send Buffer**							**Receive Buffer**
Flow	0x 00 e0 address 1 이면 01	0x	00	e0	Set Flow High	Set Flow Low	Check sum		Check sum
Gain Lead	0x 00 e5	0x	00	e5	Set Gain High	Set Gain Low	Set Lead High	Set L ead Low	Check sum
Set Acc	0x 00 e6	0x	00	e6	Set Acc 3	Set Acc 2	Set Acc 1	Set Acc 0	Check sum
MFC ON	0x 00 f1	0x	00	f1					Run 1
MFC OFF	0x 00 f0	0x	00	f0					Stop
MFC ALL ON	00 00 f1	00	00	f1					ALL Run
MFC ALL OFF	00 00 f0	00	00	f0					ALL Stop
ACC Reset	0x 00 f2	0x	00	f2					ACC Reset (Clear)
PC Com Exit	0x 00 fb	0x	00	fb					PC Com Exit

<table>
<tr><td colspan="2">RS485</td><td>Send</td><td>Receive Message</td></tr>
<tr><td colspan="2">0x = address</td><td>PC -> Board</td><td>Board -> PC</td></tr>
<tr><td>Flag</td><td>I.N</td><td>Send Buffer</td><td>Receive Buffer</td></tr>
<tr><td>Total Information Return Command</td><td>0x
00
f7</td><td>
<table>
<tr><td>0x</td><td>00</td><td>f7</td></tr>
</table>
</td><td>
<table>
<tr><td rowspan="2">0x</td><td rowspan="2">f7</td><td rowspan="2">e0(stop)
e1(Run)</td><td>Flow high</td><td>Flow Low</td><td rowspan="2">Check Sum</td></tr>
<tr><td colspan="2">Checksum</td></tr>
</table>
</td></tr>
<tr><td>Total Information Return Command</td><td>0x
00
f8</td><td>
<table>
<tr><td>0x</td><td>00</td><td>f8</td></tr>
</table>
</td><td>
<table>
<tr><td rowspan="2">0x</td><td rowspan="2">00</td><td rowspan="2">e0(Stop)
e1(Run)</td><td>Flow high</td><td>Flow low</td><td>Set Flow high</td><td>Set Flow low</td><td rowspan="2">Check Sum</td></tr>
<tr><td colspan="4">Checksum</td></tr>
</table>
</td></tr>
<tr><td>Total Information Return Command</td><td>0x
00
f8</td><td>
<table>
<tr><td>0x</td><td>00</td><td>f9</td></tr>
</table>
</td><td>
<table>
<tr><td rowspan="2">0x</td><td rowspan="2">f9</td><td rowspan="2">e0(Stop)
e1(Run)</td><td>Flow high</td><td>Flow Low</td><td>Act Acc3</td><td>Act Acc2</td><td>Act Acc1</td><td>Act Acc0</td><td rowspan="2">Check sum</td></tr>
<tr><td colspan="6">Checksum</td></tr>
</table>
</td></tr>
</table>

5.2 Comm2 : Modbus RTU Protocol

Baud Rate	: 38400 bps
Data Bit	: 8 Bit
Parity Bit	: None
Stop Bit	: 1 Stop Bit
Command and Data	: Hexa-code
Protocol	: Modbus RTU
Error Detection	: CRC-16

5.2.1 Write

MODBUS RTU MFC Address: 0x[01 for Address1, 02 for Address2...]		**Writing Message**
Set Flow Pressure (S.V)	**Send**	0x 06 00 02 Set Flow(Pres) Hi Set Flo
	Receive	0x 06 00 02 Set Flow(Pres) Hi Set Flow(Pres) Lo CRC Lo CRC Hi
Set Acc (ACC S.V)	****Acc mode Available models: KC-2700S***	
	Send	0x 10 00 07 00 02 04 Set Acc 3 Set Acc 2
	Receive	0x 10 00 07 00 02 CRC Lo CRC Hi
calzero	**reset Send**	0x 06 00 09 00 00 CRC Lo CRC Hi
	reset Receive	0x 06 00 09 00 00 CRC Lo CRC Hi
	set Send	0x 06 00 09 00 01 CRC Lo CRC Hi
	set Receive	0x 06 00 09 00 01 CRC Lo CRC Hi
Device RUN	**Send**	0x 06 00 00 00 01 CRC Lo CRC Hi
	Receive	0x 06 00 00 00 01 CRC Lo CRC Hi
All Device	**Send**	00 06 00 00 00 01 CRC Lo CRC Hi

RUN	**Receive**	(All MFC FLOW ON)
Device STOP	**Send**	0x 06 00 00 00 00 CRC Lo CRC Hi
	Receive	0x 06 00 00 00 00 CRC Lo CRC Hi
All De vice S TOP	**Send**	00 06 00 00 00 00 CRC Lo CRC Hi
	Receive	(All MFC FLOW OFF)
ACC Reset (ACC P.V Reset)	****Acc mode Available models: KC-2700S***	
	Send	0x 06 00 20 00 00 CRC Lo CRC Hi
	Receive	0x 06 00 20 00 00 CRC Lo CRC Hi
Set ACC MODE	**mfc mode (ACC OFF) Send**	0x 06 00 0A 00 00 CRC Lo CRC Hi
	mfc mode (ACC OFF) Receive	0x 06 00 0A 00 00 CRC Lo CRC Hi
	ACC mode (AC C ON) Send	0x 06 00 0A 00 01 CRC Lo CRC Hi
	acc mode (ACC ON) Receive	0x 06 00 0A 00 01 CRC Lo CRC Hi
PC Com Exit	**Send**	0x 06 00 fb 00 01 CRC Lo CRC Hi
	Receive	0x 06 00 fb 00 01 CRC Lo CRC Hi

5.2.2 Read

** Products manufactured before May 2022 can only use the [Read] Total Information Return message (no other messages can be used).

MODBUS RTU MFC Address: 0x[01 for Address1, 02 for Address 2...]		Reading Message
Run/Stop	**Send**	0x | 03 | 00 | 00 | 00 | 01 | C
	Receive	0x | 03 | 02 | [Run **0001** / Stop **000**
Flow Pressure (P.V)	**Send**	0x | 03 | 00 | 01 | 00 | 01 | C
	Receive	0x | 03 | 02 | [**P.V** Value (2 Bytes)] | CRC Lo | CRC Hi
Flow Pressure Set-point (S.V)	**Send**	0x | 03 | 00 | 02 | 00 | 01 | C
	Receive	0x | 03 | 02 | [**S.V** Value (2 Bytes)] | CRC Lo | CRC Hi
Gain	**Send**	0x | 03 | 00 | 03 | 00 | 01 | C
	Receive	0x | 03 | 02 | [**Gain** Value (2 Bytes)] | CRC Lo | CRC Hi
Lead	**Send**	0x | 03 | 00 | 04 | 00 | 01 | C
	Receive	0x | 03 | 02 | [**Lead** Value (2 Bytes)] | CRC Lo | CRC Hi
Acc P.V	****Acc mode Available models: KC-2700S***	
	Send	0x | 03 | 00 | 05 | 00 | 02 | C
	Receive	0x | 03 | 04 | [**Acc P.V** Value (4 Bytes)] | CRC Lo | CRC Hi
Acc S.V	**Send**	0x | 03 | 00 | 07 | 00 | 02 | C
	Receive	0x | 03 | 04 | [**Acc S.V** Value (4 Bytes)] | CRC Lo | CRC Hi
calzero	**Send**	0x | 03 | 00 | 09 | 00 | 01 | CRC Lo | CRC Hi

	Receive	0x | 03 | 04 | [ON **0001** / OFF **0000**] | CRC Lo | CRC Hi
Mode MFC/ACC	****Acc mode Available models: KC-2700S***	
	Send	0x | 03 | 00 | 0A | 00 | 01 | CRC Lo | CRC Hi
	Receive	0x | 03 | 04 | [MFC **0000** / ACC **0001**] | CRC Lo | CRC Hi
Total Information Return	**Send**	0x | 03 | 00 | 00 | 00 | 0B | CRC Lo | CRC Hi
	Receive	0x | 03 | 16 | [Parameter Address 0x0000 ~ 0x000A Value] (22 Bytes) | CRC Lo | CRC Hi

**For more information on Modbus communication, please refer to the KC-2700 Series RS485 Serial Protocol instruments and check if the model supports Modbus.

6. Product Warranty

** Product warranty period

-The warranty period for new products is 12 months from the date of shipment.

-The warranty period for A/S products is 3 months from the date of shipment after A/S is completed.

** Cases in which the product warranty is not applicable:

- Damage to the product due to user negligence- Damage to the product due to natural disasters
- Changes in product specifications due to selection errors
- Changes in product specifications due to changes in usage conditions
- Damage to the security label- Modification or disassembly of the product by the user

** Precautions for After-Sales Service

Please remove any attached accessories upon delivery and return the product alone.

We are not responsible for any loss.

For products used in corrosive or toxic gases, please remove any residual gas before returning.

Please describe the symptoms as specifically as possible when returning the product.

*** This product is subject to change without notice for performance improvements or structural changes.

*** All information in this manual pertains to the applicable model.

*** This product is a device that controls the flow of gas and does not function as a valve.

*** Always install a valve in processes and equipment where fluid leakage poses a risk.

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032-817-1240
goldenrules2014@naver.com
A-1805, Songdo Mirae-ro 30, Yeonsu-gu, Incheon (Songdo Smart Valley)

GOLDEN RULES Co.,Ltd