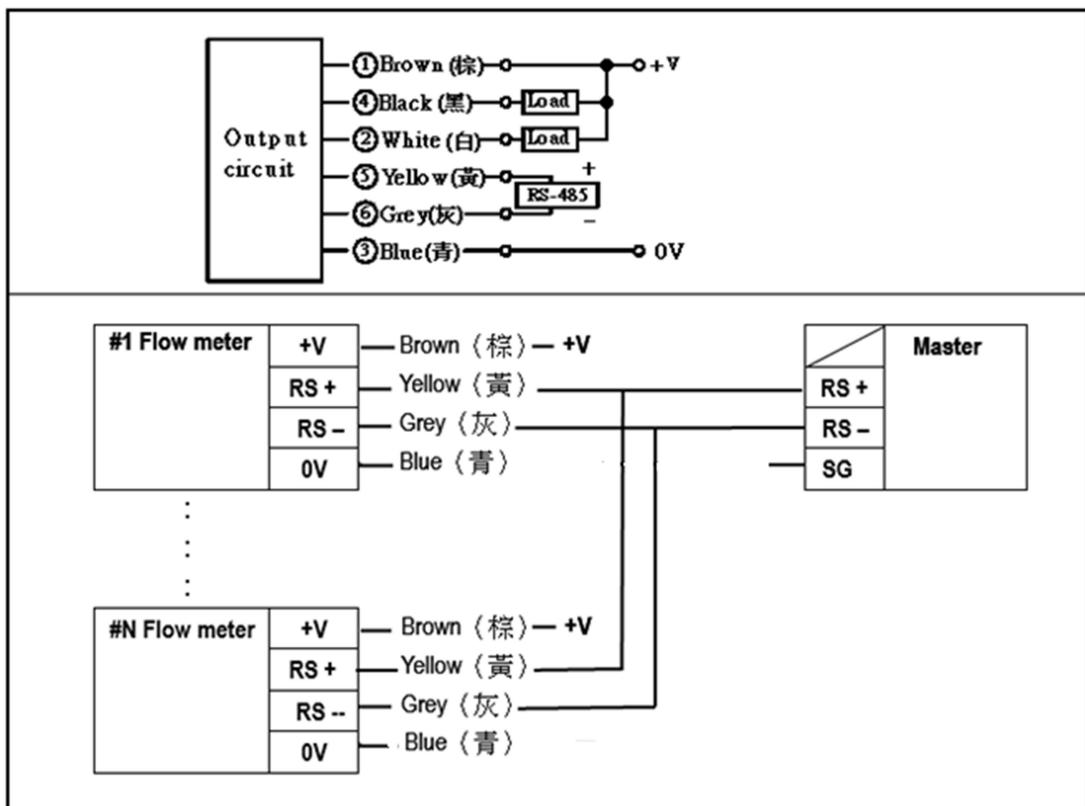


1 接线图 Connection diagram



通信标准 Communication standard	EIA – RS 485	波特率 Communication speed	9600 or 19200 or 38400 bps
通信模式 Communication mode	RS=0: [MODBUS- RTU 模式] RS=1: [MODBUS-ASCII 模式]	通信设备地址	ID No. = 01 ~ 99 (01H ~ 63H)
通信配置 (8N1)			
	<p>The diagram shows the structure of an 8N1 serial frame. It consists of a start bit (0), followed by 8 data bits (B0 to B7), then a parity bit (N), and finally a stop bit (1). The data bits are labeled B0 through B7. The N bit is labeled 'Non parity (无校验)'. Arrows indicate the sequence: Start bit → 8 bit → Non parity → Stop bit.</p>		

Address of parameter register 参数存储地址

Address No. (地址)	Parameter (参数)	Description (描述)	Read Write 读/写	Decimal point 小数点位数	Range of Data 范围
00H 01H	Lck	Lock setting (锁定设定)	R / W	0	0 ~ 9999
00H 02H	U t	Unit selecting (累计流量单位选择)	R / W	0	0 ~ 4
00H 03H	k	K value setting (K 值设定)		2	0.01 ~ 999.99
00H 0CH	Con*	Control mode (累计流量输出控制)	R / W	0	0 ~ 4
00H 0DH	t 1	Reset time (输出复位时间设定)	R / W	2	0.1 ~ 99.99
00H 0EH	ALT*	Output status (LPM (Op 1) 输出状态)	R / W	0	0 ~ 3
00H 0FH	HYS	Hysteresis (LPM 输出复位差值)	R / W	2	0.01 ~ 999.99
00H 10H	t 2	Delay time (OP1 控制动作延时时间)	R / W	0	0 ~ 9999
00H 11H	r S*	RS-485 mode (RS485 通信模式选择)	R / W	0	0 ~ 1
00H 12H	bPS*	Baud rate (RS485 通信波特率选择)	R / W	0	0 ~ 2
00H 13H	I d	Station No. (通信站从机地址选择)	R	0	1 ~ 99
00H 14H	SV1 (Lo word)	Flow rate setting (瞬间流量设定值)	R / W	2	0.00 ~ 999.99
00H 15H	SV1 (Hi word)				
00H 16H	SV2 (Lo word)	Flow volume setting (累计流量设定值)	R / W	0	0 ~ 999999
00H 17H	SV2 (Hi word)				
00H 18H	TEMP	Temperature of water (水温)	R	1	0.0~99.9
00H 20H	PV (Lo word)	Flow rate value (瞬间流量)	R	1	0.0 ~ 9999.9
00H 21H	PV (Hi word)				
00H 22H	CV (Lo word)	Flow volume value (累计流量)	R	0	0 ~ 999999
00H 23H	CV (Hi word)				
00H 24H	Output status*	Out1 & Out2 output status (输出状态)	R	0	0 ~ 3

Decimal point: All value of the parameter is processed to integer, Ex. [123.4] → [1234]

小数点: 所有参数的数值都当成整数处理, 例如[123.4] → [1234]

[Con]: [0]=[n], [1]=[r], [2]=[c], [3]=[E], [4]=[F]

[r S]: [0]=[Modbus - RTU mode], [1]=[Modbus - ASCII mode]

[bPS]: [0]=[9600], [1]=[19200], [2]=[38400]

[ALT]:

ALt No.	Description
ALt=0	「PV」≥「SV」→Relay ON; 「PV」<「SV - HyS」→Relay OFF
ALt=1	「PV」≤「SV」→Relay ON; 「PV」>「SV+HyS」→Relay OFF
ALt=2	「SV+HyS」≥「PV」≥「SV-HyS」→Relay ON; 「PV」>「SV+HyS」or 「PV」<「SV-HyS」→Relay OFF
ALt=3	「SV+HyS」≥「PV」≥「SV-HyS」→Relay OFF; 「PV」>「SV+HyS」or 「PV」<「SV-HyS」→Relay ON

Output status

Data	Out1	Out2									
00H 00H	Off	Off	00H 01H	On	Off	00H 02H	Off	On	00H 03H	On	On

Message format / 通信格式

MODBUS RTU	Read command:	Station No.	Function code	Address	Batches of data	CRC		
	Read response:	Station No.	Function code	Data byte counts	Data	CRC		
MODBUS ASCII	Read command:	Start code	Station No.	Function code	Address	Data	LRC	Stop code
	Read response:	Start code	Station No.	Function code	Address	Data	LRC	Stop code

* Function code 功能代码

Function code	Function	Description
03H	Read	To read the data on register
06H	Write (Single word)	To write the preset value on register
10H	Write (Double word)	To write the preset value on register
08H	Diagnose	To diagnose the error of message format

Ex: Read the **CV** value (flow volume) of No.01 flow meter; **CV=123456 (01E240H)** (Liters) and Write the **K** value (K factor) of No.01 flow meter; **K=123.4 (04D2H)** ;
 [Write the **SV1** value (Flow rate setting) of No.01 flow meter; **SV1=12345.6 (01E240H)**]
 [Station No= 01H,CV address = 22H/23H, **CV = 123456 (01E240H)** ,K address = 03H, **K=123.4 (04D2H)**]
 [**SV1** address = 14H/15H, **SV1 = 123456 (01E240H)**]

例子：读取# 1 流量计的[CV]值（Liters）时 CV 是[123456]；改写# 1 流量计的[K]值为[123.4]
 改写# 1 流量计的[SV1]值为[12345.6]
 [设备站点地址.= 01H, CV 位址 = 22H/23H、CV =123456 (01E240H), K 值位址= 03H,
K=123.4 (04D2H)]
 [SV1 位址 = 14H/15H、SV1 =12345.6 (01E240H)]

Communication mode: [RS = 0: MODBUS – RTU code]						
Read command	Station No.	Function code	Address	Batches of data	CRC	
	01H	03H	00H 22H	00H 02H	64H 01H	
Read response	Station No.	Function code	Data byte counts	Data	CRC	
	01H	03H	04H	E2H 40H 00H 01H	E2H A3H	
Write command	Station No.	Function code	Address	Data	CRC	
	01H	06H	00H 03H	04H D2H	FBH 57H	
Write response	Station No.	Function code	Address	Data	CRC	
	01H	06H	00H 03H	04H D2H	FBH 57H	
Write command	Station No.	Function code	Address	Data	CRC	
	01H	10H	00H 14H	E2H 40H 00H 01H	56H 69H	
Write response	Station No.	Function code	Address	Data	CRC	
	01H	10H	00H 14H	E2H 40H 00H 01H	56H 69H	

Communication mode: [RS = 1: MODBUS – ASCII code]							
Read command	Start code	Station No.	Function code	Address	Batches of data*	LRC	Stop code
	3AH	30H 31H	30H 33H	30H 30H 32H 32H	30H 30H 30H 32H	42H 36H	0DH 0AH
Read response	Start code	Station No.	Function code	Data byte counts**	Data	LRC	Stop code
	3AH	30H 31H	30H 33H	30H 34H	*1	33H 43H	0DH 0AH
Write command	Start code	Station No.	Function code	Address	Data	LRC	Stop code
	3AH	30H 31H	30H 36H	30H 30H 30H 33H	*2	39H 43H	0DH 0AH

Write response	Start code	Station No.	Function code	Address	Data	LRC	Stop code
	3AH	30H 31H	30H 36H	30H 30H 30H 33H	*2	39H 43H	0DH 0AH
Data byte counts**: 2 ASCII code byte = 1 data byte							
*1: 45H 32H 34H 30H 30H 30H 31H (4 data bytes) *2: 30H 34H 44H 32H (2 data bytes)							

Calculation of[FCS] / 校验码方式

【RS = 0: MODBUS – RTU code】: FCS = CRC –16 (Cyclic redundancy check)

Procedure of CRC-16 calculation

- 1> To load FFH FFH to the 16 bit CRC register
- 2> To exclusive OR (*) the first byte of the message format with the low order byte of the 16 bit CRC register, then put the result in the 16 bit CRC register.
- 3> To shift the CRC register one bit to right (toward the LSB) and fill the MSB with zero.
- 4> To repeat the step 3 If the carry flag is 0 (LSB is 0), Exclusive OR the CRC register with A001H which is the value of polynomial if the carry flag is 1 (LSB is 1), then put the result in the 16 bit CRC register.
- 5> To repeat the step3 and 4 until the 16 bit CRC register is shifted 8 times
- 6> To repeat from step 2 to step 5 for the next byte of the message format until final byte of message is completed. (Except the CRC bytes)
- 7> To get the CRC value by changing the high order and low order byte of the final CRC register.

【RS = 1: MODBUS – ASCII code】: FCS = LRC

Procedure of LRC calculation

- 1> To add all bytes in the message format, excluding the start code (:) and ending code (0DH 0AH), then put this value in an 8-bit field.
- 2> To get a Two's complement from this 8-bit field. it is named [Y] (8-bit field also)
- 3> To get the LRC value by changing the Hex code to ASCII code from the [Y].

◆ Error response code / 错误应答

Message format / 消息格式

RS = 0: MODBUS – RTU code				
Function	Station No.	Function code	Error code	FCS
Read	01H ~ 63H	83H	01H ~ 05H	CRC-16
Write	01H ~ 63H	86H	01H ~ 05H	CRC-16

RS = 1: MODBUS – ASCII code						
Function	Start code	Station No.	Function code	Error code	FCS	Stop code
Read	3AH	30H 31H ~ 36H 33H	38H 33H	30H 31H ~ 30H 35H	LRC	0DH 0AH
Write	3AH	30H 31H ~ 36H 33H	38H 36H	30H 31H ~ 30H 35H	LRC	0DH 0AH

Error code					
Code		Description (说明)	Code		Description (说)
MODBUS – RTU	01H	Command error (指令错误)	MODBUS – RTU	03H	Data overflow error (数据长度错误)
MODBUS – ASCII	03H 31H		MODBUS – ASCII	30H 33H	
MODBUS – RTU	02H	Address overflow error (位址错误)	MODBUS – RTU	04H	Data error (数据值错误)
MODBUS – ASCII	30H 32H		MODBUS – ASCII	30H 34H	
MODBUS – RTU	05H	CRC or LRC error			
MODBUS – ASCII	30H 35H				