PARKARN
INSTRUMENT CO.,LTD

USER MANUAL

PS300 Series Gas Mass Flow Controller

PARKARN INSTUMENT CO.,LTD
081-123-2475
www.mit-trade.com

Part I Installation

1.1 Mechanical installation

The external dimensions of PS300 series products are shown in the figure below, and the inlet and outlet of its flow channel are 1/4VCR connectors by default. If the user has other requirements, please explain when placing the order.

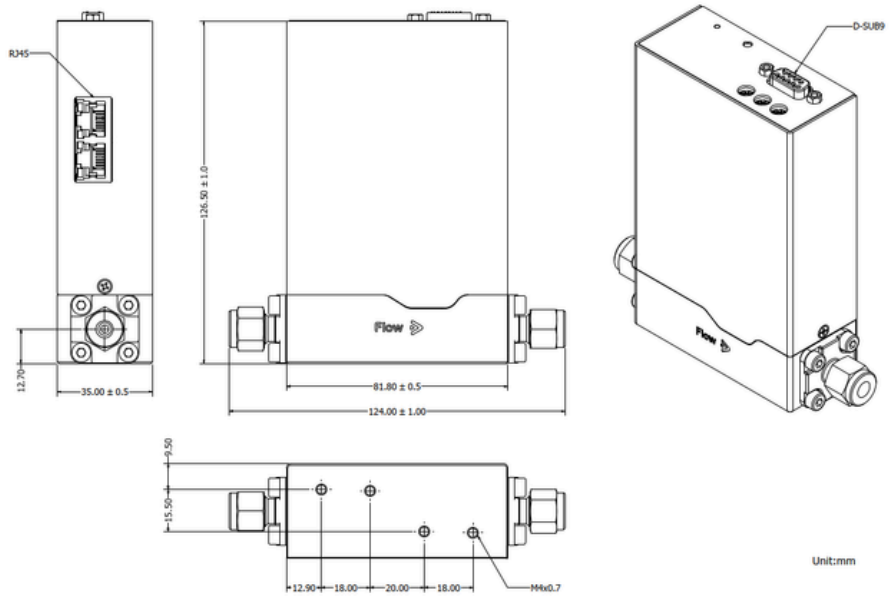


Figure PS300 Series Product Appearance Dimensions

1.2 Electrical Installation

PS300 series products adopt switching power supply mode and support DC ± 24V. D-SUB9 (line sequence arrangement is shown in the table) is used as the electrical connector by default. It supports 0~5V analog communication mode and RS485 serial communication mode (Modbus-RTU is used by default). Customers can customize the electrical connection mode according to actual needs.

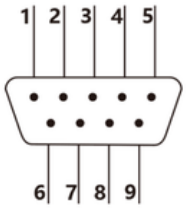


Figure D-SUB9 Pin No.

Table D-SUB9 Line sequence definition

D-SUB9 Equipment end Pin No.	Line sequence definition
1	Please do not connect
2	Analog output
3	Power (DC24v)
4	Power supply ground
5	RS485-A
6	Analog Input
7	Analog ground
8	Analog ground
9	RS485-B

1.3 Communication Mode

The default communication mode of PS300 series products includes RS-485 and 0~5V, which can be connected through the RJ45 interface or D-SUB9 interface configured by the product.

The line sequence is defined as follows:

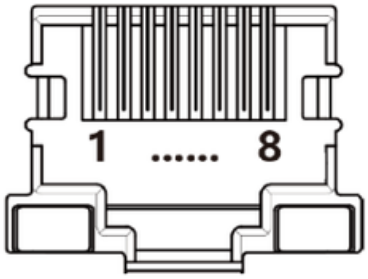


Figure D-SUB9 and RJ45 device end pin number

Table RJ45 equipment terminal wire sequence definition.

Pin No.	EtherCAT	RS485(optional)
1	Transmit+	Power supply ground
2	Transmit+	Power supply ground
3	Receive+	Please do not connect
4	Please do not connect	RS485-B
5	Please do not connect	RS485-A
6	Receive-	Please do not connect
7	Please do not connect	Please do not connect
8	Please do not connect	Please do not connect

1.4 Installation Inspection

Before starting to operate PS300 series products, the following inspections must be carried out:

1) Check whether the piping is firmly connected and whether the air circuit leaks;

2) Check the integrity of process sequence and gas circuit components;

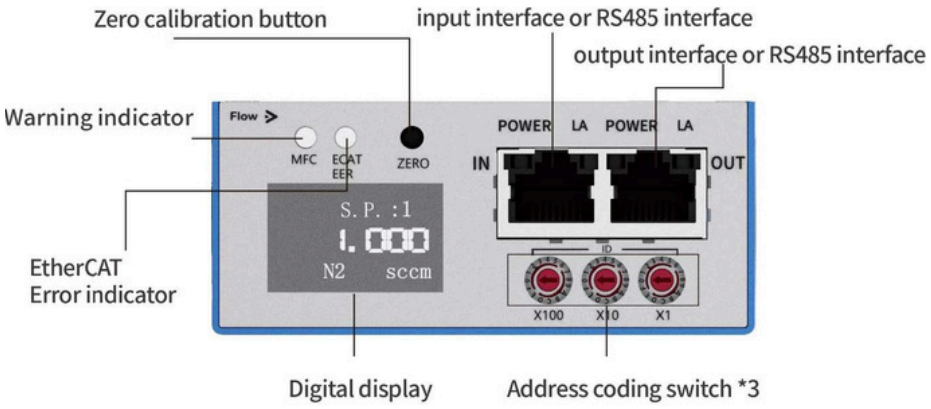
3) Check whether the wiring is firmly connected, and whether the size and form of control signal and power supply voltage are normal;

4) Check the gas type and rated pressure;

5) Inject dry inert gas for test run.

Part II Function Introduction

2.1 Function list



digital display	After power on initialization	first line	Display setting value (integer)
		second on	Display instantaneous flow (integer)
		third	Display gas type and flow unit
	in service	ZERO button	1. The set value will change with the actual input (the effective range of the actual input is 2% 100% F.S.) 2. The instantaneous flow will change according to the actual flow value 3. Instantaneous flow data refresh speed: 0.2S
Key and coding switch	Address modification	ID Rotary encoder	Change address 1. X100 is the hundred bits of the address, X10 is the ten bits of the address, X1 is the one bit of the address, and the rotation range of each rotary encoder is 0 9, that is, the range of the address is 0 999 2 You need to restart the EtherCat host after changing the address
	EtherCat indicator	Yellow light (ECAT ERR)	Communication error indication
	Alarm indicator	Red light MFC	1. Normally off 2. EEPROM reading failed: 0.5S on, 0.5S off 3 Zero calibration is successful: it is normally on first, and then off after successful execution 4. Zero point calibration failed: first, it is normally on, flashing for 8 times, and then off 5. Abnormal temperature: when the temperature is 10 or 80, it will be on for 2 seconds and off for 2 seconds 6. Cumulative flow overflow alarm: when the cumulative flow is greater than 4000000m³ On for 3 seconds and off for 3 seconds
	RJ45 EtherCat	IN	EtherCat Signal input port
		OUT	EtherCat Signal output port
		POWER	Power indicator
		LA	L/A indicator
		RUN	Running indicator

Meaning of abbreviations and symbols

CoE	CAN Application Layer over EtherCAT
ETG	EtherCAT Technical Association
EtherCAT	Ethernet for Control Automation Technology
F.S.	Full scale
MFC	Mass flow controller
OP	running state
PDO	Process data object
RO	Read ONLY
RW	Readable and writable
SDO	Service data object
WR OP	Only writable in OP state
0x	This symbol is the prefix of hexadecimal number
0x6000:01	The meaning of this value is: 0x6000 is the index value of the object, 0x01 is the sub-index value

Basic description

The EtherCAT controller of S300 supports CoE and partially complies with the ETG.5003.2020 specification.

Unless otherwise stated, all objects in this manual are volatile by default, that is, the data set by the user will be lost after power failure and restart, and the item will automatically return to its initial value.

In order to operate the EtherCAT series controller using S300 normally, an XML file with version matching is required. If you do not have the appropriate file for this device, please contact us.

Object dictionary

0x6000 - current flow

index	Subindex	Object name	data type	SDO limits of authority	PDO shine upon
0x6000	0x01	Current traffic	UDINT	RO	Tx

This object reflects the current actual flow. The data type is UDINT and the flow unit is SCCM

0x6003 - current temperature

index	Subindex	Object name	data type	SDO limits of authority	PDO shine upon
0x6003	0x01	Current temperature	INT	RO	Tx

This object reflects the integer part of the current temperature magnified by 10 times, and the data type is INT.

0x6004 - Cumulative flow

index	Subindex	Object name	data type	SDO limits of authority	PDO shine upon
0x6004	0x01	Cumulative flow	UDINT	RO	Tx

This object reflects the integer part of the current temperature magnified by 10 times, and the data type is INT.

0x6005 - Cumulative flow unit

index	Subindex	Object name	data type	SDO limits of authority	PDO shine upon
0x6005	0x01	Cumulative flow unit	USINT	RO	Tx

This object reflects the unit of the object dictionary 0x6004Cumulative flow. 0 represents SL (standard liter), 1 represents sm3 (standard cubic meter), and the data type is USINT.

0x6006 - Valve status

index	Subindex	Object name	data type	SDO limits of authority	PDO shine upon
0x6006	0x01	Valve status	USINT	RO	Tx

This object reflects the current Valve status, 0 represents the normal mode, 1 represents the full open mode, and the data type is USINT. Note that if you want to control the flow, the Valve status must be in the normal mode!

0x7000 - Set flow

index	Subindex	Object name	data type	SDO limits of authority	PDO shine upon
0x7000	0x01	Set flow	UDINT	RW	Tx

This object is used to set the flow. The data type is UDINT and the flow unit is SCCM.

0x7002 – Set Valve status

index	Subindex	Object name	data type	SDO limits of authority	PDO shine upon
0x7002	0x01	Set Valve status	USINT	RW	Tx

This object is used to set the Valve status. 0 represents the normal mode, 1 represents the full open mode, 2 represents the full close mode, and the data type is USINT. Note that if you want to control the flow, the Valve status must be in the normal mode!

0x7003 - Cumulative flow zero clearing

index	Subindex	Object name	data type	SDO limits of authority	PDO shine upon
0x7003	0x01	Cumulative flow zero clearing	USINT	RW	Rx

This object is used to perform zero clearing on the Cumulative flow. 0 represents no zero clearing, 1 represents zero clearing, and the data type is USINT.

PDO shine upon

0x1A00 TxPDO Default Mapping

PDO index	PDO Subindex	PDO Inlet index	PDO inlet Subindex	Bit length	Code
0x1A00	0x01	0x6000	0x01	32	Current traffic[UDINT]
	0x01	0x6003	0x01	16	Current temperature[USINT]
	0x02	0x6004	0x01	32	Cumulative flow[UDINT]
	0x03	0x6005	0x01	8	Cumulative flow unit [USINT]
	0x04	0x6006	0x01	8	Valve status[USINT]

0x1600 RxPDO Default Mapping

PDO index	PDO Subindex	PDO Inlet index	PDO inlet Subindex	Bit length	Code
0x1600	0x01	0x7000	0x01	8	Set flow[UDINT]
	0x02	0x7002	0x01	8	Set Valve status[USINT]
	0x03	0x7003	0x01	8	Cumulative flow zero clearing[USINT]

2.2 RS-485communication protocol

1.major parameter

communication interface	RS485/RS232 Half duplex mode
Baud rate	9600
data bit	8
Stop bit	1
verify	none
Communication data format	MODBUS RTU (default address 1)

2.Register list

Register address (hexadecimal)	Register content	data type	access type
0x0003	Gas type	unsigned 16-bit integer	only read
0x0004	Full range	unsigned 16-bit integer	only read
0x0005	Flow unit	unsigned 16-bit integer	only read
0x0015	temperature 16 bit	Signed 16 bit integer	only read
0x0016	high flow 16 bit	unsigned 32-bit integer Significant digit 0.01	only read
0x0017	low flow 16 bit		
0x0018	accumulated flow high 32 bits	unsigned 64-bit integer	read/write
0x0019			
0x001A	Accumulated traffic low 32 bits		
0x001B			
0x001C	Cumulative flow unit 0: L; 1: m³	unsigned 16-bit integer	only read
0x001D	accumulated flow days	unsigned 16-bit integer	only read
0x001E	accumulated flow hours	unsigned 16-bit integer	only read
0x001F	accumulated flow minutes	unsigned 16-bit integer	only read
0x0020	Accumulated flow seconds	unsigned 16-bit integer	only read

Register address (hexadecimal)	Register content	data type	access type
0x0021	Valve control mode 0: Flow control mode 3: Valve proportional mode	unsigned 16-bit integer	read/write
0x0022	Set flow high 16 bits	unsigned 32-bit integer Significant digit 0.01	read/write
0x0023	Set flow low 16 bits		
0x0024	Set valve opening	unsigned 16-bit integer Significant digit 0.01	read/write
0x0025	zero calibration	unsigned 16-bit integer	write only

3.Application example

Example 1- host reads basic information

send to device:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register length high bytes	Register length low bytes	CRC check low byte	CRC check high byte
0x01	0x03	0x00	0x03	0x00	0x03	0xF5	0xCB

return from device:

Device address	Function code	Data bytes	Gas type high byte	Gas type low byte	Full range high byte	Full range low byte
0x01	0x03	0x06	0x00	0x0D	0x00	0x64

Flow unit high byte	Flow unit low byte	CRC check low byte	CRC check high byte
0x00	0x0A	0xCD	0x6C

data analysis

① gas type:

0x000D (hexadecimal) = 13 (decimalism)

If you look at the code in the following table, you can see that 13 stands for nitrogen.

code (decimalism)	gas type	code (decimalism)	gas type
1	He	13	N2
2	CO	15	O2
4	Ar	25	CO2
7	H2	28	CH4
8	Air		

② flow unit:

0x000A (hexadecimal) = 10 (decimalism)

Refer to the following table code, we can see that 10 represents SCCM.

code (decimalism)	flow unit
10	SCCM
100	SLM

③ full range:

0x0064 (hexadecimal) = 100 (decimalism)

It is known that the full range of the device is 100 (if the flow unit is SCCM, the full flow is 100 SCCM; if the flow unit is SLM, the full flow is 100 SLM).

Example 2 – Host read temperature and flow

send to device:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register length high bytes	Register length low bytes	CRC check low byte	CRC check high byte
0x01	0x03	0x00	0x14	0x00	0x04	0x04	0x0D

return from device:

Device address	Function code	Data bytes	Decimal place high byte	Decimal place low byte	Temperature high bytes	Temperature low bytes
0x01	0x03	0x08	0x00	0x01	0x00	0xFD

Flow data byte1	Flow data byte2	Flow data byte3	Flow data byte4	CRC check low byte	CRC check high byte
0x00	0x00	0x30	0x39	0x3C	0xD1

data analysis

① temperature:

0x00FD (hexadecimal) = 253 (decimalism)

Divide by 10 to get the actual temperature = 253/10 = 25.3 (℃).

② flow data decimal places:

0x0001 (hexadecimal) = 1 (decimalism)

As can be seen from the following table, 1 indicates that flow data has three decimal places.

Code (decimalism)	Baud rate
0	two decimal places
1	three decimal places
2	integer
3	one decimal place

③ flow:

0x00003039 (hexadecimal) = 12345 (decimalism)

Combined with flow data decimal places, the current flow is 12345 × 0.001 = 12.345

(if the flow unit is SCCM, the flow is 100 SCCM; if the flow unit is SLM, the flow is 100 SLM).

Example 3 – Host read cumulative flow

send to device:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register length high bytes	Register length low bytes	CRC check low byte	CRC check high byte
0x01	0x03	0x00	0x18	0x00	0x09	0x05	0xCB

return from device:

Device address	Function code	Data bytes	Cumulative flow data byte1	Cumulative flow data byte2	Cumulative flow data byte3	Cumulative flow data byte4	Cumulative flow data byte5
0x01	0x03	0x12	0x00	0x00	0x00	0x00	0x07
Cumulative flow data byte6	Cumulative flow data byte7	Cumulative flow data byte8	accumulated flow unit high type	accumulated flow unit low type	Cumulative flow days high type	Cumulative flow days low type	Cumulative flow hours high type
0x5B	0xCD	0x15	0x00	0x00	0x27	0x10	0x00
Cumulative flow hours low type	Cumulative flow minutes high type	Cumulative flow minutes low type	Cumulative flow seconds high type	Cumulative flow seconds low type	CRC check low byte	CRC check high byte	
0x0A	0x00	0x32	0x00	0x1E	0x6E	0xF9	

data analysis

① accumulated flow unit:

0x0000 (hexadecimal) = 0 (decimalism)

If you look in the Register list, 0 means L.

② cumulative flow:

0x000000000075BCD15 (hexadecimal) = 123456789 (decimalism)

Divide by 1000, and the actual cumulative flow is 123456.789.

(If the flow unit is L, the full flow is 123456.789 L; If the flow unit is m3, the full flow is 123456.789 m3.)

③ cumulative time:

days 0x2710 (hexadecimal) = 10000 (decimalism)

hours 0x000A (hexadecimal) = 10 (decimalism)

minutes 0x0032 (hexadecimal) = 50 (decimalism)

seconds 0x001E (hexadecimal) = 30 (decimalism)

cumulative time is 10000 days, 10 hours, 50 minutes and 30 seconds.

Example 4 – Host clear cumulative flow

Send to device:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register number high type	Register number low type	Modify data byte length	Data1 high type	Data1 low type
0x01	0x10	0x00	0x18	0x00	0x04	0x08	0x00	0x00

Data2 high type	Data2 low type	Data3 high type	Data3 low type	Data4 high type	Data4 low type	CRC check lowbyte	CRC check high byte
0x00	0x00	0x00	0x00	0x00	0x00	0x96	0x5A

If the following data is returned, the operation succeeds

Device address	Function code	Register first address high bytes	Register first address low bytes	Register number high type	Register number low type	CRC check low byte	CRC check high byte
0x01	0x10	0x00	0x18	0x00	0x04	0x41	0xCD

Example 5 – Set flow on host (PS300 series only)

There are two methods for the host to set flow:

Method 1: Set the control mode and then the flow;

Method 2 (Recommended): Set the control mode and flow simultaneously.

Method 1 is as follows

First set control mode. send to device:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register data high type	Register data low type	CRC check low byte	CRC check high byte
0x01	0x06	0x00	0x21	0x00	0x00	0xD9	0xC0

data analysis

0x0000 (hexadecimal) = 0 (decimal)

From the Register list, 0 indicates that the control mode is set to flow control mode.

Note: By default, the flow control mode is used by the host. If you do not need to change the flow control mode, skip this step and set the Flow mode directly. If you need to set flow multiple times and the control method is the same, perform this step only once.

If the following data is returned from device, the operation succeeds.

Device address	Function code	Register first address high bytes	Register first address low bytes	Register data high type	Register data low type	CRC check low byte	CRC check high byte
0x01	0x06	0x00	0x21	0x00	0x00	0xD9	0xC0

After the control method is determined, set the flow, send to device:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register length high bytes	Register length low bytes	Modify the byte length of data
0x01	0x10	0x00	0x22	0x00	0x02	0x04

Data1 high type	Data1 low type	Data2 high type	Data2 low type	CRC check low byte	CRC check high byte
0x00	0x00	0x30	0x34	0x65	0xB9

data analysis

0x00003034 (hexadecimal) = 12340 (decimal)

Divide by 1000 to obtain the set target flow value:

12340 / 1000 = 12.34

- If the flow unit is SCCM, the target value is 12.34 SCCM
- If the flow unit is SLM, the target value is 12.34 SLM

If the following data is returned from device, the operation succeeds:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register length high bytes	Register length low bytes	CRC check low byte	CRC check high byte
0x01	0x10	0x00	0x22	0x00	0x02	0xE1	0xC2

Method 2 is as follows:

send to device:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register length high bytes	Register length low bytes	Modify data byte length	Data1 high type
0x01	0x10	0x00	0x21	0x00	0x03	0x06	0x00

data1 low type	data2 high type	data2 low type	data3 high type	data3 low type	CRC check low byte	CRC check high byte
0x00	0x00	0x00	0x30	0x34	0xA3	0xF8

data analysis

① control mode:

0x0000 (hexadecimal) = 0 (decimalism)

From the Register list, 0 indicates that the control mode is set to flow control mode.

② Flow set:

0x00003034 (hexadecimal) = 12340 (decimalism)

Divide by 1000 to get the target flow value of set = 12340 / 1000 = 12.34

(If the flow unit is SCCM, the target value is 12.34 SCCM;

If the flow unit is SLM, the target value is 12.34 SLM.)

If the following data is returned from device, the operation succeeds.

Device address	Function code	Register first address high bytes	Register first address low bytes	Register length high bytes	Register length low bytes	CRC check low byte	CRC check high byte
0x01	0x10	0x00	0x21	0x00	0x03	0xD0	0x02

Example 6 – Host set valve opening (PS300 series only)

There are two methods for the host to set the valve opening:

Method 1: set control mode, then set ratio;

Method 2 (Recommended): control mode and ratio set simultaneously.

Method 1 is as follows

First set control mode, send to device:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register data high type	Register data low type	CRC check low byte	CRC check high byte
0x01	0x06	0x00	0x21	0x00	0x03	0x99	0xC1

data analysis

0x0003 (hexadecimal) = 3 (decimal)

According to the Register list, 3 indicates that the proportional mode of control mode set is Valve.

Note: If you need to set different proportions for several consecutive times, perform this step only once.

If the following data is returned from device, the operation succeeds:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register data high type	Register data low type	CRC check low byte	CRC check high byte
0x01	0x06	0x00	0x21	0x00	0x03	0x99	0xC1

After the control method is determined, the proportional set is carried out. Send to device:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register data high type	Register data low type	CRC check low byte	CRC check high byte
0x01	0x06	0x00	0x24	0x04	0xD2	0x4B	0x5C

data analysis

0x04D2 (hexadecimal) = 1234 (decimalism)

Divide by 100 to get the target ratio of set = 1234/100 = 12.34 (%).

If the following data is returned from device, the operation succeeds.

Device address	Function code	Register first address high bytes	Register first address low bytes	Register data high type	Register data low type	CRC check low byte	CRC check high byte
0x01	0x06	0x00	0x24	0x04	0xD2	0x4B	0x5C

method 2 is as follows:

send to device:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register length high bytes	Register length low bytes	Modify data byte length	Data1 high type	Data1 low type
0x01	0x10	0x00	0x21	0x00	0x04	0x08	0x00	0x03

Data2 high type	Data2 low type	Data3 high type	Data3 low type	Data4 high type	Data4 low type	CRC check low byte	CRC check high byte
0x00	0x00	0x00	0x00	0x04	0xD2	0x7B	0x9B

data analysis

① control mode:

0x0003 (hexadecimal) = 3 (decimalism)

According to the Register list, 3 indicates that the control mode set is proportional mode of Valve.

② Proportion set:

0x04D2 (hexadecimal) = 1234 (decimalism)

Divide by 100 to get proportion = 1234/100 = 12.34 (%).

If the following data is returned from device, the operation succeeds.

Device address	Function code	Register first address high bytes	Register first address low bytes	Register length high bytes	Register length low bytes	CRC check low byte	CRC check high byte
0x01	0x10	0x00	0x21	0x00	0x04	0x91	0xC0

Example 7 - Host read address (PS300 series only)

send to device:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register length high bytes	Register length low bytes	CRC check low byte	CRC check high byte
0xFE	0x03	0x00	0x00	0x00	0x01	0x90	0x05

return from device:

Device address	Function code	Data bytes	Address high type	Address low type	CRC check low byte	CRC check high byte
0xFE	0x03	0x02	0x00	0x01	0x6D	0x90

data analysis

0x0001(hexadecimal) = 1(decimalism)

Current address is 1.

Example 8- Host zero calibration

send to device:

Device address	Function code	Register first address high bytes	Register first address low bytes	Register value high type	Register value low type	CRC check low byte	CRC check high byte
0x01	0x06	0x00	0x25	0x00	0x01	0x59	0xC1

If the following data is returned from device, the operation succeeds.

Device address	Function code	Register first address high bytes	Register first address low bytes	Register value high type	Register value low type	CRC check low byte	CRC check high byte
0x01	0x06	0x00	0x25	0x00	0x01	0x59	0xC1

Example 9- Restore factory set

send to device:

Device address	function code	Register first address high bytes	Register first address low bytes	Register value high type	Register value low type	CRC check low byte	CRC check high byte
0x01	0x06	0x00	0x25	0x00	0x02	0x19	0xC0

If the following data is returned from device, the operation succeeds.

Device address	Function code	Register first address high bytes	Register first address low bytes	Register value high type	Register value low type	CRC check low byte	CRC check high byte
0x01	0x06	0x00	0x25	0x00	0x02	0x19	0xC0

4) CRC Test algorithm (C language)

Method one:

```
unsigned short Crc16_Check(unsigned char *Pushdata, unsigned char length)
// The 16 bits of data returned are high first and low last.
{
    unsigned short Reg_Crc = 0xffff;
    unsigned char i, j;
    for(i = 0; i < length; i++)
    {
        Reg_Crc ^= *Pushdata++;
        for(j = 0; j < 8; j++)
        {
            if(Reg_Crc & 0x0001)
```

```
            {
                Reg_Crc = Reg_Crc >> 1 ^ 0xA001;
            }
            else
            {
                Reg_Crc >>= 1;
            }
        }
    }
    return (Reg_Crc);
}
```

Method Two:

```
const uint16_t crctalbeabs[] = {
    0x0000, 0xCC01, 0xD801, 0x1400, 0xF001, 0x3C00, 0x2800, 0xE401,
    0xA001, 0x6C00, 0x7800, 0xB401, 0x5000, 0x9C01, 0x8801, 0x4400 };
uint16_t crc16tablefast(uint8_t *ptr, uint16_t len)
// The 16 bits of data returned are high first and low last.
{ uint16_t crc = 0xffff;
 uint16_t i;
 uint8_t ch;
 for(i = 0; i < len; i++) {
 ch = *ptr++;
 crc = crctalbeabs[(ch ^ crc) & 15] ^ (crc >> 4);
 crc = crctalbeabs[((ch >> 4) ^ crc) & 15] ^ (crc >> 4);
 }
 return crc;
}
}
```

2.3 Shutdown

When removing the external connecting wire of this product, please cut off the power first.

Part III Maintenance

3.1 summary

There is no need for daily maintenance of this product, only occasional cleaning and recalibration. Please ensure that the product is clean, dry and free of corrosive gas, otherwise it will affect the product performance and even cause product failure. Please contact our company for more details.

3.2 Matters needing attention

1) Media usage requirements

When using this product, the gas must be clean and dry, and dust, liquid and oil stains must be avoided. If necessary, a filter shall be installed in the gas circuit. If the outlet of this product is connected with a liquid source, a check valve must be installed at the outlet to prevent liquid backflow from damaging the product.

Warning:

If it is used to measure dangerous gases, please take precautions. Dangerous, flammable and explosive gases must be handled with great care to avoid safety accidents:

a) Before ventilation, the air tightness of installation and connection shall be strictly guaranteed and inspected;

b) If the dangerous gas is wet, please stop using it immediately;

c) Before removing from the system, the product should be thoroughly cleaned with dry conventional gas (such as nitrogen, air) or inert gas that is harmless to human body before disconnecting the gas circuit;

d) Do not use this product in explosive environment unless it has been effectively certified.

2) Valve port sealing problem

The solenoid valve of the gas mass flow controller is a regulating valve and cannot be used as a stop valve. If required, the user shall provide a stop valve. Especially when users use dangerous gas, they must add a stop valve at the inlet and outlet of the product to ensure the work safety.

Part IV Fault Diagnosis

4.1 Preliminary Inspection

1. Check whether the air source and the air path to the product are opened;
2. Ensure that the power supply and control signal are correctly transmitted to the electrical connector on the circuit board;
3. Check whether the communication line is connected correctly.

4.2 Fault Inspection

Please judge the fault according to the following table.

No.	Fault	Possible Causes	Solution
1	After startup, no air flow passes.	The air source is not turned on, and the air path is blocked	Connect the air source and open the air circuit
2	When not ventilated, the displayed value is not zero.	There is still gas flow	Check whether the stop valve is closed
		Power failure	Check power supply
		Zero deviation	Using the zero point calibration function
		Other faults	※ Please contact our company
3	Unable to control flow	Incorrect gas circuit connection	Check the gas circuit connection
		The pressure is not within the required range	Check the intake pressure
		Incorrect setting signal	Check the setting signal
		Circuit board issues	※Please contact our company
		The controller is contaminated	※Please contact our company
		Valve body damaged	※Please contact our company
4	Unable to communicate	Power supply issues	Check the power supply
		Communication connection issues	Check the communication line connection
		Communication address conflict	Check communication address
		Incorrect baud rate setting	Check baud rate settings
		Other faults	※ Please contact our company

Warning:

Items marked with ※ must be handled by professional maintenance personnel of the company. If the fault is not in the above table or cannot be solved according to the above table, please contact our company.

Part V Guarantee and Service

5.1 Warranty

This product must be installed, used and maintained in strict accordance with the correct method under the normal working conditions specified in the manual.

The company provides the following warranty services for PS300 series products:

For new products, a 365-day free warranty service is provided from the date of shipment. For the repaired or replaced products, a 90-day free warranty service will be provided from the date of shipment or the original warranty period will be extended.

Note that the following conditions do not apply to warranty terms:

1) Not the original product of the company;

2) The safety label of the product is torn;

3) The product is used in (or outside) abnormal environment specified in the manual, and any other circumstances that can be considered as abnormal use.

5.2 Product warranty

The company provides the following guarantees for PS300 series products:

1) During the warranty period, the product must be maintained and repaired by our company, otherwise, the product warranty is invalid.

2) Free maintenance within the 365-day warranty period.

3) The company will check the quality and function of each product before delivery (appearance inspection, gas leakage detection and flow calibration). The user is responsible for using this product in accordance with the provisions of this manual. The damage caused by incorrect use cannot be attributed to the company.

4) If the parts of the product fail due to material or process defects, our company can provide you with free replacement services.

5.3 Service

If you have any quality problems or need technical support, our product technical support engineers will help you solve problems in operation, software development, connection, gas mixing, etc.

In addition, we also provide product use training.

5.4 Disclaimers

The company is not responsible for the damage caused by the following conditions:

1) Product failure and damage caused by fire, natural disaster and other natural disasters;

2) Product failure and damage caused by misoperation or unreasonable use;

3) Failure and damage caused by operation or storage of products under unsuitable or harsh environment;

4) Product failure and damage caused by correct use in accordance with the product instructions;

5) Product failure and damage caused by impurity mixing;

6) Tear the safety label and change the product without authorization.

Appendix Common gas conversion coefficient

formula	code	conversion coefficient
N2	01	1
Air	02	1.001
O2	03	1.025
CO2	04	0.75
Ar	05	1.6
CH4	06	0.9
H2	07	3.9
He	08	4
CO	09	1.015
SiH4	10	0.685
NH3	11	0.91
N2O	12	0.751
BCl3	13	0.481
Cl2	14	0.841
NO	16	0.994
C3H6	69	0.453
C3H8	89	0.395
AsH3	35	0.755
BF3	48	0.575
B2H6	58	0.507
CCl4	101	0.342
CF4	63	0.469
C2H2	42	0.664
C2H4	38	0.679
C2H6	54	0.548
C3H4	68	0.478
C4H6	93	0.362
C4H8	104	0.331
C4H10	117	0.289
C5H12	240	0.244
C2H6O	136	0.439
C2N2	59	0.508
D2	39	2.449
F2	18	0.949
GeH4	43	0.638
HBr	19	0.987
HCl	27	0.998

HF	29	1.019
HI	17	0.972
H2S	22	0.89
Kr	15	1.388
Ne	25	1.562
NO2	26	0.789
PCl3	193	0.399
PH3	31	0.784
PF5	143	0.34
SiCl4	108	0.318
SiF4	88	0.39
SiH2Cl2	67	0.467
SiHCl3	147	0.381
SF6	110	0.297
SO2	32	1.218
WF6	121	0.24
Xe	70	1.369

Instructions for use of conversion coefficient:

The mass flow controller and mass flow meter products delivered by our company are calibrated with N2 by default. If they are actually used for other gases, the reading shall be corrected by conversion coefficient. The method is to multiply the flow displayed by the product by the flow conversion coefficient. The conversion coefficient of some gases can be found in the company's operating instructions (as shown in the above table), and the conversion coefficient C of other gases can be

$$C=\exp(-1.193+0.016\times h+0.025\times h2)/(\rho\times Cp)$$

$$h=43.86\times\lambda$$

Including: λ Is the thermal conductivity of the gas in the standard state (unit: W/m · K)

ρ Is the density of gas in standard state (unit: g/L)

Cp is the specific heat of gas at constant pressure (unit: cal/g · K)

Standard state: pressure - 101.325kPa (760mm Hg), temperature - 273.15K (0 ℃)

For mixed gases, calculate the conversion coefficient Cmix according to the following formula:

$$Cmix=1/(q1/qmix)/C1+(q2/qmix)/C2+ \ldots+ (qm/qmix)/Cn$$

Where:

q1 ... qn - flow of corresponding gas

Qmix - flow of mixed gas

C1 ... Cn - conversion coefficient of corresponding gas

Thank you for using
PS300 Series Gas Mass Flow Controller

Website

LINE Official

Website : www.mit-trade.com
Email : info.mittrade@gmail.com
Phone : 081-123-2475

PARKARN INSTUMENT CO.,LTD