



- Not Sensitive To Gas
- 0~+10.0VDC Analogue Output
- RS485 Modbus-RTU
- 2 Control Switch
- LED Display

CMG500 Capacitance Diaphragm Vacuum Gauge

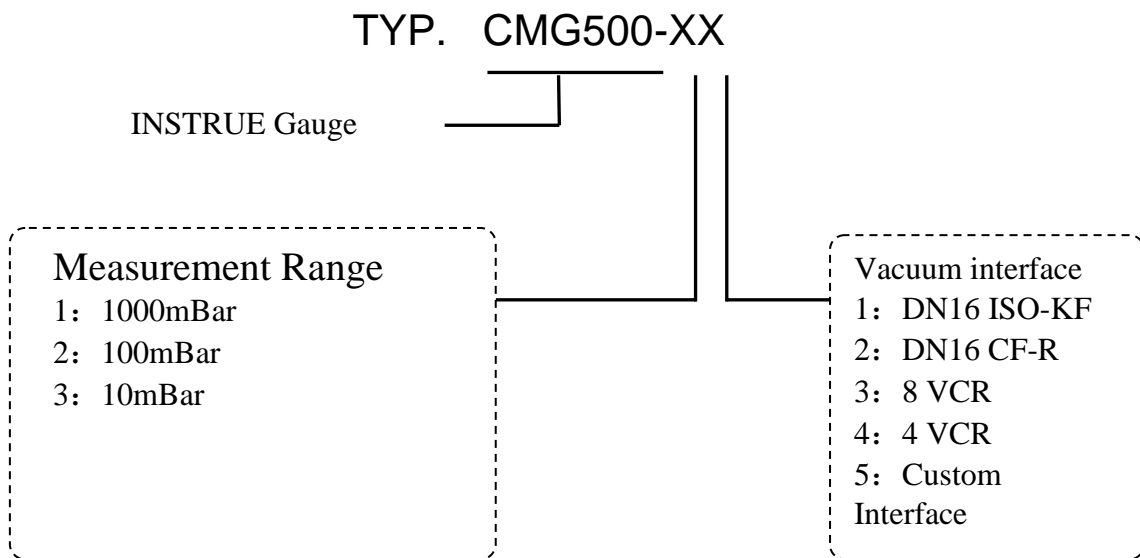
Operation Manual

INSTRUE, Makes Vacuum Measurement *Easy and Simple.*

Product Identification

This document applies to products of the CMG500 series.

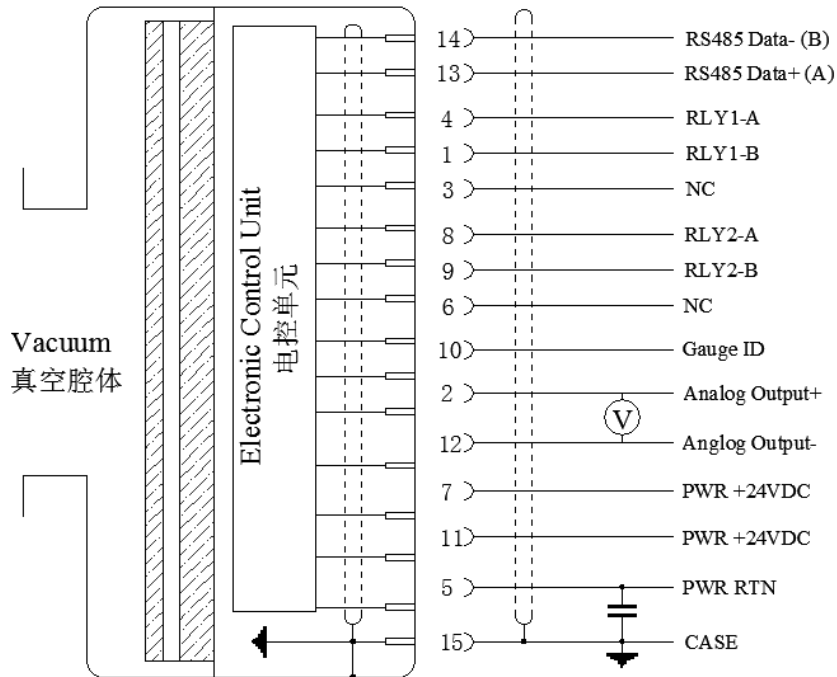
The postfixes of TYP for the standard products are indicated below. OEM products have specific types and different parameter settings as defined in the corresponding ordering information.



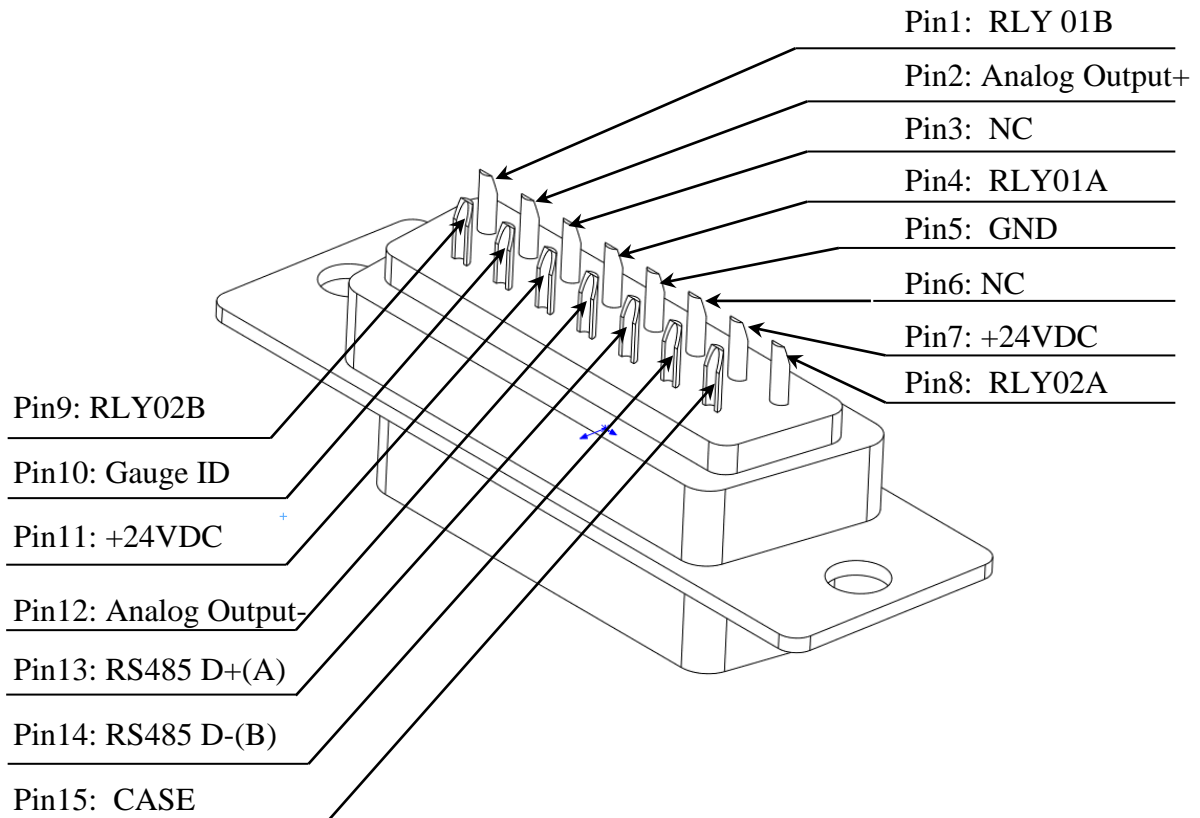
Datasheet

Parameter	Specifications
Measurement Range (air, N2)	CMG500-1000mBar: $1.0 \times 10^{+5}$ ~50.0 Pa CMG500-100mBar: $1.0 \times 10^{+4}$ ~20.0 Pa CMG500-10mBar: $1.0 \times 10^{+3}$ ~0.2 Pa
Accuracy	± 0.25 % of reading
Repeatability	± 0.1 %
Measurement Resolution	0.002%
Long-term Stability	Annual variation is not greater than ± 0.5 % of full scale (excluding environmental change factors)
Maximum Pressure(absolute)	$3.0 \times 10^{+5}$ Pa ()
Measuring Cycle	< 10 ms
Temperature Compensation Range	-20° C ~ +80° C, ± 0.01 %FS/ ° C
Ambient Temperature(Operation)	-10° C ~ +50° C; 5 ~ 85 %, Dew free
Ambient Temperature(Storage)	-20° C ~ +85° C; 5 ~ 90 %, Dew free
Signal Output	Pa, Torr, mBar Display
	Analog output of +0.0V ~ +10.0VDC, impedance of 10 Ω
	RS485 (non-isolated) at baud rate of 9600 bps
	Two solid-state relay 60VDC 500mA
Power Supply	24 \pm 5 VDC /0.5A ; 1.0W power dissipation
Protection Class	IP40, IEC529
Electrical Interface Plug	D-Sub 15 Pin, male
Vacuum Connection	Default: DN 16 ISO-KF; Option for others.
Vacuum Measuring Volume	5.0 cm ³
Weight	250g (standard KF16 flange)
Dimensions	100H x 50Dia. (including KF16 flange) (mm)
Materials Exposed To Vacuum	SS304, SS316L, Kovar 4J50, Filament W, feedthrough

CMG500 DB15 (male)

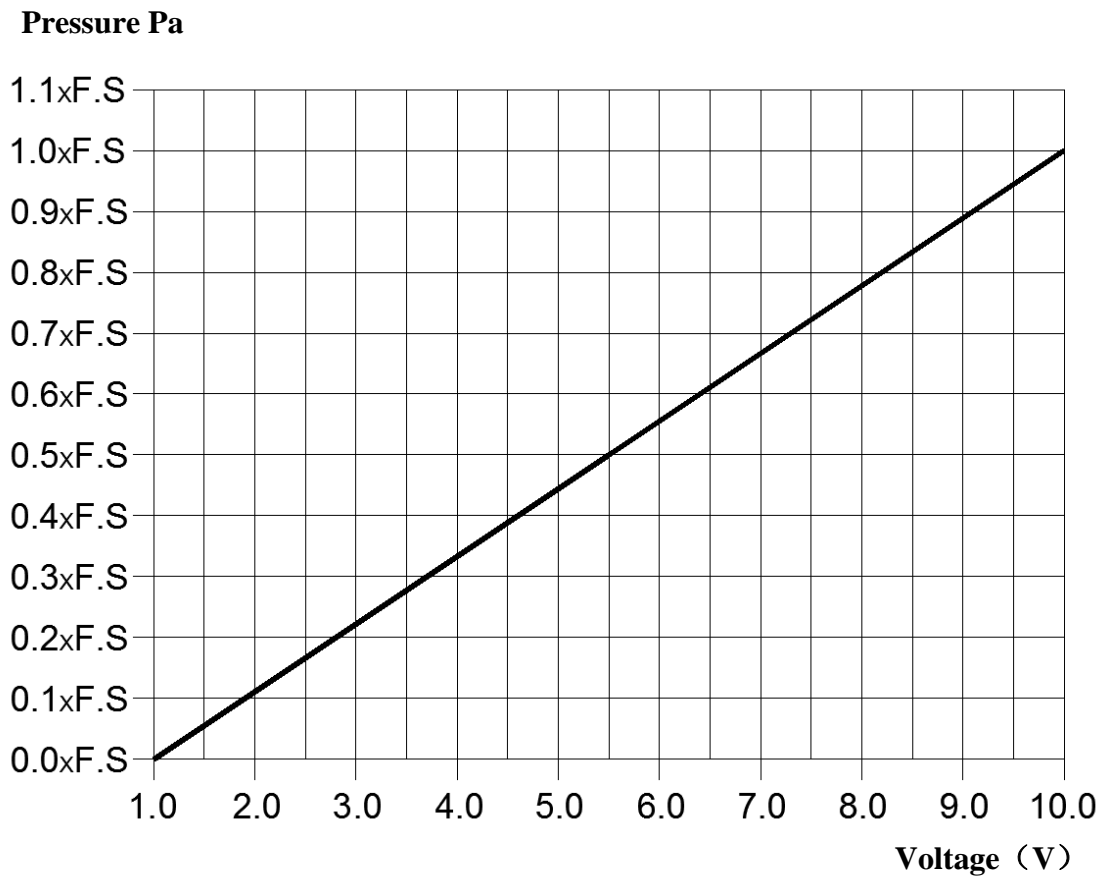


CMG500 DB15 (male)



Analog Signal Output

The measurement signal ranges from +0.0V to +10.0VDC, 2.5mV resolution.



$$P = (U/10) \times P_{FS}$$

P : pressure

U : Voltage (V)

P_{FS} : Corresponding model full scale pressure

For Example:

When use 1000mBarCMG500-11, analog voltage is U=+6.0VDC,

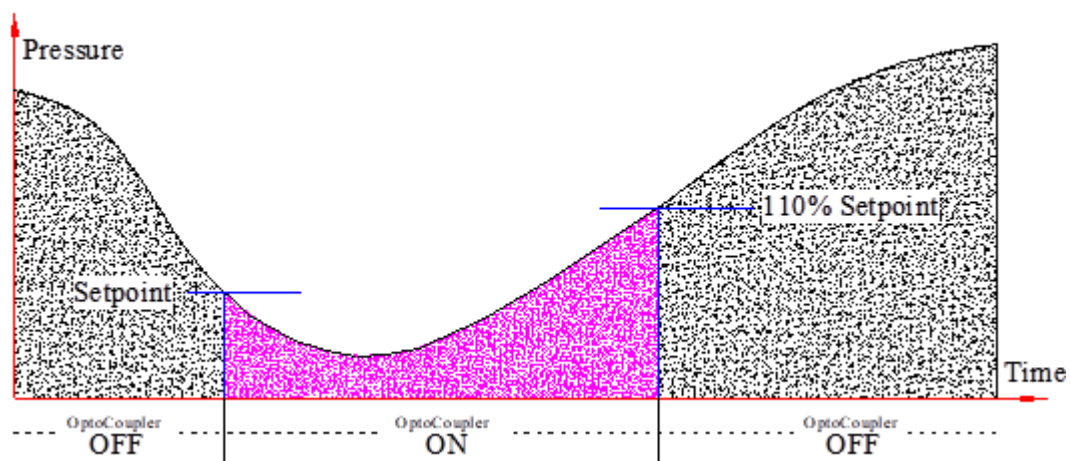
This time, Vacuum pressure $P = (6.0/10) \times 1000\text{mBar} = 600.0 \text{ mBar}$

Setpoint Control Switches

CMG500 has two independent settable switching functions. They can be manually set up via keys on the top. As well, the two setpoints are accessible through RS485 or Wireless communication commands.

The threshold values of switching functions A and B can be set within the pressure range of $1.1E-1$ Pa to $9.9E+4$ Pa.

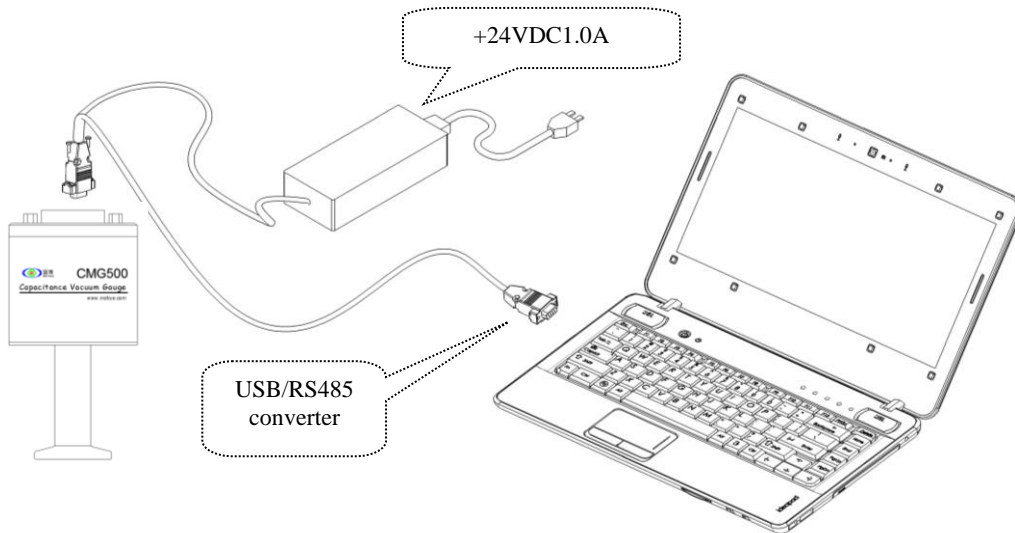
The setpoint is defined as the pressure at which point the optical coupler switches ON, the setpoint output pin is driven to LOW. At the pressure lower than the setpoint the optical coupler stays ON. When the pressure raise up to 110% of setpoint, the optical coupler goes to OFF. It is called hysteresis control.



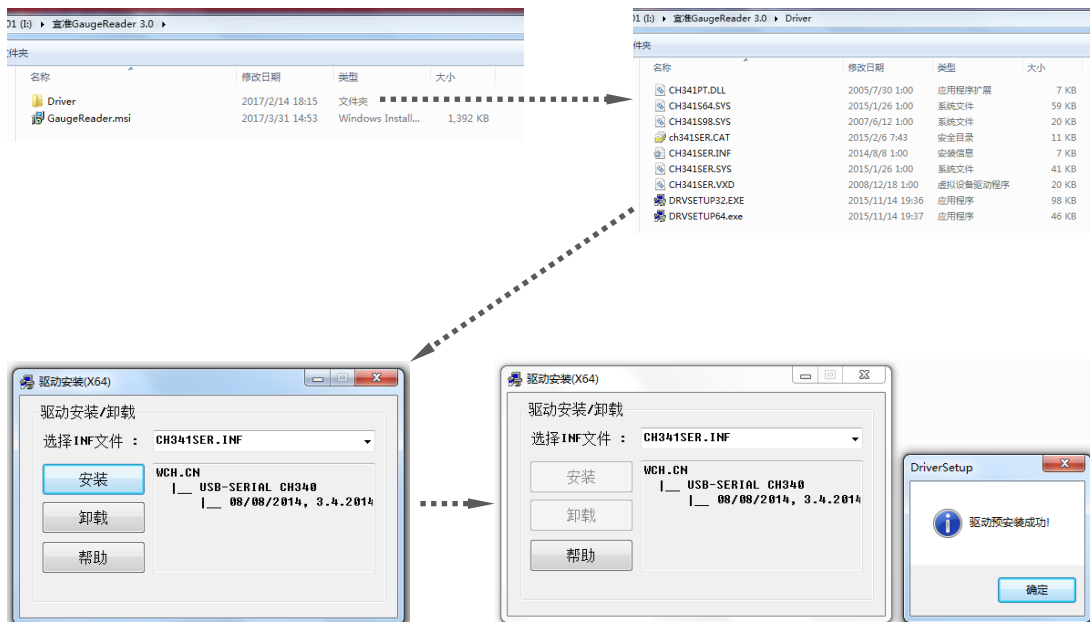
● **CMG500**

The CMG500 can be used with any kind of PLC which has a standard RS485 interface.

The CMG500 can also be used with a regular WinXP\Win7\Win8\Win10 based computer, a USB\RS485 converter is normally needed in this case. INSTRUE provides PC software Gauge Reader for this application.



For use with RS485/Wifi and Window based PC, a RS485\USB converter is normally needed. You can follow the coming-with instruction to install a related driver.

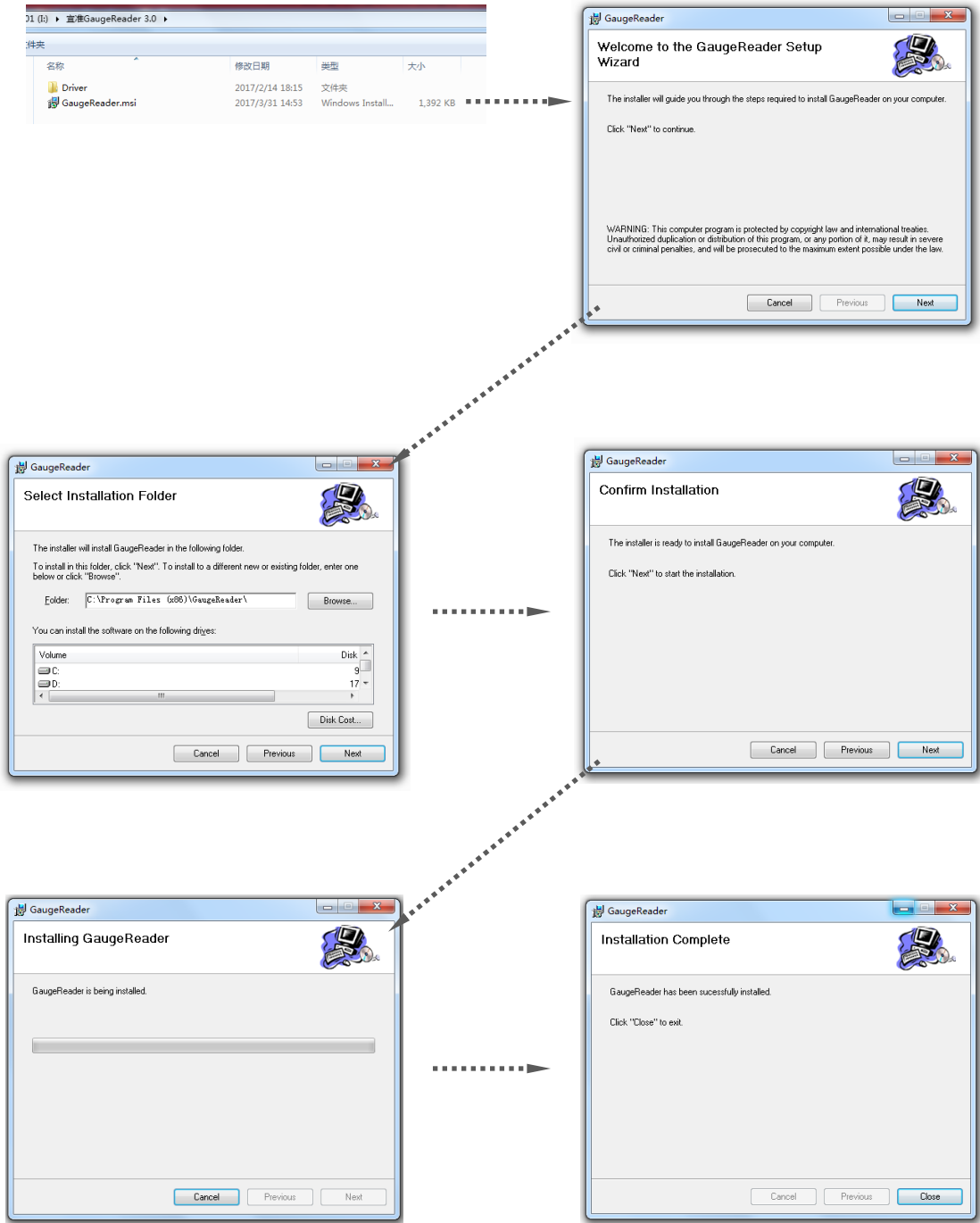


Data Rates: 9600 Baud (other rates are optional)

Byte: 8 data bits 1 stop bit No parity Default settings

For use with RS485/Wifi and Window based PC, a RS485\USB converter is normally needed. You can follow the coming-with instruction to install a related driver.

Install INSTRUE “Gauge Reader 3.0”



Find the file VacGauge.exe in your target folder path, double click, then start to use it.

3) GaugeReader3.0

The image shows the VacGauge software interface with several callout boxes providing instructions:

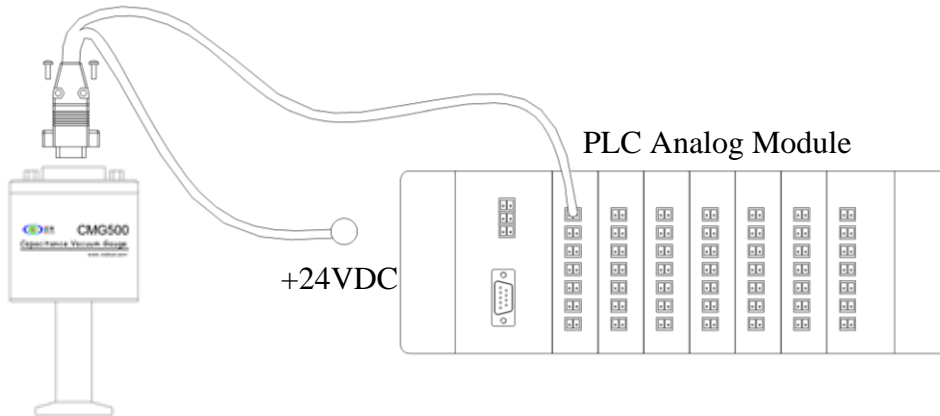
- Get gauge model**: Points to the 'Get Type' and 'Get SN' input fields.
- Choose proper serial port before selecting**: Points to the 'RS485\Wireless Selection' dropdown menu.
- Choose one address to communicate**: Points to the 'Address' dropdown menu.
- Choose one address to communicate**: Points to the 'Set Modbus Address' input field.
- Setup the Setpoints**: Points to the 'Set SP1' through 'Set SP4' input fields.
- Read the Setpoints**: Points to the 'Read SP1' through 'Read SP4' input fields.

The interface includes the following elements:

- Header:** 'VacGauge' logo and window control buttons.
- Configuration Section:**
 - 'Get Type' and 'Get SN' input fields.
 - 'Communication' radio buttons for 'RS485' and 'WIFI'.
 - 'COM Port' dropdown menu (set to '4').
 - 'Address' dropdown menu (set to '1').
 - 'Display Format' radio buttons for 'Science' (selected) and 'Float'.
 - 'Unit' radio buttons for 'Pa' (selected), 'Torr', and 'mBar'.
 - 'Gauge1' and 'Gauge2' radio buttons.
 - 'Atmosphere Calibration' and 'High Vacuum Calibration' buttons.
- Measurement Section:**
 - 'P1:' and 'P2:' labels with corresponding input fields.
 - 'Start' button.
 - 'Set Modbus Address' input field (set to '0').
 - 'Read Modbus Address' input field.
 - 'Read SP1' through 'Read SP4' input fields.
 - 'Set SP1' through 'Set SP4' input fields, each with an 'Above' checkbox.
 - 'Degas' checkbox.

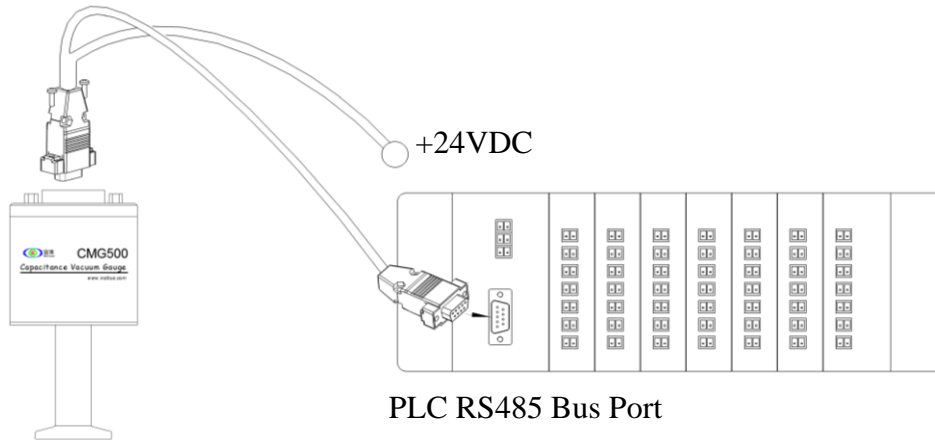
● **CMG500 and PLC Connect**

CMG500 DB5 Pin2 (V+)、Pin12 (V-) can connect with PLC for analog quantity (0.0V~+10.0VDC)



● **CMG500 and PLC Connect: RS485 Modbus-RTU**

DB9 Pin13 (D+)、Pin14 (D-) can connect PLC for RS485。



RS485 MODBUS RTU Communication protocol

1) Communication Setup:

baud rate: 9600
 Start Bit: 1
 Data Bit: 8
 Stop Bit: 1
 Checkout bit: No

2) Instruction format:

a. Read instruction:

- Upper computer sends instructions to vacuum gauge:

Add	Command	Register Hi	Register Low	Data Length (Hi 8bit)	Data Length (Low 8bit)	CRC Check (Low 8bit)	CRC Check (Hi 8bit)
0-99	03	00	XX	00	XX	XX	XX

- Return Instruction:

Add	Command	Data Hi 8 Bit	Data Low 8 Bit	Data	CRC Check (Low 8bit)	CRC Check (Hi 8bit)
0-99	03	00	XX	XX Byte	XX	XX

b. Write Instruction:

- Upper computer sends instructions to vacuum gauge:

Data Mid Byte	Data Mid Byte	Data Mid Byte	CRC Check (Low 8bit)	CRC Check (Hi 8bit)
Bit23-16	Bit15-8	Bit7-0	XX	XX

Add	Command	Register Hi	Register Low	Data Length (Hi 8bit)	Data Length (Low 8bit)	Data Byte	Highest Data Byte
0-99	16	00	XX	00	02	4	Bit31-24

- Return Instruction:

Add	Command	Register Hi	Register Low	Data Length (Hi 8bit)	Data Length (Low 8bit)	CRC Check (Low 8bit)	CRC Check (Hi 8bit)
0-99	16	00	XX	00	02	XX	XX

3) Register address table:

Register address (16hexadecimal)	Data byte length	Storage content
01	2	Gauge Ch1: Vacuum data of scientific counting format
03	2	Gauge CH2: Vacuum data of scientific counting format
11	2	Gauge Ch1: Vacuum data of floating point format
13	2	Gauge CH2: Vacuum data of floating point format
21	2	Set Point 01: Floating Format
23	2	Set Point 02: Floating Format
25	2	Set Point 03: Floating Format
27	2	Set Point 04: Floating Format
29	2	Set Point 05: Floating Format
2B	2	Set Point 06: Floating Format
31	1	Set Point 01 correspond Gauge 1: Gauge Ch1; 2: Gauge Ch2
32	1	Set Point 02 correspond Gauge 1: Gauge Ch1; 2: Gauge Ch2
33	1	Set Point 03 correspond Gauge 1: Gauge Ch1; 2: Gauge Ch2
34	1	Set Point 04 correspond Gauge 1: Gauge Ch1; 2: Gauge Ch2
35	1	Set Point 05 correspond Gauge 1: Gauge Ch1; 2: Gauge Ch2
36	1	Set Point 06 correspond Gauge 1: Gauge Ch1; 2: Gauge Ch2
40	1	Implement Calibration: 1: Gauge Ch1 atmosphere 2: Gauge Ch1 Zero 4: Gauge Ch2 atmosphere 8: Gauge Ch2 Zero

4 Data display format:

4.1 Scientific count format:

For example, the vacuum gauge display data is 1.2E+3, and the ASCII code stored in the register is the corresponding data, that is, 0x31, 0x32, 0x2b, 0x33.

For example, the vacuum gauge displays the data 1.0E-1, and the data stored in the register are 0x31, 0x30, 0x2d and 0x31.

4.2 Floating format:

The 32 bit floating number is stored in the register.

4.3 Vacuum gauge address setting:

Through Gauge Reader 3.0 application software interface, you can set the vacuum meter local address, factory address set to 01.

Size

