OSM41 HIGH PRECISION LASER DISTANCE SENSOR

Product Description

- Laser displacement sensor ,680nm laser source,FULL Metal JACKET,durable,better protective performance,small lignt spot,high precision,LED display and key setting.Suitable for dispensing machine,packing,automobile AGV and other industries.

Product features:

- Support two-way switch output,NPN/PNP can be set.
- Support RS485 output.
- Four white digital tubes,clear and bright
- Strong ambient light resistance and compact size
- Support multiple detection modes,multi-scene applications.

Type	Measurement range	Beam diameter	Repeatability	Absolute accuracy	Resolution
OSM41-KL10CB6/485	100...9999mm	0.4 divergence angle (10mm@2M 20mm@4M 50mm@10M)	tabula rasa 10mm(dis<5m,90％reflection) 30mm(dis<10m,90％reflection) blackboard 30mm(dis<5m,6％reflection) 50mm(dis<10m,6％reflection)	tabula rasa 10mm(dis<5m,90％reflection) 30mm(dis<10m,90％reflection) blackboard 30mm(dis<5m,6％reflection) 50mm(dis<10m,6％reflection)	1mm

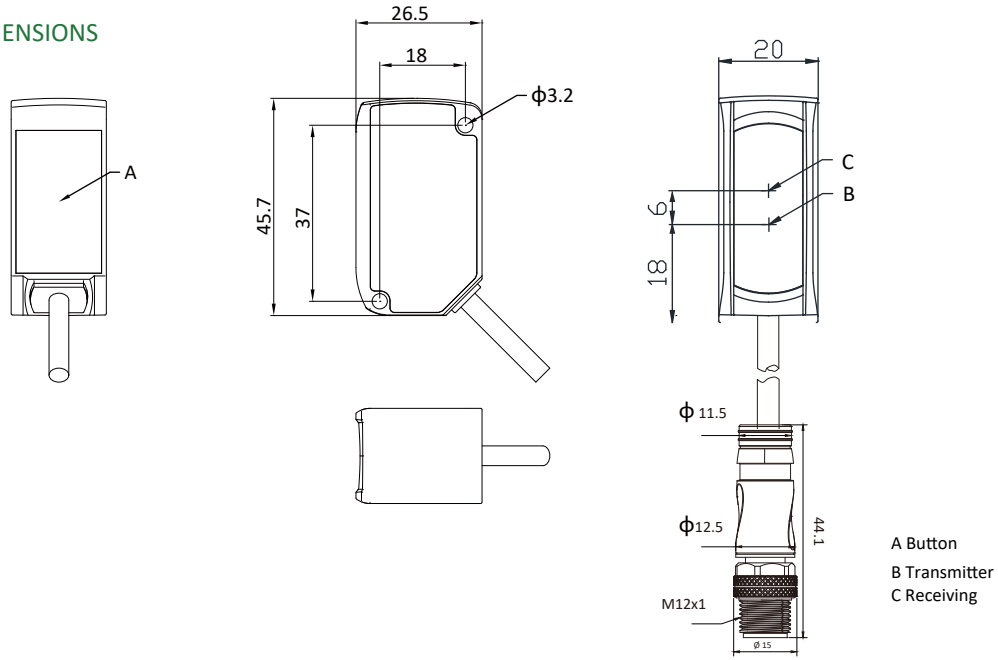
Note 1: This product is a laser product, which can be used after 10 minutes of preheating after power-on.

TECHNICAL SPECIFICATION

OPERATING VOLTAGE	10...30VDC	**WORKING TEMPERATURE**	-10°C ... +50°C
POWER SUPPLY	<1W	**ANTI-AMBIENT LIGHT ABILITY**	＞8000lux
LIGHT SOURCE TYPE	680nm red laser, class1 grade	**PROTECTION DEGREE**	IP67
CONTROL OUTPUT	NPN/PNP can be set	**HOUSING MATERIAL**	Die-cast zinc
RS485 OUTPUT	Modbus protocol TIA/EIA-485A standard	**WINDOWS MATERIAL**	Glass
RESPONSE TIME	25Hz/50Hz/100Hz	**CONNECTIONS**	Cable

OSM41 HIGH PRECISION LASER DISTANCE SENSOR

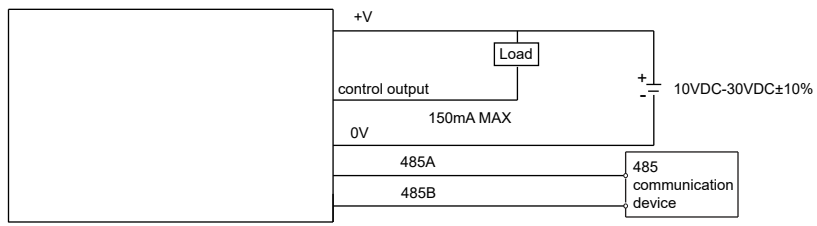
DIMENSIONS



INTERFACE DEFINITION AND WIRING DIAGRAM

	Function	Cabel product core color
1	Positive power supply	Brown
2	485B	Gray
3	Power negative	Blue
4	NPN/PNP	Black
5	485A	Pink

Wiring diagram（NPN）



OSM41高精度位移传感器

产品说明:

- 激光位移传感器，680nm激光光源，全金属外壳，坚固耐用，防护性能更好，体积小，光斑小，精度高，LED显示和按键设置。适用点胶机、包装、汽车、AGV等行业应用。

产品特点:

- 支持开关量输出，NPN/PNP可设定
- 支持RS485输出
- 四位白色数码管，明亮清晰
- 抗环境光能力强，紧凑尺寸
- 支持多种检测模式，多场景应用

型号	检测距离	光束直径	重复精度	绝对精度	分辨率
OSM41-KL10CB6/485	100...9999mm	0.4°发散角 (10mm@2M 20mm@4M 50mm@10M)	白板 10mm(dis<5m,90%反射) 30mm(dis<10m,90%反射) 黑板 30mm(dis<5m,6%反射) 50mm(dis<10m,6%反射)	白板 10mm(dis<5m,90%反射) 30mm(dis<10m,90%反射) 黑板 30mm(dis<5m,6%反射) 50mm(dis<10m,6%反射)	1mm

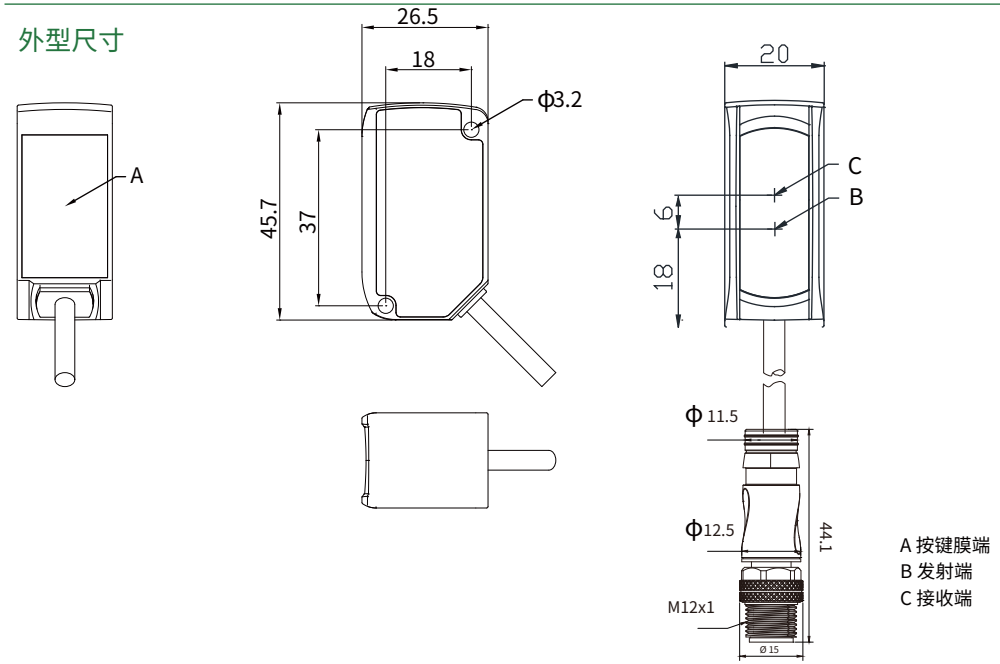
注1：本产品为激光类产品，上电预热十分钟后使用。

技术参数

工作电压	10...30VDC	**工作温度**	-10°C…+50°C
功率	<1W	**抗环境光能力**	＞8000lux
光源	680nm红激光， class1等级	**防护等级**	IP67
两路控制输出	NPN/PNP可选	**外壳**	压铸锌
RS485输出	modbus协议 TIA/EIA-485A标准	**窗口**	玻璃
检测频率	25Hz/50Hz/100Hz	**连接形式**	线缆式

OSM41高精度位移传感器

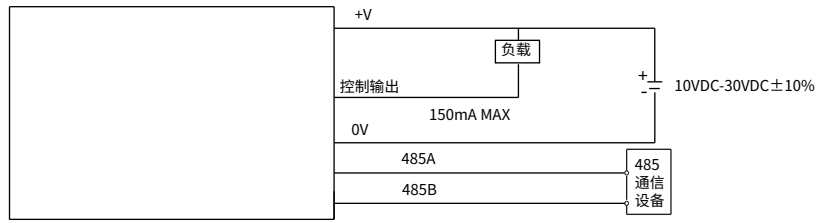
外型尺寸



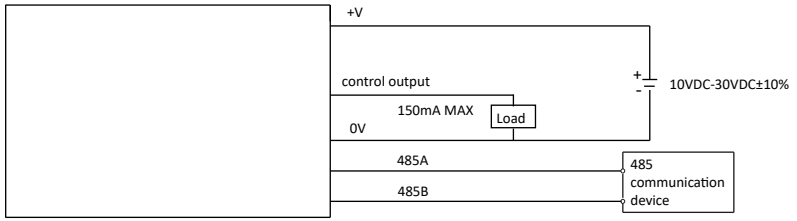
接口定义和接线图

	功能	出线式 线芯颜色
1	电源正	棕
2	485B	灰
3	电源负	蓝
4	NPN/PNP	黑
5	485A	粉

接线图（NPN）



Wiring diagram（PNP）

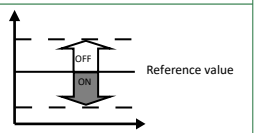


TEACHING MODE DESCRIPTION

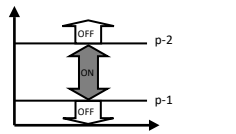
Teach

Detection mode setting description:
It is necessary to set the “Detection Mode Setting”in the menu to the corresponding function mode in advance.

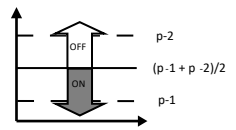
1. Normal detection mode
In the menu，select the “__|‾‾” mode,automatically enter the detection interface;Select the target object(*) within the effective detection distance and press the TEACH key,and prompt “GOOD” to complete the setting.The location of the target object is the judgement distance.



2. 2-point teaching window comparison mode
In the menu，select the “_N_.2” mode,automatically enter the measurement interface.Select the target object 1(*) within the effective detection distance and press the TEACH key,and prompt “LP1” to complete p-1 setting.Select the target object 2 (*)within the effective detection distance and press TEACH key,prompt ”GOOD” to complete the p-2 setting.
Use the distance between the location of target object 1 and target object 2 as the window to determine the window mode.



3. midpoint teaching mode
In the menu，select the “Nid” mode,automatically enter the measurement interface.Select the target object 1(*) within the effective detection distance and press the TEACH key,and prompt “LP1” to complete p-1 setting.Select the target object 2(*) within the effective detection distance and press TEACH key,prompt ”GOOD” to complete the p-2 setting.
Take the middle distance between p-1 and p-2 as the judgement distance.



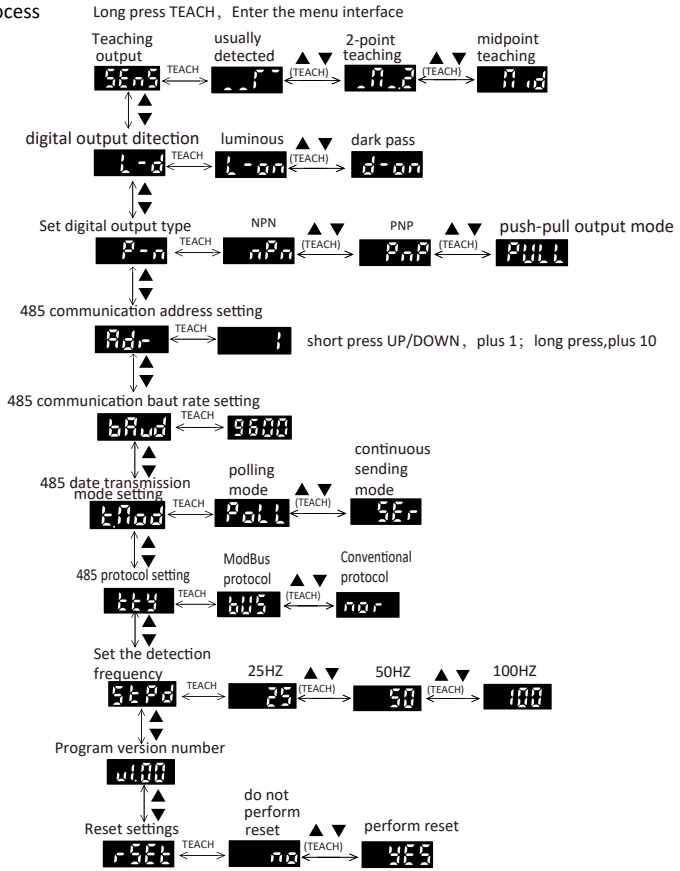
*Represents fine adjustment:After selecting the target object,you can fine-tune the distance of the target object with the UP/DOWN key,and then press the TEACH key to confirm.

OSM41 HIGH PRECISION LASER DISTANCE SENSOR
ELCO INDUSTRIAL AUTOMATION

INSTRUCTION

1.Menu operation process

STEP



2.Ranging diaplay
Measurement interface：Show actual measurement distance，resolution is 1mm，when the distance is out of detected distance, it diaplays“----”。

3.Menu and key operation

3.1 Enter the menu：Long pressTEACH above 3s when it is in the measurement interface，enter the menu interface；
Exit menu：Long pressTEACH above 3s when it is in the menu interface，or no key operation for 20s，return to measurement interface。

3.2 Menu operation
Enter the menu interface,diaplay the main menu,switch the menu options by pressing the up/down key.On the main menu interface,enter the submenu options by short pressing TEACH key.Unter the submenu,short press up/down to select the parameter.Short press the TEACH key to confirm and return to the previous main menu.

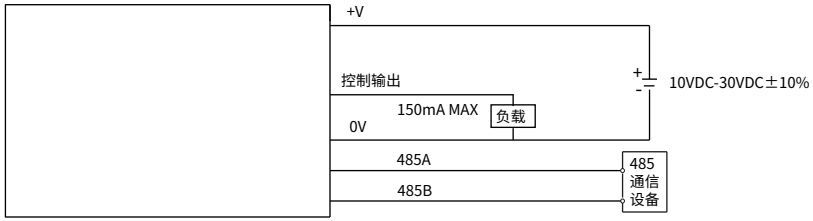
1)Teaching output
The main menu shows“SEnS”，press TEACH to enter the submenu;
Submenu items：“__|‾‾”usually detected mode（default）；“_N_.2”2-point teaching window comparison mode；“nid”midpoint teaching mode.The above teaching modes are detailed in 6.Teaching mode description.

2)Set digital output dtection
The main menu shows“ L-d”，press TEACH to enter the submenu;Submenu items：“ L-on”luminous（default）；“d-on”dark pass;

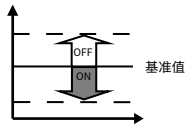
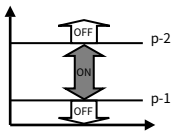
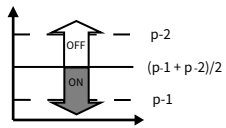
3)Set digital output type
The main menu shows“ P-n”，press TEACH to enter the submenu;
Submenu items：“ nPn”NPN output mode（default）；“ PnP”PNP output mode.“PULL”push-pull output mode.

4)485 communication address setting
The main menu shows“ Adr”，press TEACH to enter the submenu;Submenu items：“ 1”，short press UP/DOWN，plus 1；long press for 3s,plus 10.Press TEACH ,return to the previous menu。Setting range:1~254。Initial address is 1，255 is broadcast address。

接线图（PNP）



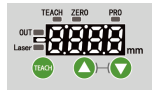
教导模式说明

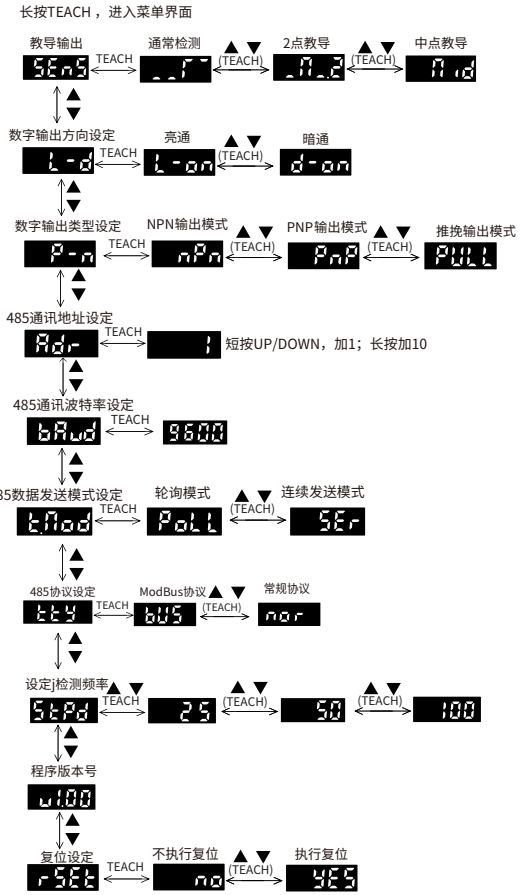
教导 检测模式设定说明： 需事先在Menu中将“检测模式设定”设为对应功能模式。	
1.通常检测模式 在菜单中，选定“__|‾”模式，自动进入测量界面； 在有效测量距离内，选定目标物体(*)，按TEACH 键，提示“ GOOD ”，完成设置；目标物体所在位置即为判定距离。	
2. 2点教导模式 在菜单中，选定“_N_.2”模式，自动进入测量界面； 在有效测量距离内，选定目标物体1(*)，按TEACH 键，提示“LP1”，完成p-1设定； 在有效测量距离内，选定目标物体2(*)，按TEACH 键，提示“GOOD ”，完成p-2设定； 以目标物体1和目标物体2所在位置之间的距离为窗口，进行窗口模式判定；	
3. 中点教导模式 在菜单中，选定“Nid”模式，自动进入测量界面； 在有效测量距离内，选定目标物体1(*)，按TEACH 键，提示“LP1”，完成p-1设定； 在有效测量距离内，选定目标物体2(*)，按TEACH 键，提示“GOOD ”，完成p-2设定； 以p-1和p-2的中间距离为为判定距离；	

*代表微调：在选定目标物体后，可通过UP/DOWN键微调目标物体距离，之后再按TEACH键确定。

操作指南

1.菜单操作流程





1.测距显示
测量界面：显示实际测量距离，分辨率为1mm，未检测到距离信息时显示“----”。
2.菜单及按键操作
2.1进入菜单：测量界面下长按TEACH键3秒以上，进入菜单界面；
退出菜单：菜单界面下长按TEACH键3秒以上，或20秒无按键操作，返回测量界面。
2.2菜单操作
进入菜单界面，显示主菜单，通过短按　　键切换菜单选项；短按TEACH进入相应子菜单选项，短按　　进行参数选择，在对应选项下短按TEACH键确认并返回上级主菜单；
1）教导输出
菜单显示“SEnS”，按TEACH进入子菜单，子菜单项：__|‾”通常检测模式（默认）；“_N_.2”2点教导窗口模式；“Nid中点教导模式”。
以上教导模式详见教导模式说明；
2）数字输出方向设定：菜单显示“L-d”，按TEACH进入子菜单，子菜单项：“L-on”亮通（默认）；“d-on”暗通；
3）数字输出类型设定
菜单显示“P-n”，按TEACH进入子菜单，子菜单项：“nPn”NPN输出模式（默认）；“PnP”PNP输出模式；“PULL”推挽输出模式；
4)485通讯地址设定
菜单显示“Adr”，按TEACH进入子菜单。子菜单初始显示“ 1”，按UP/DOWN调整参数，步进1。长按UP/DOWN键3s以上，步进10,单项按TEACH键确认并返回上级菜单。设置范围1~254。初始地址为1，255为广播地址。

5)485 communication baut rate setting
The main menu shows“bAud”，press TEACH to enter the submenu;Submenu items:“115.2”，press UP/DOWN adjustment parameters，the baut rate setting contains the following options，9600、19200、38400、115200bit/s，unit is Kbit/s。
6)485 date transmission mode setting
The main menu shows“t.Nod”，press TEACH to enter the submenu;Submenu items：“ SEr”continuous sending mode（default）；“PoLL”polling mode。Press UP/DOWN to choose，press TEACH to confirm and enter the submenu。
7)5)485 protocol setting
The menu shows "tty" and press TEACH to enter the submenu Sub-menu item: "bus Mod Bus protocol (default):"nor" general mode;
Under the submenu, press UP/DOWN to make a selection, and press the TEACH key to confirm and return to the superior menu.
8)Set the detection frequency
The main menu shows“StPd”，press TEACH to enter the submenu;Submenu items：“25”detection frequency is 25 Hz（default）；“50”detection frequency is 50 Hz;“100”detection frequency is 100 Hz;
9)Program version number
The main menu shows“vXXX”,the displayed value of this menu changes with the upgrade of program version number,and it is variable;(subject to reality)
10)Reset settingsthe
The main menu shows“rSEt”，press TEACH to enter the submenu;
Submenu items：“ no”do not perform reset；“ yES” perform reset，restore default settings.

OSM41-RS485 COMMUNICATION PROTOCOL

1.Conventional protocol

Default：baud rate：115200bps，8 data bits，1 start bit，1 stop bit，no parity。
OSM41-K2500CB6/485 Measurement range:0...3000mm,when the distance is exceeded,default 0XFFFF；
OSM41-K4000CB6/485 Measurement range:0...4500mm,when the distance is exceeded,default 0XFFFF；
Default output method：active upload，upload speed:60Hz。

1.1Full frame data format description

start character (1byte)	address bit (1byte)	byte length (1byte)	command code (1byte)	data bit(nbyte)	sum check(2byte) cs1 cs2	terminator (1byte)
0x68	0xFF is the broadcast address	from the command code to the checked byte	see command list	see command details（little endian format）	sum check from data to address（little endian format）	0x16

Supplementary description of data format：
1.start character：0x68，whitch is the start byte of a frame of data；
2.The address bit adr can be set through the menu or command，and the settable range is 1~254(0xfe);
The default address is 1，and the broadcast address is 0xff；
3.Byte length refers to the number of bytes from the command code to the check code(including check code);
4.Command code：different command codes correspond to different function commands,see the table below for details；
5.Data bit：the rerurned data can be 1 byte or multiple bytes,and the data format is little endian.
little endian format：low byte first，high byte after；
for example:for data 0x1234，first pass the low byte 0x34，and then pass the high byte 0x12；
6.The check is a sum check，the sum from the address bit to the data bit,the data format is little endian format.
For example,the distance reading command：68 ff 03 00 02 01 16，ff is address code，03 is byte length，including 1 command code and 2 check bytes.
0xff+0x03+0x00=0x0102，the low byte is in the front and the high byte is in the back，cs1=0x02，cs2=0x01，00 is the instruction code。
7.Terminator：0x16，which is the end mark of a frame of data；
8.Sending data and returning commands meet the above command frame format;
Example of sending instruction：distance reading instruction：68 ff 03 00 02 01 16
Analysis：68 is the start character，ff is the broadcast address；03 is the byte length，including 1 instruction code and 2 check bytes；00 is the command code；02 01 is the check byte；16 is the end code.
Example of receiving instruction：distance return instruction：68 01 05 00 0D 13 26 00 16
Analysis：68 is the start character，01 is the defaut address code；05 is the byte length，including 1 instruction code ,2 data bytes,and 2 check bytes；0D 13 is the data bytes.
Little endian format is converted to hexadecimal as 0x130D，and the corresponding decimal is 3347mm.
26 00 is the sum check byte,the little endian format is converted to hexadecimal as 0x0026=01+05+00+0D+13,16 is the end code.

2. Read command list

Command code	Date	Remarks	Example（address 0x01）
0x00	Receive:None Return:Distance(2byte)	Single distance output: Unsingle integer (small-end format),the distance from the sensor to the calibration object,and 0 in case of error.	Receive: 0x68 0x01 0x03 0x00 0x04 0x00 0x16 Return:If the current test distance valueis 1000mm 0x68 0x01 0x05 0x00 0xE8 0x03 0xF1 0x00 0x16
0x0C	Receive:None Return: Hardware version number(3 bytes)	Hardware version number:HEX	Receive: 0x68 0x01 0x03 0x0C 0x10 0x00 0x16 Return:If the current hardware version is v1.0.2 0x68 0x01 0x06 0x0C 0x01 0x00 0x02 0x16 0x00 0x16
0x0D	Receive:None Return: Software version number(3 bytes)	Software version number:HEX	Receive: 0x68 0x01 0x03 0x0D 0x11 0x00 0x16 Return:If the current software version is v1.3.2 0x68 0x01 0x06 0x0D 0x01 0x03 0x02 0x1A 0x00 0x16
0x0E	Receive:Set the detection frequency Return:Success 0x55 failure 0xAA	Detection frequency: 0x01:10Hz；0x02:25Hz 0x03:50Hz；0x04:100Hz	Receive:If the current detection frequency is changed 10Hz; 0x68 0x01 0x04 0x0E 0x01 0x14 0x00 0x16 Return:Settings returned successfully. 0x68 0x01 0x04 0x0E 0x55 0x68 0x00 0x16
0x0F	Send:the communication protocol is switched to modbus protocol(1byte) Returns:Continuous the distance data	Continuous transmission mode: 0x00: The slave station device enters the conti--nuous transmission mode send distance data, can not receive master station after entering this mode to exit this mode, you need to set to check through the display menu polling mode.Only one slave can be on the bus when this mode is used Station equipment.	Receive: 0x68 0x01 0x04 0x0F 0x00 0x14 0x00 0x16 Return: Returns the distance value continuously,such as 0x68 0x01 0x04 0x0F 0x00 0x14 0x00 0x16
0x80	Receive:485 address (1byte) Return:Success 0x55 failure 0xAA	485 address: Set the range from 1 to 254，0xFF is the broad--cast address,and 0x00 and 0x01 are reserved.	Receive:If the current address is changed from 1 to 5 0x68 0x01 0x04 0x80 0x05 0x8A 0x00 0x16 Return:Settings returned successfully. 0x68 0x05 0x04 0x80 0x55 0xDE 0x00 0x16
0x81	Receive:baud rate (1byte) Return:Success 0x55 failure 0xAA	baud rate: 0x02:9600bit/s;0x03:19200bit/s;0x04:38400bit/s 0x05:115200bit/s（default);Note:The original baud rate is used for this data return	Receive:If the baud rate is changed to 9600 0x68 0x01 0x04 0x81 0x02 0x88 0x00 0x16 Return:Settings returned successfully. 0x68 0x01 0x04 0x81 0x55 0xDB 0x00 0x16
0x82	Receive: Use 0xFF address Return:Actual address	Address query,when using this command,there can only be one slave device on the bus.	Receive: 0x68 0xFF 0x03 0x82 0x84 0x01 0x16 Return: 0x68 0xFF 0x04 0x82 0x01 0x86 0x01 0x16
0x83	Send: Continuous transmission mode(1byte) Return: Continuous distance data	Continuous transmission mode: 0x00: The slave station device enters the conti--nuous transmission mode send distance data, can not receive master station after entering this mode to exit this mode, you need to set to check through the display menu polling mode.Only one slave can be on the bus when this mode is used Station equipment. 0x01: The slave device enters query mode	Receive: 0x68 0x01 0x04 0x83 0x00 0x88 0x00 0x16 Return: Returns the distance value continuously,such as 0x68 0x01 0x05 0x83 0xE8 0x03 0x74 0x01 0x16

5)485通讯波特率设定
菜单显示“bAud”，按TEACH进入子菜单。
子菜单初始显示“9600”，按UP/DOWN调整参数，波特率设置包含以下选项，9600、19200、38400、115200bit/s，
菜单显示单位为Kbit/s。
6)485数据发送模式设定
菜单显示“t.Nod”，按TEACH进入子菜单。子菜单项：“PoLL”轮询模式（默认）；“SEr”连续发送模式。
在子菜单下，按UP/DOWN进行选择，按TEACH键确认并返回上级菜单。
7）485协议设定；
菜单显示“tty”，按TEACH进入子菜单；子菜单项：“bus”ModBuS协议（默认）；“Nor”常规模式。
在子菜单下，按UP/DOWN进行选择，按TEACH键确认并返回上级菜单。
8）设定检测频率；
菜单显示“StPd”，按TEACH进入子菜单。子菜单项：“25”检测频率25HZ（默认）；“50”检测频率50HZ；
“100”检测频率100HZ；
在子菜单下，按UP/DOWN进行选择，按TEACH键确认并返回上级菜单。
9）程序版本号
菜单显示“vXXX”；此项菜单显示值跟随程序版本号升级而变化，为变量；(以实际为准)
10）复位设定
菜单显示“rSEt”，按TEACH进入子菜单，子菜单项：“no”不执行复位；“yES”窗口模式；

OSM41-RS485通讯协议

1.常规协议

默认：波特率：115200bps，8位数据位，1位起始位，1位停止位，无奇偶校验。默认输出方式：主动上传；
默认地址：0x01；帧接收超时时间：1个字节的传输时间的3.5倍；完整帧数据格式说明如下：

1.1完整帧数据格式说明

起始符(1byte)	地址位(1byte)	字节长度(1byte)	命令码(1byte)	数据位(nbyte)	和校验(2byte)	结束符(1byte)
0x68	0xFF为广播地址	从命令码到校验的字节数	见命令列表	见命令详解	从地址到数据的和校验(小端格式)	0x16

数据格式补充说明：
1.起始符：0x68，为一帧数据的起始字节；
2.地址位adr可通过菜单或者指令设定，可设定范围为1~254（0xfe）；
默认地址为1，广播地址为0xff；
3.字节长度指的是从命令码到校验码的字节数（含校验码）；
4.命令码：不同命令码对应不同功能指令，详见下表；
5.数据位：返回数据可为1个字节，也可为多个字节，数据格式为小端格式
小端格式：低字节在前，高字节在后；例如数据0x1234，传递时先传递低字节0x34，再传递高字节0x12；
6.校验为和校验，从地址位到数据位的和，数据格式位小端格式
例如，距离读取指令：68 ff 03 00 02 01 16，ff为地址码，03为字节长度，包含1个指令码与2个校验字节，
0xff+0x03+0x00=0x0102，传递时低字节在前，高字节在后，cs1=0x02，cs2=0x01，00为指令码。
7.结束符：0x16，为一帧数据的结束标志；8.发送数据和返回指令均满足以上指令帧格式；
发送指令示例：距离读取指令：68 ff 03 00 02 01 16
解析：68为起始符，ff为广播地址码；03为字节长度，包含1个指令码与2个校验字节；00为命令码；
02 01 为校验字节；16为结束码;接收指令示例：距离读取指令：68 01 05 00 0D 13 26 00 16
解析：68为起始符，01为默认地址码；05为字节长度，包含1个指令码，2个数据字节，2个校验字节；
0D 13为数据字节，小端格式转化为十六进制为0x130D，对应的十进制为3347mm，
26 00 为和校验字节，小端格式转化为十六进制为0x0026 = 01+05+00+0D+13；16为结束码；

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1.2命令列表

命令码	数据	备注	示例（地址为0x01）
0x00	接收:无 返回:距离(2byte)	单次距离输出: 无符号整型(小端格式),传感器到检测物的距离,错误时为0。	接收: 0x68 0x01 0x03 0x00 0x04 0x00 0x16 返回:如当前测试距离值为1000mm 0x68 0x01 0x05 0x00 0xE8 0x03 0xF1 0x00 0x16
0x0C	接收:无 返回: 硬件版本号(3byte)	硬件版本号:HEX	接收: 0x68 0x01 0x03 0x0C 0x10 0x00 0x16 返回:如当前硬件版本为v1.0.2 0x68 0x01 0x06 0x0C 0x01 0x00 0x02 0x16 0x00 0x
0x0D	接收:无 返回: 软件版本号(3byte)	软件版本号:HEX	接收: 0x68 0x01 0x03 0x0D 0x11 0x00 0x16 返回:如当前软件版本为v1.3.2 0x68 0x01 0x06 0x0D 0x01 0x03 0x02 0x1A 0x00 0
0x0E	接收:设置检测频率 返回: 成功 0x55 失败 0xAA	检测频率: 0x01:10Hz;0x02:25Hz 0x03:50Hz;0x04:100Hz	接收:如把当前检测频率改为10Hz 0x68 0x01 0x04 0x0E 0x01 0x14 0x00 0x16 返回:设置成功返回 0x68 0x01 0x04 0x0E 0x55 0x68 0x00 0x16
0x0F	发送:通讯协议切换为modbus协议(1byte) 返回:连续距离数据	连续发送模式: 0x00:从站设备进入连续发送模式,连续发送距离数据,进入此模式后不能接收主站命令,退出此模式需要通过显示菜单设置为查询模式。使用此模式时总线上只能有1个从站设备。	接收: 0x68 0x01 0x04 0x0F 0x00 0x14 0x00 0x16 返回:连续返回距离值,如 0x68 0x01 0x04 0x0F 0x00 0x14 0x00 0x16
0x80	接收:485地址(1byte) 返回: 成功 0x55 失败 0xAA	485地址: 设置范围1-254,0xFF为广播地址,0x00和0x01保留。	接收:如把当前地址由1改为5 0x68 0x01 0x04 0x80 0x05 0x8A 0x00 0x16 返回:设置成功返回 0x68 0x05 0x04 0x80 0x55 0xDE 0x00 0x16
0x81	接收:波特率(1byte) 返回: 成功 0x55 失败 0xAA	波特率: 0x02:9600bit/s;0x03:19200bit/s 0x04:38400bit/s;0x05:115200bit/s(默认) 注:本条数据返回使用原波特率。	接收:如把波特率改为9600 0x68 0x01 0x04 0x81 0x02 0x88 0x00 0x16 返回:设置成功返回 0x68 0x01 0x04 0x81 0x55 0xDB 0x00 0x16
0x82	接收:使用0xFF地址 返回:实际地址	地址查询,使用此命令时总线上只能有1个从站设备。	接收: 0x68 0xFF 0x03 0x82 0x84 0x01 0x16 返回: 0x68 0xFF 0x04 0x82 0x01 0x86 0x01 0x16
0x83	发送: 连续发送模式(1byte) 返回: 连续距离数据	连续发送模式: 0x00:从站设备进入连续发送模式,连续发送距离数据,进入此模式后不能接收主站命令,退出此模式需要通过显示菜单设置为查询模式。使用此模式时总线上只能有1个从站设备。 0x01:从站设备进入查询模式	接收: 0x68 0x01 0x04 0x83 0x00 0x88 0x00 0x16 返回:连续返回距离值,如 0x68 0x01 0x05 0x83 0xE8 0x03 0x74 0x01 0x16

2.Modbus communication description

2.1 Basic information

Baud rate: 9600bps, 8 data bits, 1 start bit, 1 stop bit, no parity
Default output mode: passive (Poll)
Default address: 0x01

2.2 Modbus communication interactive instruction format

2.2.1 Take the default address 0x01 as an example to illustrate the instruction format.

1) The instruction format for reading registers is as follows:

address	function code	register address		Number of registers		CRC_L	CRC_H
01	03	00	00	00	01	xx	xx

2)Device response packet format for reading registers:

address	function code	Date byte length	High distance value	Low distance value	CRC_L	CRC_H

3） The instruction format for writing the registers value is as follows:

address	function code	register address		high date bit	low date bit	CRC_L	CRC_H
01	06	xx	xx	xx	xx	xx	xx

4) Write the correct response format to the device side for register operation:
The response packet is the same as the issued packet.

5) The response format for handling exceptions on the device side of writing register operations:

address	function code	Date byte length	Error code high bit	Error code low bit	CRC_L	CRC_H
01	86	02	00	xx	xx	xx

2、Field Description:

1) Address: Device address, default to 0x01

2) Function code:
03- Read Register;06- Write Register;

3) Register address:
All registers are 16 bit registers, and after modifying all registers, a "save configuration" instruction must be sent and the device must be powered on again to take effect. The register description is shown in Table 1 below.

Table 1 register

Register address	Defines	Description	Permission	Value range
00 00	the distance value	The output result of the sensor, which is the distance value for this sensor， Unit: resolution	Read only	Same sensor range
00 06	software version number	Any numerical value can be written,and the device only pays attention to the instruction function code.	Read only	Major version number +Minor version number+revision number
00 07	hardware version number			
00 08	Detection frequency	Read the detection frequency ,any numerical value can be written,and the device only pays attention to the instruction function code.	Read only	Detection frequency 0x01:10Hz;0x02:25Hz 0x03:50Hz;0x04:100Hz
00 80	Save configuration	Can write any number, the device only focus on instruction function code	Write only	0~65535
00 82	protocol switching	The protocol is switched to its own protocol, and the instruction can be take effect after being saved. Can write any number, the devi--ce only focus on instruction function code.	Write only	0~65535
00 83	Baud rate High	Configure baud rate. The reboot takes effect after the save configuration instruction is sent. For now 9600(default)、19200、38400、115200	Write only	0 or 1（1 at115200,0 for others)
00 84	Baud rate Low		Write only	9600、19200、38400、49664（115200 low)
00 85		Configure device address, default 0x01, save and restart valid	Write only	1~247

00 87	Working mode	Configure the working mode of the device,save and restart valid	Write only	0-continuous sending mode 1-polling mode （ default ）
00 88	Detection frequency	Configure the detection frequency,save and restart valid	Write only	Detection frequency 0x01:10Hz;0x02:25Hz 0x03:50Hz;0x04:100Hz
00 89	Restore factory settings	Any numeric value can be written, reboot is valid	Read and write	0~65535

4) Register count:
The number of registers pre-read from a register instruction. Values range from 1 to 8.

5) Data byte length:
Read register instruction reply, the number of bytes in the reply data segment.

6) Error code:
When reading and writing registers, issuing instruction format is wrong, or the data segment in the device response package is error code. The meaning of the error code is shown in Table 2 below

Table 2 error code description

Error code	Description
0x0001	Register address error
0x0002	Register write error

7) CRC Check:
In the protocol, a message carries a two-byte CRC check code, which is CRC16 check, the penultimate second byte of the message is the low byte of the check code, and the penultimate first byte of the message is the high byte of the check code.
Parametric model: X16 + X15 + x2 + 1;Polynomial: 0x8005;Initial value: 0xFFFF

3、An example of interactive information

Function	Instructions	Successful return value	Description
Gets the distance value	01 03 00 00 00 01 84 0A	01 03 02 DH DL CL CH	DH and DL are the high 8 bit and low 8 bit of the measured values, while CH and Cl are the low 8 bit and high 8 bit of CRC, respectively
Gets the software version number	01 03 00 06 00 02 24 0A	01 03 04 00 VM VS VC CL CH	VM, VS, and VC are the major, minor, and minor version numbers of the version
Gets the hardware version number	01 03 00 07 00 02 75 CA	01 03 04 00 VM VS VC CL CH	VM, VS, and VC are the major, minor, and minor version numbers of the version
Gets the detection frequency	01 03 00 08 00 01 05 C8	01 03 00 08 00 M CL CH	M is the detection frequency code. 0x01:10Hz； 0x02:25Hz 0x03:50Hz； 0x04:100Hz
Set the baud rate	01 06 00 83 BH1 BH2 CL CH 01 06 00 84 BL1 BL2 CL CH	01 06 00 83 BH1 BH2 CL CH 01 06 00 84 BL1 BL2 CL CH	Bh1, BH2, BL1, BL2 are the highest, the second highest, the second lowest, and the lowest bits of baud rate, respectively. For example, the modified baud rate is 9600， BH1=00 BH2=00 CL=78 CH=22,BL1=25 BL2=80 CL=D2 CH=D3
Communication protocol switching	01 06 00 82 00 01 E8 22	01 06 00 82 00 01 E8 22	switch to own protocol
Modify the device ID	01 06 00 85 IH IL CL CH	01 06 00 85 IH IL CL CH	IH, I L for ID high and low bytes, 1-247,0x00 for broadcast address. Modify ID to 2, IH = 00 IL = 02 cl = 19 ch = E2
Modify the device mode	01 06 00 87 00 M CL CH	01 06 00 87 00 M CL CH	M is device mode instruction byte M = 00 is continuous send mode M = 01 is query mode (default)
Set the working frequency	01 06 00 88 00 M CL CH	01 06 00 88 00 M CL CH	M is the set detection frequency code.
Save the configuration	01 06 00 80 00 00 88 22	01 06 00 80 00 00 88 22	Reboot takes effect after saving
Restore factory settings	01 06 00 89 00 00 58 20	01 06 00 89 00 00 58 20	The device ID address and baud rate are reset to factory status

2. Modbus通信说明

2.1基本信息（默认）

波特率：9600bps，8位数据位，1位起始位，1位停止位，无奇偶校验。
默认输出方式：被动(Poll)；默认地址：0x01；

2.2Modbus通信交互指令格式

2.2.1以默认地址0x01为例说明指令格式
1)读取寄存器的指令格式如下：

地址	功能码	寄存器地址		寄存器数量		CRC_L	CRC_H
01	03	00	00	00	01	xx	xx

2)读取寄存器的设备应答包格式：

地址	功能码	数据字节长度	距离值高位	距离值低位	CRC_L	CRC_H
01	03	02	xx	xx	xx	xx

3)写入寄存器数值的指令格式如下：

地址	功能码	寄存器地址		数据高位	数据低位	CRC_L	CRC_H
01	06	xx	xx	xx	xx	xx	xx

4)写入寄存器操作设备端处理正确的应答格式：应答数据包与下发数据包相同。
5)写入寄存器操作设备端处理异常的应答格式：

地址	功能码	数据字节长度	错误码高位	错误码低位	CRC_L	CRC_H
01	86	02	00	xx	xx	xx

2.2.2字段说明：
1)地址：设备地址，默认0x01
2)功能码:03——读寄存器；06——写寄存器；
3)寄存器地址:
所有寄存器都为16bit寄存器，所有寄存器修改后必须发送“保存配置”指令且重新上电设备才生效。
寄存器说明见下表1。

表1 寄存器说明

寄存器地址	定义	说明	权限	取值范围
0x 00 00	距离值	传感器的输出结果，对于此传感器为距离值，单位:分辨率可以写入任意数值，设备只关注指令功能码	只读	同传感器量程
0x 00 06	软件版本号	可以写入任意数值，设备只关注指令功能码	只读	主版本号+次版本号+修正版本号
0x 00 07	硬件版本号		只读	主版本号+次版本号+修正版本号
0x 00 08	检测频率	读取检测频率,可以写入任意数值，设备只关注指令功能码	只读	检测频率： 0x01:10Hz；0x02:25Hz 0x03:50Hz；0x04:100Hz
0x 00 80	保存配置	可以写入任意数值，设备只关注指令功能码	只写	0~65535
0x 00 82	协议切换	协议切换为自有协议，该指令保存后生效可以写入任意数值，设备只关注指令功能码	只写	0~65535
0x 00 83	波特率High	配置波特率。发送保存配置指令后重启生效。 暂仅支持9600（默认）、19200、38400、115200	只写	0或1，（115200时为1，其他为0）
0x 00 84	波特率Low		只写	9600、19200、38400、 49664(115200低位)
0x 00 85	设备ID	配置设备地址，默认0x01，保存后重启有效	只写	1~247
0x 00 87	工作模式	配置设备的工作模式，保存后重启有效	只写	0-为连续发送模式 1-为查询模式（默认）
0x 00 88	检测频率	配置检测频率，保存后重启有效	只写	检测频率： 0x01:10Hz；0x02:25Hz 0x03:50Hz；0x04:100Hz
0x 00 89	恢复出厂设置	可以写入任意数值，设备只关注指令功能码，重启有效	只写	0~65535

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4)寄存器数量：
读取寄存器指令中，预读取的寄存器的数量。取值1~8。
5)数据字节长度：
读取寄存器指令应答中，表示应答数据段的字节个数。
6)错误码：
读写寄存器时下发指令格式错误或设备内部处理异常时，设备应答包中数据段为错误码。
错误码含义如下表2。

表2 错误码说明

错误码	说明
0x0001	寄存器地址错误
0x0002	寄存器写入值错误

7)CRC校验：
协议中一帧报文携带两个字节的CRC校验码，为CRC16校验，报文倒数第二字节为校验码低字节，
报文倒数第一字节为校验码高字节。
参数模型：x16 + x15 + x2 + 1；
多项式：0x8005；
初始值：0xFFFF

2.3交互信息示例

表1 寄存器说明

功能	指令	成功返回值	说明
获取距离值	01 03 00 00 00 01 84 0A	01 03 02 DH DL CL CH	DH、DL分别是传感器测量值低16位的高8bit和低8bit； CH、CL分别为CRC的低8bit和高8bit
获取软件版本号	01 03 00 06 00 02 24 0A	01 03 04 00 VM VS VC CL CH	VM,VS,VC 分别是版本的主、次、修正版本号
获取硬件版本号	01 03 00 07 00 02 75 CA	01 03 04 00 VM VS VC CL CH	VM,VS,VC 分别是版本的主、次、修正版本号
获取检测频率	01 03 00 08 00 01 05 C8	01 03 00 08 00 M CL CH	M为检测频率代码 0x01:10Hz；0x02:25Hz 0x03:50Hz；0x04:100Hz
设置波特率	01 06 00 83 BH1 BH2 CL CH 01 06 00 84 BL1 BL2 CL CH	01 06 00 83 BH1 BH2 CL CH 01 06 00 84 BL1 BL2 CL CH	BH1,BH2,BL1,BL2分别为波特率的高，次高，次低，低字节。例如修改波特率为9600，BH1=00 BH2=00 CL=78 CH=22,BL1=25 BL2=80 CL=D2 CH=D3
通讯协议切换	01 06 00 82 00 01 E8 22	01 06 00 82 00 01 E8 22	切换为自有协议
修改设备ID	01 06 00 85 IH IL CL CH	01 06 00 85 IH IL CL CH	IH,IL为ID的高字节和低字节，1-247，0x00为广播地址， 修改ID为 2，IH=00 IL=02 CL=19 CH=E2
修改设备 工作模式	01 06 00 87 00 M CL CH	01 06 00 87 00 M CL CH	M为设备模式的指令字节 M=00为连续发送模式 M=01为查询模式（默认）
设置工作频率	01 06 00 88 00 M CL CH	01 06 00 88 00 M CL CH	M为设置检测频率代码
保存配置	01 06 00 80 00 00 88 22	01 06 00 80 00 00 88 22	保存后重启生效
恢复出厂设置	01 06 00 89 00 00 58 20	01 06 00 89 00 00 58 20	保存后重启生效，设备的ID地址和波特率重置为 出厂状态