SENKO CO., LTD.

4-20mA Transmitter Digital Communication Manual



Calibration



1. Transmitter

When this transmitter connects to the power, it works after 1 time blinking of D2 and 5 times blinking of D3. This 6 times of LED blinking is normal function for reading stored data. If this D3 LED blinks continuously, the transmitter should be repaired. There are 2 Calibration function; Fresh air calibration, Standard Gas Calibration.

- Fresh air Calibration should be performed at the environment of fresh air
- Standard Gas Calibration should calibrate with the gas that has concentration of calibration gas.

2. Calibration and Connecting cable

Caution : In case of standard gas calibration, before you push calibration button, you should keep sensor contacting calibration gas more than 1 minute for stable sensor reading.



Oxygen gas sensor calibration:

- Span calibration(air calibration) :

- ① If you Push calibration button more than 2 seconds, D3 LED turns on.
- ② If you push the button more than 2 seconds once more, span calibration start with D3 LED blinks.
- ③ After calibration completed, D3 & D2 LED turns on together and turns off.

- Zero calibration(0% oxygen standard gas calibration) :

- 1 If you Push calibration button more than 2 seconds, D3 LED turns on.
- ② If you push the button twice within 1 second, D2 LED turns on.
- ③ If you push the button more than 2 seconds, Zero calibration start with D2

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LED blinks.

④ After calibration completed, D3 & D2 LED turns on together and turns off.

Toxic(or %LEL) gas sensor calibration:

- Zero calibration(air calibration)

- 1 If you Push calibration button more than 2 seconds, D3 LED turns on.
- ② If you push the button more than 2 seconds once more, span calibration start with D3 LED blinks.
- ③ After calibration completed, D3 & D2 LED turns on together and turns off.

- Span calibration(standard gas calibration) :

- 1 If you Push calibration button more than 2 seconds, D3 LED turns on.
- 2 If you push the button twice within 1 second, D2 LED turns on.
- ③ If you push the button more than 2 seconds, Zero calibration start with D2 LED blinks.
- ④ After calibration completed, D3 & D2 LED turns on together and turns off.

3. Connector for data transfer to PC

In order to transfer data to PC, PC connector shown below and drivers are needed





4. USB-232TTL Installation

- ① Connect USB-232TTL equipment to USB Port.
- ② Right-Click "My Computer" icon and choose "Properties" .
- ③ Select "Hardware" tap on the top of the window and click "Device Manager".
- Right-click the "USB Serial Port" which shows a yellow '?' sign and select "Update driver".
- S When a "hardware update wizard" pop up, select "No, not this time" and click "Next".
- 6 Select "install from a link or specific location(Advanced)" and click "Next".
- ⑦ Select "Search for the best driver in these locations" and check "Include this location in the search".
- 8 Click "Browse", In the Locate File dialog box that appears next, navigate to the folder that you extracted as part of the driver download and click "Next".
- ③ Driver installation completed and USB Serial Port(COMx) in the Device Manager - PORT(COM and LTP) will be shown.
 - * COMx is depends on the computer. PORT is determined like COM4 or COM5.

5. Connecting to PC

Connect enclosed connector to MOLEX marked below.





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6. Connecting PC and Transmitter via USB_232TTL



7. Run Serial Data Analyzer Program

To see measurement of module on PC,

1 Run "Pcom.exe" in attached file.





② Click "OPTION" button when Serial Data Analyzer program is pop up.

You can see the windows shown below

褖 Serial Data	Analyzer Prog	ıram - Untitled					_	
<u>F</u> ile <u>H</u> elp								
COM OPEN	SCREEN CLEAR		OPTION	EXIT	🕨 🕨 SE	END START	🔳 SEND	STOP
1 2	3 4	5 6	7 8	9 Tran	smit Data View	Custom	Protocol	
	5					Display	Traffic : 0%	
Serial Port Setti	ng New Line Cha	ar Echo Display E	uffer Setting	Run Time Save	e Setting(Log File	e)		
Serial Port	COM4 💌	Display Forma	t ASC	•				
Baud Data	0000	Deed Timesut	2					
baud Hate	19800	Read Timeout	12ms					
Data Bits	8 💌							
Stop Bits	1 💌							
Parity Bits	NONE -							
PORT : COM4, 9	500, 8, 1, NONE	Display Format : ASC	New Line	Char:ON Ec	ho:OFF Auto	Interval : 500	ms STOP	1



Go to "Serial Port Setting",

Change *"Serial Port" to "PC port" which is USB-232TTL connected. (Shown picture below is random value)

Change "Baud Rate" to "9600", and "Display Format" to "HEX"



* To see user's Serial Port,

Right click My Computer Icon and click Properties.

Select Hardware tap on the top of the window and click Device Manager.

There is USB Serial Port when click PORT(COM and LTP) and you can see COMx in the parenthesis next of it.

For example, Choose Serial Port COM4 if value in Device Manager is COM4 and choose COM5 if value is COM5.



(4) Change value "00" to "7F" in "HEX Input" box as shown below.

🎭 Serial Data	Analyzer Prog	ıram - Untitled						_ 🗆 🛛
<u>F</u> ile <u>H</u> elp				_				
COM OPEN	SCREEN CLEAR	RECEIVE VIEW	OPTION	EXI		⊳ SEND	START	🔳 SEND STOP
1 2	3 4	5 6	7 8	9	Transmit Data	a View	Custom	Protocol
							Display	Traffic : 0%
Serial Port Settin	ng New Line Cha	ar Echo Display B	Buffer Setting	Run Time	Sa∨e Setting((Log File)		
When BX Thi	is Char, NewLine	<pre><display cr="" lf=""></display></pre>						
HEX Input <	lf this Char is OO,	No Action> ==>(7F)						
DODT - COMA CO	00 0 1 NONE		(N	0	[5-1055		1 . 100	0 0TOD
PORT : COM4, 96	00, 8, 1, NONE	Uisplay Format : HE>	New Line	Char : UN	Echo : OFF	Auto Int	erval : 100	Ums STUP

(5) Click "Transmit Data View" after "HEX Input" Setting change.

You can see the windows shown below

象 Serial Data	Analyzer Prog	ram - Untitled	[- O 🗙
<u>F</u> ile <u>H</u> elp								
COM OPEN	SCREEN CLEAR RECEIVE VIEW OPTION EXIT > SEND START SEND							ND STOP
1 2	3 4	5 6	7 8	9 Trans	mit Data View	Custon	n Protocol	
[No]	Transmit Da	ata Input Line (Da	ta Length 100Byte	Limit)		Format	Auto	CR7LF
No.1 [ALT+1]						HEX 🔹	OFF 🔹	OFF 💌
No.2 [ALT+2]						HEX -	OFF 💌	OFF -
No.3 [ALT+3]						HEX -	OFF 💌	OFF -
No.4 [ALT+4]						HEX -	OFF 🔹	OFF -
No.5 [ALT+5]						HEX -	OFF 💌	OFF -
No.6 [ALT+6]						HEX 💌	OFF 💌	OFF -
No.7 [ALT+7]						HEX 💌	OFF 💌	OFF 💌
No.8 [ALT+8]						HEX -	OFF 💌	OFF -
No.9 [ALT+9]						HEX -	OFF 💌	OFF 💌
	Auto	Transmit Interval	Setting			Interval Ti	me (ms)	
	<u> </u>		· · ·	<u> </u>	<u>.</u>	500n	ns	
PORT : COM4, 96	500, 8, 1, NONE	Display Format :	HEX New Line	Char:ON Ect	no : OFF Auto	Interval : 50	IOms STOP	
		_	FINS	WW	W.Senko	CO.KF		

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6 Put "7F0201037F" in No.1 box and change "Auto" to "on".

Drag scroll until "Interval Time" shows "1000ms" (*example) on the bottom of the windows.

🎭 Serial Data	Analyzer Prog	ram - Untitled					_ 🗆 🔀	
<u>F</u> ile <u>H</u> elp								
COM OPEN	SCREEN CLEAR	RECEIVE VIEW	OPTION	EXIT	🕨 SE	🕨 SEND START 🛛 🔳 SEND STO		
1 2	3 4	5 6	7 8	9 Trans	mit Data View	Custom Proto	col	
[No]	Transmit D	ata Input Line (Dat	a Length 100Byte	Limit)		Format Auto	CR/LF	
No.1 [ALT+1] 7F	0201037F						OFF -	
No.2 [ALT+2]						HEX . OFF .	OFF -	
No.3 [ALT+3]						HEX . OFF .	OFF •	
No.4 [ALT+4]						HEX • OFF •	OFF •	
No.5 [ALT+5]						HEX . OFF .	OFF •	
No.6 [ALT+6]						HEX • OFF •	OFF •	
No.7 [ALT+7]						HEX • OFF •	OFF •	
No.8 [ALT+8]						HEX • OFF •	OFF •	
No.9 [ALT+9]						HEX • OFF •	OFF -	
	Auto	Transmit Interval 9	Setting			Interval Time (ms)	
						1000ms		
PORT : COM4, 96	00, 8, 1, NONE	Display Format :	HEX New Line	Char:ON Ech	o:OFF Auto	Interval : 1000ms S	STOP	

* "1000ms" means show measurement once every 1 second.
This Interval Time is user-programmable from 20ms to 5000ms.

⑦ Click "COM OPEN" after "Transmit Data View" Setting change.



You can see the windows shown below

象 Serial Dat	a Analyz	er Prog	ram -	Untitled									- 🗆 🗙
<u>F</u> ile <u>H</u> elp													
COM CLOSE	SCREE	N CLEAR	RECEIV	VE VIEW	OP	PTION	EX	п		🕨 SENI	D START	📃 🔳 SEN	ND STOP
1 2	3	4	5	6	7	8	9	Trans	mit Data	View	Custo	om Protocol	
											Displ	lay Traffic : 0)%

(8) Click "SEND START" button as marked below.



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Measurement will be displayed on screen as shown below.

Measurement display is updating according to setting time that set up in "Auto Transmit Interval Setting".





8. Protocol

•Data command	START 0x7F	LENGTH 0x02	CMD 0X01	CRC 0X03	END 0X7F				
	LENGTH CMD CRC	:Tota :0x01 :xor 1	I number o , Zero Cali from LENG	f byte from bration->(GTH to CM	n LENGTH † Dx02, SPAI ID	to CMD. N Calibrati	on- >0x03		
•Data Response	START 1Byte	LENGTH 1Byte	DEST 1Byte	DATA 2Byte	CRC 1Byte	END 1Byte			
	START LENGTH DEST DATA CRC END	T : start frame -> 0x7F TH : Total number of byte from LENGTH to Data : sensor id -> 0xEF (in case of OXYGEN) : sensor data (low high) : xor from LENGTH to CMD : end frame -> 0x7F							
• Calibration Response	START 1Byte	LENGTH 1Byte	RES 1Byte	CRC 1Byte	END 1Byte				
LENGTH : Total number of byte from LENGTH to RES RES : Zero Calibration Response ->0x05 Span Calibration Response ->0x07 CRC : xor from LENGTH to RES									



9. Calculate concentration

Data Response

START	LENGTH	DEST	DATA	CRC	END
1Byte	1Byte	1Byte	2Byte	1Byte	1Byte

- 1. In Data Response shown above, Data 2 bytes is in the order of Low byte and High byte.
- 2. Unit of Oxygen is "%", others are ppm.
- 3. To get calculated concentration of gas, Convert (high byte/low byte) to decimal number.
- 4. Divide the value that calculated from no.1 with the value that eliminate decimal point of resolution(10 multiplier).

For example; O2

- 1. If data response is 0xD1 0x00, it becomes decimal number of 209.
- 2. Oxygen's resolution is 0.1%, 10 multiplier value that eliminate decimal point is 10.
- 3. Concentration is 209/10 = 20.9

For example; O3

- 1. If data response is $0x62 \ 0x00$, it becomes decimal number of 98.
- 2. Resolution of ozone is 0.02ppm,10 multiplier value that eliminate decimal point is 100.
- 3. Concentration is 98/100 = 0.98 ppm.

