

# K-30 ASCII Direct Display Direct Display Guide

## Overview:

This guide will show you how to connect a K-30 ASCII enabled sensor directly to a serial LCD character display. This set up will work with any serial LCD display but the format may differ from model to model. In this example we will be using the Serial Display unit available at Co2meter.com

## Formatting the Output:

Before we connect the display we need to format our output from the sensor. If using a display other than the one available from co2meter.com you will have to check your displays datasheet for commands and work those into the string.

The K-30 ASCII has 112 bytes of EEPROM dedicated to the output string (Addresses 0x90-0xFF). This gives us plenty of room to work with for sending commands to the display.

For this example we want the Display to show “CO2 = <val>ppm” where <val> is the current co2 reading. The variable used to show the co2 reading is ‘%d’ or [0x25 0x64] in hex. So here’s what our display string will look like:

<b>Byte</b>	0x43	0x4F	0x32	0x20	0x3D	0x20	0x25	0x64
<b>Char</b>	C	O	2		=		%	d

*Figure 1: display string*

Now we need to add in our commands so we aren't just writing out one long string to the display which will jumble up and overflow. Here's a look at the command set for our display:

Prefix	Command	Parameter	Description	Execution time
-	-	1 Byte	Display Character Write (0x00 ~ 0xFF)	100uS
0xFE	0x41	None	Display on	100uS
0xFE	0x42	None	Display off	100uS
0xFE	0x45	1 Byte	Set cursor	100uS
0xFE	0x46	None	Cursor home	1.5mS
0xFE	0x47	None	Underline cursor on	1.5mS
0xFE	0x48	None	Underline cursor off	1.5mS
0xFE	0x49	None	Move cursor left one place	100uS
0xFE	0x4A	None	Move cursor right one place	100uS
0xFE	0x4B	None	Blinking cursor on	100uS
0xFE	0x4C	None	Blinking cursor off	100uS
0xFE	0x4E	None	Backspace	100uS
0xFE	0x51	None	Clear screen	1.5mS
0xFE	0x52	1 Byte	Set contrast	500uS
0xFE	0x53	1 Byte	Set backlight brightness	100uS
0xFE	0x54	9 Byte	Load custom character	200uS
0xFE	0x55	None	Move display one place to the left	100uS
0xFE	0x56	None	Move display one place to the right	100uS
0xFE	0x61	1 Byte	Change RS232 BAUD rate	3mS
0xFE	0x62	1 Byte	Change I2C address	3mS
0xFE	0x70	None	Display firmware version number	4mS
0xFE	0x71	None	Display RS232 BAUD rate	10mS
0xFE	0x72	None	Display I2C address	4mS

Each time we receive a new measurement, we will want to clear the display, move the cursor back to the top left corner, and write out our string. This display uses the precursor 0xFE to distinguish commands from characters. So to clear the screen and set the cursor to home we will use the string:

<b>Byte</b>	0xFE	0x51	0xFE	0x46
<b>COMMAND</b>	Clear screen		Cursor home	

Now we can put the commands and string together and write them to the EEPROM.

Address	90	91	92	93	94	95	96	97	98	99	9A	9B	9E
Byte	FE	51	FE	46	43	4F	32	20	3D	20	25	64	00
	Clear screen		Cursor home		C	O	2		=		%	d	END*

*\*The format string must end with a 0x00 to let the sensor know to terminate the string.*

To write this to the EEPROM we need to connect the sensor to a computer and use a Serial terminal such as HyperTerminal or the Serial Utility available at [co2meter.com](http://co2meter.com)

**\*remove the ASCII jumper to stop the stream while we configure the sensor**

The K-30 uses a Modbus protocol and the most we can write at a time is 8 bytes. So we will write it in 2 parts:

sensor address	Write command	EEPROM Address		# of bytes	Data							
FE	43	00	90	8	FE	51	FE	46	43	4F	32	20

sensor address	Write command	EEPROM Address		# of bytes	Data					
FE	43	00	98	5	20	3D	20	25	64	00

\*\*For more details on writing to the K-30 EEPROM, see document AN104 under the 'Links' tab at [co2meter.com](http://co2meter.com).

## Wiring the Display:

Now that the output string is properly formatted to drive our display, we can disconnect the sensor from the computer and wire it directly to the display. If you removed the ASCII stream jumper, you can replace it now. Make the following connections

Display	K-30	Power Supply
Rx(pin 1)	UART Tx	
Vss(pin 2)	GND	Ground
Vdd(pin 3)	Vcc	+5VDC

