Environdata
FA12 4 – 20 mA
Converter Guide

REV 14th July 2015

Introduction

This handbook covers the installation and operation of Environdata's FA12 frequency to current converters.

NOTE

Each frequency to current converter is factory calibrated and can then be individually set to a specific sensor type by adjusting DIP switch settings within the FA12.

Your FA12 is configured for your sensor during final testing just prior to shipping. If you have several different sensors and converters, please ensure that each sensor is connected to the correct converter.

Principle of operation

The frequency to current converter measures the frequency of the incoming signal (digital pulse train), and then converts this to an analog output current proportional to the input frequency.

Limitations

The FA12 series of converters need to operate using a 3 wire system, such that the output wire is separate from the power supply wires.
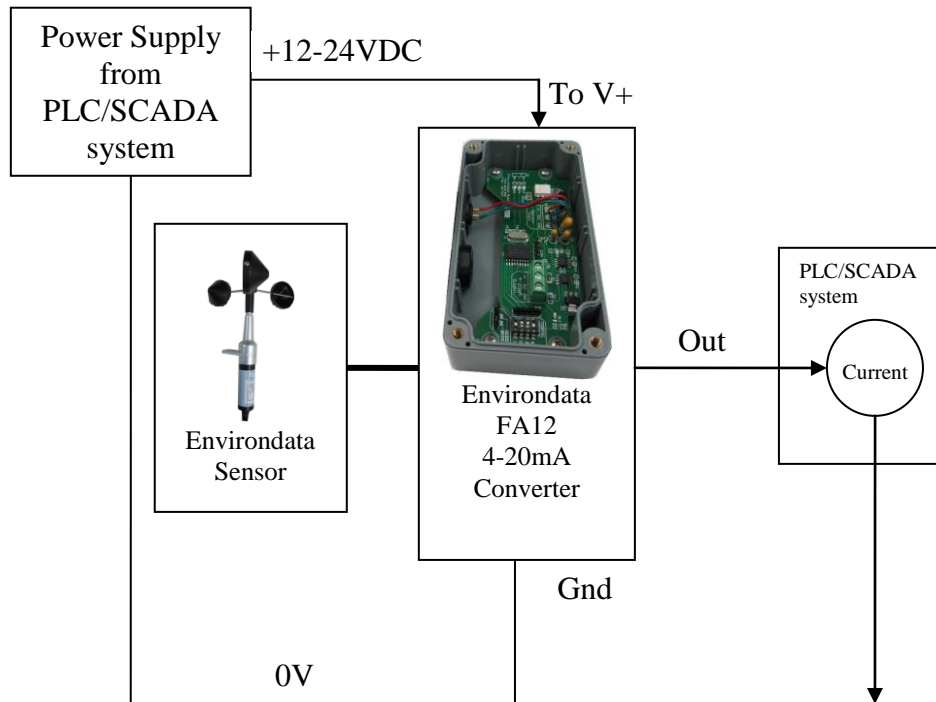
Both the Ground wire (GND) and the 4-20 mA Output (Output) must be connected for the device to operate correctly.

Protection

The FA12 series of converters have been protected from reverse polarity connection (applies to Hardware version 3.5 and later).

Typical 3 wire Connection Diagram

4-20mA Connection Diagram for PLC or SCADA system

The FA12 4-20mA converter needs +Power, a GND path and the signal line connected. When connecting to a PLC or SCADA system, you must connect the signal out through the PLC and back via the 0V connection.

Installation

The frequency to current converter should be connected between the output of an Environdata sensor and your equipment that requires a current signal.

As both current and Environdata sensors signals are capable of being run over long cables, you are free to mount the FA12 in a position that is convenient for your installation.

Physical mounting of the FA12 can be done by using the two mounting holes identified in the image below. You are required to remove the plastic lid (remove the 4 screws) to access the mounting holes.

• After locating the FA12 in a suitable position, connect the Environdata sensor to the 3 pin connector located on the FA12.
• Connect a 3 wire cable to the FA12 taking note of the wiring details in the following section.

The FA12 uses a terminal strip located inside the FA12 converter housing for connection of the wires. Please tighten the cable gland and ensure a tight seal is formed once you have inserted your cable. This will need checking and re-tightening after 14 days and at your regular site visits.

Please see the markings inside the converter for connection of the three wires (FA12 is indicated in the image below).
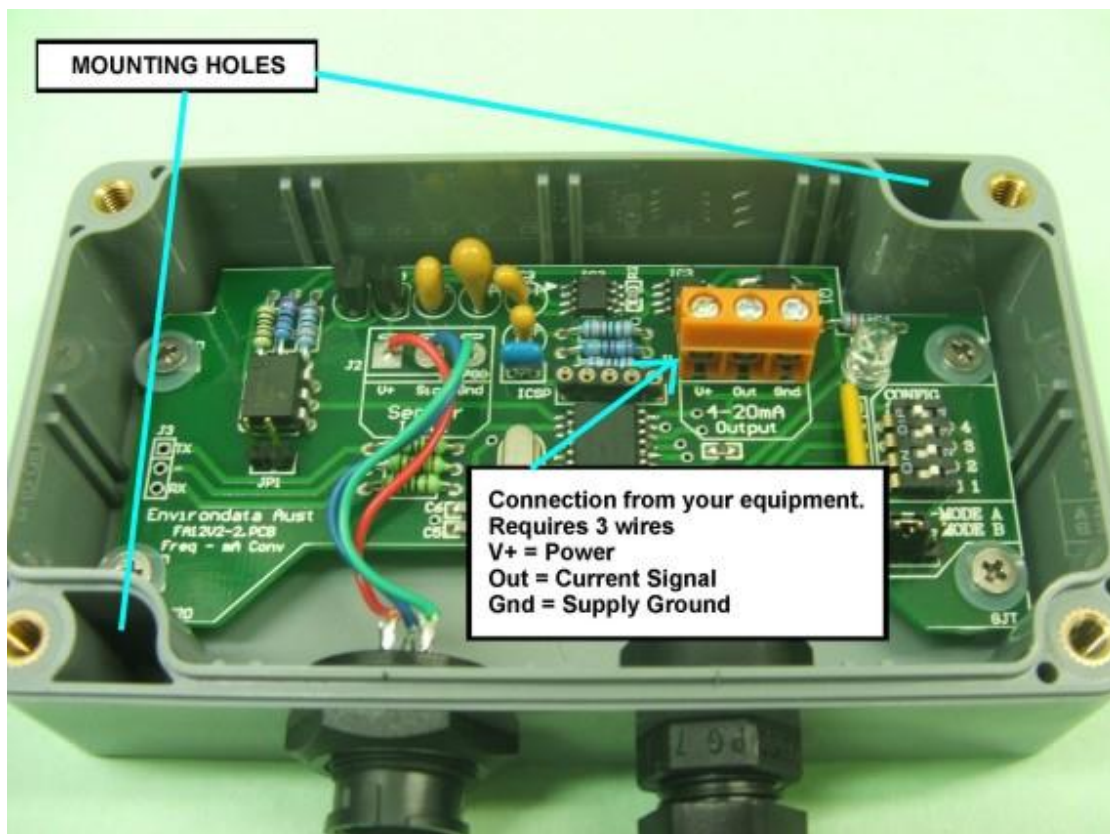
As there are many and varied devices that require a current signal, we are unable to provide information on how to connect the FA12 to your particular equipment. Please consult your equipment's handbook for wiring details.

Sensor Configuration

The FA12 can be configured for various Environdata sensor types by changing the DIP switch setting and the MODE jumper. Currently the MODE jumper is not implemented and must be set to Mode A or the FA12 will not operate correctly. (The mode jumper will provide for an additional 16 sensor types in the future).

Please confirm your sensor type and DIP switch setting from this list. The label in the LID of your converter may be out of date, if unsure check with Environdata. The list below is the most recent list at the time of printing this handbook and should be similar.
NOTE that a new setting will ONLY take effect after the power is turned OFF and ON again.

THIS list applies to applies to Firmware version 3.4 , 24th April 2013 & Later

Sensor Type	Signal input - output	Dip Switch Setting (Yellow is switch Position)
RH40 Relative Humidity (0-100%)	10-20Hz = 4-20mA	1 OFF, 2 OFF, 3 OFF, 4 OFF
SR10 Solar Radiation (0-2000 W/m2) RH21 Humidity (0-100%)	0-10Hz = 4-20mA	1 ON, 2 OFF, 3 OFF, 4 OFF
WS30 Wind speed (0-60Kph) WS40, WS45 Wind speed (0-71Kph)	0-20Hz = 4-20mA	1 OFF, 2 ON, 3 OFF, 4 OFF
PR10 PAR Sensor WS30 Wind speed (0-90Kph) WS40, WS45 Wind speed (0-106Kph)	0-30Hz = 4-20mA	1 ON, 2 ON, 3 OFF, 4 OFF
TA10, TA40, TA60, TS10, TS40, TS60, TG10, TG40, TG60 Temperature sensors (-20 to +60) WS30 Wind speed (0-120Kph) WS40, WS45 Wind speed (0-142Kph)	0-40Hz = 4-20mA	1 OFF, 2 OFF, 3 ON, 4 OFF
SR41 Solar Radiation (0 - 2000 Watts / metre Squared)	10-50Hz = 4-20mA	1 ON, 2 OFF, 3 ON, 4 OFF
WS30 Wind speed (0-180Kph) WS40, WS45 Wind speed (0-213Kph)	0-60Hz = 4-20mA	1 OFF, 2 ON, 3 ON, 4 OFF
WD32, WD42, WD45 Wind Direction	0-90Hz = 4-20mA	1 OFF, 2 OFF, 3 OFF, 4 ON

Sensor Type	Signal input - output	Dip Switch Setting (Yellow is switch Position)
BP40 Barometric Pressure (800 to 1100 hPa)	10-70Hz = 4-20mA	1: ON, 2: ON, 3: ON, 4: OFF
BP10 Barometric Pressure (900-1050 hPa)	17.5-19.75Hz = 4-20mA	1: ON, 2: OFF, 3: ON, 4: ON
NR40 Net Radiometer (-500 to +1500 Watts/metre squared)	10-30Hz = 4-20mA	1: OFF, 2: ON, 3: ON, 4: OFF
SM40 Echo Soil Moisture	10-40Hz = 4-20mA	1: ON, 2: OFF, 3: ON, 4: OFF
LW10, LW12 Leaf Wetness	7.7-18Hz = 4-20mA	1: OFF, 2: OFF, 3: OFF, 4: OFF
Test Mode - half signal	12 mA Test mode	1: ON, 2: OFF, 3: ON, 4: OFF
Test Mode - Zero signal	4 mA Test mode	1: OFF, 2: ON, 3: OFF, 4: OFF
Test Mode - Full Signal	20 mA Test mode	1: OFF, 2: OFF, 3: OFF, 4: OFF

Selecting a DIP switch setting that is not valid or changing the MODE to "B" will result in a default setting of 10 - 20Hz = 4-20mA.

Operation

When power is first applied to the FA12, the status LED will flash the number of times the DIP switch is set to. This is useful to confirm that your switch setting is correct.

During this time, the FA12 will output 4mA. Once the flash sequence has completed, it will then measure the incoming frequency from the connected sensor and adjust its output current to match. The normal response time is less than a few seconds.

If the sensor is disconnected at any time during normal operation, causing an unexpected stop of pulses, the output of the FA12 may take up to five seconds to return to the correct value of 4mA.

Independent Test Circuit
If you want to test the FA12 and its sensor independently of your system, you can use the circuit below.

Independent Test Diagram
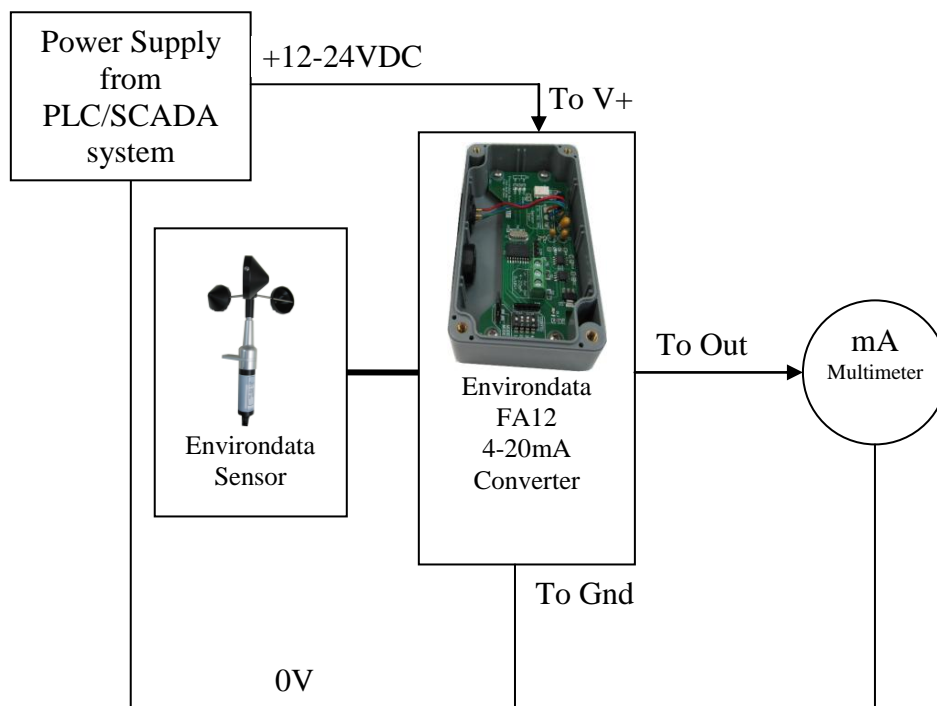
Connect a multimeter on its current setting and check the current values are as per the expected setup. (See Table1 in handbook).

FAQ (Frequently Asked Questions)

Q. Why are three wires needed?
A. The third wire is used to power the connected Environdata sensor, and the FA12 regulates this voltage to the correct level to power the Environdata sensor.

Q. If my FA12 is calibrated for a WS30 wind speed sensor for 20mA at 120kph, what happens if the wind speed goes higher than 120kph?
A. The FA12 output will NOT continue to increase past 20mA. In this situation if you require the ability to measure a higher wind speed, check the DIP switch settings to see if a different range is available for your sensor (ie. WS30: 0-180kph = 4-20mA)

Q. Should the FA12 be mounted near the sensor?
A. 1: *When there is less than 20m cable run between the sensor and your PLC / Data recorder, and no environmental interference:* Both 4-20mA and Environdata sensor signals can be run on medium length cables. You may mount the FA12 where it is most convenient for your installation.
**A. 2:** *For longer cable runs between the sensor and your PLC / data recorder (20+ metres or when there is potential of interference from the environment):* The Environdata sensor signal is able to be run for several hundred metres with no signal loss and is highly resistant to any interference. Therefore it is recommended you run extension cables from our sensors to your PLC / DR location and connect your FA12's close to the PLC /DR in this situation.

Q. My FA12 works correctly in all three Test modes, but appears unstable when I connect a sensor with the normal modes. Why is that?
A. The most likely problem is that either the ground wire (GND) is not connected back to the zero volts of the supply or the 4-20 mA output (OUTPUT) is not drawing current.
The latter could be because the 4-20 mA shunt converting the PLC/SCADA Input from voltage to current has not been set / inserted OR an Isolated analog input is being used and the link from Analog minus to Power Supply zero volts has not been connected.

Connection Hints

Where your PLC does not have a dedicated 4-20 mA input, an analogue voltage input can be used.

**Using the FA12 with a Voltage input on the PLC.
(Analogue Voltage Input)**
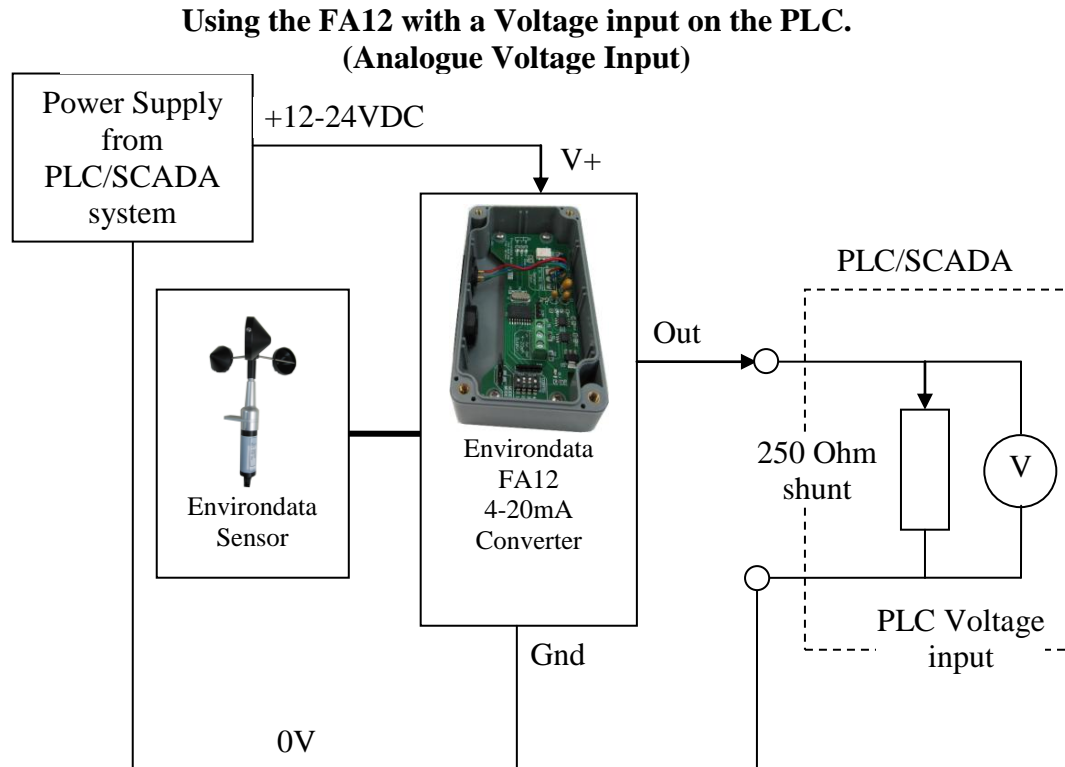
The FA12 can be connected to a Voltage input on a PLC. To do this, connect a 250 Ohm resistor across the Out and Gnd pins of the FA12. This will give a 1 to 5V signal range for 4 to 20 mA into the PLC.

Some PLC systems have a switch or jumper selection that provides the connection to the 250 ohm resistor internally as part of the setup instructions.

A 100 ohm shut can also be used, giving 0.4 volts to 2.0 volts for the 4 to 20 mA range.

Isolated 4 – 20 mA Inputs

If you are using an *isolated* input, it will be necessary to connect the analogue input negative terminal to the zero volts with a link. This link provides the return path for the output signal.

Sensor Connection

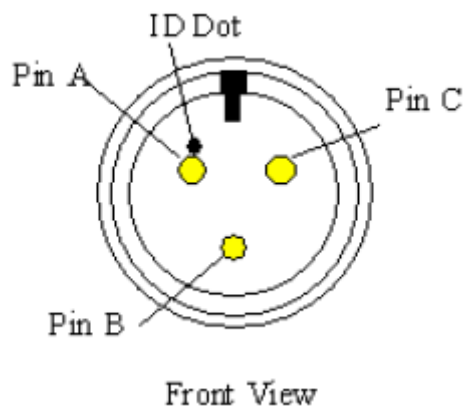*Provided for reference*
Sensor connection
The FA12 series of converters use a 3 pin weather proof connector for connecting the Environdata sensor.
The wiring detail is as follows:
A = Power +6 to +7 volts DC (Red) [nominal 6.25V DC]
B = Sensor signal (Blue)
C = 0V Ground (Green)

This is the view of the sensor connector mounted on the FA12 converter.