



MONARCH INSTRUMENT

Instruction Manual

F2A1X

Frequency to Analog Converter Module



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SAFEGUARDS AND PRECAUTIONS



1. Read and follow all instructions in this manual carefully, and retain this manual for future reference.
2. Do not use this instrument in any manner inconsistent with these operating instructions or under any conditions that exceed the environmental specifications stated.
3. Be sure the power supplied to this instrument matches the specification indicated on the rear panel of the instrument
4. Be sure all power is removed before making or removing any connections to or from this instrument.
5. There are no user serviceable parts in this instrument. Refer service to a qualified technician.
6. This instrument is not intended for use in adverse or wet environments. This may cause permanent damage and void the warranty.
7. Do not allow cables extending from unit to come into contact with rotating machinery, as serious damage to the equipment, or severe personal injury or death may occur as a result
8. This instrument may not be safe for use in certain hazardous environments, and serious personal injury or death could occur as a result of improper use. Please refer to your facility's safety program for proper precautions.



In order to comply with EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE):

■ This product may contain material which could be hazardous to human health and the environment. DO NOT DISPOSE of this product as unsorted municipal waste. This product needs to be RECYCLED in accordance with local regulations; contact your local authorities for more information. This product may be returnable to your distributor for recycling; contact the distributor for details.

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Monarch Instrument's Limited Warranty applies.
See www.monarchinstrument.com for details.

Warranty Registration and Extended Warranty Coverage information is available
online at www.monarchinstrument.com.

1.0 OVERVIEW

The F2A1X Frequency to Analog Module converts frequency input into an analog voltage (0 to 5 V dc) or current (4 to 20 mA dc) output. The output is electrically isolated from the rest of the unit. The input signal may be from an external sensor (measuring RPM for example) or any source of digital signal not exceeding 12 volts.

The F2A1X may be factory preprogrammed or user programmed using an optional USB programming cable (see Options and Accessories section) for any full scale output and input scale factor to provide an output of mV or mA out for a given input signal.

The device is powered from 12 to 24 V dc and consumes less than 100 mA and can be operated freestanding or can be mounted to a panel using the fixing wings on either end of the device. The F2A1X accepts input signals from optical, infrared, laser or 3-wire proximity sensors, or direct TTL or external ac inputs. User settings include sensor supply voltage, AC/DC coupling and input termination.

When ordering the user needs to specify either a 4 to 20 mA current output or 0 to 5 V dc voltage output and whether isolated outputs are required.

2.0 INSTALLATION

The F2A1X Frequency to Analog Module is housed in a mountable ABS enclosure 3.2 x 1.6 x 1.2 inches [80 x 40 x 28 mm] excluding the mounting wings. There are screw terminal connections on both ends of the unit.

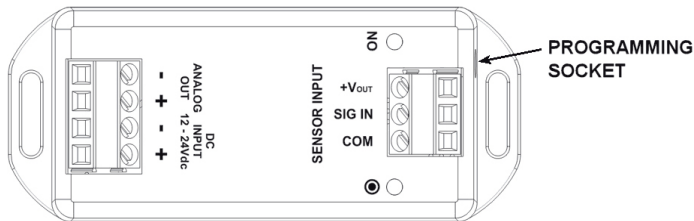


Figure 1 F2A1X Module – top view

Before mounting the unit to a panel all user options should be set. See Sections 3 and 4.

2.1 Power

Power to the unit is connected to the 4-way terminal block marked **DC INPUT 12 – 24 V dc**. Refer to Figure 2.1 above. Note that these inputs are polarity sensitive. Connect a supply of 12 to 24 V dc (with a 150 mA source capacity) ensuring that the positive wire goes to the + terminal and the common or negative wire goes to the – terminal.

2.2 Analog Out

The Analog Out terminals are the source for the voltage or current output as ordered. These terminals are polarity sensitive and are marked + and – accordingly.

The F2A1X Frequency to Analog Module may be equipped with either a Current Output or a Voltage Output depending on how the unit was ordered. The Analog Out terminals are the source for the voltage or current output. These terminals are polarity sensitive and are marked + and – accordingly.



The **ANALOG OUT** is an **OUTPUT**. **DO NOT CONNECT THE DC POWER TO THESE TERMINALS.**

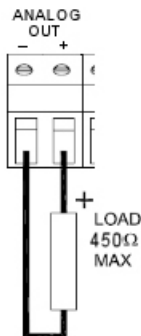
Note: The full scale output settings must have been specified when ordered or may be user programmed using the User Programming Cable.

2.2.1 Current Output Option

The current output is 4 to 20 mA. This output is a current source and has a 10 V dc internal compliance voltage. The maximum load that may be connected is 450 ohms.

Typical connections (shown right) are as follows:

Connections for current out are to the terminals marked **ANALOG OUT**. Connect the Positive side of the load to the terminal marked + and the other side of the load to the terminal marked -.



2.2.2 Voltage Output Option

The voltage output is 0 to 5 V dc.

Connections for voltage out are to the terminals marked **ANALOG OUT**. Connect the Positive side of the load to the terminal marked + and the negative or common side of the load to the terminal marked -.

2.3 Sensor Input

The **SENSOR INPUT** is the input terminal used to connect an external sensor or trigger source. There is a voltage output that may be used to power an external sensor (5 or 12 V dc – user selectable at 75 mA max). The system supports two wire inputs (Signal and Common) or three wire sensors (Supply, Signal and Common). Three-wire sensors can be open collector types – NPN or PNP, TTL output or –ve output types.

Connections and their functions are as follows:

+Vout Positive +5 or +10 V dc (user selectable) to provide power to optical, laser, infrared or amplified magnetic sensors. Maximum load is 75 mA dc.

SIG IN Input signal from signal sources or speed sensor. Accepts TTL pulses or ac signals, unipolar and bipolar, from ± 3 to ± 12 Volts. Connect the signal wire from 3-wire sensors or the positive side of two wire sources to this terminal. Typical input impedance is 10 Kohms.

COM Common or Negative connection for both signal and power from most sensors/sources.

Refer to the User Settings section for input option settings. Typical connection for Monarch standard sensors is shown below:

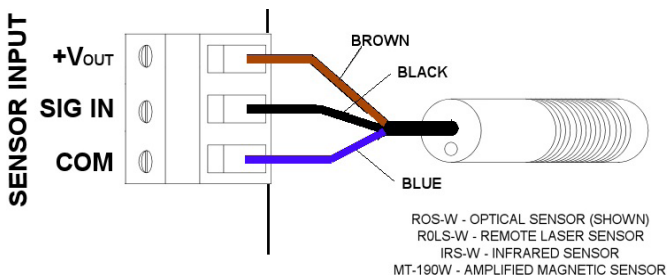


Figure 2 Sensor Connection Detail

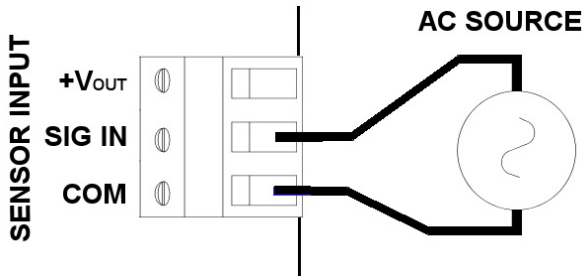


Figure 3 AC Source Connection Detail

3.0 USER PROGRAMMABLE HARDWARE SETTINGS

There are several settings relating to the sensor input that can be set by the user.

The settings are done by moving jumpers on the circuit board inside the housing. To access these jumpers **REMOVE ALL WIRING FROM THE UNIT.** Then remove the two screws on the bottom of the unit and remove the base exposing the circuit board as shown below.

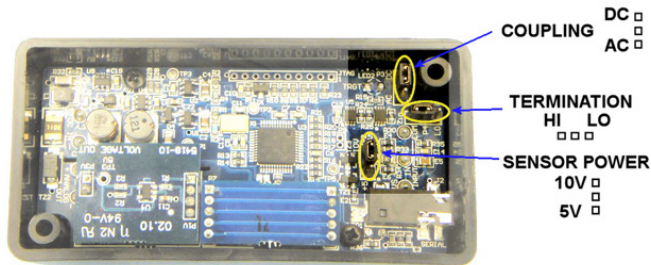


Figure 4 Exposed Circuit Board showing Program Jumpers

There are three jumpers as shown in Figure 4. These are:

3.1 Sensor Power Voltage

This jumper adjusts the supply voltage to the external sensor. Can be set as +5 V dc or +10 V dc depending on the sensor used. Factory Default is +5 V.

3.2 Sensor Termination

This jumper sets the input termination. Can be set **HI** for 10k pull up resistor (to sensor supply voltage) for NPN type open collector sensors (factory default) or **LO** for 10k pull down resistor (to Common) for PNP type open collector sensors or none (remove jumper altogether) high impedance input for external termination.

3.3 Input Coupling

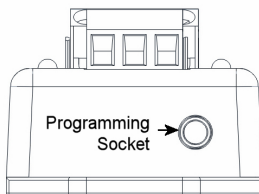
This jumper sets the input coupling for the external signal. Can be set to **DC** (default) for most digital input sources or **AC** for sine wave and bidirectional sources or sensors that provide negative going pulses.

Once the jumpers have been set, replace the base and the two screws.

4.0 USER PROGRAMMABLE SOFTWARE SETTINGS

All the operational settings of the F2A1X Frequency to Analog Module can be set remotely using the PM Remote PC Software and the optional User Programming Cable (UPC). This cable plugs into the unit via the phone jack socket below the SENSOR INPUT terminal block as shown here and into a USB port on the PC.

Settings that can be programmed include input scaling, analog output full scale and offset, input pulse polarity and update rate. In addition you can view real-time data on the PC – refer to the PM Remote manual and help screen.



5.0 SPECIFICATIONS

Specifications*	F2A1X Frequency to Analog Module
Input Range	0.1 to 10 KHz, 5 to 600,000 RPM
Accuracy	0.005%
mA Option	4 to 20 mA out, 16-bit resolution 10 V dc compliance voltage; zero and full scale settings as specified when ordered or user programmable using USB Programming Cable and PM Remote Software
V dc Option	0 to 5 V dc out, 5 mA 16-bit resolution; zero and full scale settings as specified when ordered or programmable using USB Programming Cable and PM Remote Software
Resolution	76 microvolts or 30.5 micro amps
Power Supply	12 to 24 V dc $\pm 5\%$ @ 150 mA max
Input	TTL input or ± 3 V ac to ± 12 V ac
Sensor Supply	5 V dc or 10 V dc at 75 mA – user selectable
Dimensions LxWxH	3.2 in. x 1.6 in. x 1.2 in. [80 mm x 40 mm x 28 mm] excluding the mounting wings

*Specifications are subject to change without notice.

5.1 Compliance

This product is CE certified and RoHS compatible.
Manufactured in an ISO9001 facility.

6.0 SENSORS AND ACCESSORIES

For a complete list of accessories, see webpage.

Sensors:

ROS Remote Optical	PN: 6180-056	Remote optical LED sensor with tinned wire termination, 3-wire connection
ROLS Remote Optical Laser	PN: 6180-030	Remote optical laser sensor with 8 ft. cable, 3 tinned leads
RLS Rugged Laser	PN: 6180-080	Rugged laser sensor with removable 3 m cable, watertight M12 connector to tinned leads
ROS-HT-W-25 Remote Optical High Temp	PN: 6180-058-25	Remote optical sensor for high temperature applications with visible incandescent white light source
P5-11 Proximity	PN: 6180-013	Two-wire inductive NAMUR output with 10 ft. cable and tinned leads
PS-12 Proximity	PN: 6180-032	Three-wire sensor that outputs an open collector PNP pulse
M-190W Magnetic	PN: 6180-012	Magnetic sensor commonly used with 60-tooth 20 pitch gears
GE200 HP Inductive	PN: 6180-014	Electromagnetic inductive spark plug sensor with 15 ft. cable



ROS



ROLS



RLS



ROS-HT-W-25



P5-11



PS-12



M-190W



GE200 HP

Accessories:

USB Programming Cable

PN: 6180-031 Enables the user to connect the F2A1X to a Windows® PC USB port to use PM Remote Software to program the unit. The software also allows remote monitoring of the RPM using a graphic display or an Excel™ spreadsheet. Software available for download at monarchinstrument.com

T-5 Reflective Tape

PN: 6180-070 Single pack, 5 ft. x 0.5 in. roll

PN: 6180-069 Two-pack, 5 ft. x 0.5 in. rolls

PN: 6180-079 Waterproof, 5 ft. x 1 in. roll

7.0 APPENDIX A - SERIAL PROGRAMMING COMMANDS

Programming the unit requires the optional USB Programming Cable with associated PM Remote software and a PC running Windows XP or later with an available USB port.

All serial commands are @ then two or more characters or words separated by a delimiter "/". One or two numbers follow some commands. All valid commands respond immediately with an "OK" or data, or "ERR" if incorrect. Default Baud rate is 9600. Communication requires the User Programming Cable.

@PI	Product Information, shows name \n Firmware revision \n
@C1	Shows all settings
@C2	Shows all settings with CR after each parameter
@D0	Sends current display value once
@D1	Sends display data continuously (at up to display update rate)
@D2	Stops sending data
@MX	Sends Max reading
@MN	Sends Min. reading
@RE 32	Resets Max
@RE 64	Resets Min.
@RE 96	Resets Max and Min.
@CH_A/TYPE	Shows current type
@CH_A/TYPE = RPM	Sets scale to 60 so displays in RPM
@CH_A/TYPE = FREQ	Sets scale to 1 so displays in hertz
@CH_A/TYPE = SCALE	Scale mode. Enter Scale factor.
@CH_A/TYPE/SCALE = 30.00	This will set the SCALE factor to 30.00
@CH_A/INPUT	Shows Sense of trigger input
@CH_A/INPUT = POS (or NEG)	Sets the sense of the input trigger
@CH_A/LOEND	Sets how long (in secs) with no pulses before the unit outputs 0

@CH_A/LOEND = 12 (or 1_SEC, HALF)	Sets low end time; allows a minimum reading of 5 RPM, 60 RPM, or 120 RPM
@CH_A/GATE	Show Gate Speed (default is 12)
@CH_A/GATE = STD (1/100 Second) or FAST (1/1000 second)	Sets Gate Speed (default is 1/100)
@DECPT	Shows the number of decimal places displayed
@DECPT = NONE, 1, 2, or 3	Sets the maximum number of decimal places
@DAC1/ FSCAL	Shows Analog Out Full Scale
@DAC1/FSCAL = xxx.xx	Sets the Reading value that the Analog output will output Full Scale (5 V or 20 mA); depends on TYPE
@DAC1/OSCAL	Shows Analog Out Zero Scale
@DAC1/OSCAL = xxx.xx	Sets the Reading value that the Analog output will output Zero Scale (0 V or 4 mA); depends on TYPE(default is 0.00)
@DISPR	Shows Display Update Rate
@DISPR = HALF or 1_SEC or 1.5_S.	Sets the maximum display update rate to one half a second, 1 second or 1 ½ seconds between updates
@SERNO	Shows unit serial number

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