MONARCH INSTRUMENT

Instruction Manual

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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 2002/96/EC 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

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@CH_A/LOEND = 12 (or 1_SEC, HALF) Sets low end time. This allows a min 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 (5V or 20mA). Depends on TYPE.

@DAC1/0SCAL   Shows Analog Out Zero Scale

@DAC1/0SCAL = xxx.xx   Sets the Reading value that the Analog output will output Zero Scale (0V or 4mA). Depends on TYPE. (Default is 0.00)

@DISPR   Shows Display Update Rate

@DISPR = HALF or 1_SEC or 1.5_S. This sets the maximum display update rate to one half a second, 1 second or 1 ½ seconds between updates.

@SERNO   Shows unit Serial Number

more information. This product may be returnable to your distributor for recycling - contact the distributor for details.

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

Warranty Registration and Extended Warranty coverage available online at www.monarchinstrument.com.

TABLE OF CONTENTS

1.0   OVERVIEW

The F2A1X Frequency to Analog Module converts frequency input into an analog voltage (0 to 5Vdc) or current (4 to 20mAdc) 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 24Vdc and consumes less than 100mA and can be ooperated free standing 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 Vdc voltage output and whether isolated outputs are required.

2.0   INSTALLATION

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

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 Product 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

6.0   OPTIONS AND ACCESSORIES / SENSORS

T-5   Reflective Tape - 5 foot (1.5 m) roll, 0.5 inch (10 mm) wide

USB Programming Cable with PM Remote Software on CD:
Enables the user to program the F2A1X using a PC with USB connection. The software also allows remote monitoring of the RPM using a graphic display or an Excel™ spreadsheet.

ROLS-W   Remote Optical Laser Sensor with 8 foot cable

ROS-W   Remote Optical Sensor with 8 foot cable

ROS-P-25   Remote Optical Sensor with 25 foot cable (must cut plug off)

ROS-HT-W-25   Remote Optical Sensor for high temperature applications to 257 °F (125 °C) with 25 foot cable

GE-200HP   Electromagnetic Inductive Spark Plug Sensor with 15 feet of cable

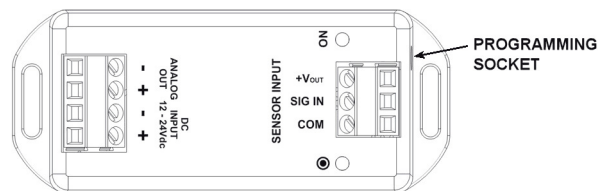**IRS-W**   Infrared Sensor with 8 foot cable

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 – 24Vdc**. Refer to Figure 2.1 above. Note that these inputs are polarity sensitive. Connect a supply of 12 to 24Vdc (with a 150mA 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.

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 Vdc internal compliance voltage. The maximum load that may be connected is 450 ohms.
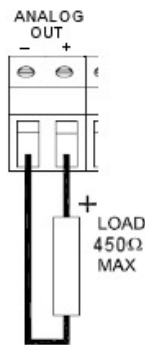
Typical connections are as follows: (Shown right)

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 Vdc.

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 Vdc – user selectable at 75mA 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.
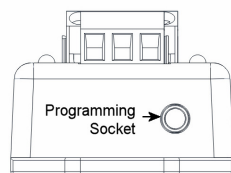
5.0 SPECIFICATIONS

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 10Vdc compliance voltage. Zero and full scale settings as specified when ordered or user programmable using USB Programming Cable and PM Remote Software
Vdc Option:	0 to 5 Vdc 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
Dimensions:	L x W x H = 80 x 40 x 28 mm (3.2 x 1.6 x 1.2 inches) excluding the mounting wings
Power Supply:	12 to 24Vdc $\pm$5% @ 150mA max
Input:	TTL input or $\pm$3 Vac to $\pm$12 Vac
Sensor Supply:	5Vdc or 10 Vdc at 75 mA – User selectable

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

For troubleshooting information and technical support visit
www.monarchinstrument.com.

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.

Connections and their functions are as follows:

+Vout   Positive +5 or +10 Vdc (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 three 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:
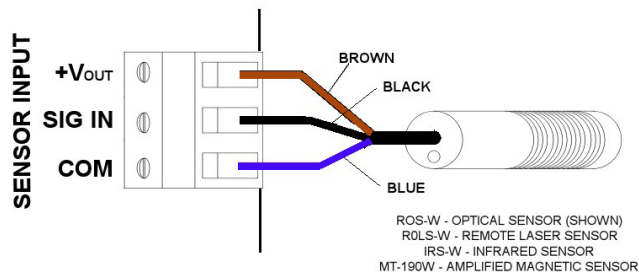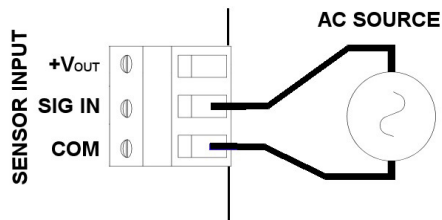
Figure 2 Sensor Connection Detail

Figure 3 Signal 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.
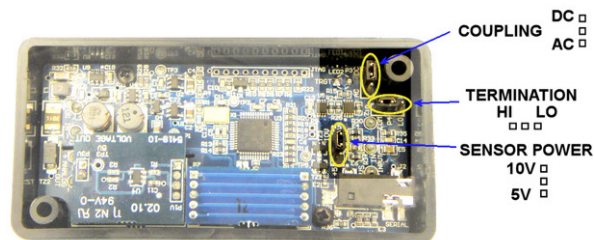

Figure 4 Exposed Circuit Board showing Program Jumpers

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 +5Vdc or +10Vdc depending on the sensor used. Factory Default is +5V.

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.