INSTALLATION GUIDE

MAXIFLEX 1000 SERIES

16 Analog Input (16 AI) Module

Model No : M1403A

General Description

The M1403A module has 16 analog inputs divided into two groups of 8 each, with two common terminals linked together internally. The analog input range is selectable by means of a four-way DIP switch, and the selected range is common to all sixteen inputs. Figure 2 shows the layout of the M1403A module.

The module is controlled by the Maxiflex CPU module. The CPU reads seventeen 16-bit registers from a block of 34 bytes of RAM in the module. The seventeenth register is used to check the validity of data read back. A value of 8008 Hex (32776 decimal) is read back if the 16 channel data is valid, and a value of 0 is read back if the 16 channel data is invalid.

The 16 channels are multiplexed into one common range selection conditioner. The conditioner output is converted to a 12-bit digital value by an Analog to Digital Converter (ADC). The on-board controller then scales the 12-bit value to a 16-bit value for standardization and places it in RAM for access by the CPU module.

Isolation of 2 500 Vrms between input and system logic is provided.

Scan and module identity (ID) codes on the card are used by the CPU for addressing and diagnostics. If the card is removed or becomes faulty, this status will be detected by the CPU immediately, and can be read via the network.

Field calibration is possible on the module. An external reference voltage source is required to calibrate the module.

Three LEDs labelled HEALTHY, HIGH and LOW are visible behind the LED cover. They indicate the functional state of the module as shown in Table 1 **Any deviation from this indicates a module malfunction.**

Table 1 : LED Indicators

	LEDS			
Mode	**Healthy**	**High**	**Low**	**Description**
Normal	On	Off	Off	Normal Operation
Calibration	Flash	On	On	Calibration Correct
Calibration	Flash	On	Off	See Calibration Procedure
Calibration	Flash	Off	On	See Calibration Procedure

Input Range Selection Set-up

Table 2 shows the input range settings for DIP switch SW1, which is located adjacent to the terminal blocks. (Refer to Figure 1). **The selected range is common to all 16 inputs.**

Table 2 : SW1 Input Range Settings

Input Range	*Switch*				*Module Mode*
	1	*2*	*3*	*4*	
0 V to 10 V	On	Off	Off	Off	Normal
0 V to 1 V	Off	On	Off	Off	Normal
0 mA to 20 mA	Off	On	Off	Off	Normal
2 V to 10 V	On	Off	On	Off	Normal
0,2 V to 1 V	Off	On	On	Off	Normal
4 mA to 20 mA	Off	On	On	Off	Normal
0 V to 5 V	Off	Off	Off	Off	Normal
1 V to 5 V	Off	Off	On	Off	Normal
10 V SPAN	On	Off	Off	On	Calibration
1 V SPAN	Off	On	Off	On	Calibration

For 20 mA current ranges, a 50 Ω 0,1 %, 50 ppm resistor is connected between the input terminals and common, or between the turrets supplied on the module printed circuit board (PCB). The module is supplied as standard with the input range set to 4 mA to 20 mA, and sixteen 50 Ω 0,1 % resistors soldered onto the turrets on the PCB. Remove these resistors for the voltage ranges. To remove the resistors on the PCB, it will be necessary to remove the PCB from the housing.

Removing and Replacing the PCB

1. Remove the module from the base. Remove the top screw and lift off vent cover.
2. Gently ease the LED cover and the door away from the module.
3. Slide out the PCB.
4. Reverse order to replace the PCB. Remove lowest terminal block for easier assembly.

Field Calibration Procedure

Calibration is done in the voltage mode. A voltage reference source with 0,01 % resolution on the 10 V dc scale and the 1 V dc scale, is required.

Proceed as follows:

1. Remove the field wiring and the current sense resistor (if connected), from input 1.
2. Select the “10 V SPAN” calibration range on the DIP switch SW1 in accordance with Table 2. Check that the “HEALTHY” LED starts flashing.

On selection of the calibration mode, the 16-bit data values read back from the module by the CPU module for inputs 2 to 16, and the reference channel are set to zero. Input 1 operates in the normal mode, that is, it returns a 16-bit value corresponding to the input range selected and input voltage.

3. Set the voltage reference source to 7,5 V dc ± 1 mV dc and connect to input 1 and common.
4. Check the LEDs as follows:
   a) If the HIGH and LOW LEDs are on, the range is within calibration. Go to step [5].
   b) If the HIGH LED is off and the LOW LED is on, the 10 V SPAN calibration is low. Adjust the 10 V SPAN potentiometer clockwise until the HIGH and LOW LEDs are both on.
   c) If the HIGH LED is on and the LOW LED is off, the 10 V SPAN calibration is too high. Adjust the 10 V SPAN potentiometer counter-clockwise until the HIGH and LOW LEDs are both on.
5. Set the voltage reference source to 0,75 V dc ± 0,1 mV dc.
6. Select the “1 V SPAN” calibration range on the DIP switch SW1 in accordance with Table 2.
7. Check the LEDs as follows:

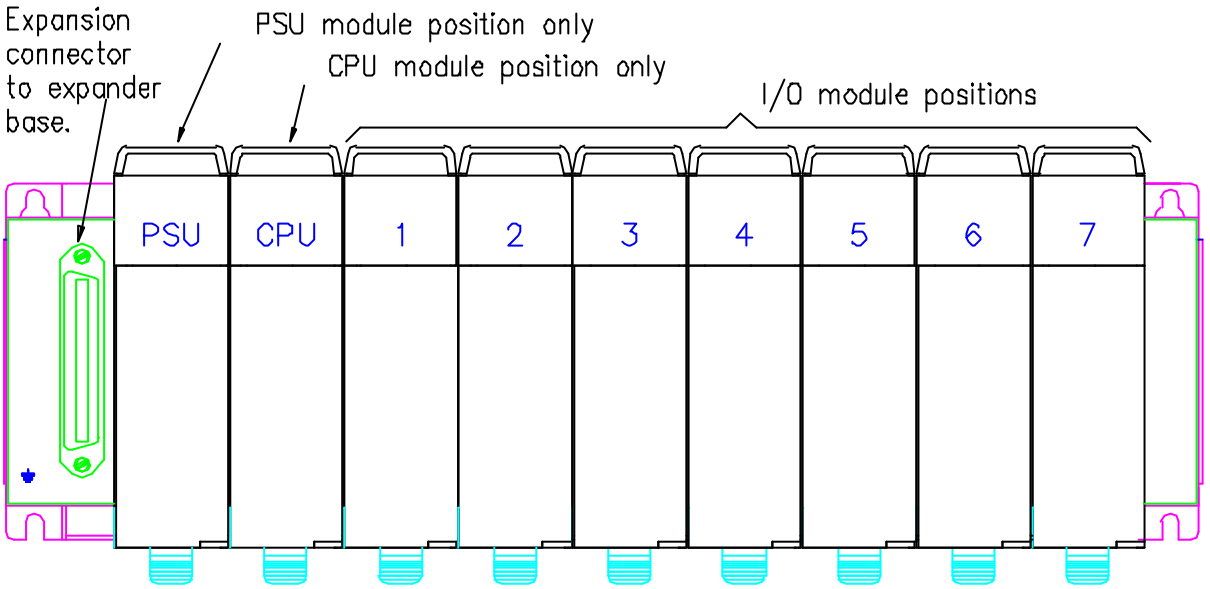
a) If the HIGH and LOW LEDs are on, the range is within calibration. Go to step [8].
b) If the HIGH LED is off and the LOW LED is on, the 1 V SPAN calibration is low. Adjust the 1 V SPAN potentiometer clockwise until the HIGH and LOW LEDs are both on.
c) If the HIGH LED is on and the LOW LED is off, the 1 V SPAN calibration is too high. Adjust the 1 V SPAN potentiometer counter-clockwise until the HIGH and LOW LEDs are both on.

8. Remove the voltage reference from input 1.
9. Set the input range to the original range or to the required range in accordance with Table 2.
10. Reconnect the input field wiring and the current sense resistor (if necessary) to input 1.

Installation

The M1403A must be installed in one of the seven I/O positions on the right-hand side of the base.

Figure 1 : Layout of a 7 I/O Master Base



Note: The exact position of the I/O module will depend on the system configuration

Figure 2 : Layout of M1403A module

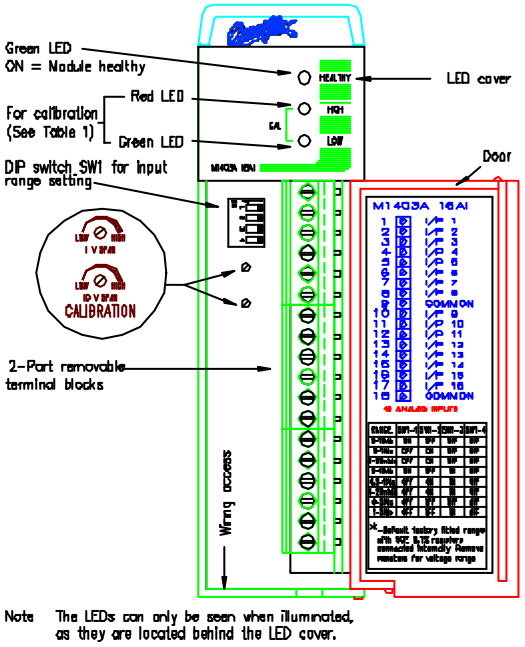


Figure 3 : Electrical Connections (voltage inputs)

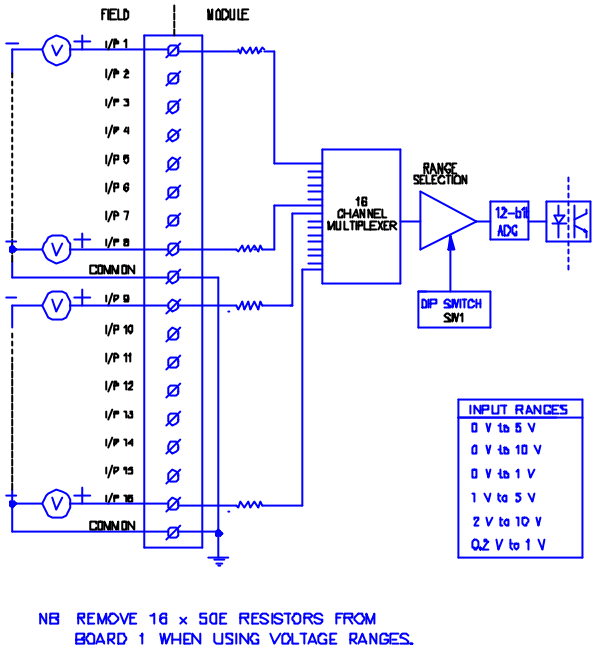
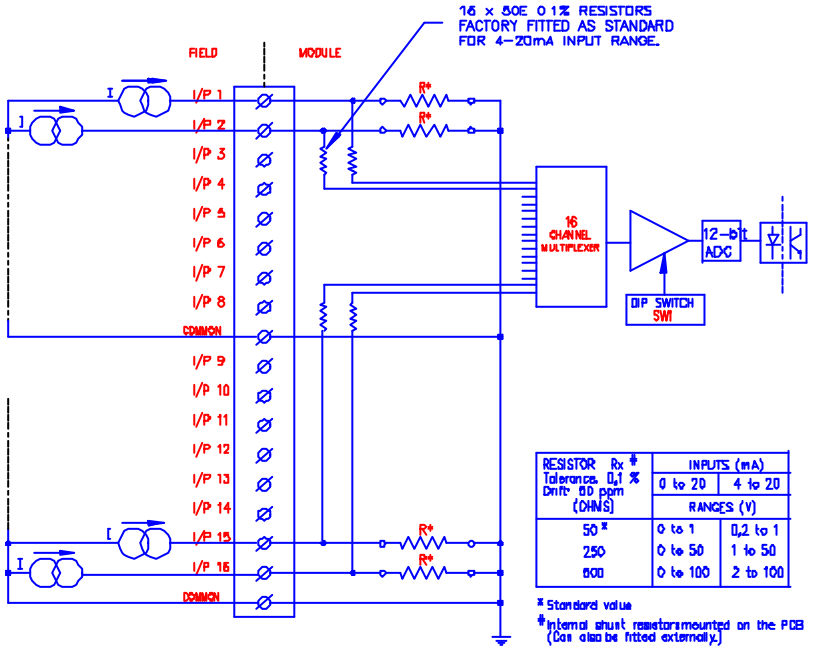


Figure 4 : Electrical Connections (current inputs)



Specifications

Inputs

Quantity	: 16

Specifications	
Input Range	: Selected range common to all 16 inputs
Ranges	: 0 mA to 20 mA/4 mA to 20 mA (factory set) 0 V to 5 V dc/1 V to 5 V dc 0 V to 10 V dc/2 V to 10 V dc 0 V to 1 V dc/0,2 V to 1 V dc (Current ranges use 50 Ω 0,1 % 50 ppm resistors which must be removed for voltage ranges.)
Wire Gauge	: 2,0 mm2 (maximum) # # For manageable cabling to the modules, a conductor size of up to 0,5 mm2, with a maximum overall outside diameter of 2 mm, is recommended.
Performance	
Accuracy	: 0,25 % of FSR (maximum)
Linearity	: 0,1 % of FSR (typical)
Resolution	: 12 bits
Drift	: 100 ppm/°C (typical)
Response Time 10 % to 90 % output step change	 : 320 ms (maximum) for all 16 channels
Isolation	
Input to system logic	: 2 500 Vrms
Insulation Resistance	
Input to system logic	: 20 MΩ at 500 V dc
Power Supply	
Internal	: From Base PSU
Voltages Current (Typical)	: +5 V dc : +12 V dc : 35 mA (5 V); 140 mA (12 V)
Environmental	
Operating Temperature	: -25°C to +60°C (-13°F to +140°F)
Storage Temperature	: -40°C to +70°C (-40°F to +158°F)
Operating Humidity	: 5 % to 95 % (non-condensing)
Identification Codes	
Scan Code	: 14
Module ID	: 30
Mass	
Including packaging	: 450g (15.9 oz)
Excluding packaging	: 360g (12.7 oz)
Ordering Information	
Order Code	: M1403A

