INSTALLATION GUIDE

6 Isolated 2 or 3 wire RTD Inputs (6 RTD ISO) Module
M1433B

General Description

The M1433B 6 RTD ISO module consists of six isolated analog inputs where each input can be configured as a 2 or 3 wire RTD input. The RTD types and ranges handled by the module are as follows :-

Type	Min	Max
Pt-100	-200°C	+850°C
Ni-120	-80°C	+320°C

The RTD inputs are linearised in the module by means of a lookup table. The actual temperature value in degrees Celsius or degrees Fahrenheit is presented to the Maxiflex CPU in signed integer format to 0.1 degrees resolution.

The data presentation format and RTD type for each input is downloaded to the module data registers by the Maxiflex CPU user application Ezi-forth program. Should a power failure occur, or the module is replaced, then the module will have to be re-initialised by the Maxiflex CPU module.

Over-range and under-range inputs are read as +32767 and –32767 values respectively for the particular input selected. In addition, each input has four programmable trip setpoints and a deadband value. A status register is then used to indicate the status of each trip setpoint.

Isolation of 1500 VACrms is provided between the inputs and bus logic. Isolation of 500 VACrms is provided between inputs.

The module plugs into any I/O slot and has a Scan Code and Module ID which are used by the CPU module to detect the module and run the appropriate driver for the module. A CPU OK green LED is viewable through the front cover which shows the status of the module as follows:-

Table 1 – LED Indicator

CPU OK	MODULE
On	Operating correctly
Flashing	Failure
Off	No power or failure

With the aid of an accurate ohm source and the M1433B Ezi-forth calibration program*, the module can be field calibrated by the user. The module is factory calibrated at an ambient temperature of ±25°C.

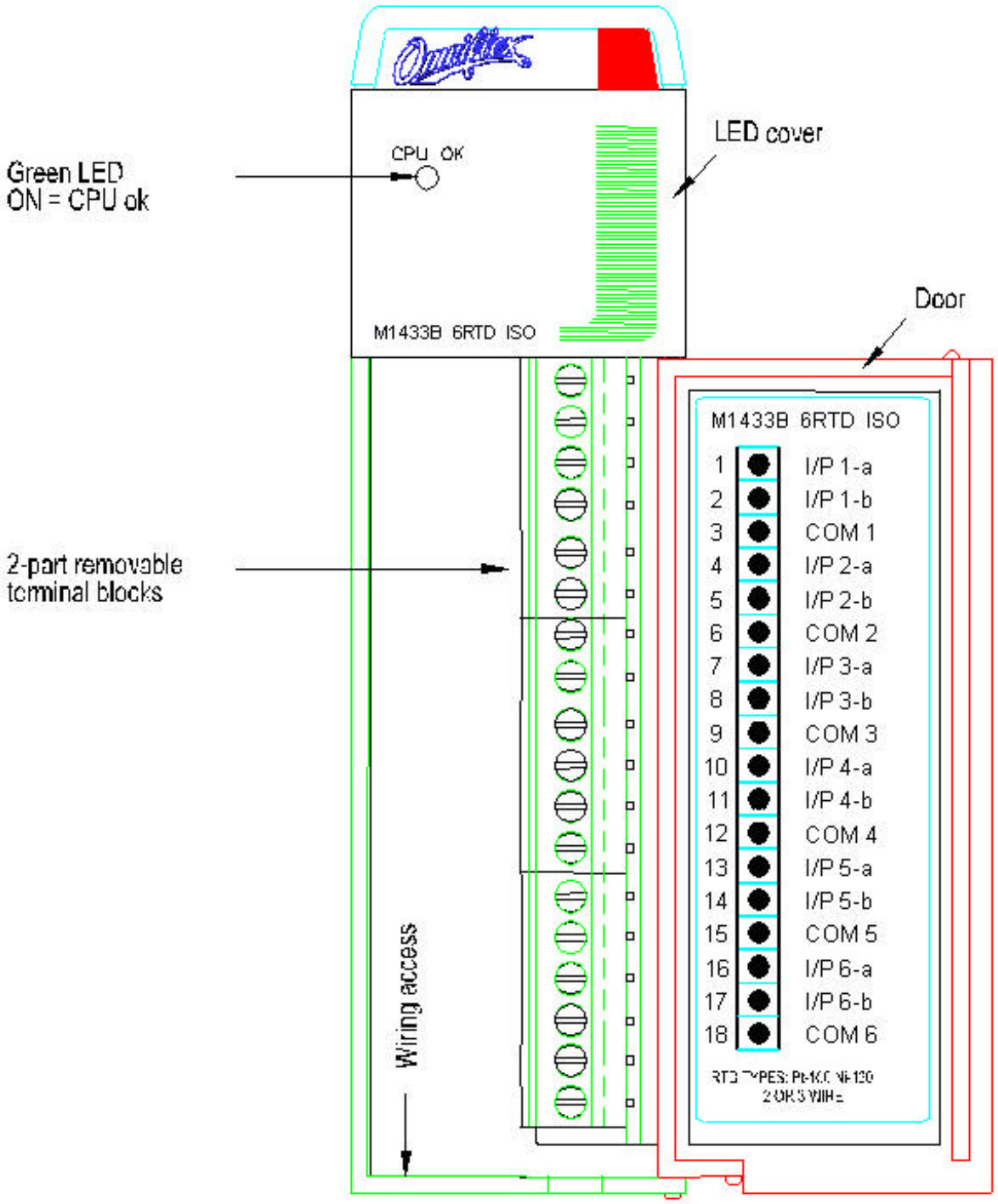
Removing/Replacing LED Cover

1. Remove top screw and lift off vent cover.

2. Open the door and gently force down the door until the door is free of the LED cover. Remove door.
3. Holding the LED cover, gently force the housing apart until the LED cover is freed.

Replace in reverse order.

Figure 1 : Layout of M1433B Module



Note: The LEDs can only be seen when illuminated. as they are located behind the LED cover.

Installation

The M1433B can be installed in any I/O slot of a Maxiflex base located on the right hand side of the bases.

Figure 2 : Layout of the 7 I/O Master Base

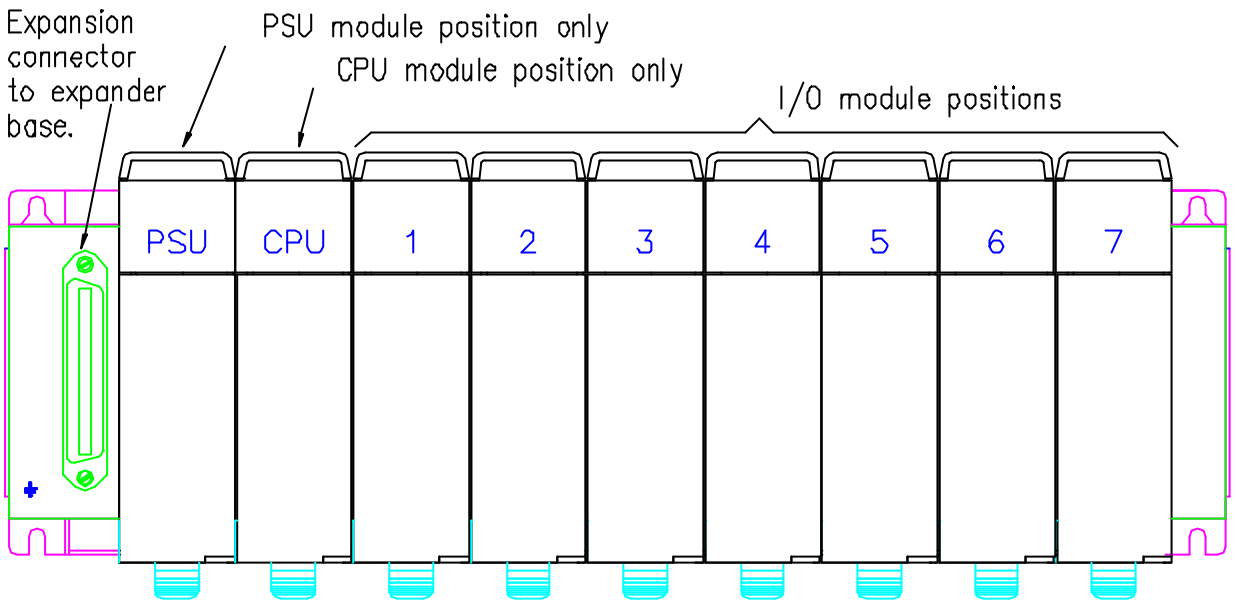
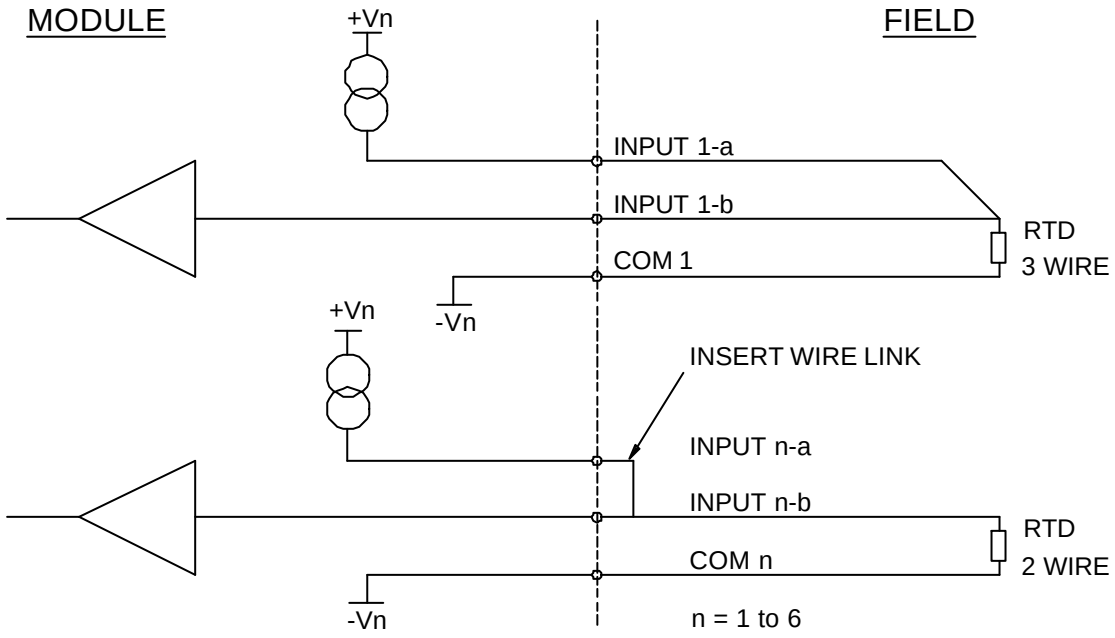


Figure 3 : Electrical Connections



Module Memory Map

The input type, data display format and setpoints configuration for each input are downloaded to the module by the Maxiflex CPU user application Ezi-forth program. The layout and

description of the modules registers are provided in the Table below, as well as a sample forth program that configures and reads a module's inputs. If after configuration the module loses power for any reason, then the module will revert back to default values and the module will therefore have to be reconfigured.

Table 2 : M1433B Memory Map

Register	Description
0	Scancode (41) MSB
	Module ID (49) LSB
1	Input 1 Value
2	Input 2 Value
3	Input 3 Value
4	Input 4 Value
5	Input 5 Value
6	Input 6 Value
7	Spare
8	Spare
9	Input 1 Status
10	Input 2 Status
11	Input 3 Status
12	Input 4 Status
13	Input 5 Status
14	Input 6 Status
15	Spare
16	Spare
17	Input 1 Type
18	Input 2 Type
19	Input 3 Type
20	Input 4 Type
21	Input 5 Type
22	Input 6 Type
23	Spare
24	Spare
25	Spare
26	Temperature Format
27	Spare
28	Spare
29	Spare
30	Input 1 High High Limit

Register	Description
31	Input 1 High Limit
32	Input 1 Low Limit
33	Input 1 Low Low Limit
34	Input 1 Deadband
35	Input 2 High High Limit
36	Input 2 High Limit
37	Input 2 Low Limit
38	Input 2 Low Low Limit
39	Input 2 Deadband
40	Input 3 High High Limit
41	Input 3 High Limit
42	Input 3 Low Limit
43	Input 3 Low Low Limit
44	Input 3 Deadband
45	Input 4 High High Limit
46	Input 4 High Limit
47	Input 4 Low Limit
48	Input 4 Low Low Limit
49	Input 4 Deadband
50	Input 5 High High Limit
51	Input 5 High Limit
52	Input 5 Low Limit
53	Input 5 Low Low Limit
54	Input 5 Deadband
55	Input 6 High High Limit
56	Input 6 High Limit
57	Input 6 Low Limit
58	Input 6 Low Low Limit
59	Input 6 Deadband
60-80	Spare
81	Firmware Version Number
82	Calibration Done Flag

* - used by the M1433B Ezi-Forth calibration program to calibrate the module

Scancode and Module ID

The scancode and module ID's are used by the Maxiflex CPU module to detect and identify the M1433B module. The scancode is 41 and the module ID is 49. Refer to Table 2 for the addresses.

Input Values

This table consists of six integer values corresponding to inputs 1 to 6. The output value is a °F or °C signed integer value to 0.1 degrees resolution. Refer to Table 2 for the addresses.

Input Status

This table contains one register per input. If a particular trip limit is transgressed then its corresponding bit is set. If D4 is set, then EEprom has been corrupted and the module needs re-calibration. If D5 is set, then user configuration data has been corrupted and the user must re-configure the module. If D6 is set, then the incorrect input type has been downloaded to the module. Table 3 lists the allocation of the bits. Refer to Table 2 for the address of the individual inputs status registers.

Table 3 : Format of Input Status register	
Input >= High Limit	D0 = 1
Input >= High High Limit	D1 = 1
Input <= Low Limit	D2 = 1
Input <= Low Low Limit	D3 = 1
Calibration EEprom Corrupted	D4 = 1
Configuration Ram Corrupted	D5 = 1
Input Type Selection Incorrect	D6 = 1

D7 not used. Default set to zero.

Input Types

This table consists of six integer values corresponding to input types 1 to 6. Table 4 below lists the various input t ypes and their corresponding input type numbers. Refer to Table 2 for the addresses

Table 4 : Input Types	
Input Type No	**Description**
0	Input not used*
100	Pt-100
101	Ni-120

* - default value

Temperature Format

This register indicates whether the temperature should be displayed in degrees celsius or in degrees fahrenheit. The default setting is zero which indicates that temperatures will be displayed in degrees celsius. If the register is non-zero, the temperatures will be displayed in degrees fahrenheit. Refer to Table 2 for the addresses.

Trip Limits

This Table contains two high trip limits, two low trip limits, and a deadband for each input. The limits are used to determine if the input signal has transgressed a particular limit. Refer to Table 2 for the addresses. Default value zero. The format is the same as the display format above.

Firmware Version Number

The register contains the installed firmware version number in hex format.

Calibration Done Flag

The value of one indicates the module has been calibrated. Any other value indicates calibration not done or corrupt.

Sample Forth Program

The following program provides a “TO” and a “FROM” command which allows the module’s registers to be directly accessed. The program assumes that the module is in slot 3 and configures it as follows : All inputs set to Pt-100 RTD and all inputs set to display ºC. The trip limits are set as follows : High High = 600.0ºC, High = 500.0ºC, Low = 200.0ºC, Low Low = 100.0ºC and deadband = 20.0ºC.

```
FORGET ALL
: ALL ;

3  CONSTANT SLOT3
100 CONSTANT PT_100
30 CONSTANT INPUT_1_HH
31 CONSTANT INPUT_1_H
32 CONSTANT INPUT_1_L
33 CONSTANT INP UT_1_LL
34 CONSTANT INPUT_1_DB

: TO ( value reg slot--- ) 33 BIOS
: FROM ( reg slot --- value ) 32 BIOS

: CONFIG_MOD
  7 1 DO
     PT_100 I 16 + SLOT3 TO ( set all inputs to PT-100 )
     6000 I 1 - 5 * INPUT_1_HH + SLOT3 TO   ( HH trip = 600.0 ºC )
     5000 I 1 - 5 * INPUT_1_H  + SLOT3 TO    ( H trip = 500.0 °C )
     2000 I 1 - 5 * INPUT_1_L  + SLOT3 TO    ( L trip = 200.0 °C )
     1000 I 1 - 5 * INPUT_1_LL + SLOT3 TO    ( LL trip = 100.0 °C )
     200  I 1 - 5 * INPUT_1_DB + SLOT3 TO    ( DB  = 20.0 °C  )
    LOOP
;
: RD_INPUTS
  CR
  7 1 DO
    ." TEMP = " I SLOTS3 FROM .                    (read input value)
    ." STATUS =" I 8 + SLOT3 FROM.CR               (read input value)
    LOOP
   CR
;
```

Specifications				
Inputs				
Quantity	6			
RTD type	Pt-100 or Ni-120 (Software selectable)			
Range	Pt-100 : -200C to +850ºC Ni-120 : -80ºC to +320ºC			
Performance				
RTD Type	**Operating Lower**	**Range Upper**	**Typical Error**	**Maximum Error**
Pt-100	200ºC	850ºC	0.5ºC	1.0ºC
Ni-120	-80ºC	320ºC	0.5ºC	1.0ºC
Accuracy	Typ/max reading error from above table			
Line resistance	1000 ohm/leg balanced maximum			
Line effect	0.5ºC per 100Ω balanced line resistance			
Drift	100ppm/ºC typ			
Linearization Technique	Software breakpoint with linear interpolation			
Number of inputs	6 (max)			
Resolution	0.1ºC /0.1ºF			

Specifications	
Display	ºC or ºF (software configurable)
Response Time	
Step Input	10% to 90%. Settles to within 3% in 200ms
Isolation	
Input to system logic	1500 VACrms
Input to input	500 VACrms
Insulation	
Input to system logic	>20MΩ at 500 V dc
Interference Rejection	
CMRR @50Hz	No effect up to 400 VACrms
MMRR @50Hz	50 dB
Power Supply	
Voltage	+5 V dc ± 5%
Current	300 mA (maximum)
Environmental	
Operating Temperature	0ºC to 60ºC
Storage Temperature	-40ºC to +85ºC
Operating Humidity	5% to 95% (non-condensing)
Identification Codes	
Scan Code	41
Module ID	49
Mass	
Including Packaging	505g
Excluding Packaging	419g
Ordering Information	
Order Code	M1433B