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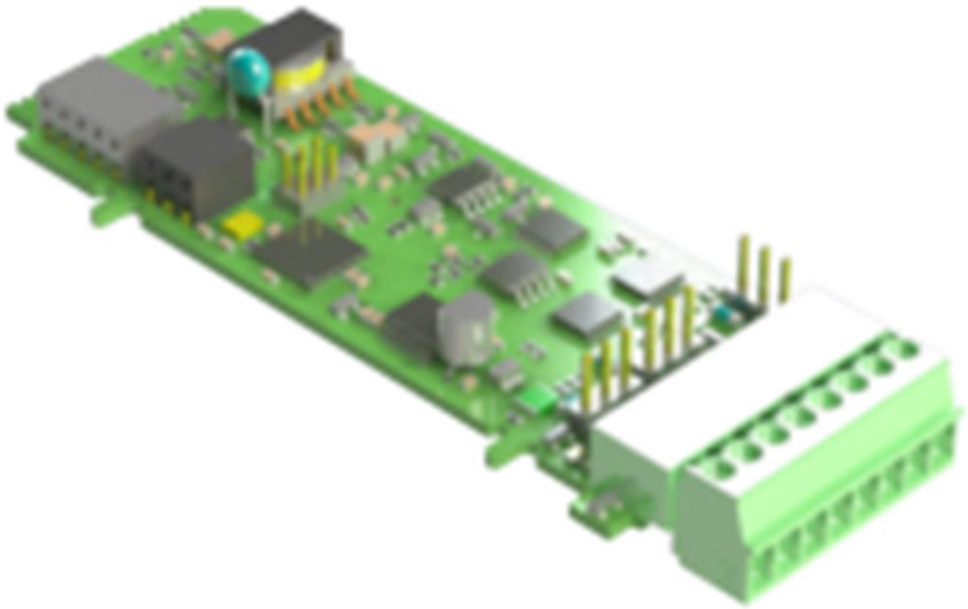

PM10UNI2A card

Manual

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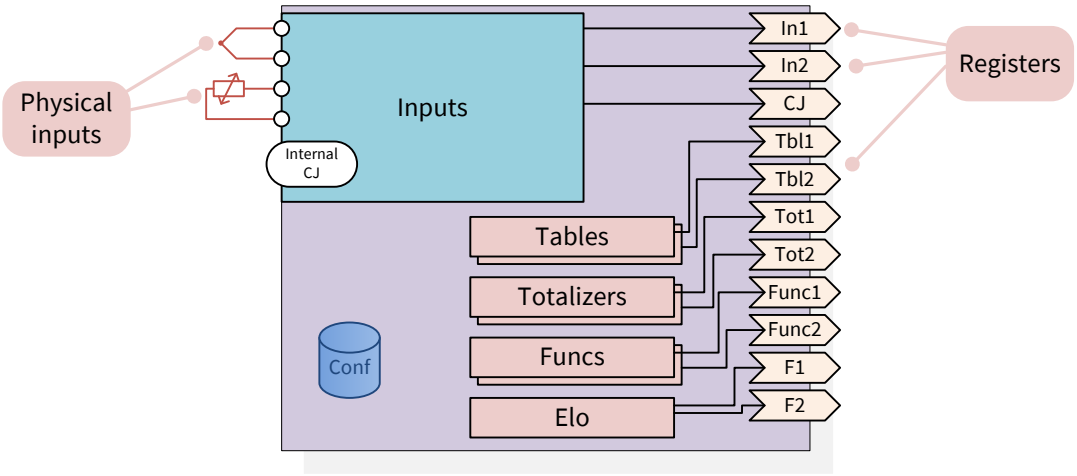
Introduction

PM10UNI2A is a dual-channel analog input card to the PM10 panel meter series and compatible series. It can measure common industrial temperature sensors and accepts current and voltage signals too.

This manual covers the PM10UNI2A card only. The rest of the device is explained in the device manual (e.g. PM10A Manual).

PM10UNI2A uses the FreeRTOS real-time operating system V8.0.1. The FreeRTOS source code is available from Nokeval support on request.

The card and the registers



The PM10UNI2A contains two analog inputs, an internal cold junction sensor, four table blocks, two totalizer blocks, six function blocks, and an Elo engine. Each of these is configurable and have an own submenu in the configuration menu of this card.

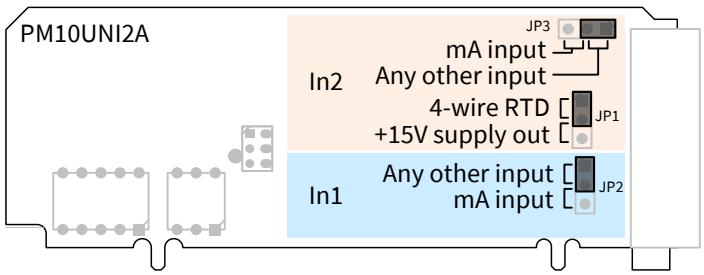
The blocks publish their output in registers. Each register is an output that can be used (read) by the other blocks on any card.

Register	Description	Block
In1, In2	The (scaled) readings of the analog inputs.	Inputs
CJ	The temperature of the internal cold junction compensation sensor.	
Tbl1…Tbl4	The outputs of the tables.	Tables
Tot1, Tot2	The outputs of the totalizers.	Totalizers
TotTime1, TotTime2	The running times of the totalizers.	
Func1…Func6	The outputs of the function blocks.	Funcs
F1…F12	The Elo variables/outputs.	Elo

The inputs block is covered by this manual. The other blocks, as being common to many PM10 cards, are instructed in the PM10A Manual.

Inputs

Setting the jumpers

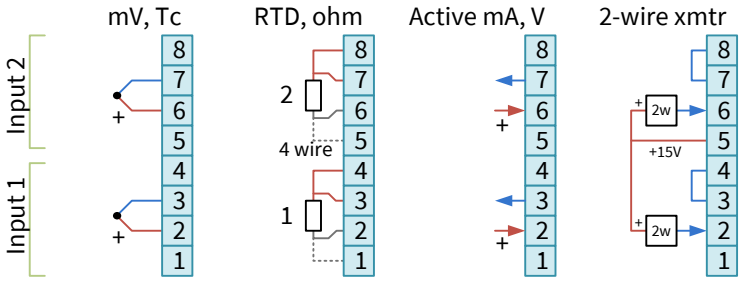


The jumpers JP2 (input 1) and JP3 (input 2) must be switched depending on if the input signal is mA or not. They engage/disengage a shunt resistor. The factory setting is not mA.

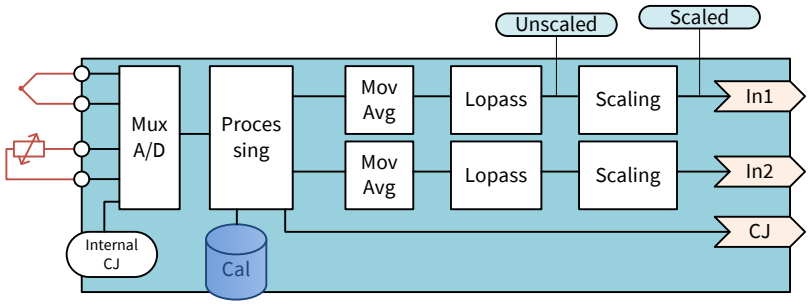
The jumper JP1 switches the terminal 5 purpose between 15 V supply out and channel 2 4-wire RTD (factory default). Selecting the 15 V supply may damage a 4-wire RTD sensor!

Connecting the signals

⚠ A hazardous voltage must never be connected to this card. The galvanic isolation is functional, not fulfilling the safety regulations.



Operation



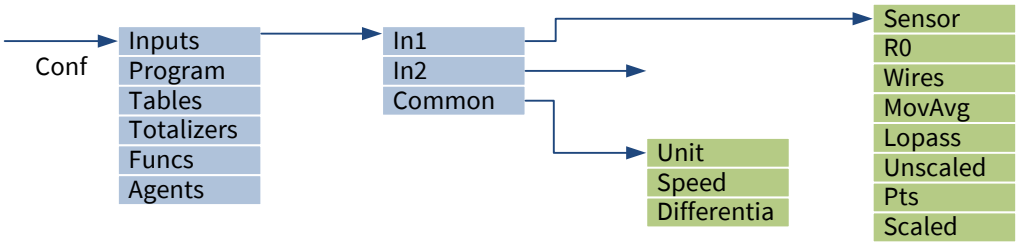
The two inputs and the internal cold junction sensor are measured cyclically, one at a time. Using the factory calibration data and calculations, a temperature/current/voltage value is obtained. This is optionally processed with a configurable moving average filter and a configurable first degree lowpass filter. The filtered value can be viewed in the configuration menu under name Unscaled.

The unscaled value may be scaled with two freely selectable “points” to obtain the final Scaled value (visible in the configuration menu) and the In1 or In2 register value, available to all the blocks in the device.

The internal cold junction temperature is published in the CJ register. It measures the connector block temperature and can be used for coarse ambient temperature monitoring or special sensor compensation.

Configuring the settings

Navigate to the configuration menu of the card and advance to Inputs. It has a submenu for each input channel plus a submenu for common settings.



Note that some settings are hidden when not applicable.

Configure:

Sensor	Select the input signal type: • Off: This channel is not used. Switch any unused input off. • NPN: A NPN type digital signal. PM10UNI2A pulls to 15V, the external device to ground. The threshold is 2.5 V. • PNP: A PNP type digital signal. The input is considered on when above 2.5 V. An external pull-down resistor must be provided. Max input 15 V! • 55mV, 100mV: Millivolt signal. Can measure at least ±55 mV and ±100 mV respectively. • 1V, 2.5V, 10V: Voltage signal. See the specifications for impedance and measurement range. • 1mA, 20mA, 50mA: Current signal. • 0-10V, 0-20mA, 4-20mA: Easily scalable standard signals (with Lo+Hi). The 4-20mA range obeys NAMUR NE 43 failure indication levels. • 400 ohm, 4000 ohm, 40000 ohm: Resistance measurement for non-standard temperature sensors and potentiometers. • Pt, Ni, Cu: Resistance thermometer devices (Pt α=0.00385). • KTY83: NXP PTC sensor. • NTCLE3977: Vishay NTCLE series NTC sensor with β=3977. • TcB…TcT: Thermocouples.
R0	Set the nominal resistance of a thermometer device – not visible on other sensor-settings. For Pt100 and Ni100, set 100. For Pt1000, set 1000. The nominal resistance is given at 0 °C for Pt and Ni, and at 25 °C for Cu, KTY83, and NTCLE3977. If the exact resistance of a Pt100 at 0 °C is known, it can be entered here.
Wires	Select the number of wires of an RTD. Options 3 and 4. For a 2-wire sensor, select 3 and loop the terminals 3 and 4, or 7 and 8.
Pullup	Switch on to detect sensor faults, mainly on thermocouples. A weak current is injected in the wires to detect a sensor or wire fault. Switch off if the sensor is

	affected by the current (the reading is fluctuating).
ExtCJ	Set to None to use the internal cold junction compensation on thermocouples. Or select a register that measures the external junction box temperature.
MovAvg	Set to 1 to disable the moving average filter. Or set a value of 2 to 20 to average the corresponding amount of latest samples.
Lopass	Set the time constant of the first-order lowpass filter. The higher value, the more the reading is attenuated. Set to 0 for no filtering.
Unscaled	This is the unscaled reading. If the sensor/input signal is already connected, check that this reading seems correct.
Lo, Hi	Visible on the easy scaling inputs 0-10V, 0-20mA, and 4-20mA only. Set the engineering values corresponding to the ends of the input range, e.g. at 0 and 10 V.
Pts	Not visible on the easy scaling inputs 0-10V, 0-20mA, and 4-20mA. Set to 0 to disable further scaling. Or set to 2 to use two point scaling or sensor trimming.
Mea1, Sca1	The first scaling point. When the unscaled value corresponds to Mea1, the scaled value will be Sca1. Can be used to scale nonstandard input signals (e.g. 2-10V) or to correct the sensor error. Teaching: The current unscaled input can be copied to Mea1 by clicking the L button in Mekuwin. Then enter the desired scaled reading in Sca1. Do the same for Mea2 -> Sca2 point.
Mea2, Sca2	The second scaling point.
Scaled	The final scaled reading, which is published in the In1 or In2 register.

It is not usually necessary to adjust the common settings, but they are available:

Unit	Temperature measurement unit Celsius, Fahrenheit, or Kelvin.
Speed	The measurement (multiplexing and analog to digital conversion) speed. The faster options increase the noise significantly and load the other blocks.
Differential	No: This card connects the negative line of the input signal to the internal ground while measuring. Select this option normally. Yes: The inputs are floating. Their potential must be controlled externally.

Maintenance

The card doesn’t need regular maintenance. The analog inputs may be recalibrated, when maximum accuracy is desired. For a new and recalibrated unit, a calibration certificate can be downloaded from the Nokeval web site.

Troubleshooting

Specifications

Environmental

Storage temperature	-40…+70 °C
Operating temperature	-30…+70 °C
Weight	23 g

Inputs

Range	Minimum range	Impedance or excitation current	Accuracy at 25 °C (±)	Resolution (typ)	Noise (typ)
55mV	-55…+55 mV	>1 MΩ	0.05%rdg+10 µV	2 µV	
100mV	-100…+100 mV	>1 MΩ	0.05%rdg+20 µV	3 µV	
1V	-1…+1 V	~800 kΩ	0.05%rdg+100 µV	32 µV	
2.5V	-1.5…+2.5 V	~800 kΩ	0.05%rdg+200 µV	80 µV	
10V and 0-10V	-11…+11 V	>1 MΩ	0.05%rdg+1 mV	350 µV	
1mA	-1…+1 mA	50…80 Ω	0.05%rdg+1 µA	40 nA	
20mA, 0-20mA	-21…+21 mA	50…80 Ω	0.05%rdg+1 µA	700 nA	
4-20mA	3.76…20.8 mA	50…80 Ω	0.05% of range =8µA	700 nA = 0.004% of range	
50mA	-50…+50 mA	50…80 Ω	0.05%rdg+5 µA	1.7 µA	
400 ohm	0…400 Ω	250 µA	0.04%rdg+70 mΩ	13 mΩ	
4000 ohm	0…4000 Ω	250 µA	0.05%rdg+700 mΩ	130 mΩ	
40000 ohm	0…40000 Ω	250 µA	0.05%rdg+7 Ω	1.3 Ω	
Pt100	-200…+700 °C	250 µA	0.1%rdg+0.2 °C	0.03 °C	
Ni100	-60…+180 °C	250 µA	0.1%rdg+0.2 °C	0.02 °C	
Cu10	-200…+260 °C	250 µA	1 °C	0.3 °C	
KTY83	-55…+175 °C	250 µA		0.02 °C	
NTCLE3977	-40…+150 °C	250 µA		0.003 °C @25	
TcB	400…1700 °C	>1 MΩ			
TcC	0…2300 °C	>1 MΩ			
TcD	0…2300 °C	>1 MΩ			
TcE	-100…900 °C	>1 MΩ			
TcG	1000…2300 °C	>1 MΩ			
TcJ	-160…950 °C	>1 MΩ			
TcK	-150…1370 °C	>1 MΩ	0.05%rdg+2.5 °C	0.04 °C	
TcL	-150…900 °C	>1 MΩ			
TcN	0…1300 °C	>1 MΩ			
TcR	0…1700 °C	>1 MΩ			
TcS	0…1700 °C	>1 MΩ			
TcT	-200…400 °C	>1 MΩ			

Warnings

Read this manual carefully before using the device.

The device must not be disposed with household waste. Observe local regulations concerning electronic waste recycling.

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