



ICU Installation guide/datasheet

Specification

Item	Specification
Measurement Channels	4,6,14 um
Reporting Formats	ISO4406 e.g. 18/15/10
Analysis Range	ISO 0-20
Accuracy	+/- 0,5 ISO code (across analysis range)
Flow Control	Built-in pressure compensated flow control valve 200ml/min
Working Pressure	25-350 bar
Hydraulic Connection	Manifold mounting
Electrical Supply	24VDC +/- 20%
Communication	1 switched input START + 4-20mA output
Local displays	-
Data storage	-
Water Sensor	-
USB	-
Working Temperature	0-60'C
Calibration Interval	No re-calibration



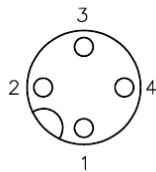
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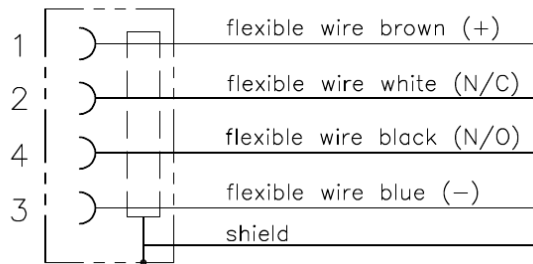
Electrical Connection

Connectors are 4pin M12, "A-Coded". The connector on the device has the male pins.

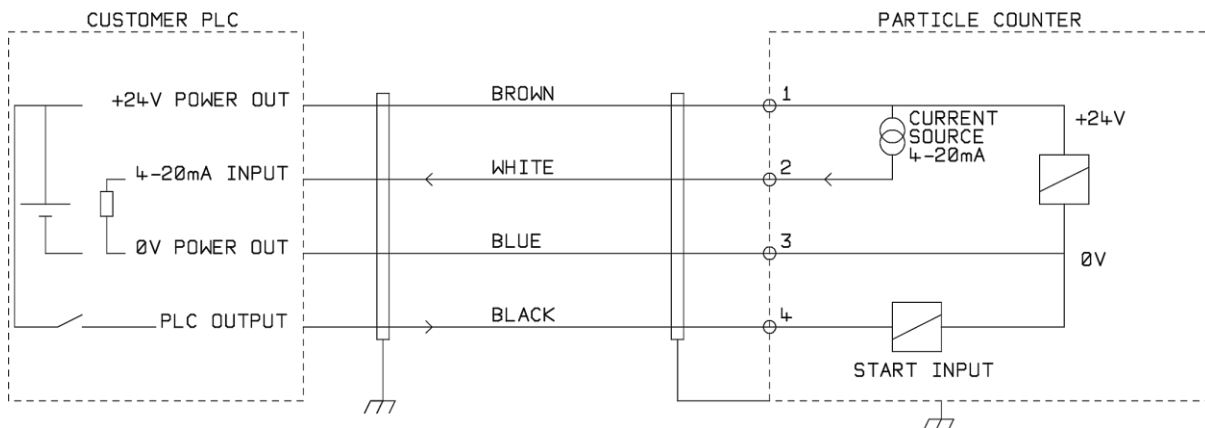
Contact Layout
Female



Schematic diagram



SIGNAL	PIN	Color	Comment
+24V	1	BROWN	DC POWER
4-20mA	2	WHITE	CURRENT SOURCE
0V	3	BLUE	DC POWER
START+	4	BLACK	Connect to +24 during test time



The cable + connector needs to be a shielded 4way, A-coded, female pin type. An example could be TE 2273099-1. Alternatively a re-wireable type can be used.



Customer PLC Program Example

The customer PLC communicates with the unit by energizing a switched START signal and reading the results result from a 4-20mA current signal

- The START signal duration controls the test period
- The 4-20mA signal is time-multiplexed. That is, the parameters are output in a timed sequence.

We report the 4, 6 and 14um ISO codes. We also include a function to report the status of the unit (OK, ERROR, TESTING etc) but decoding this is optional

An example test sequence is shown below, the **highlighted** sections may not be required for the application

Sequence

- If pump not running
 - Turn on pump
 - Then wait until flow is stable and piping flushed, perhaps 60 seconds
- If ICU not powered
 - Turn on ICU power
 - then wait >3 seconds
 - Option: read status signal
- turn on START signal
- wait 300 seconds for testing (example)
 - Option: check status
- turn off START signal
- wait 1 second
- read 4-20mA signal. $ISO4 = (mA \times 2) - 8$
- wait 2 seconds
- read 4-20mA signal. $ISO6 = (mA \times 2) - 8$
- wait 2 seconds
- read 4-20mA signal. $ISO14 = (mA \times 2) - 8$
- Option: check status
 - Wait 2 seconds
 - read status

Optional

The customer program can also read and decode the STATUS signal

The flow can be continuous

The power can be continuous

Detailed Sequence

Duration (seconds)	Device Action	START Signal	4-20mA	PLC Responsibility
	Power off	OFF	-	start pumps, flow etc.
	Power on	OFF	-	Apply power
<3	(ICM starts up, self tests)	OFF	-	
	Output status value	OFF	STATUS	Optional: Check status
>10s if required Perhaps 60 seconds		OFF	STATUS	If flow is not continuous, ensure machine operation is stable, and there has been time for old fluid to be flushed from the system
	Start testing	ON	TESTING	Turn on START signal Start test timer
Customer defined, perhaps 300 seconds	Count particles	ON	TESTING	Test timer running
<0.1s	Calculate result codes	OFF		Test timer finished Turn off START signal Start 1.0 second timer
2.0s	Output 4um result	OFF	ISO(4um)	Timer finished: Read 4um result Start 2.0 second timer
2.0s	Output 6um result	OFF	ISO(6)	Timer finished: Read 6um result

				Start 2.0 second timer
2.0s	Output 14um result	OFF	ISO(14)	Timer finished: Read 14um result Start 2.0s
	Output status	OFF	STATUS	
				Start another test or wait or power off etc



ISO Coding

$$\text{ISO CODE} = 2 \times (\text{mA} - 4) = (2 \times \text{mA}) - 8$$

$$(\text{reverse: mA} = 4.0 + \text{ISO}/2)$$

CODE	Nominal Current (mA) +/- 0.2mA
0	4.0
1	4.5
2	5.0
3	5.5
4	6.0
5	6.5
6	7.0
7	7.5
8	8.0
9	8.5
10	9.0
11	9.5
12	10.0
13	10.5
14	11.0
15	11.5
16	12.0
17	12.5
18	13.0
19	13.5
20	14.0
SATURATION	17.0
NO VALUE	18.0
RESERVED	19.0
RESERVED	20.0

Note: any value above 14.0 up to but not including the 17.0



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STATUS Values

- It is optional to read these
- These functions may be changed or removed before final project release

STATUS	Nominal Current (mA) +/- 0.2mA	When Output
OK – READY	4	After power-up or after test
TESTING	5	During test
FAULT: LED FAIL OR BLOCKED	6	After power up or during test or after test
NOT READY	20	During power-up and self- test
	11-19	Reserved for future use



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