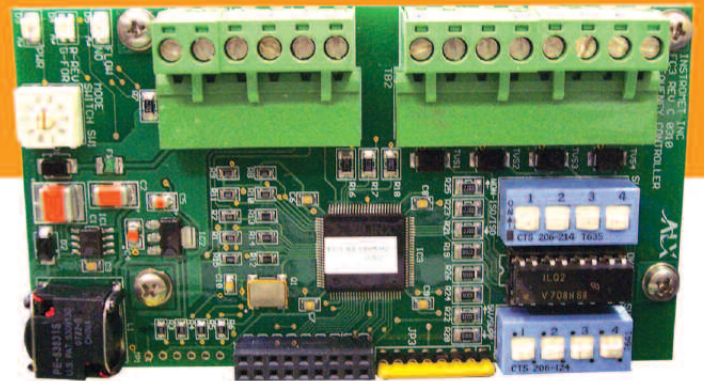
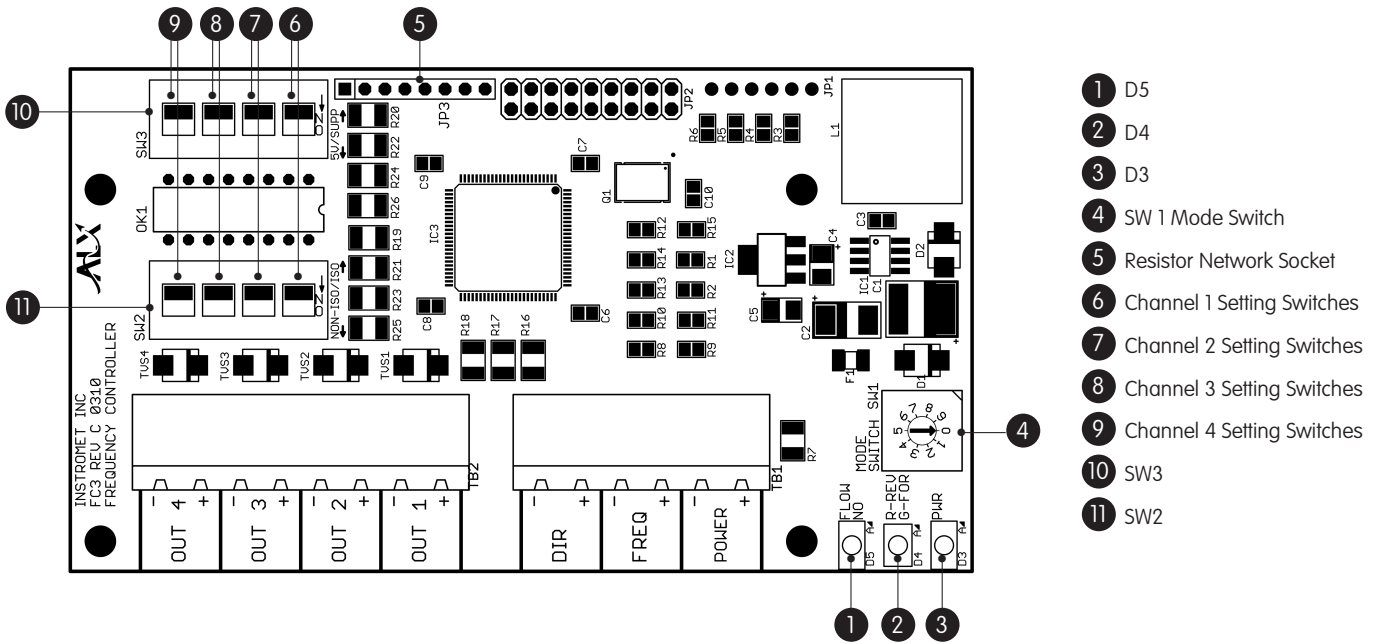


FC3 Frequency Controller, Rev.C

Technical Information



The FC3 Controller card receives flow direction and frequency inputs from the Elster Instromet Ultrasonic meter SPU and provides four outputs which can be configured based on the application and user requirements. When compared to earlier frequency splitter, the FC3 features more efficient power conversions, decreased input to output latency, on-board 5VDC square wave output capabilities, and an expansion header that will allow for additional outputs such as an isolated dual channel 4-20mA current option or additional optically isolated outputs. The switch banks allow for fully isolated outputs, non-isolated pull up outputs, and non-isolated 5VDC square wave outputs.



SW1 Settings

Switch Setting	Mode of Operation	Out 1 1(+) & 2(-)	Out 2 3(+) & 4(-)	Out 3 5(+) & 6(-)	Out 4 7(+) & 8(-)	Output Channel TB2 Terminal No.
0	Bi-directional mode	FF	RF	FD	RD	
1	Uni-directional mode	F	F	FD	RD	
2	Dual Bi-directional frequencies	FF	RF	FF	RF	
3	Quad frequency output	F	F	F	F	
4	Bi-directional, regular and divide by 10	FF	RF	FF/10	RF/10	
5	Bi-directional, regular and divide by 100	FF	RF	FF/100	RF/100	
6	Bi-directional, regular and divide by 1000	FF	RF	FF/1000	RF/1000	
7	Uni-directional, regular and divide by 10, 100, 1000	F	F/10	F/100	F/1000	
8	Test Mode 100 Hz	100 Hz	100 Hz	Open (off)	Open (off)	
9	Test Mode 5 kHz	5 Hz	5 Hz	Open (off)	Open (off)	

F: Frequency (Both Fwd and Rev), FF: Forward Frequency, RF: Reverse Frequency, FD: Forward Direction (discrete), RD: Reverse Direction (discrete)

Modes of Operation

The FC3 Controller has 10 modes of operation. Each mode, set on switch SW1, has a predefined configuration of the 4 outputs from the controller. The mode settings are summarized in the table above.

Mode 0: Bi-directional mode (with Flow Direction outputs)

- Output channel 1 is a proportional-to-flow frequency output of the forward flow.
- Output channel 2 is a proportional-to-flow frequency output of the reverse flow.

- Output 3 is conductive ('closed') when the flow in the meter is in the forward direction and non-conductive ('open') when the flow is in the reverse direction.
- Output 4 is conductive ('closed') when the flow in the meter is in the reverse direction and non-conductive ('open') when the flow is in the forward direction.

Mode 1: Uni-directional mode (with Flow Direction outputs)

- Output channel 1 is a proportional-to-flow frequency output (both directions).
- Output channel 2 is identical to Output #1.

- Output 3 is conductive ('closed') when the flow in the meter is in the forward direction and non-conductive ('open') when the flow is in the reverse direction.
- Output 4 is conductive ('closed') when the flow in the meter is in the reverse direction and non-conductive ('open') when the flow is in the forward direction.

Mode 2: Dual Bi-directional frequencies

- Output channel 1 is a proportional-to-flow frequency output of the forward flow.
- Output channel 2 is a proportional-to-flow frequency output of the reverse flow.
- Output 3 is the same signal as Output 1.
- Output 4 is the same signal as Output 2.

Mode 3: Quad frequency output

- All 4 output channels are proportional-to-flow frequency output (both directions).

Mode 4: Bi-directional, regular and divided by 10

- Output channel 1 is a proportional-to-flow frequency output of the forward flow.
- Output channel 2 is a proportional-to-flow frequency output of the reverse flow.
- Output 3 is a frequency output of the forward flow, divided by 10.
- Output 4 is a frequency output of the reverse flow, divided by 10.
- For example, if the frequency output in channel 1 is 1000 Hz, the frequency output in channel 3 would be 100 Hz.

Mode 5: Bi-directional, regular and divided by 100

- Output channel 1 is a proportional-to-flow frequency output of the forward flow.
- Output channel 2 is a proportional-to-flow frequency output of the reverse flow.
- Output 3 is a frequency output of the forward flow, divided by 100.
- Output 4 is a frequency output of the reverse flow, divided by 100.
- For example, if the frequency output in channel 1 is 1000 Hz, the frequency output in channel 3 would be 10 Hz.

Mode 6: Bi-directional, regular and divided by 1000

- Output channel 1 is a proportional-to-flow frequency output of the forward flow.
- Output channel 2 is a proportional-to-flow frequency output of the reverse flow.
- Output 3 is a frequency output of the forward flow, divided by 1000.
- Output 4 is a frequency output of the reverse flow, divided by 1000.
- For example, if the frequency output in channel 1 is 1000 Hz, the frequency output in channel 3 would be 1 Hz.

Mode 7: Unidirectional, regular and divided by 10, 100, and 1000

- Output channel 1 is the proportional-to-flow frequency output.
- Output channel 2 is the frequency output, divided by 10.
- Output channel 3 is the frequency output, divided by 100.
- Output channel 4 is the frequency output, divided by 1000.
- For example, if the output on channel 1 is 1000 Hz, the output on channel 2 would be 100 Hz, the frequency output on channel 3 would be 10 Hz, and the frequency output on channel 4 would be 1 Hz.

Mode 8: Test mode 100 Hz

- Output channels 1 & 2 have a constant 100 Hz output.
- Output channels 3 & 4 have no signal.

Mode 9: Test mode 5 kHz

- Output channels 1 & 2 have a constant 5000 Hz output.
- Output channels 3 & 4 have no signal.

Pull up Resistor

The FC-3 comes with an 8-pin 2.7 kΩ resistor network installed in the socket. Also included in the electronics enclosure box are a 1 kΩ resistor network, a 1.5 kΩ resistor network, and a 4.7 kΩ resistor network. The resistor network should be matched to the supplied power voltage and the flow computer's internal resistance. Recommended resistor values are shown below. If the resistor network needs to be changed, carefully pull the old one straight out of the board to avoid damaging the resistor or the sockets. The new resistor should then be carefully installed. Replacement resistors can be ordered from Elster Instromet, or any reputable electronics supply source. Manufacturer part numbers are listed below for convenience. Any comparable parts are acceptable.

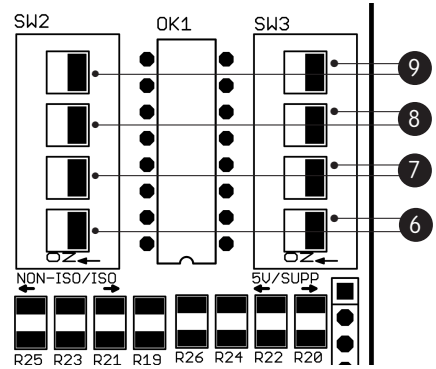
Resistor value	Resistor marking	Recommended for supply voltage	Bourns part number
1 kΩ	8X-2-102LF	12-15 VDC (12-15 mA)	4608X-102-102LF
1.5 kΩ	8X-2-152LF	12-15 VDC (8-10 mA)	4608X-102-152LF
2.7 kΩ	8X-2-272LF	24-27 VDC (10mA)	4608X-102-272LF
4.7 kΩ	8X-2-472LF	24-27 VDC (5 mA)	4608X-102-472LF

Output Settings

The four (4) output channels of the FC3 Controller can be configured independently for isolated, non-isolated pulled up to source or non-isolated 5VDC. When SW2 is in the OFF position, the output is fully isolated and the setting on SW3 is ignored. When SW2 is in the ON position, the output is a non-isolated pulse that is either:

- Pulled up to the incoming supply voltage (through pull up resistor in JP3) if SW3 is off, or
- 5VDC square wave if SW3 is on.

Note that each of the channels is independent from the others and has its own switch on SW2 and SW3 (see items 6-9 in board figure). The following table shows the type of output signal based on the SW2 and SW3 settings.

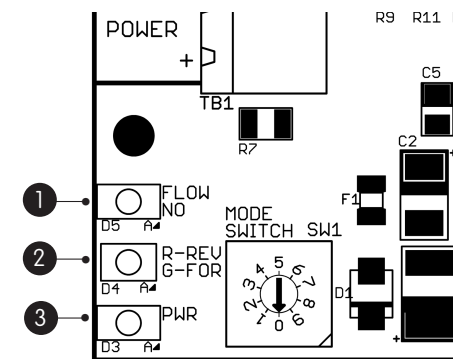


SW2 & SW3 Settings

SW2 Setting	SW3 Setting	Output
Off	(does not matter)	Isolated (Open Collector)
On	Off	Non-Isolated Pulse at Supply Voltage via RN1
On	On	5VDC Square Wave

Board LED Information

- D3 will be red when power is on to the board (item 3 on board picture).
- D4 will be green when the meter registers forward flow and red for reverse flow (item 2 on board picture).
- D5 will be amber when the meter is registering zero flow (item 1 on board picture).



About Elster Group

A world leader in advanced metering infrastructure, integrated metering, and utilization solutions to the gas, electricity and water industries, Elster's systems and solutions reflect over 170 years of knowledge and experience in measuring precious resources and energy.

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