

# Application FC03

## Single Channel Flow Computer

for Mass Frequency or Analog Flowmeters



### Features

- Tailored to suit mass flowmeters
- Programmable for either frequency or analog flow input
- Uses a live or fixed density value for mass to volume calculations
- Versatile “user value” available on main menu
- Selection of Detail or Basic main menu to suit operator and application
- Selection of second language and user tags
- RTC logging with over 1000 entries.
- Programmable pulse width and scaling of pulse output
- 4-20mA retransmission
- RS232 and RS485 or Ethernet (optional) serial ports
- Modbus RTU, Printer and other serial port protocols
- Front panel adjustment of 8-24V DC output voltage
- Backlit display



### Overview

The 515 FC03 application pack is a rate totaliser for the measurement of a product using the frequency or analog mass flow signal output from a wide range of flowmeters.

The flow computer can calculate and display the flow rate, resettable total and the accumulated total for volume and mass, using a live or fixed density for the conversion.

The frequency input is compatible with a wide range of frequency signals, including millivolt signals, reed switches, Namur proximity switches and pulse trains via its smart front-panel program selection. The analog input can be scaled and have filtering, square law, non-linear correction and cutoff points applied to the signal.

A freely programmable “user value” on the main menu can serve as a setpoint for the 4-20mA output or as an operator identifier to be logged.

### Calculations

For the frequency input the calculation of *mass total* is exact as the instrument collects all pulses detected on the input.

$$mass\ total = pulses / k\text{-factor}$$

The flow rates are derived from an accurately measured frequency:

$$mass\ flow = frequency / k\text{-factor}$$

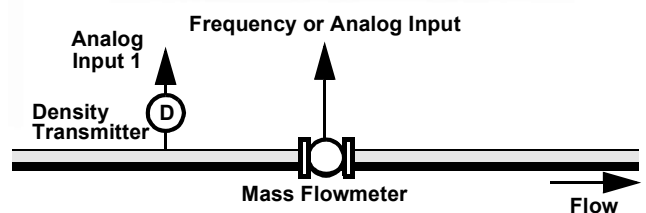
For the analog input, to derive the flow rate, the analog signal is normalised to a value (A) between 0 and 1.

$$mass\ flow = (V_f\ max - V_f\ min)A + V_f\ min$$

$$total = \int (flow \cdot \Delta t)$$

Density is used to calculate the volume flow and total:

$$volume = mass / density$$



## Displayed Information

The front panel display shows the current values of the input variables and the results of the calculations. A list of the variables for this application and their type (total or rate) is shown at the end of this document.

The instrument can be supplied with a real-time clock for data logging of over 1000 entries of the variables as displayed on the main menu.

## Communications

There are two communication ports available as follows:

- COM-1 RS232 port
- COM-2 RS485 or Ethernet Port (optional)

All types of ports can be used for remote data reading, while RS232 and RS485 serial ports can be used for printouts and for uploading and downloading of the application software to the instrument.

## Isolated Outputs

The opto-isolated outputs can re-transmit any main menu variable. The type of output is determined by the nature of the assigned variable. Totals are output as pulses and rates are output as 4-20mA signals. One output is standard, a second output is available as an option.

## Relay Outputs

The relay alarms can be assigned to any of the main menu variables of a rate type. The alarms can be fully configured including hysteresis. Two relays are standard with two additional relays available as an option.

## Software Configuration

The instrument can be programmed to suit the particular application needs and the flexible I/O can be assigned as required. Program settings can be changed either via the front panel (depending on assigned access levels) or via the 500 Series Program Manager (500-PM software).

The instrument stores all set-up parameters, totals and logged data in non-volatile memory with at least 30 years retention.

## Terminal Designations

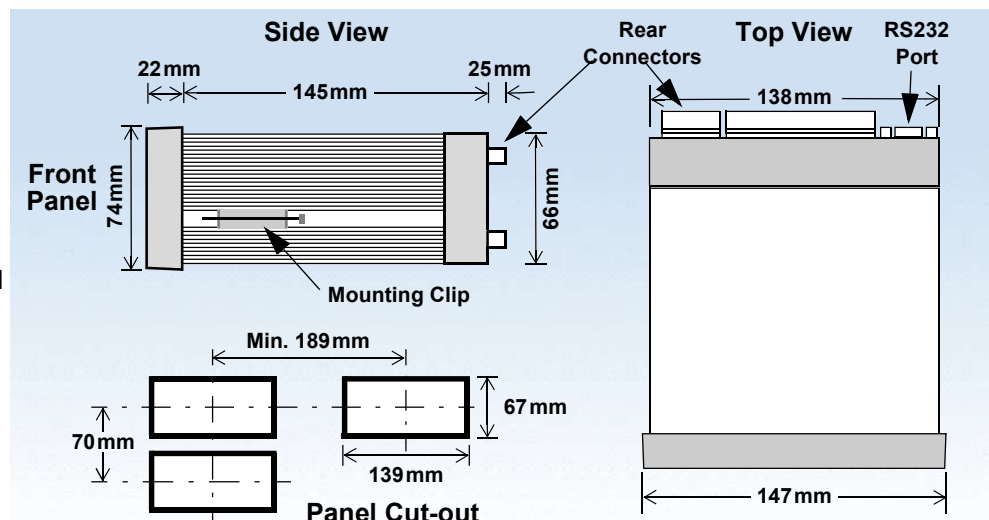
Terminal Label	Designation	Comment
1	FINP 1+	Frequency Input 1+
3	SG -	Signal ground
7	AINP1 +	Analog Input ch 1 (+)
8	-	Analog Input ch 1 (-)
11	AINP3 +	Analog Input ch 3 (+)
12	-	Analog Input ch 3 (-)
15	Vo +	8-24 volts DC output
16	G -	DC Ground
17	Vi +	DC power input
18	SH E	Shield terminal
19	RS485 +	RS485 (+)
20	COM-2 -	RS485 (-)
21	port G	RS485 ground
22	1+	Switch 1
23	2+	Switch 2
24	3+	Switch 3
25	4+	Switch 4
26	C-	Signal ground
27	OUT1 +	Output ch 1 (+)
28	-	Output ch 1 (-)
29	OUT2 +	Output ch 2 (+)
30	-	Output ch 2 (-)
31	RC	Relay Common 1-2
32	R1	Relay 1
33	R2	Relay 2
34	R3	Relay 3
35	R4	Relay 4
36	RC	Relay common 3-4
E	E	Mains ground
N	N	Mains neutral
A	A	Mains active
RS232 COM-1 port	9-pin serial port	

## Dimension Drawings

### Part Number

515.XXXXXX-FC03  
see **Product Codes** to select required features

Default Application software:  
515-FC03-000000



# Specifications

## Operating Environment

<b>Temperature</b>	+5°C to +40°C (standard - no coating) -20°C to +60°C (with conformal coating) -30°C to +60°C (ExD housing with heater)
<b>Humidity</b>	0 to 95% non condensing (conformal coating) 5% to 85% non condensing (no coating)
<b>Power Supply</b>	100-240 V AC (+/-10%) 50-60 Hz (+/-10%) or 12-28 V DC
<b>Consumption</b>	10W (max) Overvoltage category II
<b>Protection</b>	Sealed to IP65 (Nema 4X) when panel mounted
<b>Dimensions (panel option)</b>	147mm (5.8") width 74mm (2.9") height 170mm (6.6") depth (behind the panel)

## Display

<b>Type</b>	Backlit LCD with 7-digit numeric display and 11-character alphanumeric display
<b>Digits</b>	15.5mm (0.6") high
<b>Characters</b>	6mm (0.24") high
<b>LCD Backup</b>	Last data visible for 15min after power down
<b>Update Rate</b>	0.3 second

## Non-volatile Memory

<b>Retention</b>	> 30 years
<b>Data Stored</b>	Setup, Totals and Logs

## Approvals

<b>Interference</b>	CE compliance
<b>Enclosure</b>	IECEX, ATEX and CSA approved enclosures available for hazardous areas

## Real Time Clock (Optional)

<b>Battery Type</b>	3 volts Lithium button cell - For Issue 7 option card, type CR2450N manufactured by Renata only - For conformal coated 'C' version, type BR2032 manufactured by Panasonic only - For non-conformal coated versions, type BR2032 and CR2032 manufactured by Panasonic or Sony
<b>Battery Life</b>	5 years (typical)

## Frequency Input (General)

<b>Range</b>	0 to 10kHz for Pulse input type 0 to 5 kHz for Coil & NPS input types
<b>Overvoltage</b>	30V maximum
<b>Update Time</b>	0.3 sec
<b>Cutoff frequency</b>	Programmable
<b>Configuration</b>	Pulse, coil or NPS input
<b>Non-linearity</b>	Up to 10 correction points

## Pulse

<b>Signal Type</b>	CMOS, TTL, open collector, reed switch
<b>Threshold</b>	1.3 volts

## Coil

<b>Signal Type</b>	Turbine and sine wave
<b>Sensitivity</b>	15mV minimum amplitude (typical)

## NPS

<b>Signal Type</b>	NPS sensor to Namur standard
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## Analog Input (General)

<b>Overcurrent</b>	100mA absolute maximum rating (30mA for 4-20mA inputs)
<b>Update Time</b>	< 1.0 sec
<b>Configuration</b>	4-20mA, 0-5V and 1-5V input
<b>Non-linearity</b>	Up to 20 correction points (some inputs)

## 4-20mA Input

<b>Impedance</b>	100 Ohms (to common signal ground)
<b>Accuracy</b>	0.05% full scale (20°C) 0.1% (full temperature range, typical)

## 0-5 or 1-5 Volts Input

<b>Impedance</b>	10MΩ (to common signal ground)
<b>Accuracy</b>	0.05% full scale (20°C) 0.1% (full temperature range, typical)

## Logic Inputs

<b>Signal Type</b>	CMOS, TTL, open collector, reed switch
<b>Overvoltage</b>	30V maximum

## Relay Output

<b>No. of Outputs</b>	2 relays plus 2 optional relays
<b>Voltage</b>	250 volts AC, 30 volts DC maximum (solid state relays use AC only)
<b>Current</b>	3A maximum - mechanical relays 1.5A maximum - solid state relays

## Communication Ports

<b>Ports</b>	COM-1 RS-232 port COM-2 RS-485 or Ethernet port (optional)
<b>Baud Rate</b>	2400 to 19200 baud
<b>Parity</b>	Odd, even or none
<b>Stop Bits</b>	1 or 2
<b>Data Bits</b>	8
<b>Protocols</b>	ASCII, Modbus RTU, Modbus TCP/IP (Ethernet Port), Printer*

## Transducer Supply

<b>Voltage</b>	8 to 24 volts DC, programmable
<b>Current</b>	70mA @ 24V, 120mA @ 12V maximum
<b>Protection</b>	Power limited output

## Isolated Output

<b>No. of Outputs</b>	2 configurable outputs
<b>Configuration</b>	Pulse/Digital or 4-20mA output

## Pulse/Digital Output

<b>Signal Type</b>	Open collector
<b>Switching</b>	200mA, 30 volts DC maximum
<b>Saturation</b>	0.8 volts maximum
<b>Pulse Width</b>	Programmable: 10, 20, 50, 100, 200 or 500ms

## 4-20mA Output

<b>Supply</b>	9 to 30 volts DC external
<b>Resolution</b>	0.05% full scale
<b>Accuracy</b>	0.05% full scale (20°C) 0.1% (full temperature range, typical)

*Important: Specifications are subject to change without notice.*

# Ordering Information

## Product Codes

Model	Supplementary Code	Description
515	- FC03	
Enclosure	1	Panel mount enclosure
	2	Field mount enclosure (NEMA 4X / IP66)
	3/5	Explosion proof Ex d (IECEx/ATEX), metric glands (5 specifies heater)
	4/6	Explosion proof Ex d (CSA), NPT glands (6 specifies heater)
Output Options	0	4 logic inputs, 1 isolated output, 2 relays (only relay type 1 is available), RS232 (DB9) communication port
	1	4 logic inputs, 2 isolated outputs, 4 relays, real-time clock data logging, RS232 (DB9) and RS485 communication ports
	2	4 logic inputs, 2 isolated outputs, 4 relays, real-time clock data logging, RS232 (DB9) & Ethernet communication ports
Relay Type	1	Electromechanical relays only
	2	2 electromechanical and 2 solid state relays
	3	Solid state relays only
Power Supply	U	Inputs for 12-28VDC and 100-240 VAC, 50-60Hz (Previous Models: A = 110/120 VAC, E = 220/240 VAC)
	D	Input for 12-28VDC power only
Display Panel Option	S	Standard option (now with backlight & LCD backup) (original Full option: F, with Infra-Red comms, no longer available)
PCB Protection	C	<b>Conformal coating</b> - required for maximum environmental operating range. Recommended to avoid damage from moisture and corrosion.
	N	<b>None</b> - suitable for IEC standard 654-1 Climatic Conditions up to Class B2 (Heated and/or cooled enclosed locations)
Application Pack Number	FC03	Defines the application software to be loaded into the instrument

Example full product part number is 515.111USC-FC03 (this is the number used for placing orders).

## Main Menu Variables

Main Menu Variables	Default Units	Preferred Units	Variable Type
Volume	L		Total
Volume Flowrate	L/min		Rate
Mass	kg		Total
Mass Flowrate	kg/min		Rate
Density	kg/m <sup>3</sup>		Rate
User Value	- - -		Rate



Example of 500 Series in BZC Ex d enclosure

[www.contrec.co.uk](http://www.contrec.co.uk)



**Contrec Limited**  
Riverside, Canal Road  
Sowerby Bridge, West Yorkshire  
HX6 2AY United Kingdom  
Tel: +44 1422 829944  
Email: sales@contrec.co.uk

**Contrec - USA, LLC**  
916 Belcher Drive  
Pelham, Alabama  
AL 35124 United States  
Tel: +1 (205) 685 3000  
Email: contrec@contrec-usa.com

**Contrec Systems Pty Ltd**  
5 Norfolk Avenue  
Ringwood, Victoria 3134  
Melbourne Australia  
Tel: +61 413 505 114  
Email: info@contrec.com.au