Model 515

Application FC01

Single Channel Flow Computer

for Volumetric Frequency or Analog Flowmeters

Features

- **Tailored to suit volumetric flowmeters**
- **Programmable for either frequency or analog flow input**
- **Uses a live or fixed density value for volume to mass 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**

Overview

The 515 FC01 application pack is a rate totaliser for the measurement of a fluid using the frequency or analog volumetric 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 *volume* total is exact as the instrument collects all pulses detected on the input.

volume total = pulses / k-factor

The flow rates are derived from an accurately measured frequency:
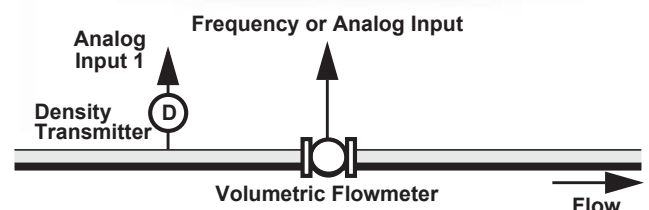
volume flow = frequency / k-factor

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

volume flow = $(V_f max - V_f min)A + V_f min$

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

Density is used to calculate the mass flow and total:

mass = volume x density

Frequency or Analog Input

Analog Input 1

Density Transmitter D

Volumetric Flowmeter

Flow

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 RS-232 port
- COM-2 RS-485 port (optional) or Ethernet (optional)

All types of ports can be used for remote data reading, while RS-232 and RS-485 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.
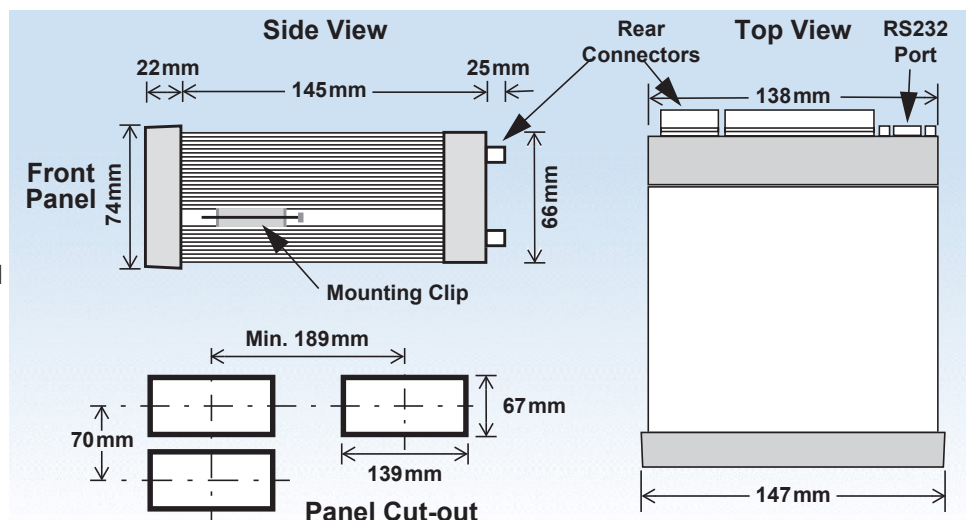
Dimension Drawings

Part Number

515.XXXXXX-FC01
see **Product Codes** to select required features

Default Application software:
515-FC01-000000

Terminal Designations

	Terminal Label		Designation	Comment
1	FINP	1+	Frequency Input 1+	Volumetric Flow
3	SG	-	Signal ground	
7	AINP1	+	Analog Input ch 1 (+)	Density Input
8		-	Analog Input ch 1 (-)	
11	AINP3	+	Analog Input ch 3 (+)	Volumetric Flow
12		-	Analog Input ch 3 (-)	
15	Vo	+	8-24 volts DC output	Overload protected
16	G	-	DC Ground	
17	Vi	+	DC power input	DC power in 12-28V
18	SH	E	Shield terminal	
19	RS485	+	RS485 (+)	Optional RS485 port may be replaced by Ethernet port.
20	COM-2	-	RS485 (-)	
21	port	G	RS485 ground	
22	LOGIC INPUTS	1+	Switch 1	Remote Key
23		2+	Switch 2	
24		3+	Switch 3	
25		4+	Switch 4	CAL Switch – In field access protection
26		C-	Signal ground	
27	OUT1	+	Output ch 1 (+)	
28		-	Output ch 1 (-)	
29	OUT2	+	Output ch 2 (+)	
30		-	Output ch 2 (-)	
31	RELAYS	RC	Relay Common 1-2	*Term 31 - Common 1-4 on legacy option card*
32		R1	Relay 1	
33		R2	Relay 2	
34		R3	Relay 3	
35		R4	Relay 4	
36		RC	Relay common 3-4	*Term 36 only available on new style option card*
E	AC MAINS	E	Mains ground	AC power in 100-240VAC
N		N	Mains neutral	
A		A	Mains active	
RS232 COM-1 port			9-pin serial port	

Side View

22mm · 145mm · 25mm

Front Panel · 74mm · 66mm

Mounting Clip

Min. 189mm

70mm · 139mm · 67mm

Panel Cut-out

Rear Connectors · Top View · RS232 Port

138mm

147mm

Specifications

Operating Environment

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

Display

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

Non-volatile Memory

Retention	> 30 years
Data Stored	Setup, Totals and Logs

Approvals

Electrical & **Interference**	UKCA, CE, CSA compliance
Enclosure	Ex d Enclosure - ATEX & IECEx available for hazardous area (CSA Pending). Field Mount Enclosure - UKCA, CE, CSA safe area weather proof enclosure. Other - RoHS compliant

Real Time Clock (Optional)

Battery Type	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
Battery Life	5 years (typical)

Frequency Input (General)

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

Pulse

Signal Type	CMOS, TTL, open collector, reed switch
Threshold	Signals switch below 1.3 & above 2 volts

Coil

Signal Type	Turbine and sine wave
Sensitivity	15mV minimum amplitude (typical)

NPS

Signal Type	NPS sensor to Namur standard

Analog Input (General)

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

4-20mA Input

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

0-5 or 1-5 Volts Input

Impedance	10MOhms (to common signal ground)
Accuracy	0.05% full scale (20°C) 0.1% (full temperature range, typical)

Logic Inputs

Signal Type	CMOS, TTL, open collector, reed switch
Overvoltage	30V maximum

Relay Output

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

Communication Ports

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

Transducer Supply

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

Isolated Output

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

Pulse/Digital Output

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

4-20mA Output

Supply	9 to 30 volts DC external
Resolution	0.05% full scale
Accuracy	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	**.**						**- FC01**	
Enclosure	1							Panel mount enclosure
	2/7							Field mount enclosure (NEMA 4X / IP66) (7 specifies heater included)
	3/5							Explosion proof Ex d (IECEx/ATEX), metric glands (5 specifies heater included)
	4/6							Explosion proof Ex d (CSA), NPT glands (6 specifies heater included)
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 relays (1-2) and 2 solid state relays (3-4)
			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		**Conformal coating** - required for maximum environmental operating range. Recommended to avoid damage from moisture and corrosion.
						N		**None** - suitable for IEC standard 654-1 Climatic Conditions up to Class B2 (Heated and/or cooled enclosed locations)
Application Pack Number							FC01	Defines the application software to be loaded into the instrument

Example full product part number is 515.111USC-FC01 (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^3		Rate
User Value	- - -		Rate

Example of 500 Series in BZC Ex d enclosure

MADE IN BRITAIN