

# Application BF03

## Dual Stage Batch/Flow Controller

for Mass Frequency Flowmeters



### Features

- Tailored for mass frequency flow inputs
- Single or Dual stage control
- Preset or manual On-Off modes
- Easy access to batch and flow rate presets
- No-flow, leakage and overflow error detection
- Remote RUN/STOP/RESET functions
- Allows for permissive with prompt
- Uses PI Loop Control
- Allows for non-linear correction of flow input
- Storage of 1000 transactions with time and date stamp
- Selection of Detail or Basic main menu to suit operator and application
- Available protocols on communication ports including Printers, Modbus RTU & TCP/IP

### Overview

The 515 BF03 application is a batching flow controller for delivery of preset quantities at preset flowrates using a mass frequency input. Batch control can operate in preset or on-off modes, while flow control can be set to local (manual) or PI loop mode.

This application provides the operator with clear local readout including flowrate deviation and can be controlled via communications in more automated systems. There is quick access to commonly used preset values directly from the front panel if access has been authorized.

The PI control of the process flow is via a 4-20mA proportional valve or pump controller. It has integral wind-up protection, a deadband, output hold and ramp time that can be programmed to reduce wear on valves and actuators and provide for bumpless operation.

### Calculations

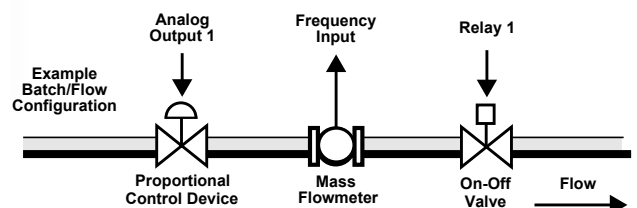
The total and flowrate are derived from accurately measured frequency and the number of received pulses.

$$mass = pulses / k-factor$$

$$mass\ flow = frequency / k-factor$$

Automatic overrun compensation calculates the new valve closure point to ensure correct delivery by averaging the overrun amount from the last three complete batches.

The overrun compensation value is valid for a new preset value provided the stored overrun is less than 20% of the new preset.



## 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 storage of up to 1000 transactions with time and date stamps.

## Communications

There are two communication ports available as follows:

- COM-1 RS-232 port
- COM-2 RS-485 port (optional) or Ethernet (optional)

The ports are available for remote data reading, printouts and for initial application loading of the instrument.

## Isolated Outputs

The opto-isolated outputs can be configured to retransmit any main menu variable or provide various error/control signals (flow error, pump control, end-of-batch, etc.). One output is standard, a second output is available as an option.

## Relay Outputs

The relay outputs 1 and 2 are used to control the flow of product for each delivery. These contacts are normally open and can be used to drive external relays, valves, pump circuits etc. The advanced option provides another two relays that can be used as fully programmable alarms for any rate type variable.

## 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

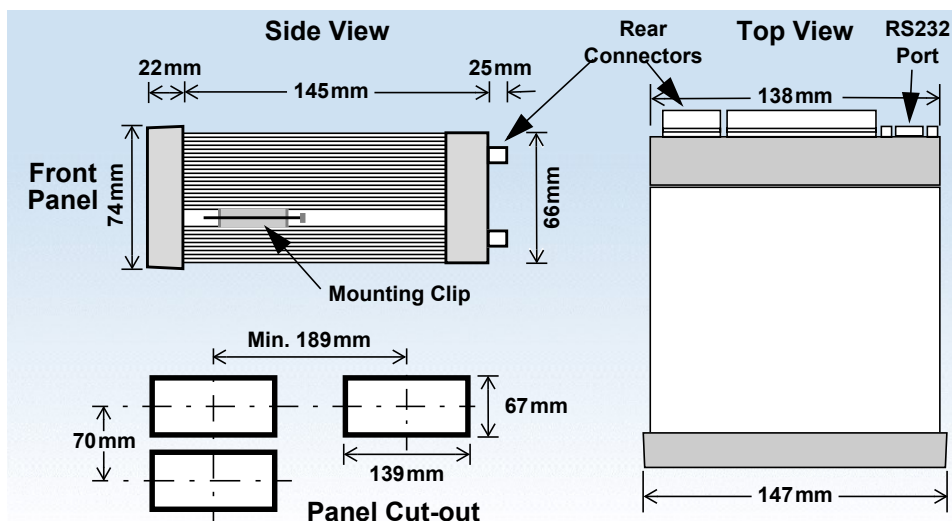
### Part Number

515.XXXXXX-BF03  
see **Product Codes** to select required features

Default Application software:  
515-BF03-000000

## Terminal Designations

Terminal Label	Designation	Comment
1 FINP	1+ Frequency Input 1+	Mass Flow Input
3 SG	- Signal ground	
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	1+ Switch 1	Remote Run
23	2+ Switch 2	Remote Stop/Reset
24 LOGIC INPUTS	3+ Switch 3	Permissive Input
25	4+ Switch 4	CAL Switch – In field access protection
26	C- Signal ground	
27 OUT1	+ Output ch 1 (+)	Process control output
28	- Output ch 1 (-)	
29 OUT2	+ Output ch 2 (+)	
30	- Output ch 2 (-)	
31	RC Relay Common 1-2	<i>Term 31 - Common 1-4 on legacy option card</i>
32	R1 Relay 1	Single Stage Control
33	R2 Relay 2	Dual Stage Control
34	R3 Relay 3	
35	R4 Relay 4	
36	RC Relay common 3-4	<i>Term 36 only available on new style option card</i>
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	



# 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>Electrical &amp; Interference</b>	UKCA, CE, CSA compliance
<b>Enclosure</b>	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)

<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>	Signals switch below 1.3 & above 2 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
--------------------	------------------------------

## 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	- BF03	
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	<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	BF03	Defines the application software to be loaded into the instrument

Example full product part number is 515.111USC-BF03 (this is the number used for placing orders).

## Main Menu Variables

Main Menu Variables	Default Units	Preferred Units	Variable Type
Mass	kg		Total
Process Flowrate	kg/min		Rate
Process Control Output	%		Rate
Process Flowrate Deviation	%		Rate
Preset Quantity *	---		---

\* These variables are logged and can be printed but are not shown in main menu.



500 Series in BZC Ex d enclosure

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



**Contrec Ltd**  
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