Model 515

Application BA01

Batch & Additive Controller

for Volumetric Frequency Flowmeters

Features

- **Accurately controls the additive into a batch or loading process**
- **Volumetric frequency flow on product and additive lines**
- **Product line has 2 stage valve control, Additive line has pump and valve control**
- **Batch mode can be PACING, UNLOAD, PRESET, or ON-OFF**
- **Dosing can be fixed quantity or ratio controlled**
- **Additive Target Ratio is entered in PPM in the range of 0 – 99999 (0 to 10%)**
- **Special flush and trim algorithms included**
- **Permissive inputs available for product and additive lines**
- **Test input available for calibration and commissioning**
- **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-BA01 application is a batch/additive controller designed to be a standalone unit capable of controlling a batch and the injection of an additive into a main product line during a delivery. Both the main and additive inputs are for volumetric frequency flowmeters.

Batch control can operate in preset or on-off modes. In PRESET mode the 515-BA01 is responsible with providing the dual stage batch control of a main line product as well as controlling the dosing of an additive product into the main product. In UNLOAD/PACING mode the unit operates in conjunction with an external load or batch controller by monitoring a main line flow signal and is responsible for the accurate dosing of the additive.

An intelligent additive dosing algorithm and trimming has been designed in the 515-BA01 which simplifies the programming required and ensures the additive dosing remains within specification. Dosing is primarily based on the target dosing PPM and the nominal additive flowrate with the choice of time or quantity based intervals.
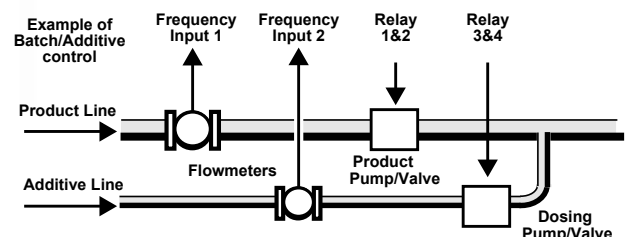
Calculations

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

volume = pulses / k-factor

volume 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.

Example of Batch/Additive control

A c c u r a c y • Q u a l i t y • P e r f o r m a n c e

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.
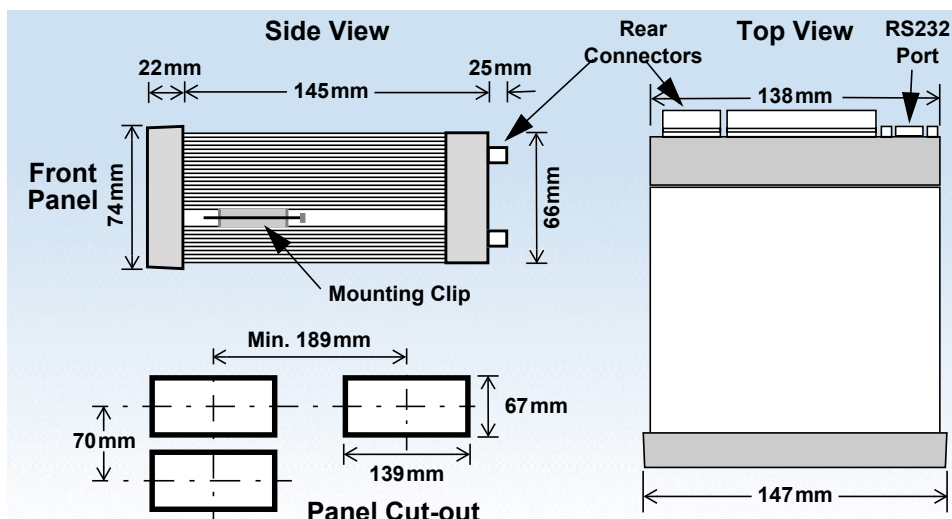
Dimension Drawings

Part Number

515.XXXXXX-BA01
see **Product Codes** to select required features

Default Application software:
515-BA01-000000

Terminal Designations

Terminal Label			Designation	Comment
1	FINP	1+	Frequency Input 1+	Product Volumetric Flow Input
2	FINP	2+	Frequency Input 2+	Additive Volumetric 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	Additive Test Input
23		2+	Switch 2	Additive Permissive Input
24	LOGIC INPUTS	3+	Switch 3	Product Permissive Input
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		RC	Relay Common 1-2	*Term 31 - Common 1-4 on legacy option card*
32		R1	Relay 1	Product - Single Stage Control
33	RELAYS	R2	Relay 2	Product - Dual Stage Control
34		R3	Relay 3	Additive - Pump Control
35		R4	Relay 4	Additive - Valve Control
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, 74mm, 66mm

Front Panel

Mounting Clip

Rear Connectors

Top View — 138mm

RS232 Port

Panel Cut-out — Min. 189mm, 70mm, 67mm, 139mm

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

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	**.**					**- BA01**	
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						BA01	Defines the application software to be loaded into the instrument

Example full product part number is 515.111USC-BA01 (this is the number used for placing orders).

Main Menu Variables

Main Menu Variables	Default Units	Preferred Units	Variable Type
Product Volume	L		Total
Product Flowrate	L/min		Rate
Additive Volume	L		Total
Additive Flowrate	L/min		Rate
Net Volume	L		Total
Net Flowrate	L/min		Rate
Additive Delivery Ratio	PPM		Rate
Additive Ratio Deviation	%		Rate
Additive Sample Ratio	PPM		Rate
Additive Dosing Count	Count		Total
Additive Target Ratio	PPM		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

MADE IN BRITAIN