

# Application BC01

## Dual Stage Batch Controller

for Volumetric Frequency or Analog Flowmeters



### Features

- Caters for volumetric flow inputs from frequency or analog flowmeters
- Single or Dual stage control
- Quick access to common batch quantities
- No-flow, leakage and overflow error detection
- Remote RUN/STOP/RESET & BATCH SET functions
- Allows for square law and non-linear correction
- Storage of 1000 transactions with time and date stamp
- Selection of Detail or Basic main menu to suit operator and application
- Selection of second language and user tags
- Selectable protocols on serial ports including Modbus RTU and Printer output
- Backlit display with LCD backup



### Overview

The 515 BC01 application is a dual stage batch controller for reliable measurement of preset quantities using a volumetric frequency or analog input. Used as a single or dual stage controller it is suitable for fast batch applications.

It provides the operator with clear local readout 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. Overrun compensation caters for system delays such as valve closure for precise quantities.

The instrument is compatible with a wide range of flowmeter outputs, including millivolt signals, reed switches, pulse, Namur proximity switches and analog signals. Inputs can be scaled, filtered and have non-linear correction applied. Square law and cutoff points can also be applied to the analog input.

### Calculations

If using the frequency input, the total and flowrate are derived from accurately measured frequency and the number of received pulses.

$$volume = pulses / k-factor$$

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

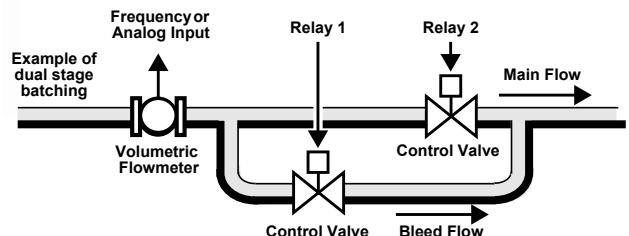
If using the analog input, to derive the flow rate the input is normalised to a value (A) between 0 and 1.

$$volumeflow = (V_fmax - V_fmin)A + V_fmin$$

$$volume = \int (volumeflow \cdot \Delta t)$$

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)

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

## Isolated Outputs

The opto-isolated outputs can retransmit 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 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.

## Terminal Designations

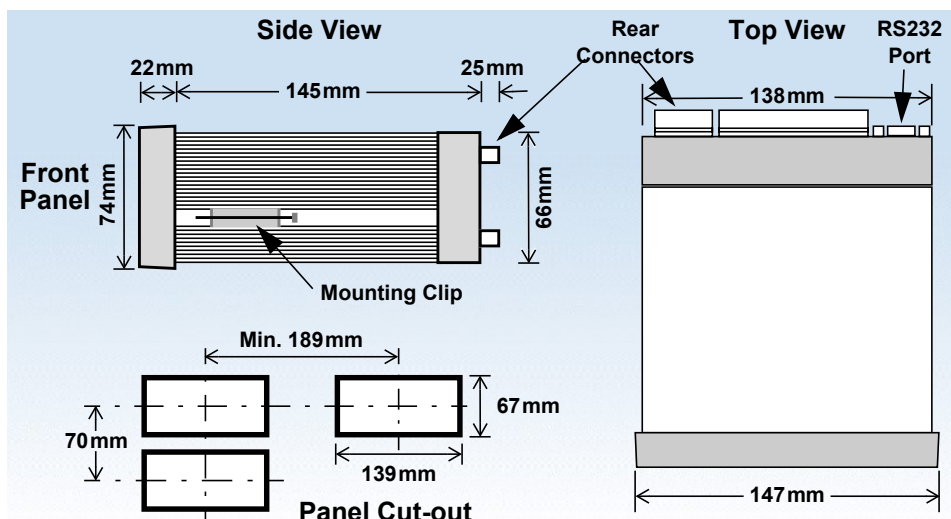
Terminal Label	Designation	Comment
1 FINP	1+ Frequency Input 1+	Volumetric Flow Input
3 SG	- Signal ground	
11 AINP3	+ Analog Input ch 3 (+)	Volumetric Flow Input
12	- Analog Input ch 3 (-)	
15 Vo	+ 8-24 volts DC output	Overload protected
16 G	- DC Ground	
17 Vi	+ DC power input	DC power in 12-28V
18 SH	E Shield terminal	
19 RS485	+ RS485 (+)	Optional RS485 port
20 COM-2 port	- RS485 (-)	
21	G RS485 ground	
22	1+ Switch 1	Remote Run Remote Stop/Reset Remote Set CAL Switch – In field access protection
23	2+ Switch 2	
24 LOGIC INPUTS	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 (+)	Optional output
30	- Output ch 2 (-)	
31	RC Relay common	Single Stage Control Dual Stage Control
32 RELAYS	R1 Relay 1	
33	R2 Relay 2	
34	R3 Relay 3	
35	R4 Relay 4	Optional relays
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	

## Dimension Drawings

### Part Number

515.XXXXXX-BC01  
see **Product Codes** to select required features

Default Application software:  
515-BC01-000000



# Specifications

## Operating Environment

<b>Temperature</b>	-20°C to +60°C (conformal coating) +5°C to +40°C (standard - no coating)
<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>	6W (typical)
<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 (BR2032 for extended temperature range) (CR2032 for standard temperature range)
<b>Battery Life</b>	5 years (typical)

## Frequency Input (General)

<b>Range</b>	0 to 10kHz
<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 p-p minimum

## 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)

## 4-20 mA 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>	10M Ohms (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>	Maximum 3A EMR, 1A SSR

## Communication Ports

<b>Ports</b>	COM-1 RS-232 port COM-2 RS-485 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, 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>	1 configurable output (plus 1 optional)
<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

## 4-20 mA 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.  
Printer protocol is available only if RTC option is installed.*

# Ordering Information

## Product Codes

Model	Supplementary Code						Description
515	- BC01						
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	BC01						Defines the application software to be loaded into the instrument

Example full product part number is 515.111USC-BC01 (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

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