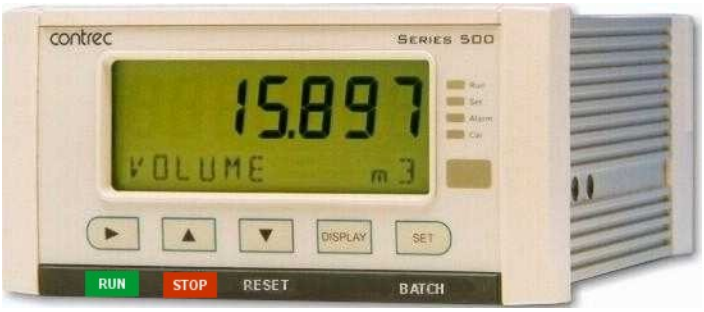
Application BR01

Batch/Ratio Process Controller

for Volumetric Frequency Flowmeters



Features

- Tailored for volumetric frequency flow input
- 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
- Allows for permissive with prompt
- Uses PI Loop Control
- Allows for non-linear correction
- Storage of 1000 transactions with time and date stamp
- Selection of second language and user tags
- Selectable protocols on serial ports including Modbus RTU and Printer output
- Backlit display with LCD backup

CE

Overview

The 515 BR01 application is a batching ratio controller for delivery of preset quantities at preset ratios using volumetric frequency inputs. Batch control can operate in preset or on-off modes, while flow control can be set to various loop control modes.

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

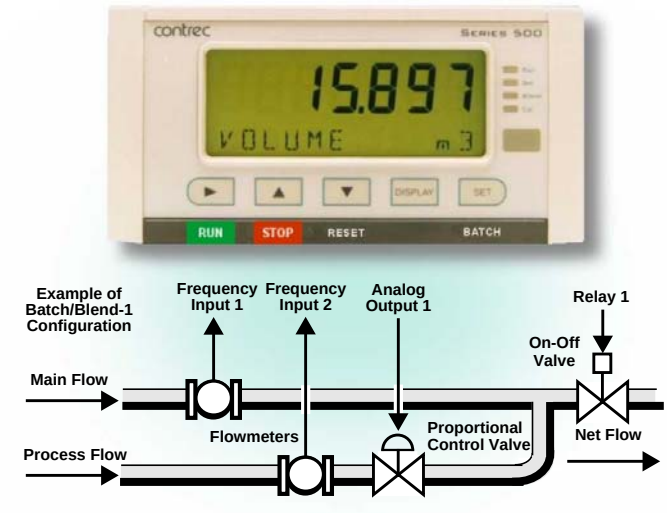
There are three types of control modes in which the process flow is dependent on the main flow. These are RATIO, BLEND-1 and BLEND-2 modes where the relationship between the flows are as follows:

Ratio Control Mode.
The process flow is a ratio of the main flow (0 to 400% range).

$$Ratio\% = \frac{P_{flow}}{M_{flow}} \times 100$$

Blend Control Modes.
These modes cater for blending points before and after the main flowmeter. The process flow is a ratio of the net (combined) flow (0 to 80% range).

$$Ratio\% = \frac{P_{flow}}{Net_{flow}} \times 100$$



Accuracy • Quality • Performance

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:

- RS-232 port
- 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 4-20 mA 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 further tailored to suit specific application needs including units of measurement, custom tags, second language or access levels. A distributor can configure these requirements before delivery.

Instrument parameters including units of measurement can be programmed in the field, according to the user access levels assigned to parameters by the distributor.

All set-up parameters, totals and logged data are stored in non-volatile memory with at least 30 years retention.

Terminal Designations

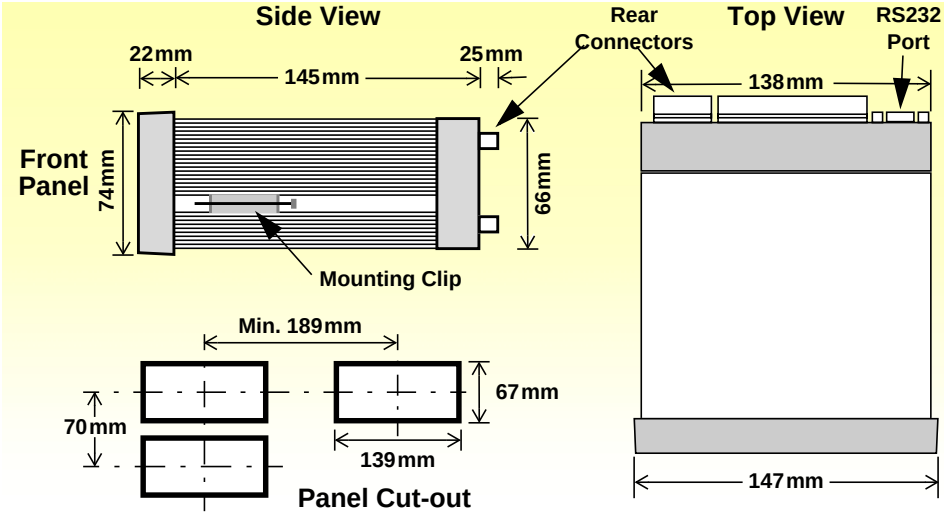
Terminal Label			Designation	Comment
1	FINP	1+	Frequency Input 1+	Main flow Input
2	FINP	2+	Frequency Input 2+	Process flow Input
3	SG	-	Signal ground	
15	Vo	+	8-24 volts DC output	Overload protected
16	G	-	DC Ground	
17	Vi	+	DC power input	DC power in 12-28V
18	SH	E	Shield terminal	
19		+	RS485 (+)	
20	RS485	-	RS485 (-)	Optional RS485 port
21		G	RS485 ground	
22		1+	Switch 1	Remote Run
23		2+	Switch 2	Remote Stop
24	LOGIC INPUTS	3+	Switch 3	Remote Reset
25		4+	Switch 4	Permissive Input
26		C-	Signal ground	
27	OUT1	+	Output ch 1 (+)	Process control output
28		-	Output ch 1 (-)	
29	OUT2	+	Output ch 2 (+)	Optional output
30		-	Output ch 2 (-)	
31		RC	Relay common	
32		R1	Relay 1	Single Stage Control
33	RELAYS	R2	Relay 2	Dual Stage Control
34		R3	Relay 3	Optional relays
35		R4	Relay 4	
E		E	Mains ground	
N	AC MAINS	N	Mains neutral	AC power in 100-240VAC
A		A	Mains active	
RS232 port			9-pin serial port	

Dimension Drawings

Part Number

515.XXXXXX-BR01
see **Product Codes** to select required features

Default Application software:
515-BR01-000000



Specifications

Operating Environment

Temperature	-20°C to +60°C (conformal coating) +5°C to +40°C (no coating)
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	6W (typical)
Protection	Sealed to IP65 (Nema 4X) when panel mounted
Dimensions (panel option)	147mm (5.8") width 74mm (2.9") height 167mm (6.6") depth

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

Interference	CE compliance
Enclosure	IECEx, ATEX and CSA approved enclosures available for hazardous areas

Real Time Clock (Optional)

Battery Type	3 volts Lithium button cell (CR2032)
Battery Life	5 years (typical)

Frequency Input (General)

Range	0 to 10kHz
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	1.3 volts

Coil

Signal Type	Turbine and sine wave
Sensitivity	15mV p-p minimum

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

Communication Ports

Ports	RS-232 port RS-485 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, 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	1 configurable output (plus 1 optional)
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.
Printer protocol is available only if RTC option is installed.

Ordering Information

Product Codes

Model	Supplementary Code							Description
515 .						-	BR01	
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
		2/3						4 logic inputs, 2 isolated outputs, 4 relays, real-time clock data logging, RS232 (DB9) and Ethernet/RF communication ports (not yet available)
Relay Type			1					Electromechanical relays only
			2					2 electromechanical and 2 solid state relays
			3					Solid state relays only (not yet available)
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							BR01	Defines the application software to be loaded into the instrument

Example full product part number is 515.111USC-BR01 (this is the number used for placing orders).

Main Menu Variables

Main Menu Variables	Default Units	Preferred Units	Variable Type
Net Volume	L		Total
Net Flowrate	L/min		Rate
Main Line Volume	L		Total
Main Line Flowrate	L/min		Rate
Process Line Volume	L		Total
Process Line Flowrate	L/min		Rate
Process Volume Ratio	%		Rate
Process Flowrate Ratio	%		Rate
Control Output	%		Rate
Flowrate Deviation	%		Rate

500 Series in typical Ex d enclosure

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BR01 AP 06/17