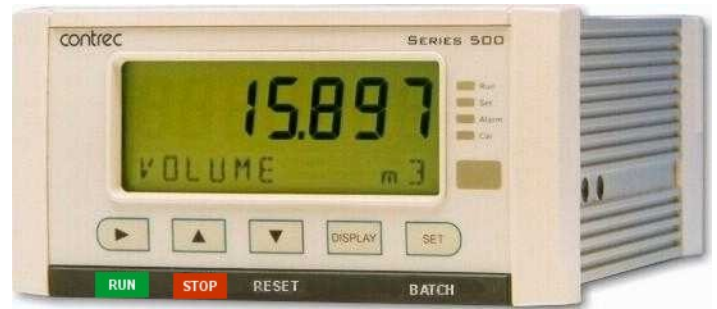


# Application BR02

## Batch/Ratio

## Process Controller

for Volumetric Analog Flowmeters



### Features

- Tailored for volumetric analog input such as vortex flowmeters
- 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
- “Flushing” available via external logic signal
- 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



### Overview

The 515 BR02 application is a batching flow controller for delivery of preset quantities at preset flowrates using a volumetric analog 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

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.

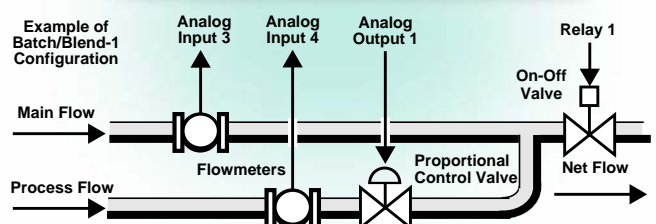
The process flow is a ratio of the main flow (0 to 400% range).

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

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).

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



## 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 4-20mA 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 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

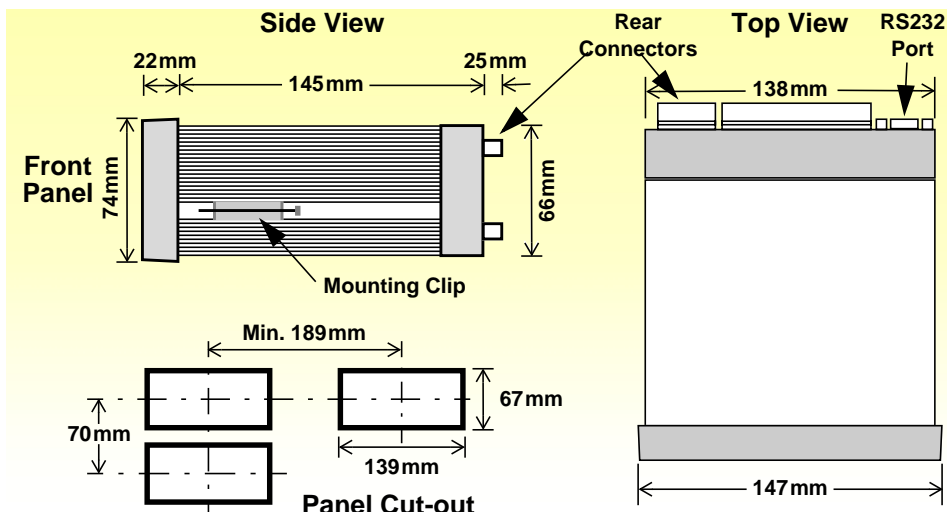
| Terminal Label  | Designation             | Comment   |
|-----------------|-------------------------|---|
| 3 SG            | - Signal ground         |   |
| 11 AINP3        | + Analog Input ch 3 (+) | Main Flow Input   |
| 12              | - Analog Input ch 3 (-) |   |
| 13 AINP4        | + Analog Input ch 4 (+) | Process Flow Input  |
| 14              | - Analog Input ch 4 (-) |   |
| 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 (+)             | Optional RS485 port   |
| 20 RS485        | - RS485 (-)             |   |
| 21              | G RS485 ground          |   |
| 22              | 1+ Switch 1             | Remote Run<br>Remote Stop<br>Remote Reset<br>Permissive Input |
| 23              | 2+ Switch 2             |   |
| 24 LOGIC INPUTS | 3+ Switch 3             |   |
| 25              | 4+ Switch 4             |   |
| 26              | C- Signal ground        |   |
| 27              | + Output ch 1 (+)       | Process control output  |
| 28              | - Output ch 1 (-)       |   |
| 29              | + Output ch 2 (+)       | Optional output   |
| 30              | - Output ch 2 (-)       |   |
| 31              | RC Relay common         | Single Stage Control  |
| 32              | R1 Relay 1              |   |
| 33              | R2 Relay 2              | Dual Stage Control  |
| 34              | R3 Relay 3              |   |
| 35              | R4 Relay 4              | Optional relays   |
| E               | E Mains ground          | AC power in 100-240VAC  |
| N               | N Mains neutral         |   |
| A               | A Mains active          |   |
| RS232 port      | 9-pin serial port       |   |

## Dimension Drawings

### Part Number

515.XXXXXX-BR02  
see **Product Codes** to select required features

Default Application software:  
515-BR02-000000



# Specifications

## Operating Environment

|                                      |  |
|--------------------------------------|--|
| <b>Temperature</b>                   | -20°C to +60°C (conformal coating)<br>+5°C to +40°C (no coating)                     |
| <b>Humidity</b>                      | 0 to 95% non condensing (conformal coating)<br>5% to 85% non condensing (no coating) |
| <b>Power Supply</b>                  | 100-240 V AC (+/-10%) 50-60 Hz (+/-10%) or<br>12-28 V DC                             |
| <b>Consumption</b>                   | 6W (typical)   |
| <b>Protection</b>                    | Sealed to IP65 (Nema 4X) when panel mounted  |
| <b>Dimensions<br/>(panel option)</b> | 147mm (5.8") width<br>74mm (2.9") height<br>167mm (6.6") depth                       |

## Display

|                    |   |
|--------------------|---|
| <b>Type</b>        | Backlit LCD with 7-digit numeric display and<br>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<br>available for hazardous areas |

## Real Time Clock (Optional)

|                     |                                      |
|---------------------|--------------------------------------|
| <b>Battery Type</b> | 3 volts Lithium button cell (CR2032) |
| <b>Battery Life</b> | 5 years (typical)                    |

## Analog Input (General)

|                      |  |
|----------------------|--|
| <b>Overcurrent</b>   | 100mA absolute maximum rating            |
| <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) |

## 4-20mA Input

|                  |   |
|------------------|---|
| <b>Impedance</b> | 100 Ohms (to common signal ground)                                |
| <b>Accuracy</b>  | 0.05% full scale (20°C)<br>0.1% (full temperature range, typical) |

## 0-5 or 1-5 Volts Input

|                  |   |
|------------------|---|
| <b>Impedance</b> | 10MΩ (to common signal ground)                                    |
| <b>Accuracy</b>  | 0.05% full scale (20°C)<br>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<br>(solid state relays use AC only) |
| <b>Current</b>        | 3A maximum  |

## Communication Ports

|                  |                                       |
|------------------|---------------------------------------|
| <b>Ports</b>     | RS-232 port<br>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 |

## 4-20mA 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)<br>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                     | - BR02             |   |
| 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<br>(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)<br>(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 | BR02               | Defines the application software to be loaded into the instrument   |

Example full product part number is 515.111USC-BR02 (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

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



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