

Application AC01

Additive Controller

for Volumetric Frequency Flowmeters & Stroking Dosing Pumps



Features

- Suited for injection ratios from 10 to 10000 PPM
- Programmable pump stroke volumes and maximum stroke rates to cater for wide range of dosing pumps
- Adjustable sampling method deals with the inherent problems of measurement and control of pulsating injections
- Continual monitoring of main flow and calculation and 'trimming' of required dosing rates
- Permissive input allows system to settle without raising exceptions
- Warnings provided for: No Additive Flow, Excess Additive Flow and Sample Deviation Exceeded
- Warning of external alarms and main flow too high for dosing pump
- Allows for non-linear correction
- Selection of Detail or Basic main menu to suit operator and application
- RTC logging with over 1000 entries
- Available protocols on communication ports including Printers, Modbus RTU and TCP/IP

Overview

The 515 AC01 application is designed to control the injection of additive chemicals with respect to a main flow. Tailored for volumetric frequency flowmeters it will operate with a range of stroking dosing pumps controlling the dosing rate via either an output pulse or 4-20mA signal.

The instrument will calculate a Target Stroke Rate and the intervals of main volume at which a Stroke Output Pulse will be generated based on the dosing pump parameters and the process ratio set point, programmed in PPM (parts per million).

The additive flow is monitored and measured along with the main flow to continuously calculate the overall Process Ratio and the Sample Ratio that provides a faster "real time" PPM value of the dosing chemical. There are flow and deviation exceptions, alarms and a permissive that can be used to help maintain control and integrity of an additive injection system.

Calculations

The Sample Ratio (in ppm) is an average value based on the internal sample totals for the additive and main volumes captured during a sliding period of the programmable "Sample Strokes".

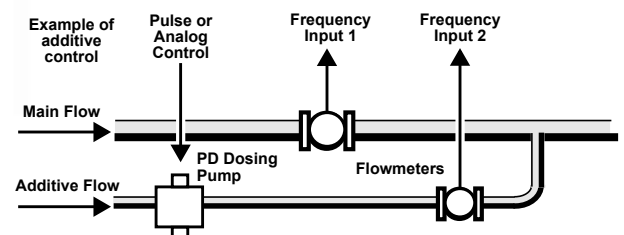
$$SampleRatio = \frac{Additive_{sample}}{Main_{sample}} \times 10^6$$

The Process Ratio (in ppm) is based on the actual Additive Volume and main volume since the last reset.

$$ProcessRatio = \frac{Additive_{volume}}{Main_{volume}} \times 10^6$$

The Target Stroke Rate (TSR) can be a key visual or automation aid for the dosing operations.

$$TSR = \frac{Setpoint \times Main_{flowrate}}{Stroke_{volume}}$$



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 data logging of over 1000 entries of the variables as displayed on the main menu.

Communications

There are two communication ports available as follows:

- COM-1 RS232 port
- COM-2 RS485 port (optional) or Ethernet (optional)

The ports can be used for remote data reading, printouts and for uploading and downloading of the application software to the instrument.

Isolated Outputs

The opto-isolated outputs can re-transmit 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. By default, output 1 has been assigned to the Stroke Count to provide a pulse signal and output 2 is assigned to the Target Stroke Rate to provide a 4-20mA output.

Relay Outputs

All four alarm relays can be freely assigned. As well as assigning a particular rate variable as a high or low alarm, a relay can be assigned to the unit's exceptions/warnings to drive external sounders, beacons or other master control devices.

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

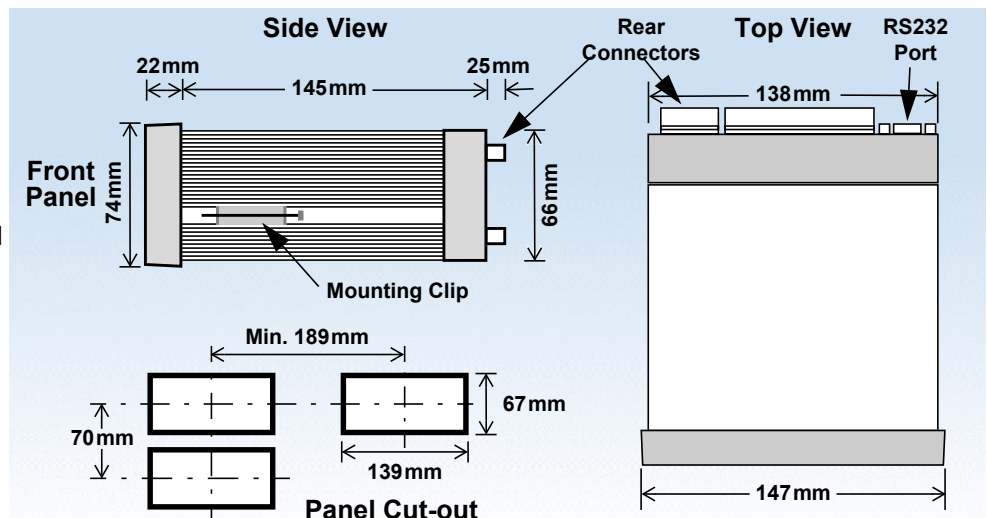
Terminal Label	Designation	Comment
1	FINP 1+	Frequency Input 1+
2	FINP 2+	Frequency Input 2+
3	SG	Signal ground
15	Vo	+ 8-24 volts DC output
16	G	- DC Ground
17	Vi	+ DC power input
18	SH	E Shield terminal
19	RS485	+ RS485 (+)
20	COM-2	- RS485 (-)
21	port	G RS485 ground
22	LOGIC INPUTS	1+ Switch 1
23		2+ Switch 2
24		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 (+)
30		- Output ch 2 (-)
31	RC	Relay Common 1-2
32	RELAYS	R1 Relay 1
33		R2 Relay 2
34		R3 Relay 3
35		R4 Relay 4
36	RC	Relay common 3-4
E	AC MAINS	E Mains ground
N		N Mains neutral
A		A Mains active
RS232 COM-1 port		9-pin serial port

Dimension Drawings

Part Number

515.XXXXXX-AC01
see **Product Codes** to select required features

Default Application software:
515-AC01-000000



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
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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

4-20 mA 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	- AC01	
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	AC01	Defines the application software to be loaded into the instrument

Example full product part number is 515.111USC-AC01 (this is the number used for placing orders).

Main Menu Variables

Main Menu Variables	Default Units	Preferred Units	Variable Type
Main Line Volume	m3		Total
Main Line Flowrate	m3/min		Rate
Additive Line Volume	L		Total
Additive Sample Flowrate	L/min		Rate
Stroke Output Count	Count		Total
Target Stroke Rate	STK/M		Rate
Sample Ratio	ppm		Rate
Process Ratio	ppm		Rate



Example of 500 Series in BZC Ex d enclosure

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