

# 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 second language and user tags
- RTC logging with over 1000 entries
- Selectable protocols on serial ports including Modbus RTU and Printer output
- Backlit display with LCD backup



### 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".

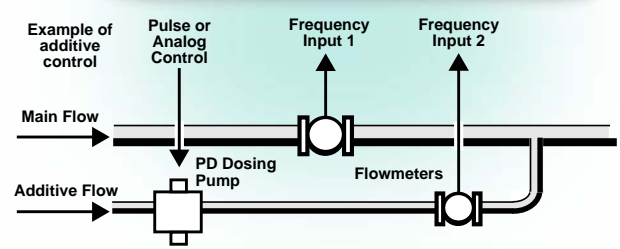
$$SampleRatio = \frac{Additive_{sample}}{Main_{sample}} \times 10^6$$

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 currently 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 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 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

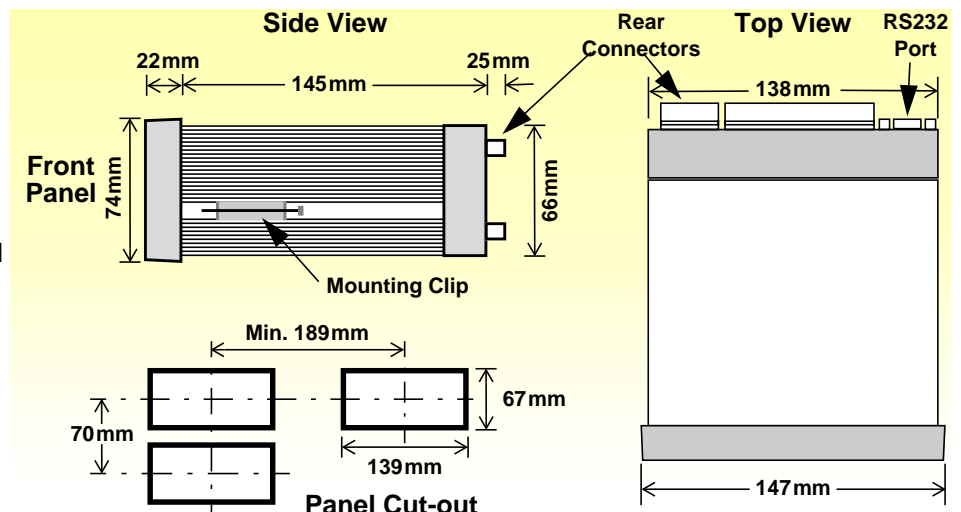
Terminal Label	Designation	Comment
1	FINP 1+	Frequency Input 1+
2	FINP 2+	Frequency Input 2+
3	SG -	Signal ground
15	Vo +	8-24 volts DC output
16	G -	DC Ground
17	Vi +	DC power input
18	SH E	Shield terminal
19	+ RS485 (+)	Optional RS485 port
20	- RS485 (-)	
21	G RS485 ground	
22	1+ Switch 1	External Alarm Signal Remote Display Remote Reset Permissive Input
23	2+ Switch 2	
24	3+ Switch 3	
25	4+ Switch 4	
26	C- Signal ground	
27	+ Output ch 1 (+)	Stroke Pulse output
28	- Output ch 1 (-)	
29	+ Output ch 2 (+)	Target Stroke Rate output
30	- Output ch 2 (-)	
31	RC Relay common	
32	R1 Relay 1	
33	R2 Relay 2	
34	R3 Relay 3	
35	R4 Relay 4	
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-AC01  
see **Product Codes** to select required features

Default Application software:  
515-AC01-000000



# Specifications

## Operating Environment

<b>Temperature</b>	-20°C to +60°C (conformal coating) +5°C to +40°C (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 167mm (6.6") depth

## 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 (CR2032)
<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
--------------------	------------------------------

## 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>	3A maximum

## Communication Ports

<b>Ports</b>	RS-232 port 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	- AC01	
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	<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	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



500 Series in Ex410 Enclosure

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



**Contrec Limited**  
Riverside, Canal Road  
Sowerby Bridge, West Yorkshire  
HX6 2AY United Kingdom  
Tel: +44 1422 829944  
Email: sales@contrec.co.uk

**Contrec - USA, LLC**  
916 Belcher Drive  
Pelham, Alabama  
AL 35124 United States  
Tel: +1 (205) 685 3000  
Email: contrec@contrec-usa.com

**Contrec Systems Pty Ltd**  
5 Norfolk Avenue  
Ringwood, Victoria 3134  
Melbourne Australia  
Tel: +61 413 505 114  
Email: info@contrec.com.au