

# Application FA01

## Add or Subtract Flow Computer

with 2 Input Channels for Volumetric Applications



### Features

- Programmable for either frequency or analog flow inputs
- Tailored for volumetric units of measure
- Freely assignable alarms for high or low levels
- Selection of second language and user tags
- RTC logging with over 1000 entries
- Programmable pulse width and scaling of pulse output
- 4-20mA retransmission
- RS-232 and RS-485 (optional) serial ports
- Modbus RTU, Printer and other serial port protocols
- Front panel adjustment of 8-24V DC output voltage
- Backlit display



### Overview

The 515 FA01 application pack is an add or subtract flow computer that is tailored specifically for volume measurement. It can perform either addition or subtraction on two frequency inputs or on two analog inputs.

The flow computer is suitable for accepting signals directly from flowmeters or for collecting re-transmitted signals from other flow computers providing a resultant rate and total. The instrument displays the flow rate and total for each channel as well as the result.

The frequency input is compatible with a wide range of frequency signals, including millivolt signals, reed switches, Namur proximity switches and pulse trains via its smart front-panel program selection. The analog input can be scaled and have filtering, non-linear correction and cutoff points applied to the signal.

### Calculations

For frequency inputs the calculation of totals are exact as the instrument collects all pulses detected on each channel.

$$\text{channel total} = \text{pulses} / k\text{-factor}$$

The flow rates are derived from an accurately measured frequency:

$$\text{channel flow} = \text{frequency} / k\text{-factor}$$

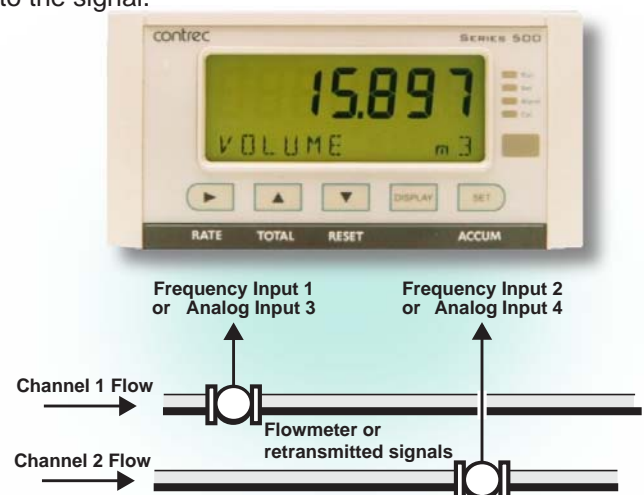
For analog inputs, to derive the flow rate, the analog input is normalised to a value (A) between 0 and 1.

$$\text{channel flow} = (V_{fmax} - V_{fmin})A + V_{fmin}$$

$$\text{channel total} = \int (\text{channel flow} \cdot \Delta t)$$

The resultant values are then:

$$\begin{aligned} \text{ADD result} &= \text{channel 1} + \text{channel 2} \\ \text{SUB result} &= \text{channel 1} - \text{channel 2} \end{aligned}$$



## 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:

- RS-232 port
- RS-485 port (optional)

The ports can be used 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. One output is standard, a second output is available as an option.

## Relay Outputs

The relay alarms can be assigned to any of the main menu variables of a rate type. The alarms can be fully configured including hysteresis. Two relays are standard with additional two relays available as an option.

## 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.

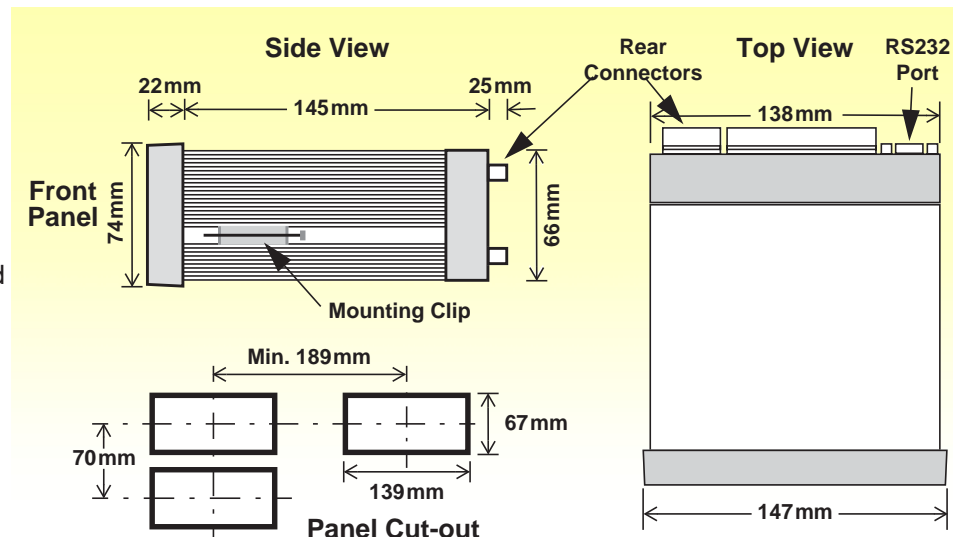
Instrument parameters including units of measurement can be programmed in the field, according to the user access levels assigned to parameters by the distributor.

## Dimension Drawings

### Part Number

515.XXXXXX-FA01  
see **Product Codes** to select required features

Default Application software:  
515-FA01-000000



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
11	AINP3 +	Analog Input ch 3 (+)
12	-	Analog Input ch 3 (-)
13	AINP4 +	Analog Input ch 4 (+)
14	-	Analog Input ch 4 (-)
15	Vo	8-24 volts DC output
16	G	DC Ground
17	Vi	DC power input
18	SH	E Shield terminal
19		+ RS485 (+)
20	RS485	- RS485 (-)
21		G RS485 ground
22		1+ Switch 1
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 (+)
30		- Output ch 2 (-)
31		RC Relay common
32		R1 Relay 1
33	RELAYS	R2 Relay 2
34		R3 Relay 3
35		R4 Relay 4
E	AC MAINS	E Mains ground
N		N Mains neutral
A		A Mains active
RS232 port		9-pin serial port

# 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
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## 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) 0.1% (full temperature range, typical)

## 0-5 or 1-5 Volts Input

<b>Impedance</b>	10MOhms (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>	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

## 4-20mA 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) 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	- FA01	
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	FA01	Defines the application software to be loaded into the instrument

Example full product part number is 515.111USC-FA01 (this is the number used for placing orders).

## Main Menu Variables

Main Menu Variables	Default Units	Preferred Units	Variable Type
Total 1	m <sup>3</sup>		Total
Flowrate 1	m <sup>3</sup> /min		Rate
Total 2	m <sup>3</sup>		Total
Flowrate 2	m <sup>3</sup> /min		Rate
Resulting Total	m <sup>3</sup>		Total
Resulting Flowrate	m <sup>3</sup> /min		Rate



500 Series in Ex410 Enclosure

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