Model 515

Application MP01

Volume
Flow Computer

with Master Proving
for Volumetric Frequency Flowmeters

Features

- Provides “on the fly” proving
- Remote Modbus or rear panel control
- Tailored for volumetric frequency flow and master meter inputs
- Includes Live and Average Temperature and Pressure values
- Temperature and Pressure averaged over flow (not time)
- Selection of Detail or Basic main menu to suit operator and application
- Selection of second language and user tags
- RTC logging with over 1000 entries
- Programmable pulse width and scaling of pulse output
- 4-20 mA retransmission
- RS232 and RS485 or Ethernet (optional) serial ports
- Modbus RTU, Printer and other serial port protocols

Overview

The 515 MP01 application measures the volume flow of a product. The instrument uses the frequency output from a volumetric flowmeter and has an additional “master meter” input and Meter Factor for in-line proving.

The master meter input allows an “on the fly” proving run to be carried out against the line meter without interrupting the flow. A recommended Meter Factor is calculated and can be entered to ensure accurate measurement for current flow conditions or to cater for a slight deterioration in the line meter.

The flow computer maintains the Line flowrate and total independently of the proving totals. Proving runs can be controlled via the RTU Modbus communications or via rear panel logic inputs.

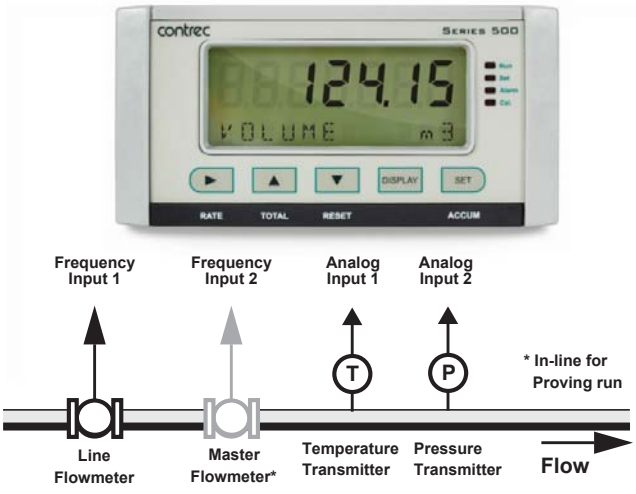
Calculations

The Meter Factor (MF) is a multiplication correction factor used for the line meter. It is applied to each total and rate sample, as they are collected, to obtain the correct value.

volume = MF × (pulses / k-factor)

The flow rate is derived from an accurately measured frequency:

flow = MF × (frequency / k-factor)



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 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 RS-232 port
- COM-2 RS-485 port (optional) or Ethernet (optional)

All types of ports can be used for remote data reading, while RS-232 and RS-485 serial ports can be used for 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 4-20 mA 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 two additional relays available as an option.

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.

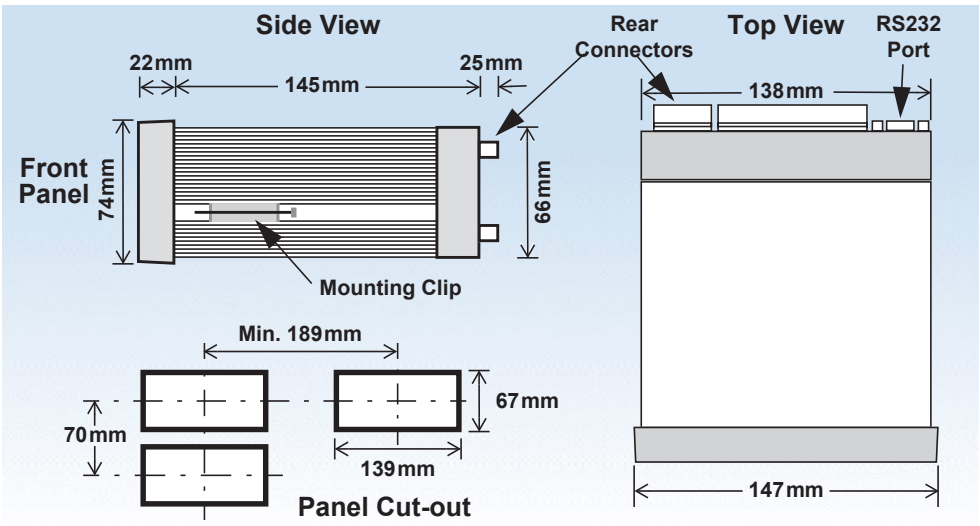
Analog Input Types

Any analog input can be set to accept a 4-20 mA, 0-5 V or 1-5 V signal, while any inputs assigned to a temperature sensor can also be set to accept a PT100 or PT500 signal.

Terminal Designations

Terminal Label			Designation	Comment
1	FINP	1+	Frequency Input 1+	Main Line Flow Input
2	FINP	2+	Frequency Input 2+	Master meter Flow Input
3	SG	-	Signal ground	
5	EXC V	2+	Excitation Term 2+	For AINP1 RTD Input
7	AINP1	+	Analog Input ch 1 (+)	Temperature Input
8		-	Analog Input ch 1 (-)	
9	AINP2	+	Analog Input ch 2 (+)	Pressure Input
10		-	Analog Input ch 2 (-)	
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 COM-2 port	+	RS485 (+)	Optional RS485 port may be replaced by Ethernet port.
20		-	RS485 (-)	
21		G	RS485 ground	
22	LOGIC INPUTS	1+	Switch 1	Proving Run/Stop
23		2+	Switch 2	Proving Reset & Stop
24		3+	Switch 3	
25		4+	Switch 4	CAL Switch – In field access protection
26		C-	Signal ground	
27	OUT1	+	Output ch 1 (+)	
28		-	Output ch 1 (-)	
29	OUT2	+	Output ch 2 (+)	
30		-	Output ch 2 (-)	
31	RELAYS	RC	Relay Common 1-2	*Term 31 - Common 1-4 on legacy option card*
32		R1	Relay 1	
33		R2	Relay 2	
34		R3	Relay 3	
35		R4	Relay 4	
36		RC	Relay common 3-4	*Term 36 only available on new style option card*
E	AC MAINS	E	Mains ground	AC power in 100-240VAC
N		N	Mains neutral	
A		A	Mains active	
RS232 COM-1 port			9-pin serial port	

Dimension Drawings



Part Number

515.XXXXXX-MP01
see **Product Codes** to select required features

Default Application software:
515-MP01-000000

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

Analog Input (General)

Overcurrent	100mA absolute maximum rating (30mA for 4-20mA inputs)
Update Time	< 1.0 sec
Configuration	4-20mA
Non-linearity	Up to 20 correction points (some inputs)

RTD Input

Sensor Type	PT100 & PT500 to IEC 751
Connection	Four Wire
Range	-200°C to 350°C -200°C to 800°C (PT100 extended range)
Accuracy	0.1°C typical 0.2°C typical (PT100 extended range)

4-20mA Input

Impedance	100 Ohms (to common signal ground)
Accuracy	0.05% full scale (20°C) 0.1% (full temperature range, typical)

0-5 or 1-5 Volts Input

Impedance	10MOhms (to common signal ground)
Accuracy	0.05% full scale (20°C) 0.1% (full temperature range, typical)

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

4-20mA 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.

Ordering Information

Product Codes

Model	Supplementary Code							Description
515 .						-	**MP01**	
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							**MP01**	Defines the application software to be loaded into the instrument

Example full product part number is 515.111USC-MP01 (this is the number used for placing orders).

Main Menu Variables

Main Menu Variables	Default Units	Preferred Units	Variable Type
Line Volume	kg		Total
Line Flowrate	kg/min		Rate
Proving Volume	kg		Total
Proving Flowrate	kg/min		Rate
Master Volume	kg		Total
Master Flowrate	kg/min		Rate
Proving Run Deviation	%		Rate
Recommended Meter Factor	- - -		Rate
Temperature	Deg C		Rate
Average Temperature	Deg C		Rate
Pressure	kPa		Rate
Average Pressure	kPa		Rate

Example of 500 Series in BZC Ex d enclosure

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