

Application PP01

Pressurised Petroleum Flow Computer

for Quadrature Flowmeters



Features

- Pressure and Temperature compensation to ASTM D1250-04
- Caters for wide range of petroleum products including crude, lube and refined
- Accepts temperature and/or density inputs for volume correction
- Allows quadrature flow input for ISO 6551 level B pulse security
- 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 PP01 application measures the flow of a pressurised petroleum fluid according to ASTM D1250-04. The frequency flow inputs can accept a quadrature signal for ISO 6551 level B pulse security. An analog pressure, temperature and/or density input allows for volume correction to reference conditions.

This instrument is compatible with a wide range of flowmeter frequency outputs, including millivolt signals, reed switches, Namur proximity switches and pulse trains via its smart front-panel program selection.

The flow computer displays the net and gross flowrates, resettable and accumulated totals. It can be used to measure a range of crude and refined petroleum fluids including gasoline, jet fuels, heating oils, diesels and lube oils.

Calculations

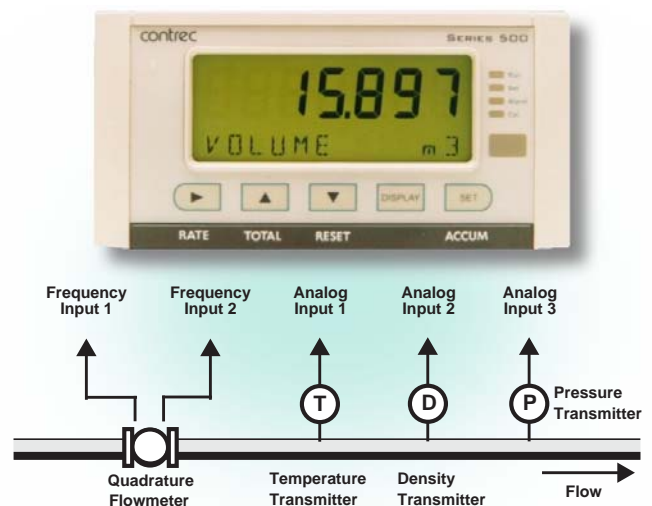
The volume total and flowrate are derived from accurately measured frequency and the number of received pulses.

$$volume = pulses / k-factor$$

$$volume\ flow = frequency / k-factor$$

The volume correction calculations are based on the ASTM D1250-04 standard for the following products:

- Crude Oils
- Lube Oils
- Refined Products



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.

All set-up parameters, totals and logged data are stored in non-volatile memory with at least 30 years retention.

Temperature, Pressure and Density Input Types

Temperature sensor input(s) can be either PT100, PT500, 4-20mA, 0-5V or 1-5V signals. Density and Pressure sensor input(s) can be either 4-20mA, 0-5V or 1-5V signals.

Terminal Designations

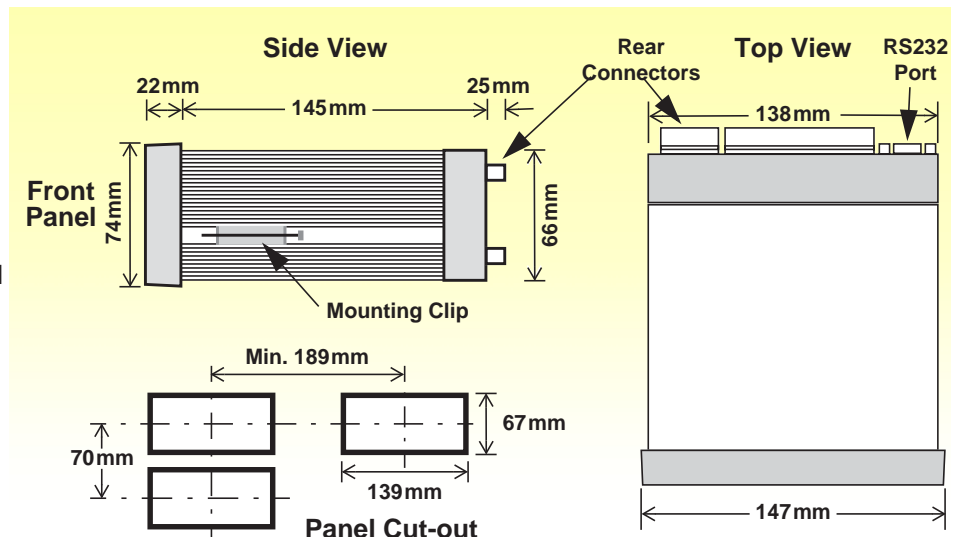
Terminal Label	Designation	Comment
1	FINP 1+	Frequency Input 1+
2	FINP 2+	Frequency Input 2+
3	SG	Signal ground
5	EXC V 2+	Excitation Term 2+
		For AINP1 RTD Input
7	AINP1 +	Analog Input ch 1 (+)
8	AINP1 -	Analog Input ch 1 (-)
		Temperature Input
9	AINP2 +	Analog Input ch 2 (+)
10	AINP2 -	Analog Input ch 2 (-)
		Density Input
11	AINP3 +	Analog Input ch 3 (+)
12	AINP3 -	Analog Input ch 3 (-)
		Pressure Input
15	Vo	8-24 volts DC output
16	G	DC Ground
17	Vi	DC power input
18	SH	Shield terminal
		Overload protected
		DC power in 12-28V
19	RS485 +	RS485 (+)
20	RS485 -	RS485 (-)
21	G	RS485 ground
		Optional RS485 port
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	OUT1 -	Output ch 1 (-)
29	OUT2 +	Output ch 2 (+)
30	OUT2 -	Output ch 2 (-)
		Optional output
31	RELAYS	RC Relay common
32		R1 Relay 1
33		R2 Relay 2
34		R3 Relay 3
35		R4 Relay 4
		Optional relays
E	AC MAINS	E Mains ground
N		N Mains neutral
A		A Mains active
		AC power in 100-240VAC
	RS232 port	9-pin serial port

Dimension Drawings

Part Number

515.XXXXXX-PP01
see **Product Codes** to select required features

Default Application software:
515-PP01-000000



Specifications

Operating Environment

Temperature	-20°C to +60°C (conformal coating) +5°C to +40°C (no coating)
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	6W (typical)
Protection	Sealed to IP65 (Nema 4X) when panel mounted
Dimensions (panel option)	147mm (5.8") width 74mm (2.9") height 167mm (6.6") depth

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

Interference	CE compliance
Enclosure	IECEX, ATEX and CSA approved enclosures available for hazardous areas

Real Time Clock (Optional)

Battery Type	3 volts Lithium button cell (CR2032)
Battery Life	5 years (typical)

Frequency Input (General)

Range	0 to 10kHz (3kHz for pulse security)
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	1.3 volts

Coil

Signal Type	Turbine and sine wave
Sensitivity	15mV p-p minimum

NPS

Signal Type	NPS sensor to Namur standard
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Analog Input (General)

Overcurrent	100mA absolute maximum rating
Update Time	< 1.0 sec
Configuration	RTD, 4-20mA, 0-5V and 1-5V input
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
Accuracy	0.1°C typical (-100°C to 300°C)

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

Communication Ports

Ports	RS-232 port RS-485 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, 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	1 configurable output (plus 1 optional)
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.
Printer protocol is available only if RTC option is installed.*

Ordering Information

Product Codes

Model	Supplementary Code	Description
515	- PP01	
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	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	PP01	Defines the application software to be loaded into the instrument

Example full product part number is 515.111USC-PP01 (this is the number used for placing orders).

Main Menu Variables

Main Menu Variables	Default Units	Preferred Units	Variable Type
Net Volume	m ³		Total
Net Flowrate	m ³ /min		Rate
Gross Volume	m ³		Total
Gross Flowrate	m ³ /min		Rate
Mass	kg		Total
Mass Flowrate	kg/min		Rate
Temperature	Deg C		Rate
Density	kg/m ³		Rate
Pressure	MPa		Rate



500 Series in Ex410 Enclosure

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