



# ELECTRONIC DIGITAL PULSE and ANALOG TRANSMITTERS FOR MECHANICAL FLOWMETERS

TS-510

Rev. 0-96-02-01

Mechanical Flowmeter Transmitters

Digital: Models VR, VRHR, 50,  
PE 500, PE 505, PES 550,  
PES 555 and Tricon-S

Analogue: Models CL 420

## SPECIFICATIONS

### DIGITAL TRANSMITTERS

Digital transmitters produce signals that exist only in one of two states: ON or OFF. These states may also be referred to as HIGH or LOW, or 1 or 0 (zero).

#### MODEL VR1871

This economical and versatile bidirectional digital pulse transmitter provides 10 pulses per revolution with excitation power of 115-250 VAC or 12-36 VDC, making it compatible with most remote read-out equipment.

#### MODEL VR7671 (HR)

This solid state Hall Effect digital pulse transmitter provides 100 pulses per revolution. Note that input (excitation) power is limited to 10-15 VDC.

#### MODEL 50

This digital pulse transmitter is magnetically driven with an internal dry reed switch. It provides 10 pulses per revolution to a frequency of 50 Hz. The Model 50 is used with the hot water turbine flowmeters.

#### MODEL PE 500

This Solid State Optical transmitter provides 100 pulses per revolution to a frequency of 2000 Hz. These units are bidirectional, and are CURRENT SOURCING<sup>1</sup>.

#### MODEL PE 505

The Model 505 is the same as Model 500, with the exception that it is CURRENT SINKING<sup>1</sup> and is compatible with TTL circuits.

#### MODEL PES 550

The Model 550 is the same as the Model 500 with the addition of an internal pulse scaling module with a selectable scale range (multiplier) of 0.0001 to 1.9999. The output pulse may be adjusted to correct for flowmeter wear, compensate for a nonstandard liquid viscosity, or to convert from one engineering unit to another. The Model 550 is CURRENT SOURCING<sup>1</sup>.

#### MODEL PES 555

This unit is the same as Model 550 with the exception that it is CURRENT SINKING<sup>1</sup>.

### TRICON-S PULSER

The TRICON-S is a magnetically driven non-resettable odometer/sweepand register with an internal dry reed switch type digital pulse transmitter. It is compatible ONLY with Neptune Type TM (nutating disk) and Type HPT (turbine) flowmeters which use a bayonet 90° twist type mount. Normally the Type TM and HPT flowmeters are used by water authorities, communities and large industrial customers for high volume flow recording. They provide 1/10 or 1/100 pulse per sweepand rotation in US Gallons, Cubic Meters (M<sup>3</sup>), and Kilolitres (kl). They are not intended for batching operations.

### ANALOG SIGNAL TRANSMITTERS

An analog signal transmitter varies its current or voltage magnitude in proportion to the measured rate of flow. Neptune offers 4 to 20 mA transmitters. These devices are ideal for driving chart recorders or rate indicators. Analog signals must be converted to digital signals if they are to be used by counters or batch controllers.

#### MODEL CL 420

The Model CL 420 is a two wire electronic current transmitter specifically designed for Neptune positive displacement mechanical flowmeters. SPAN and ZERO adjustments are accessed by removing the screw-on lid for field calibration. The zero adjustment allows the current to be adjusted to 4 mA when there is no flow (and no rotation of the input shaft). The SPAN adjustment is normally set for 20 mA to be equal to Q-Max (100% of flowmeter specified rate of flow), although it may be set to any setting desired by the end user. The Model CL-420 is compatible for use with the BATCHMATE 1500 (must specify 4-20mA input).

*Note: Model CL 420 requires 60-600 Hz at Q-max for proper operation. In cases of field retrofit to existing flowmeter, the end user must advise final drive RPM.*

<sup>1</sup>See explanation on Page 3.

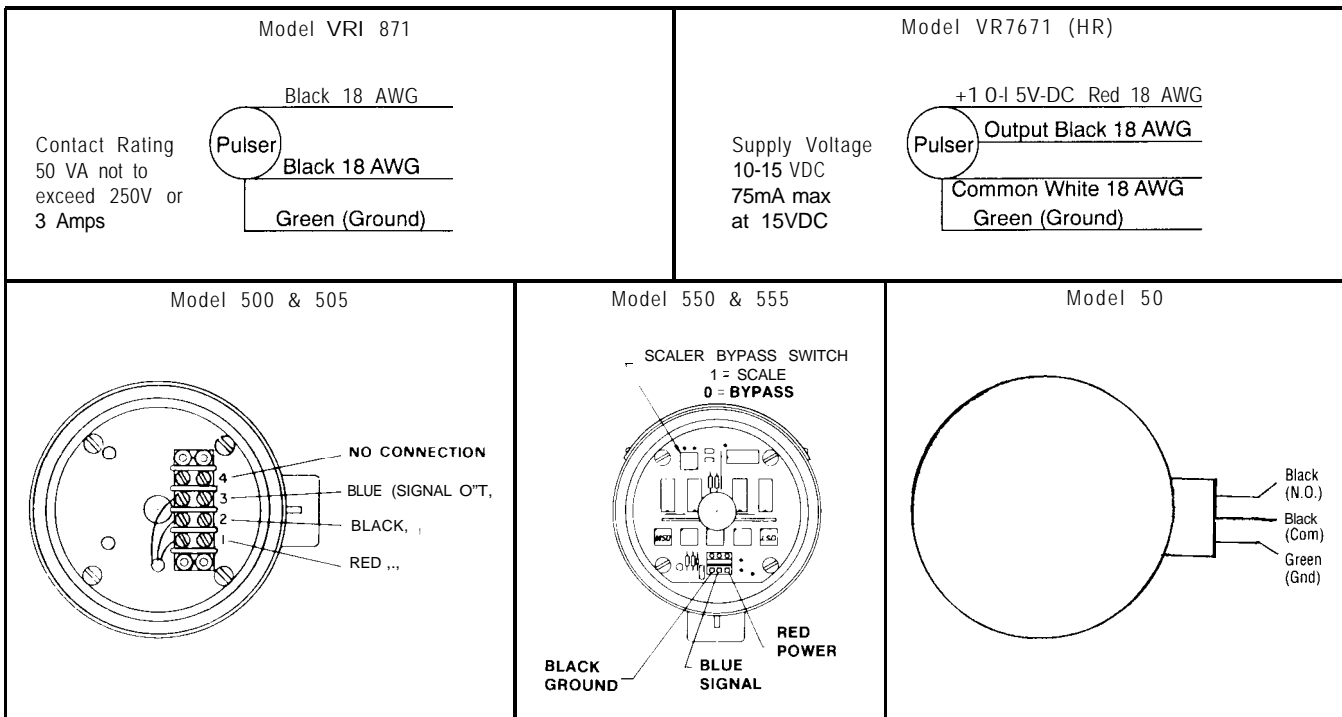
# NEPTUNE DIGITAL PULSE ELECTRONIC TRANSMITTER DATA

Model No.	Type Of Device	Contact	Pulses per Revolution	Max Speed: (RPM) (2)	Contact Rating (2)	Enclosure Rating	Input Voltage	Remarks
VR1871	Dry Reed Bi-directional	SP/ST	10	50 (300)	50 VA resistive (not to exceed 250v or 3 amp)	U.L., CSA X-proof Class 1, Div 1 Groups C&D	110 & 250 VAC 12-36 VDC	
VR7671 (HR)	Hall Effect Uni-directional	Solid State	100	1000 (600)	75mA max @ 15 VDC	U.L., X-proof Class 1, Div. 1 Groups C&D	10-15 VDC	
500	Optic Bi-directional	Solid State	100	1067 (2b) (640)	100 mA max @ 36 VDC	U.L., X-proof Class 1, Div 1 Groups C&D	10-36 VDC	Current Sourcing: Output voltage = input - 1 VDC
505	Optic Bi-directional	Solid State	100	1067 (2b) (640)	100 mA max @ 36 VDC	U.L., X-proof Class 1, Div 1 Groups C&D	10-36 VDC	Current Sinking: Open source MOSFET (1000 ohms to DC common)
550	Optic Bi-directional	Solid State	100 Scalable x .0001 to 1.9999	1067 (2b) (640)	100mAmax @ 36 VDC	U.L., X-proof Class 1, Div 1 Groups C&D	10-36 VDC	Current Sourcing: Output voltage = input - 1 VDC
555	Optic Bi-directional	Solid State	100 Scalable x .0001 to 1.9999	1067 (2b) (640)	100mAmax @ 36 VDC	U.L., X-proof Class 1, Div 1 Groups C&D	10-36 VDC	Current Sinking: Open source MOSFET (1000 ohms to DC common)
Tricon s	Dry Reed Single Direction	SPIST	0.1 or 0.01	(do,	0.5 Amps (DC) 200 V (DC)	NEMA-1	12-36 VDC	Compatible with TM and HPT units only (3)
50	Dry Reed	SPIST	10	50 (300)	50 VA resistive (not to exceed 250V or 3 amp)	NEMA-4	110+250 VAC 12-36 VDC	Only used with the Hot Water Turbine

**Notes:**

- (1) All above units are compatible with Batchmate 1500 Solid State Controller (see TS 1500)
- (2) a. Max speed in pulses per revolution, Hz, and RPM limits from Manufacturers' data  
 b. Models 500, 505, 550, & 555 limited to max RPM of 640
- (3) Tricon-S Mechanical Pulsar/Register for S/Water Div. Cold water units only.

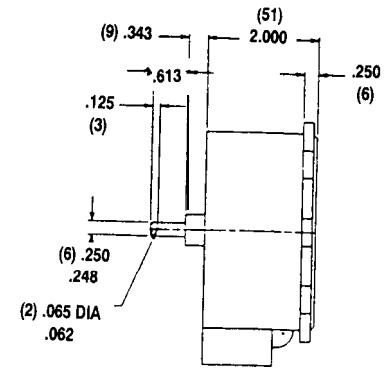
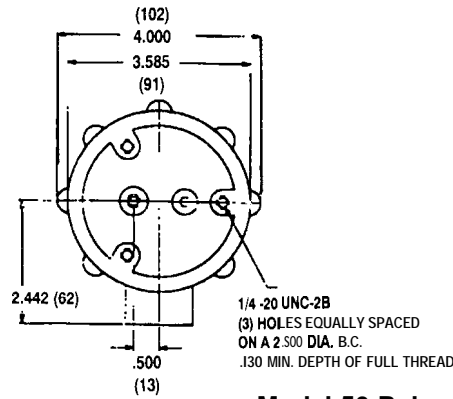
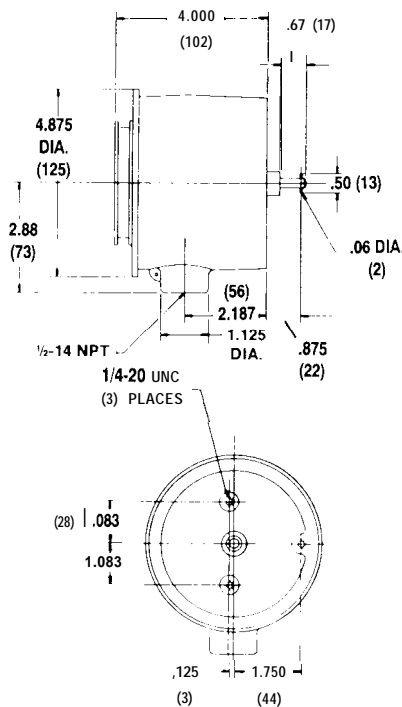
## WIRING DIAGRAMS



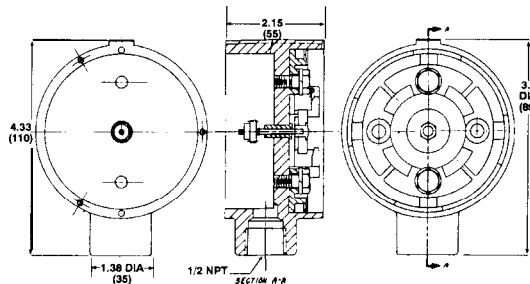
## DIMENSIONS in (mm)

Models 500,505,550,555, and CL 420

Model VR1871 & VI?7671 (HR)



Model 50 Pulsar



### CURRENT SOURCING -vs- CURRENT SINKING

**Current Sourcing:** sensor supplies the voltage to the count input. Sourcing sensors are PNP transistor outputs or a contact closure to V+.

**Current Sinking:** sensor provides a path to DC common for the count input. Sinking sensors are NPN transistor outputs or a contact closure to DC common.

**Compatibility:** Both sourcing and sinking digital pulse transmitters offered by Neptune are fully compatible with the Neptune BATCHMATE 1 500™ electronic batch controllers, which can be set by DIP switches in the device at the factory or in the field to match the transmitter.

### SCALER MODULE (PES 550 & 555)

The scaler module is a solid state device which multiplies or divides the incoming pulses by a scale factor that is set using rotary switches on the pulser's front panel. Output pulse frequency can be programmed to be *greater than*, equal to, or *less than* input pulse frequency, with a total range of 1.9999 to 0.0001 output pulses per input pulse.

Both pulsers provide 100 *unscaled* pulses per revolution of the input shaft (the actual measured volume depends on the gear train used). These pulses may be used "as is" in the unscaled mode, or used with a scaling factor. In unscaled, or *bypass* mode, a straight unscaled pulse with a 40 to 60% duty cycle is provided. In the *scaled* mode, pulses have a 5 msec width.

#### Scaling Factor Example A

Determine the scaling factor that will result in 10 pulses per gallon for a meter with a 1 gallon gear train.

$$\text{Scaling Factor} = \frac{10 \text{ pulses}}{\text{gallon}} \times \frac{1 \text{ revolution}}{100 \text{ pulses}} \times \frac{1 \text{ gallon}}{\text{revolution}}$$

$$\therefore \text{Scaling Factor} = 0.100$$

#### Example B

Determine the pulser scale factor that results in 7 pulses/second at 35 gallons/minute for a meter with a 10 gallon gear train.

$$\text{Scaling Factor} = \frac{7 \text{ pulses}}{\text{second}} \times \frac{1 \text{ revolution}}{100 \text{ pulses}} \times \frac{10 \text{ gallons}}{\text{revolution}} \times$$

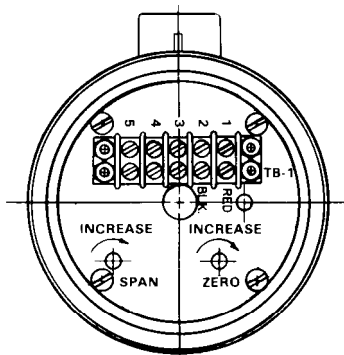
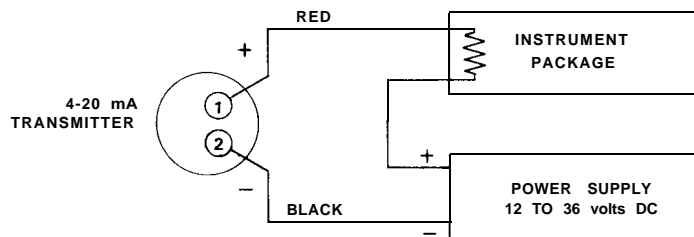
$$\frac{1 \text{ minute}}{35 \text{ gallons}} \times \frac{60 \text{ seconds}}{\text{minute}}$$

$$\therefore \text{Scaling Factor} = 1.200$$

Note: Adjustments must always be made for both units volume and time.

# NEPTUNE ANALOG ELECTRONIC TRANSMITTER - MODEL CL 420

## Wiring Information



**Notes:**

(1) The CL 420 maximum frequency is 600 Hz.

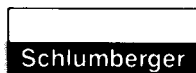
(2) "Zero" is set first, with 4mA equal to zero flow. Span is normally set with 20mA indicating 700% of Rated flow (Q<sub>max</sub>). However the 20mA (top end) setting may be at any reasonable end-user value based on ancillary equipment.

DISK	CL 420 100 tooth	CL 420 40 tooth
Minimum	36 RPM 60 Hz	90 RPM 60 Hz
Maximum (1)	360 RPM 600 Hz	640 RPM 426 Hz
Pulses per Revolution	100 square wave	40 square wave

Type of Device	Analog Transmitter 4-20mA proportional to flow
How Generated	Solid State Optic Pulsar through a frequency to voltage converter
Power Supply	12-36 VDC
Enclosure Rating	Class I, Div 1, Groups C&D UL
Zero and Span Adjustment (2)	3mA to 5mA 10 to 1 turn down ratio
Accuracy	0.2% of full scale
Independent Linearity	-0.1% of full scale
Terminal Based Linearity	±0.2% of full scale
Repeatability	±0.1% of full scale
Maximum Temp. Drift	±0.1% of full scale -29°C to 65°C (-20°F to 150°F)
Shaft Rotation	Bidirectional
Mounting	Any Position
Load Limitations Straight line	12VDC      0 OHMS 36VDC     1200 OHMS

### NEPTUNE ELECTRONIC TRANSMITTER Operating and Storage Temperature Data

Model No.	VR1871	VR 7871 (HR)	500,505 550,555	Tricon-S	CL 420	50	
<b>Environment</b>							
<b>Operating</b>	°C	-40 to +71	-40 to +182	-26 to +125	-40 to +52	-31 to +65	0 to +93
	°F	-40 to +160	-40 to +180	-15 to +185	-40 to +125	-25 to +150	+32 to +200
<b>Storage</b>	°C		-55 to +125	-51 to +121		-45 to +71	
	°F		-67 to +257	-60 to +250		-50 to +160	



Measurement Division

