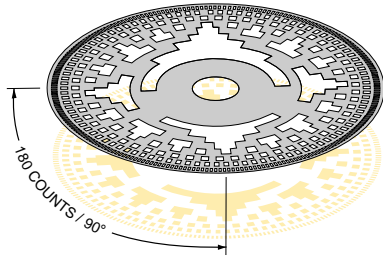


Transmitters

Spectrum DT Position Transmitter



General Description

The Westlock digital valve position transmitter represents a state of the art departure from conventional practice. Sensing of valve position is accomplished in a totally digital manner. No potentiometers, LVDTs, or other analog means are employed for determination of shaft angle. Philosophically, the design is intended to offer advantages of digital sensing, with the flexibility offered by conventional 4 to 20 mA analog transmission, which remains the most popular signal standard in the process industry.

The transmitter is based upon use of an optical absolute shaft encoder, providing non-contact determination of shaft angle by methods inherently free of error and instability. The only moving part is a disc, carrying coded patterns corresponding to shaft angle. The disc is read optically, utilizing high reliability LEDs and phototransistors. Importantly, the LEDs are excited for only very small time intervals (duty cycle is typically less than 1%), further increasing reliability. High quality ceramic integrated circuits are used, again in the interest of greatest reliability.

A minimum of analog circuitry is employed, resulting in superior stability. Maintenance is also simplified due to use of digital sensing. In that regard, replacement of one small board, without need of any calibration whatsoever, constitutes a complete electronics changeout.

Although the transmitter is a rotary motion device, it can be equipped with linkage in the same manner as many popular valve positioners, for control valve use. Where linearization is required, it can be provided via encoder disc pattern characterization.

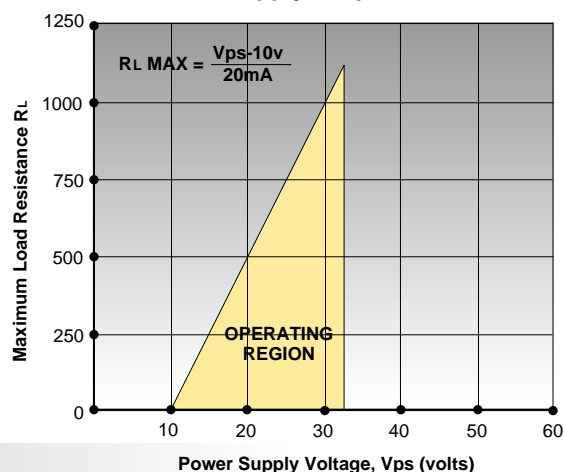
Resolution is 1/2 degree, corresponding to 180 encoder sensing increments in 90° of shaft rotation. Although the 4 and 20 mA endpoints are normally provided to cover a 90° angular segment, 19° of over-range is provided, resulting in a maximum loop current of 23.38 mA. Underrange capability is also provided, again at two encoder counts per degree of rotation, down to the transmitter keepalive current of approximately 3.5 mA.

Operating Description

The shaft encoder is an 8 bit device, utilizing grey code parallel outputs. Grey to binary conversion takes place before further signal processing, as shown in the accompanying block diagram, Fig 1. Data corresponding to shaft position is latched, and fed to a high quality digital to analog convertor, with timing synchronized to encoder LED excitation. A precision, low drift voltage reference is utilized for the D/A convertor DC source, as it is for the scaling and live zero circuitry which follows. Voltage to current conversion develops the true current sink output characteristic provided by the transmitter. Current sampling and feedback assure that a current which is truly representative of shaft position is generated.

The internal power supply is derived in total from the 4 to 20 mA signal loop. Stored energy from that power supply is delivered to the encoder LEDs for excitation on a pulsed basis for a period of several milliseconds approximately once each second. In this manner, LED current excitation requirements in excess of 100 mA can readily be met despite the constraints imposed by 2 wire current loop operation. Operation of the data latch and D/A convertor, as mentioned above, is synchronized to LED excitation.

Power Supply Requirements

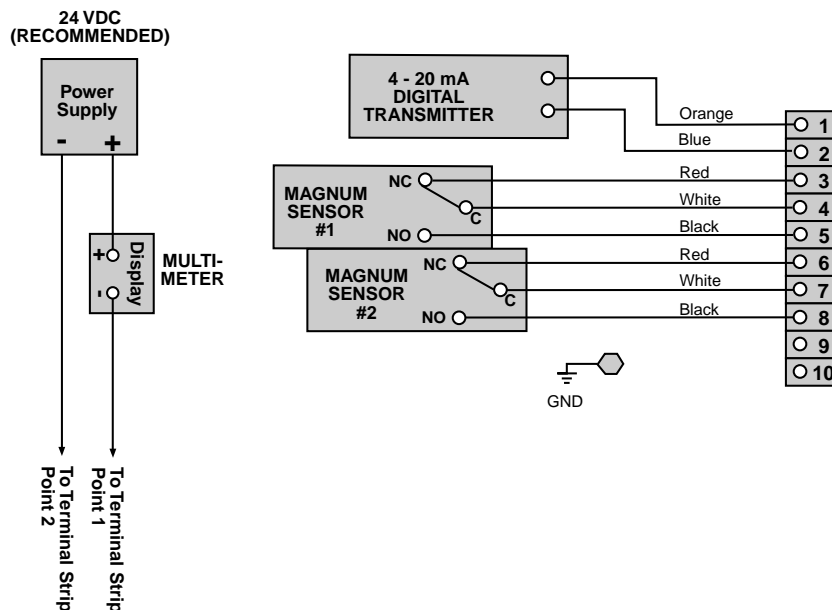


Technical Data

Transmitter type:	Angular position, intended primarily for control valve applications, damper applications, and similar uses.
Output:	4 to 20 milliamperes (2 wire), proportional to position. Position range is 90° (reversible) corresponding to nominal output current range.
Operating principle:	Absolute shaft encoder, non-contacting.
Electrical overrange capability:	19° nominal at each° end of 90° span. For travel below range bottom, output current will limit at minimum of approximately 3.2 mA.
Mechanical overrange capability:	Infinite (shaft may be continuously rotated).
End of range wraparound:	Provided 180° away from range midpoint.
Terminal voltage req.	10 to 32 volts DC. Reverse polarity protected.
Temperature range:	-29°C to +82°C. Sunshade available for use when needed.
Temperature effect:	Less than 0.01%°C referred to full scale.
Humidity range:	10% to 90%, non-condensing.
Terminal voltage effect:	Less than 0.1%, from 10 to 32 volts.
Linearity:	Within one encoder count increment.
Output update rate:	Once per second.
Startup stabilisation time:	6 seconds, nominal.
Resolution	0.5° 180 counts in 90°

Spectrum 4-20 mA Transmitter

with 2 SPDT Magnum Sensors & 10 Point Terminal Strip



NOTE: THERE IS NO REQUIRED POLARITY FOR THE 2 WIRE 4 -20 mA WIRING OF THE TRANSMITTER