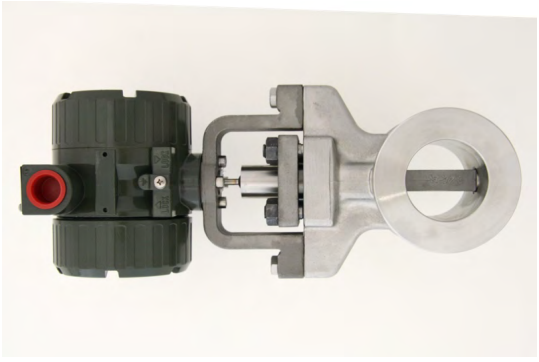
General Specifications ISTEC 7150

Vortex Flow Meters Model DY, Model DYA

Model 7150
Remote Type Detector



Based on the field proven sensor technology of the YEWFLO series vortex flowmeters, DIGITAL YEWFLO features a new amplifier with Yokogawa's proprietary Spectral Signal Processing (SSP) technology to analyze the vortex waveform into its spectral components to filter noise from signal for the most stable measurement possible.
DIGITAL YEWFLO will provide excellent vibration immunity for stable, accurate measurements at low flows without any need for start-up tuning. The user benefits through greater reliability, reduced maintenance and a lower total cost of ownership.

■ FEATURES

- SSP (Spectral Signal Processing) technology:
  A unique signal processing technique extends the features of Digital Signal Processing (DSP). Analyzes incoming signals and applies an intelligent amplification circuit based on measured frequency and predicted process conditions.
- No start-up tuning
  Automatically selects the optimum settings – even in noisy environments
- Low flow stability
  Accurately senses vortices at low flow rates for stable, accurate flow measurement
- Backward compatible
  The SSP amplifier can be retrofitted to provide the best vortex flow measurement available today
- Advanced self-diagnostics
  Analysis of the process allows true condition-based maintenance
- Simplified parameter settings
  Frequently used parameters grouped together in a quick-access format decreases commissioning time
- Clear, parallel two line LCD display
  Displays simultaneous flow rate and total along with process diagnostics
- New compact amplifier housing
  Lighter, small and easier to handle design with increased reliability and performance
- Simultaneous analog and pulse outputs
- Status output (flow switch function) or alarm output
- BRAIN and HART communication
- Configurable through local display interface (MMI)
- Wide process temperature range
  High temperature option to 842°F (450°C)
- High accuracy
  ±0.75% of reading (liquid)
  ±1% of reading (gas, steam)
- 100 ft. (30m) signal cable length for remote amplifier configuration
- Compliance with NACE and NAMUR 43
- Explosion proof and intrinsically safe designs

■ MULTI-VARIABLE TYPE (OPTION)

- Integral temperature sensor (Pt1000)
- Calculates mass flow of saturated steam based on steam tables embedded in the software and the mass flow of liquids based on programmed fluid temperature coefficients.
- Provides simultaneous outputs for temperature monitoring and mass flow measurement
- Displays mass flow rate and temperature on two line LCD indicator

Contents

■ STANDARD SPECIFICATIONS

Performance Specifications

Fluid to be Measured:
Liquid, Gas, Steam (Avoid Multiphase Flow and Sticky Fluids)

Measuring Flow Rates:
Refer to Tables10, 11, and 12, pages 8 and 9

Accuracy:
±0.75% of Reading (Liquid)
±1% of Reading (Gas, Steam)
Refer to Table 8, page 8
Refer to Table 3, Page 7 for multi-variable option

Repeatability:
± 0.2% of Reading

Calibration:
factory-calibrated using water flow.

Normal Operating Condition

Process Temperature Range:
General: -40 to 500°F [–40 to 260°C]
High Process Temperature Version option
-40 to 842°F [–40 to 450°C]
Refer to Figure 1 for integral converter type.
Refer to Page 6 for multi-variable option

Process Pressure Limit:
-14.2 PSIA (–1 kg/cm2) to flange rating.

Ambient Temperature Range:
Remote type detector, Remote type converter: -40 to 185°F [–40 to 85°C]
Integral type, refer to Figure 1:
-40 to 185°F [–40 to 85°C]
Integral type with Indicator, refer to Figure 1: -22 to 176°F [-30°C to 80°C]

Ambient Humidity:
5 to 100% RH (at 40°C)
(Non Condensing)

Power Supply Voltage:
10.5 to 42 V DC
(Refer to Figure 2 ; Relationship Between Power Supply Voltage and Load Resistance)

Mechanical Specifications

Material (General Type):
Refer to Table.1

Body: CF8M casting stainless steel (SUS316)
Shedder bar: Duplex stainless steel (ASTM CD4MCu equivalent to JIS SUS329J1,)
Gasket: JIS SUS316 stainless steel with polytetrafluoroethylene (Teflon) coating.
Converter housing and case, cover: Aluminum alloy

Coating Color:
Converter case, cover: Deep sea moss green (Munsell 0.6GY 3.1/2.0)
(Polyurethane corrosion-resistant coating)

Protection:
IP67 immersion proof and dust proof. (NEMA 4X).

Hazardous Area Classifications:
Refer to item “Option Specifications”

Electrical Connection:
ANSI 1/2 NPT female

Signal Cable:
Model DYC cable, used for remote detector and converter.
Max. length: 98 ft. (30 m.)
Outer Sheath Material: Heat resistant polyethylene
Temperature Rating : -40 to 302°F [–40 to 150 °C]

Weight:
Refer to Dimensional Drawings.

Mounting:
Integral type and Remote type detector : Flange mounting or wafer mounting
Remote type converter : 2 inch pipe mounting.

Electrical Specifications

*Note: Pulse output, alarm output and status output use common terminals, therefore these functions are not used simultaneously.

Output Signal: Simultaneous Output (both analog and transistor contact output available). Refer to “Installation” for power supply and pulse output wiring.

Analog: 4 to 20 mA DC, 2-wire system.

Transistor Contact Output*:
Open collector, 3-wire system.
Pulse, alarm, status output are selected by parameter setting.
Contact rating: 30 V DC, 120 mA DC
Low level: 0 to 2 V DC. (refer to Figure 3)

Communication Requirement

Communication Signal:
BRAIN or HART communication signal (superimposed on a 4 to 20 mA DC signal)

Conditions of Communication Line:

Load Resistance: 250 to 600 Ω(including cable resistance). Refer to Figure 2.

Supply Voltage: 16.4 to 42 V DC for digital communications BRAIN and HART protocols .(16.4 to 30 V DC for intrinsically safe type). Refer to Figure 2.

Spacing from Power Lines :
6 in. (15cm) or more (Parallel wiring should be avoided.)

BRAIN

Communication Distance:
Up to 1.2 miles (2 km),when polyethylene insulated PVC-sheathed cables (CEV cables) are used. Communication distance varies depending on type of cable used.

Load Capacitance:
0.22 µF or less

Load Inductance: 3.3 mH or less

Input Impedance of Receiver Connected to the Receiving Resistance:
10 kΩ or more at 2.4 kHz.

HART

Communication Distance:

Up to .9 miles (1.5km), when using multiple twisted pair cables. Communication distance varies depending on type of cable used.

Cable Length for Specific Applications:

Use the following formula to determine cable length for specific applications.

$$L = \frac{65X10^6}{(RXC)} - \frac{(Cf+10,000)}{C}$$

where:

L=length in meters.

R=resistance in Ω (including barrier resistance)

C=cable capacitance in pF/m.

Cf= maximum shunt capacitance of receiving devices in pF/m.

Functions

Damping Time Constant:

0 to 99 Sec (63% response time)

*Note: Delay time is 0.5 Sec.

Analog output circuit time constant is 0.3 Sec.

Pulse Output Function*:

Pulse output is selected from scaled pulse, unscaled pulse, frequency (number of pulses output per second at 100% of output).

Pulse frequency: Max 10 kHz

Duty cycles: Approx. 50% (1:2 to 2:1)

Self -diagnostics and Alarm Output*:

In an alarm condition (over range output signal, EEPROM error, vibration noise, abnormal flow such as clogging, bubble) an alarm signal is output and indicated. The alarm signal output goes from close(ON) to open(OFF) during alarm.

Analog Output Function:

For multi-variable option the analog output corresponds to flow rate or temperature.

Status Output Function*

Flow Switch:

In case flow rate falls below the flow set value, a status signal is output. The status signal output mode can be reversed (ON/OFF).

Data Security During Power Failure:

Data (parameter, totalizer value, etc.) storage by EEPROM. No back-up battery required.

Correction

Instrument Error Correction:

Vortex flowmeter errors can be corrected by line segment approximations.

Reynolds Number Correction:

Output error at Reynolds number 20000 or less is corrected by using five-break-point line-segment approximation.

Gas Expansion Correction:

When measuring a compressible gas and steam, this expansion factor is useful to correct the error at velocities above 115 f/s (35m/s or more).

Down-scale or Up-scale burn out

In case a CPU or EEPROM failure occurs, the output can be driven up-scale (21.6Ma) or down-scale (3.6Ma). Selection can be made by the end user via a jumper setting.

Indicator:

Flow rate (% or engineering units) and totalizer can be indicated simultaneously.

Short message for self diagnostics is displayed.

Local parameter setting can be accomplished by push buttons.

Rotatable 90° right and left

EMC Conformity Standards:

EN61326

AS/NZS 2064

Note: For remote converter type, the signal cable should be used with metal conduit.

Figure 1 Ambient Temperature Limit (Integral Type)

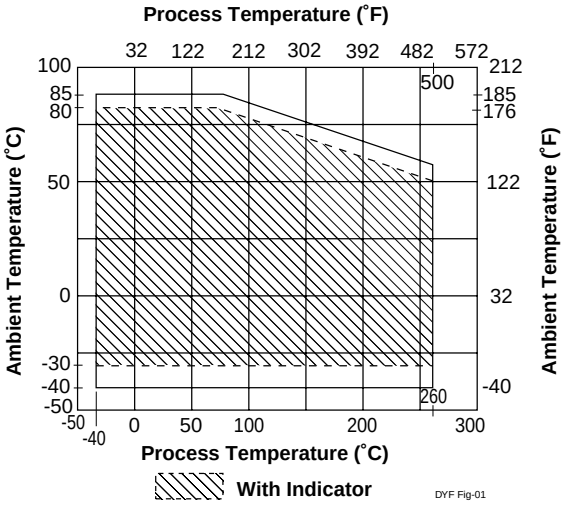


Figure 2 Relationship Between Power Supply and Load Resistance

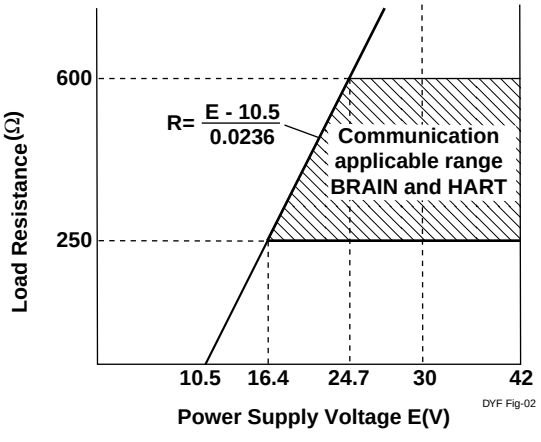


Figure 3 High and Low Level (Pulse Output)