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Water Flow Sensor

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SENTROL

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Water Flow Sensor

LINK TO RELATED SPECIFICATIONS					
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1 Scope

This specification provides the mechanical, electrical and physical requirements of Hall Effect type water flow sensor for use in water quantity measurement sensor products. The sensors included are plastic body, Impeller, magnet, O-ring, wire harness and connector. The sensor must be suitable for operating at 0°C to +50°C with the supply voltage 5.0 Vdc to 15 Vdc.

The product components layout is to comprise a Hall IC, wire harness and a plastic housing. Electrical connections must be located as specified in this document to ensure compatibility with specific SENTROL package styles. The output voltage must be proportional to the water flow rate.

Equipment, equipment settings, tooling and process flow required to achieve the requirements described below are not in the scope of this document but must be included in Suppliers Process Flow, FMEA and Control Plan and any changes are subject to Supplier Change Request which must be approved by SENTROL.

2 Basic Requirements

2.1.1 Mechanical Structure

- Sensor is to consist of wires for power supply, ground, output and plastic Housing
- Wire must be RoHS compliant.
- The Sensor feature is shown in Figure 1, dimension and tolerances of all external Sensor features (height, width, length, location etc) are relevant to packaging fit and must be specified on the Part Drawing.
- Mounting dimension of sensor housing and wire harness must also be shown on the Part Drawing.
- Wire grade, number, color and its order must be specified on the Part Drawing

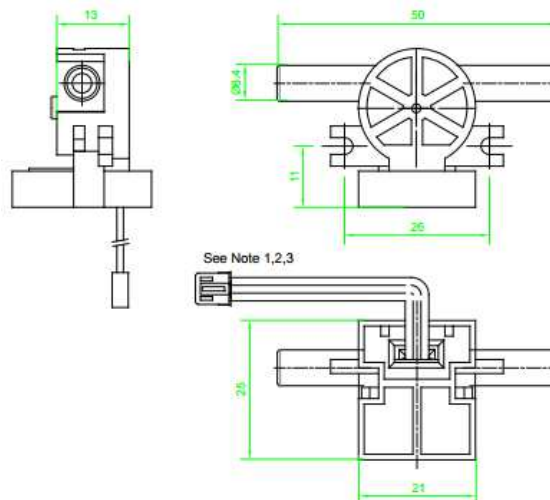


Figure 1 Feature of the water flow sensor.

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2.1.2 Electrical Connections

- The wire layout of the Sensor is shown in Figure 1, the exact connection of each wire and colour order must be specified on the Part Drawing. Red – Vcc, Black – Ground, White - Vout
- Electrical function is defined in Section 3.1.

2.1.3 Environmental Durability

- The sensor must be designed to include all necessary electrical isolation required to minimize the effects of any contamination which may be present due to processing/materials of the components, part itself or which may become present on the sensor from manufacturing and application environments.
- The sensor must also withstand exposure to the high and low temperature environment and to the water.

3 Water Flow Sensor Characteristics

3.1 General Definitions

This Section defines the parameters which are used in the Sections 2 to specify the water flow Sensor.

3.1.1 Electrical Circuit

Equivalent circuit layout for Sensor is shown in Section 2.1.

This circuit defines the connections for the Supply (V_{DD}), Ground (GND), Output (V_o)

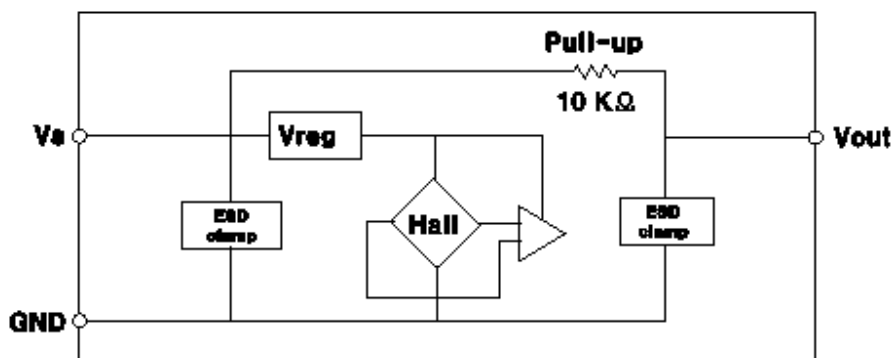


Figure 2 Circuit schematic diagram of the sensor. This diagram Hall IC circuit.

3.1.2 Output Voltage Characteristic

The Output Voltage (V_{OUT}) is open collector structure and an internal pull-up resistor is in the circuit. The output is high in north pole of magnet and the output signal drops when the south pole of the magnet is closed to the Hall IC. See the test procedure in 5.2.

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Output Signal

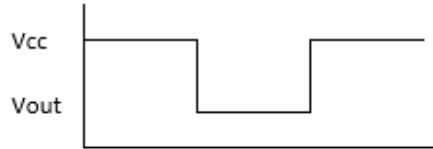


Figure 3 Output diagram of the sensor

3.2 Maximum Ratings

Unless otherwise stated values are specified at **5±0.1Vdc** at **25±3°C**

Item	PARAMETER	SYMB	CONDITIONS	MIN	TYP	MAX	UNIT
ELECTRICAL EXCITATION							
3.2.1	Maximum Supply Voltage	V _{cc}		5.0		15	V
3.2.2	Maximum Output Current	I _s				20	mA
TEMPERATURE RANGE							
3.2.3	Operating Temperature Range			0	25	50	°C
3.2.4	Storage Temperature Range			0	25	80	°C

This parameter can be verified for each part on process monitor structures if necessary

3.3 Performance Characteristics

Unless otherwise stated values are specified at **5±0.1Vdc** at **25±3°C**

Item	PARAMETER	SYMB	CONDITIONS	MIN	TYP	MAX	UNITS
SUPPLY VOLTAGE AND BRIDGE RESISTANCE							
3.2.5	Operating Supply Voltage	V _{cc}		5.0	-	15	V
3.2.6	Supply Current	I _s		-		10	mA
3.2.7	Output Current			-	-	20	mA
OUTPUT SIGNAL							
3.2.8	Output High	V _{High}		V _s -0.3		V _s +0.3	Vdc
3.2.9	Output Low	V _{Low}		-	0	0.5	Vdc
3.2.10	Output Signal – low volume		300cc per minute	13.3	14.3	15.3	Hz
3.2.11	Output Signal – high volume		1,000cc per minute	120.7	129.8	138.9	Hz

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4 Output Signal Pulse per water flow rate

This Section defines the output pulse test data which must meet the requirements specified in Sections 3.3. The requirement of the pulse number as per the water flow rate must in this graph and table.

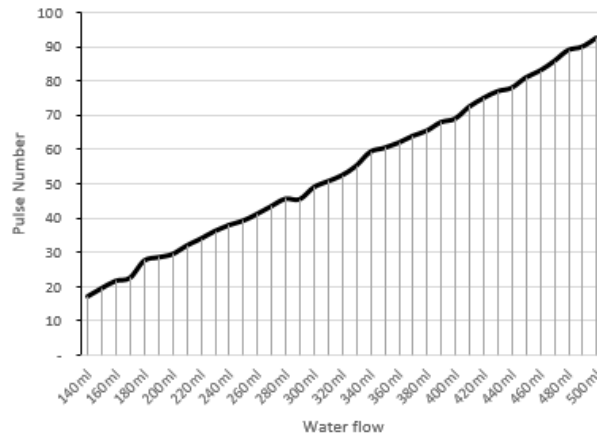


Figure 4 Output pulse number graph

5 Test condition and procedure

5.1 Basic function test

5.1.1. Function test procedure: Connect to the fitting hose to the water flow sensor, set the water pressure to 3.0 bar, connect the Vcc power, ground line to the sensor's connector and turn on the tester until the water pressure is 3.0 bar, and then check the sensor signal show the high and low digital output if the sensor signal is normal, and turn off the pressure switch and then wait for 1 minute to see the water leakage.

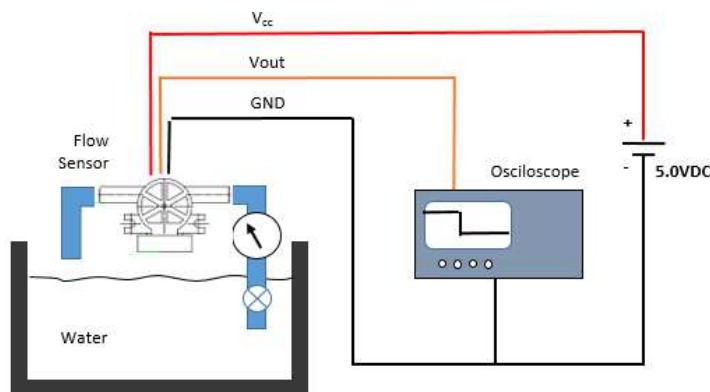


Figure 6 Function test diagram

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5.1.2. Insulation test: > 100M Ohm

5.2 Environment Test

5.2.1 High Temperature Test in Air

To determine behaviour during and after high temperature stress, samples are to be exposed to the following conditions:

- Temperature: **70°C ± 5°C**
- Dwell Time at Temp: **1 hour**
- Cooling Time: **< 1 hour**

5.2.2 Low Temperature Test in Air

To determine behaviour during and after low temperature stress, samples are to be exposed to the following conditions:

- Temperature: **-20°C ± 5°C**
- Dwell Time at Temp: **1 hour**
- Dry Time: **< 1 hour**

5.3 Vibration Test

To determine behaviour during and after vibration test, samples are to be exposed to the following conditions:

Frequency: 1000 Hz
Amplitude: 2mm
Mounting face of sensor: X, Y & Z direction
Duration: 20 minutes at each direction

5.4 Drop Test

To determine behaviour during and after vibration test, samples are to be exposed to the following conditions:

Height from ground: 75 mm
Drop direction: X, Y & Z direction of the sensor

The sensor must meet the requirement after the environment test.

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5.5 Shipping and Handling Conditions

5.5.1 Cleanliness

The Sensor must be supplied free from all forms of contamination such as dust water or oil liquid residues.

5.5.2 Shipping Conditions

- The sensor must be shipped on a carton box - the dimensions and mechanical details of this packaging must be specified on the Part Drawing.
- Sensor must be bundled by 25 sensors and packed the 2 bundles in a plastic pack.
- The packing quantity in the carton box must be defined by sensor channel and it size
- Shipping Identification information must be supplied with each box shipment as follows: -
 - Purchase Order Number (Date of order may be substituted)
 - SENTROL Part Number
 - Lot Number
 - Number of Good