



DESCRIPTION • INSTALLATION • MAINTENANCE INSTRUCTIONS

FLOW GAUGES

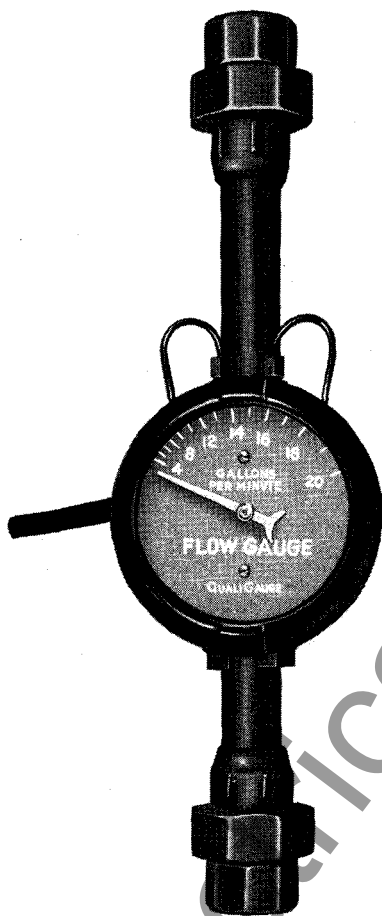


FIG. 1. Front View of Flow Gauge.

THE WESTINGHOUSE FLOW GAUGE is an indicating differential gauge, with alarm contacts, operated by the differential pressure across a Venturi tube.

The flow gauge (Fig. 1) is composed of four main component parts (shown in Fig. 2): (1) the Venturi Tube; (2) the air traps; (3) the differential pressure gauge; (4) the alarm contacts.

The Venturi tube is made of rust resistant metal. It is tappered to take a standard 1-inch iron-pipe-size line and is designed to read correctly for flow in

one direction only, downward through the Venturi tube being standard.

Two air traps are placed between the Venturi tube and the gauge to prevent water being carried over into the gauge. These traps also act as a chamber for the deposit of dirt and silt which might otherwise enter the gauge. A drain plug is provided in each air trap for cleaning out, when necessary, by simply removing the plug and allowing full line pressure to force water through the traps. Both air trap drain plugs are located at the bottom of the gauge.

The differential pressure gauge has two siphon bellows arranged co-axially. One end of each bellows is securely fastened to the frame of the gauge. The two adjacent ends are attached to a common shaft which transmits the movement of the bellows to the alarm mechanisms and to the pointer, indicating on a scale the rate of water flow in gallons per minute.

The alarm contacts are positive in action and are located in a dry, weatherproof compartment. They are suitable for either a-c or d-c supply, being rated at 1250 volt-amperes, 110-440 volts a-c, 125 volt-amperes, 125-250 volts d-c non-inductive load, or 12.5 volt-amperes, 125-250 volts d-c inductive load with $L/R=0.026$. One make and one break contact are available, being equivalent to a single-pole, double-throw switch. The contacts are adjustable over the entire range of the scale and make with decrease or increase in flow depending upon the connection used. They can be adjusted by turning the adjusting screw with a screw driver after the bezel is removed.

The outline dimensions of the entire gauge are $4\frac{3}{4}$ " O.D. x 6" deep. The shipping weight is approximately 20 pounds for domestic shipment and approximately 30 pounds for export shipment.

INSTALLATION

The complete gauge is designed for installation in a 1-inch iron-pipe-size line and for a maximum pressure of 50 pounds per square inch. Care should be taken not to connect the gauge to a line of higher

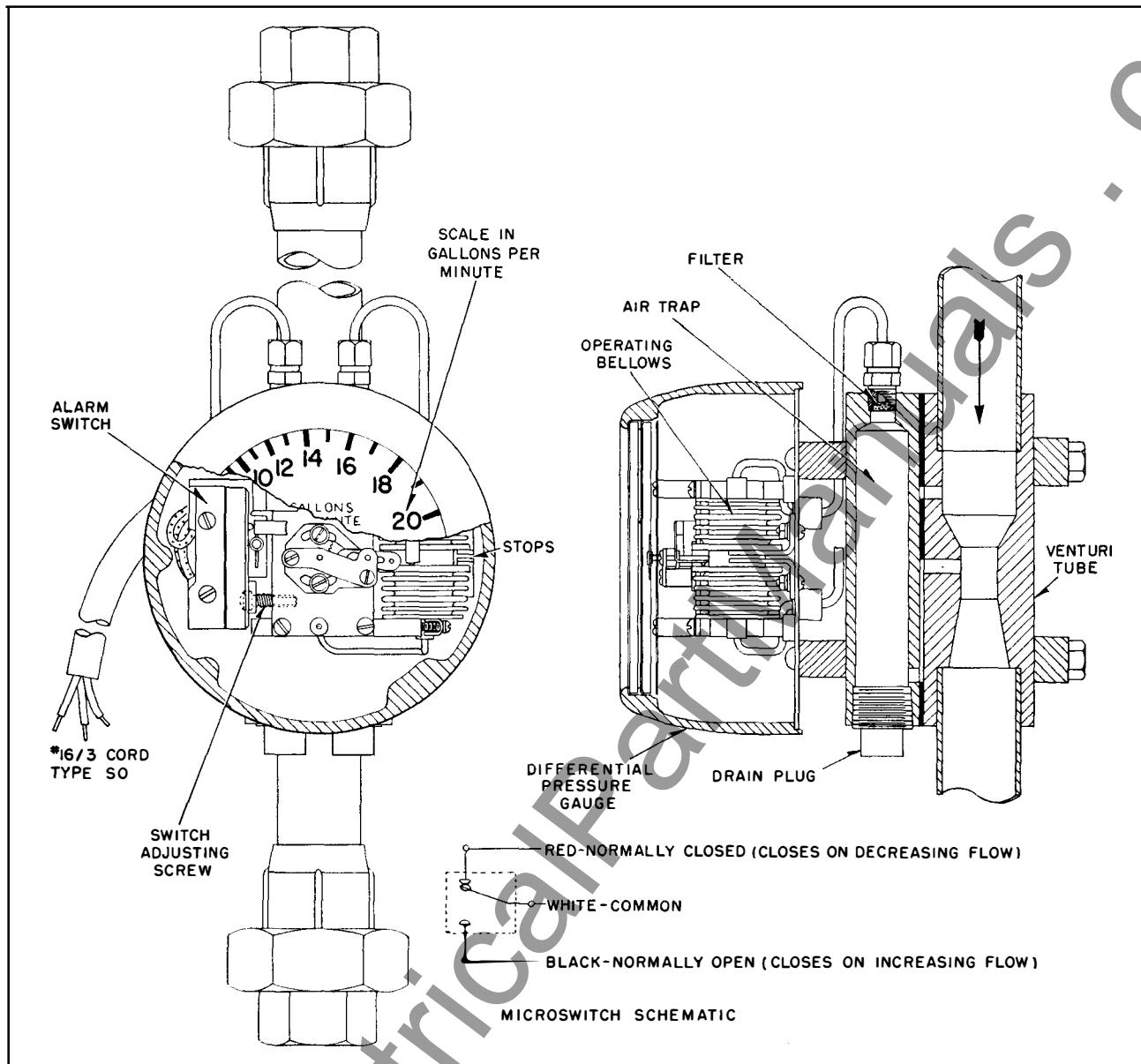


FIG. 2. Cutaway View and Switch Schematic of Flow Gauge.

pressure. The standard gauge for transformer application is designed to read correctly when the flow is down, through the Venturi tube. The direction of flow is indicated by an arrow on the Venturi tube. If the water flows in the wrong direction, the gauge will not read correctly with any rate of flow.

The gauge should be mounted only in a vertical position and the pipe connections made only to the unions furnished with the device. Do not remove the pipe nipples attached to the Venturi tube or damage them with wrenches, since this will change the calibration of the instrument.

Special gauges can be supplied for application to lines where the flow is up through the Venturi

tube or for special scale readings of litres per second, litres per minute, or Imperial gallons per minute, etc. Gauges can also be supplied for those cases where it is not feasible to mount the gauge on the Venturi tube. In this case, the gauge is mounted separately and connected to the Venturi tube by means of copper pressure tubes.

The alarm circuit is connected so that white (common) closes on black on increasing flow and white closes on red or (green) on decreasing flow.

Important: When used in extremely cold weather, it is possible that the water in the air traps may freeze and damage the gauge. The customer should make provisions against

freezing by means of a suitable heated housing. However, if the heater is left in the circuit continuously, the temperatures will be excessive during warm weather, and the bellows will likely expand and affect calibration. The maximum temperature should not be allowed to go above 120°F. It is recommended that a pilot light be connected in the heater housing circuit to show when the heater is in operation.

Note: When the gauge is not in use, the air traps should be carefully drained. Every precaution has been taken in the design to prevent water entering the bellows; nevertheless, some moisture may get in either by condensation or otherwise. To prevent freezing of the bellows when the gauge is not in use, the entire gauge should be removed and stored in a warm place unless it is installed in a heated housing.

Note: When the gauge is used with water cooled transformers, it should be mounted as shown on the outline drawing of the transformer.

Important: At all times the gauge must be carefully handled by grasping the body. Never handle it by whatever piping may be connected to it.

Important: When checking circuits through this instrument it is necessary to observe the switch limitations on page 1. This means that a low voltage bell ringer cannot be used unless switched through a high impedance relay. An indicating light type device is generally recognized as best for checking circuits through instruments containing micro-switches of similar capacities.

OPERATION

The Westinghouse Flow Gauge measures the water flow by means of the differential pressure across a Venturi tube acting on two bellows working in opposition. A suitable operating mechanism connects a pointer and the alarm contacts to the bellows. The gauge will operate satisfactorily at water pressures up to and including 50 pounds per square inch. Its accuracy is within 5 per cent of full scale reading at any reading from half to full scale.

Field Test: This instrument may be field tested providing the proper equipment is available and the necessary precautions are observed. A water source should be available capable of 50 pounds per square inch pressure and a flow rate in excess

of the instrument rating. The instrument should have a valve at its entrance and exit, and should be mounted over a tank seated on a weighing device.

50 psi Pressure Test. Partially open both valves and allow the water to run, then gradually close off the exit valve, and then open up the entrance valve to bring the pressure up to 50 psi and hold for five minutes. Do not exceed 50 psi pressure at any time. Observe for any leaks.

Calibration Test. Open up the exit valve full, and control the flow rate by the entrance valve. Collect a minimum of 200-300 pounds of water in the tank and check the time period. The larger the amount of water collected the greater the accuracy. A stop watch reading in hundredths of seconds is recommended for this test. The measured and indicated flow rates should check within 5 percent of full scale reading for any point from half to full scale. The alarm setting may be checked at the same time and adjusted, if necessary, using instructions found on page 1. When checking the operation of the micro-switch be sure to observe the warning note about the switch capacity.

MAINTENANCE

The gauge should be periodically inspected and the air traps cleaned occasionally. The drain plugs must be screwed in tightly after each cleaning to make the air traps air tight.

Note: It is recommended that all gauges requiring repairs be returned to the Sharon Works through the nearest Engineering & Service Department. The repair of any of these gauges by the customer is not recommended.

REPLACEMENT

In the event it becomes necessary to replace the gauge, give stock order number or serial number of transformer. Address all correspondence to the nearest Westinghouse Office.

When purchased separately for applications other than replacements on transformers, if possible, standard gauges should be ordered. If special gauges are wanted, state desired direction of flow, maximum rate of flow, desired scale reading and any other special requirements. The Venturi tube and maximum scale reading should correspond to the maximum flow.

Note: Where larger sizes are required or where larger pipe sizes than one inch are desired, the proper number of standard gauges suitably arranged in parallel is recommended.



WESTINGHOUSE ELECTRIC CORPORATION
SHARON PLANT • TRANSFORMER DIVISION • SHARON, PA.

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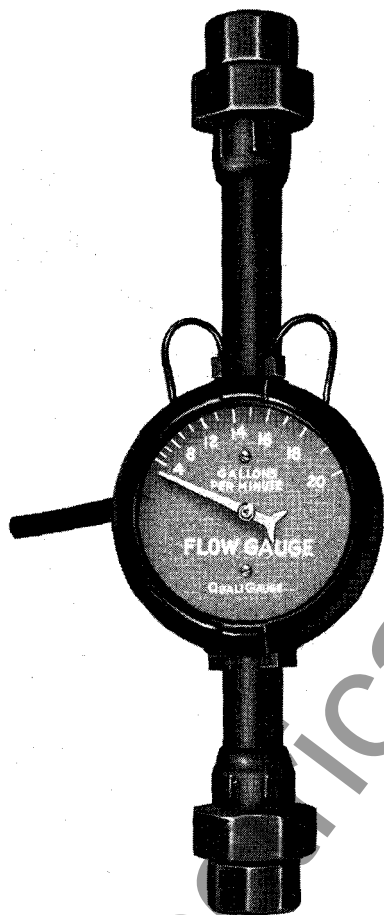


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The Venturi tube is made of rust resistant metal. It is tapped to take a standard 1-inch iron-pipe-size

line and is designed to read correctly for flow in one direction only, downward through the Venturi tube being standard.

Two air traps are placed between the Venturi tube and the gauge to prevent water being carried over into the gauge. These traps also act as a chamber for the deposit of dirt and silt which might otherwise enter the gauge. A drain plug is provided in each air trap for cleaning out, when necessary, by simply removing the plug and allowing full line pressure to force water through the traps. Both air trap drain plugs are located at the bottom of the gauge.

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The outline dimensions of the entire gauge are $4\frac{3}{4}$ " O.D. x 6" deep. The shipping weight is approximately 20 pounds for domestic shipment and approximately 30 pounds for export shipment.

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The complete gauge is designed for installation in a 1-inch iron-pipe-size line and for a maximum

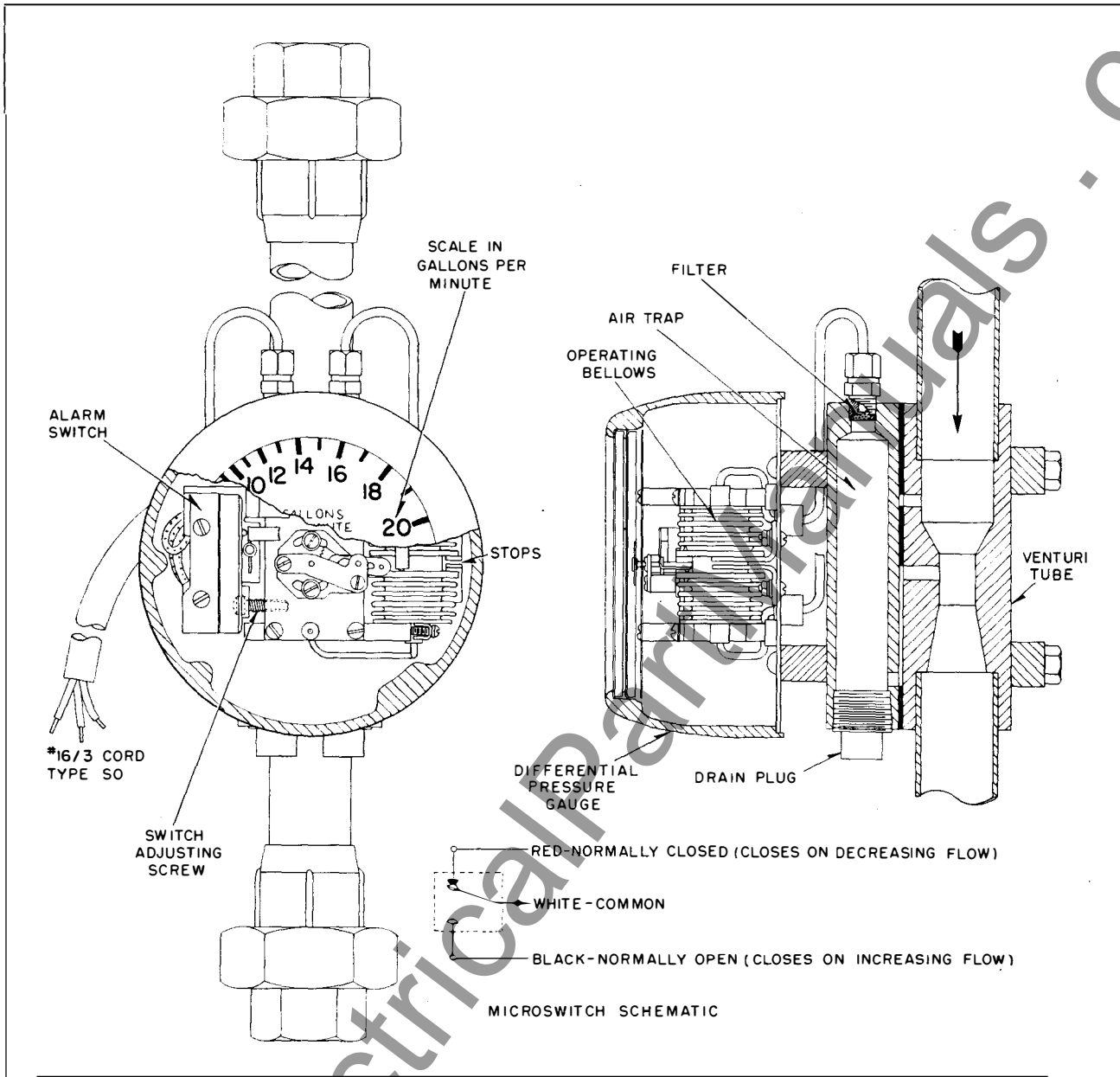


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pressure of 50 pounds per square inch. Care should be taken not to connect the gauge to a line of higher pressure. The standard gauge for transformer application is designed to read correctly when the flow is down, through the Venturi tube. The direction of flow is indicated by an arrow on the Venturi tube. If the water flows in the wrong direction, the gauge will not read correctly with any rate of flow.

The gauge should be mounted only in a vertical position and the pipe connections made only to the unions furnished with the device. Do not remove the pipe nipples attached to the Venturi tube or the calibration will be changed.

Special gauges can be supplied for application to lines where the flow is up through the Venturi tube or for special scale readings of litres per second, litres per minute, or Imperial gallons per minute, etc. Gauges can also be supplied for those cases where it is not feasible to mount the gauge on the Venturi tube. In this case, the gauge is mounted separately and connected to the Venturi tube by means of copper pressure tubes.

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