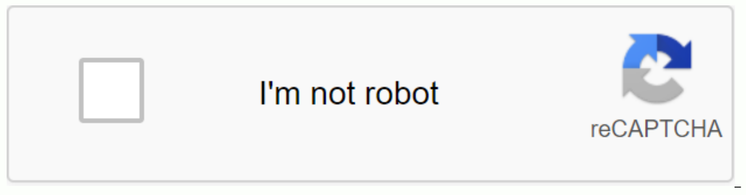

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Magnetic flowmeter calibration

AutoQuiz is edited by Joel Don, ISA's Community Manager. Today's question about the automation industry comes from the ISA Certified Control Systems Technician (CCST) program. Certified control engineers calibrate, document, rectify and repair/replace measuring instruments for systems that measure and control level, temperature, pressure, flow rate and other process variables. Click this link for more information about the CCST program. This question comes from the Level I Study Guide, Domain 3, Troubleshooting. Level I represents a professional with five years of total training, training and/or experience. Image credit: Flow control magazIne The following article deals with the principle of the magnetic flow meter, the calibration of the magnetic flow meter and the configuration of the magnetic flow meter. In measuring and control circuits, where the process flow is a conductive liquid, magnetic flow meters can be used to measure the flow rate. When liquid flows through the meter's magnetic field, the liquid acts as a conductor. The change in potential varies directly with the fluid speed... Input and output standards Disconnect the flow pipe from the transmitter. A magnetic flow meter calibrator simulates the signal of the electrodes in the flow pipe. The operating voltage and frequency range of the calibrator shall be the same as those of the magnetic flow meter. Select the maximum output signal with the calibration range switch. Signal options include 5.10 or 30 mV AC. The magnetic flow meter calibrator has a predetermined probe, so the percent output button is used to set each output for a five-point test. Because the output is in milliampere, a milliammeter is the appropriate output measurement standard for this calibration. Calibration - Five-point test To start calibrating a magnetic flow meter, calculate the input signal value. The input signal is equal to the upper range multiplied by the calibration factor and the phase band factor. These values are specified on the data board of the device. Input signal = upper range x calibration factor x phase band factor Record the output values at each test point and use this data to determine whether the device is within the manufacturer's specifications. The following formula indicates whether the error range is within the manufacturer's specifications: Accuracy = (Deviation / Span) * 100 Deviation = Expected Value - Set Actual Value Zero at the lowest point in the range of the instrument by turning the zero adjusting screw until the initial value is correct. Then adjust the span and because zero and span interact frequently, check both until no further adjustment is required. To complete the calibration, check the up and down scalereading readings to ensure that the device is properly calibrated. Instrumentation Tools – Feb 1, 18 Magnetic Flow Meter Based on Electromagnetic Induction. These flow meters are commonly used as magnetic magnetic or simply Magflow meter. Magnetic flow meters (magmeters) are often used in water and wastewater applications due to the conductivity properties of the water. In an article in water & Wastewater Asia, Better Flowmeter Management with EDDL, Jonas Berge from Emerson describes how intelligent magmeters ... Accurate and reliable measurement, more reliable conduit detection and low maintenance costs for calibration... For those unfamiliar with measuring a magmeter, Jonas describes it as [hyperlink added]: ... based on the principle of the Faraday Law: A conductor moving through a magnetic field induces a voltage that is proportional to the speed of the conductor. In a magnetic flow meter, two coils at the top and bottom of the flowtube are driven by the transmitter to produce a pulsed magnetic field with consistent strength. The induced voltage is proportional to the speed of the conductive liquid flowing through the flow pipe. Over time, the calibration of these meters can drift due to temperature, vibration and electrode coating, to name just a few causes. The traditional way to recalibrate the device: ... the flow meter to be switched and the wiring had to be disconnected before the simulator could be connected. Then the electronics needed time to warm up. The configuration of the transmitter had to be changed for the check and then returned to the operating settings. This process was disruptive and time-consuming. Jonas raises a second traditional method of calibration with a: ... mobile Prover Rig and qualified technicians. This procedure is labor-intensive and disruptive. External contract work is costly and increases dramatically with line size. Smart Meter Verification Technology makes it possible to check calibration while keeping the magnetic flow meter in place. Jonas shares the functionality of this technology: The current properties for magnetic field strength and electrode resistance are compared with the basic parameter values when the Magnetic Flow Meter was last fully calibrated. The basic parameters for the coil resistance are captured during installation. Test criteria can be set to what is required to meet the compliance requirements for the application. The discrepancy between the current values and the base values that exceed the test criteria indicates that full calibration is required. Checking smart meters does not eliminate the need for calibration, but detects when it is required. Instead of performing these calibration procedures according to a schedule, operations are Maintenance when calibration needs to be performed based on current performance versus baseline performance. Jonas points out that the combination of digital bus technologies such as Foundation Fieldbus, HART and WirelessHART in combination with Electronic Device Description Language (EDDL) offers a way to: smart meter verification process remotely from the control center or maintenance workshop. He notes: EDDL wizards created by the flow meter manufacturer perform the technician step-by-step; no special training is required. The percentage completion is displayed throughout the process so that technicians know how long they need to wait. The Counter Check Wizard makes this a simple pass of such a mistest. Read the article to learn more about how these diagnoses help the maintenance team identify and warn about electrical disease, grounding problems, conduit detection, and meter and environmental issues. Volume 9, 1982, pages 95-105Electromagneticelectromagnetic flowmetercross-correlation function View full text