

Specification for CBX Automatic Sludge Blanket Meter



Application

The CBX is used for automatic measurement of sludge blanket level in clarifiers, thickeners, etc. in water and wastewater treatment plants. Unit consists of one sensor control box and separate processor control box that will accommodate up to four different types of sensors. Sludge blanket monitor to generate two depths, 1st - blanket depth at preset concentration and 2nd - fluff depth at preset concentration both as mA outputs.

Sensor Control Box Assembly

***Sensor**

The measuring principle is based on transmission of a single NIR (Near Infra-Red) light beam between two glass prisms and the ability of particles to absorb this light. NIR light is not sensitive to color and does not contribute to biological growth as with visible light. Light source to be 880 nm wavelength NIR light (reflective design sensors are not acceptable). The sensor should be lowered at programmable intervals or pulses from the limit switch activated by the rake until the sludge phase is found or blanket level detected. Second measurement should be available for fluff depth from a programmed concentration. The sensor is then raised and cleaned with a built-in water flushing system after each cycle. The sensor head should be made of 316SS and attached to 33' (10 m) of 4 conductor cable with Teflon outer coating, in order to withstand mechanical wear and chemical attack from various fluids.

***Control box**

Winch assembly to consist of motor, 110/1/60, aluminum winding drum where cable winds on top of itself and SS weather-proof enclosure. Winch includes flushing mechanism for probe and 1/2" npt (12 mm) hose connection for flushing water. Maximum flush water pressure is 90 psig (6bar). Winch has safety clutch to prevent major damage in case of probe being caught in the rake. Safety clutch is adjustable from motor to winch drum. Probe speed to 5.7" per second. Sensor to have built-in tilt alarm, so sensor will return to home position, if it contacts the rake or any other item trip down. Control box comes with built-in heater, fan and thermostat and automatic shutoff feature if internal temperature of control box goes below freezing to alleviate damage to unit from cold weather.

***Mounting**

The Sludge Blanket Monitor is equipped with SS handrail frame with two (2) 1.5" SS u-bolts for attachment to handrail. Optional 4" & 6" SS U brackets should be available for angle handrail.

Common Processor Control Box – (up to four sensors)

Signal Processor Control Box

Control box to support up to four instruments, which can be either/or sludge blanket monitor, dissolved oxygen, suspended solids, pH, ORP, or open channel flow sensors and generates up to 4 independent and isolated 4-20 mA output signals. Control box to be designed for future upgrade to commonly used fieldbus protocols by installing a protocol board. Microprocessor based control box with self-instructing menu, digital circuitry, and illuminated graphical LCD display. Graphical display to show blanket level in feet or meters and 0-100% of mA output. Control box to have field adjustable contrast from front keyboard panel. The control box produces up to four linearized 4-20 mA, max 500 ohms galvanically isolated, output signals (12 bit resolution) proportional to blanket level or Profibus DP digital output signal. The control box has light on the front panel to indicate status of alarms. The control box enclosure should be watertight molded polycarbonate box, NEMA 4X (IP65). The power supply must be equipped with filter, fuse and varistors for protection against power surges. The control box should have EEPROM memory, so that following a power failure the control box should start up and resume measuring without requiring recalibration. Power supply is to be 110/1/60 or 220/1/50. Control box to be equipped with built-in heater on circuit board to maintain proper temperature inside control box down to -20 F outside temperature. Y-splitters are to be supplied for attachment of multiple digital sensors to a common control box.

Programming Module

Sounding intervals to be determined by internal timer or externally pulses from a rake. Timer intervals are adjustable from 4 – 120 minutes. Transmitter has an internal pulse counter that is adjustable from 1–99 pulses. Pulses are generated by external closing relay, which is activated by the rake and powered by 5 VDC supplied by the control box. Limit switch to be normally mounted 90 degrees out of phase with rake on circular clarifiers.

Zero point calibration to be done using clean de-aerated water. The control box should allow for blanket calibration against suspended solids solution at to one point. The value for the calibration point which is obtained from laboratory analysis should be able to be entered anytime after calibration since the meter correlates these to light transmission values. Output range should be easily adjustable by changing 4–20 mA output range. The Programming menus are of a cursor type.

All programming and settings are performed from the outside of the transmitter box by using a self-instructing menu controlled by just four touch pad keys. Unit to accept two calibrations points: 1) zero point using clean de-aerated water and 2) sample point using RAS and entering concentration determined by lab. In order to obtain a high accuracy on distance measurement, the unit should allow for calibration against a known distance between the probe's "home position" and a reference point. The Unit has programming offset for dead zone in order to prevent floating sludge or foam from being detected as false sludge blanket. Maximum span or travel distance to be 32' from bottom of control box to bottom of tank.

Tamperproof programming feature is required to keep settings from being changed, except by authorized personnel. In the case of power loss an EEPROM memory should save programming during power outages.

Self-Diagnostics

The software is of Multi-task design. It contains a watch-dog function connected to the microprocessor. The software should inform the “watch-dog” at least once per second that the device is working properly. If it does not, then the “watch-dog” shall restart the processor in order for the unit to resume measuring.

Warranty

The manufacturer shall warrant the equipment to be free of defects from workmanship and material for a period of one (1) year after shipment.

Supplier

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