process measurement solutions

Mobrey MSM400

Ultrasonic suspended solids density monitoring and control

Data sheet
IP257

Features

- Simple calibration
- Micro based
- Analogue output
- HART compatible
- Keypad control
- Set point relays
- Automatic desludge control

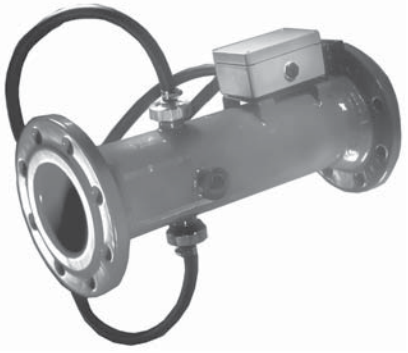
The MSM400 suspended solids monitor is a microprocessor based HART compatible, feature-rich system, with a range of built-in, display, control, alarm and communications options. Simple menu driven programming allows complete configuration of the the unit. local programming is carried out via a membrane key pad.

Desludge control systems

The Mobrey suspended solids monitoring system with a sensor mounted in the settlement tank provides analogue measurement of the settled solids blanket density at the sensor level.
This is used to initiate or control a desludge process, possibly using the relays in the MSM400.
The pipe section sensor on the discharge line from the bottom of the tank, or a sensor suspended in the outlet hopper of the tank itself, can be used to stop the desludge when the discharge density falls too low. This improves plant efficiency, by reducing the volume of liquid sent to disposal, digestion or treatment, and maintains a high average percent solids to optimise the treatment process.

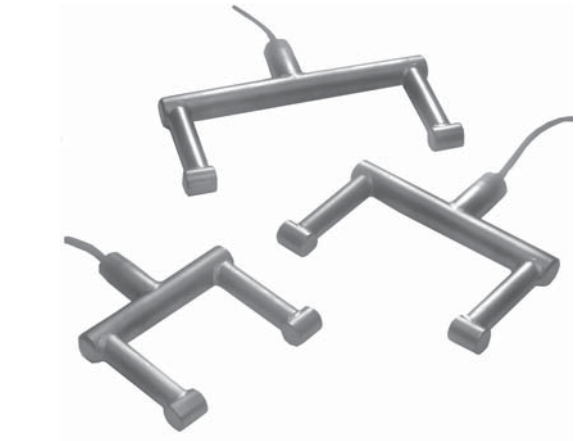
Description

Many years of practical experience have shown that measurement of ultrasonic attenuation in a slurry is directly proportional to the percentage of suspended solids. The MSM400 uses this to produce a digital display of suspended solids, plus an analogue output. The microprocessor allows HART communication on a 4-20 mA output signal. The unit also has two control relays to provide set point switches; or selected alarms for sensor failure or other fault. Built-in clock and timer functions allow time based desludge operations for normal settlement tank systems.
The MSM400 is easily programmed to suit site conditions and comes complete with a range of user selectable calibration settings for simple initial set-up. For more demanding applications and best accuracy, the system can be calibrated against reference samples, analysed for percent solids in a laboratory. All displays and output functions or scaling can be customer configured as required.
Typical display would show % solids, ultrasonic attenuation value, relay and input status, plus a bar graph representing the reading as a percent of full scale.



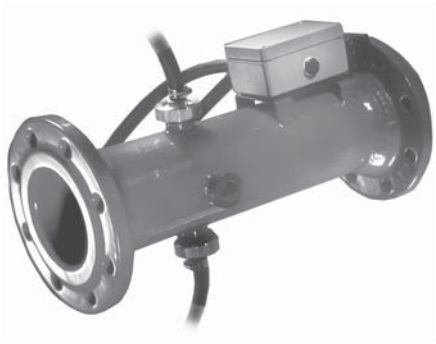
Mobrey sensor types

For suspended solids density control or monitoring of a settlement tank there are two basic sensor types - pipe section sensors for installation in the discharge line, and sludge blanket sensors for mounting in the tank. Both types of sensors are compatible with the MSM400 control unit.



Mobrey Suspended Sensor (MSM433)

The MSM433 sensor has all welded stainless steel construction, with an IP68 cable entry. The sensor can be simply mounted either by suspending it from the cable, or mounting the sensor onto 3/4" BSPT conduit. The sludge density is measured in the liquid present between the forks of the sensor, at the particular level in the tank where the sensor is suspended. This can be in the discharge hopper, to monitor the sludge about to leave the tank, or higher, to monitor the upper parts of the settled blanket.



Mobrey pipe section sensors (MSM448)

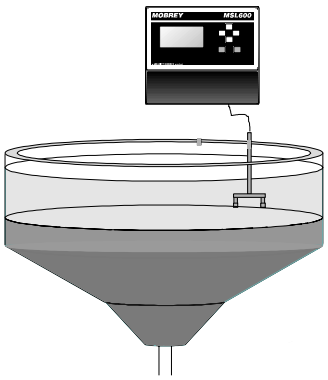
The Mobrey pipe section sensor is constructed of cast iron with stainless steel transducers. The pipe section is epoxy coated to minimise grease and debris build-up on the sensor faces, and typically monitors suspended solids during a tank desludge cycle. The sensors themselves are mounted flush with the sides of the pipeline, to prevent ragging up and to allow a cleaning action by the flowing sludge. To allow easy maintenance routines, separate connections are available for a spray nozzle and drain valve.

Technical specification

MSM400 Control unit			
Housing dimensions	237h x 257w	Output (Main relay)	SPCO 5A resistive
Fixing centres	373 x 254	Output (Fault relay)	SPCO 5A resistive or volt free contact
Enclosure rating	IP65	Trigger input	5V logic
Cable entries	3 off M20 glands 3 off M16 glands	Current input	4-20mA
		Power supply	115/230V ac 50/60Hz 24V dc
Mounting options	Wall mount	Frequency	1 MHz or 3.3 MHz automatic selection
Operating temp.	- 30°C to + 55°C	Cable termination	Captive screw terminal block
mA output	4-20mA	Max. cable size	2.5mm^2
		Hazardous approval	[EExia IIC] (option)

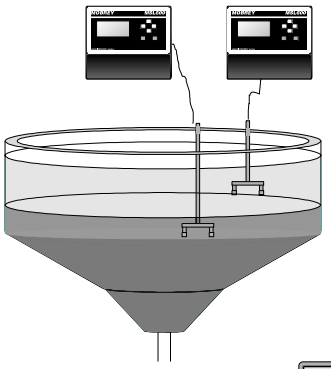
Sensors	Mobrey pipe section sensors	Tank mount sensors
Material pipe section	Malleable cast iron epoxy coated	N/A
Material sensors	316 stainless steel	316 Stainless steel
Drain fitting	1" NPT	N/A
Mounting connection	In line installation	¾" BSPT (suitable for 25mm conduit)
Flanges	DN100, DN150, DN200 to BS4772 (others on request)	Gap size 100, 150, 200 & 300mm as standard (others on request)
Max pressure	10 Bar (PN10)	105 Bar
Operating temp.	-40°C to +70°C(for T6) -40°C to +120°C(for T5)(Others on request)	-40°C to +70°C (150°C on request)
Sensor cable	Oil hose protected on pipe section, Screened twisted pair	Dual screened twisted pair
Cable length	7m from junction box (others on request)	7 metres (others on request)
Cable junction box	IP65 Aluminium alloy	Sensor is IP68
Hazardous approval	E Exia IIC T5 (option)	E Exia IIC T5 (option)

Applications



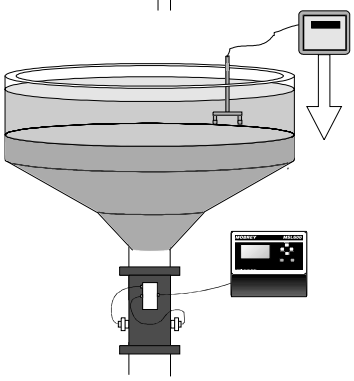
Settlement tanks for sewage or industrial slurries

In sewage processing or mineral refining, liquids with suspended solids are separated in a settling tank. The discharge slurry density needs to be high, eliminating as much water as possible, to reduce the costs of later processes, whether heating, pressing or transport. The Mobrey MSM400 systems allow monitoring of suspended solids. Typically, the percentage solids being delivered to the next process is monitored using a pipe section sensor on the discharge line. Alternatively a sensor suspended at a specific point in the settling tank is used to ensure that the tank has been used to the maximum capacity, before the discharge process commences. Similar sensors are also used in sludge thickening tanks to monitor the settlement process, identifying when the highest levels can be displaced with further sludge input.



Automated desludge processes

The MSM400 suspended solids measurement can provide an analog output signal to the main plant control system. But if required, the MSM400 has all the necessary clocks, timers, logic inputs and relay outputs to operate as a stand-alone automatic discharge control system. Typically this would operate on a clock cycle to start, and then close the discharge valve once the sensor in the outlet line indicates that the percent solids has consistently dropped below a preset level. Logic inputs can be configured to enable external control of the start or stop points of the discharge cycle.



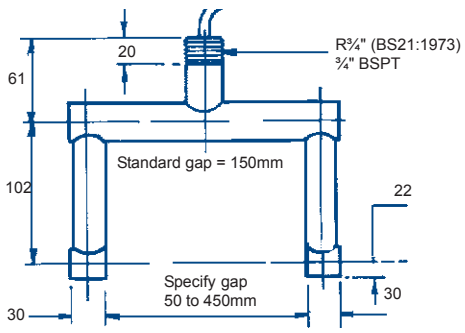
Industrial slurry processes

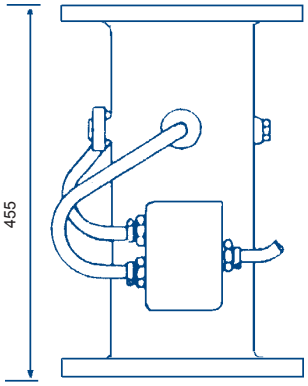
A typical industrial slurry measurement is in the refining of clay. Several stages of settlement tanks are used to obtain the correct density of china clay in the underflow, and all these discharges are monitored by Solartron Mobrey ultrasonic systems. Elsewhere in the process the percent solids measurement is linked to flowmeter outputs to give solids mass flow. Other mineral ores, coal tailings, glass bead abrasives and even metallic paint particles in suspension have been measured.

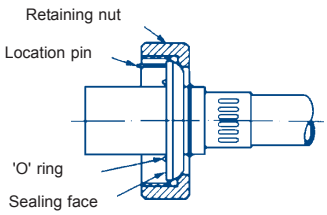
Clarified water quality monitoring

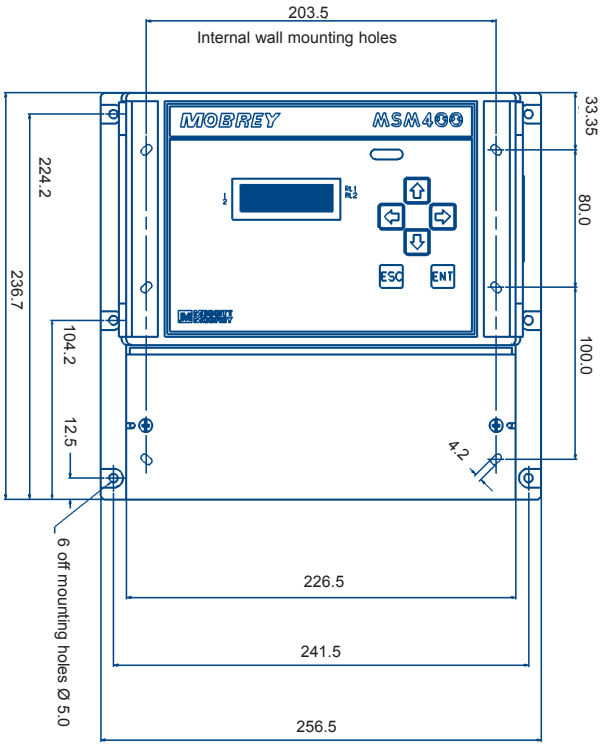
For potable water treatment, with alumina floc blankets, or river water clarifiers, before use as a coolant, it is important to prevent carry over of the blanket into the clear water overflow. Again the MSM400 monitors the blanket solids load, at a specific height in the tank, to provide quality records and initiate a sludge discharge cycle when needed.

Dimensions









Ordering information

MSM400 Control unit	
Code	Description
MSM400	MSM400 standard control unit IS
MSM401/S*	MSM400 special control unit non IS
MSM400/S*	MSM400 special control unit IS

Sensors

Code	Description
MSM	MSM400 sensor

Code	Description
433	Tank mount
448	Pipe mount

Code	Description
A	Intrinsically safe (ATEX)
N	Standard unit

Code	Description
000	Sensor size i.e. 100,150,200,300,450mm as standard for tank mount (others on request) 100,200,150mm as standard for pipe mount

Code	Description
V	Spray valve (pipe section only)
P	No spray valve (pipe section only)
T	Tank mount

Code	Description
7	7m cable supplied as standard
D	Customer specified length up to 100m (must be clearly stated on the order)

MSM	433	A	150	T	7	Typical ordering information

Sensor size is specified depending on the application. Please contact the sales office to ensure that the size is suitable for the application.

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