

## Technical specification

### Control unit

MSM400 control unit			
Enclosure rating	IP65	mA output	4-20mA into 1000 ohms max
Cable entries	3 off M20 glands	Trigger input	Volt free contact 5V logic
	2 off M16 glands	Current input	4-20mA
Mounting options	Wall mount	Power supply	115/230V ac 50/60Hz 24V dc
Operating temp.	- 30°C to + 55°C	Frequency	1 MHz or 3.3 MHz auto selection
	- 22°F to + 130°F	Cable termination	Captive screw terminal block
Relay output	2 x SPDT rated up to	Max. cable size	2.5mm <sup>2</sup> / 12 AWG
	5A 250V AC resistive	Hazardous approval	ATEX II (1) G, [EEx ia] IIC

### Sensors

Sensors	Mobrey pipe section sensors MSM448	Tank mount sensors MSM433
Material pipe section	Epoxy coated carbon steel	N/A
Material sensors	316 stainless steel	316 Stainless steel
Drain fitting	1" NPT	N/A
Mounting connection	Flanged in line installation	¾" BSPT
Flanges	DN100, DN150, DN200 to BS4772, PN10 rated or 4", 6", 8" ANSI 150lb (others on request)	Gap size 100, 150, 200, 300, 450mm (4", 6", 8", 12", 18") as standard (others on request)
Max pressure	10 bar / 145 psi	105 bar
Operating temp.	- 40°C to + 70°C / - 40°F to 158°F	- 40°C to + 50°C (100°C on request)
Sensor cable	Dual screened twisted pair oil hose protected	Dual screened twisted pair
Cable length	7m / 23ft from junction box (others on request)	7m / 23ft (others on request)
Cable junction box	IP65 Aluminium alloy	Sensor IP68
Hazardous approval	ATEX II 1 G EEx ia IIC T6	ATEX II 1 G EEx ia IIC T6

### Typical measuring ranges in % solids for MSM433 Gap sensors and MSM448 pipe sections

SENSOR GAP SIZE / Ø		PRIMARY	PRIMARY	FINAL
mm	inches	1MHz	3.3MHz	3.3MHz
100	4	3 - 29%	1 - 6%	2 - 15%
150	6	2 - 19%	1 - 4%	1 - 10%
200	8	2 - 14.5%	0.5 - 3%	1 - 7.5%
300	12	1 - 10%	0.5 - 2%	0.5 - 5%
450	18	1 - 6.5%	0.5 - 1.3%	0.5 - 3.3%

\* Above percentage figures are based on typical values for municipal wastewater sludge

# Level

## Ordering information

MSM400 Control unit

Code	Description
MSM400	Control unit ATEX intrinsically safe certified / IP65

## Sensors

Code	Description
MSM	MSM400 sensor
	Code Mounting
433	Tank mount
448	Pipe mount
	Code Approvals
A	Intrinsically safe (ATEX and UL)
	Code Size
100T	1 - 3.3 MHz 100mm / 4" gap tank sensor
150T	1 - 3.3 MHz 150mm / 6" gap tank sensor
200T	1 - 3.3 MHz 200mm / 8" gap tank sensor
300T	1 - 3.3 MHz 300mm / 12" gap tank sensor
450T	1 - 3.3 MHz 450mm / 18" gap tank sensor
100	1 - 3.3 MHz flanged PN10/PN16 DN100 pipe sensor
150	1 - 3.3 MHz flanged PN10/PN16 DN150 pipe sensor
200	1 - 3.3 MHz flanged PN10 DN200 pipe sensor
A10	1 - 3.3 MHz flanged ANSI 150lb 4" pipe sensor
A15	1 - 3.3 MHz flanged ANSI 150lb 6" pipe sensor
A20	1 - 3.3 MHz flanged ANSI 150lb 8" pipe sensor
	Code Description
V	Spray valve (pipe section only)
P	No spray valve (pipe section only)
	Code Description
7	23 feet / 7metres cable supplied as standard
D	Customer specified cable length up to 100 metres / 330 feet (must be clearly stated on order)
MSM 448 A 150 V 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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**EMERSON**  
Process Management

# Mobrey MSM400

## Ultrasonic sludge density measurement system



### Features

- Measuring range up to 50% solids
- Simple keypad operation
- HMI menu based programming
- 4-20 mA output
- HART output
- 2 x SPDT control relays
- LCD Display of Density (% solids, mg/l)
- Automatic De-sludge control routines
- Dual operating frequency sensors 1MHz / 3.3MHz

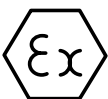
The MSM400 Sludge density meter is a microprocessor based HART compatible measurement and control system, featuring a range of built in display, control, alarm and communication options. Simple menu driven programming allows complete configuration of the unit. Local programming is carried out via a membrane key pad.

The measurement of ultrasonic attenuation in slurry or sludge is directly proportional to the percentage of suspended solids. The MSM400 uses this principle to produce a digital display of suspended solids in user selectable measurement units. The microprocessor allows HART communication on the 4-20 mA output signal. The unit has two SPDT control relays to provide set point switches for control or alarm purposes. A built in real time clock and timer functions allow time based de-sludge operations for normal settlement tank and clarifier applications.

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 improved 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 percentage solids, ultrasonic attenuation value, relay and input status, plus a bar graph representing the reading as a percentage of full scale.



## Mobrey sensor types

For sludge density measurement or automatic control of the de-sludge process in a settlement tank, there are two basic types of sensor. A pipe section sensor is used on installations where the density is to be measured on the sludge discharge line from the settlement tank or clarifier. Alternatively, a tank mounted sensor can be installed directly in the settlement tank to measure density at a fixed point in the tank or to provide control when the sludge density reaches a certain percentage solids. Both sensor types can operate on dual frequencies of 1MHz and 3.3MHz automatically selected by the MSM400 controller allowing greater flexibility in selecting the optimum mode for performance and accuracy.



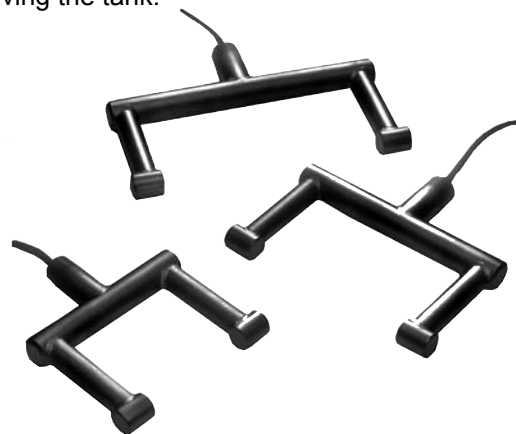
### Mobrey pipe section sensors MSM448

The Mobrey pipe section sensor is manufactured from epoxy coated carbon steel with 316 stainless steel transducers. The pipe is coated to minimise grease and debris build up, and typically monitors suspended solids during a tank de-sludge cycle. The transducers are mounted flush with the sides of the pipe section to prevent ragging. To allow easy maintenance separate connections are made available on the pipe for a spray nozzle and drain valve.



### Mobrey suspended tank mount sensor MSM433

The MSM433 sensor is available in a range of sizes depending on the range of density to be measured. The sensors are of an all welded 316 stainless steel construction, with an IP68 submersible rating for the cable entry. The sensor can be simply mounted either by suspending it from the cable, or mounting the sensor onto a pipe or conduit by means of the  $\frac{3}{4}$ " BSPT mounting thread. The sludge density is measured between the gap of the sensor, and can be located at the top of the tank to monitor the upper parts of the settled blanket, or close to the discharge point at the bottom of the tank to monitor the density leaving the tank.

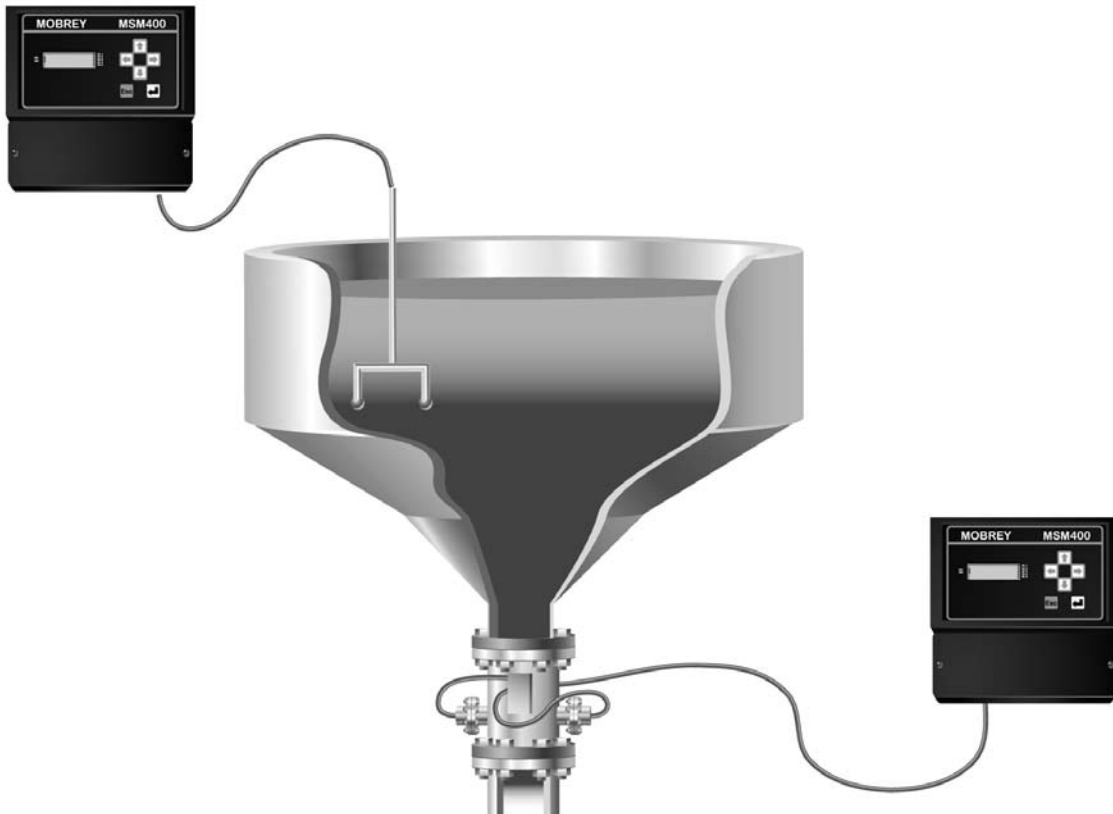


## Applications

### 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 can provide programmable outputs via relays to provide total automation of the de-sludging process.

Programmable timer delays are built in to provide the necessary time over-rides at the beginning and end of the de-sludge cycle. The MSM400 can initiate the de-sludge cycle either based on time or sludge density and terminate the cycle either on a fixed run time or by monitoring the sludge density at the point of discharge.

Logic inputs are also available to initiate or terminate the de-sludge cycle from external control signals.

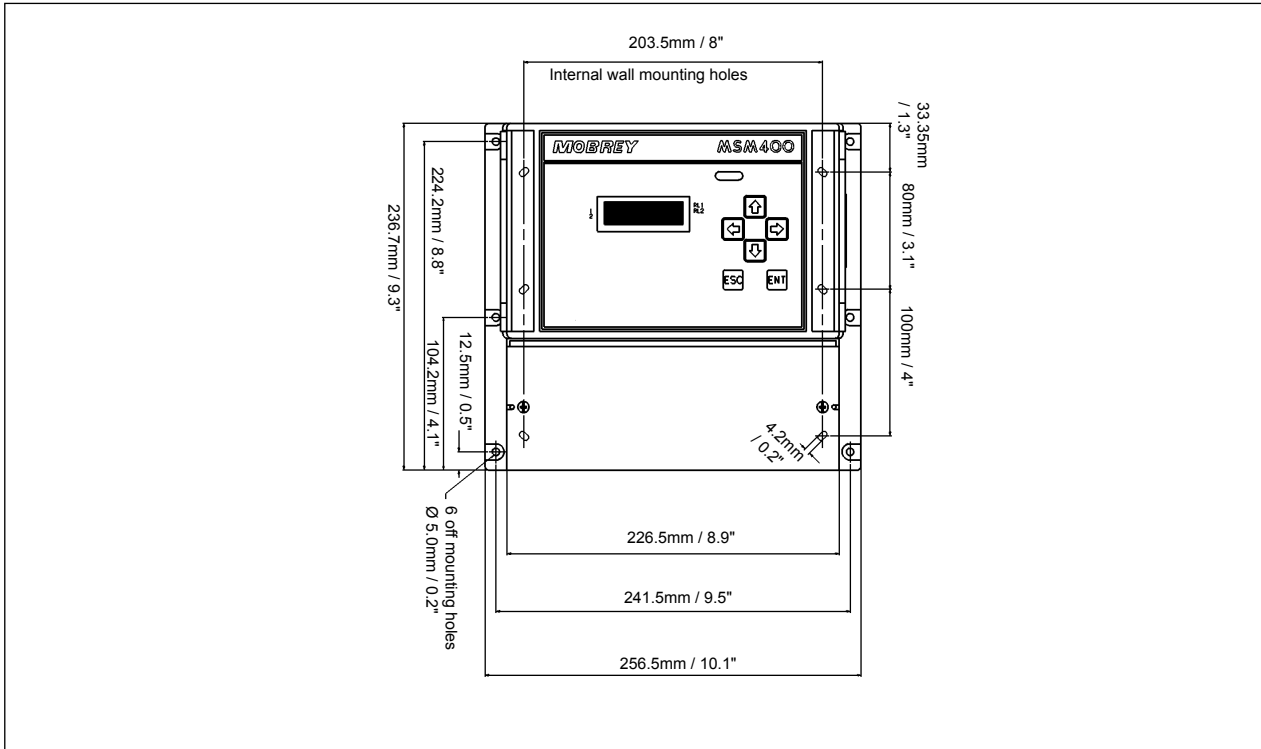
### Industrial slurry processes

A typical industrial slurry measurement is in the refining of minerals or china clay. Several stages of settlement tanks are used to obtain the correct density of china clay in the underflow, and normally all these discharges need to be measured. If combined with a flowmeter output (4-20mA) the MSM400 can be used to output a value based on mass flow using the volumetric discharge and sludge density.

Other typical applications are monitoring the percentage solids of mineral ores, coal tailings, glass beads, abrasives and even metal particles in suspension.

## Dimensions

### Control units



## Sensors

