

Hydrastep and Hydratect Water/Steam Monitoring Systems

- *High clarity electronic gauging system for steam drums with options of local and remote indication*
- *4–20mA output proportional to drum level*
- *High reliability, low water level shutdown system*
- *Superior quality electrodes manufactured for long life and reliability*
- *Each system custom designed for your application to ensure minimum installation costs*
- *“Sole gauge” and ASME compliance with International approvals*
- *Hydratect for use as a Turbine Water Ingress Protection (TWIP) system*



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Hydrastep and Hydratect

Hydrastep



Hydrastep Control Unit

A Hydrastep electronic steam/water gauging system comprises:-

- Control unit (see Table 1)
- Water column (see Table 2)
- Electrodes and electrode cables (see Table 4)
- Remote display (optional – see Table 6)

Hydrastep capabilities include:

- Replacement of hard-to-read gauge glasses with a highly visual indication of drum level. Multiple remote displays up to 3280 ft. (1000 m) away from drum
- 4–20mA signal for re-transmission
- Up to 16 trip/alarm relays for low water warning and boiler shut down
- No single fault will disable the system. Fault indication is on all displays
- Dual power supplies and continuous monitoring of electrodes and wiring provide high levels of reliability

Additional Information

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 Dimensions: page 8

TABLE 1. Hydrastep Control Unit Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
 The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2468	Hydrastep Control Unit	
Power Supply Input Boards		
Standard		Standard
CA	16 point EGS, single power supply (ac mains)	★
CB	32 point EGS, dual power supplies (2 x ac mains)	★
CC	16 point EGS, single power supply (24 Vdc)	★
CD	32 point EGS, dual power supplies (2 x 24 Vdc)	★
CE	32 point EGS, dual power supplies (1 x ac, 1 x dc)	★
Optional Output Boards		
Standard		Standard
AD	No output boards	★
BD	1 Relay output board (4 relays)	★
CD	2 Relay output boards (8 relays)	★
DD	4 Relay output boards (16 relays)	★
Expanded		
ED	1 Relay output board with time delay (4 relays)	
FD	2 Relay output boards with time delay (8 relays)	
GD	4 Relay output boards with time delay (16 relays)	
HD	1 Opto isolated output board (4 outputs)	
JD	2 Opto isolated output boards (8 outputs)	
KD	4 Opto isolated output boards (16 outputs)	
Typical Model Number: 2468 CB CD		

Product Data Sheet

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TABLE 2. Water Column Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
Standard		Standard
120	Low Pressure (up to 1740psi / 120 bar) Water Column (Schedule 80 Process Connections) – See Table 3	★
210	High Pressure (up to 3045 psi / 210 bar) Water Column (Schedule 160 Process Connections) – See Table 3	★
Expanded		
300 ⁽¹⁾	Super Critical (up to 4350 psi / 300 bar) Water Column (Schedule XXS Process Connections) – See Table 3	
In-line Design		
Standard		Standard
L ⁽²⁾	In-line design (top-and-bottom process connections)	★
No Code ⁽²⁾⁽³⁾	Side-arm design (side-and-side process connections with hanger)	★
Distance Between Top and Bottom Tappings		
Standard		Standard
TTTT ⁽⁴⁾	TTTT = Distance between top and bottom tappings (mm or inches)	★
Site Range		
Standard		Standard
SSSS ⁽⁵⁾	SSSS = Distance between top and bottom electrodes (mm or inches)	★
Number Of Electrodes		
Standard		Standard
8	Eight electrode ports	★
10	Ten electrode ports	★
12	Twelve electrode ports	★
14	Fourteen electrode ports	★
16	Sixteen electrode ports	★
18	Eighteen electrode ports	★
20	Twenty electrode ports	★
22	Twenty two electrode ports	★
24	Twenty four electrode ports	★
26	Twenty six electrode ports	★
28	Twenty eight electrode ports	★
30	Thirty electrode ports	★
32	Thirty two electrode ports	★
Typical Model Numbers: 120-1250-900-24 (Low Pressure Water Column, Side-and-side, 1250 mm Process Connection Centers) 210-L-43-37-16 (High Pressure Water Column, Top-and-bottom, 37 in. Process Connection Centers)		

(1) Available to special order only.

(2) Specify the process connection size (25, 32, 38, or 50 mm) on the column design sheet, which is available from your local sales office.

(3) Water column with hanger design has side arm/side-and-side process connections. Specify the drain connection size (20 or 25 mm) on the column design sheet, which is available from your local sales office.

(4) Maximum tap-to-tap distance is 138 in. (3500 mm).

(5) Refer to water column design sheet available from your local sales office.

TABLE 3. Water Column Selection Data

Parameter	LP Rectangular Section	HP Series 3	HP Super 3
Design Pressure	1740 psi (120 bar)	3045 psi (210 bar)	4350 psi (300 bar)
Test Pressure	2610 psi (180 bar)	4567 psi (315 bar)	6525 psi (450 bar)
Design Temp.	650 °F (343 °C)	698 °F (370 °C)	1040 °F (560 °C)
Design Code ⁽¹⁾	ASME B31.1 Power Piping	ASME B31.1 Power Piping	ASME B31.1 Power Piping
Maximum Length	138 in. (3500 mm)	138 in. (3500 mm)	138 in. (3500 mm)
Materials of Construction	Carbon Steel ASTM A105/A106 GR B	Carbon Steel ASTM A105/A106 GR B body with SA 479 – 316N electrode mounts	Stainless steel ASTM A312/A182 F316 with SA 479 – 316N electrode mounts
Protective Covers	18 SWG (17 AWG) Stainless steel	18 SWG (17 AWG) Stainless steel	18 SWG (17 AWG) Stainless steel
Gross Weight ⁽²⁾	26.5 lb (12 kg)	37.5 lb (17 kg)	37.5 lb (17 kg)
Electrode Types	459600602 or 459600802	246781ZA, 246782AC, or 246784AA	246785A

(1) Manufactured and tested in accordance with ASME Boiler and Pressure Vessel Code: Section 1.

(2) Typical for (610 mm / 24 in.) steam/water range, 12 port, with electrodes and covers.

Hydrastep and Hydratect

TABLE 4. Electrodes And Electrode Cables Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.

The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
Standard		Standard
459600602	Low pressure (LP) electrode – Zirconia insulator (see Table 5 for electrode data)	★
459600802	Low pressure (LP) electrode – PTFE insulator (see Table 5 for electrode data)	★
246781ZA	High pressure (HP) electrode – Series III, Zirconia insulator (see Table 5 for electrode data)	★
246782AC	High pressure (HP) electrode – Series III, PTFE insulator (see Table 5 for electrode data)	★
246784AA	High pressure (HP) electrode – Series III, Zirconia insulator, PTFE coated (see Table 5 for electrode data)	★
246785A	Super critical electrode – Series III, ZTA Insulator (see Table 5 for electrode data), 1 in. (25 mm) fitting	★
24680204A	18-core electrode cable – 10 ft. (3 m). <i>One cable is required for every multiple of eight electrodes</i>	★
24680205A	18-core electrode cable – 33 ft. (10 m). <i>One cable is required for every multiple of eight electrodes</i>	★
24680206A	18-core electrode cable – 60 ft. (18 m). <i>One cable is required for every multiple of eight electrodes</i>	★
24680207A	18-core electrode cable – 98 ft. (30 m). <i>One cable is required for every multiple of eight electrodes</i>	★
Note: Do not mix electrode types. See Table 5 for further Hydrastep electrode data.		

TABLE 5. Hydrastep Electrodes Selection Data

Part Number	Style	Material	Max Pressure PSI (Bar)	Max Temperature °F (°C)	ph Range
459600802	Threaded (LP column)	PTFE	725 (50)	500 (260)	7 to 13.5
459600602	Threaded (LP column)	Zirconia	1740 (120)	698 (370)	7 to 11
247682AC	Union (HP column)	PTFE	725 (50)	500 (260)	7 to 13.5
2467 84AA	Union (HP column)	Ceramic PTFE coated	4350 (300)	500 (260)	7 to 13.5
246781ZA	Union (HP column)	Zirconia	3045 (210)	698 (370)	7 to 11

TABLE 6. Hydrastep Accessories Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.

The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
Standard		Standard
24683C	32 point remote display, large panel mount	★
24683D	32 point remote display, IP65 wall mount (Type NEMA 4)	★
480121230	Armoured cable, 5-pair shielded (order per ft. or m). Maximum length is 820 ft. (250 m)	★
Expanded		
24683BB	32 point remote display, DIN panel mount	

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Hydratect



Hydratect Control Unit

Additional Information

Specification: page 7
Dimensions: page 9

A Hydratect steam/water detection system comprises:-

- Control unit (see Table 7)
- Two electrodes, two electrode cables, two inserts, and two covers (see Table 8)
- Manifold (see Table 8 note), if user is not mounting electrodes in own manifold or pipework

Hydratect capabilities include:

- Fault tolerance and continuous monitoring ensure a high reliability water ingress protection system
- Trips are fully validated by the twin electrode configuration before action is taken
- Can be supplied with a factory manufactured manifold or as components for local mounting in existing pipework or condensate pots

TABLE 7. Hydratect Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2462	Hydratect Electronic Level Switch	
Power Supply And Input Boards		
Standard		Standard
A	2 point level switch, ac mains, single pole single throw relay outputs	★
E	2 point level switch, ac mains, two pole changeover relay outputs	★
Expanded		
C	2 point level switch, 24 Vdc, single pole single throw relay outputs	
Typical Model Number: 2462 A		

TABLE 8. Shrouded Insert, Cover, Electrode, and Cable Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
Standard		Standard
24673540B	Series III Insert, stainless steel (300 bar, 560 °C) ⁽¹⁾ – one insert for each electrode	★
24673547B	Series III Insert PTFE Electrode (50 bar 260 °C) ⁽¹⁾ – one insert for each electrode	★
24670118A	Series III cover – one cover for each electrode	★
246785Z ⁽²⁾	Hydratect electrode – Series III, Zirconia insulator (see Table 9), 1 in. (25 mm) fitting – one electrode per port	★
246785A ⁽²⁾	Hydratect electrode – Series III, ZTA insulator (see Table 9), 1 in. (25 mm) fitting – one electrode per port	★
246785P ⁽²⁾	Hydratect electrode – Series III, PTFE insulator (see Table 9), 1 in. (25 mm) fitting – one electrode per port	★
24620204A	4-core electrode cable – 10 ft. (3 m) – one cable per electrode	★
24620205A	4-core electrode cable – 33 ft. (10 m) – one cable per electrode	★
24620206A	4-core electrode cable – 60 ft. (18 m) – one cable per electrode	★
24620207A	4-core electrode cable – 98 ft. (30 m) – one cable per electrode	★
Note: Manifolds (up to 4 ports) available for in-line/side-arm applications to special order – ask a local sales office for a manifold design sheet		

(1) Minimum pipe I/D for installation of insert is 1.65 in. (42 mm).

(2) See Table 9 for Hydratect electrode selection data. Do not mix electrode types.

TABLE 9. Hydratect Electrode Selection Data

Part Number	Style	Material	Max Pressure PSI (Bar)	Max Temperature °F (°C)	ph Range
246785Z	Union Hydratect insert	Zirconia	3045 (210)	698 (370)	7 to 11
246785A	Union Hydratect insert	ZTA	4350 (300)	1040 (560)	7 to 11
246785P	Union Hydratect insert	PTFE	725 (50)	500 (260)	7 to 13.5

Hydrastep and Hydratect

Specifications

HYDRASTEPE SPECIFICATION

General			
Product	Hydrastep electronic steam/water gauging system		
Electrode Channels	8 to 32, in pairs. See Table 5 on page 4 for Hydrastep electrode specifications		
Water/Steam Threshold	0.6 $\mu\text{S/cm}$ in clean water (up to 106 $\mu\text{S/cm}$); 1.6 $\mu\text{S/cm}$ in dirty water (up to 300 $\mu\text{S/cm}$) Models for highly contaminated water, up to 1600 $\mu\text{S/cm}$, available to special order		
Display And Fault Indication			
Integral Display	Red/green bar graph, 32 LED segments. Display blanking from the bottom with less than 32 electrodes in use. Channel fault indication by flashing display segment. General fault indication by amber LED		
Remote Display	Indication same as Integral Display Powered from main unit (1 display only). Local power 20 to 54 Vdc, 240 mA required for additional remote displays		
Electrical			
Power Supply	Power supply (ac): 94 to 130 V or 187 to 256V, 48Hz to 65 Hz, 60 VA max. Power supply (dc): 20 to 40V negative ground or isolated		
Analog Output	Signal is proportional to the water level Range: 0–20mA or 4–20mA, forward or reverse Accuracy: ± 0.2 mA Drive capability 600 ohms at nominal supply voltage, or 500 ohms at minimum supply voltage		
Relay Outputs (Optional)	Maximum of 4 can be fitted for alarm indication <table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top; width: 50%;"> Relay Board: Four independent change-over relays Relay contact rating (ac powered): <i>Maximum voltage of 250 Vac</i> <i>Maximum current of 8A</i> <i>Maximum switching power: 1500VA</i> Relay contact rating (dc powered): <i>Maximum voltage of 125 Vdc</i> <i>Maximum current of 8A</i> <i>Maximum switching power:</i> <i>40 W < 30 V, 65 W < 60 V, 25 W < 125 V</i> Type N safety: <i>5A at 12Vdc, 100mA at 30Vdc, 20mA at 125Vdc</i> </td> <td style="vertical-align: top; width: 50%;"> Delayed Relay Board <i>(Specification as per Relay Board)</i> Delay range: 0 to 25s ± 1s Opto-coupled Board Solid state relays: Four independent outputs Rating: 30 Vdc, 1A Maximum voltage drop: 1.1 V @ 1A Maximum leakage current: 1 mA @ 30 Vdc </td> </tr> </table>	Relay Board: Four independent change-over relays Relay contact rating (ac powered): <i>Maximum voltage of 250 Vac</i> <i>Maximum current of 8A</i> <i>Maximum switching power: 1500VA</i> Relay contact rating (dc powered): <i>Maximum voltage of 125 Vdc</i> <i>Maximum current of 8A</i> <i>Maximum switching power:</i> <i>40 W < 30 V, 65 W < 60 V, 25 W < 125 V</i> Type N safety: <i>5A at 12Vdc, 100mA at 30Vdc, 20mA at 125Vdc</i>	Delayed Relay Board <i>(Specification as per Relay Board)</i> Delay range: 0 to 25s ± 1 s Opto-coupled Board Solid state relays: Four independent outputs Rating: 30 Vdc, 1A Maximum voltage drop: 1.1 V @ 1A Maximum leakage current: 1 mA @ 30 Vdc
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Remote Display Output	Drive to remote displays (maximum 6 units). 3280 ft. (1000 m) maximum distance		
Opto-isolated Fault Output	Detects fault in electrode connection (open circuit and short-circuit to ground)		
Mechanical			
Weight	26.4 lb (12 kg)		
Control Unit Enclosure	Brushed stainless steel, wall mounting (four point), IP65 / NEMA4X 16.7 in. high x 12.8 in. wide x 6.4 in. deep (425 mm x 325 mm x 163 mm)		
Remote Display Unit Enclosure	2468 3BB (Case style: DIN Panel Mount) <i>Dimensions: 5.67 in. x 2.38 in. x 7.87 in. deep (144 mm x 72 mm x 200mm)</i> <i>Panel cutout: 5.41 in. x 2.60 in. (137.5mm x 66mm)</i> 2468 3C (Case style: Large Panel Mount) <i>Dimensions: 7.56 in. x 3.78 in. x 8.23 in. deep (192mm x 96mm x 209mm)</i> <i>Panel cutout: 7.32 in. x 3.62 in. (186mm x 92mm)</i> 2468 3D (Case style: Rugged enclosure, NEMA 4X (IP65)) <i>Dimensions: 11.89 in. x 7.32 in. x 6.89 in. deep (302mm x 186mm x 175mm)</i>		
Environment			
Operating Temperature	–4 to 158 °F (–20 to 70 °C)		
Operating Pressure	See Table 3 on page 3 for the Hydrastep water column specifications		
Relative Humidity	Up to 100%		

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Hydrastep Approvals	
LVD	EN 61010-1
ATEX	II3 G EEx nA IIC, T4 (-20 °C < ta < +70 °C)
CSA	(Canada) Ex nA [nL] nL IIC T4, (USA) Class 1 Zone 2, AEx nA IIC with relay output connected only to energy limited circuits
Electromagnetic Compatibility	EN 61326-1:2006
Pressure Equipment Directive	Safety accessory

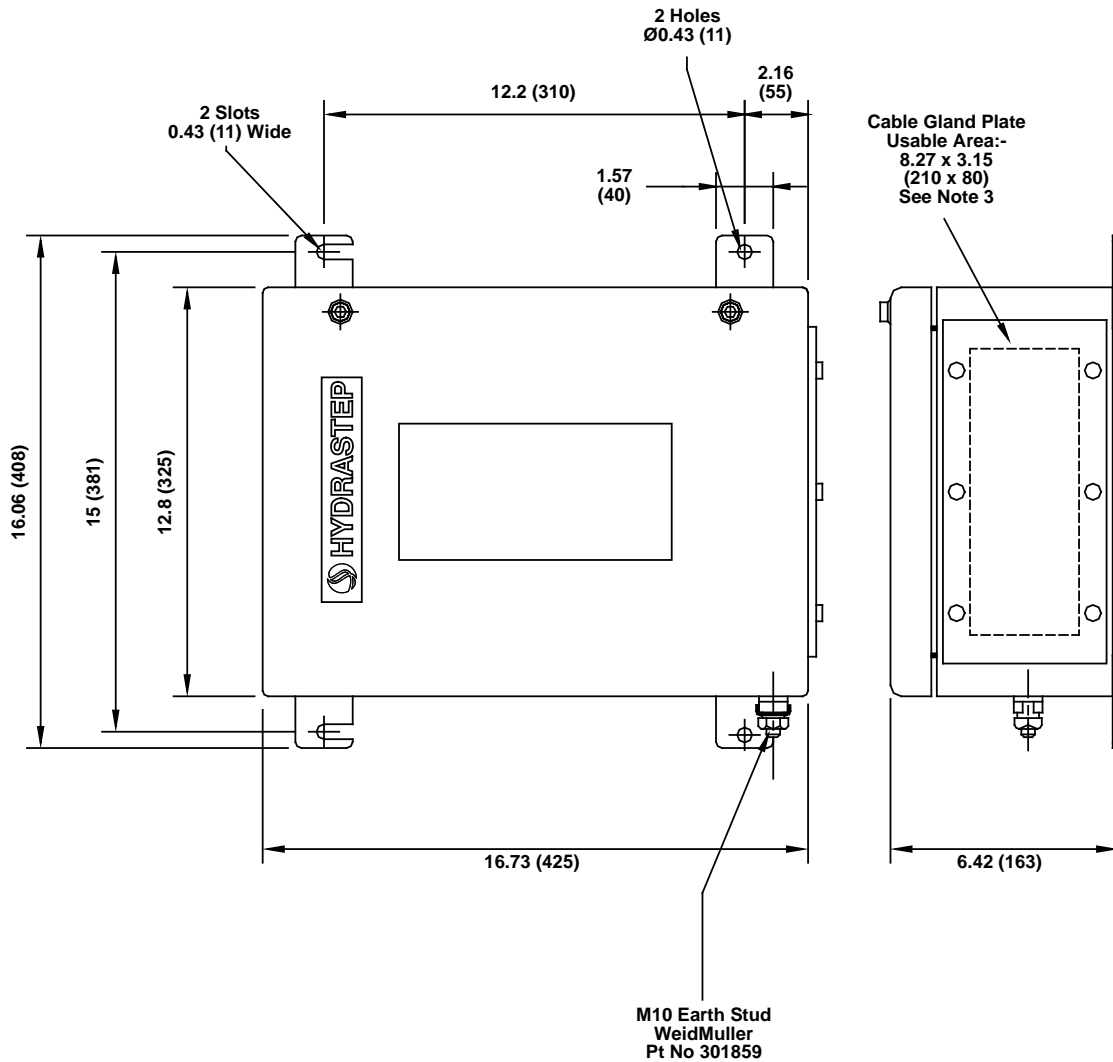
HYDRATECT SPECIFICATION

General	
Product	Hydratect steam/water detection system
Electrode Channels	2 (See Table 9 on page 5 for Hydrastep electrode specifications)
Water/Steam Threshold	0,6 µS/cm (normal) or 1,6 µS/cm (alternate) depending on water purity
Display	
Integral Display	One Red LED for indication of steam One Green LED for indication of water One Amber LED for indication of fault
Electrical	
Power Supply	Power supply (ac): 94 to 130 V or 187 to 256 V, 48 Hz to 65 Hz, 2 x 10 VA maximum Power supply (dc): 20 to 60 V, 2 x 200 mA maximum, +ve or -ve ground
Status Relay Output (One Per Channel)	Water normal: Energized in water Steam normal: Energized in steam Separate normally open and normally closed contacts: <ul style="list-style-type: none"> • Maximum voltage: 250 Vac, 125 Vdc • Maximum current: 8 A • Maximum Switching Power (ac): 1500 VA • Maximum Switching Power (dc): 240 W < 30 V, 65 W < 60 V, 25 W < 125 V
Opto-isolated Fault Output	Detects fault in electrode connection (open circuit and short-circuit to ground) Output rating "off": 30 Vdc max, leakage <1 mA Output rating "on": 1 A dc, voltage <1.1 V @ 1 A
Fault Relay Output (One Per Channel)	Energized during normal operation (fail-safe). <i>Specification as status relay output above</i>
Mechanical	
Enclosure	Stainless steel, grade 304, wall mounting (two point) Finish - natural IP65 / NEMA4X 7.5 in. x 7.5 in. x 3.5 in. (190 mm x 190 mm x 90 mm)
Weight	6.2 lb (2.8 kg)
Environment	
Operating Temperature	-4 to 158 °F (-20 to 70 °C)
Operating Pressure	Manifolds are available with 1 to 4 electrode ports. Various materials depending on required pressure and temperature rating. Design sheets are available on request. A selection of electrode types are available for pressures up to 4350 psi (300 bar) at 1040 °F (560 °C): <ul style="list-style-type: none"> • The low pressure type, up to 1740 psi (120 bar) has a threaded style fitting (metaflex gasket seal). Choice of PTFE or ceramic insulator • The high pressure type, up to 4350 psi (300 bar), uses a union fitting (metal-to-metal seal). Choice of insulators
Relative Humidity	Up to 100%

Dimensional Drawings

Hydrastep Enclosure

Note: Dimensions are in inches (mm)



NOTES:

1. Weight: 12 kg
2. IP Rating: IP65 / NEMA4X
3. Material Thickness Between Cable Gland Holes Must Be 9 mm Minimum.
4. Enclosure: Brushed Stainless Steel

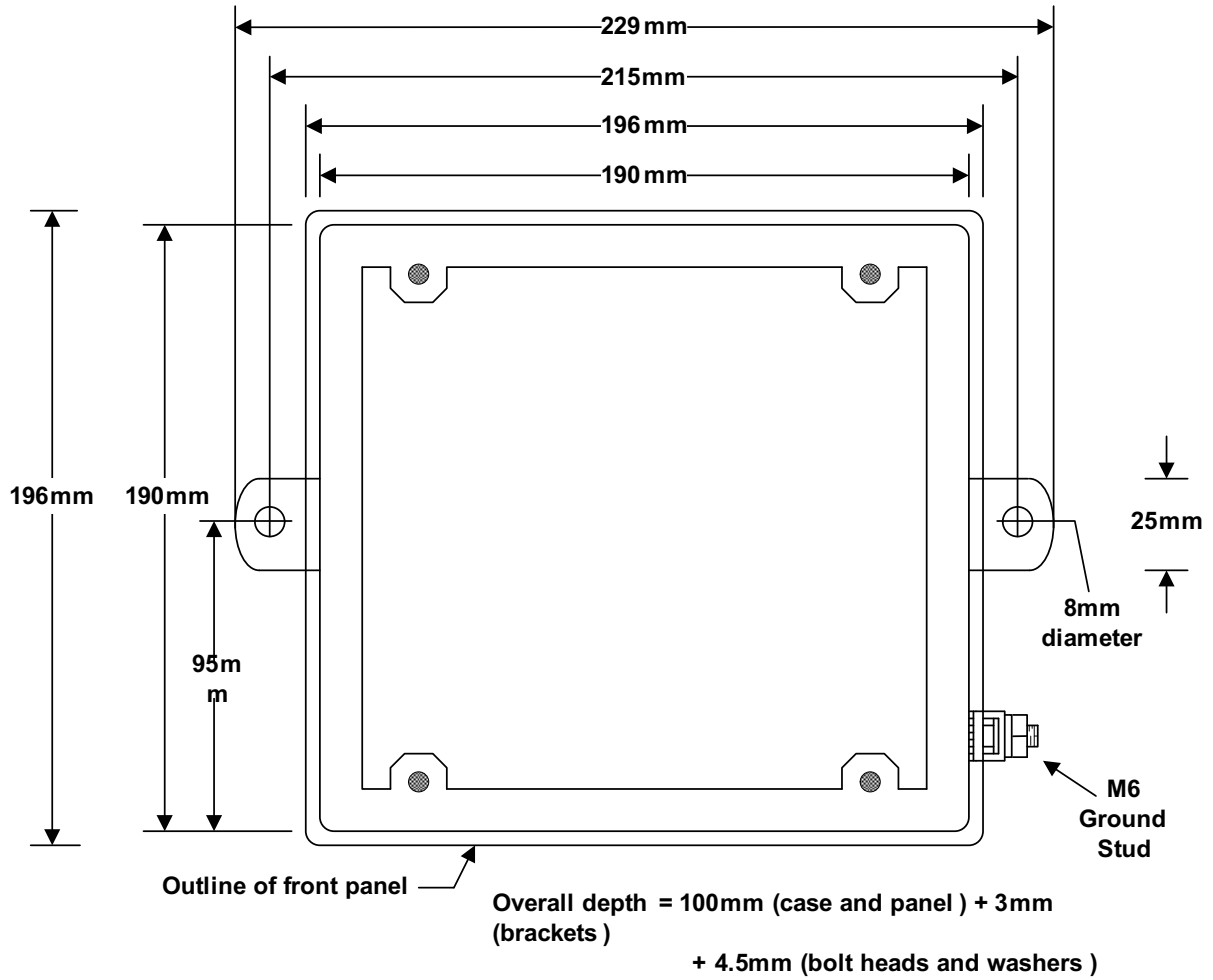
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Hydrastep and Hydratect

Hydratect Enclosure

Note: Dimensions are in mm



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Mobrey Level Solutions

Emerson provides a wide range of Mobrey products for level measurement applications.

POINT LEVEL DETECTION

Vibrating Fork Liquid Level Switches

For high and low alarms, overflow protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.

- Mobrey Mini-Squing (Compact)
- Mobrey Squing 2 (Full-featured)

Ultrasonic Gap Sensor Liquid Level Switches

For use in non-hazardous industrial processes to detect high or low liquid levels and liquid interface. Immune to changing density, and wide dielectric and pH variations. Suitable for use in most clean and non-aerated liquids, with options for sludges and slurries.

Float and Displacer Liquid Level Switches

Mobrey electromechanical float and displacer level switches are ideal for alarm and pump control duties, especially in critical applications or hazardous areas.

- Mobrey Horizontal Level Switches
- Mobrey Vertical Level Switches

Chambers are available for external mounting of these level switches on process vessels.

Dry Products Level Switches

For high and low level alarms. Including threaded mounting connections, extended lengths, high temperature capability, and multiple detection techniques. Suitable for a wide variety of powders, granules, and free flowing solids with wide variations in bulk densities.

- Mobrey VLS Series – Vibrating Rod Level Switch
- Mobrey PLS Series – Paddle Level Switch
- Mobrey CLS Series – Capacitance Level Switch

CONTINUOUS MEASUREMENT

Ultrasonic Continuous Level Transmitters and Controllers

Top mounted, non-contacting for simple tank and open-air process level measurements. Unaffected by fluid properties such as density, viscosity, dirty coating, and corrosiveness. Intrinsically Safe versions are available for operating in hazardous areas.

- Mobrey MSP Series Ultrasonic Level and Flow Transmitters
- Mobrey MCU900 Series Universal Controllers

Ultrasonic Sludge Density Blanket Monitoring and Control

Ultrasonic in-line pipe or tank mounted sensors for sludge density measurement and control, and top mounted ultrasonic sensors for continuous measurement of sludge blanket level in Industrial and Municipal effluent treatment processes.

- Mobrey MSM400 – Sludge Density Monitor
- Mobrey MSL600 – Sludge Blanket Level Monitor

Displacer Continuous Level Measurement

Top mounted in a vessel or externally mounted in a vertical chamber. For use in hazardous areas.

- Mobrey MLT100 – Displacer Level Transmitter

Hydrostatic Continuous Level Transmitter

For level measurements in non-pressurized tanks where in-tank problems such as foaming, vapor layers, and temperature gradients prohibit the use of other instrumentation.

- Mobrey 9700 Series hydrostatic electronic level transmitters

SPECIALIZED CONDUCTIVITY

Conductivity Water and Steam Interface Monitoring

Steam/water interface level gauges using specialized, high performance conductivity probes in external columns and manifolds, ideal for steam plants where reliable and redundant indication of boiler water level and turbine protection is critical.

- Hydratect 2462 – Water/Steam detection Systems
- Hydrastep 2468 – Water/Steam Monitoring Systems

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