

Indirect Heat Exchanger Ideal for a Wide Range of Dry Gas Seal Applications



HYDROSAFE®, Watlow's new indirect electric heat exchanger for dry gas seal applications, has been designed as a standardized thermal solution that minimizes custom engineering requirements because it can be adapted to a variety of conditions. The HYDROSAFE provides very flexible heating capabilities (12 to 31.2 kW) to compensate for changes in gas flow rates, or changes in gas composition, when interconnected to our purpose engineered control panel. Multiple units may be connected in series for higher kW needs.

The HYDROSAFE holds complete assembly hazardous certifications with a "touch-safe" exterior versus competitors that offer enclosure-only certifications.

The seal gas is heated inside a small diameter seamless formed cylinder to allow for high system pressure capability requirements. In addition to high pressure capabilities, up to 6800 psi (469 bar) in the standard offering, the heater is up to 50 percent smaller than comparable circulation heaters. The weight of the HYDROSAFE heater is about 400 pounds (182 kgs). This small footprint and weight allow the user to reduce the cost of the supporting super structure on rigs, platforms, FPSOs, vessels, etc.

Indirect technology means there is no concern about your seal gas stream ever coming into contact with the heating elements, especially when elements reach end-of-life conditions and are typically more susceptible to corrosion. The small diameter and low volume pressure boundary allow use in many countries without the need for further pressure vessel certifications.

HYDROSAFE is extremely reliable and has been tested in both the Watlow lab and in the field. It also holds all necessary certifications including IECEx, ATEX, ASME and CSA/NRTL. The formed cylinder raw material is listed in accordance with NACE and ISO standards including MR 0175/ISO 15156/MR 0103.



Standard Performance Capabilities

- **Wattages:** from 12 to 31.2kW
- **Voltages:** from 380 to 600VAC
- **Design temperature:** -60 to +300°C (-76 to 572°F)
- **Design pressure:** up to 6800 psi (469 bar)*
- **Inlet temperature:** user specified
- **Outlet temperature:** maximum 232°C (450°F)**
- **Working pressure:** user specified
- **Flow rate:** user specified
- **Maximum back pressure:** user specified
- **Maximum ambient temperature:** 50°C (122°F) for North American certifications, 80°C (176°F) for IEC and ATEX certifications
- **Media phase:** liquid or gas
- **Typical Media:** methane, natural gas (methane, butane, propane, ethane and water vapor) and nitrogen
- **Environment T code rating:** none, T2 or T3

Features and Benefits

Fluid path constructed independent from the sheath

- Allows sensitive materials to be heated safely and effectively
- Assures safety because heater failure will not cause leaks or significant damage
- Prevents fluid contamination

Seamless fluid path construction

- Offers economical package price
- Minimizes potential leakage
- Allows high-pressure operation

Standard 316L SS fluid path

- Provides compatibility with different materials
- Assures high-pressure application reliability

* Higher custom pressures available

** T Code dependent

HYDROSAFE Heater Assembly Specifications

| HYDROSAFE Assembly | Standard Offering | Standard Options | Other Available Options |
|---|--|--|--|
| Base Construction | Fully certified indirect electric heat exchanger assembly - flow coil and tubular elements cast into an aluminum cylinder. Complete with sensors, enclosure, insulation, nozzles and shroud. | | |
| Control Configuration | Cascade using one internal cascade sensor per heater assembly (included) and separate process temperature sensor (not included) | | |
| Casting Material | Al Alloy 356 | | |
| Corrosion Protection on Casting | Corrosion and weather protectant high temperature coating to 538°C (1000°F) | | |
| Number of Flow Coils | 1 | | |
| Heater Element | Tubular elements - 0.430 in. O.D. x 0.035 in. wall, 316 stainless steel, NiCr resistance element, welded wire connection, bright annealed | | |
| Heater Element Moisture Seal | Epoxy 180°C (356°F) rated | | |
| Casting Insulation | Aerogel insulation | | |
| Baseplate, Top Plate, Stand-off Shroud, Casting Shroud Material | 316 stainless steel | | |
| HYDROSAFE Assembly Area Classification - Certification | North American (Class 1, Div. 1 & 2, Groups B, C, D) | ATEX (Ex d IIC) and/or IEC (Ex d IIC) | — |
| HYDROSAFE Assembly T Code Rating | None, T2 or T3 | — | — |
| Maximum Casting Temperature Limit | 150°C (302°F) for T3, 250°C (482°F), for T2 | — | — |
| Pressure Boundary Compliance | Design, calculation and production acc. to ASME VIII Div. 1 | — | Contact Watlow |
| Electrical | | | |
| Voltage | 480V or 400V | 380, 415, 440, 460, 575, or 600 | — |
| Voltage Supply | 3 Phase AC + ground, with or without neutral connection (assembly is universally configured for both) | | |
| Frequency | 50 or 60 Hz | | |
| Wattage (at specified voltage) | 31.2kW (480V and 600V) or 28.9kW (400V) | 26.07kW (380V), 31.1kW (415V), 28.65kW (460V and 575V), 26.22kW (440V) | 10.4kW (480V), 7.22kW (400V), 6.52kW (380V) |
| Number of Heater Supply Circuits | 1 | | |
| Max Amperage per Circuit | Voltage/wattage dependent (max. 45 amps in any configuration) | | |
| Power Connection Entry Size | 1 in. NPT coupling or 1 in NPT x M32 x 1.5 adaptor | | |
| Power Connection within Enclosure | Compression type, screw style distribution terminal block on DIN-rail within enclosure (3-phase + neutral) Compression type, screw style ground terminal block in enclosure (ground) Split bolt ground termination on external enclosure (with ATEX or IEC option) | | |
| Flow Coil | | | |
| Vessel Coil Material | 316/316L (dual rated) | — | Inconel® 625, Super Duplex 2507 |
| Vessel Coil Raw Material Certifications | NACE MR-0175 / ISO15156 and MR-0103 with applicable technical circulars and addendas | | |
| Inlet/Outlet | | | |
| Inlet/Outlet Connection Type | Standard flange | — | High pressure hub type connector |
| Inlet/Outlet Connection Material (match flow coil) | 316/316L (dual rated) | — | Inconel® 625, Super Duplex 2507 |
| Inlet/Outlet Connection | ANSI 1 in., Class 600, RF, sched 80 bore | ANSI 1 in., Class 2500, RTJ, sched 160 bore | Clamp hub Super Duplex 2507 only |
| Inlet/Outlet Nozzle Connection Gaskets | Spiral wound or ring joint | — | — |
| Enclosure | | | |
| Enclosure Type | 304 stainless steel North America painted carbon steel (IEC/ATEX) | 316 stainless steel | — |
| Enclosure Paint Color (only if Painted Carbon Steel) | RAL 7035 light grey | — | Other - custom color to be reviewed by factory (painted carbon steel enclosure only) |
| Enclosure Rating | See Item 11, Ordering Information on page 4 | | |
| Enclosure Anti Condensation Heater | None | — | Enclosure heater |
| Hazardous/Non-Hazardous Area Classification | Per assembly hazardous location rating | | |
| External Enclosure Hardware | 316 stainless steel | | |

HYDROSAFE Heater Assembly Specifications (con't)

| HYDROSAFE Assembly | Standard Offering | Standard Options | Other Available Options |
|---|---|------------------|--|
| Sensors | | | |
| Process and Limit Temperature Sensor Type | Duplex Pt 100, 3 wire RTDs 300 series stainless steel sheath | — | Duplex thermocouple - Type K 300 series stainless steel sheath |
| Number of Sensors | 3 | | |
| Sensor Junctions | Duplex sensor: (1) cascade process sensor, (1) internal casting high limit duplex sensor: (1) external casting high limit, (1) spare duplex sensor: (1) enclosure high limit, (1) spare | | |
| Inlet or Outlet Sensors | Customer supplied (not included) | | |
| Sensor Connection Entry Size | 3/4 in. NPT coupling or 3/4 in. NPT to M25 x 1.5 adaptor | — | 1/2 in. NPT coupling or 1/2 in. NPT to M20 x 1.5 adaptor |
| Sensor Connections within Control Panel | 3 wire RTD terminal blocks within heater enclosure | — | Type K thermocouple terminal blocks within heater enclosure (when thermocouple option selected) |
| Testing | | | |
| Pressure Testing (Hydro) | Standard on all assemblies per pressure vessel code requirements (15 minutes @ 1.3 x MAWP x LSR) | — | Custom time for hydro test |
| Other Options | | | |
| Country of Origin Materials | Watlow standard vendors - no restrictions | — | Certified countries |

HYDROSAFE Specifications

Design temperature

- 60 to +300°C (-76 to 572°F)

Design pressure

- Up to 6800 psi (469 bar)

Weight

- 400 lbs (182kg)

Inlet temperature

- User specified

Outlet temperature

- Max. 232°C (450°F)

Working pressure

- User specified

Flow rate

- User specified

Maximum back pressure

- User specified

Maximum ambient temperature

- 50°C (122°F) for North American certifications, 80°C (176°F) for IEC and ATEX certifications

Media type

- Liquid or gas

Media

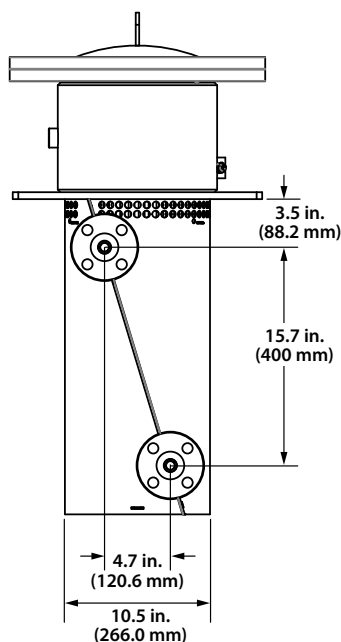
- Methane, natural gas (methane, butane, propane, ethane and water vapor) and nitrogen

Environment T code rating

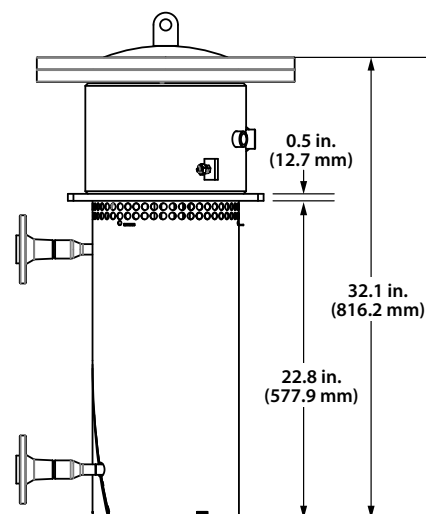
- None, T2 or T3

Dimensional Drawings

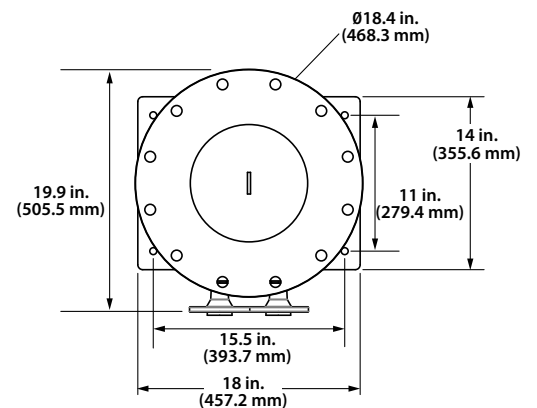
Front View



Side View



Top View



Note: Dimensions shown are approximate. Configuration GA drawing available with order or quote.

HYDROSAFE Ordering Information

Part Number

| ① ② ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ | ⑩ | ⑪ | ⑫ | ⑬ | ⑭ | ⑮ | ⑯ | ⑰ |
|------------|-------------|---------------------|--------------------------|---------------------------|----------------------------|---------------|-------------------------------|----------------------------------|-------------|-------------------|--------|-------------|-----------------|-------------------------|
| | Base Module | Input Voltage/Phase | Nameplate Wattage Rating | Inlet & Outlet Connection | Connection & Coil Material | Temp. Sensors | Electrical Enclosure Material | Hazardous Location Certification | Mech. Cert. | Elec. Conn. Entry | Gasket | Enc. Heater | Testing Options | Mat'l Country of Origin |
| HYH | | | | | | | | | | | | | | |

| ④ Base Module | |
|---------------|---------------------------------------|
| A = | 15 ³ / ₄ in. CL |
| B = | Future option |

| ⑤ Input Voltage/Phase | |
|-----------------------|---------------|
| A = | Future option |
| B = | Future option |
| C = | Future option |
| D = | 380V, 3-phase |
| E = | 400V, 3-phase |
| F = | 415V, 3-phase |
| G = | 460V, 3-phase |
| H = | 480V, 3-phase |
| J = | 575V, 3-phase |
| K = | 600V, 3-phase |

| ⑥ Nameplate Wattage Rating | |
|----------------------------|--|
| A = | Future option |
| B = | Future option |
| C = | Future option |
| D = | Future option |
| E = | Future option |
| F = | 26.07kW (15 ³ / ₄ in. CL only, 380V) |
| G = | 28.65kW (15 ³ / ₄ in. CL only, 460V, 575V) |
| H = | 28.9kW (15 ³ / ₄ in. CL only, 400V) |
| J = | 31.1kW (15 ³ / ₄ in. CL only, 415V) |
| K = | 31.2kW (15 ³ / ₄ in. CL only, 480V, 600V) |

| ⑦ Inlet & Outlet Connection | |
|-----------------------------|--|
| A = | Future option |
| B = | Future option |
| C = | Clamp hub 1 in. NPS 4 bolt |
| D = | ANSI 1 in. CI 600 RF, sched 80 Bore |
| E = | Future option |
| F = | Future option |
| G = | ANSI 1 in. CI 2500 RTJ, sched 160 Bore |

| ⑧ Connection & Coil Material | |
|------------------------------|----------------------------|
| A = | 316/L |
| B = | Inconel® 625 or equivalent |
| C = | Duplex Stainless 2507 |

| ⑨ Temperature Sensors | |
|-----------------------|------------|
| 1 = | RTD |
| 2 = | Type K T/C |

| ⑩ Electrical Enclosure Material | |
|---------------------------------|---------------------------|
| A = | Painted carbon steel |
| B = | Stainless steel, Type 304 |
| C = | Stainless steel, Type 316 |

| ⑪ Hazardous Location Certification | |
|------------------------------------|----------------|
| 1 = | North America* |
| 2 = | IEC w/IP66 |
| 3 = | ATEX w/IP66 |

* Env. Protection: If carbon steel enclosure, will be Type 4. If stainless steel enclosure, will be Type 4X.

| ⑫ Mechanical Certifications | |
|-----------------------------|---|
| A = | ASME VIII Div. 1 design, calculation and production |
| B = | PED (EU) |
| C = | CRN + ASME VIII Div. 1 design, calculation and production |

| ⑬ Power and Sensor Connection Entries | |
|---------------------------------------|--|
| 1 = | (1) 1 in. NPT for power and (1) ³ / ₄ in. for sensor |
| 2 = | (1) M32 x 1.5 adaptor for power and (1) M25 x 1.5 adaptor for sensor |

| ⑭ Gasket | |
|----------|--------------|
| A = | None |
| B = | Spiral wound |
| C = | Ring joint |

| ⑮ Enclosure Heater | |
|--------------------|-----------|
| 1 = | Yes, 220V |
| 2 = | No |

| ⑯ Testing Options | |
|-------------------|---|
| A = | Custom time hydro |
| B = | Radiography of heating coil weld joints |
| C = | Dye penetrant of heating coil weld joints |
| D = | PMI of pressure boundary materials |
| E = | A + B + D |
| F = | A + C + D |

| ⑰ Material Country of Origin | |
|------------------------------|-----------------------|
| 1 = | Standard Watlow |
| 2 = | Specified by customer |

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