flowquip

# Temperature Measurement

# Temperature Measurement

# Introduction

Flowquip have worked in partnership with H&b Sensors for over 10 years.

Established in 1978, H&b Sensors specialise in the manufacture of a wide range of temperature sensors and associated products in accordance with their ISO 9001:2008 certified management system.

H&b's core product range includes platinum resistance thermometers, thermocouples, thermowells, bi-metallic thermometers, platinum detectors, temperature transmitters, level float switches, and miniature heaters.

Flowquip supply temperature products into a wide range of different industries including: Petro-Chemical, Oil & Gas, Power Generation, Energy Management, Aerospace, Automotive, Marine, Pharmaceutical, Machine Building, Refrigeration, Food and Drink.

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We are confident that together our professional expertise and flexibility ensures we offer a service which is second to none.

# Platinum Resistance Thermometers

**H&b Sensors manufacture both mineral insulated and fabricated platinum resistance thermometers.**

Suitable for temperature ranges between -200°C and +600°C, platinum resistance thermometers provide highly repeatable, long term and high accuracy readings. Utilising our specialist manufacturing facilities, H&b are able to manufacture platinum resistance temperature sensors for virtually any industrial or scientific application in accordance with national, international and customer specific standards.

Built to customer specification; platinum resistance thermometers may be configured with options including; but not limited to the following: connection head, wiring configuration, termination style, sheath material, lengths and diameters, detector type, tip style, thermowells and surface mount packages.

In addition H&b are licensed to manufacture sensor assemblies for use in hazardous areas requiring Exd or Exia certification.

## Sensor Types

**Pt10** Platinum, 10 Ω at 0°C

**Pt100** Platinum, 100 Ω at 0°C

**Pt130** Platinum, 130 Ω at 0°C

**Pt500** Platinum, 500 Ω at 0°C

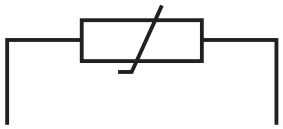
**Pt1000** Platinum, 1000 Ω at 0°C

**Others available on request**

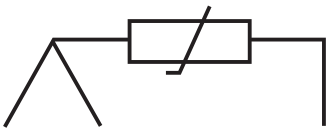
## Detector Tolerances

| Class | Accuracy @ 0°C |
|---|---|
| 1/10 DIN | ± 0.03°C |
| 1/5 DIN | ± 0.06°C |
| 1/3 DIN | ± 0.08°C |
| Class A | ± 0.15°C |
| Class B | ± 0.30°C |

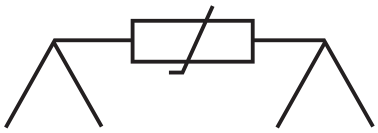
## Wiring Configurations



2 Wire



3 Wire



4 Wire

4 Wire Compensated (Blind Loop)

## Cold End Connections

Plain Pot

ISO Pot

Plugs and Connectors

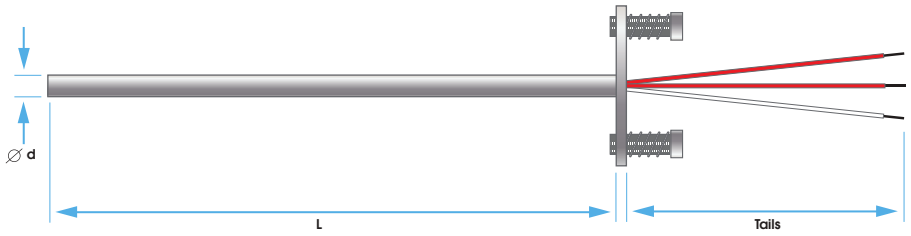
Cable

Terminal Block

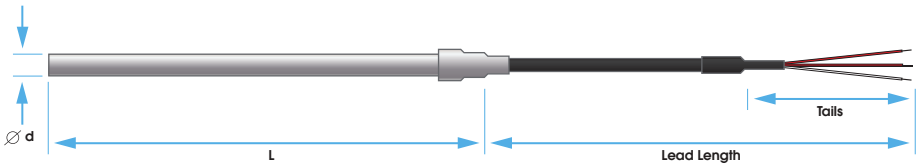
Transmitter (See pages 18 - 19 for technical information)

# Platinum Resistance Thermometers

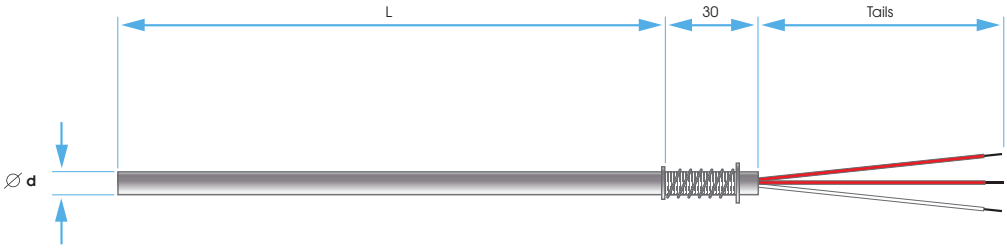
## Sensor Configurations



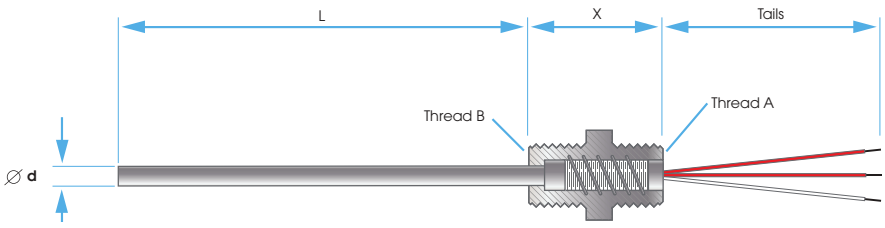

Spring Loaded Din Plate Insert



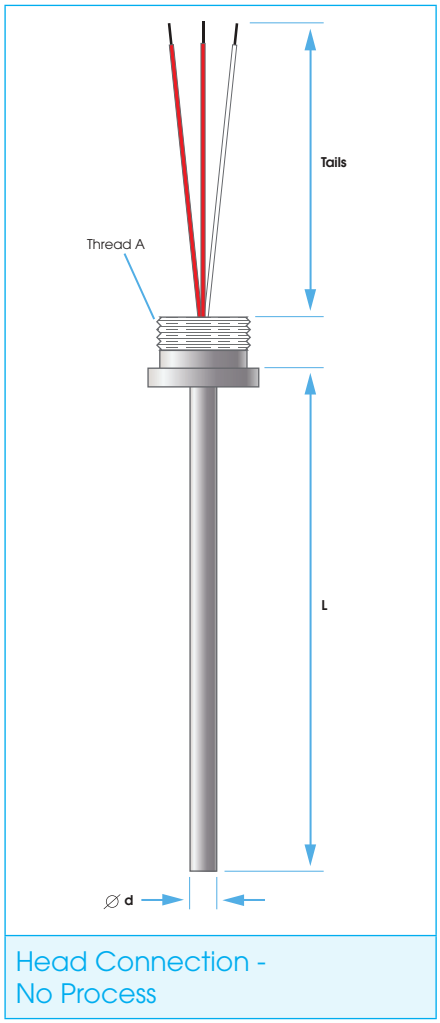

Cable Connection



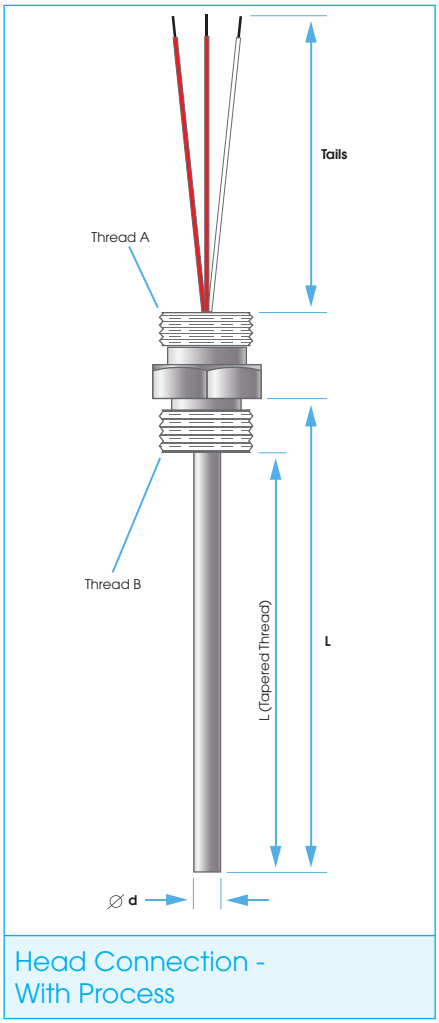

Spring Mounted Insert



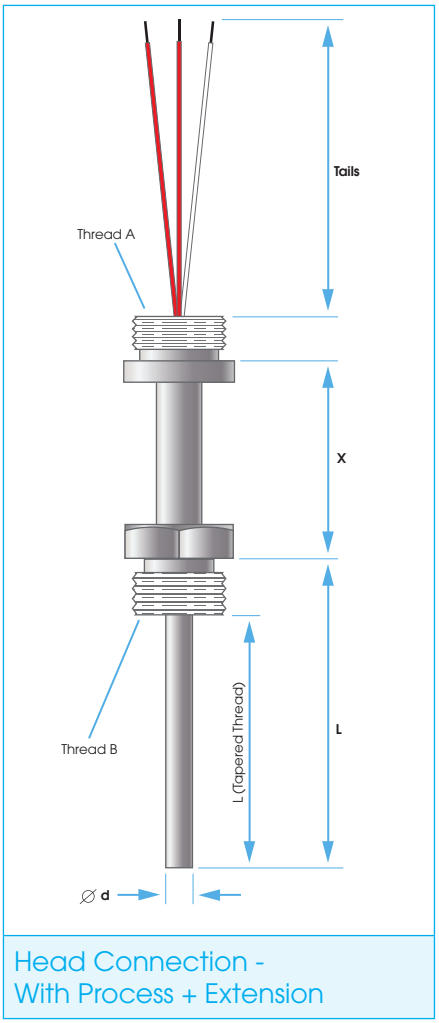

Spring Mounted Head Connection - With Process




Head Connection -
No Process

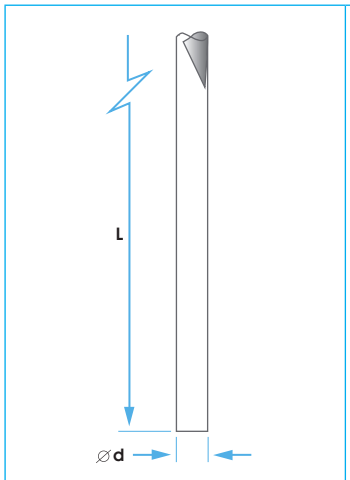



Head Connection -
With Process

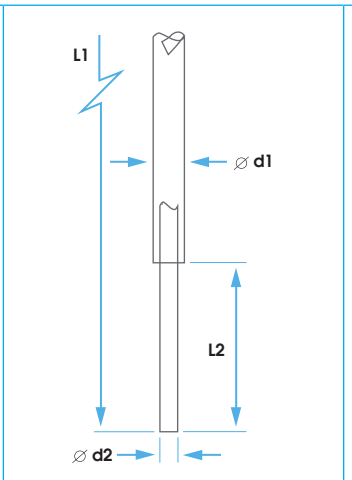



Head Connection -
With Process + Extension

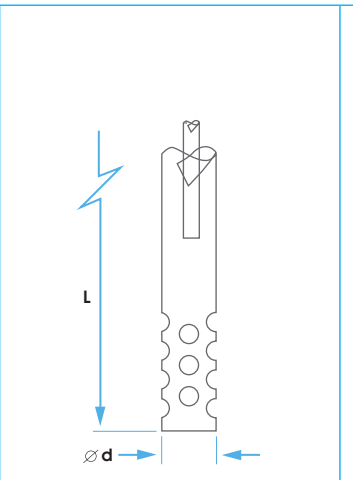
## Tip Styles



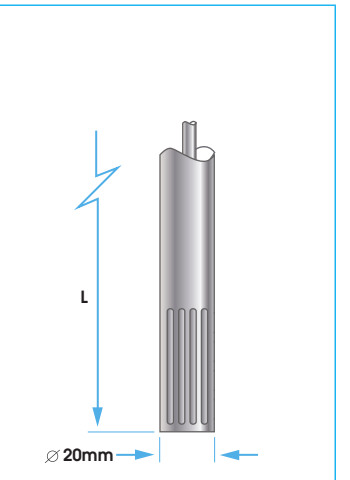

Standard




Reduced Tip




Drilled Guard Tube




Slotted Guard Tube

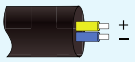
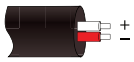
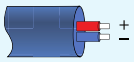
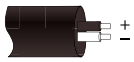
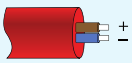
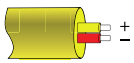
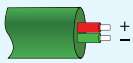
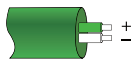
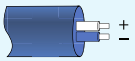
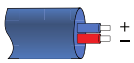
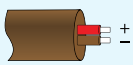
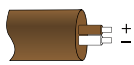
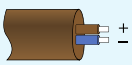
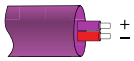
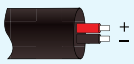
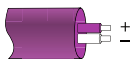
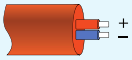
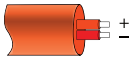
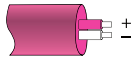
# Thermocouples

**H&b Sensors manufacture both class 1 and class 2 mineral insulated, fabricated and bare wire thermocouples suitable for temperature ranges between -250°C and +1300°C.**

Utilising our specialist manufacturing facilities, H&b are able to manufacture thermocouple sensors for virtually any industrial or scientific application in accordance with national, international and customer specific standards.

Built to customer specification; thermocouples may be configured with options including, but not limited to the following: connection head, thermocouple type, wiring configuration, termination style, sheath material, lengths and diameters, junction type, tip style, ceramic sheath, thermowells and surface mount packages.

In addition H&b are licensed to manufacture sensor assemblies for use in hazardous areas requiring Exd or Exia certification.

| Type | Conductors +/- Operating Range | BS | ANSI | DIN | IEC/CEI |
|---|---|---|---|---|---|
| J | Iron Constantan 0-850°C |  |  |  |  |
| K | Nickel Chromium / Nickel Aluminium -200°C - 1100°C |  |  |  |  |
| T | Copper Constantan -250°C - 400°C |  |  |  |  |
| E | Nickel Chromium / Constantan -200°C - 800°C |  |  |  |  |
| N | Nicrosil/Nisil -250°C - 1300°C |  |  | |  |

## Wiring Configurations

Simplex

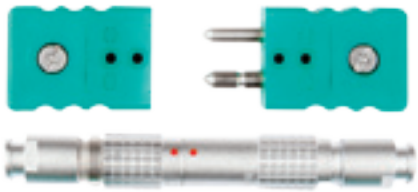
Duplex

Triplex

## Cold End Connections

Plain Pot

ISO Pot



Plugs and Connectors

Cable

Terminal Block

Transmitter (See page 18 - 19 for technical information)

## Hot End Junctions

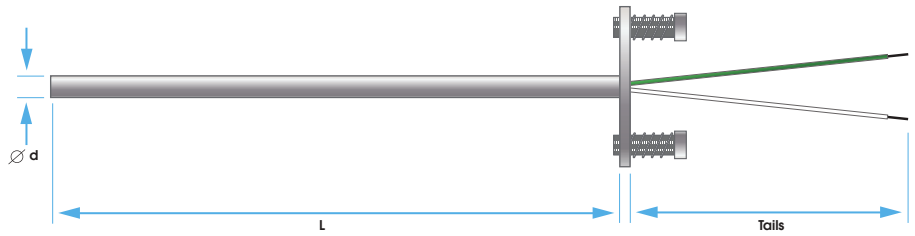
Grounded Thermocouple

Insulated Thermocouple

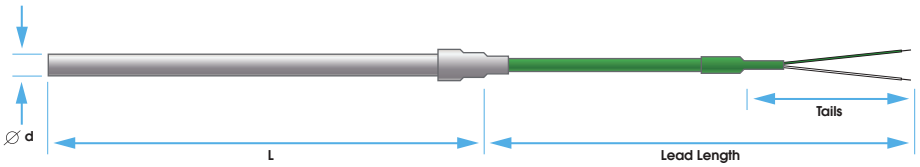
Exposed Thermocouple

# Thermocouples

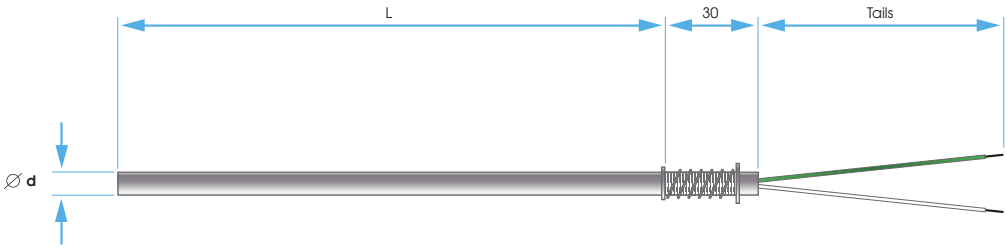
## Sensor Configurations



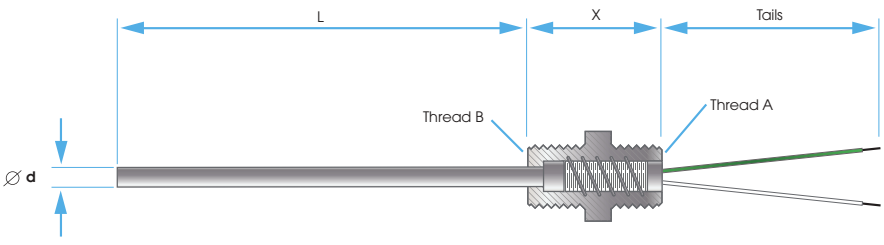

Spring Loaded Din Plate Insert



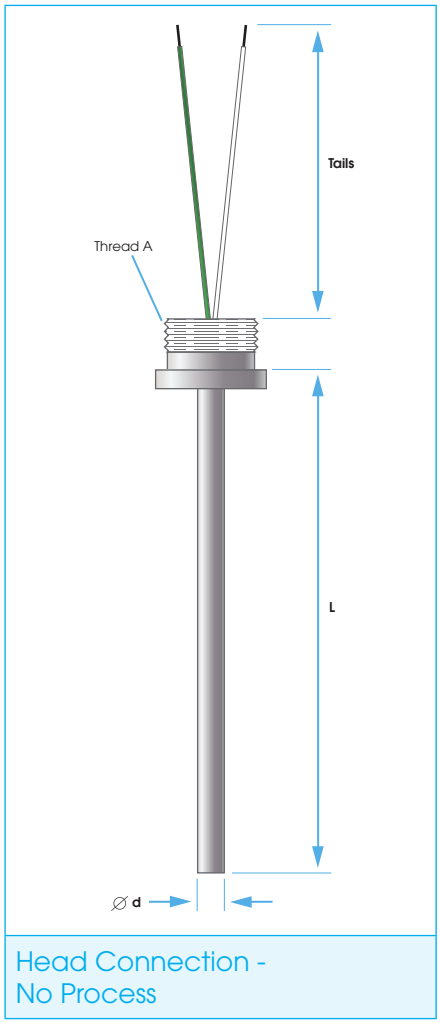

Cable Connection



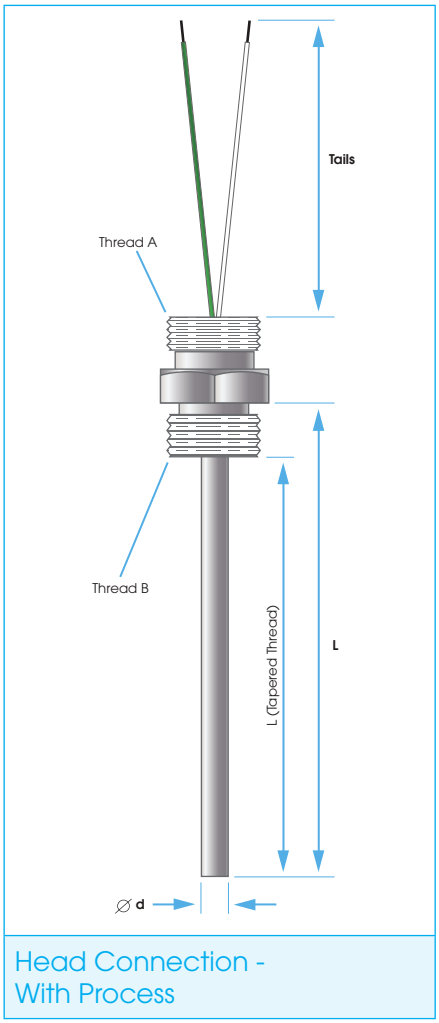

Spring Mounted Insert



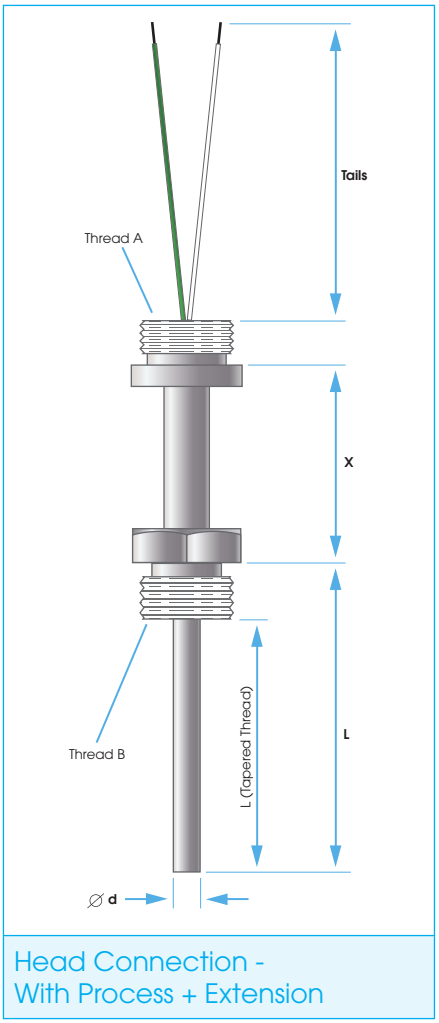

Spring Mounted Head Connection - With Process




Head Connection -
No Process

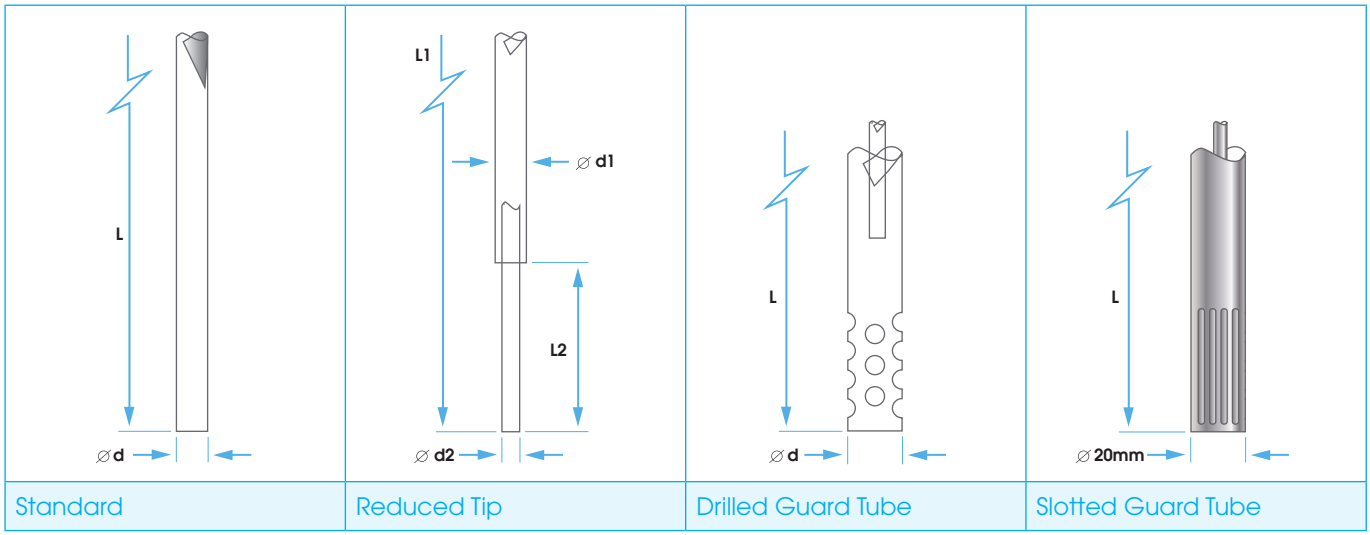



Head Connection -
With Process




Head Connection -
With Process + Extension

## Tip Styles




Standard | Reduced Tip | Drilled Guard Tube | Slotted Guard Tube

# Connection Heads

## Aluminium

| Type 2 | | Type 4 | | Type 11 | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Cable Entry | M16 x M16 | Cable Entry | M20 x 1.5 | Cable Entry | M20 x 1.5 |
| IP Rating | None | IP Rating | IP68 | IP Rating | IP65 |
| Certified | No | Certified | No | Certified | Exia* |
| Options | None | Options | None | Options | None |

| Type 15 | | Type 16 | | Type 17 | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Cable Entry | M20 x 1.5 | Cable Entry | M20 x 1.5 / PG16 | Cable Entry | M16 x 1.5 |
| IP Rating | IP68 | IP Rating | IP68 | IP Rating | IP66 |
| Certified | No | Certified | No | Certified | No |
| Options | None | Options | Dual Entry | Options | None |

| Type 38 | | Type 45 | | Type 47 | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Cable Entry | M20 x 1.5 / ½" NPT | Cable Entry | M20 x 1.5 | Cable Entry | M16 x 1.5 |
| IP Rating | IP68 | IP Rating | IP68 | IP Rating | IP68 |
| Certified | No | Certified | No | Certified | No |
| Options | Dual Entry | Options | None | Options | None |

| Type 49 | | Type 50/0/1 | | Type 51/0/1 | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Cable Entry | M20 x 1.5 / ½" BSP / ½" NPT | Cable Entry | M20 x 1.5 / ½" NPT | Cable Entry | X2 M20 x 1.5 / ½" NPT |
| IP Rating | IP68 | IP Rating | IP68 | IP Rating | IP68 |
| Certified | No | Certified | Exd and Exia* | Certified | Exd and Exia* |
| Options | None | Options | Window (50/0/3) | Options | Window (51/0/3) |

## Plastic

| Type 8 | | Type 24 | | Type 46 | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Cable Entry | M20 x 1.5 | Cable Entry | M16 x 1.5 / M20 x 1.5 | Cable Entry | M20 x 1.5 |
| IP Rating | IP54 | IP Rating | IP67 | IP Rating | IP68 |
| Certified | No | Certified | No | Certified | FDA Approved |
| Options | None | Options | High Cap | Options | White or Black |

## Cast Iron

| Type 21 | |
|---|---|
|  | |
| Cable Entry | M20 x 1.5 |
| IP Rating | IP67 |
| Certified | No |
| Options | None |

* When part of an assembly.

# Connection Heads

## 316 Stainless Steel

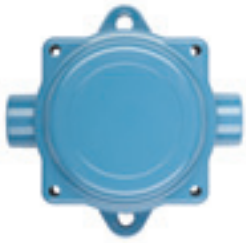
| Type 34 | | Type 37 | | Type 41 | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Cable Entry | M20 x 1.5 / ½" BSP | Cable Entry | M16 x 1.5 | Cable Entry | M20 x 1.5 |
| IP Rating | None | IP Rating | IP65 | IP Rating | IP68 |
| Certified | No | Certified | No | Certified | No |
| Options | None | Options | None | Options | None |

| Type 44 | | Type 50/1/1 | | Type 51/1/1 | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Cable Entry | M20 x 1.5 | Cable Entry | M20 x 1.5 / ½" NPT | Cable Entry | X2 M20 x 1.5 / ½" NPT |
| IP Rating | IP68 | IP Rating | IP68 | IP Rating | IP68 |
| Certified | No | Certified | Exd and Exia* | Certified | Exd and Exia* |
| Options | None | Options | Window (50/1/3) | Options | Window (51/1/3) |

| Type 80/X | |
|---|---|
|  | |
| Cable Entry | M16 x 1.5 / M20 x 1.5 / ½" NPT |
| IP Rating | IP68 |
| Certified | No |
| Options | None |

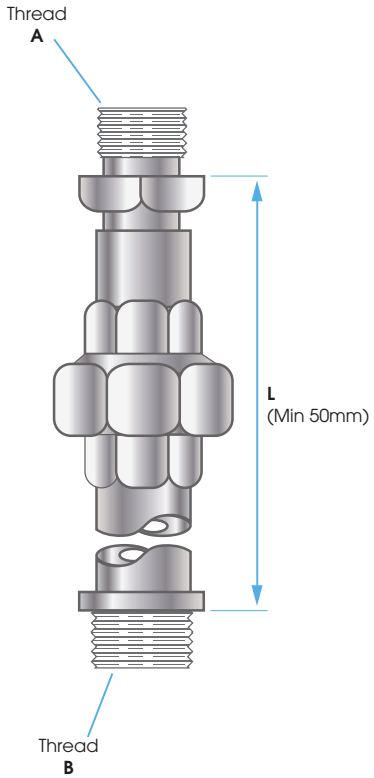
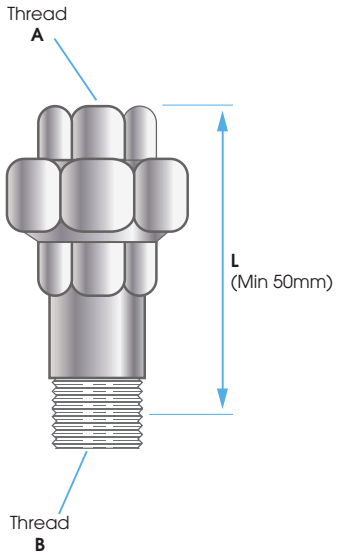
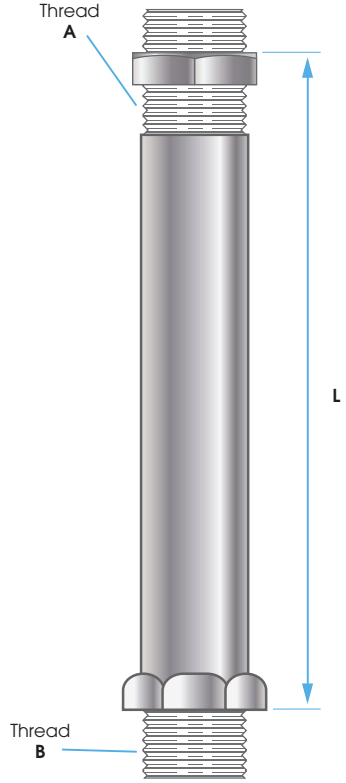
* When part of an assembly.

## Junction Boxes

| Type 25 | | Type 40 | | Type 53/0/1 | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Material | Plastic | Material | Aluminium | Material | Aluminium / St.St |
| Cable Entry | X2 M16 x 1.5 / X2 M20 x 1.5 | Cable Entry | X2 M20 x 1.5 | Cable Entry | X2 M20 x 1.5 / X2 ½" NPT |
| IP Rating | IP67 | IP Rating | IP65 | IP Rating | IP68 |
| Certified | No | Certified | No | Certified | Exd and Exia* |
| Options | High Cap | Options | High Cap | Options | Window (53/0/3) |

## Extension Pieces

Used for positioning the connection head, lagging extension, easy removal of sensor and protecting the head from excessive temperature.

| | | |
|---|---|---|
|  |  |  |
| Nipple Union Nipple | Nipple Union | Nipple & Locknut |

# Bi-Metallic Thermometers


**Mounting Style**
Every angle, Vertical & Co-axial

**Dial Size**
100mm, 130mm & 160mm

**Case Material**
304 or 316 Stainless Steel, IP65

**Window**
Standard Instrument Glass,
Toughened Glass, Perspex

**Stem Material**
316 Stainless Steel

**Stem Diameter**
6.0mm, 6.3mm, 8.0mm, 12.7mm

**Maximum Stem Lengths**
6.0mm & 6.3mm = 500mm
8.0mm = 1000mm
12.7mm = 1500mm

**Fitting**
Plain stem for fitting with
compression gland

**Accuracy**
Class 1 (±1% FSD)

**External Zero Adjustment**
Fitted as standard

# HBS 6000
# Programmable Transmitter

**Body & Wetted Parts**
316 Stainless Steel standard
Weatherproof rated IP65

**Sensor**
Pt100 Class A.

**Output**
4...20 mA

**Accuracy**
±0.25%

**Stability**
±0.02%/ °C

**Connection**
½" BSP as standard
(others available)

**Stem Length**
30mm minimum

**Span**
-20°C to + 250°C
(Consult us for higher temperatures)

**CE Approval**
BS EN61326

**Ambient Temperature Limits**
70 °C

# Temperature Transmitters

## Head Mounted Transmitters

| 5331A | | 5331D | | 5333A | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | PRT (2,3,4 Wire) / Thermocouple | Input | PRT (2,3,4 Wire) / Thermocouple | Input | PRT (3 Wire) |
| Output | 4…20 mA | Output | 4…20 mA | Output | 4…20 mA |
| Communication | No | Communication | No | Communication | No |
| Certified | No | Certified | Exia | Certified | No |

| 5333D | | 5334A | | 5334B | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | PRT (3 Wire) | Input | Thermocouple | Input | Thermocouple |
| Output | 4…20 mA | Output | 4…20 mA | Output | 4…20 mA |
| Communication | No | Communication | No | Communication | No |
| Certified | Exia | Certified | No | Certified | Exia |

| 5335A | | 5335D | | 5350A | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | PRT (2,3,4 Wire) / Thermocouple | Input | PRT (2,3,4 Wire) / Thermocouple | Input | PRT (2,3,4 Wire) / Thermocouple |
| Output | 4…20 mA | Output | 4…20 mA | Output | 4…20 mA |
| Communication | HART® | Communication | HART® | Communication | Profibus®PA / Foundation™F |
| Certified | SIL2 | Certified | Exia, SIL2 | Certified | No |

| 5350B | | SEM 110P | | SEM 110XP | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | PRT (2,3,4 Wire) / Thermocouple | Input | PRT (3 Wire) | Input | PRT (3 Wire) |
| Output | 4…20 mA | Output | 4…20 mA | Output | 4…20 mA |
| Communication | Profibus®PA / Foundation™F | Communication | No | Communication | No |
| Certified | Exia | Certified | No | Certified | Exia |

| SEM 110TC | | SEM 110XTC | | SEM 203P | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | Thermocouple | Input | Thermocouple | Input | PRT (3 Wire) |
| Output | 4…20 mA | Output | 4…20 mA | Output | 4…20 mA |
| Communication | No | Communication | No | Communication | No |
| Certified | No | Certified | Exia | Certified | No |

| SEM 203TC | | SEM 206P | | SEM 206TC | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | Thermocouple | Input | PRT (2,3 Wire) | Input | Thermocouple |
| Output | 4…20 mA | Output | 4…20 mA | Output | 4…20 mA |
| Communication | No | Communication | No | Communication | No |
| Certified | No | Certified | No | Certified | No |

# Temperature Transmitters

## Head Mounted Transmitters

| SEM 210 | | SEM 210X | | SEM 310 | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | PRT (3 Wire) / Thermocouples | Input | PRT (3 Wire) / Thermocouples | Input | PRT (2,3,4 Wire) / Thermocouple |
| Output | 4…20 mA | Output | 4…20 mA | Output | 4…20 mA |
| Communication | No | Communication | No | Communication | HART® |
| Certified | No | Certified | Exia | Certified | SIL2 |

| SEM 310X | | TTC 200 | | TTC 200X | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | PRT (2,3,4 Wire) / Thermocouple | Input | Thermocouple | Input | Thermocouple |
| Output | 4…20 mA | Output | 4…20 mA | Output | 4…20 mA |
| Communication | HART® | Communication | No | Communication | No |
| Certified | Exia, SIL2 | Certified | No | Certified | Exia |

| TTR 200 | | TTR 200X | |
|---|---|---|---|
|  | |  | |
| Input | PRT (3 Wire) | Input | PRT (3 Wire) |
| Output | 4…20 mA | Output | 4…20 mA |
| Communication | No | Communication | No |
| Certified | No | Certified | Exia |

## Din Rail Mounted Transmitters

| 6331A | | 6331B | | 6333A | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | PRT (2,3,4 Wire) / Thermocouple | Input | PRT (2,3,4 Wire) / Thermocouple | Input | PRT (3 Wire) |
| Output | 4…20 mA | Output | 4…20 mA | Output | 4…20 mA |
| Communication | No | Communication | No | Communication | No |
| Certified | No | Certified | Exia | Certified | No |

| 6333B | | 6334A | | 6334B | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | PRT (3 Wire) | Input | Thermocouple | Input | Thermocouple |
| Output | 4…20 mA | Output | 4…20 mA | Output | 4…20 mA |
| Communication | No | Communication | No | Communication | No |
| Certified | Exia | Certified | No | Certified | Exia |

| 6335A | | 6335D | | 6350A | | 6350B | |
|---|---|---|---|---|---|---|---|
|  | |  | |  | |  | |
| Input | PRT (2,3,4 Wire) / Thermocouple | Input | PRT (2,3,4 Wire) / Thermocouple | Input | PRT (2,3,4 Wire) / Thermocouple | Input | PRT (2,3,4 Wire) / Thermocouple |
| Output | 4…20 mA | Output | 4…20 mA | Output | 4…20 mA | Output | 4…20 mA |
| Communication | HART® | Communication | HART® | Communication | Profibus®PA / Foundation™F | Communication | Profibus®PA / Foundation™F |
| Certified | SIL2 | Certified | Exia, SIL2 | Certified | No | Certified | Exia |

# Displays

## Head Mounted Displays

| HBS 16000 | | HBS 16000/X | | HBS 16001 | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | PRT / Thermocouple | Input | PRT / Thermocouple | Input | 4…20 mA |
| Supply | AA Battery Powered | Supply | AA Battery Powered | Supply | Loop Powered |
| Communication | No | Communication | No | Communication | No |
| Certified | No | Certified | Exia | Certified | No |

| HBS 16001/X | | HBS 16002 | | HBS 16002/X | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | 4…20 mA | Input | PRT | Input | PRT |
| Supply | Loop Powered | Supply | AA Battery Powered | Supply | AA Battery Powered |
| Communication | No | Communication | No | Communication | No |
| Certified | Exia | Certified | No | Certified | Exia |

| HBS 16003 | | HBS 16003/X | | HBS 16004/X | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | 4…20 mA | Input | 4…20 mA | Input | 4…20 mA |
| Supply | Loop Powered | Supply | Loop Powered | Supply | Loop Powered |
| Communication | No | Communication | No | Communication | HART® |
| Certified | No | Certified | Exia | Certified | Exia |

## Panel Mounted Displays

| 5331A | | 5531B | | 5714 | |
|---|---|---|---|---|---|
|  | |  | |  | |
| Input | 4…20 mA | Input | 4…20 mA | Input | PRT / Thermocouple / Ω / mA / V |
| Supply | Loop Powered | Supply | Loop Powered | Supply | AC / DC |
| Communication | No | Communication | No | Communication | No |
| Certified | No | Certified | Exia | Certified | No |

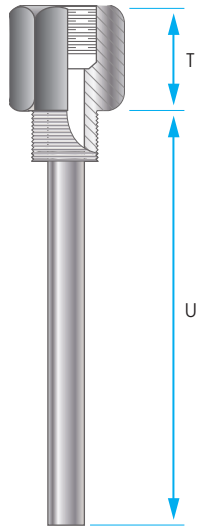
| 5715 | | 5725 | |
|---|---|---|---|
|  | |  | |
| Input | PRT / Thermocouple / Ohms / mA / V | Input | kHz / µS |
| Supply | AC / DC | Supply | AC / DC |
| Communication | No | Communication | No |
| Certified | No | Certified | No |

# Thermowells

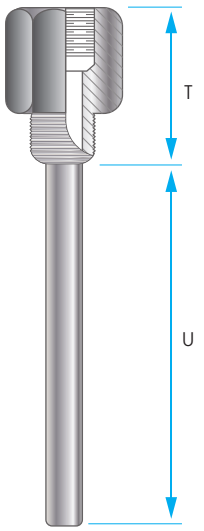
**H&b manufacture a comprehensive range of both solid drilled, fabricated and forged thermowells.**

A wide selection of configurations are available including screwed, flanged, welded or hygienic process attachments complete with a wide variety of extension pieces and additional options. Solid drilled thermowells as standard include 3.1 material certificates and internal pressure test. Fabricated thermowells include 3.1 material certificates and a leak test. Additional Testing is available including: Wake Frequency, Dye Penetrant, X-Ray, Positive Material Identification (PMI), Heat Treatment, Magnetic Particle Inspection, Oxygen Cleaning, Ultrasonic and Charpy Impact Testing.

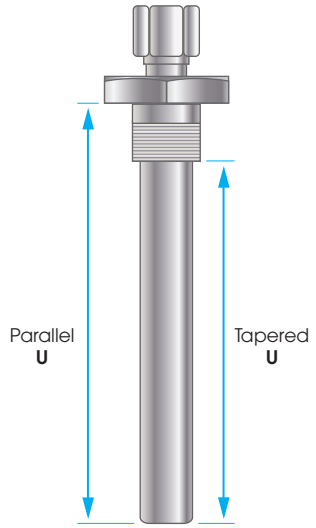
## Process Connection



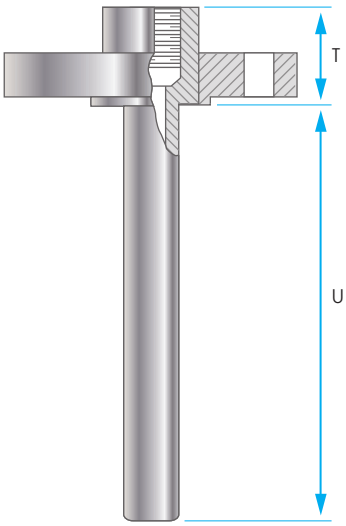

Parallel Thread



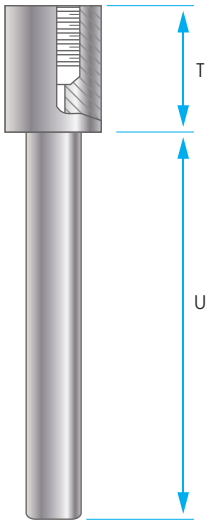

Taper Thread



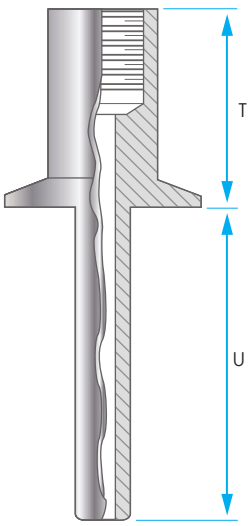

Integral Compression Fitting




Flanged




Weld In

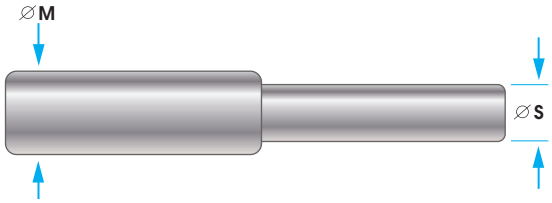



Hygienic

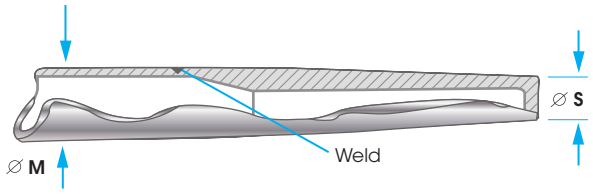
## Stem Types


Parallel - Solid Drilled or Fabricated


Tapered - Solid Drilled

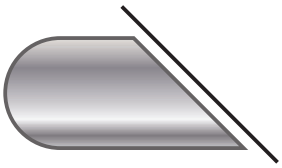



Stepped - Solid Drilled or Fabricated

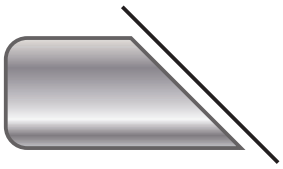



Combination

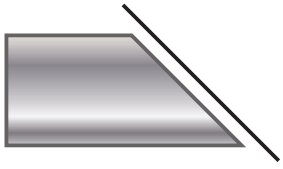
## Tip Styles



Spherical

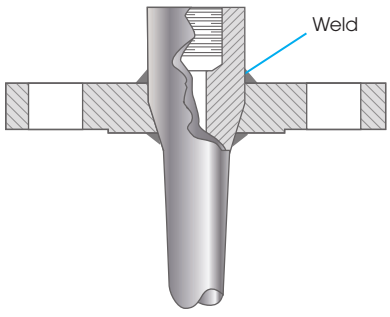


Radius

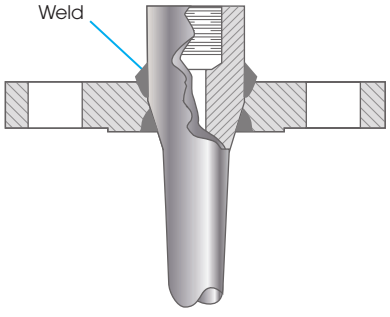


Flat

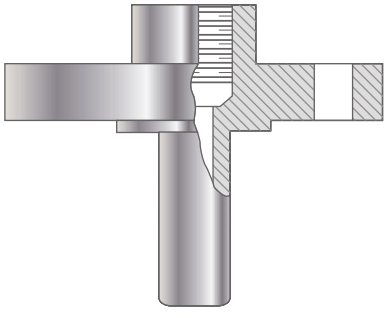
## Flange Connections




Seal Welded




Full Penetration Welded



Forged

# Certified Products

**H&b Sensors manufacture a wide range of Exd (explosion proof) and Exia (intrinsically safe) products for use in hazardous areas and harsh environments.**

Exd certification is available for both temperature measurement and level detection assemblies conforming to both ATEX and IECEx standards. Using either our aluminium or stainless steel Type 50 series connection head, a variety of different assembly configurations are available.

Exia certified temperature assemblies conforming to ATEX are available using both our Type 50 series and Type 11 connection heads.

## Connection Heads and Junction Box See Pages 12 - 15 For Full Technical Specification.

| Type 11 | | Type 50 | | Type 51 | | Type 53 | |
|---|---|---|---|---|---|---|---|
|  | |  | |  | |  | |
| Material | Aluminium | Material | Aluminium & Stainless Steel | Material | Aluminium & Stainless Steel | Material | Aluminium & Stainless Steel |
| Certified | Exia* | Certified | Exd and Exia* | Certified | Exd and Exia* | Certified | Exd and Exia* |

## Exia Head Mounted Temperature Transmitters See Pages 18 - 19 For Full Technical Specification.

| | 5331D | 5333D | 5334D | 5335D | 5350B |
|---|---|---|---|---|---|
| | 2-wire programmable transmitter | 2-wire programmable transmitter | 2-wire programmable transmitter | 2-wire transmitter with HART® protocol | Profibus®PA/ Foundation™ Fieldbus transmitter |
| **Input** | PRT / Thermocouple | PRT | Thermocouple | PRT / Thermocouple | PRT / Thermocouple |
| **Output** | 4…20mA | 4…20mA | 4…20mA | 4…20mA | 4…20mA |

## Exia Head Mounted Temperature Transmitters See Pages 18 - 19 For Full Technical Specification.

| | SEM 110XP | SEM 110XTC | SEM 210X | SEM 310X | TTC 200X | TTR 200X |
|---|---|---|---|---|---|---|
| | 2-wire programmable transmitter | 2-wire programmable transmitter | 2-wire programmable transmitter | 2-wire transmitter with HART® protocol | 2-wire programmable transmitter | 2-wire programmable transmitter |
| **Input** | PRT | Thermocouple | PRT / Thermocouple | PRT / Thermocouple | Thermocouple | PRT |
| **Output** | 4…20mA | 4…20mA | 4…20mA | 4…20mA | 4…20mA | 4…20mA |

## Exia Din Rail Mounted Temperature Transmitters See Pages 20 - 21 For Full Technical Specification.

| | 6331B | 6333B | 6334B | 6335D | 6350B |
|---|---|---|---|---|---|
| | 2-wire programmable transmitter | 2-wire programmable transmitter | 2-wire programmable transmitter | 2-wire transmitter with HART® protocol | Profibus®PA/ Foundation™ Fieldbus transmitter |
| **Input** | PRT / Thermocouple | PRT | Thermocouple | PRT / Thermocouple | PRT / Thermocouple |
| **Output** | 4…20mA | 4…20mA | 4…20mA | 4…20mA | 4…20mA |

## Exia Head Mounted Displays See Page 23 For Full Technical Specification.

| | HBS 16000/X | HBS 16001/X | HBS 16002/X | HBS 16003/X | HBS 16004/X |
|---|---|---|---|---|---|
| | Battery Powered Programmable LCD display | Loop-Powered Programmable LED display | Battery Powered Programmable LCD display | Loop-Powered Programmable LCD display | Loop-Powered HART® Programmable LCD display |
| **Input** | PRT / Thermocouple | PRT | Thermocouple | PRT / Thermocouple | PRT / Thermocouple |

## Panel Mounted Display See Page 22 For Full Technical Specification.

| | 5531B |
|---|---|
| | Loop-Powered LCD display |
| **Input** | 3.6…23 mA |

## Exd 316 Stainless Steel Compression Fittings

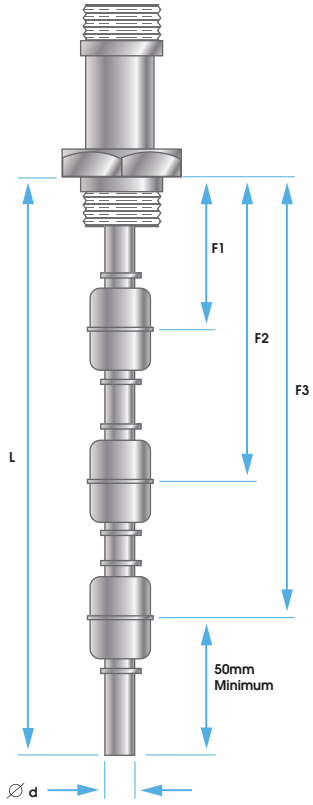
| | ¼" | | | ½" | | | ¾" | | | 1" | | | Metric | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Thread Size** (3mm Ø, 4.5mm Ø and 6mm Ø Bores Available) | ¼" BSP | ¼" BSPT | ¼" NPT | ½" BSP | ½" BSPT | ½" NPT | ¾" BSP | ¾" BSPT | ¾" NPT | 1" BSP | 1" BSPT | 1" NPT | M16 x1.5 | M20 x1.5 |

* When part of an assembly.

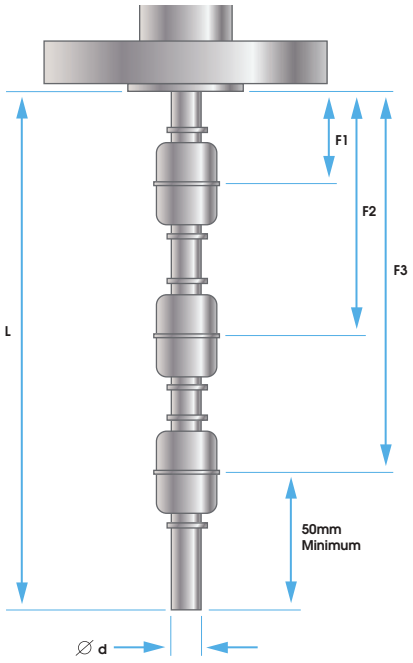
# Level Float Switches

**H&b Sensors manufacture a variety of level float switches to customer specification.**

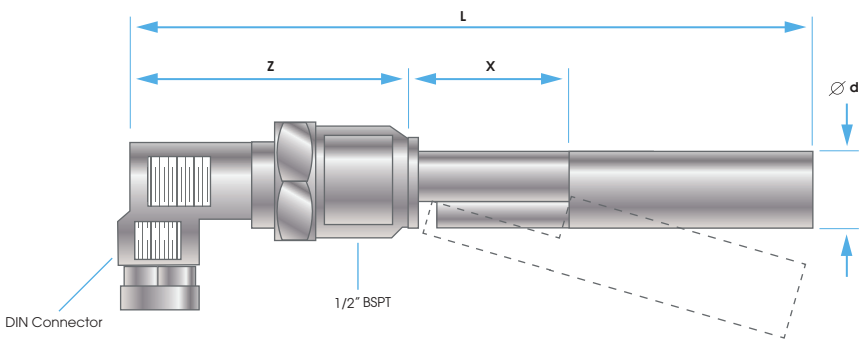
Float switches are efficient level detectors, simple to install, and designed for trouble free operation over a long period. Configurations include threaded or flanged process connections, number of floats and float style, ATEX Exd certification, and incorporation of temperature sensor or switch.




Threaded Level Float Assembly




Flanged Level Float Assembly




Side Entry Level Float Assembly

## Style 1

| | |
|---|---|
| Material | 316 Stainless Steel |
| Max Operating Temperature | 100°C |
| Max Operating Pressure | 20 Bar |
| Special Gravity | 0.75 |

## Style 2

| | |
|---|---|
| Material | 316 Stainless Steel |
| Max Operating Temperature | 100°C |
| Max Operating Pressure | 30 Bar |
| Special Gravity | 0.53 |

## Style 3

| | |
|---|---|
| Material | Buna – N |
| Max Operating Temperature | 100°C |
| Max Operating Pressure | 15 Bar |
| Special Gravity | 0.47 |

# Miniature Heaters

**H&b Sensors manufacture a select range of high temperature nickel and inconel® sheathed miniature heaters with operating temperatures of up to 900°C. The heaters are designed for use in applications where size, high reliability and long life are important.**

The miniature heaters supplied by H&b have a uniform external diameter of approximately 1.5mm. Incorporating virtually non-hygroscopic materials minimises the problems associated with moisture ingress of the conventional mineral insulated heaters. The heaters have been designed so they can be subjected to very high levels of vibration during operation without performance levels being affected.

H&b's miniature heaters can be formed into virtually any shape; with a minimum bend radius of 1.5mm. All heaters are hermetically sealed with a choice of terminations to suit a wide variety of applications.

After forming but prior to termination, the heaters can be attached to an item or structure by high temperature brazing, metal spraying or moulding.

The heaters are normally constructed with a cold lead at each end; special heaters can be built with composite elements to supply a variable wattage density or intermediate unheated section.

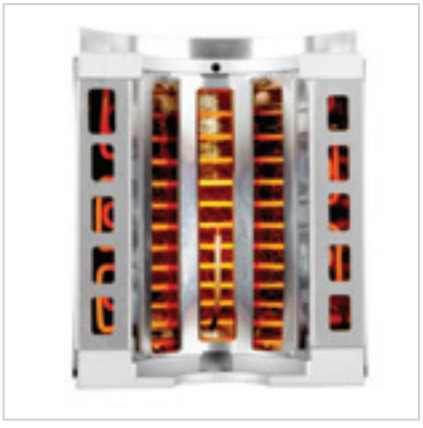
All heaters manufactured by H&b Sensors are extremely adaptable to meet virtually any laboratory or industrial application and can be tailored to exact customer requirements. Thermocouples can be incorporated into the structure for temperature measurement or control purposes along with a variety of electronic components.

## Constant Wattage Heaters

These heaters are designed to operate at a fixed wattage, independent of ambient temperature for rapid heating, where it is necessary to dissipate large amounts of heat over a small area. The wattage density of the heaters can vary up to 20W/cm dependent upon voltage.

## Self Regulating Heaters

The power uptake ranges inversely with the change of ambient temperature. These heaters are designed primarily for operation under icing conditions or to prevent overheating during zero flow conditions when heating moving fluids.



# Pressure Products

## Pressure Gauges

| | |
|---|---|
| Gauge Type | Gauge, Absolute, Differential |
| Pressure & Vacuum Ranges | 10 mbar to 1600 Bar |
| Dial Sizes | 50mm, 63mm, 100mm, 150mm, 160mm |
| Process Connection | BSP or NPT Threads |
| Wetted Parts | Stainless Steel, Monel®, Hastelloy® |
| Certified | PED Complaint |

## Pressure Transmitters

| | |
|---|---|
| Gauge Type | Gauge, Absolute, Differential |
| Pressure & Vacuum Ranges | 10 mbar to 1600 Bar |
| Outputs | 4...20 ma, 0...20 mA, 1...5V, 0...10V, Hart® & Profibus® |
| Process Connection | BSP, NPT Threads and Hygienic |
| Certified | Exd & Exia, PED |

## Pressure Switches

| | |
|---|---|
| Gauge Type | Gauge, Differential |
| Pressure & Vacuum Ranges | 10 mbar to 1600 Bar |
| Process Connection | BSP or NPT Threads |
| Certified | Exd & Exia, PED |

# Orifice Plates

**Material**
Stainless Steel, Hastelloy®, Monel® and Titanium

**Bore Profile**
Concentric, Eccentric, Multi-Hole and Segmental

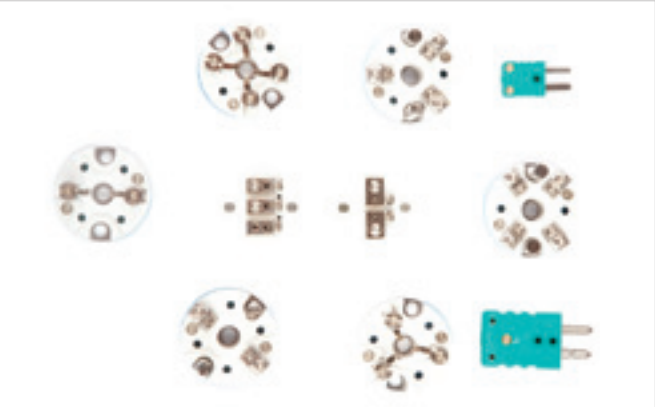
**Calculations**
Standard calculations are to BS 1042 or ISO 5167

**Pipe Size**
Suitable for 1/2" to 12" lines

**Options**
Vent Holes, Drain Holes, Special Coatings, Carrier Plates and Flanges

# Sensor Components

- Connection Heads
- Terminal Blocks
- Compression Fittings
- Stainless Steel Fittings
- Nipples and Unions
- Olives
- Lock Nuts
- Plugs and Sockets
- Cable & Wire
- Stainless Steel Armour / Conduit
- Pot Seals
- Bayonet Adaptors, Caps & Springs
- MI Cable
- Weld Caps
- Handles & Curly Leads
- Detectors
- Stainless Steel Tube



# Services

## Product Development

H&b Sensors provide a complete range of product development, research and design services based on realistic design, smart thinking and efficient practises. Our team of dedicated design engineers are constantly exploring new avenues and innovative temperature measurement solutions.

Every project we undertake commences with a thorough evaluation to identify the most appropriate path and enlist the resources necessary. We review progress regularly with our clients during the development stages through CAD drawings, samples and prototypes.

From design and development through to manufacture, H&b's knowledge and experience can find solutions to the most difficult of applications.

## Calibration & Testing

H&b Sensors in-house calibration and testing laboratory provide the following services:

- Temperature Calibration - Traceable to UKAS covering temperature ranges -40°C to +1200°C.
- Response Time Calibration - Air speed (up to 35 m/s) and flow rate (2 m/s).
- Pressure Testing - Internal and external up to 20,000 PSI
- Dye Penetrant Testing

## Machine Shop

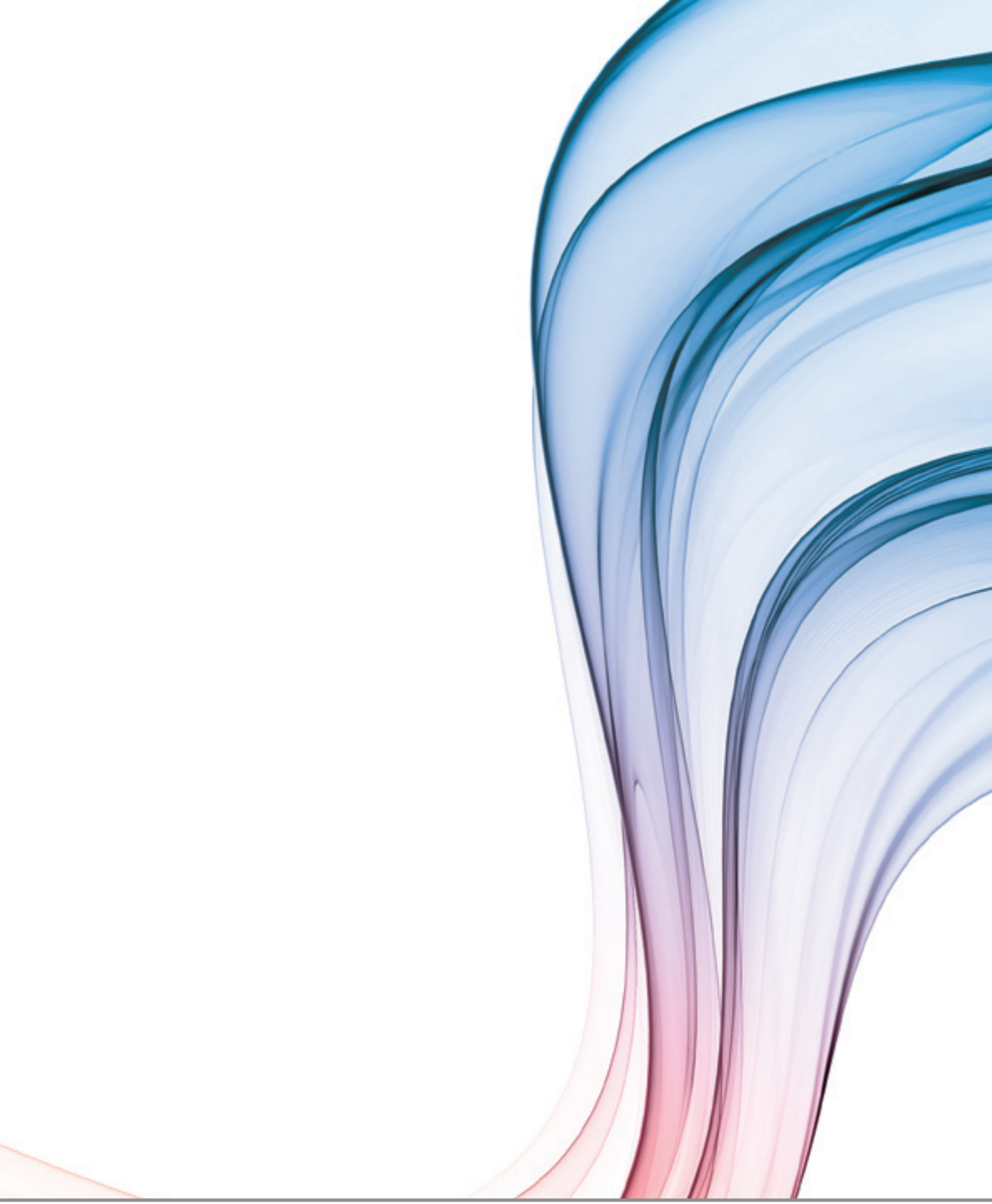
H&b's well-appointed machine shop and highly skilled engineers provide a full range of services including turning, milling, deep hole drilling, sheet metal work, and welding. H&b's ISO 9001:2008 certified management system ensures quality and excellence is achieved time after time.

Investing in the latest machine technology not only allows H&b to offer a superior service, but improves quality and cuts lead times.

Before, during and after processing, through final inspection, packing and despatch, materials maintain full traceability and are subject to our stringent QA and inspection procedures, as approved by Lloyds.

## Emergency Breakdown Service

In the case of an emergency and to minimise down time, H&b offer a premium fast-track breakdown service; depending upon specification and stock availability often being able to manufacture and deliver goods the very same day.



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