



Pressure and Temperature
Instrumentation for
HVAC/R Systems

Welcome to Ashcroft

**Keep your HVAC/R system running
efficiently with pressure and temperature
instruments designed for optimized performance.**

The term “HVAC/R” stands for heating, ventilation, air conditioning, and refrigeration—applicable to processes that encompass indoor climate control operations for commercial, industrial and residential facilities. It covers a wide range of products and applications, such as building management systems, boiler control, chiller optimization, data center air systems, clean room environmental control, and ammonia-based refrigeration, among others.

As HVAC/R consumers become more conscious of their energy usage and its impact on society, equipment suppliers are increasingly challenged to meet tighter efficiency standards and higher safety standards.

You deserve to feel confident in your equipment. Ashcroft offers a variety of pressure and temperature measurement products—including pressure gauges, pressure switches, low differential pressure transducers, and temperature transducers—all of which are built to meet the high-performance specifications and standards in optimizing HVAC/R systems.

Let us help you get reliable pressure and temperature measurements for your process.

Contact us to help you with your next project:

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CHAPTER 1: Common Applications

CRITICAL ENVIRONMENTS

Cleanrooms, laboratories, hospital operating and isolation rooms, data centers and other critical facilities that have strict environmental guidelines require close monitoring and control over pressure and other environmental conditions, including isolation room pressurization, HEPA filter condition (DP drop), and airflow monitoring and control.



BUILDING AUTOMATION

Industrial and commercial facilities rely on their Building Automation Systems (BAS) to seamlessly communicate with their Air Handling Equipment – requiring chillers, boilers and other building management equipment to maintain proper working and comfort conditions for their operations while driving energy efficiency.





BOILERS & BURNERS

Boilers and burners in commercial and industrial facilities require accurate and reliable monitoring systems to ensure they maintain efficient and effective operation, including water/steam pressure and temperature monitoring, exhaust verification (pressure) and temperature monitoring, high pressure/low water control, and safety shutdown processes.



HVAC/R OEM

HVAC/R systems, such as air handling units, terminal boxes, rooftop systems, and refrigeration units, demand accurate sensing technology to improve efficiency and optimize system performance to lower the risk of system failure.



CALIBRATION/VALIDATION

Calibration operations and FDA standards require the use of high-quality instruments to ensure accurate and reliable pressure readings when validating the performance of the system operations.



CHAPTER 2: Top 3 Factors to Consider When Selecting Low-Pressure Sensors

1 ACCURACY/PERFORMANCE

At Ashcroft, many of our pressure instruments are manufactured to our TruAccuracy™ standard, which is based on the terminal point method. Some of the products with this specification include our CXLdp differential pressure sensor, DXLdp differential pressure transmitter, and newly introduced GXLdp differential indicating pressure transmitter. These products meet their rated accuracies out of the box without the need for field calibration adjustments.

If a pressure sensor is assumed to perform at $\pm 0.5\%$ of span accuracy, but really adds up to $\pm 2\%$ or $\pm 3\%$ of span accuracy, this correlates to inefficiency and higher operating costs for the owner. Ashcroft can help you achieve greater HVAC/R efficiency and save money with the TruAccuracy™ performance specification.

2 REPEATABILITY, RELIABILITY, DURABILITY

Ashcroft® proprietary Si-Glas™ sensor features:

- A Silicone Capacitive MEMS design for unparalleled repeatability, reliability and durability
- Pressure sensors that meet our TruAccuracy™ statement
- Pressure ranges as low as 0 to 0.10 in. H₂O

The exclusive patented Ashcroft SpoolCal™ actuator allows the user to perform in-place system calibrations without disturbing process connections to save time and cost.

3 PRESSURE RANGE AND MEDIA COMPATIBILITY

The pressure range and reference (gauge/vacuum, absolute or differential) is the first step in determining which transducer technologies can be used in a design. What pressure do you want to measure?

The media you choose to match your sensor material will often reduce the technology options available. As an example, technologies suitable for low-flow DP air are very different than those for high-pressure hydrogen.

Reliable High-Quality Measurement Instruments

Designed to deliver maximum value, Ashcroft pressure instruments ensure the highest performance with exceptional reliability. From refrigerant charges to ultra-low differential air pressure in variable air volume (VAV) systems, Ashcroft has the precise instruments for every installation.

- Ultra-Low DP transmitters that are highly accurate and sensitive for tight control of air flow
- Rugged, reliable pressure gauges that resist vibration
- Repeatable pressure switches for consistent control
- Thermowells to protect thermometers against extreme heat
- An array of accessories such as pulsation dampeners and snubbers to protect instruments





CHAPTER 3: Recommended Products for Your HVAC/R System

There are many different pressure transducers available on the market today, but they dramatically differ in quality, accuracy, stability, reliability and other important features. How can you ensure you have chosen the best low-pressure transducer for your needs?

At Ashcroft, we understand that the wrong choice in instrumentation can cause inefficiencies, balancing issues and poor long-term equipment performance. Not only does this result in higher operating costs, but also could affect safety, throughput and quality in critical applications.

We believe that you deserve to spend more time focused on your business, and less on your pressure and temperature measurements. Let us be your partner for your HVAC/R needs and help you optimize your critical pressure and temperature applications.

Ashcroft is committed to providing instrumentation with the technology you need to keep up with the demand for continuous performance improvement.



DXLdp



CXLdp



GXLdp

Recommended Ashcroft® Products

Pressure Transmitters/Transducers



		CXLdp Differential Pressure Transmitter	DXLdp Differential Pressure Transmitter	GXLdp Differential Indicating Pressure Transmitter	IXLdp Differential Pressure Transmitter	XLdp Differential Pressure Transmitter
Model		CXLdp	DXLdp	GXLdp	IXLdp	XLdp
Specifications	Accuracy	±0.25%, ±0.4%, ±0.8% of span	±0.25%, ±0.5%, or ±1.0% of span	±0.25%, ±0.5%, of span	±0.25% of span, ±0.5% of span	±0.25% of span, ±0.5% of span
	Output	0-10 Vdc 0-5 Vdc 4-20 mA	0-10 Vdc 0-5 Vdc 1-5 Vdc 1-6 Vdc 4-20 mA	0-10 Vdc 0-5 Vdc 1-5 Vdc 1-6 Vdc 4-20 mA	± 2.5 Vdc ± 5.0 Vdc 0-5 Vdc 1-5 Vdc 1-6 Vdc 4-20 mA	1-5 Vdc 1-6 Vdc 4-20 mA
Ranges	Pressure	Bidirectional: ±0.05 in. H ₂ O to ±50.00 in. H ₂ O Unidirectional: 0.10 in. H ₂ O to 100.00 in. H ₂ O	Bidirectional: ±0.05 in. H ₂ O to ±25.00 in. H ₂ O Unidirectional: 0.10 in. H ₂ O to 50.00 in. H ₂ O	Bidirectional: ±0.05 in. H ₂ O to ±25.00 in. H ₂ O (±15 Pa to ±5.00 kPa) Unidirectional: 0.10 in. H ₂ O to 25.00 in. H ₂ O (25 Pa to 6.00 kPa)	Bidirectional: ±0.05 in. H ₂ O to ±100.00 in. H ₂ O Unidirectional: 0.10 in. H ₂ O to 200.00 in. H ₂ O	Bidirectional: ±0.05 in. H ₂ O to ±50.00 in. H ₂ O Unidirectional: 0.10 in. H ₂ O to 50.00 in. H ₂ O
	Operating Temperature	0 °F to 160 °F (-17 °C to 71 °C)	-20 °F to 160 °F (-29 °C to 71 °C)	-4 °F to 176 °F (-20 °C to 80 °C)	-20 °F to 185 °F (-29 °C to 85 °C)	-20 °F to 160 °F (-29 °C to 71 °C)



		GC51 Rangeable Indicating Pressure Transmitter	GC52 Rangeable Wet/Wet Differential Pressure Transmitter	GC55 Wet/Wet Indicating Differential Pressure Transducer with Switch Outputs	G2 Pressure Transducer
Model		GC51	GC52	GC55	G2
Specifications	Accuracy	±0.25% of span (URL)	±0.25% of span (URL)	±0.5% of span Includes linearity, hysteresis and repeatability	±0.25% of span Static BFSL (Best Fit Straight Line Method)
	Output	4-20 mA (2 wire)	4-20 mA (2 wire)	0.1-5 Vdc (3 Wire) 4-20 mA (2 Wire)	4-20 mA, 20-4 mA, 1-5 Vdc, 1-6 Vdc, 0-5 Vdc, 0-10 Vdc, 1-11 Vdc, 0.1-5 Vdc, 0.1-10 Vdc, and 0.5-4.5 Vdc
Ranges	Pressure	Ranges: 50 psi to 7500 psi, 15# & VAC to 50# & VAC (Compound)	Unidirectional: 4 to 400 in H ₂ O, Bidirectional ±4 to ± 200 in H ₂ O	Differential: 75 to 300 psid	15-300 psi absolute, compound to 300 psi gauge, 1.5-20,000 psi gauge
	Operating Temperature	14 °F to 140 °F (-10 °C to 60 °C)	14 °F to 140 °F (-10 °C to 60 °C)	14 °F to 122 °F (-10 °C to 50 °C)	-40 °C to 257 °F (-40 °C to 125 °C)

See datasheets at ashcroft.com for complete product specifications.



Recommended Ashcroft® Products

Pressure Gauges



		8008S Pressure Gauge	8008A Pressure Gauge	1009 Pressure Gauge	1005, 1005P & 1005S Pressure Gauge	1001T Panel Mount Gauge
Model		8008S	8008A	1009 - 2.5/3.5 1009 - 4.5/6	1005, 1005P, 1005S	1001T
Specifications	Accuracy	±1% & ±1.6% of span (EN 837-1) ±2-1-2% of span (ASME B40.100)	±1.6% & ±1.0% of span (EN837-1) ±2-1-2% of span (ASME B40.100)	1009 - 2.5/3.5 : ±1.0% of span (ASME B40.100 Grade 1A), ±1.5% of span (Liquid filled) 1009 - 4.5/6: ±1.0% of span (ASME B40.100 Grade 1A)	±3-2-3% of span (ASME B40.100, Grade B)	±3-2-3% of span (ASME B40.100, Grade B)
	Sizes	Solid Front 63 mm (2½") Open Front 63 mm (2½"), 100 mm (4")	63 mm (2½"), 100 mm (4")	2½", 3½", 4½" and 6"	1005 & 1005P: 1½", 2", 2½", 3½" 1005S: 1½" and 2"	1½" 2½" 2" 3½"
Ranges	Pressure	Vacuum, Compound, 15 to 20,000 psi	Vacuum, compound, 15 to 15,000 psi	1009 - 2.5/3.5: Vacuum, compound, 15 to 15,000 psi 1009 - 4.5/6: Vacuum, compound, 15 to 30,000 psi	Vacuum, compound to 6,000 psi	Vacuum, compound to 6,000 psi

Temperature Switches



		T-Series Watertight Temperature Switch	T-Series Explosion Proof Temperature Switch	L-Series Watertight Temperature Switch	G-Series Watertight Temperature Switch
Model		T4	T7	LT	GT
Specifications	Enclosure	Epoxy coated aluminum NEMA 4, 4X, IP66	Epoxy coated aluminum NEMA 7/9, IP66	Epoxy coated aluminum NEMA 4, 4X, IP66	316 stainless steel NEMA 4, 4X, IP66
	Function	Single setpoint, fixed deadband, SPDT (or) single setpoint, fixed deadband, (2) SPDT (DPDT action)	Single setpoint, fixed deadband, SPDT (or) single setpoint, fixed deadband, (2) SPDT (DPDT action)	Dual independent setpoints, fixed deadband Single setpoint, adjustable deadband Single setpoint, fixed deadband	Dual independent setpoints, fixed deadband Single setpoint, adjustable deadband Single setpoint, fixed deadband
Ranges	Pressure	-40 °F to 750 °F (-40 °C to 400 °C)	-40 °F to 750 °F (-40 °C to 400 °C)	-40 °F to 750 °F (-40 °C to 400 °C)	-40 °F to 750 °F (-40 °C to 400 °C)
Approvals					

See datasheets at ashcroft.com for complete product specifications.

Pressure Switches



		A-Series Watertight Pressure Switch	A-Series Explosion Proof Miniature Pressure Switch	B-Series Pressure Switch	B-Series Differential Switch	B-Series NEMA 7/9 Explosion Proof Pressure Switch
Model		A-Series Watertight	A-Series Explosion	B4	D4	B7
Specifications	Enclosure	NEMA 6, IP67	NEMA 4X, 7, 9, IP 67	Watertight epoxy coated aluminum NEMA 4, 4X, IP66	Watertight epoxy coated aluminum NEMA 4, 4X, IP66	Explosion proof epoxy coated aluminum NEMA 7/9, IP66
	Function	Single setpoint - factory set or field adjustable	Single setpoint - factory set or field adjustable	Single setpoint, fixed deadband, SPDT (or) single setpoint, fixed deadband, (2) SPDT (DPDT action)	Single setpoint, fixed deadband, SPDT (or) single setpoint, fixed deadband, (2) SPDT (DPDT action)	Single setpoint, fixed deadband, SPDT (or) single setpoint, fixed deadband, (2) SPDT (DPDT action)
Ranges	Pressure	Vacuum - 15 to 15,000 psi	Vacuum to 15,000 psi	Vacuum to 3,000 psi	10 in. H ₂ O diff thru 600 psid	Vacuum to 3,000 psi
Approvals						

* A-Series Switch



		D7 NEMA 7/9 Differential Pressure Switch	L-Series NEMA 4 Pressure Switch	L-Series NEMA 4 Watertight Differential Pressure Switch	GP-Series NEMA 4 Pressure Switch	GD-Series NEMA 4 Differential Pressure Switch
Model		D7	LP	LD	GP	GD
Specifications	Enclosure	Explosion proof epoxy coated aluminum NEMA 7/9, IP66	Watertight epoxy coated aluminum NEMA 4, 4X, IP66	Watertight epoxy coated aluminum NEMA 4, 4X, IP66	Watertight 316 Stainless Steel NEMA 4, 4X, IP66	Watertight 316 Stainless Steel NEMA 4, 4X, IP66
	Function	Single setpoint, fixed deadband, SPDT (or) single setpoint, fixed deadband, (2) SPDT (DPDT action)	Dual independent setpoints, fixed deadband Single setpoint, adjustable deadband, Single setpoint, fixed deadband	Dual independent setpoints, fixed deadband Single setpoint, adjustable deadband Single setpoint, fixed deadband	Dual independent setpoint, fixed deadband Single setpoint, adjustable deadband Single setpoint, fixed deadband	Dual independent setpoint, fixed deadband Single setpoint, adjustable deadband Single setpoint, fixed deadband
Ranges	Pressure	10 in. H ₂ O differential thru 600 psid	Vac to 3000 psi	30 in. H ₂ O differential thru 400 psid	Vacuum to 3,000 psi	30 in. H ₂ O differential thru 400 psid
Approvals						

See datasheets at ashcroft.com for complete product specifications.



Recommended Ashcroft® Products

Bimetals



		Bimetal Thermometer	Bimetal Thermometer
Model		Model E	Model C
Specifications	Accuracy	±1.0% of span	±1% of span ASME B40.200 (B40.3 Grade A)
	Size & Case Features	2", 3", 5" Stainless Steel Hermetically Sealed	2", 3", 5" 304 Stainless Steel
	Stem Lengths	2½" to 60"	2½" to 60"
Ranges	Temperature	-80 °F to 1000 °F (-50 °C to 500 °C)	-40 °F to 200 °F (-40 °C to 93 °C)

RTDs and Thermocouples



		RTD Probes	Thermocouple Probes
Model		Pt 100 Pt 1000	Type J Type E Type K Type N
Specifications	Accuracy	Class A Class B	Class 1 Class 2 Class 3 Standard Special
	Stem Lengths	2" to 120" 50 mm to 3,000 mm	2" to 120" 50 mm to 3,000 mm
Ranges	Temperature	Pt 100 -200 to +600 °C Pt 1000 -40 to +600 °C	Type J -40 to +750 °C Type E -200 to +800 °C Type K -200 to +1100 °C Type N -200 to +1100 °C

Thermowells



		Thermowell	Thermowell	Thermowell	Thermowell
Model		Threaded	Socket Weld	Weld-in	Van Stone
Specifications	Process Connection	½, ¾, 1 NPT	¾" & 1" Pipe Size	1½" Pipe Size	1", 1½", 2", 3", & 4" Pipe Size
	Overall Length	Min U dimension 1"	Min U dimension 1"	Min U dimension 1"	Min U dimension 2"
	Materials	Variety of metallic materials	Variety of metallic materials	Variety of metallic materials	Variety of metallic materials

See datasheets at ashcroft.com for complete product specifications.

Recommended Weksler® Products

Temperature



		Bi-metal Thermometers			Glass Thermometers	
Model		Models 3S	Models 3A	Models AF	Models D960AF2	Models A935AF5
Specifications	Accuracy	±1% of span	±1% of span	±1% of span	±1% of span	±1% of span
	Dial Size & Case Features	3"	3"	3" and 5"	9" column	9" column
	Stem Lengths	2 1/2" to 24"	2 1/2" to 24"	2 1/2" to 24"	3 1/2", 6", 9" & 12" stems available	3 1/2", 6", 9" & 12" stems available
Ranges	Temperature	-80 to 1000 °F, -50 to 550 °C	-80 to 1000 °F, -50 to 550 °C	-80 to 1000 °F, -50 to 550 °C	-40 to 110 °F, -50 to 550 °F -20 to 45 °C, 0 to 300 °C	-40 to 110 °F, -50 to 550 °F -20 to 45 °C, 0 to 300 °C

Thermowells



		Thermowell	Thermowell
Model		Threaded	Threaded for Adjustable Angle Only
Specifications	Process Connection	1/2, 3/4, 1 NPT	3/4" NPT
	Overall Length	Min U dimension 1"	Min U 2 1/2" to 11" Min U 1 1/2" to 8 1/2" if lag
	Materials	Variety of metallic materials	Brass

Accessories



		Adjustable Snubber	Pressure Snubber Filter Type	Steel Needle Valve
Model		MSB4, MSB2, MSS4	BW, SW & AO	BBV4, SSV4, AV32, AV44, AV74
Specifications	Process Connection	MSB4 & MSS4: 1/4 NPT Male MSB2: 1/2 NPT Male	BW: 1,500 psi, SW: 5,000 psi, AO: 15,000 psi	BBV4: 1/4 NPT, SSV4: 1/4 NPT, AV32: 1/2 NPT, AV44: 1/4 NPT, AV74: 1/4 NPT
	Instrument Connection	MSB4 & MSS4: 1/4 NPT Female MSB2: 1/2 NPT Female	BW & SW: 1/4 NPT AO: 1/2 NPT	BBV4: 1/4 NPT, SSV4: 1/4 NPT, AV32: 1/2 NPT, AV44: 1/4 NPT, AV74: 1/4 NPT
	Max Allowable Working Pressure:	MSB4 & MSB2: 3,000 psi MSS4: 5,000 psi	BW: 1,500 psi SW: 5,000 psi AO: 15,000 psi	BBV4: 600 psi @ 300 °F SSV4: 5,000 psi @ 500 °F AV32: 500 psi @ 150 °F AV44: 475 psi @ 1,000 °F 550 psi @ 900 °F 600 psi @ 850 °F 10,000 psi @ 150 °F AV74: 4,000 psi @ 150 °F

For detailed Weksler product specifications, please visit weksler.com.



Considerations with Choosing Pressure Gauges and Transducers

Your pressure measurement instrumentation performs an important role in your application, and if it stops working then your entire process can come to an abrupt halt. If you replace it with the wrong instrument, it can cost you time, money and the safety of your personnel. There are many considerations when selecting instrumentation, specifically pressure gauges and transducers.

PRESSURE TRANSDUCERS

Here are some factors to consider when choosing a pressure transducer:

1. Pressure Reference/Range

The pressure range and reference (gauge/vacuum, absolute or differential) is the first step in determining which transducer technologies can be used in a design. What pressure do you want to measure? Once your pressure reference/range is known, you need to look at media compatibility.

2. Media Compatibility

The media you choose to match your sensor material will often reduce the technology options available. As an example, technologies suitable for low-flow DP air are very different than those for high-pressure hydrogen.

3. Accuracy/Performance

Accuracy has several important elements. For example, how important is stability (long-term drift or long-term repeatability of the output reading) in a pharmaceutical cleanroom application requiring regular validation? Inefficiencies in an HVAC/R system also increase building management costs.

4. Power Supply/Output

Consider output requirements when researching pressure transducers. Most manufacturers incorporate ASIC/digital technology for the internal linearization/compensation circuitry. However, certain outputs such as IO-Link or J1939 may require additional circuitry, or even printed circuit boards and may add cost to the product.

5. Environment

Three aspects of the external environment should be considered when selecting the proper pressure transducer:

IP Rating: What IP rating is required for the application and what is the required lifespan?

Hazardous Area: If required, consider the approach to be used – Intrinsically Safe, Non-Incendive (Non-Sparking), or Explosion Proof/Flameproof.

EMI/RFI: EM/RFI (electromagnetic radio frequency interference) are a result of the general standard of protection being met by most industrial type transducers bearing the CE Mark. However, there are many environments where users wish to incorporate pressure transducers, and the EMI/RFI levels (whether conducted or radiated) exceed those levels.

6. Design/Product Configuration

Are you incorporating a display or a military type connector? One area that may be overlooked is integral cable versus integral connector. There are many options for design/product configuration to consider as an addition to your process.

PRESSURE GAUGES

Here are some factors to consider when choosing a pressure gauge:

1. Case (Enclosure/Housing)

What material is it? Gauge cases are typically available in black-painted aluminum, stainless steel, phenolic, plastic, brass, or another material for meeting an industry specification and/or requirement. Next is the case's structural design. Does it have a solid front or open front?

2. Vibration and Pulsation Protection

Another feature often overlooked is whether the gauge is liquid-filled and/or has a throttling device. Each protects the measuring instrument; liquid fill dampens the effects of vibration, whereas a throttle plug/screw dampens pressure fluctuations.

3. Contamination Control

To replace your gauge, be sure to confirm that the wetted material of the pressure system is fully compatible with your process media. Often, the pressure system's wetted materials are printed on the dial face and/or on the gauge socket.

4. Accuracy

Check the gauge face (dial) of your gauge. How many graduations and figure intervals are there? This will help verify gauge accuracy. Most gauges meet either ASME B40.100 or EN 837-01 – both standards guide the number of dial graduations and figure intervals.

5. Connection Size

The most common standard for the U.S. is NPT (National Pipe Thread). You should know the thread type to ensure proper installation and prevent potential damage due to galling or cross-threading. As a rule, the size of the gauge dial is a guide to understanding the common pressure connection size.

6. Connection Location

Where is the mounting location on your instrument? Is it lower or center back/lower back connected, or does it have a special orientation such as 3, 9 or 12 o'clock? Additionally, you should be aware of space restrictions that will limit installation.

7. Pressure Ranges

Confirm the dial pressure range and units of measure of your gauge. When replacing the gauge, consider that ASME B40.100 recommends normal operating pressure be confined to 25% to 75% of the selected range.

Learn More: HVAC/R Related Blog Articles

[Product Review: GXLdp Differential Pressure Transmitter](#)

[How Does Media Temperature Affect Pressure Transducer Performance?](#)

[How to Cross Reference Low-Pressure Transducers to Find the Right One for You](#)

[How Accurate Are Your HVAC System's Pressure Instruments?](#)

[How Much Do Pressure Transducers Cost? \(6 Factors Impacting Price\)](#)

If you have additional questions about instrumentation for HVAC/R applications or would like to discuss your unique requirements with one of our experts, please [contact us](#).

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