



Pressure and Temperature
Instrumentation for

Mining & Metallurgy

Welcome to Ashcroft

Your single-source solution for pressure and temperature instruments.

The mining and metallurgy industry encompasses various processes, from the extraction of natural resources to the processing of raw materials. There are many reasons to integrate measurement and monitoring technology into equipment used for ore extraction and metallurgy including improving compliance with regulatory requirements, increasing operational efficiency, reducing costs and protecting people and the environment.

At Ashcroft, we understand the challenges of this market. With over 170 years of industry expertise we have been a single source solution for our customers' pressure and temperature instrumentation needs.

Our products are ideal for both common applications and hazardous environments. We have the expertise and skills to produce and supply individual components and complete assembly solutions that handle some of the most severe operational and environmental conditions.

This guide will help you understand the common applications and challenges of the mining industry. You'll also learn important factors to consider when selecting instrumentation and the products and support Ashcroft offers to address your specific needs.

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

Contact us today!

 1.800.328.8258

 [ashcroft.com](https://www.ashcroft.com)

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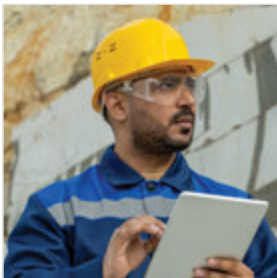
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CHAPTER 1: Market Overview

Many mining and metallurgy processes depend on precise pressure and temperature conditions. Industry professionals often use measurement and monitoring technology—such as temperature and pressure instruments—to ensure that operational parameters in extraction and processing equipment remain at optimal levels for maximum effectiveness and efficiency.

Our pressure and temperature solutions are found in a wide range of equipment and systems for mineral extraction and processing, including:

- **Mining Water Treatment:** for measuring and controlling conditions in monitoring, treatment, recycling, and water level operations
- **Mines and Excavations:** for measuring and controlling conditions in weighing operations, load positioning, and hydraulic circuits
- **Extractive Metallurgy:** for measuring and controlling conditions in separation and chemical processing operations



Importance of Measurement and Monitoring Technology for the Mining and Metallurgy Industry

Below are the main reasons for integrating measurement and monitoring technology in mining and metallurgy equipment:

Better compliance with regulatory requirements.

Mining and metallurgy operations are highly regulated to ensure operator and environmental safety. Pressure and temperature instruments help operators keep operational parameters under control.



Increased operational efficiency.

Measurement and monitoring technology provides an assessment of system performance. By tracking these values, industry professionals can determine if system modifications are needed to improve performance and productivity.



Greater cost savings.

Sensors monitor system conditions, such as temperature, pressure, level, and flow. Pressure switches initiate an appropriate system response when sensors detect a problem. Together, these instruments detect issues before they escalate, resulting in reduced risk of damage to components or systems, and consequently, lower spending on repair, replacement, and losses due to downtime.



Enhanced protection for people, processes, and the environment.

Constant monitoring of pressure and temperature is the best way to prevent damage to the environment, people, and mining equipment, while also saving on insurance premiums and repair costs.





Processes in the Mining Industry

The mining process involves activities such as exploration, extraction, transportation, processing, mineral transformation and commercialization of the final product. The stages include Exploration, Mineral Research, Mining (Extraction) and Mine Decommissioning.

Types of ore processing

Physical

- Comminution (crushing and grinding)
- Size classification (screening and fluidized separation)
- Concentration (flotation, gravity separation, magnetic separation)
- Solid-liquid separation (thickening and filtration)

Chemicals / Hydrometallurgy

- Leaching
- Solvent extraction
- Ion exchange
- Chemical precipitation

User industries

- Oil & Gas
- Chemical, petrochemical
- Power generation

Most commonly used

Farming

- Crawler tractors, front-end loaders, excavators and trucks, jackhammers and drill rigs.
- Physical treatment: cone and gyratory crushers; jaw crushers; vibrating chutes; bag filters; hammer mills; dewatering screens; vibrating screens; storage silos; drying drums; belt conveyors; hydrocyclones; flotation cells or tanks; flotation columns.

Chemical Treatment

Open agitated leaching tanks, pressure leaching tanks, settling and treatment tanks, pulsed solvent separation columns, etc.





Characteristics of Ore Treatment Processes

In Comminution and Screening

- **High Vibration** drastically reduces the lifespan, as well as complicates the reading of instruments installed on the equipment and in the surroundings.
- Presence of mineral dust in the atmosphere can, in some cases, make the atmosphere explosive, posing risks if electrical or electronic instruments are used without protection.

In fluid separation and in all concentration processes, as well as in solid/liquid separation

- Presence of suspended solids: This can cause abrasion and can destroy the installed instrumentation.
- Clogs in instrumentation: Resulting in a loss of function.
- High pulsation and water hammer in pumping operations: May cause the destruction or drastic reduction in the useful life of the instrumentation.
- Large water flow: Represents a significant risk of contamination and/or environmental destruction, as well as a risk to human life.
- Special and often large-diameter piping: Makes the installation and maintenance of instruments significantly more difficult and costly.

In chemical and hydrometallurgical treatment processes and all the factors previously mentioned

Chemical attack from solvents and catalysts and reactions of the ore itself can cause corrosion and consequently reduce the lifespan of the instrumentation, as well as potential leaks of hazardous substances.





CHAPTER 2: Selecting the Right Equipment

With more than 170 years of experience, Ashcroft has been working alongside leading global mining companies to develop innovative and exclusive solutions designed to extend the lifespan and reduce the maintenance of our instruments. Safety and protection is our primary objective, ensuring Ashcroft solutions provide precise and reliable performance for your operation.

Below, you will find the latest advancements in instrument design to enhance longevity and minimize maintenance costs, ensuring accurate readings in the mining industry.

High Vibration Resistance with Reduced Maintenance

Pressure gauges with **PLUS!**[™] Performance technology for applications with excessive vibrations or pulsations, eliminate the need for filling fluid and its associated leakage issues, high maintenance costs and environmentally correct disposal.



Pressure switches with Beleville[®] spring technology option for use in vibration environments eliminate the need for relocation, thereby reducing installation costs and extending the lifespan of the micro switch.

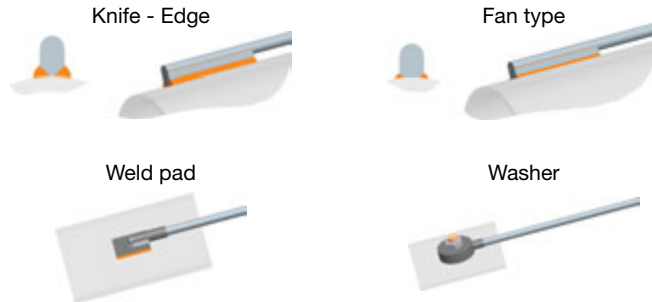




S70 Tube Skin
Thermocouple

Tube skin type sensors accurately and reliably measure the temperature of a surface that the process media is in contact with without ever coming into contact with the media.

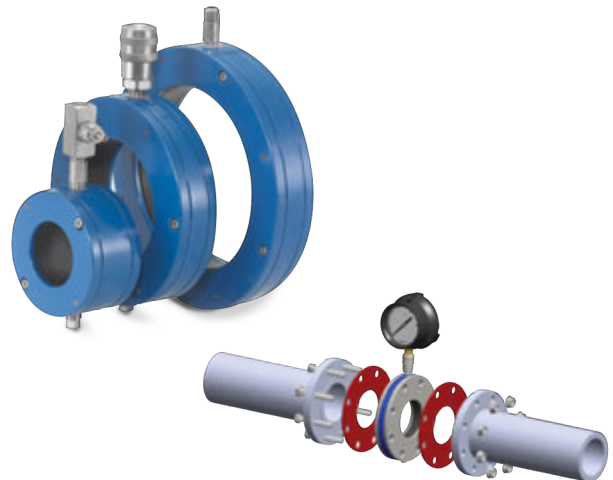
Sensing Element Options



Isolators for High Resistance and Ease of Installation

Isolation rings and diaphragm seals are designed for pressure gauges, switches, transmitters and instrument assemblies. They offer high resistance to abrasion and chemical attack, and include self-cleaning features for monitoring applications involving high water flow, suspended solids, special conditions, or large pipe diameters.

The design also focuses on ease of installation—fitting between valve or pump flanges—and ease of maintenance, allowing for refilling or calibration without removing the process instrument.



Assembly Example



1106 Pulsation
Dampener

High Resistance to Pulsation, Water Hammer and Overpressure

Pulsation dampeners with internal capillary for turbulence or water hammer arrestors with floating balls block the hammer effect, and include field-adjustable overpressure protectors.



[2274 Digital Pressure Gauge](#)

Electrical or Electronic Instrumentation Applicability in Explosive Atmospheres and Harsh Environments

Pressure transmitters, pressure switches, temperature switches, thermocouples and resistance thermometers are certified for use in explosive atmospheres or intrinsically safe environments with FM certification.

All products are certified IP65 or higher.

Multifunctional Instruments

Especially important in the mining industry, the Ashcroft® 2274 digital pressure gauge integrates a gauge, a 4-20 mA transmitter and a pressure switch, significantly reducing installation costs by eliminating the need for diaphragm seals.



[B-Series NEMA 7/9
Explosion Proof
Pressure Switch](#)



[ATE-2 Handheld Calibrator](#)

Field Calibration & Maintenance

The Ashcroft® ATE-2 handheld calibrator can be used with our gauges equipped with **PLUS!™ Performance**, as well as other Ashcroft pressure and temperature instruments. It enables field calibration of gauges, thermometers, pressure switches, thermostats, and pressure and temperature transmitters.

This instrument also allows users to store data for issuing calibration certificates and recording information directly, significantly reducing maintenance costs. Plus, the modular sensor system lets you adapt the device to current needs at a lower cost, and expand its range as requirements grow—without needing to reinvest in the base unit.

CHAPTER 3:

Products for Mining

Ashcroft offers a comprehensive range of pressure and temperature instruments. Below are the key products used in Mining and Metallurgy.

Pressure Gauges



Model		1259 Pressure Gauge	1279 Duragauge® Pressure Gauge	2274 Digital Pressure Gauge
Specifications	Function	Local & Remote Indication		Local Indication, Remote Installation & Monitoring, Control
	Accuracy	±0.5% of span (ASME B40.100 Grade 2A)	±0.5% of span (ASME B40.100 Grade 2A)	±0.25% of span
	Sizes	4½"	4½"	3", 4½"
	Pressure Ranges	Vacuum, compound, 15 to 20,000 psi	Vacuum, compound, 15 to 20,000 psi	Vacuum, Compound, 15 to 20,000 psi
	Protection against vibration, pulsation, and environmental conditions	PLUS!™ Performance	PLUS!™ Performance	Stainless steel
	Wetted Materials	PBT Polybutylene terephthalate (Meets UL 94 V-0)	Phenolic	Immune to RFI and EMI, Weatherproof (IP 65). Optionally intrinsically safe



Model		1209 Stainless Steel Case Gauges	T5500 and T6500 Stainless Steel Case Gauges
Specifications	Function	Local & Remote Indication	
	Accuracy	±0.5% of span	±0.5% or ±1% of span
	Sizes	4½"	100 or 160 mm
	Pressure Ranges	Vacuum, compound, 20,000 psi	Vacuum, compound, pressure psi: -30in. Hg-0, 0-20,000
	Protection against vibration, pulsation, and environmental conditions	PLUS!™ Performance or Liquid Fill IP65 Protection Rating	PLUS!™ Performance or Liquid Fill IP66/67 Protection Rating
	Wetted Materials	316 Stainless steel, Monel®	316 Stainless steel, Monel®



Pressure Sensors



Model		GC51 Pressure Transmitter	E2F Explosion-Proof Pressure Transducer	G2 Pressure Transducer
Specifications	Function	Remote Installation & Monitoring		
	Accuracy	±0.25% or 0.1% of span	±0.25% of span	±1% of span
	Output	4-20 mA or HART or PROFIBU	4-20 mA	4-20 mA or 1-5 V or 1-6 V or 0-5 V or 0-10 V DC or 0.5-4.5 V DC ratiometric
	Pressure Ranges	Gauge: 5 psi to 20,000 psi (20.00 ksi)	Vacuum to 20,000 psig, 0 to 500 psi absolute	Compound and gauge pressure, 30 to 20,000 psi
	Wetted Materials	Stainless steel	Stainless steel	Stainless steel
	Degree of Protection	RFI and EMI resistant, weatherproof (IP68). Optionally intrinsically safe	Immune to RFI and EMI Weatherproof (IP67). Optionally explosion-proof or intrinsically safe	RFI and EMI immune, weatherproof (IP67)

Pressure Switches



Model		B4 and B7 (Relative Pressure)	D4 and D7 (Differential Pressure)
Specifications	Function	Alarm & Control	
	Accuracy	±1% of span	±1% of span
	Actuator	1 or 2 Micro Switches SPDT	1 or 2 Micro Switches SPDT
	Pressure Ranges	Vacuum to 3,000 psi	30 in. H ₂ O differential thru 600 psid
	Vibration protection	Spacing with capillary or optional Belleville®	Spacing with capillary
	Enclosure Rating	Weatherproof (IP66) and/or explosion-proof	Weatherproof (IP66) and/or explosion-proof

Bimetal Thermometers



Model		EI	EL
Specifications	Function	Local reading	
	Accuracy	±1% of span	±1% of span
	Size	2", 3", 5"	3", 5"
	Temperature Range	-80 °F to 1000 °F (-50 °C to 500 °C)	-40 °F to 550 °F (-40 °C to 290 °C)
	Vibration & Weather Protection	IP66 Protection Rating	Liquid filling in the case. IP66 Protection Rating
	Wetted Materials	Stainless steel	Stainless steel

Gas-actuated Thermometers



Model		C-600A	S5500
Specifications	Function	Local or remote reading	
	Accuracy	±1% of span	±1% of span
	Size	4.5", 6", 8½"	100 mm, 160 mm
	Temperature Range	-320 °F to 1200 °F (-200 °C to 650 °C)	-320 °F to 1450 °F (-200 °C to 800 °C)
	Vibration & Weather Protection	Movementless design resists shock and vibration	Remote mounting IP65 liquid filling the case
	Wetted Materials	Stainless steel	Stainless steel



Temperature Switches

Model		T4 NEMA 4X Watertight Temperature Switch	T7 NEMA 7/9 Explosion Proof Temperature Switch
Specifications	Function	Alarm and Control	
	Accuracy	±1% of span	±1% of span
	Actuator	1 or 2 micro switch SPDT	1 or 2 SPDT micro switches
	Temperature Range	-40 to 400 °C	-40 to 400 °C
	Vibration Protection	Capillary distance	Capillary distance
	Protection Rating	Weatherproof (IP66)	Weatherproof (IP66) and/or explosion-proof



Thermocouples

Model		S80 Thermocouple Probes	S81 RTD Probes	S50 Thermocouple Probes	S70 Probes with Tube Skin Connections
Specifications	Function	Local Indication, Remote Installation & Monitoring			
	Types	TC	RTD	TC and RTD	TC for surface pipe
	Temperature Range	-200 °C to 1200 °C	-200 °C to 600 °C	-200 °C to 1200 °C	-200 °C to 1200 °C
	Material	316 Stainless steel or Inconel® 600	316 Stainless steel	316 Stainless steel or Inconel® 600	316 Stainless steel or Inconel® 600



Thermowells

Model		Threaded	Flanged
Specifications	Function	Isolation & Protection	
	Process Connection Types and Stem Shape	Machined threaded from solid bar, available in straight, tapered or stepped shapes	Flanged, machined from solid bar, with welded flange, available in straight, tapered or stepped shapes
	Nominal Connection Size	½", ¾" or 1" NPT Male	½", ¾", 1", 1½", 2", 2½", 3", 150, 300, 600, 900, 1500, or 2500 lbs and their metric equivalents
	Materials	Brass, 304 or 316 Stainless steel, Monel®, Hastelloy®, Duplex, or Super Duplex	Brass, 304 or 316 Stainless steel, Monel®, Hastelloy®, Duplex, or Super Duplex
	Certificates and Testing	Variety available including materials or hydrostatic testing and vibration frequency calculation	Variety available including materials or hydrostatic testing and vibration frequency calculation

Diaphragm Seals & Isolation Rings



Model		Seal 200 (Threaded)	DF Flanged Seal	Isolation Ring Seal
Specifications	Function	Clogging & Corrosion Protection		
	Process Connections	Male or Female Thread with or without cleaning connection	Flanged, level with the process, with or without ring, with or without cleaning connection	Flanged, Inline, Wafer Type, or Bolt Thru
	Connection Size	½" to 1" NPT or BSP	1", 1 ½", 2", 2 ½", 3" or 4" 150, 300, 600, 900, or 1500 lbs and their metric equivalents	From 2" to 20" in 150 or 300 lbs in wafer model, and from 1" to 10" in 150 or 300 lbs in Bolt-Thru model
	Wetted Materials	Viton™, Teflon™, Kalrez®, 316L, Monel®, Nickel, Carpenter 20, Hastelloy®	316 L, Monel®, Tantalum, Hastelloy®, 316 coated with Halar® or Teflon™, or goldplated	Buna N, Teflon™, EPDM, Natural Rubber, or Viton™
	Temperature Limits	-40 °C to 399 °C	-40 °C to 399 °C	-40 to 177 °C
	Certificates and Testing	Material certificates or hydrostatic testing	Material certificates or hydrostatic testing	Material certificates or hydrostatic testing

Accessories



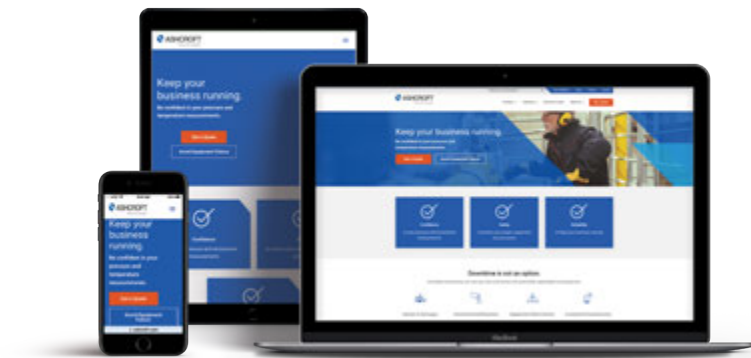
Model		1106 Pulsation Dampers	V01 - Gauge Valve V02 - 2 Valve Manifold Block & Bleed
Specifications	Function	Vibration & Pulsation Protection	Isolation & Integration
	Type	Internal capillary (turbulence damping)	1-way needle valve, 1-way valve with drain, or 2-way valve with or without drain
	Wetted materials	Brass, Carbon Steel, or Stainless steel 316	316L Stainless steel or Monel®
	Maximum Pressure	420 Kg/cm²	6,092 psi at 140 °F (60 °C)
	Temperature Limit		500 °C PTFE: 392 °F (200 °C) Graphite: 1022 °F (550 °C)
	Certificates and Testing	Materials or hydrostatic testing	Materials or hydrostatic testing



Test Instruments

Model		ATE-2
Specifications	Function	Calibration
	Accuracy	Low pressure Modules: ±0.1%, ±0.06, ±0.7% of span Medium/high Pressure modules ±0.025%, ±0.05%, ±0.1% of span
	Pressure Modules	0.25 in. H ₂ O up to 10,000 psi
	Temperature Modules	-200 to 850 °C (RTD or TC)
	Data Storage	16,000 readings
	Communication	Data download to Excel spreadsheet via SD card
	Protection Rating	RFI and EMI resistant, weatherproof (IP65), and optionally Intrinsically Safe

Learn more about Mining & Metallurgy applications and associated Ashcroft® instrumentation by visiting our website:



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