Aviation Fuel Contamination Monitoring

ACM20 Lab Unit

Aviation Fuel Contamination Monitoring

ACM20 Lab Unit

Features & Benefits

Test Time:
2 minutes

Repeat Test Time:
Every 2 minutes (Manual testing)

Principle of Operation:
Optical scanning analysis and measurement of actual particles and inference to water presence

Primary Output:
>4µ(c), >6µ(c), >14µ(c), >21µ(c), >25µ(c), >30µ(c) counts per ml

Secondary Diagnostic Output:
% Volume Distribution, via graphical display on handset and printout

International codes:
ISO 7-22 in accordance with ISO 4406-1999

Data entry:
32 character two line dot matrix LCD. Full alpha numeric entry facility on keypad

Data retrieval:
Memory access gives test search facility

Calibration:
In accordance with Parker Calibration Procedure CM20-N, which complies to ISO11171:1999, Clause 6 (Omitting Annex F)

Re-calibration:
Every 12 months by a dedicated Parker Service Centre (Consult Parker)

Max. working pressure:
420 bar

Operating Temperature:
+5°C to +80°C

Memory store:
300 test capacity

Computer compatibility:
Interface via RS 232 connection @ 9600 baud rate (USB serial cable to RS232 option available)

Laboratory sampling:
Oil delivery unit (ODU) - test portion sampling device

Portability:
Only 8 kg. ACM20 has its own battery pack and carry case with wheels

Power requirement:
12vDC input, 6 x 'D' Cell or rechargeable batteries

Printer facility:
Integral 16 column printer for hard copy data

Certification:
Complies with all relevant EC declarations of conformity

DEFSTAN 9191 Jet A-1 Fuel Specification, Adopts Energy Institute Test Method IP 564

Development work carried out by the CMC engineers, in conjunction with ExxonMobil Aviation, highlighted the need for an alternative test method to determine the levels of dispersed contamination in Jet fuel.

5 years of field testing and development of the already established and successful LCM20 Hydraulic Laser Particle Counter saw the introduction of the Parker ACM20 with enhanced software providing the user with a better understanding of the contamination present in a sample.

As the benchmark particle counter for use in measuring the levels of contamination in fuels, the ACM20, as per the UK's Energy Institute Test Method IP564, has now been included in the DEFSTAN 9191 Jet Fuel Specification as a report only test alongside the current Gravimetric test method (IP423 or ASTM D5452) and Clear & Bright Visual test method (IP216 or ASTM D2276).

Specification

Construction:
Case-Lexan structural foam and ABS
Hand-held display - ABS
Keypad flurosilicone rubber

Mechanical Components:
Brass, plated steel, stainless steel and aluminium

Seals:
Fluorocarbon

Hoses:
Nylon (Kevlar braided microbore). St. steel armoured ends

Flow Rate:
25 - 50ml/min (dictated by ODU)

Fluid Compatability:
Hydrocarbon Fuel, Mineral Oil. For other fluids consult Parker

Fuse:
1.25 amp fast blow fuse included for overload protection (spare supplied)

ACM20 Technology:
Patented flow cell, light obscuration

Repeatability/Accuracy:
As per or better than ISO 11171

Coincidence:
40,000 particles per ml

Viscosity Range:
1 -100 centistokes

ACM20 Weight:
8 kg

Monitor Carrying Case:
Astra Board case

Carrying Case Weight:
5 kg

Applications

The Parker ACM20 Portable Particle Counter has been developed from existing technology for monitoring contamination in AvTur and other Hydrocarbon fuels, in accordance with the Energy Institute (EI) Method IP 564.

In addition, the ACM can also be used to monitor various fuels from existing sampling points in locations from refineries, pipelines, distribution terminals, airport fuel supply systems all the way through to the point of uplift into aircraft*.

* Hot works permit required for online sampling (ATEX Zone II unit available).

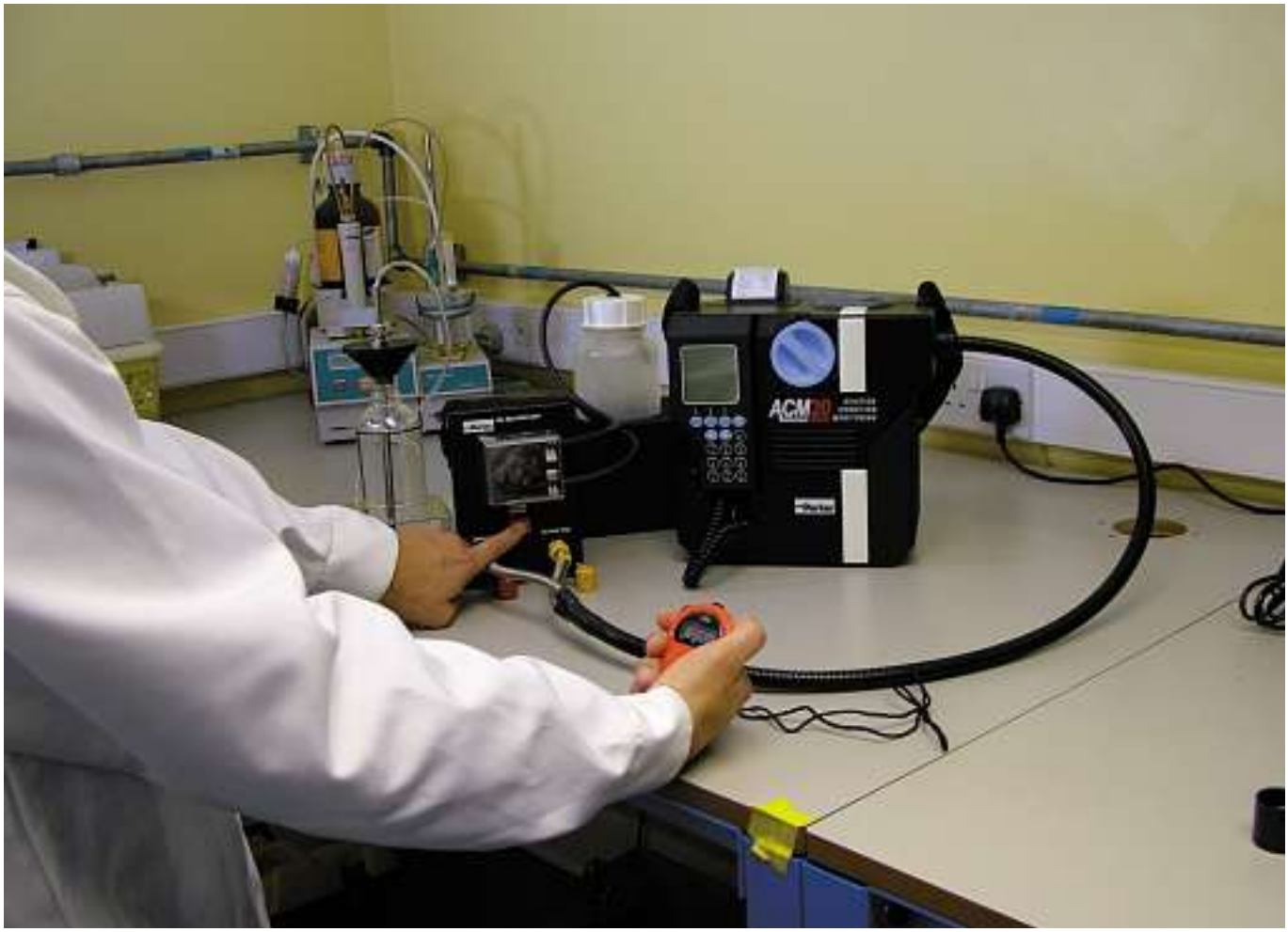
- **Fuel Testing Laboratories – DefStan 9191**
  In order to better understand dispersed contamination in jet fuel, particle counting is now included alongside existing laboratory techniques
- **Bottle Sampling - Energy Institute (EI) - IP 564**
  Laboratory determination of the level of dispersed contamination in aviation kerosine using an Automatic Particle Counter (APC)
- **Replace Clear & Bright and Gravimetric**
  With the introduction of the ACM20, all subjectivity surrounding Clear & Bright and Gravimetric methods can be removed
- **Also for use on petroleum based hydraulic applications (Skydrol compatible available)**
  Suitable for use with mineral oil and petroleum based fluid as per standard hydraulic particle counter, reporting fluid cleanliness to ISO 4406:1999

Aviation Fuel Contamination Monitoring

ACM20 Lab Unit

DEF STAN 91-91 Issue 6

Defence Standard 91-91 is the specification for aviation turbine fuel, which the United Kingdom Civil Aviation Authority (CAA) has agreed is under the technical authority of the Director of the Defence Fuels Group.



IP 564

Laboratory determination of the level of dispersed contamination in aviation kerosene using an Automatic Particle Counter (APC).

This standard describes a method for determining the level of dispersed contamination in aviation kerosene fuels, specifically dirt particles and water droplets in the range from >4µ(c) to >30µ(c). This method relates specifically to Aviation fuels but the equipment can be used on all fuels, petroleum and mineral based fluids.

ACM20 Lab Unit

IP 564 Procedure

1 **Apparatus:**
The apparatus shall be set up in accordance with manufacturers' operating instructions

2 **Test Portion Preparation:**
Decant a minimum of 450ml of the field sample into a clean test portion container

3 Prior to starting a test, tumble the test portion end over end for 60 seconds to ensure any settled particles are redistributed

4 Flush the equipment with the new test sample for 60 seconds prior to starting the test

5 Following the flush, start a test by turning the blue valve in the direction indicated
Repeat a further 3 times

Note:
The implementation date for IP 564 test method "Determination of the level of cleanliness of aviation turbine fuel - laboratory automatic particle counter" will be June 2009. It is the specification authorities intention to replace current test methods with particle counting at the earliest opportunity

ACM20 Family

Field Monitoring - ACM202022

For use in non-hazardous areas, the ACM2022 is designed for online sampling of hydrocarbon fuels and hydraulic systems, utilising existing "quick connect" sampling points such as the Millipore Adaptor

Field Monitoring - ACM202032 (Z2)

The ACM202032 (Z2) is the worlds only ATEX approved portable particle counter for sampling directly from the process line in hazardous areas

- Assembled in an approved and certified stainless steel enclosure to comply with ATEX Directive 94/9/EC and EN50 021 requirements
- Certified to CE Ex 11 3 G Ex nR/nl 11C T6
- "A" Class product defined for the Aviation market
- ATEX approved handset and keypad

Ordering Information

Standard products table - ACM20

Product number	Description
ACM202022UK	Particle counter UK*
ACM202022US	Particle counter US*
ACM202022EUR	Particle counter Euro*
ACM202024UK	Particle counter with lab kit UK (DefStan 9191)
ACM202024US	Particle counter with lab kit US (DefStan 9191)
ACM202024EUR	Particle counter with lab kit Euro (DefStan 9191)
B84794	1m process cable assembly
B84816	Parsmart downloader software
P843855	Carry case
B84746	Bottle assembly
B84745	Throttle kit
B84645	Millipore adaptor assy
B84609	Re-chargeable battery pack
B84817	UK power supply
B84830	US power supply
B84831	Euro power supply
B84832	Laboratory kit

Note 1: Part numbers featured with bold highlighted codes will ensure a 'standard' product selection.
Note 2: Alternate displayed part number selection will require you to contact Parker Filtration for availability.
* Hot works permit required for online sampling.

Notes

ATEX Approved Portable Particle Counter

ACM20 Z2

ATEX Approved Portable Particle Counter

ACM20 Z2

Features & Benefits

Test Time:
2 minutes.

Repeat Test Time:
Every 2 minutes (Manual testing) Every 6 minutes (Automatic).

Principle of Operation:
Optical scanning analysis and measurement of actual particles and inference to water presence.

Primary Output:
>4µ(c), >6µ(c), >14µ(c), >21µ(c), >25µ(c), >30µ(c) counts per ml.

Secondary Diagnostic Output:
% Volume Distribution, via graphical display on handset.

International codes:
ISO 7-22 in accordance with ISO 4406-1999

Data entry:
32 character two line dot matrix LCD. Full alpha numeric entry facility on keypad.

Data retrieval:
Memory access gives test search facility.

Calibration:
In accordance with Parker Calibration Procedure CM20-N, which complies to ISO11171:1999, Clause 6 (Omitting Annex F).

Re-calibration:
Every 12 months by a dedicated Parker Service Centre (Consult Parker).

Max. working pressure:
420 bar.

Operating Temperature:
+5°C to +80°C

Memory store:
300 test (scrolling memory) capacity.

Computer compatibility:
Interface via RS 232 connection @ 9600 baud rate.

Portability:
15 kg. ACM20 has its own battery pack and carry case with wheels.

Power requirement:
Rechargeable battery powered or via the 12vDC input.

System connection:
Via Millipore adaptor with flow restriction through supplied needle valve.

Certification:
Complies with all relevant EC declarations of conformity

- Assembled in an approved and certified stainless steel enclosure to comply with ATEX Directive 94/9/EC and EN50 021 requirements.
- Can be used in explosive and hazardous areas, including Offshore and Mining.
- Certified to CE Ex II 3 G Eex nA/nL IIB T * (*as tested)
- “A” Class product defined for the Aviation market.
- ATEX approved Handset and keypad.
- Suitable for use with mineral oil and petroleum based fluid as per LCM20 particle counter.

Specification

Construction:
Unit: stainless steel
Carrying case: ABS
Hand-held display: ABS
Keypad: polyester membrane

Mechanical components:
Brass, plated steel, stainless steel and aluminium

Seals: Viton

Hoses: Nylon (Kevlar braided microbore)

Fluid compatibility:
All fuels. For other fluids consult Parker

Internal rechargeable battery:
Note: ONLY to be charged outside of the hazardous area, with the unit switched off

Fuse:
1.25A fast blow fuse included for overload protection
Return to Parker Hannifin if fuse is blown

ACM20.2032 technology:
Unique optical scanning system

Repeatability/Accuracy:
Better than 5% (typical)

Using ACM20 Z2

ACM20Z2 is designed to be used to monitor various fuels from existing sampling points in hazardous locations from refineries, pipelines, distribution terminals, airport fuel supply systems all the way through to the point of uplift into aircraft. With Zone 2 classification, the ACM20Z2 is the worlds only ATEX approved particle counter.

Applications in Fuels

- **Oil Refinery**
  - To count and verify the levels of dispersed contamination in accordance with specification limits.
- **Distribution Terminals/Hubs**
  - For use on receipt and outbound supply. Also to provide filtration performance, tank cleanliness and product quality checks.
- **Storage**
  - Settling times can be reduced by monitoring with the ACM by ensuring that levels of dispersed contamination are below acceptable levels.
- **Airport Fuel Farm**
  - Monitoring of the fuels into storage, through the fuel farm, hydrant system and uplift into wing.
- **Pipeline Commissioning**
  - Fast real time monitoring of pipelines following pigging and cleaning processes.
- **Oil and Gas Platforms**
  - Used to monitor the filtration performance, system cleanliness and quality of delivered product.

ATEX Approved Portable Particle Counter

ACM20 Z2

Applications in hydraulics

Solutions in the offshore industry.
In addition, the ACM20 Z2 can be used in many hydraulic system applications as detailed below.

In many industries, worker awareness needs to be maintained at a high level to ensure the safety of their operation. This is particularly relevant to offshore oil-drilling and gas-drilling crews, given the interactive and hazardous nature of their work. The Zone 2 ACM20 portable particle analyser is a tried and tested technology designed, proven and approved as a fluid contamination monitor that crews are using and trusting in such hazardous and demanding environments.

- Certified to CE Ex II 3 G EexnA/nL IIB T* (*as tested).
- Can be used in explosive and hazardous areas, including Offshore and Mining.
- Primary Output. Six cumulative particle size channels ranging from >4µm(c) to >30µm(c) and numbers per ml in accordance with ISO4406-1999.

ACM20Z2 – operational in oil refineries and fuel fields.
Already operational in oil refineries and designed to be used inside commercial airfield fuel locations and at the point of upload of fuel into the aircraft, ACM20Z2 has an impressive success record in this approvals sensitive area of operation.

With a number of safety features designed in as operational standards, the ACM20Z2 can be taken to the point of use, connected in moments and reporting in little more than 2 minutes to ISO approved standards.

- Assembled in an approved and certified stainless steel enclosure to comply with ATEX Directive 94/9/EC and EN50 021 requirements.
- 'A' Class product defined for the aviation market.
- Designed for on-line operation, connecting to the process line via existing Millipore™ fittings, already in use for other industry equipment.

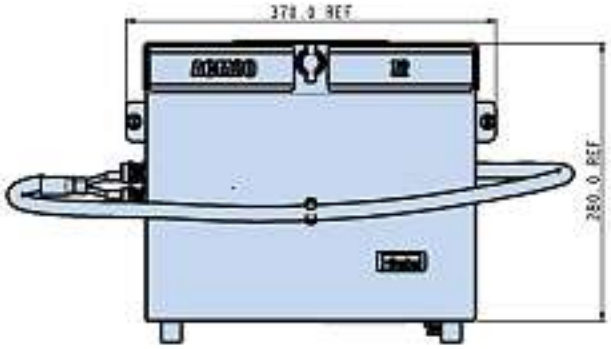
Applications in other hazardous environments.

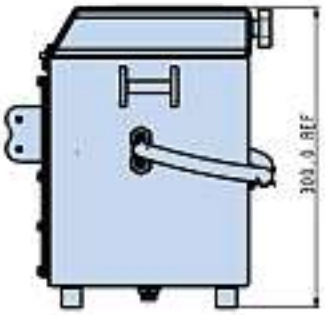
- Railroad equipment manufacturer - Warranty protection.
- Power generation stations - Preventative maintenance.
- Mobile equipment - Roll-off cleanliness testing.
- Mining operations - Service tool.
- Steel mills - Preventative maintenance.

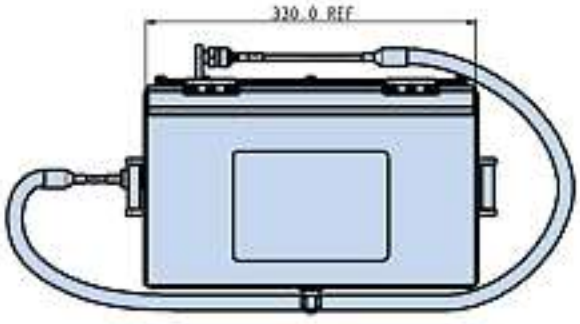
Online Commission Kit

a – ACM20 Zone 2 Particle Counter
b – Battery Charger
c – Process Cable
d – User Manual
e – Downloader Software
f – Throttle Kit
g – Millipore Adaptor Assembly
h – Aluminium Case
i – Bottle Assembly

Installation Details







ATEX Approved Portable Particle Counter

ACM20 Z2

Alternative Fuel Monitoring

In addition to the Z2 Parker also have the ACM20 laboratory Particle Counter which has been designed in accordance with the Energy Institute (EI) Method IP PM DK.

The ACM20 with additional laboratory kit is proposed as an alternative method for use within DefStan 9191 – the standard for aviation turbine fuel, which the United Kingdom Civil Aviation Authority (CAA) has agreed is under the technical authority of the Director Defence Fuels Group.

The ACM can also be used to monitor various fuels from existing sampling points in the same way as the Z2*.

*Hot works permit required for online sampling.

Laboratory Kit
The Oil Delivery Unit (ODU) laboratory kit is a peristaltic pump unit that allows fuel to be pumped through the ACM20 for testing purposes offline.

Specification
Height: 150mm wide x 150mm deep x 170mm

Weight: 1.7 kg

Power Requirement:
Can be run from the 12-volt ACM20 power supply or from another suitable supply via the connecting lead supplied.

Fuse: 0.5 amp fast blow fuse included for overload protection.

Minimum Flow Rate: 15ml/min.

Average Particle Counts in AV System

The table below gives estimated counts found in a typical aviation fuel distribution system, and is given as guidance, in which APR/EI filtration equipment is installed.

Receipt into Microfilter
Expect 2,500 counts per ml
or cleaner @ 4µ(c)

MF

Receipt into FWS (After MF)
Expect 500 counts per ml
or cleaner @ 4µ(c)

FWS

Receipt into Storage (After FWS/MF)
Expect 100 counts per ml
or cleaner @ 4µ(c)

Airport storage

FWS out of storage
Expect 500 counts per ml
or cleaner @ 4µ(c)

FWS

After FWS into Hydrant
Expect 100 counts per ml
or cleaner @ 4µ(c)

To Hydrant/Refueller

After Monitor Into Plane
Expect 100 counts per ml
or cleaner @ 4µ(c)

Receipt into Microfilter	ISO Code - 4406 1999
	High Count	High Count Code
>4µ(c)	2,500	18
>6µ(c)	350	15
>14µ(c)	10	10

Receipt into FWS (After MF)	ISO Code - 4406 1999
	High Count	High Count Code
>4µ(c)	500	16
>6µ(c)	50	13
>14µ(c)	5	9

Receipt into Storage (After FWS/MF)	ISO Code - 4406 1999
	High Count	High Count Code
>4µ(c)	100	14
>6µ(c)	10	10
>14µ(c)	1	7

FWS Out of Storage	ISO Code - 4406 1999
	High Count	High Count Code
>4µ(c)	500	16
>6µ(c)	50	13
>14µ(c)	5	9

After FWS Into Hydrant	ISO Code - 4406 1999
	High Count	High Count Code
>4µ(c)	100	14
>6µ(c)	10	10
>14µ(c)	1	7

After Monitor Into Plane	ISO Code - 4406 1999
	High Count	High Count Code
>4µ(c)	100	14
>6µ(c)	10	10
>14µ(c)	1	7

Note: Figures will vary from location to location.

Ordering Information

Standard products table - ACM20 Z2

Product number	Description
ACM202032UK	Particle counter with online kit & UK power supply
ACM202032US	Particle counter with online kit & US power supply
ACM202032EUR	Particle counter with online kit & Euro power supply
ACM202034UK	Particle counter with online & lab kit + UK power supply
ACM202034US	Particle counter with online & lab kit + US power supply
ACM202034EUR	Particle counter with online & lab kit + Euro power supply
B84647	UK battery charger
B84652	US battery charger
B84653	Euro battery charger
B84650	2m process cable assembly
B84816	Parsmart downloader software
P843066	Carry case
B84746	Bottle assembly
B84745	Throttle kit
B84645	Millipore adaptor assy

WARNING — USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

- This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.
- The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met.

  The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.
- To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

Sales conditions

The items described in this document are available for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. Any sale contract entered into by Parker will be governed by the provisions stated in Parker's standard terms and conditions of sale (copy available upon request)

Parker's Motion & Control Technologies

At Parker, we're guided by a relentless drive to help our customers become more productive and achieve higher levels of profitability by engineering the best systems for their requirements. It means looking at customer applications from many angles to find new ways to create value. Whatever the motion or control technology need, Parker has the experience, breadth of product and global reach to consistently deliver. No company knows more about motion and control technology than Parker.

AEROSPACE

Key Markets

- Aircraft engines
- Business & general aviation
- Commercial transports
- Land-based weapons systems
- Military aircraft
- Missiles & launch vehicles
- Regional transports
- Unmanned aerial vehicles

Key Products

- Flight control systems & components
- Fluid conveyance systems
- Fluid metering delivery & atomization devices
- Fuel systems & components
- Hydraulic systems & components
- Inert nitrogen generating systems
- Pneumatic systems & components
- Wheels & brakes

CLIMATE CONTROL

Key Markets

- Agriculture
- Air conditioning
- Food, beverage & dairy
- Life sciences & medical
- Precision cooling
- Processing
- Transportation

Key Products

- CO^2 controls
- Electronic controllers
- Filter driers
- Hand shut-off valves
- Hose & fittings
- Pressure regulating valves
- Refrigerant distributors
- Safety relief valves
- Solenoid valves
- Thermostatic expansion valves

ELECTROMECHANICAL

Key Markets

- Aerospace
- Factory automation
- Life science & medical
- Machine tools
- Packaging machinery
- Paper machinery
- Plastics machinery & converting
- Primary metals
- Semiconductor & electronics
- Textile
- Wire & cable

Key Products

- AC/DC drives & systems
- Electric actuators, gantry robots & slides
- Electrohydrostatic actuation systems
- Electromechanical actuation systems
- Human machine interface
- Linear motors
- Stepper motors, servo motors, drives & controls
- Structural extrusions

FILTRATION

Key Markets

- Food & beverage
- Industrial machinery
- Life sciences
- Marine
- Mobile equipment
- Oil & gas
- Power generation
- Process
- Transportation

Key Products

- Analytical gas generators
- Compressed air & gas filters
- Condition monitoring
- Engine air, fuel & oil filtration & systems
- Hydraulic, lubrication & coolant filters
- Process, chemical, water & microfiltration filters
- Nitrogen, hydrogen & zero air generators

FLUID & GAS HANDLING

Key Markets

- Aerospace
- Agriculture
- Bulk chemical handling
- Construction machinery
- Food & beverage
- Fuel & gas delivery
- Industrial machinery
- Mobile
- Oil & gas
- Transportation
- Welding

Key Products

- Brass fittings & valves
- Diagnostic equipment
- Fluid conveyance systems
- Industrial hose
- PTFE & PFA hose, tubing & plastic fittings
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects

HYDRAULICS

Key Markets

- Aerospace
- Aerial lift
- Agriculture
- Construction machinery
- Forestry
- Industrial machinery
- Mining
- Oil & gas
- Power generation & energy
- Truck hydraulics

Key Products

- Diagnostic equipment
- Hydraulic cylinders & accumulators
- Hydraulic motors & pumps
- Hydraulic systems
- Hydraulic valves & controls
- Power take-offs
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects

PNEUMATICS

Key Markets

- Aerospace
- Conveyor & material handling
- Factory automation
- Life science & medical
- Machine tools
- Packaging machinery
- Transportation & automotive

Key Products

- Air preparation
- Brass fittings & valves
- Manifolds
- Pneumatic accessories
- Pneumatic actuators & grippers
- Pneumatic valves & controls
- Quick disconnects
- Rotary actuators
- Rubber & thermoplastic hose & couplings
- Structural extrusions
- Thermoplastic tubing & fittings
- Vacuum generators, cups & sensors

PROCESS CONTROL

Key Markets

- Chemical & refining
- Food, beverage & dairy
- Medical & dental
- Microelectronics
- Oil & gas
- Power generation

Key Products

- Analytical sample conditioning products & systems
- Fluoropolymer chemical delivery fittings, valves & pumps
- High purity gas delivery fittings, valves & regulators
- Instrumentation fittings, valves & regulators
- Medium pressure fittings & valves
- Process control manifolds

SEALING & SHIELDING

Key Markets

- Aerospace
- Chemical processing
- Consumer
- Energy, oil & gas
- Fluid power
- General industrial
- Information technology
- Life sciences
- Military
- Semiconductor
- Telecommunications
- Transportation

Key Products

- Dynamic seals
- Elastomeric o-rings
- EMI shielding
- Extruded & precision-cut, fabricated elastomeric seals
- Homogeneous & inserted elastomeric shapes
- High temperature metal seals
- Metal & plastic retained composite seals
- Thermal management

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