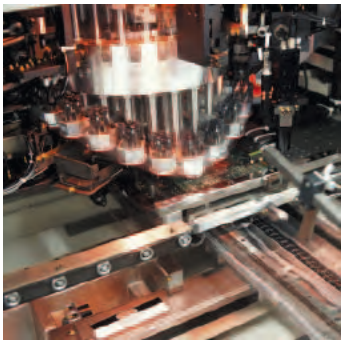
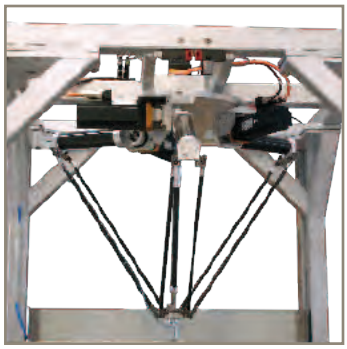
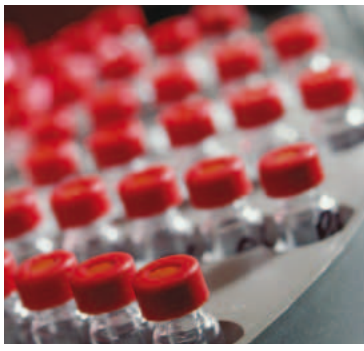


aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



Motornet DC

Brushless Servomotor with Integrated Electronics 0.9 - 7.5 Nm



Parker

ENGINEERING YOUR SUCCESS.

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- 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.
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Parker Hannifin

- the global leader in motion and control technologies

A world class player on a local stage

Global Product Design

Parker Hannifin has more than 40 years experience in the design and manufacturing of drives, controls, motors and mechanical products. With dedicated global product development teams, Parker draws on industry-leading technological leadership and experience from engineering teams in Europe, North America and Asia.

Local Application Expertise

Parker has local engineering resources committed to adapting and applying our current products and technologies to best fit our customers' needs.

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Parker is committed to meeting the increasing service demands that our customers require to succeed in the global industrial market. Parker's manufacturing teams seek continuous improvement through the implementation of lean manufacturing methods throughout the process. We measure ourselves on meeting our customers' expectations of quality and delivery, not just our own. In order to meet these expectations, Parker operates and continues to invest in our manufacturing facilities in Europe, North America and Asia.

Worldwide Manufacturing Locations

Europe
Littlehampton, United Kingdom
Dijon, France
Offenburg, Germany
Milan, Italy

Asia
Shanghai, China
Chennai, India

North America
Rohnert Park, California
Irwin, Pennsylvania
Wadsworth, Ohio
Charlotte, North Carolina
New Ulm, Minnesota

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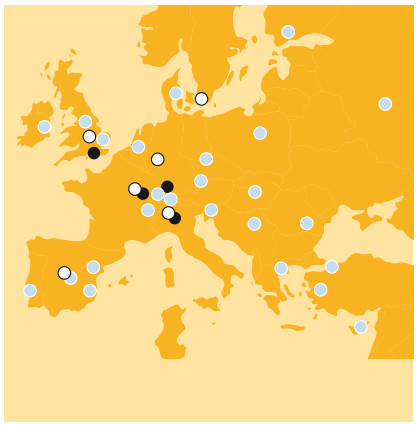
Parker provides sales assistance and local technical support through a network of dedicated sales teams and authorized technical distributors throughout Europe.

For contact information, please refer to the Sales Offices on the back cover of this document or visit www.parker.com

Milan, Italy

Littlehampton, UK



Manufacturing
Parker Sales Offices
Distributors

Dijon, France

Motornet DC System - MDC

Motornet DC Overview

Description

Motornet DC is a brushless servomotor system with integrated electronics, supplied from a DC-bus voltage. Hybrid power, control and communications cables, a Power supply and Interface module complete the system and local I/O's can be connected directly to the motor.

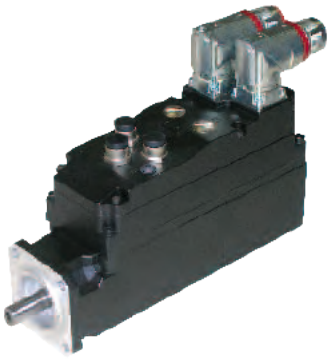
Ideally suited to multi-axis applications where a number of motors are mounted in close proximity on the machine, Motornet DC allows a decentralized approach to motion control to be taken.

- Packaging Machines
- Rotary Tables
- Filling, bottling and capping machines

Motion control functionality is executed by means of EtherCAT communication or optionally CANopen DS402 communication.

Features

- Feedback: Resolver
- Fieldbus: EtherCAT
- 2 digital Input / 2 digital Output
- Protection level: IP64 / IP65 (optional)

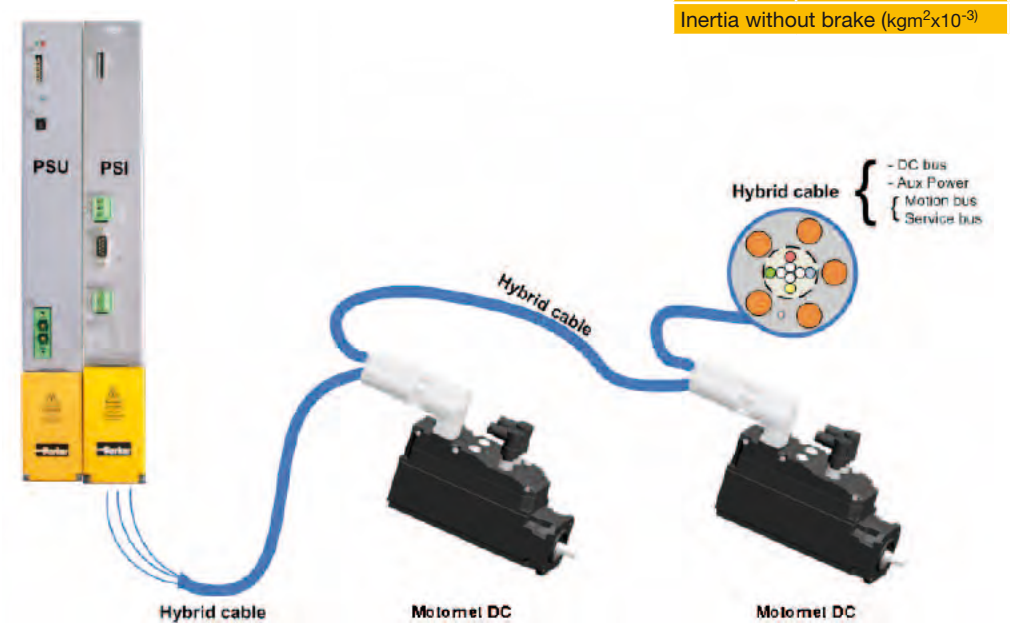


General technical characteristics

230 VAC supply		Size		
		MDC60	MDC70	MDC100
Speed 3000 min^{-1}	Stall torque (Nm)	1	2.5	6.5
	Peak torque (Nm)	4	11	15
Speed 6000 min^{-1}	Stall torque (Nm)	0.9	1.9	-
	Peak torque (Nm)	4	7	-
Inertia J without brake (kgm^{2}x10^{-3})		0.0302	0.1	0.504

400 VAC supply		Size		
		MDC60	MDC70	MDC100
Speed 3000 min^{-1}	Stall torque (Nm)	1	2.6	7.5
	Peak torque (Nm)	4	11	26
Speed 5200 min^{-1}	Stall torque (Nm)	-	-	5.7
	Peak torque (Nm)	-	-	15
Speed 6000 min^{-1}	Stall torque (Nm)	0.9	2.2	-
	Peak torque (Nm)	4	7	-
Inertia without brake (kgm^{2}x10^{-3})		0.0302	0.1	0.504

Typical System Architecture

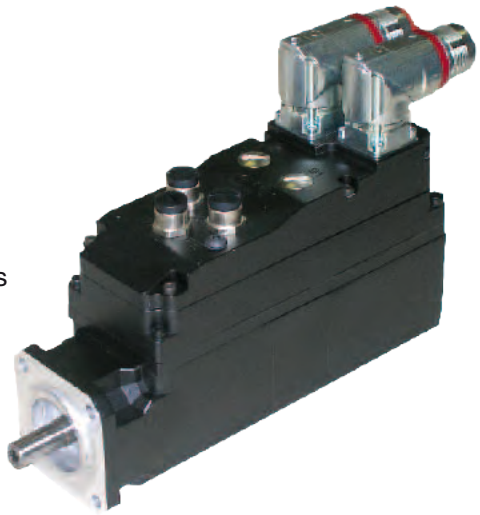


Motornet DC System
Overview

Description

The next logical evolution in machine motion control, Motornet DC integrates servo control electronics into a brushless servomotor creating a self-contained motor and servo controller. This offers considerable benefits in terms of machine design by allowing a decentralised motion control architecture to be used. This in turn allows substancial savings in time and materials to be realised, while reducing machine footprints.

Typical applications for Motornet DC include packaging machines and rotary tables where numerous motors are mounted on the machine.



Motornet DC Unit

Features and Benefits

Quick and simple machine configuration and reduced wiring

The hybrid cabling solution, which contains all power supply, control and communications signalling offers machine builders a number of benefits including:

- Simplified plug and socket connections at the motor
- Reduced number of connections and potential points of failure
- Reduced wiring time and cost of associated cabling

Reduced machine footprint

With a power supply and PSI Interface module being the only additional components required in the cabinet, the electronics footprint is up to 70 % smaller than traditional centralised solutions. Additionally, all wiring changes are made on the machine via plug and socket connections rather than in the electrical cabinet.

Modular machine design

Because of the modular nature of Motornet DC, machine design becomes very easy. Additional axes can be added with very little effort, simply by duplicating schematic drawings from other axes. This not only reduces engineering time and costs, but simplifies build and significantly improves time to market.

Efficient power control

Motornet DC works on a common DC bus power supply that allows the system to absorb and re-supply much of the braking energy to other Motornet DC units rather than dissipating it in the form of heat via external resistors. In some instances,resistors can be removed completely and in others smaller resistors are required.

PSUP- Power Supply Unit and PSI - Power Supply Interface for Motornet DC

Motornet DC System
Overview

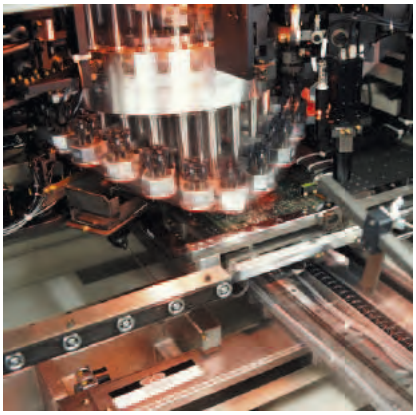
Application

Motornet DC is ideally suited to applications where a number of motors are mounted in close proximity on a machine, such as a filling machine. In this case, the reduced cabling and electronics allow a much smaller physical footprint for the machine to be developed. Motornet DC is suited to packaging lines in general as the plug and play nature of its cable architecture allows new machine modules to be easily added or removed without considerable rewiring cost being incurred.

- **Packaging lines**
- **Rotary tables**
- **Filling, bottling and capping machinery**

Functionality

Motornet DC offers full motion control and is designed to compliment the existing Parker servo drive and motor product range. Being flexible in its configuration, Motornet DC can be used to provide repeatable and accurate motion control for a wide range of applications and can be integrated into a larger hybrid motion solution.

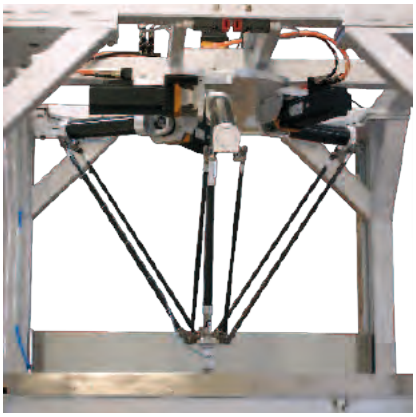


Standard Version

Available in flange sizes of 60 mm, 70 mm and 100 mm with continuous torque ratings of 0.9 to 7.5 Nm and motor speeds up to 6000 min^{-1}.

Motornet DC can be configured to suit the needs of any number of applications with a range of options. As standard Motornet DC is supplied with:

- **EtherCAT**
- **Localised I/O - 2 digital inputs and 2 digital outputs**
- **Resolver feedback**



Options

The capabilities of Motornet DC can be further enhanced with numerous options which are available upon request, including:

- **IP65 protection for harsh environments**
- **Safety Torque Off (STO) functionality**
- **CANopen DS402 communication in place of EtherCAT**
- **Encoder feedback**
- **Holding brake**

Technical Characteristics

Technical Data

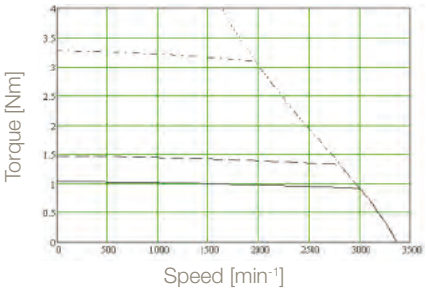
Type	AC Voltage Power Supply	Speed	Rated torque	Cont. stall torque	Peak torque	Inertia (without brake)
	[VAC]	[min^{-1}]	[Nm]	[Nm]	[Nm]	[10^{-3} kgm^2]
MDC60	230	3000	0.90	1.0	4.0	0.0302
		6000	0.55	0.9	4.0	
	400	3000	0.90	1.0	4.0	
		6000	0.55	0.9	4.0	
MDC70	230	3000	2.00	2.5	11.0	0.1000
		6000	0.50	1.9	7.0	
	400	3000	2.00	2.6	11.0	
		6000	0.50	2.2	11.0	
MDC100	230	3000	4.40	6.5	15.0	0.5020
	400	3000	4.40	7.5	26.7	
		5200	1.00	5.7	15.0	

Data referred to an operating temperature of +40 °C.

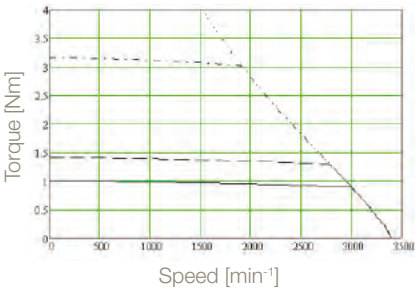
Motornet DC - Torque Vs Speed Characteristic Curves

MDC60

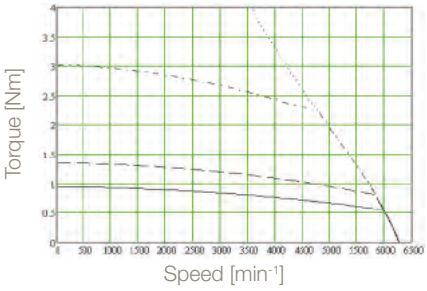
MDC60 - 3000 min^{-1} 230 VAC



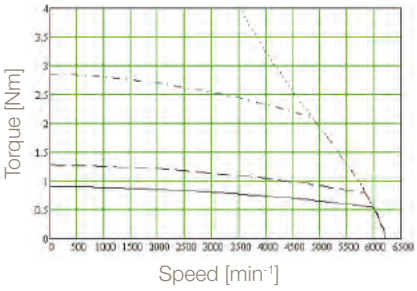
MDC60 - 3000 min^{-1} 400 VAC



MDC60 - 6000 min^{-1} 230 VAC



MDC60 - 6000 min^{-1} 400 VAC



Key

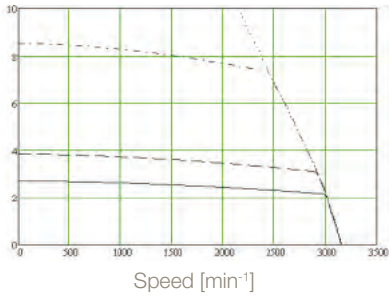
····· Voltage Limit
—— S1 60 K ΔT
– – S3 50 %
—· S3 10 %

Technical Characteristics

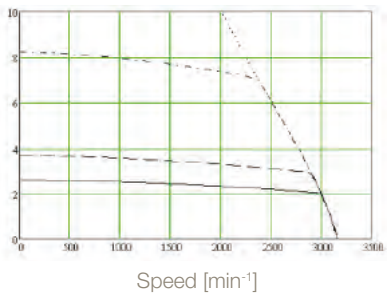
Motornet DC

MDC70

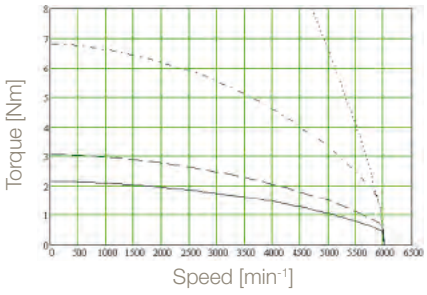
MDC70 - 3000 min^{-1} 230 VAC



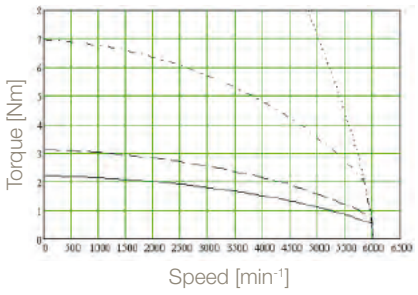
MDC70 - 3000 min^{-1} 400 VAC



MDC70 - 6000 min^{-1} 230 VAC

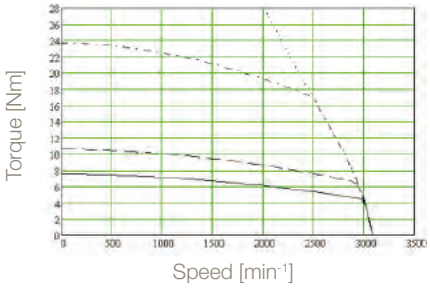


MDC70 - 6000 min^{-1} 400 VAC

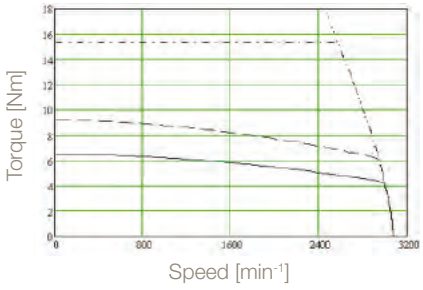


MDC100

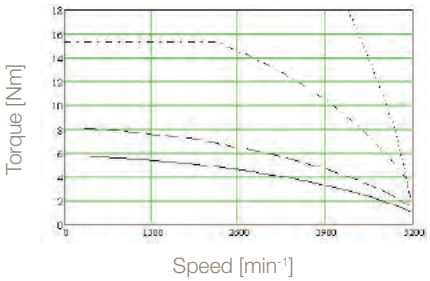
MDC100 - 3000 min^{-1} 400 VAC



MDC100 - 3000 min^{-1} 230 VAC



MDC100 - 5200 min^{-1} 400 VAC



Key

- ····· Voltage Limit
- —— S1 60 K ΔT
- – – S3 50 %
- —· S3 10 %

Electrical Characteristics

MDC - Motornet DC

Auxiliary Voltage Supply

Motornet DC Model	MDC60	MDC70	MDC100
Rated Input Voltage	24...48 VDC (0...+10 %)		
Maximum Rated Input Current	20 A*		
Control Stage Input Power	12 W		

Power Stage Voltage

Maximum DC Voltage Supply	750 VDC

** This is the maximum rated input current that may be supplied to the overall MDC branch. To calculate the maximum number of MDC units that can be connected in a single branch without exceeding this value, the user must also consider the input braking current.*

PSUP - Power Supply Unit

Mains Supply

Power Supply Model	PSUP10			PSUP20			PSUP30		
Rated Input Voltage	230...480 VAC 3 phase								
Input Frequency	50...60 Hz ±10 %								
Supplied Voltage	230	400	480	230	400	480	230	400	480
Rated Input Current A_{rms}	22	22	18	44	44	35	50	50	42
Rated Output Current A_{rms}	18	18	15	36	36	30	41	41	36
Peak Output Current A (≤ 2 s)	36	36	30	72	72	60	82	82	72
Power kW	6	10	10	12	20	20	18	30	30

Control Supply

Rated Input Voltage	24 VDC ±12.5 % (21...27 VDC)		
Maximum Ripple	0.5 V_{pkpk}		
Supply Current	200 mA	300 mA	400 mA

PSI - Power Supply Interface for Motornet DC

Supply Voltage

Power Supply Interface	PSI5	PSI10	PSI20
DC Voltage Range	300...750 VDC		

Control Supply

Rated Input Voltage	24 VDC ±10 %
Maximum Ripple	Do not exceed peak voltage
Supply Current	0.5 A

Motornet DC Control Stage Supply

Supply Voltage	24 or 48 VDC (Internal or external)
Supply Voltage - P version	90...264 VAC, 47...63 Hz / 110...370 VDC

Environmental Characteristics

Motornet DC, PSUP - Power Supply Unit and PSI - Power Supply Interface

Environmental Characteristics

Model Type	Motornet DC	PSUP	PSI
Operating Temperature	0...+40 °C		
Storage Temperature	-25 °C...+55 °C		
Shipping Temperature	-25 °C...+70 °C		
Product Enclosure Rating	IP64, IP65 as option	IP20 (only in closed electrical cabinet) UL open type equipment	
Altitude	1000 m ASL. Derate output current by 1.5 % per 100 m to a maximum of 2000 m		
Operating Humidity	Class 3K3 - Maximum 85 % non-condensing		
Storage Humidity	Class 1K3 - Maximum 95 % non-condensing		
Shipping Humidity	Class 2K3 - Maximum 95 % at 40 °C		
Operating Vibration	3M1 Class 2...9 Hz width 0.3 mm 9...200 Hz accel. 1 m/s^2	IEC60068-2-6 10...57 Hz width 0.075 mm 57...150 Hz accel. 9.81 m/s^2	

MDC - Motornet DC

Standards & Conformance - EMC Compatibility

EN 61800-5-1	Adjustable speed electrical power drive systems - safety requirements, thermal and energy
EN 60034-1	Rotating electrical machines - Part 1: Rating and performances
89/336/CEE directive	EMC directive
EN 61800-3	Adjustable speed electrical power drive systems - Part 3: EMC product standard including specific test method

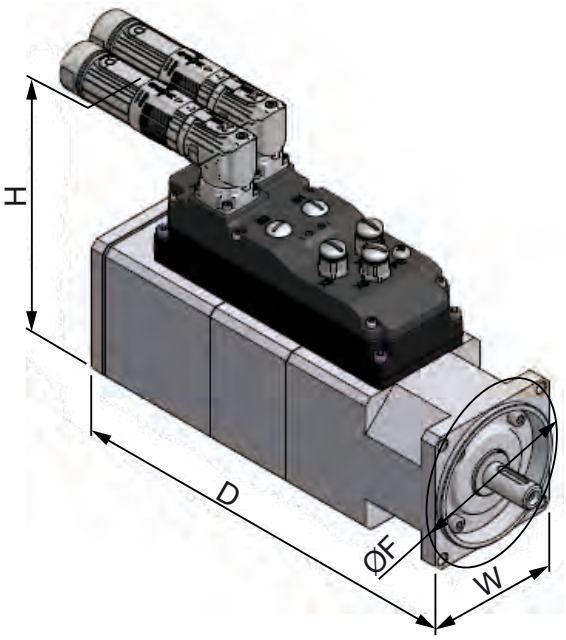
PSUP - Power Supply Unit and PSI - Power Supply Interface for Motornet DC

Standards & Conformance - EMC Compatibility

72/23/CEE directive mod. by 93/68/CEE	Low voltage directive
EN 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 61800-2	Adjustable speed electrical power drive systems - Part 2: General requirements - Rating specifications for voltage adjustable frequency a.c. power drive systems
EN 61800-5-1	Adjustable speed electrical power drive systems - safety requirements, thermal and energy
89/336/CEE directive	EMC directive
EN 61800-3	Adjustable speed electrical power drive systems - Part 3: EMC product standard including specific test method

Dimensions

Motornet DC



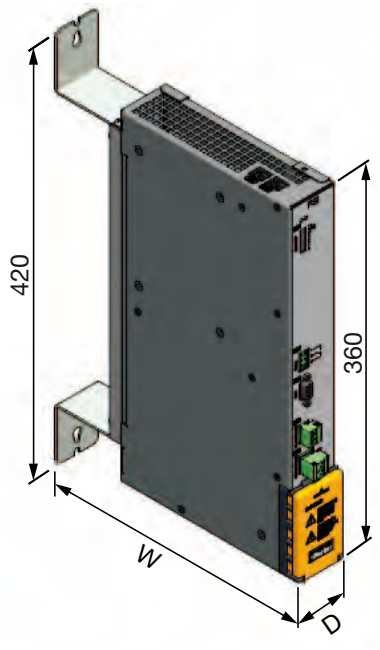
Dimension and weights - Motornet DC

Type	H [mm]	W [mm]	D [mm]	ød x length [mm]	øPCD [mm]	F [mm]	Weight [kg]
MDC60	154	60	192	9x20 / 11x 23	40	63	2.7
MDC70	164	70	287	11x23 / 14x30 / 19x40	60	75	4.7
MDC100	194	100	262	19x40 / 24x50	80	100	8.5

PSU - Power Supply Unit and PSI - Power Supply Interface for Motornet DC

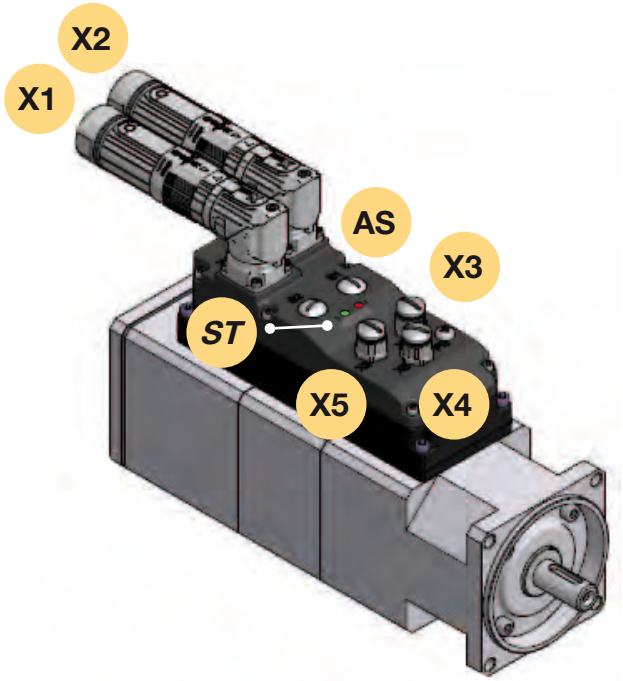
Dimension and weights - PSI & PSUP

Type	W [mm]	D [mm]	Weight [kg]
PSUP10, PSI5/PSI10/PSI20	50	270	3.6
PSUP20/PSUP30	100	270	5.4



Connector Layout

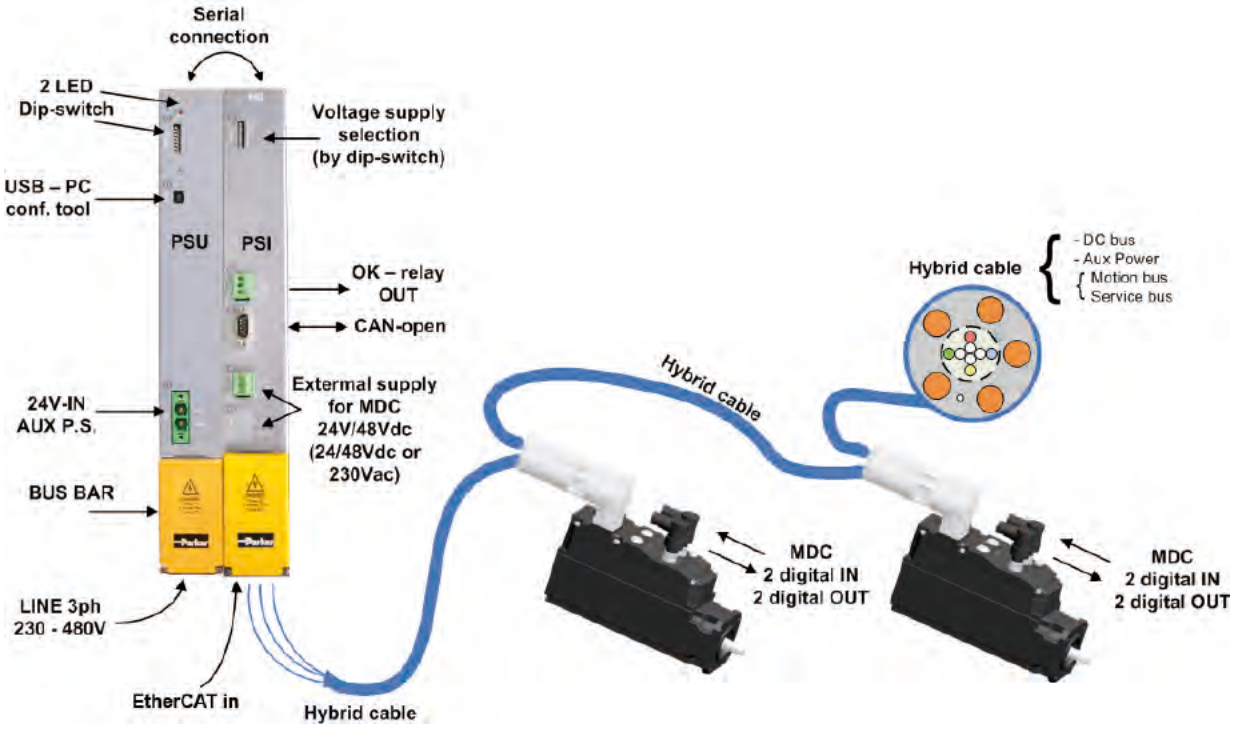
Motornet DC



Key	Description
X1	IN: DC Bus, 24 VDC Supply, Motion Bus, Service Bus
X2	OUT: DC Bus, 24 VDC Supply, Motion Bus, Service Bus
X3	Digital Inputs
X4	I/O STO
X5	Digital Outputs
AS	Address setting selector switches
ST	Status LEDs: Green - Power On, Red - Status

Typical Connection Diagram

Motornet DC



Order Code

MDC - Motornet DC

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Order example	**MDC**	**E**	**A**	**60**	**30**	**5**	**9**	**S**	**HXX**	**F4**	**M**	**R**	**E**	**64**	**4**

1 Motor family

MDC	Motornet DC - integrated resolver

2 Encoder*

Empty field	Resolver
E	Encoder (option)

3 Brake*

Empty field	Without holding brake
A	With holding brake (option)

4 Motor frame size (Refer to compatibility table)

60	60 mm motor frame
70	70 mm motor frame
100	100 mm motor frame

5 Nominal speed (Refer to compatibility table)

30	3000 min^{-1} (230/400 VAC - all frames)
52	5200 min^{-1} (400 VAC - frame 100 only)
60	6000 min^{-1} (230/400 VAC - not frame 100)

6 Flange

5	Flange 5 (available for all sizes)
8	Flange 8 (contact your local sales office)

7 Shaft diameter

9	9 mm shaft (frame 60 only)
11	11 mm shaft (frame 60 and 70)
14	14 mm shaft (frame 70 only)
19	19 mm shaft (frames 70 and 100)
24	24 mm shaft (frame 100 only)

8 Smooth shaft - keyway

Empty field	With keyway
S	Without keyway

9 Motor shaft*

Empty field	Standard shaft
HXX	Hollow shaft, xx = internal dia. (max 12 mm) Available only for MDC70 and MDC100 with resolver

10 Feedback

Empty field	Standard resolver
F4	Encoder EQI1130 (with E selected in block 2)

11 Increased inertia*

Empty field	Standard inertia
M	increased inertia (option)

12 Safety torque off (STO)*

Empty field	Without safety torque off
R	With safety torque off (option)

13 Fieldbus

E	EtherCAT
D*	CANopen (option)

14 Protection level

64	IP64 protection
65	IP65 protection (option)

15 AC supply voltage (PSU supply voltage)

2	230 VAC
4	400 VAC

** Option currently under development*

Order Code

Motornet DC Hybrid Cables

	1	2	3	4
Order example	**HYBCA**	**0030**	**PSI**	**4**

1	Cable type	
	HYBCA	Hybrid cable for Motornet DC

2	Length (x10 mm)	
	0030	300 mm
	0100	1000 mm (1 m)
	1000	10 m
	Note: maximum cable length is 15 m	

3	Connector Type	
	PSI	Wired cable for PSI to MDC with PSI connector and female mating MDC connector
	MDC	Wired cable for MDC to MDC with male and female mating MDC connectors

4	Cable Size	
	Empty field	2.5 mm^2 cable size
	4	4.0 mm^2 cable size

Cables options

HYBCA1	MDC hybrid cable only (no connectors) - 1 m length / 2.5 mm^2
HYBCA14	MDC hybrid cable only (no connectors) - 1 m length / 4 mm^2
CONMDCMV	MDC hybrid connector (male)
CONMDCFV	MDC hybrid connector (female)
TAPHYB	MDC Daisy chain end cap (only for EtherCAT protocol)

PSUP - Power Supply Unit

	1	2	3	4	5
Order example	**PSUP**	**10**	**D6**	**USB**	**M00**

1	Device type	
	PSUP	PSUP - Power supply unit

2	Nominal power	
	10	10 kW rating
	20	20 kW rating
	30	30 kW rating

3	Nominal supply	
	D6	Input voltage 230...480 VAC 3 phase

4	USB connection	
	USB	USB Connection

5	Options	
	M00	Without I/O extension

PSI - Power supply interface for Motornet DC

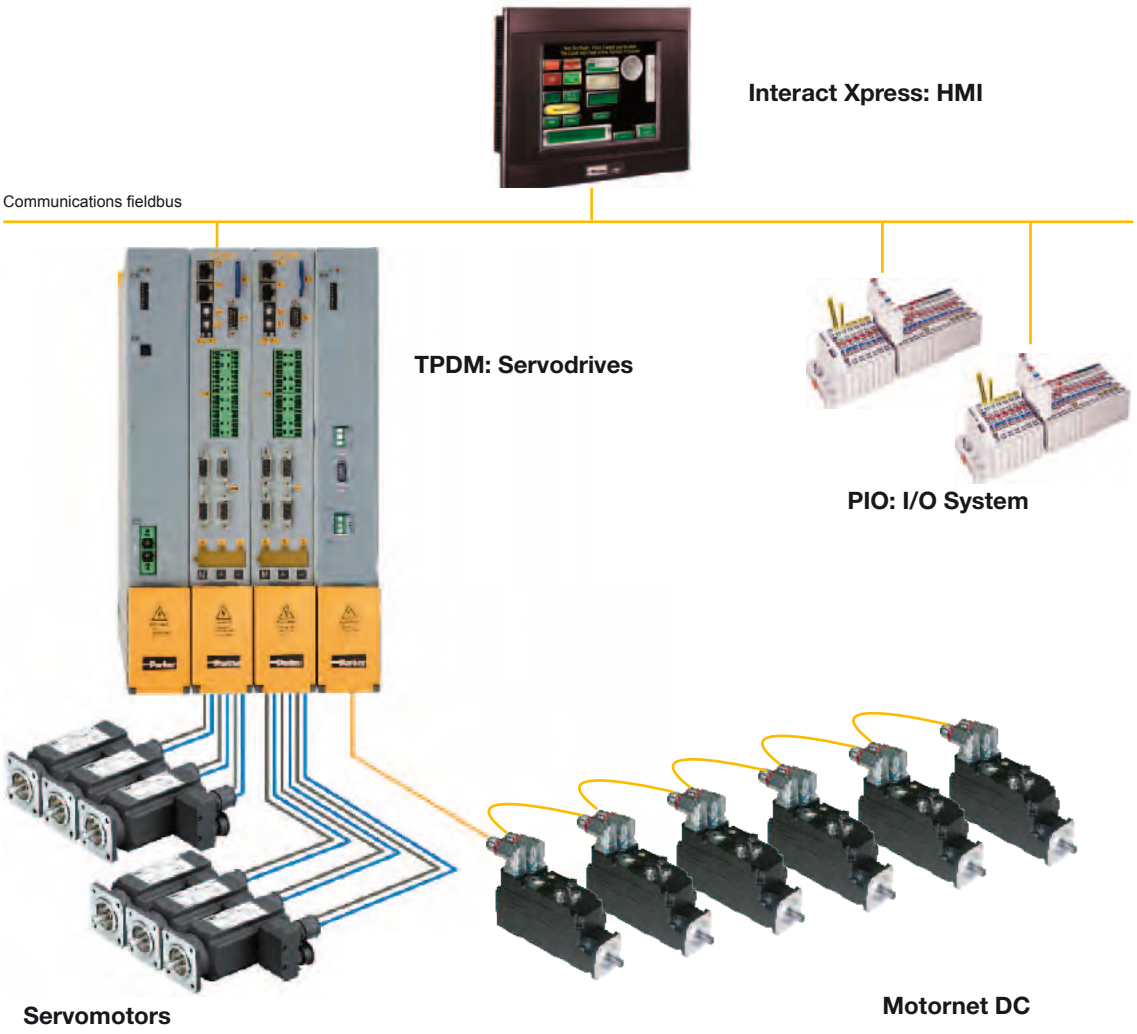
	1	2	3
Order example	**PSI**	**10**	**P**

1	Device type	
	PSI	Power supply interface for Motornet DC

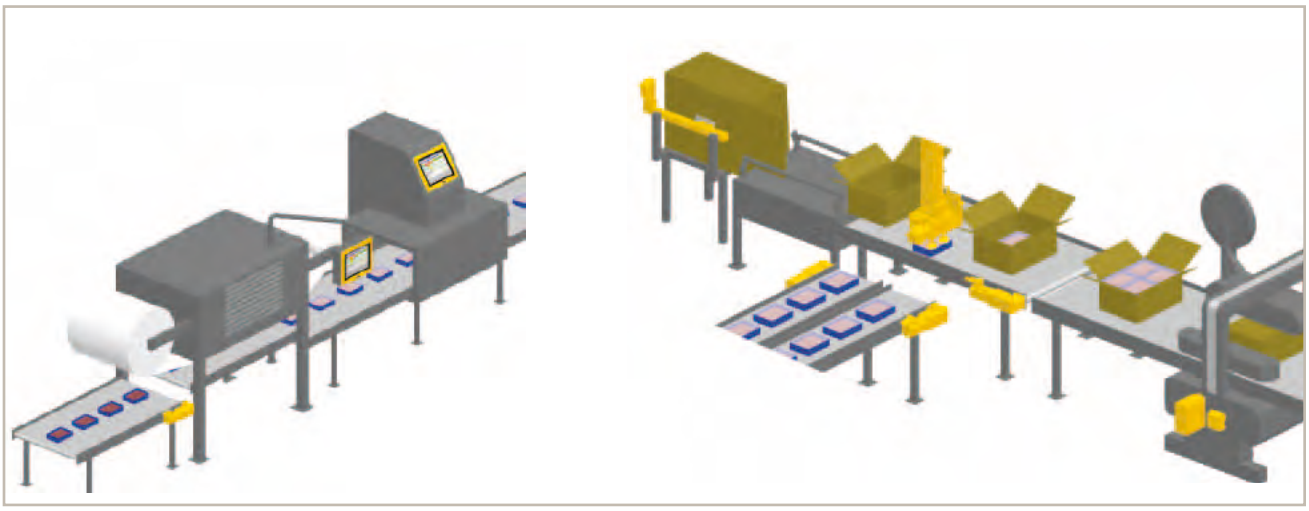
2	Supply size	
	5	5 kW rating
	10	10 kW rating
	20	20 kW rating

3	Internal power supply	
	P	Internal power supply (standard)

Hybrid Integrated Motion Solutions



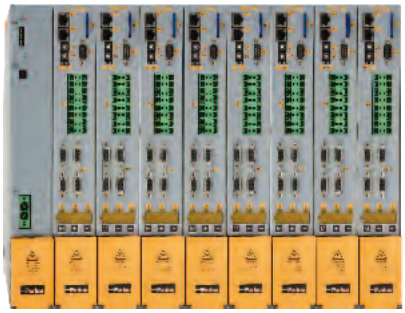
In this example Motornet DC is shown in a system which also uses the TPD-M series servoamplifier, SMB/H series servomotors, InteractXpress series HMI and PIO series I/O to form a complete integrated hybrid motion solution. This type of architecture can be used for the complete control of packaging or process lines.



Hybrid Integrated Motion Solutions

TPDM: Triple Power Drive

TPD-M is a flexible servo drive that integrates three power stages in a single housing. The flexibility of the TPD-M servo drive is based on the power stage adapting to supply the correspondening servo motor with the necessary power within the range of 2 to 30 Amperes. The base configuration consists of a common DC bus supply (PSU) and TPD-M multiple modules connected through DC bus bars. The modular concept allows a system to be configured using 50 mm wide modules comprising either 3 axes, 2 axes or a single axis. A single common DC bus supply can support up to 15 modules.



SMB/H-MB/H: Brushless servo motors

The MB/H and SMB/H Series of highly-dynamic brushless servo motors utilise "salient pole" technology to produce an extremely compact design. Motor dimensions are drastically reduced and significant gains in terms of torque and dynamic performance are achieved. The high quality Neodymium-Iron-Boron magnets and the encapsulation method used to fasten them to the shaft, allows the two Series' to achieve very high acceleration and withstand high overloads without risk of demagnetisation or detachment of the magnets. The MB/H and SMB/H Series is avalaible in sizes from 0.2 to 285 Nm.

Interact Xpress: HMI

Interact Xpress is Parker's HMI hardware and software solution, for the process's control in distributed applications where multiple HMIs are deployed on a single machine or across several remote stations. Interact Xpress software, features an advanced development environment for easy creation of rich graphics and multimedia applications. Interact Xpress allows you to run, view and edit on line - from any PC -applications in Internet Explorer™ browser. Available with 6, 8,10 and 15 inch, these units are specifically designed to optimize the performance, storage and connectivity features of the software.

PIO: I/O System

Parker's PIO modular bus terminal system offers a range of popular industrial fieldbus networks to interface to a wide variety of control signals from field-based devices. Connection to field level devices can be implemented quickly and reliably with PIO.

PS/RS Series: Planetary Gearheads

Stealth advanced gearheads are available in either in-line or right-angled versions with 8 frame sizes and 12 gear ratios. With input speeds up to 6000 min^{-1} and exceptionally quiet, strong and reliable operation, you can be confident that there is a Stealth advanced gearhead to fit any of your high performance servo application needs.

Configuration Software

MotionWiz

MotionWiz is free of charge downloadable configuration software that allows users to configure and optimise the Motornet DC series with a few easy clicks of the mouse.

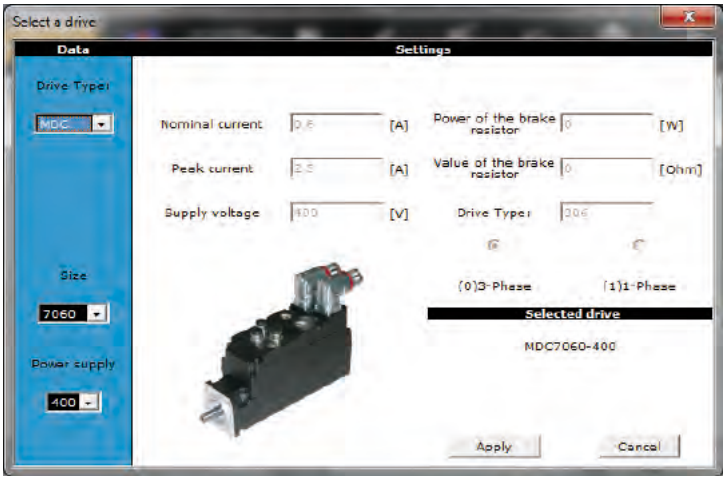
MotionWiz features an intuitive, easy and simple to use Windows® style environment to aid installation, optimisation and diagnostic use.

MotionWiz permits operation in both “on line” mode, directly in the controller, and in “offline” mode, remotely on the PC before downloading to the controller.

To simplify the configuration of systems with a large number of similar axes but with different motion profiles, MotionWiz allows users to copy the configuration from one application to another.

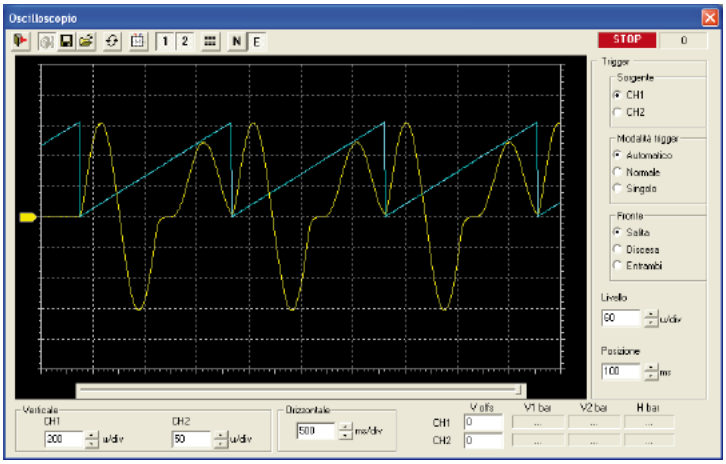
Inside the MotionWiz configurator is a database containing the technical characteristics of the full range of Parker motors and drives.

MotionWiz can be downloaded at www.parker-eme.com/motornet



MotionWiz: Motor's size selection

MotionWiz: MDC page - Main electronic control parameters and fieldbus status



MotionWiz Oscilloscope: Real speed & torque trends

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 and 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. For further info call 00800 27 27 5374.

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
- Food & beverage
- 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
- Controllers
- Gantry robots
- Gearheads
- Human machine interfaces
- Industrial PCs
- Inverters
- Linear motors, slides and stages
- Precision stages
- 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
- Food & beverage
- Life science & medical
- Machine tools
- Packaging machinery
- Transportation & automotive

Key Products

- Air preparation
- Compact cylinders
- Field bus valve systems
- Grippers
- Guided cylinders
- Manifolds
- Miniature fluidics
- Pneumatic accessories
- Pneumatic actuators & grippers
- Pneumatic valves and controls
- Rodless cylinders
- Rotary actuators
- Tie rod cylinders
- 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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