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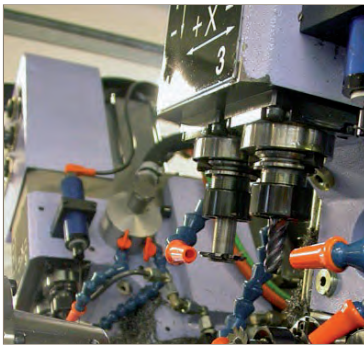
# AC650 Series

## Variable Speed AC Drives



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## General Purpose AC Drives - AC650 Variable Speed Series

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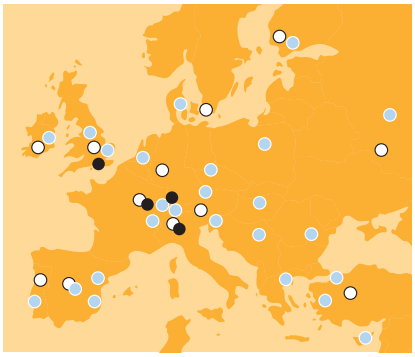

Electromechanical Manufacturing
Parker Sales Offices
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Dijon, France

# General Purpose AC Drives - AC650 Variable Speed Series

## Overview

### Description

Whether you need to control a conveyor belt, automatic barrier, machine spindle or other general purpose application, the AC650 delivers reliable, cost-effective voltage/frequency speed control of your motor.
Designed with simplicity in mind, the AC650 comes in a compact format with DIN rail mounting as standard allowing easy integration into any electrical control panel. The operator/programming keypad can be removed after setup to prevent unauthorised changes to inverter configuration.
For simple motor speed control up to 7.5 kW, the AC650 is an easy to use, out of the box solution that will have your system up and running in no time.

### Features

- **Integrated operator keypad with option for remote mounting**
- **Integrated EMC filter ensures compliance while maintaining a compact footprint**
- **Pre-programmed macros allowing quick and simple drive setup**
- **DIN rail mounting for easy integration into any electrical cabinet**
- **Flexible I/O including analogue and relay output and motor thermister input allowing greater control options**
- **6514 cloning module (option) allows easy back-up and transfer of parameters between different drives**

### International Standards

The AC650 and AC650V series AC drives meets the following standards when installed in accordance with the relevant product manual.

- **CE marked to EN 50178 (Safety, Low Voltage Directive)**
- **CE marked to EN 61800-3 (EMC Directive)**
- **UL listed to US Standard UL508C**
- **cUL listed to Canadian Standard C22.2 #14**

**Technical Characteristics - Overview**

| | |
|---|---|
| **Power Supply** | Single Phase Units:<br>220-240 VAC ±10 %, 50-60 Hz ±5 %<br>Three Phase Units:<br>380-460 VAC ±10 %, 50-60 Hz ±5 % |
| **AC650 Series**<br>0.25-7.5 kW | The AC650 is a simple, compact, cost effective solution to basic Volts/ Hertz open-loop motor speed control applications to 7.5 kW, such as:<br>• Conveyors<br>• Automatic barriers<br>• Machine spindles |
| **AC650V Series**<br>0.25-110 kW | The AC650V expands upon the AC650 and benefits from the addition of sensorless flux vector control. This makes it ideally suited for applications up to 110 kW where improved speed regulation of variable loads and higher starting torques for high inertia systems is required.<br>• Centrifugal pumps<br>• Industrial blower fans<br>• Mixers |

# AC650V - High Performance AC Drives

**0.25 kW - 110 kW**

## Overview

### Description

The AC650V expands upon the simple, no-fuss philosophy of the AC650 and provides reliable, robust motor control from 0.25 kW through to 110 kW. With the addition of sensorless flux vector technology, the AC650V allows improved motor control at lower speeds, better speed regulation of variable loads and higher starting torques for high inertia systems. The variable torque configuration option above 5.5 kW makes the AC650V ideally suited to energy saving in pump and fan applications.

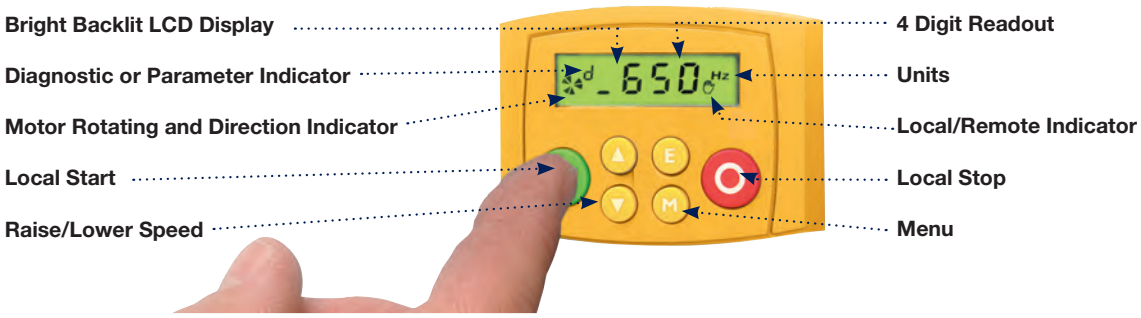
### Features

**The AC650V offers the same high level of specification as the AC650 and also includes:**

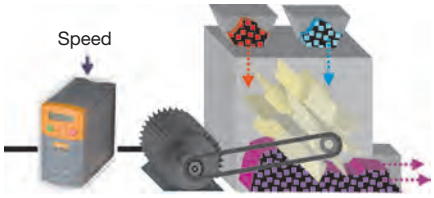
- **High torque sensorless vector control mode for advanced motor control**
- **Selectable constant torque or (higher) variable torque rating for centrifugal pump and fan applications allowing optimum inverter sizing to suit the application**
- **Fully configurable with graphical software tools such as DSE Lite provided at no additional charge.**
- **Additional user configurable I/O points offering increased control capabilities**
- **Additional PROFIBUS communications options for integration into PLC systems**
- **Wall and panel mounting options above 7.5 kW**
- **Extended power range to 110 kW makes the AC650V suited to a wide of uses**

## Diagnostic and control through the operator keypad

**Easy-to-use Operator/Programming Controls**

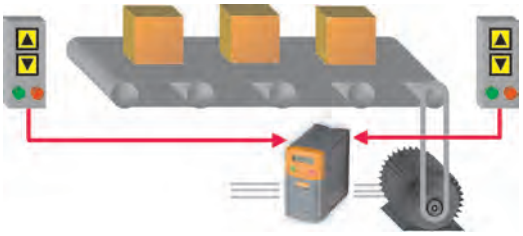



## Simplified operation throught the use of pre-programmed macros

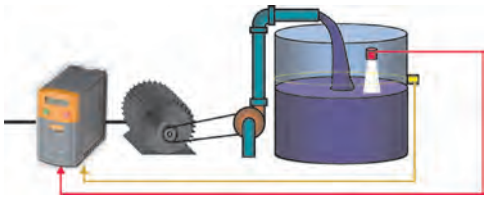



- Simple speed control
  set speed and voltage or current with start / stop direction control

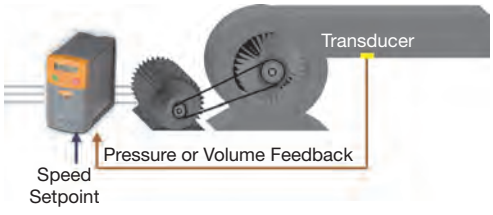
- Manual / Automatic control
  set to run with local speed setting or external reference



- Preset speed control
  select up to 8 pre-programmed speeds using digital inputs



- Increase / Decrease
  Increase or reduce speed using digital inputs




- PID Control
  Control the pressure, flow, temperature or any process variable

# Technical Characteristics

**AC650 and AC650V Series**

| | |
|---|---|
| **Power Supply** | Single Phase Units:<br>220-240 VAC ±10 %, 50-60 Hz ±5 %<br>Three Phase Units :<br>380-460 VAC ±10 %, 50-60 Hz ±5 % |
| **Environment** | 0-40 °C (derate to 50 °C)<br>Up to 1000 m ASL (derate >1000 m) |
| **Protection** | IP20 |
| **Overload** | Constant torque rating:<br>150 % for 60 s<br>Variable torque rating (pumps and fans):<br>110 % for 60 s |
| **Output Frequency** | 0-240 Hz |
| **Analogue Inputs** | 2;<br>Speed Control<br>0-10 V, 0-10 V/4-20 mA |
| **Analogue Outputs** | 1;<br>User configurable output frequency / load 0-10 V |
| **Digital Inputs** | AC650 - 3,<br>AC650V - 5;<br>User configurable Start / Stop / Direction / pre-set speeds (8) |
| **Digital Inputs / Outputs** | AC650 - 1,<br>AC650V - 2;<br>User configurable as inputs or outputs |
| **Digital Relay Outputs** | 1;<br>Relay output 4 A @240 V<br>All digital outputs configurable for; at (not at) speed / at (above) minimum speed / running (stopped) / health (tripped) / above (below) pre-set load |
| **Motor Thermistor Input** | 1 |
| **Power Supply Outputs** | 24 VDC (50 mA) - Digital I/O Supply<br>10 VDC (10 mA) - Analogue reference supply |
| **Communications Options** | AC650V and AC650:<br>RS485 / RS232<br>AC650V:<br>PROFIBUS |

# Electrical Characteristics

## AC650 and AC650V Series

### 220-240 VAC (+10 %) 50 Hz (+5 %) 1phase

| Order Reference | Nominal Power [kW] | Output Current [A] | Frame |
|---|---|---|---|
| 650(V)-21115010-... | 0.25 | 1.5 | 1 |
| 650(V)-21122010-... | 0.37 | 2.2 | 1 |
| 650(V)-21130010-... | 0.55 | 3.0 | 1 |
| 650(V)-21140010-... | 0.75 | 4.0 | 1 |
| 650(V)-21155020-... | 1.1 | 5.5 | 2 |
| 650(V)-21170020-... | 1.5 | 7.0 | 2 |

### 220-240 VAC (+10 %) 50 Hz (+5 %) 1/3 phase

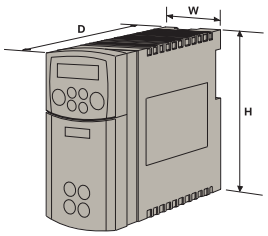
| Order Reference | Nominal Power [kW] | Output Current [A] | Frame |
|---|---|---|---|
| 650(V)-22196030-... | 2.2 | 9.6 | 3 |

### 380-460 VAC (+10 %) 50 Hz (+5 %) 3phase

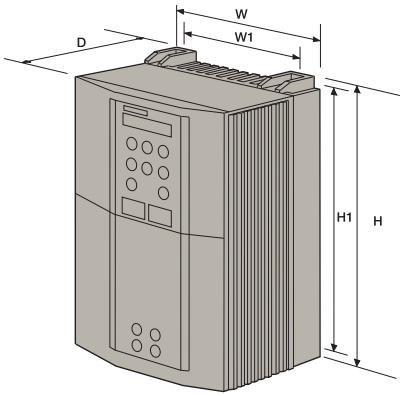
| | Constant Torque | | Variable Torque | | |
|---|---|---|---|---|---|
| Order Reference | Nominal Power [kW] | Output current [A] | Nominal Power [kW] | Output Current [A] | Frame |
| 650(V)-43115020-... | 0.37 | 1.5 | - | - | 2 |
| 650(V)-43120020-... | 0.55 | 2.0 | - | - | 2 |
| 650(V)-43125020-... | 0.75 | 2.5 | - | - | 2 |
| 650(V)-43135020-... | 1.1 | 3.5 | - | - | 2 |
| 650(V)-43145020-... | 1.5 | 4.5 | - | - | 2 |
| 650(V)-43155020-... | 2.2 | 5.5 | - | - | 2 |
| 650(V)-43168030-... | 3.0 | 6.8 | - | - | 3 |
| 650(V)-43190030-... | 4.0 | 9.0 | - | - | 3 |
| 650(V)-43212030-... | 5.5 | 12 | - | - | 3 |
| 650(V)-43216030-... | 7.5 | 16 | - | - | 3 |
| 650V-432160C0-... | 7.5 | 16 | 11 | 23 | C |
| 650V-432230C0-... | 11 | 23 | 15 | 30 | C |
| 650V-432300C0-... | 15 | 30 | 18 | 38 | C |
| 650V-432380D0-... | 18 | 38 | 22 | 45 | D |
| 650V-432450D0-... | 22 | 45 | 30 | 59 | D |
| 650V-432590D0-... | 30 | 59 | 37 | 73 | D |
| 650V-432730E0-... | 37 | 73 | 45 | 87 | E |
| 650V-432870E0-... | 45 | 87 | 55 | 105 | E |
| 650V-433105F1-... | 55 | 105 | 75 | 145 | F |
| 650V-433145F1-... | 75 | 145 | 90 | 165 | F |
| 650V-433180F1-... | 90 | 180 | 110 | 205 | F |

**Note:** **Old reference refers to legacy part references prior to 2009.
See "Selection and Order Code" to complete product reference.
230 VAC 3phase supply also available as an option.

## Dimensions




Frame 1, 2, 3




Frame C, D, E, F

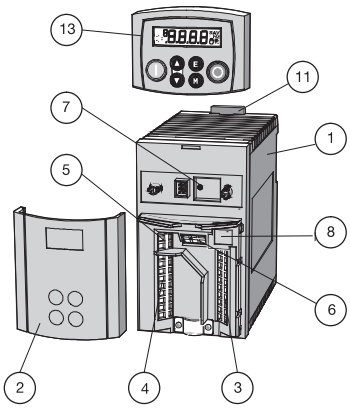
### Dimensions and Weights

| Frame | Overall Dimensions | | | Fixing Centres | | |
|---|---|---|---|---|---|---|
| | Height (H) [mm] | Width (W) [mm] | Depth (D) [mm] | Height (H1) [mm] | Width (W1) [mm] | Weight [kg] |
| 1 | 132 | 73 | 142 | - | - | - |
| 2 | 188 | 73 | 173 | - | - | - |
| 3 | 242 | 96 | 200 | - | - | - |
| C | 348 | 201 | 208 | 335 | 150 | 9.3 |
| D | 453 | 252 | 245 | 440 | 150 | 17.4 |
| E | 669 | 257 | 312 | 630 | 150 | 32.5 |
| F | 720 | 257 | 355 | 700 | 150 | 41.0 |

# Accessories and Options

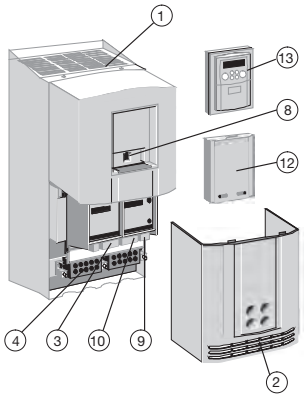
### AC650/AC650V Series AC Drive

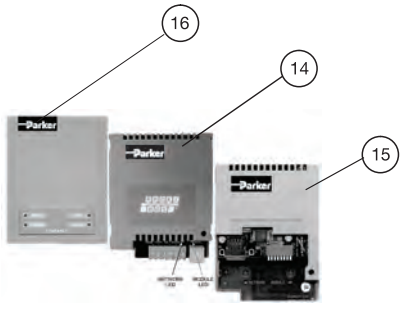
| Options | | Frame | AC650V only | Fitting | Reference |
|---|---|---|---|---|---|
| **AC Inverters** | | | | | |
| 1 | Inverter housing | 1–F | | Standard | See order code |
| 2 | Terminal Cover (simplified wiring diagram) | | | | |
| 3 | Control wiring terminals | | | | |
| 4 | Power wiring terminals | | | | |
| 5 | Volt-free relay contact | | | | |
| 6 | Encoder / Digital Inputs | | √ | | |
| 7 | Power On LED | | | | |
| 8 | RS232 P3 port for remote mounting of operator keypad | | √ | | |
| 9 | RS232 P3 port for programming | C-F | √ | | |
| 10 | RS485 port | | | | |
| 11 | DIN Rail mounting clip | 1-3 | | | |
| 12 | Front cover | C-F | | | |
| **Operator keypad** | | | | | |
| 13 | TTL keypad (local mounting only) | 1-3 | | Standard | 6511-TTL-00 |
| | RS232 keypad (remote mountable) | 1-3 | √ | Option | 6511-RS232-00 |
| | RS232 keypad (remote mountable) | C-F | √ | Standard | 6901-00-G |
| **Communication** | | | | | |
| 14 | Profibus communications card | 1-3 | √ | Factory Option | 6513-PROF-00 |
| | | C-F | √ | | 6523/PROF/00 |
| 15 | RS232/RS485 communication card (Modbus RTU, EI Bisync F1/3) | 1-3 | √ | | 6513-EI00-00 |
| | | C-F | √ | | See order code |
| **Other options** | | | | | |
| 16 | Cloning module for the storage and transfer of up to 10 drive configurations | 1-3 C-F | | Option | 6514-00 |
| **Accessories** | | | | | |
| 17 | Brake resistor | See corresponding section | | | |




Frames 1 - 3 up to 7.5 kW






Frames C - F up to 110 kW

## Operator Keypads

6511-xxxx-00

6901/00

### Product Codes

| Order Code | Description | Suitable for |
|---|---|---|
| **6511-TTL-00** | TTL keypad (local mounting) | All AC650 Series AC Drives Frames 1-3 |
| **6511-RS232-00** | RS232 keypad (remote mountable) | All AC650 Series AC Drives Frames 1-3 |
| **6901-00-G** | RS232 keypad (remote mountable) | All AC650 Series AC Drives Frames 1-3 |

## Communication Interfaces

### RS485 Modbus Interface

#### Description

The RS485/RS232 communications interface provides serial data communication, allowing an AC650V/AC650S drive to connect to a Modbus RTU network as a slave station.

| 6513-E100-00 | RS485 / Modbus communication interface |
|---|---|
| **Supported Protocols** | Modbus RTU or EI-6ASCII |
| **Communication Speed** | 1200 to 115200 bits/s |
| **Station Address** | Selectable via software |
| **Suitable for firmware** | All AC650 Series AC Drives V4.x+ |


## PROFIBUS-DP Interface

#### Description

The PROFIBUS option supports the PROFIBUS-DP PROFIBUS protocol, designed specifically for communication between a PLC system and remote I/O. The PROFIBUS interface enables the drive to connect to a PROFIBUS-DP as a slave station.

| 6513-PROF-00 | PROFIBUS-DP I/O communication interface |
|---|---|
| **Supported Protocols** | PROFIBUS-DP; Demand data and data exchange |
| **Communication Speed** | Up to 12 Mbits/s; selected by the master |
| **Station Address** | Software setting of station address via DSE |
| **Suitable for firmware** | All AC650 Series AC Drives V4.9+ |

## Cloning Module


### Description

The cloning module can be used with the complete range of AC650 series AC drives.
It allows the user to store up to 10 separate drive configurations which can then be transferred between different drives. The configurations can be mapped between different drive sizes. This is an invaluable tool for commissioning or plant maintenance personnel allowing drives to be backed up and reconfigured simply and easily without the need of a computer.

### Product Codes

| Order Code | Description | Suitable for |
|---|---|---|
| **6514-00** | Cloning Module | All AC650 Series Drives |

# Braking Resistors

## for AC Drives

### Description

Brake resistors are used with AC650 Series or AC690 drives equipped with a braking option modules. They are designed to allow the drive to stop a motor at full load during deceleration or an overhauling load.

**Brake resistor selection**
Brake resistor assemblies must be rated to absorb both peak braking power during deceleration and the average power over the complete cycle.

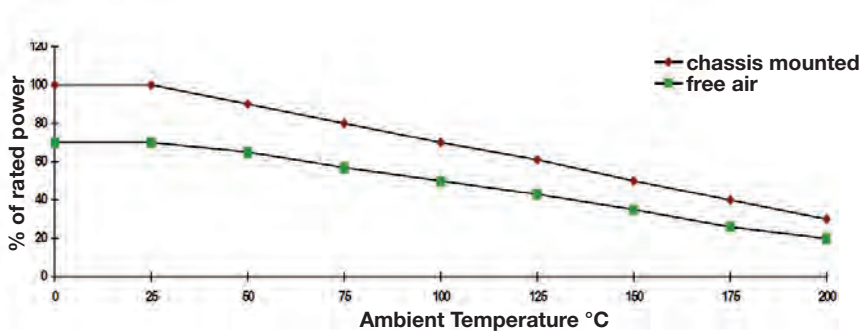
**Resistors above 500 W**
Resistors above 500 W are available upon request:

- IP20 protection up to 3 kW
- IP13 protection between 4.2 and 9.8 kW

$$\text{Peak braking power} = \frac{0.0055J \times (n_1^2 - n_2^2)\ (W)}{tb}$$

$$\text{Average braking power } P_{av} = \frac{P_{pk} \times t_b}{t_c}$$

J - total inertia in $kgm^2$
$n_1$ - initial speed in $min^{-1}$
$n_2$ - final speed $min^{-1}$
$t_b$ - braking time in s
$t_c$ - cycle time in s

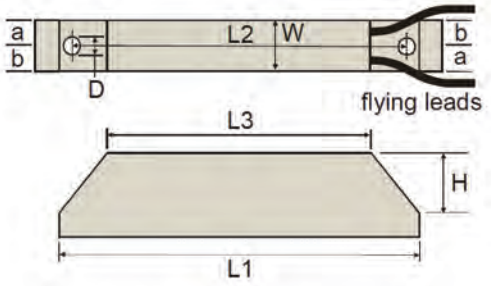



## Dimensions

| Nominal Power [kW] | Dimensions | | |
|---|---|---|---|
| | L [mm] | H [mm] | P [mm] |
| **1.0** | 137 | 450 | 140 |
| **1.6** | 182 | 450 | 140 |
| **2.0** | 182 | 450 | 140 |
| **2.5** | 227 | 450 | 140 |
| **3.0** | 227 | 450 | 140 |
| **4.2** | 450 | 440 | 540 |
| **5.6** | 530 | 440 | 540 |
| **7.0** | 530 | 440 | 540 |
| **8.4** | 610 | 440 | 540 |
| **9.8** | 610 | 440 | 540 |

| Model | Impedance [Ω] | Nom. Power [W] | Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L1 | L2 | L3 | W | H | D | a | b |
| **CZ467715** | 500 | 60 | 100 | 87 | 60 | 22 | 41 | 4.3 | 10 | 12 |
| **CZ467714** | 200 | 100 | 165 | 152 | 125 | 22 | 41 | 4.3 | 10 | 12 |
| **CZ389853** | 100 | 100 | 165 | 152 | 125 | 22 | 41 | 4.3 | 10 | 12 |
| **CZ467717** | 100 | 200 | 165 | 146 | 125 | 30 | 60 | 4.3 | 13 | 17 |
| **CZ463068** | 56 | 200 | 165 | 146 | 125 | 30 | 60 | 4.3 | 13 | 17 |
| **CZ388397** | 56 | 200 | 165 | 146 | 125 | 30 | 60 | 4.3 | 13 | 17 |
| **CZ388396** | 36 | 500 | 335 | 316 | 295 | 30 | 60 | 4.3 | 13 | 17 |
| **CZ467716** | 28x2 | 500 | 335 | 316 | 295 | 30 | 60 | 4.3 | 13 | 17 |

Overload 5 s : 500 %
Overload 3 s : 833 %
Overload 1 s : 2500 %



# EMC Filters

## for AC Drives

### Description

A range of custom designed optional EMC (Electromagnetic Compatibility) filters are available for use with Parker SSD Drives product range.

They are used to help achieve conformance with the EMC directive BS EN 61800-3:2004 - "Adjustable speed electrical power drive systems - Part 3".

Installation of the drive must be in accordance with the installation guidelines in the product manual. The filters comply with the relevant standards as outlined in the following table.

**1st Environment**: Drives directly connected without intermediate transformers to a low voltage (<100 Vrms) supply network that is part of a network that also supplies buildings used for domestic purposes.
**2nd Environment** : Establishments where there is no direct connection to a low voltage supply network that also supplies buildings used for domestic purpose.
**TN Earthing** = Grounded neutral AC supply <460 VAC
**IT Earthing** = Ungrounded neutral AC supply <500 VAC
**Ext. Filter** = External filter
**Ext. Filter FP** = Footprint external filter


Drive mounted on an external footprint filter

| AC Drives | | 2nd Environment (Industrial) | 1st Environment (Domestic) |
|---|---|---|---|
| **650 / 650V** | | | |
| **Frame 1-3** | | Indicated by an F in the product code | Indicated by an F in the product code |
| **650V / 690P** | | | |
| **Frame B** | | Indicated by an F in the product code | Indicated by an F in the product code |
| **Frame C** | | Standard | TN/IT AC Supply Ext. Filter FP C0467842U044 |
| **Frame D** | | Standard | TN/IT AC Supply Ext. Filter FP C0467842U084 |
| **Frame E** | | Standard | TN/IT AC Supply Ext. Filter FP C0467842U105 |
| **Frame F** | | Standard | TN/IT AC Supply Ext. Filter FP C0467842U215 |
| **Frame G/H/J** | **(690PG-1100, 690PG-1320)** | Standard | TN and IT AC Supply Ext. Filter FP C0467842U340 |
| | **(690PG-1600, 690PG-1800, frame H and J)** | Standard | TN and IT Ext. Filter 2 x FP C0467842U340 |

### IP40 mounted: use mounting kits below

| Filter | Mounting Kit |
|---|---|
| **CO467842U020** | BA467840U020 |
| **CO467842U044** | BA467840U044 |
| **CO467842U084** | BA467840U084 |
| **CO467842U105** | BA467840U105 |

### Dimensions

| Filter Reference | Terminal size [mm²] | Earth terminal [mm] | Gland mountings [mm] | Filter dimensions [mm] | Fixing centres [mm] | Weight [kg] |
|---|---|---|---|---|---|---|
| **CO467842U044** | 10 | 5 | 4 x 4 | 400 x 178x 55 | 384 x 150 | 2.1 |
| **CO467842U084** | 25 | 6 | 4 x 4 | 513 x 233 x 70 | 495 x 208 | 4.2 |
| **CO467842U105** | 50 | 8 | 4 x 4 | 698 x 250 x 80 | 680 x 216 | 6.2 |
| **CO467842U215** | 95 | 8 | N/A | 825 x 250 x 115 | 795 x 216 | N/A |

# Three Phase Line Reactors

## for AC Drives

### Description

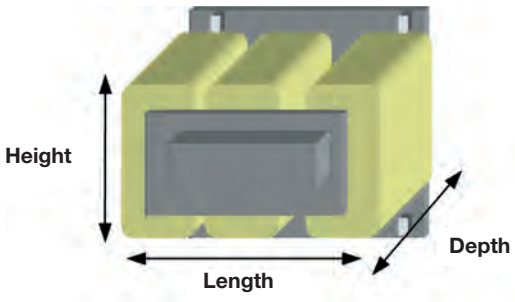
Parker's range of line reactors have been especially selected to match the requirements of the Parker AC drive range and can be used on both the input and output sides of the drive. They are used to reduce the harmonic content of the supply current. A choke fitted in the drive output limits the capacitive current when motor cable runs in excess of 50 m are used. It prevents overcurrent trips and temperature rise of the motor.
As well as helping with compliance with IEEE 519 there are other benefits to using line/load reactors including:

- Increased drive system reliability
- Reduced harmonics / surge currents
- Reduced motor noise and temperature
- Improved true power factor

### Dimensions

| Order Reference | Inductance | In [A] | Height [mm] | Length [mm] | Depth [mm] | Fixing Centres [mm] | Weight (approx.) [kg] |
|---|---|---|---|---|---|---|---|
| **CO389936U401** | 75 µH | 315 | 215 | 330 | 320 | 175 x 225 | 70 |
| **CO389936U402** | 50 µH | 480 | 215 | 330 | 320 | 175 x 225 | 95 |
| **CO466448U040** | 50 µH | 36 | 70 | 155 | 127 | 48 x 140 | 2.5 |
| **CO466448U165** | 50 µH | 148.5 | 115 | 190 | 155 | 93 x 170 | 12 |
| **CO466709U038** | 30 µH | 342 | 370 | 350 | 226 | 240 x 320 | 38 |
| **CO466709U050** | 25 µH | 450 | 431 | 420 | 226 | 290 x 381 | 53 |
| **CO466709U073** | 20 µH | 653 | 431 | 420 | 226 | 290 x 381 | 60 |
| **CO466709U083** | 15 µH | 747 | 431 | 420 | 226 | 290 x 381 | 69 |
| **CO468314U650** | 5 µH | 650 | 30 | 300 | 325* | 100 x 250 | 35 |
| **CO468325U006** | 1.749 mH | 12.7 | 83 | 157 | 160* | 60 x 80 | 6 |
| **CO468325U037** | 0.416 mH | 54 | 110 | 240 | 250* | 80 x 200 | 13 |
| **CO468325U110** | 0.137 mH | 165 | 140 | 300 | 310* | 110 x 240 | 30 |
| **CO468326U006** | 2.917 mH | 12.8 | 170 | 240 | 260* | 80 x 140 | 17 |
| **CO468326U037** | 0.693 mH | 54 | 240 | 360 | 380* | 120 x 200 | 50 |
| **CO468326U110** | 0.227 mH | 165 | 320 | 390 | 490* | 280 x 260 | 130 |
| **CO468325U055** | 0.282 mH | 79 | 130 | 240 | 250* | 100 x 200 | 19 |
| **CO466448U015** | 50 µH | 13.5 | 60 | 80 | 67 | 64 x 40 | 1 |
| **CO466448U110** | 50 µH | 100 | 100 | 190 | 155 | 170 x 75 | 7.5 |
| **CO468326U006** | 2.917 mH | 12.8 | 170 | 240 | 260 | 80 x 140 | 17 |
| **CO466448U070** | 50 µH | 63 | 85 | 155 | 127 | 140 x 63 | 4.5 |
| **CO466250U012** | 15 µH | 1080 | 400 | 420 | 450 | 300 x 140 | 170 |

* Include Earth Stud

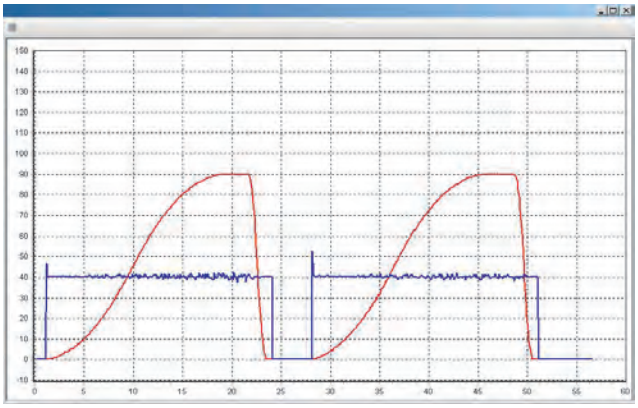


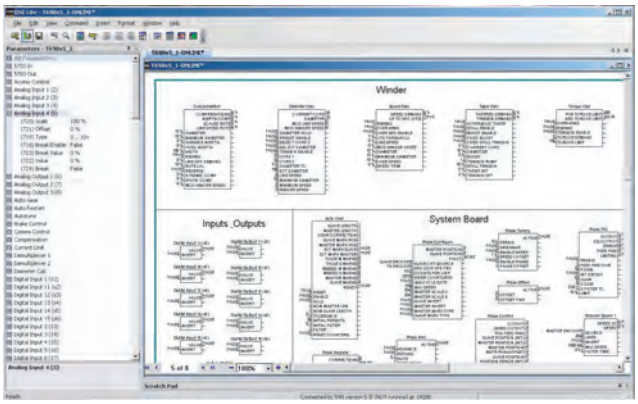
## Accessories for all AC Drives

### Drive System Explorer Lite (DSE Lite) Software

### Description

DSE Lite software is an easy to use configuration, commissioning and monitoring tool with graphical interface for the Parker SSD Drives range of AC and DC drives.
While the drive is in running mode the oscilloscope function allows "on-line" monitoring of selected parameters and the recording of trends.
DSE Lite, allows the user to create, parameterize and configure user defined applications thanks to function blocks dedicated to speed control, Winder, PID, Diameter calculator, Shaftless...
DSE Lite is downloadable from our website.
www.parker.com





# Order Code

## AC650 Series

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Order example | **650** | **21** | **11501** | **0** | **0** | **0** | **0** | **P** | **00** | **A** | **0** |

### 1 Product family

| | |
|---|---|
| **650** | AC650 AC Drive - V/F |

### 2 Supply voltage

| | |
|---|---|
| **21** | 230 VAC 1phase |
| **22** | 230 VAC 1/3phase |
| **23** | 230 VAC 3phase |
| **43** | 400/460 VAC 3phase |

### 3 Power/Current Rating

| 230 VAC 1-phase | kW | Output current [A] | HP | Frame |
|---|---|---|---|---|
| **11501** | 0.25 | 1.5 | 0.3 | 1 |
| **12201** | 0.37 | 2.2 | 0.5 | 1 |
| **13001** | 0.55 | 3 | 0.75 | 1 |
| **14001** | 0.75 | 4 | 1 | 1 |
| **15502** | 1.1 | 5.5 | 1.5 | 2 |
| **17002** | 1.5 | 7 | 2 | 2 |
| **230 VAC 1/3-phase** | **kW** | **Output current [A]** | **HP** | **Frame** |
| **19603** | 2.2 | 9.6 | 3 | 3 |
| **230 VAC 3-phase** | **kW** | **Output current [A]** | **HP** | **Frame** |
| **21233** | 3 | 12.3 | 4 | 3 |
| **21643** | 4 | 16.4 | 5 | 3 |
| **400/460 VAC 3-phase** | **kW** | **Output current [A]** | **HP** | **Frame** |
| **11502** | 0.37 | 1.5 | 0.5 | 2 |
| **12002** | 0.55 | 2 | 0.75 | 2 |
| **12502** | 0.75 | 2.5 | 1 | 2 |
| **13502** | 1.1 | 3.5 | 1.5 | 2 |
| **14502** | 1.5 | 4.5 | 2 | 2 |
| **15502** | 2.2 | 5.5 | 3 | 2 |
| **16803** | 3 | 6.8 | 4 | 3 |
| **19003** | 4 | 9 | 5 | 3 |
| **21203** | 5.5 | 12 | 7.5 | 3 |
| **21603** | 7.5 | 16 | 10 | 3 |

### 4 Auxiliary supply

| | |
|---|---|
| **0** | Not required |

### 5 Brake switch

| | |
|---|---|
| **0** | Not fitted (not available on frames 1-2 230 VAC products) |
| **B** | Brake switch fitted (must be fitted on frame 2 400/460 V, and all frame 3 products) |

### 6 Filter

| | |
|---|---|
| **0** | Not fitted |
| **F** | Filter fitted |

### 7 Communications

| | |
|---|---|
| **0** | No communications port |
| **1** | RS232 port fitted (must be selected if remote mounting of keypad required) |

### 8 Mounting

| | |
|---|---|
| **P** | Panel mounting |

### 9 Special option

| | |
|---|---|
| **00** | None |
| | Documented special options (01-99) (Refer to local sales office) |

### 10 Language

| | |
|---|---|
| **A** | English (50 Hz) |
| **B** | English (60 Hz) |
| **D** | German |
| **E** | Spanish |
| **F** | French |
| **I** | Italian |
| **S** | Swedish |

### 11 Keypad

| | |
|---|---|
| **0** | None |
| **1** | 6511 TTL fitted (local mounting only) |
| **2** | 6511 RS232 fitted (local or remote mounting - RS232 port must be selected for remote mounting) |

## AC650V Series High Performance AC Drive - 230 VAC

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Order example | **650V** | **21** | **11501** | **0** | **0** | **0** | **0** | **P** | **00** | **A** | **0** |

### 1 Product family

| | |
|---|---|
| **650V** | AC650V AC Drive - Sensorless Flux Vector Control |

### 2 Supply voltage

| | |
|---|---|
| **21** | 230 VAC 1phase |
| **22** | 230 VAC 1 or 3phase |
| **23** | 230 VAC 3phase |

### 3 Power/Current Rating

| 230 VAC 1-phase | Constant Torque kW/A | Constant Torque HP/A | Variable Torque kW/A | Variable Torque HP/A | Frame |
|---|---|---|---|---|---|
| **11501** | 0.25/1.5 | 0.3/1.5 | - | - | 1 |
| **12201** | 0.37/2.2 | 0.5/2.2 | - | - | 1 |
| **13001** | 0.55/3.0 | 0.75/3.0 | - | - | 1 |
| **14001** | 0.75/4.0 | 1.0/4.0 | - | - | 1 |
| **15502** | 1.1/5.5 | 1.5/5.5 | - | - | 2 |
| **17002** | 1.5/7.0 | 2.0/7.0 | - | - | 2 |
| **230 VAC 1/3-phase** | **Constant Torque** kW/A | **Constant Torque** HP/A | **Variable Torque** kW/A | **Variable Torque** HP/A | **Frame** |
| **19603** | 2.2/9.6 | 3.0/9.6 | - | - | 3 |
| **230 VAC 3-phase** | **Constant Torque** kW/A | **Constant Torque** HP/A | **Variable Torque** kW/A | **Variable Torque** HP/A | **Frame** |
| **21233** | 3.0/12.3 | 4/12.3 | - | - | 3 |
| **21643** | 4.0/16.4 | 5/16.4 | - | - | 3 |
| **2220C** | 5.5/22 | 7.5/22 | 7.5/28 | 10/28 | C |
| **2280C** | 7.5/28 | 10/28 | 11/42 | 15/42 | C |
| **2420D** | 11/42 | 15/42 | 15/54 | 20/54 | D |
| **2540D** | 15/54 | 20/54 | 18.5/68 | 25/68 | D |
| **2680D** | 18.5/68 | 25/68 | 18.5/68 | 25/68 | D |
| **2800E** | 22/80 | 30/80 | 30/104 | 40/104 | E |
| **3104F** | 30/104 | 40/104 | 37/130 | 50/130 | F |
| **3130F** | 37/130 | 50/130 | 45/154 | 60/154 | F |
| **3154F** | 45/154 | 60/154 | 55/192 | 75/192 | F |

### 4 Auxiliary supply

| | |
|---|---|
| **0** | Not required (not available on frames 1-3 & frames C-E) |
| **1** | 115 VAC 1ph (frame F only) |
| **2** | 230 VAC 1ph (frame F only) |

### 5 Brake switch

| | |
|---|---|
| **0** | Not fitted (not available on frames 1-2 230 VAC products) |
| **B** | Brake switch fitted (must be fitted on frame 2 400/460 VAC, and all frame 3 products) |

### 6 Filter

| | |
|---|---|
| **0** | Not fitted |
| **F** | Filter fitted |

### 7 Communications

| | |
|---|---|
| **1** | RS232 port fitted |
| **2** | RS232 & RS485 port fitted (frame C-F only) |

### 8 Mounting

| | |
|---|---|
| **P** | Panel mounting (standard fitting) |
| **W** | Wall mount (option on frames C-F only) |
| **T** | Through panel mount (option on frames C-E only) |

### 9 Special option

| | |
|---|---|
| **00** | None |
| | Documented special options (01-99) (Refer to local sales office) |

### 10 Language

| | |
|---|---|
| **A** | English (50 Hz) |
| **B** | English (60 Hz) |
| **D** | German |
| **E** | Spanish |
| **F** | French |
| **I** | Italian |
| **S** | Swedish |

### 11 Keypad

| | |
|---|---|
| **0** | None |
| **1** | 6511 TTL fitted (option on frames 1-3 only, local mounting only) |
| **2** | 6511 RS232 fitted (option on frames 1-3 only, local or remote mounting) |
| **3** | 6521 RS232 fitted (option on frames C-F only, local or remote mounting) |

## AC650V Series High Performance AC Drive - 400 VAC

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Order example | **650V** | **43** | **11501** | **0** | **B** | **0** | **1** | **P** | **00** | **A** | **0** |

### 1 Product family

| | |
|---|---|
| **650V** | AC650V AC Drive - Sensorless Flux Vector Control |

### 2 Supply voltage

| | |
|---|---|
| **43** | 400/460 VAC 3phase |

### 3 Power/Current Rating

| | Constant Torque | | Variable Torque | | |
|---|---|---|---|---|---|
| | kW/A 400 VAC | HP/A 460 VAC | kW/A 400 VAC | HP/A 460 VAC | **Frame** |
| **11502** | 0.37/1.5 | 0.5/1.5 | - | - | 2 |
| **12002** | 0.55/2.0 | 0.75/2.0 | - | - | 2 |
| **12502** | 0.75/2.5 | 1.0/2.5 | - | - | 2 |
| **13502** | 1.1/3.5 | 1.5/3.5 | - | - | 2 |
| **14502** | 1.5/4.5 | 2.0/4.5 | - | - | 2 |
| **15502** | 2.2/5.5 | 3.0/5.5 | - | - | 2 |
| **16803** | 3.0/6.8 | 4.0/6.8 | - | - | 3 |
| **19003** | 4.0/9.0 | 5.0/9.0 | - | - | 3 |
| **21203** | 5.5/12 | 7.5/12 | - | - | 3 |
| **21603** | 7.5/16 | 10/16 | - | - | 3 |
| **2160C** | 7.5/16 | 10/14 | 11/23 | 15/21 | C |
| **2230C** | 11/23 | 15/21 | 15/30 | 20/27 | C |
| **2300C** | 15/30 | 20/27 | 18.5/37 | 25/34 | C |
| **2310D** | 15/31 | 20/31 | 18.5/38 | 25/38 | D |
| **2380D** | 18.5/38 | 25/38 | 22/45 | 30/45 | D |
| **2450D** | 22/45 | 30/45 | 30/59 | 40/52 | D |
| **2590D** | 30/59 | 40/52 | 37/73 | 50/65 | D |
| **2590E** | 30/59 | 40/59 | 37/73 | 50/73 | E |
| **2730E** | 37/73 | 50/73 | 45/87 | 60/87 | E |
| **2870E** | 45/87 | 60/87 | 55/105 | 75/105 | E |
| **3105F** | 55/105 | 75/100 | 75/145 | 100/125 | F |
| **3145F** | 75/145 | 100/130 | 90/165 | 125/156 | F |
| **3180F** | 90/180 | 150/180 | 110/205 | 150/205 | F |

### 4 Auxiliary supply

| | |
|---|---|
| **0** | Not required (not available on frames 1-3 & frames C-E) |
| **1** | 115 VAC 1ph (frame F only) |
| **2** | 230 VAC 1ph (frame F only) |

### 5 Brake switch

| | |
|---|---|
| **0** | Not fitted |
| **B** | Brake switch fitted (must be fitted on frame 2 400/460 VAC, and all frame 3 products) |

### 6 Filter

| | |
|---|---|
| **0** | Not fitted (option on frames 1-3 and must be selected for frames C-F) |
| **F** | Filter fitted (option on frame 1-3 only) |

### 7 Communications

| | |
|---|---|
| **1** | RS232 port fitted |
| **2** | RS232 & RS485 port fitted (frame C-F only) |

### 8 Mounting

| | |
|---|---|
| **P** | Panel mounting (standard fitting) |
| **W** | Wall mount (option on frames C-E only) |
| **T** | Through panel mount (option on frames C-E only) |

### 9 Special option

| | |
|---|---|
| **00** | None |
| | Documented special options (01-99) (Refer to local sales office) |

### 10 Language

| | |
|---|---|
| **A** | English (50 Hz) |
| **B** | English (60 Hz) |
| **D** | German |
| **E** | Spanish |
| **F** | French |
| **I** | Italian |
| **S** | Swedish |

### 11 Keypad

| | |
|---|---|
| **0** | None |
| **1** | 6511 TTL fitted (option on frames 1-3 only, local mounting only) |
| **2** | 6511 RS232 fitted (option on frames 1-3 only, local or remote mounting) |
| **3** | 6521 RS232 fitted (option on frames C-F only, local or remote mounting) |

# 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

Aftermarket services
Commercial transports
Engines
General & business aviation
Helicopters
Launch vehicles
Military aircraft
Missiles
Power generation
Regional transports
Unmanned aerial vehicles

### Key Products

Control systems & actuation products
Engine systems & components
Fluid conveyance systems & components
Fluid metering, delivery & atomization devices
Fuel systems & components
Fuel tank inerting systems
Hydraulic systems & components
Thermal management
Wheels & brakes

## Climate Control

### Key Markets

Agriculture
Air conditioning
Construction Machinery
Food & beverage
Industrial machinery
Life sciences
Oil & gas
Precision cooling
Process
Refrigeration
Transportation

### Key Products

Accumulators
Advanced actuators
$CO_2$ controls
Electronic controllers
Filter driers
Hand shut-off valves
Heat exchangers
Hose & fittings
Pressure regulating valves
Refrigerant distributors
Safety relief valves
Smart pumps
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

Aerospace
Food & beverage
Industrial plant & equipment
Life sciences
Marine
Mobile equipment
Oil & gas
Power generation & renewable energy
Process
Transportation
Water Purification

### Key Products

Analytical gas generators
Compressed air filters & dryers
Engine air, coolant, fuel & oil filtration systems
Fluid condition monitoring systems
Hydraulic & lubrication filters
Hydrogen, nitrogen & zero air generators
Instrumentation filters
Membrane & fiber filters
Microfiltration
Sterile air filtration
Water desalination & purification filters & systems

## Fluid & Gas Handling

### Key Markets

Aerial lift
Agriculture
Bulk chemical handling
Construction machinery
Food & beverage
Fuel & gas delivery
Industrial machinery
Life sciences
Marine
Mining
Mobile
Oil & gas
Renewable energy
Transportation

### Key Products

Check valves
Connectors for low pressure fluid conveyance
Deep sea umbilicals
Diagnostic equipment
Hose couplings
Industrial hose
Mooring systems & power cables
PTFE hose & tubing
Quick couplings
Rubber & thermoplastic hose
Tube fittings & adapters
Tubing & plastic fittings

## Hydraulics

### Key Markets

Aerial lift
Agriculture
Alternative energy
Construction machinery
Forestry
Industrial machinery
Machine tools
Marine
Material handling
Mining
Oil & gas
Power generation
Refuse vehicles
Renewable energy
Truck hydraulics
Turf equipment

### Key Products

Accumulators
Cartridge valves
Electrohydraulic actuators
Human machine interfaces
Hybrid drives
Hydraulic cylinders
Hydraulic motors & pumps
Hydraulic systems
Hydraulic valves & controls
Hydrostatic steering
Integrated hydraulic circuits
Power take-offs
Power units
Rotary actuators
Sensors

## 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

Alternative fuels
Biopharmaceuticals
Chemical & refining
Food & beverage
Marine & shipbuilding
Medical & dental
Microelectronics
Nuclear Power
Offshore oil exploration
Oil & gas
Pharmaceuticals
Power generation
Pulp & paper
Steel
Water/wastewater

### Key Products

Analytical Instruments
Analytical sample conditioning products & systems
Chemical injection fittings & valves
Fluoropolymer chemical delivery fittings, valves & pumps
High purity gas delivery fittings, valves, regulators & digital flow controllers
Industrial mass flow meters/ controllers
Permanent no-weld tube fittings
Precision industrial regulators & flow controllers
Process control double block & bleeds
Process control fittings, valves, regulators & manifold valves

## Sealing & Shielding

### Key Markets

Aerospace
Chemical processing
Consumer
Fluid power
General industrial
Information technology
Life sciences
Microelectronics
Military
Oil & gas
Power generation
Renewable energy
Telecommunications
Transportation

### Key Products

Dynamic seals
Elastomeric o-rings
Electro-medical instrument design & assembly
EMI shielding
Extruded & precision-cut, fabricated elastomeric seals
High temperature metal seals
Homogeneous & inserted elastomeric shapes
Medical device fabrication & assembly
Metal & plastic retained composite seals
Shielded optical windows
Silicone tubing & extrusions
Thermal management
Vibration dampening

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