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


# Compax3 Series

## Intelligent Servo Drive

Parker

ENGINEERING YOUR SUCCESS.

***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.**

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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.

**Manufacturing to Meet Our Customers' Needs**

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

Offenburg, Germany

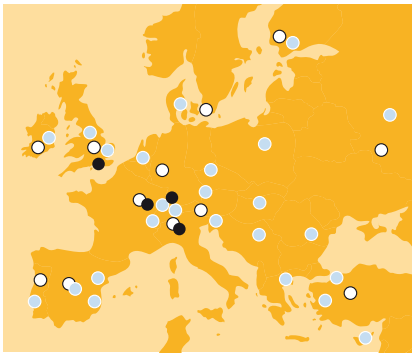
**Local Manufacturing and Support in Europe**

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

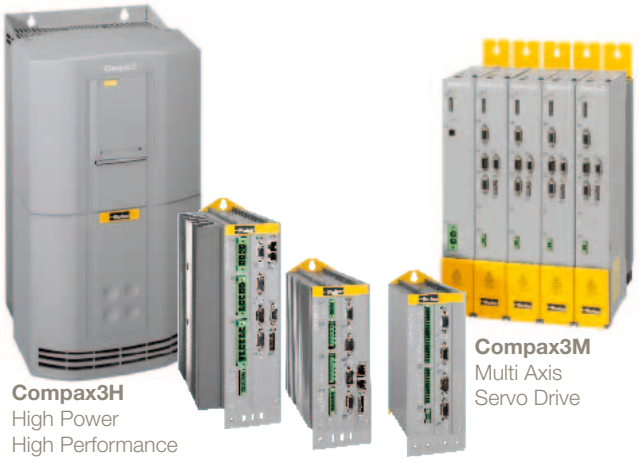

Dijon, France

# Intelligent Servo Drive Compax3

## Overview

### Description

Compax3 is Parker Hannifin's global servo drive. The drive series includes single and multi axis drives as well as hydraulic controllers. It features a power range from 1 to 110 kVA.
The servo drives are completely developed and manufactured in Germany. An additional Compax3 production site was established in the US. As a global servo drive controller, Compax3 is of course available all over the world. Service and support sites are located in the vicinity of all major industry locations - worldwide. The “Parker Authorised Distribution Partners” do play an important role in this context - well-trained and experienced application and support specialists will provide the necessary professional support in any situation.



**Compax3H**
High Power
High Performance
Servo Drive

**Compax3S**
High Performance
Servo Drive

**Compax3F**
High Performance
Hydraulics
Controller

**Compax3M**
Multi Axis
Servo Drive

### Features

#### Hardware

- Power range from 1 to 110 kW
- 1 encoder output / 1 encoder input
- 8 digital inputs /4 digital outputs
- 2 analog inputs (14 Bit)
- 2 analog outputs (8 Bit)
- Multiple fieldbus options
- Extensive safety technology

#### Technology Functions

- I10T10: Drive control via: velocity/torque control, step/direction input, encoder input
- I12T11: Positioning via digital I/Os, RS232/ RS485, absolute/incremental positioning, registration mark related positioning, electronic gearbox, dynamic positioning
- T30: Programming based on IEC61131-3 with CoDeSys
  - PLCOpen function modules
  - IEC61131-3 - standard modules
  - C3-specific function modules
- T40: T30 functionality + cam function
- Technology controller with integrated Motion PLC
  Compax3 powerPLmC-C20

### Technical Characteristics - Overview

| Device: | Current [A] | | Supply voltage | Power [kVA] |
|---|---|---|---|---|
| Compax3 | $I_{cont.}$ | $I_{peak}$ (<5 s) | | |
| S025V2 | 2.5 | 5.5 | 1 * 230/240 VAC | 1.0 |
| S063V2 | 6.3 | 12.6 | | 2.5 |
| S100V2 | 10 | 20 | 3 * 230/240 VAC | 4.0 |
| S150V2 | 15 | 30 | | 6.0 |
| S015V4 | 1.5 | 4.5 | 3 * 400/480 VAC | 1.25 |
| S038V4 | 3.8 | 9.0 | | 3.1 |
| S075V4 | 7.5 | 15 | | 6.2 |
| S150V4 | 15 | 30 | | 11.5 |
| S300V4 (1) | 30 | 60 | | 25.0 |
| | | | | |
| H050V4 | 50 | 75 | 3 * 400/480 VAC | 35.0 |
| H090V4 | 90 | 135 | | 70.0 |
| H125V4 | 125 | 187.5 | | 91.0 |
| H155V4 | 155 | 232.5 | | 109.0 |

(1) Operation with condenser module C4.

| Device: | Current [A] | | DC bus voltage |
|---|---|---|---|
| Compax3 | $I_{cont.}$ | $I_{peak}$ (<5 s) | |
| M050D6 | 5 | 10 | 325 ... 679 VDC (Rated voltage 560 VDC) |
| M100D6 | 10 | 20 | |
| M150D6 | 15 | 30 | |
| M300D6 | 30 | 60 | |

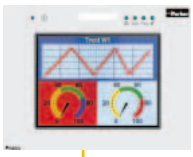
# System Layout

**Ethernet**

Motion control
**Compax3** powerPLmC-**C20**

Motion control
**C3** powerPLmC-**E30**

POP



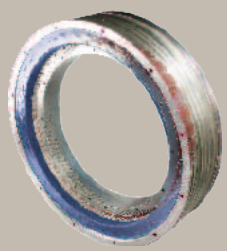
**Communication channel**

PIO

**Compax3S**
High Performance
Servo Drive

**Compax3M**
Multi Axis
Servo Drive

Synchronous Servo Motors

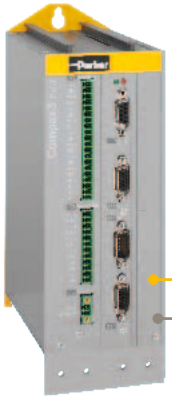


Direct drives

Handling Actuators

PIO

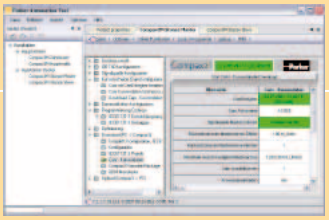
**Compax3H**
High Power
High Performance
Servo Drive



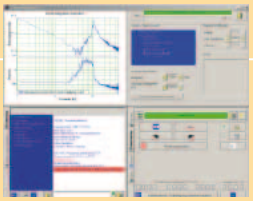
**Compax3F**
High Performance
Hydraulics
Controller

**Parker Automation Tools**

IEC 61131-3
PLCopen
Data handling
Visualization
Communication (Process Control)
Access to all components
Project management

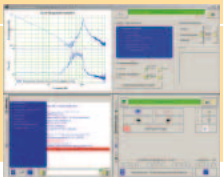


Communication
Multi-axis tool
C3 ServoManager
Drive Interface



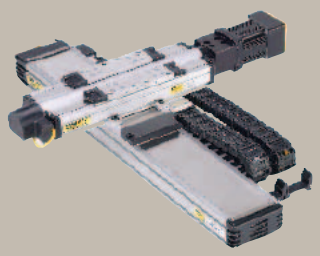
IEC 61131-3
PLCopen
CamDesigner
Optimization
Setup
Diagnosis / Analysis / Maintenance
Oscilloscope

MotorManager
Motor library
HydraulicsManager
Valve library



Dimensioning
Tool

PC Software



Precision Actuators

Hydraulics Components

# Innovative, Flexible Device Technology

The development of Compax3 was focused on maximum openness and flexibility for a wide variety of applications.

## Motors / Actuators

Today, motors and actuators are available in many different versions and technologies. The Compax3 servo drives support most common motors. Among these are:

- Sine commutated synchronous and asynchronous motors
- Direct drives
  - Torque motors
  - Linear servo motors
  - Voice coil motors

## Feedback Systems

In this context, the Compax3 servo drives support the following feedback systems:

- Resolver
- Sine - Cosine Feedback (Single or Multiturn)
  - Hiperface interface
    Optical and capacitive sensors
  - EnDat Interface
- Analog and digital Hall sensors
- Rotary and Linear Encoders
  - Distance coded
  - Incremental and RS422
  - EnDat Interface

## Control Technology

The drive controller's control technology with automatic load identification / self control, and additional observer functionality optimizes control under all conditions.

## Communication

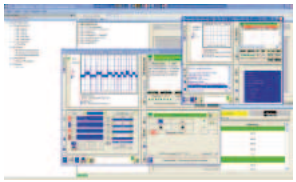
The support of all common Fieldbus interfaces is an essential feature of open systems. Among these are Profibus, CANopen, DeviceNet as well as the modern Ethernet based interfaces such as EtherCAT, PROFINET and Powerlink interfaces. The open OPC communication standard simplifies system integration considerably.
For dynamic, multi axis synchronized applications, a real-time drive bus is available for all drives from the Compax3 family.

## Software / Tools

Simple and efficient use of a modern and complex automation component offering high functionality such as Compax3 is guaranteed by an intuitively operable software tool, The specially designed "Parker Integrated Engineering Tool". Integral components of this software package are:

- Multi axis system management
- ServoManager
- MotorManager
- ActuatorManager
- HydraulicsManager
- CamDesigner
- IEC 61131-3 / CoDeSys – programming environment
- IEC 61131-3 – Debugger

This software tool supports the user in the configuration, the setup and optimization, the programming as well as the maintenance of all Compax3 devices (see page 27).

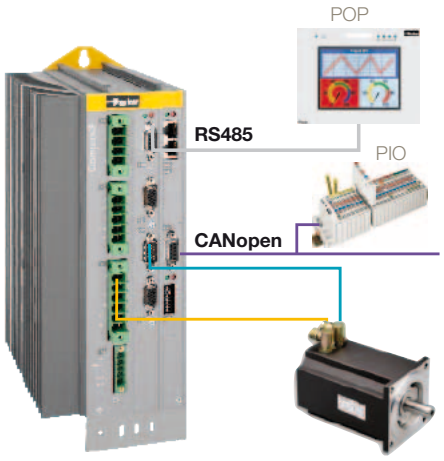


## System Solutions

The Compax3 series servo drives represent an important component for the design of complete automation systems. The user can chose between additional components optimally suited for the use with Compax3.
Among those are:

- Operating and observing - Pop operator panels for all graphics and text applications
- Service and maintenance - BDM plug-in module
  - Change of parameters
  - Manual mode
  - Device exchange without PC
- PIO -Extension modules for the field level - external devices for digital and analog signal acquisition and control

**Compax3 I21T30 or I21T40**




## Electromechanical system solutions

Electromechanical system solutions play a special role today. Parker Hannifin is not only the manufacturer of modern drive and control technology, but also of:

- Handling technology
- Precision Mechanics

As a special service we offer our customers complete, ready-to-mount Electromechanical solutions, especially developed and manufactured for special industries or individual customers. In many cases, this reduces the development overhead on the user side considerably.
Thousands of systems installed prove Parker Hannifin's as well as their partner's - the "Parker Automation Technology Centers" - high competence and long experience.
Prefabricated integrated technology functions support the user's tasks. Furthermore, you can extend these functions by your own know-how at any time.

## Quality

Our customer systems must meet the highest demands with respect to resilience. Compax3 by Parker Hannifin exceeds by far the high quality requirements for an automation component. Not only the quality characteristics but also our customers speak volumes.

## Safety

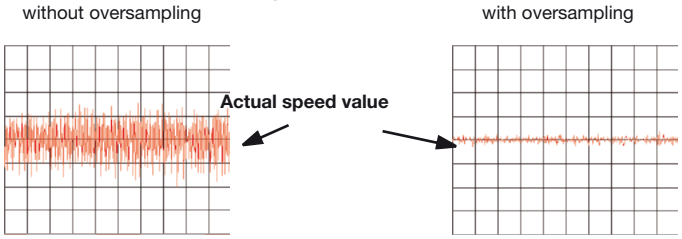
With many applications in harsh and arduous environments such as presses and robot cells, Parker ensures that product and system reliability and quality are second to none. Drive integrated systems as implemented in Compax3 support the machine designer in realizing safe and cost-efficient solutions.

# Control Technology

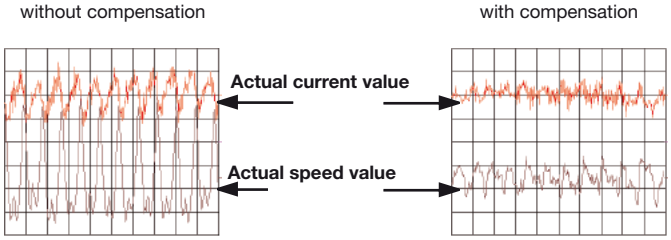
## Real-time signal processing

- Reduction of the quantization noise
- Increase of the signal resolution
  - Due to oversampling of the speed and current signals
- Online feedback error compensation of offset and gain errors
- 14 Bit resolution increase
  (Increase of the resolution of the scale graduation of up to 14 Bit)
  - By interpolation of sine-cosine feedback signals
- Determination of the speed by the observer technique
- Doubling of the controller bandwidth
  - By load torque observer principle

**Signal resolution**

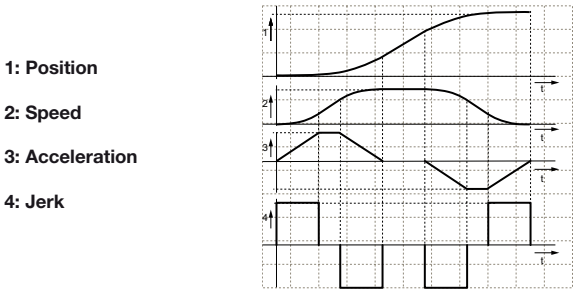



**Online feedback error compensation**




## Jerk-limited setpoint generation, resulting in:

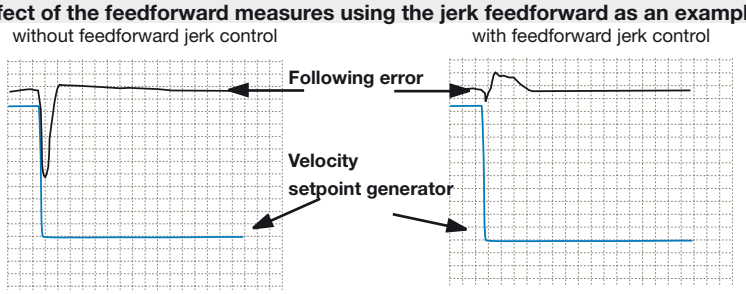
- Gentle handling of the moved goods
- Increased service life of mechanical components
- Overshoot free positioning
- Reduced excitation for mechanical resonance frequencies




## Control:

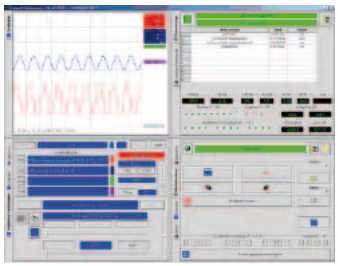
- Controller in the feedback path helps avoid differentiating components in the numerator of the transmission function (which will result in a significant overshoot of the actual value)
- Automatic and robust controller design
  - User-oriented optimization parameters "damping" and "stiffness"
- Optimization of the response behavior
- Minimization of the following error
  - Due to feedforward of speed, acceleration, motor current and jerk
- Dual Loop Option
  - The load control can be activated via an additional feedback system for the acquisition of the actual position of the load.

**Effect of the feedforward measures using the jerk feedforward as an example**




## Commissioning / controller optimization

- Automatic determination of the load moment of inertia
- Compax3 MotorManager for determining the motor characteristics and the motor position feedback
- Optimization with integrated oscilloscope function



## Safety Technology

The Compax3M and Compax3S drive controllers support the "safe torque off" (STO) safety function in the sense of the "Safe Stop", with protection against unexpected startup according to the requirements EN ISO 13849-1 Category 3, EN ISO 13849-1 PL=d/e (Compax3S), PL=e (Compax3M) and EN 1037.
Together with the external safety control device, the "safe stop 1" (SS1) safety function according to the requirements of EN ISO 13849-1 category 3 can be used.
Switching off the motor torque must be effected by the machine controller. According to a risk analysis which must be carried out according to the machine standard 89/392/EWG or EN 292; EN 954, EN ISO 13849-1 and EN 1050, the machine manufacturer must project the safety system for the entire machine including all integrated components. This does also include the electrical drives.

### Compax3 with “Safe Torque Off” - STO

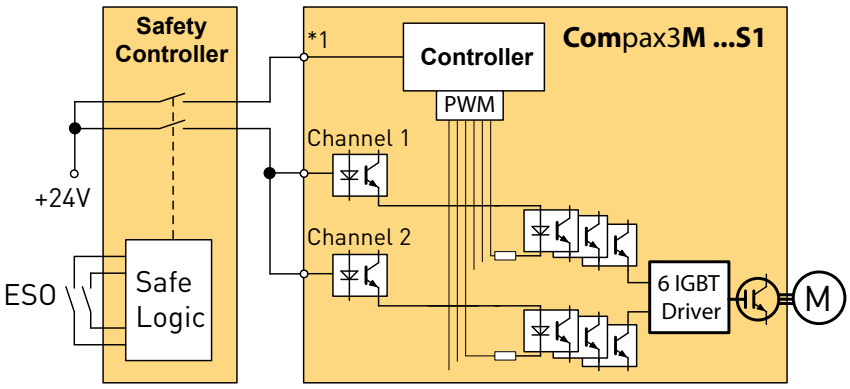
The STO safety function or The “safe torque off” safety function was differently implemented for the Compax3S and Compax3M families. In the Compax3S, the feedback paths of the 2 channel switch-off must be integrated into the external connection for monitoring. For the Compax3M, a protocol describing the orderly function of the safety function must be established upon setup and after defined maintenance intervals. The safety function in the Compax3M was implemented entirely without wear-prone relay technology.
The Compax3H does not feature any safety function.

### Safety functions with Compax3M

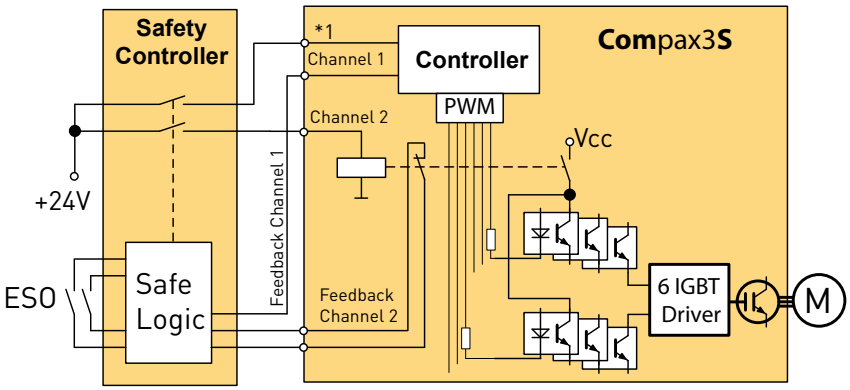
- SS1 - Safe Stop 1
- SS2 - Safe Stop 2
- SOS - safe operating stop
- SLS – Safely Limited Speed
- SLP - Safely Limited Position
- SLI – Safely Limited Increment
- SDI – Safe Direction
- SSM - Safe Speed Monitor (Diagnostics output for SLS)

The safety functions correspond to the standard in accordance with EN13849-1 PL=e.

### STO function on the Compax3M




### STO function on the Compax3S




ESO = Emergency switch off
*1 Deceleration Input

# Device Technologies

## Compax3 I10T10: Step/Direction and Analogue Command Input

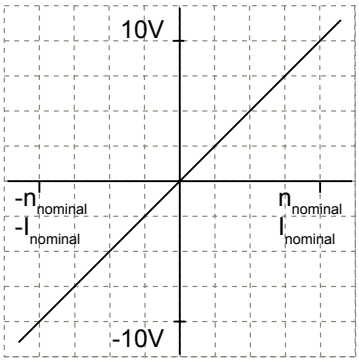
### I10T10 Scope of Functions

With its analogue interface or alternatively with step/direction or encoder step signals, the Compax3 I10T10 gives you easy and reasonably priced access to the world of servo-drive technology. Irrelevant of whether you have a PLC or PC central control unit, this remains unchanged.
The Compax3 I10T10 represents an ideal way of migrating from analog ±10 V drives to digital, intelligent servo-drives.

**You can choose between the different operating modes:**

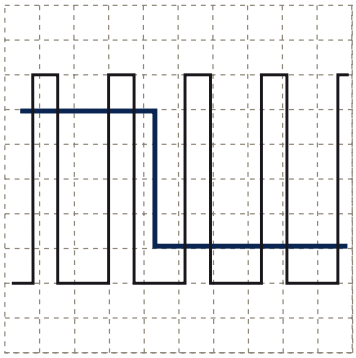
**±10 V Input**

- ±10 V predefined speed with encoder simulation as actual value feedback.
- ±10 V predefined current setpoint with encoder emulation for actual position value feedback and configurable holding functions



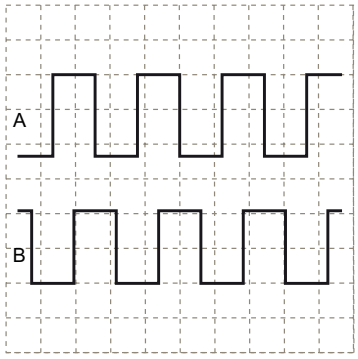

**Step/Direction Command Input**

- Step/direction signals as 24 V logic levels or
- With step/direction logic signals conforming to RS422



**Encoder Input**

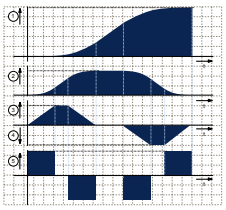
- RS422
- 24 V level



## Compax3 T11: Positioning

### T11 Scope of Functions

Due to its high functionality, the Positioning version of Compax3 forms an ideal basis for many applications in high-performance motion automation.

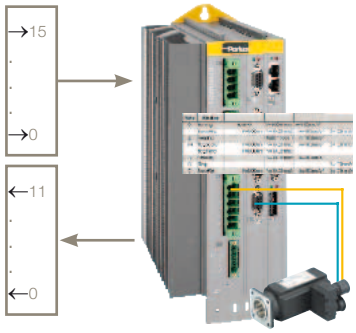


- Up to 31 motion profiles can be created with the help of the PC software:
  - Absolute or relative positioning
  - Electronic Gearbox (Gearing)
  - Reg-related positioning
  - Speed control
  - Stop - Set
- Dynamic positioning
- Movement profiles in non-volatile flash
- Motion profiles can be selected via field bus or digital inputs/outputs
- Wide choice of machine zero modes for your individual application
- Detection of the absolute position by distance-coded feedback
- Simple commissioning
  - Guided configuration with the Compax3 ServoManager
  - Flexible Optimization
- Adjustable jerk limitation
- Optional extension of the digital I/Os

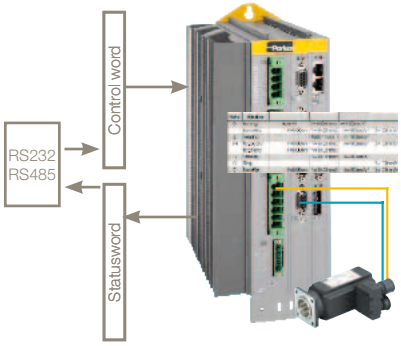
### Compax3 I12T11 / Motion Control:

- Via digital I/Os
- Via RS232 / RS485 with the aid of control & status word
- Up to 31 motion functions via set table
- Status bits for each motion set

**Access via Compax3 inputs and outputs:**




**Access via RS232 / RS485:**

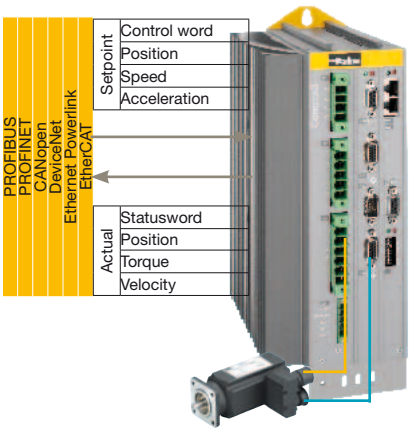



### Compax3 I2xT11 / I3xT11 Motion Control:

- Standard profiles via PROFIBUS, CANopen, DeviceNet, Ethernet Powerlink and EtherCAT
- Direct set specification via fieldbus telegrams or
- Set selection (31 motion sets)
- Status bits for each motion set
- Operating modes:
  - Speed controller, direct positioning, positioning via set selection

Characteristics:

| | |
|---|---|
| **PROFIBUS** | |
| Profile: | PROFIdrive Profile drive system V3 |
| DP versions: | DPV0/DPV1 |
| Baud rate: | up to 12 Mbit/s |
| **PROFINET** | |
| Profile: | PROFIdrive profile drive technology V4.1 |
| Version: | PROFINET IO (RT) |
| Transmission mode: | 100BASE-TX (Full Duplex) |
| **CANopen** | |
| Profile: | MotionControl CiADS402 |
| Baud rate: | 20...1000 Kbit/s |
| **DeviceNet** | |
| I/O Data: | up to 32 bytes |
| Baud rate: | 125...500 Kbit/s |
| Nodes: | up to 63 slaves |
| **Ethernet Powerlink** | |
| Profile: | MotionControl CiADS402 |
| Baud rate: | 100 Mbit/s (FastEthernet) |
| Cycle time: | 1 ms |
| **EtherCAT** | |
| Profile: | MotionControl CiADS402 |
| Baud rate: | 100 Mbit/s (FastEthernet) |
| Cycle time: | 1 ms |



## Motion Function:

### Absolute / Relative Positioning:
MoveAbs and MoveRel

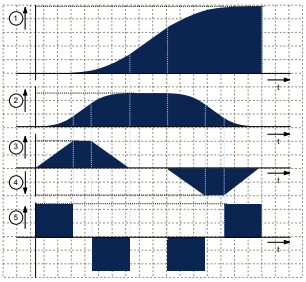
- A motion set defines a complete motion with all settable parameters.
  - (1) Target position
  - (2) Travel speed
  - (3) Maximum Acceleration
  - (4) Maximum deceleration
  - (5) Maximum Jerk

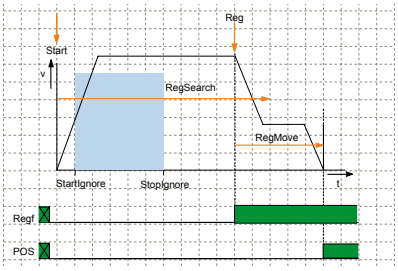
### Reg-related positioning:
RegSearch, RegMove

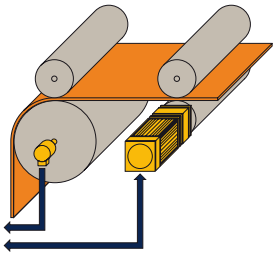
- For registration mark-related positioning, 2 motions are defined.
  - RegSearch: Search of an external signal - a reg; e.g. a mark on a product
  - RegMove: The external signal interrupts the search movement and the second movement by an offset follows without transition
- Accuracy of the reg detection: <1 µs

### Electronic Gearbox:
Gearing

- Synchronous motion to a leading axis with any transmission ratio. The position of a master axis can be detected via:
  - +/-10 V analog input
  - Step / direction input
  - the encoder input or
  - HEDA, with Compax3 master





### Dynamic positioning

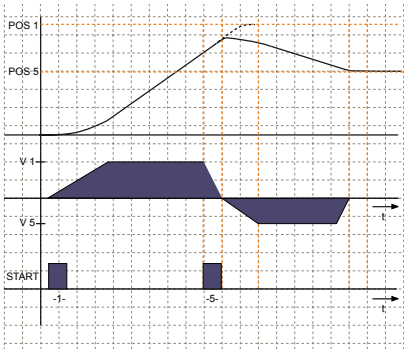
- You can switch to a new motion profile during a positioning sequence - a dynamic transition takes place.

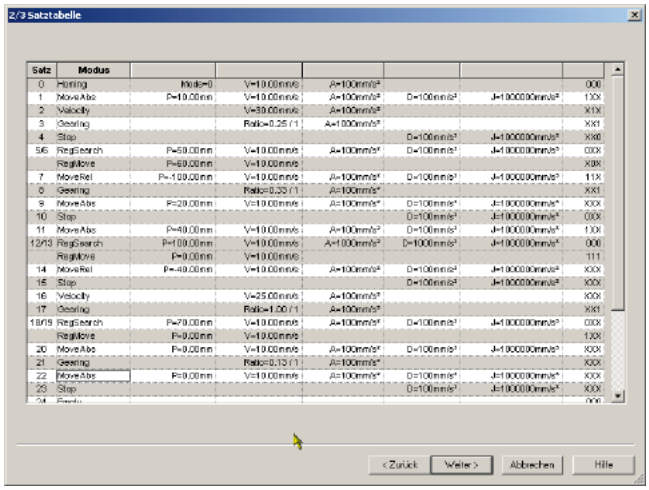
### Speed control:
Velocity

- Defined via speed and acceleration.

### Stop movement:
Stop

- The Stop set interrupts the current motion set.




**Entry of motion sets**

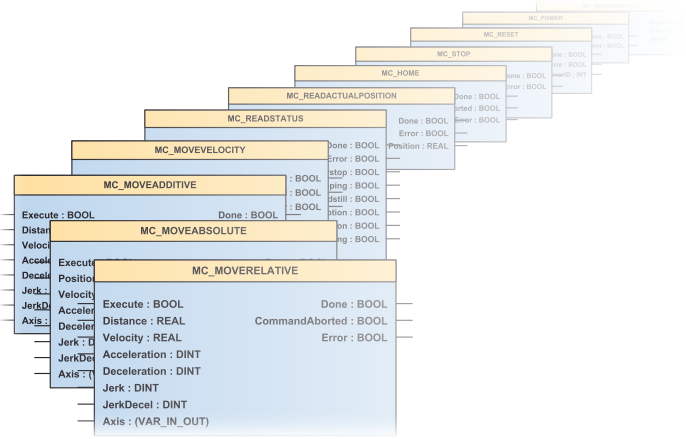
## Compax3 T30: IIEC 61131-3 Positioning with function modules based on PLCopen

### T30 Scope of Functions

- Programming in accordance with IEC 61131-3
- Programming system: CoDeSys
- up to 6000 instructions
- 650 16bit variables / 200 32bit variables
- Recipe table with 288 variables
- 3 16-bit retain variables / 3 32-bit retain variables
- Inputs/outputs:
  - 8 digital inputs (24 V level)
  - 4 digital outputs (24 V level)
  - 2 analog inputs (14 Bit)
  - Optional extension of 12 inputs/ outputs
- IEC 61131-3 standard modules:
  - Up to 8 timers (TON, TOF, TP)
  - Triggers (R_TRIG, F_TRIG)
  - Flip-flops (RS, SR)
  - Counters (CTU, CTD, CTUD)
- Device-specific function modules:
  - C3_Input: Generates an input process image
  - C3_Output: Generates an output process image
  - C3_ReadArray: Access to recipe table
- PLCOpen function modules:
  - Positioning: absolute, relative, additive, continuous
  - Machine Zero
  - Stop, energizing the power stage, Quit
  - Position, device status, reading axis error
  - Electronic gearbox (MC_GearIn)

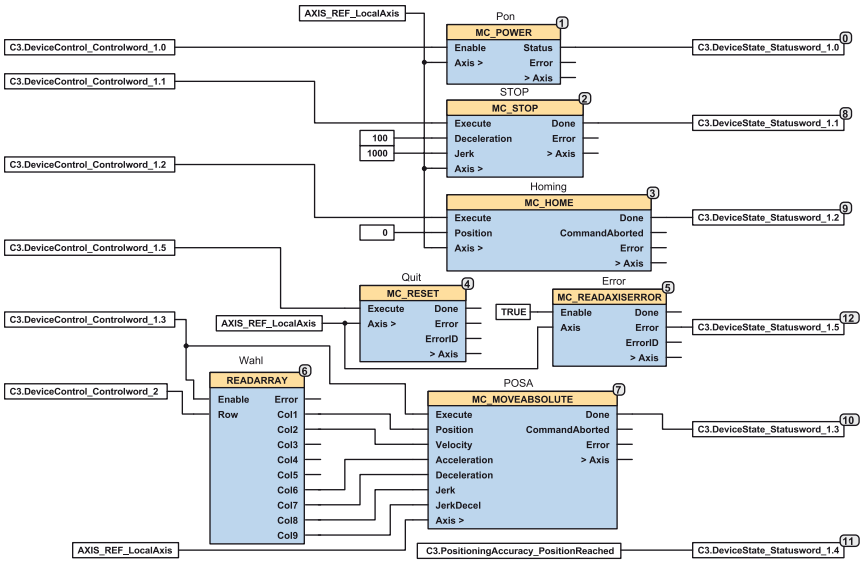
### Compax3 Function Blocks

- Absolute Positioning
- Stop
- Reading axis error
- Relative Positioning
- Machine Zero
- Acknowledging errors
- Additive positioning
- Energizing the power stage
- Reading the current position
- Continuous positioning
- Reading device status
- Electronic Gearbox (Gearing)




### Example of an IEC 61131 application controlled by means of a bus interface:

- 2 control words are placed on the cyclic channel of the bus.
- The position data records (position, speed, acceleration, ... are stored in a table (array).
- The desired position data record is selected with Controlword_2.
- The individual bits of Controlword_1 control positioning.
- A return message is given through a status word on the cyclic channel of the bus.



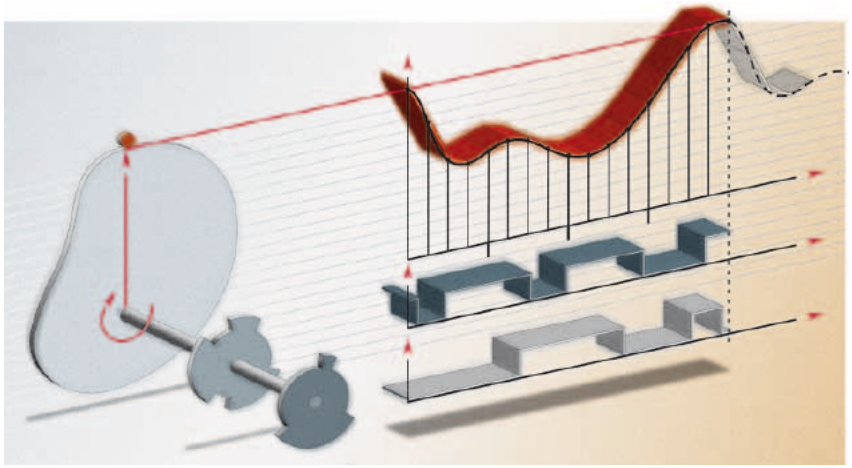
## Compax3 T40: IEC 61131-3 positioning with cam function modules

### T40 Scope of Functions:

Compax3 T40 is able to simulate mechanical cams and cam switching mechanisms electronically.
The “Electronic Cam - T40 was especially optimized for

- Packaging Machinery,
- Printing Industry as well as
- all applications where a mechanical cam is to be replaced by a flexible, cyclic electronic solution.

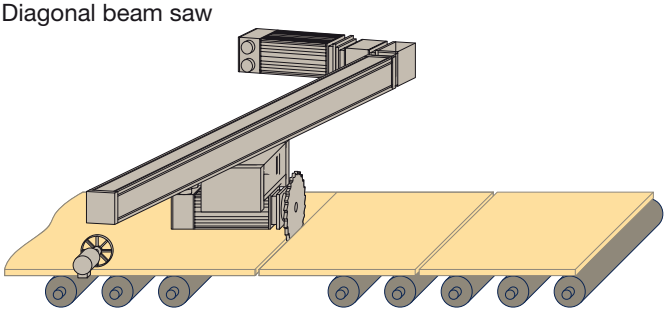
This helps to realize discontinuous material supply, flying knife and similar drive applications with distributed drive performance.
Compax3 T40 supports both real and virtual master movements. In addition, the user can switch to other cam profiles or cam segments on the fly.
Programming is carried out in the IEC 61131-3 environment.
Cam applications can be easily implemented with the aid of the cam function modules and the CamDesigner.



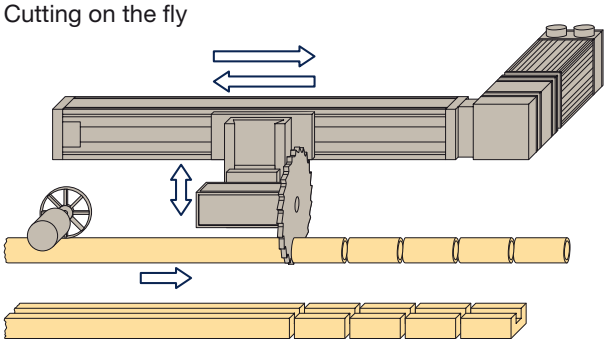
### T40 Function Overview:

- T30 Technology Functions completely integrated and available
- Master position acquisition
- Reg synchronization
- Cam switching mechanism
- Coupling and decoupling functions
- Cam profiles
- Cam memory
- Cam creation with the CamDesigner

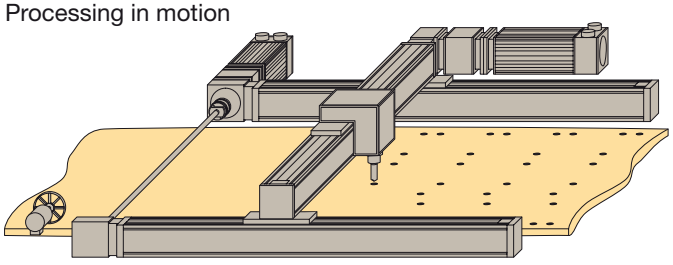
Diagonal beam saw



Cutting on the fly

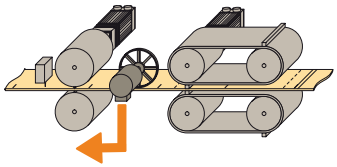


Processing in motion



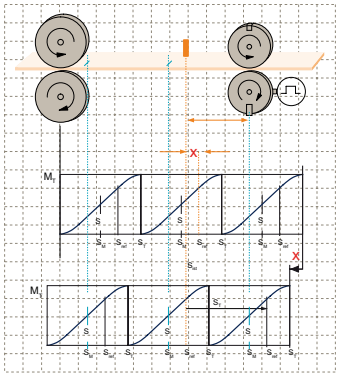
### Master Position Acquisition

- Acquisition via SSI encoder or incremental encoder
- Acquisition by the HEDA real-time bus
- Virtual master:
  - A second axis in the IEC - program can be used to program a motion profile which serves as a master for one or several slaves.



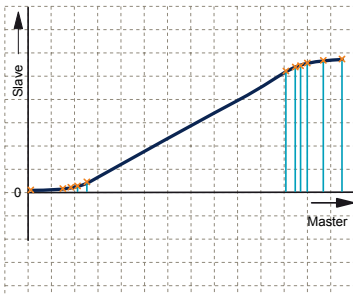
### Reg Synchronization

- Master or slave oriented (simultaneous, cam-independent)
- Highly precise reg mark recognition (accuracy < 1 µs; Touchprobe)



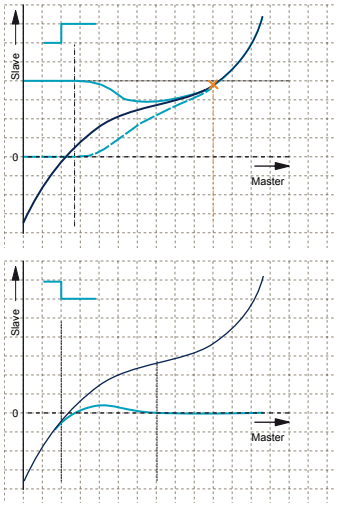
### Cam Memory

- 10000 points (master / slave) in 24 bit format
- High-precision profile generation:
  - Non equidistant interpolation points of the master and slave coordinates (stored fail-safe)
  - Linear interpolation between interpolation points
- Cam memory for up to 20 curves



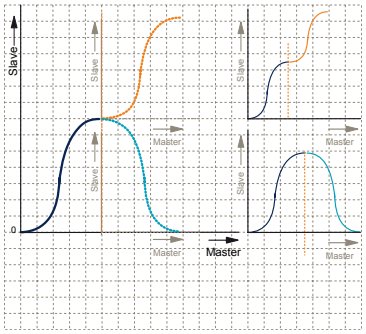

### Coupling and Decoupling Functions

- By means of a setpoint generator
- By means of a change-over function
- Without overspeeding by coupling over several master cycles
- Virtually free set-up of the coupling and decoupling movement
- Master-guided coupling movement
- Random standstill position



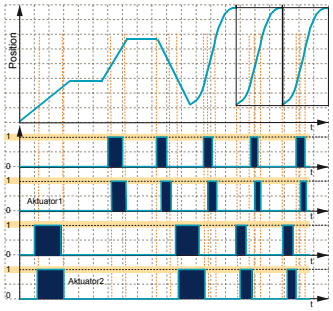

### Cam Profiles

- Up to 20 cam segments can be produced by:
  - Virtually random cam links (forwards and backwards)
  - Freely programmable event-controlled cam branches
  - Scalable cam segments and complete cam profiles




### Cam Controller

- 36 cams with individual profiles.
- 4 fast cams (125 µs per cam) standard: 500 µs.
- 32 serial cams, 16 ms/cam cycle (0.5ms/cam).
- Delay-time compensated cams: Compax3 can advance the cam to compensate for delays in switching elements.



# Compax3 - C3 powerPLmC Control Technology

## C3 powerPLmC: Control of individual and multiple axes

**Description**
Modern machines feature high flexibility and productivity. Automation solutions from Parker Hannifin offer the basis for the implementation of state-of-the-art machine concepts. The consequent integration of international standards provides OEMs with the freedom to concentrate entirely on the technological process.

**The motion control plays an increasingly central role in this development.**

Compax3H powerPLmC-C20
Compax3S powerPLmC-C20
Compax3M powerPLmC-C20

- integrated -
into the Compax3 servo drive

C3 powerPLmC-E30

-standalone -
without servo drive

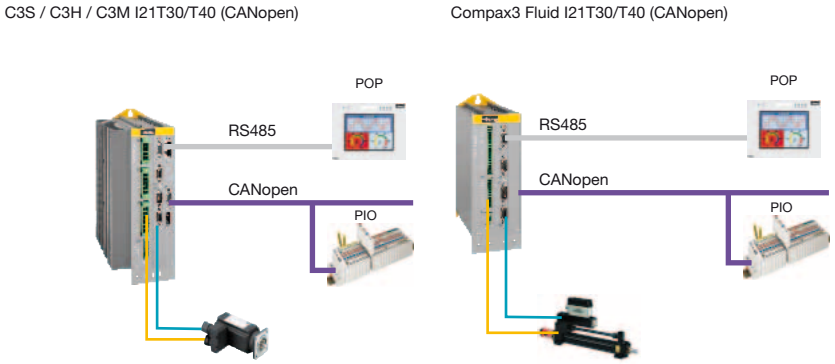
**Attributes**

- Basis for the implementation of modular machine concepts
- Windows® based standard tools for programming, start-up and diagnostics
- Minimization of the wiring overhead by reduction of the interface diversity
- Maximum functionality and flexibility
- Optimized space requirements due to minimized components and state-of-the-art installation concept
- Realization of safe machine concepts
- Basis for the realization of hybrid machine concepts - electromechanics, hydraulics and pneumatics

## Compax3 T30 / T40 Technology Controller:

Main fields of application

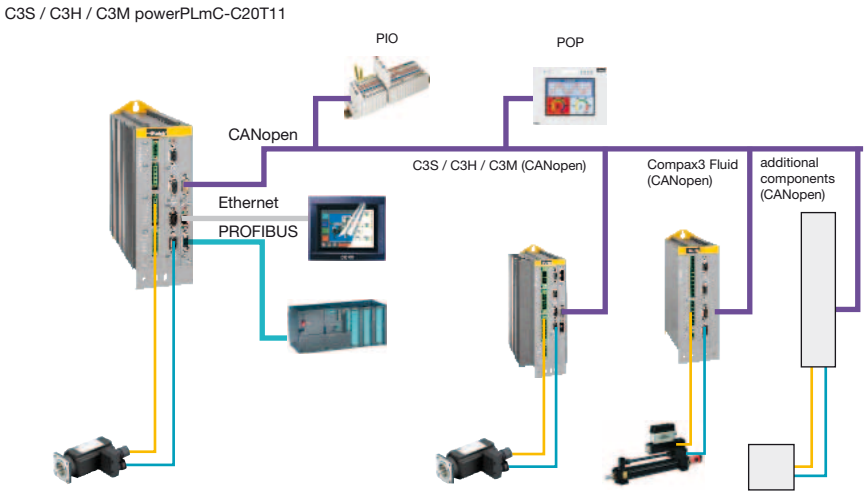
- Machines or machine modules with one or two servo axes
- Applications requiring a high degree of flexibility with respect to sequence control
- Optional connection of upgrading devices for the operation and monitoring as well as external I/Os




## Technology controller with integrated Motion PLC - Compax3 powerPLmC-C20

Main fields of application

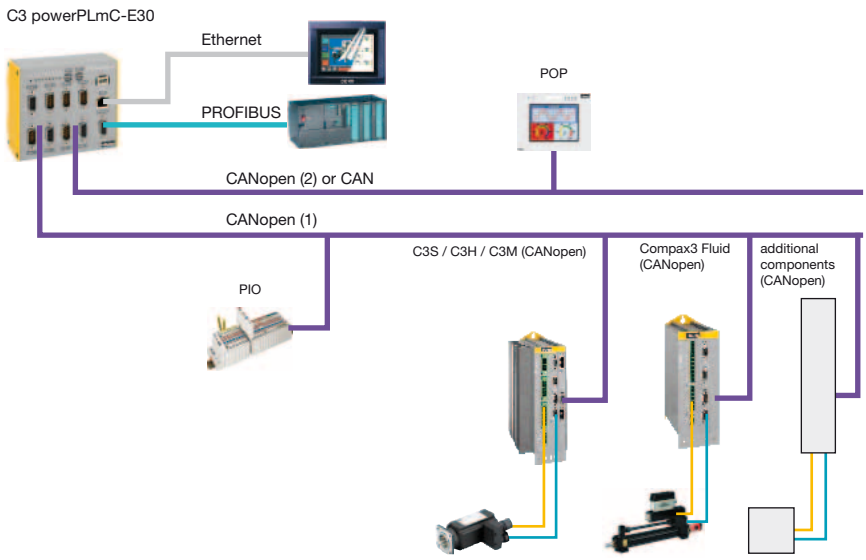
- More than two axes for motion automation
- High degree of system integration (e.g. via Ethernet)
- Integration of complex devices for machine visualization and operation
- Connection to a wide number of digital and analog inputs
- Integration of pneumatic and hydraulic automation devices




## Motion PLC with Technology Functions - C3 powerPLmC-E30

Main fields of application

- As Compax3 powerPLmC-C20
- High proportion of PLC typical tasks
- Integration of additional automation components via a second CAN bus.
- Basis for the realization of hybrid machine concepts electromechanics, hydraulics and pneumatics



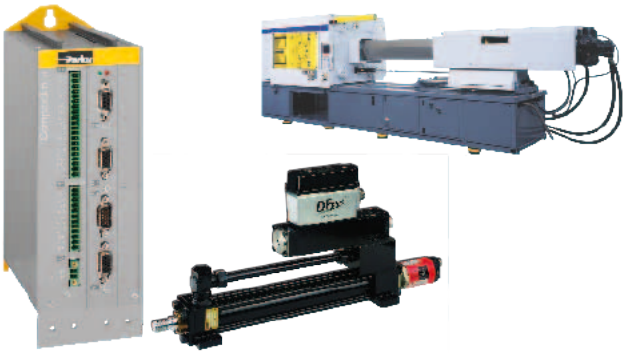
## Controller Characteristics



| Modell Productname | Compax3 powerPLmC-C20 | C3 powerPLmC-E30 | Compax3 T30 / T40 |
|---|---|---|---|
| | | | |
| **General information** | | | |
| **Platform** | 32Bit RISC processor 200 MHz | | 24 Bit Signal processor |
| **Boot FLASH / Program memory FLASH** | 1 MB / 4 MB | 4 MB / 128 MB compact flash | - |
| **Data memory SDRAM / Data memory non volatile** | 16 MB / 32 kB (Retain) | | 64 kB / 18 Byte (Retain) |
| **Real time clock** | Yes, battery backed | | No |
| **Operating system / supply** | Real-time multitasking / 24 VDC | | Single tasking |
| **Controller features** | | | |
| **Processing time** | <100 µs for 1000 IL rows | | 2 ms for 1000 AWL rows |
| **Real time tasks** | Coasting<br>Cyclical<br>Event-controlled, internal / external events | | Cyclical |
| **Minimal cycle time** | Typical 1 ms | | |
| **Online program change** | Yes | | No |
| **Watchdog Timer** | Yes | | Yes |
| **Data exchange in distributed systems (network variables)** | Yes | | No |
| **Programming and debugging** | | | |
| **Programming system** | CoDeSys | | |
| **Programming languages** | IL, SFC, FBP, ST, LD, CFC | | |
| **Protocol** | IEC 61131-3 | | |
| **PLCopen - Motion control modules** | Yes | | |
| **Debug, single step, watch function** | Yes | | Yes (no single step) |
| **Simulation, online trace** | Yes | | Yes |
| **Breakpoints** | Yes (source level debugging) | | Yes |
| **Source code download** | Yes | | Yes |
| **Write, read, force variables** | Yes | | Yes (no forcing) |
| **Program administration** | File System, FTP | | No |
| **Programming interface** | Fast Ethernet | | RS232 |
| **Visualization** | | | |
| **Locally on the programming system** | Yes | | No |
| **Web Server** | Yes | | No |
| **OPC Server** | Yes | | No |
| **Interfaces** | | | |
| **General** | RS232/RS485 | 2x RS232 | RS232/RS485 |
| **Fieldbusses (standard)** | CANopen Master<br>Ethernet 10/100 | 2 x CANopen Master<br>Ethernet 10/100<br>Modbus TCP/IP Server | CANopen Master for the connection of PIOs (input/ output modules) |
| **Fieldbusses (optional)** | PROFIBUS DP Slave<br>HEDA: Real-time data bus | PROFIBUS DP Slave | HEDA: Real-time data bus |
| **Digital and analog inputs/outputs Option** | Any | Any (depending on the number of axes) | 24 digital / 4 analog |
| **Encoder output** | Yes, up to 16384/revolutions | No | Yes, up to 16384/revolutions |

## Compax3F: Hydraulics Controller

The Compax3F hydraulics controller is another member of the Compax3 family based on the well-known Compax3 digital drive.
Thus, all advantages offered by the Compax3 family are now also available in servo- and proportional hydraulics. The hydraulics controller is available with the following technologies:



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### Technology Functions

- T11: Positioning
- T30: Motion control programmable in accordance with IEC 61131-3
- T40: Electronic cam

| Device: | Compax3 F001 D2 F12 Ixx Txx Mxx |
|---|---|
| **Voltage supply** | |
| Voltage range | 21-27 VDC |
| **Inputs and outputs** | |
| 8 control inputs | 24 VDC / 10 kOhm |
| 4 control outputs | Active HIGH / short-circuit proof / 24 V / 100 mA |
| 4 analog current inputs | 14 Bits |
| 2 analog voltage inputs | 14 Bits |
| 4 analog outputs | 16 Bits, current or voltage |
| 2 analog monitor outputs | 8 bits |
| **Communication** | |
| RS232 | 115200 Bauds |
| RS485 (2 or 4-wire) | 9600, 19200, 38400, 57600 or 115200 Bauds |
| ... | |
| **Feedback** | |
| | 1 $V_{PP}$ SineCosine (max. 400 Hz)<br>RS422 Encoder (max. 5 MHz, or Step/Direction)<br>SSI (RS422)<br>Start/Stop (Time of Flight, RS422)<br>EnDat2.1 |
| **Size / Weight** | |
| H x W x D [mm] | 199 x 80 x 130 |
| Weight [kg] | 2.0 |
| Housing / protection class | Enclosed metal housing, IP20 |

### Communication

CANopen DeviceNet OPC ETHERNET POWERLINK EtherCAT PROFINET PROFIBUS

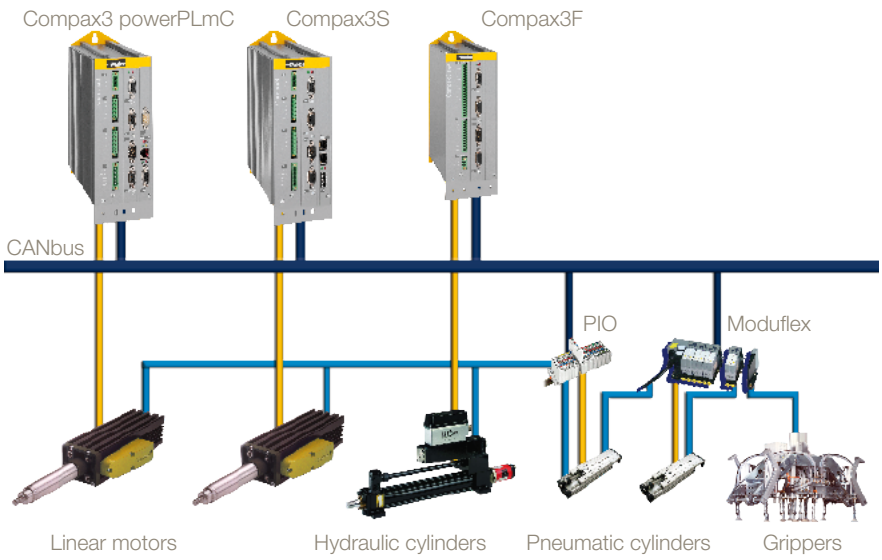


### Your Advantages:

- It is no longer necessary to distinct between the motion of a hydraulic or an electromechanical axis on the control technology level .
- Common software tools for electromechanics and hydraulics supporting the design of hybrid machines.

Especially the combination with the highly dynamic DFplus valve can be used to efficiently increase your machine performance.

### Example: System Layout



# Technical Characteristics

## Technical Data

### Compax3S

| Type Compax3... | | S025V2 | S063V2 | S100V2 | S150V2 | S015V4 | S038V4 | S075V4 | S150V4 | S300V4 (1) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Unit | | | | | | | | | |
| **Supply voltage and device currents** | | | | | | | | | | |
| **Supply voltage** | [V] | 1*230/240 VAC (80...253 VAC) / 50...60 Hz | | 3*230/240 VAC (80...253 VAC) / 50...60 Hz | | 3*400/480 VAC (80...528 VAC) / 50...60 Hz | | | | |
| **Output nominal current (rms)** | [A] | 2.5 | 6.3 | 10 | 15 | 1.5 | 3.8 | 7.5 | 15 | 30 |
| **Peak current (<5 s)** | [A] | 5.5 | 12.6 | 20.0 | 30.0 | 4.5 | 9.0 | 15.0 | 30.0 | 60.0 |
| **Power rating** | [kVA] | 1.0 | 2.5 | 4.0 | 6.0 | 1.25 | 3.1 | 6.2 | 11.5 | 25.0 |
| **Control Voltage** | [V] | 24 VDC ±10 %, ripple <1 Vpp | | | | | | | | |
| **Electric current drain** | [A] | 0.8 A (Compax3)<br>(+ digital outputs 0.1 A each<br>+ motor brake up to 1.6 A) | | | | | | | | |
| **Regenerative braking** | | | | | | | | | | |
| **Capacity** | [µF] | 560 | 1120 | 780 | 1170 | 235 | 235 | 470 | 690 | 1100 |
| **Storable energy** | [Ws] | 15 @230 V | 30 @230 V | 21 @230 V | 31 @230 V | 37@400 V 21@480 V | 37@400 V 21@480 V | 75@400 V 42@480 V | 110@400 V 61@480 V | 176@400 V 98@480 V |

(1) Operation with condenser module C4.

### Compax3H

| Models Compax3 | | H050V4 | H090V4 | H125V4 | H155V4 |
|---|---|---|---|---|---|
| | Unit | | | | |
| **Supply voltage and device currents** | | | | | |
| **Supply voltage** | [V] | 3*400/480 VAC (350...528 VAC) / 50...60 Hz | | | |
| **Output nominal current (rms)** | [A] | 50.0 | 90.0 | 125.0 | 155.0 |
| **Peak current (<5 s)** | [A] | 75.0 | 135.0 | 187.5 | 232.5 |
| **Power rating** | [kVA] | 35.0 | 70.0 | 91.0 | 109.0 |
| **Control Voltage** | [V] | 24 VDC ±10 %, ripple <1 Vpp | | | |
| **Electric current drain** | [A] | 0.8 A (Compax3)<br>(+ digital outputs 0.1 A each<br>+ motor brake up to 1.6 A) | | | |
| **Regenerative braking** | | | | | |
| **Capacity** | [µF] | 2600 | 3150 | 5000 | 5000 |
| **Storable energy** | [Ws] | 602@400 V 419@480 V | 729@400 V 507@480 V | 1158@400 V 806@480 V | 1158@400 V 806@480 V |

### Compax3M

| Models Compax3 | | M050D6 | M100D6 | M150D6 | M300D6 |
|---|---|---|---|---|---|
| | Unit | | | | |
| **Supply voltage and device currents** | | | | | |
| **Supply voltage** | [V] | 325...679 VDC<br>(Rated voltage 560 VDC) | | | |
| **Output nominal current (rms)** | [A] | 5 | 10 | 15 | 30 |
| **Peak current (<5 s)** | [A] | 10 | 20 | 30 | 60 |
| **Power (@ 560 VDC)** | [kVA] | 3.33 | 6.66 | 10 | 20 |
| **Regenerative braking** | | | | | |
| **Capacity** | [µF] | 110 | 220 | 220 | 440 |
| **Storable energy** | [Ws] | 18@400 V 10@480 V | 37@400 V 21@480 V | 37@400 V 21@480 V | 74@400 V 42@480 V |

## Mains module PSUP

**Mains supply:**

| Power Supply Model | Unit | PSUP10 | | | PSUP20 | | | PSUP30 (1) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Supply voltage | | *230...480 VAC ±10 % 50...60 Hz (Rated voltage 3*400 VAC) | | | | | | | | |
| Output voltage | | 325...680 VDC ±10 % | | | | | | | | |
| Supply voltage | [VAC] | 230 | 400 | 480 | 230 | 400 | 480 | 230 | 400 | 480 |
| Output power | [kVA] | 6 | 10 | 10 | 12 | 20 | 20 | 18 | 30 | 30 |
| Pulse power (<5 s) | [kVA] | 12 | 20 | 20 | 24 | 40 | 40 | 34 | 60 | 60 |
| Control Voltage | | 24 VDC ±10 % | | | | | | | | |
| Maximum ripple | | <1 Vpp | | | | | | | | |
| Electric current drain | [A] | 0.2 A | | | 0.3 A | | | 0.3 A | | |
| | [A] | **C3M050D6:** 0.85 A | | **C3M100D6:** 0.85 A | | **C3M150D6:** 0.85 A | | **C3M300D6:** 1.0 A | | |
| | | (+ total load of the digital outputs + current for motor holding brake up to 1.6 A) | | | | | | | | |

(1) Operation of the PSUP30 only with mains choke

## Positioning

| | |
|---|---|
| **Positioning on the motor shaft** | |
| | • Resolver (option F10)<br>  • Resolution: 16 Bit (= 0.005°)<br>  • Absolute accuracy: +/-0.167°<br>• SinCos® (Option F11)<br>  • Position resolution: 13.5Bit/Encoder sine period => 0.03107°/encoder resolution<br>• Direct drives (F12)<br>  • Maximum position resolution:<br>  Linear: 24 Bits per motor magnet spacing<br>  Rotary: 24 bits per motor revolution<br>  • For 1 Vpp sine-cosine encoders (e.g. EnDat): 13.5 bits / graduation of the encoder scale. For RS422 encoders: 4x encoder resolution / encoder bypass possible Accuracy of the feedback zero pulse acquisition = accuracy of the feedback resolution. For analog hall sensors with 1Vpp signal: 13.5 bits / motor magnet spacing<br>The accuracy of the position signal is above all determined by the type and exactitude of the feedback system used. |
| **Setpoint generator** | |
| | • Jerk-limited ramps<br>• Travel data in increments, mm, inch or variable by scale factor<br>• Specification of speed, acceleration, deceleration and jerk |
| **Monitoring functions** | |
| | • Power/auxiliary supply range<br>• Motor power stage temperature/stall protection<br>• Following error monitoring |

## Supported Motor and Feedback Systems

| | |
|---|---|
| **Motors** | |
| | • Sinusoidally commutated synchronous motors<br>  • Maximum electrical turning frequency: 1000 Hz<br>  • Maximum velocity at 8 pole motors: 15 000 $min^{-1}$<br>  • Maximum speed: 60*1000/number of pole pairs in $min^{-1}$<br>• Sinusoidal commutated asynchronous motors<br>  • Maximum electrical turning frequency: 1000 Hz<br>  • Maximum speed: 60*1000/number of pole pairs - slip in $min^{-1}$<br>• 3 phase synchronous direct drives |
| **Feedback systems** | |
| | • Resolver (option F10)<br>  • Litton: JSSBH-15-E-5, JSSBH-21-P4, RE-21-1-A05, RE-15-1-B04<br>  • Tamagawa: 2018N321 E64<br>  • Siemens: 23401-T2509-C202<br>• Rotary SineCosine Single- or Multiturn encoder with Hiperface®- or EnDat 2.1 interface<br>  • SinCos® single-turn (Stegmann)<br>  • SinCos® - Multiturn (Stegmann), Absolute position up to 4096 motor revolutions<br>  • Rotary feedback with HIPERFACE® interface: SRS50, SRM50, SKS36, SKM36, SEK52, SEL57<br>• Analog hall sensors<br>  • Sine-Cosine signal (max. 5 $V_{pp}$; typical 1 $V_{pp}$) 90° offset<br>  • U-V signal (max. 5 $V_{pp}$; typical 1 $V_{pp}$) 120° offset<br>• Encoder linear or rotary<br>  • Sine-Cosine (max. 5 $V_{pp}$; typical 1 $V_{pp}$) (max. 400 kHz) or<br>  • TTL (RS422) (max. 5 MHz)with the following modes of commutation: Automatic commutation or digital hall sensors<br>• Digital, bidirectional interface:<br>  • EnDat 2.1 or EnDat 2.2 feedback systems with incremental track (sine-cosine track)<br>  • Linear or rotary<br>• Distance coded feedback systems<br>  • Distance coding with 1 $V_{pp}$ interface<br>  • Distance coding with RS422 - Interface<br>  • Feedback error compensation Automatic feedback error compensation (offset & amplification) for analog hall sensors and sine-cosine encoder can be activated in the MotorManager |

## Ambient Conditions

| | | |
|---|---|---|
| **Temperature range** | | |
| | **Compax3S & Compax3H** | **PSUP / Compax3M** |
| | 0...45 °C | 0...40 °C |
| **Tolerated humidity:** | | |
| | max. relative air humidity <=85% class 3K3;non-condensing | |
| **Elevation of operating site** | | |
| | • <=1000 m asl for 100 % load ratings<br>• <=2000 m above sea level for 1 % / 100 m power reduction<br>• please inquire for greater elevations | |
| **Product Enclosure Rating** | | |
| | IP20 protection level in accordance with EN 60529 | |

## Interfaces

| | |
|---|---|
| **COM ports** | |
| | • RS232, 115 200 Baud<br>• RS485, 2- or 4-wire) 9600, 19200, 38400, 57600 or 115200 Bauds<br>• USB (Compax3M), USB 2.0 Full Speed compatible |
| **Bus systems** | |
| | • PROFIBUS DP V0-V2 (I20), 12 Mbit/s, PROFIdrive profile drive technology<br>• CANopen (CiADS402) (I21), 20...1000 Kbit/s, SDO1, PDO1, ... PDO4<br>• DeviceNet (I22), up to 32 bytes I/O, 125...500 Kbit/s, up to 63 slaves<br>• Ethernet Powerlink (I30), 100 Mbit/s (FastEthernet), 1 ms cycle time<br>• EtherCAT (I31), 100 Mbit/s (FastEthernet), 1 ms cycle time<br>• PROFINET (I32), PROFINET IO (RT), 100BASE-TX (Full Duplex) |
| **Inputs and outputs** | |
| | • 8 control inputs: 24 VDC / 10 kOhm<br>• 4 control outputs: Active HIGH / short-circuit proof/ 24 V / 100 mA<br>• 2 analog inputs (14 Bit)<br>• 2 analog outputs (8 Bit) |
| **Encoder simulation** | |
| | • 4-16384 increments per revolution<br>• Limit frequency: 620 kHz |

## Safety Technology

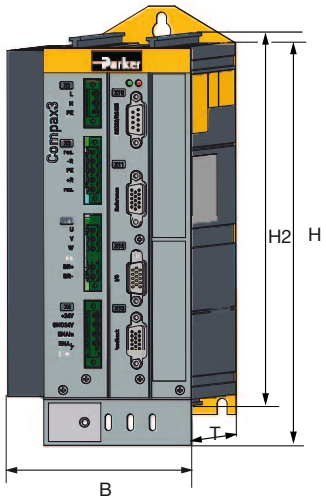
| | |
|---|---|
| **Compax3S** | |
| | STO (Safe torque off) in accordance with EN ISO 13849:2008, category 3:PL=d/e. Certified: BG-PRÜFZERT |
| **Compax3M** | |
| | Optional state-of-the-art safety technology (EN ISO 13849-1:2007, category 3, PL=e |

## Standards and Conformance

| | |
|---|---|
| **Insulation requirements** | |
| | • Protection class in accordance with EN 60664-1<br>• Protection against human contact with dangerous voltages: in accordance with EN 61800-5-1<br>• Overvoltage: Voltage category III in accordance with EN 60664-1<br>• Level of contamination 2 in accordance with EN 60664-1 and EN 61800-5-1 |
| **CE compliance** | |
| | • Low voltage directive 2006/95/EC EN 61800-5-1, Standard for electric power drives with settable speed; requirements to electric safety EN 60664-1, isolation coordinates for electrical equipment in low-voltage systems EN 60204-1, Machinery norm, partly applied<br>• EC-EMC-directive 2004/108/EC EN 61800-3, product standard for speed adjustable drives |
| **UL certification** | |
| | • UL conform according to UL508C<br>  • Compax3S: Recognized Component Mark for Canada and the US<br>  • PSUP / Compax3M & Compax3H: UL Listing |
| **RoHS compliance** | |
| | Available for Compax3S, Compax3M, Compax3F Complies with European Union Directive 2002/95/EC - Restriction of Hazardous Substances (RoHS) |

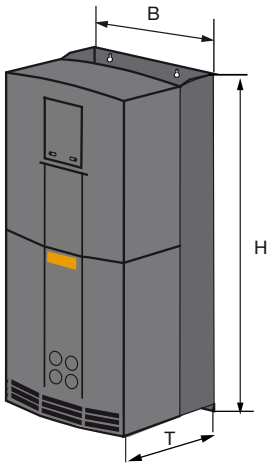
## Dimensions

### Compax3S



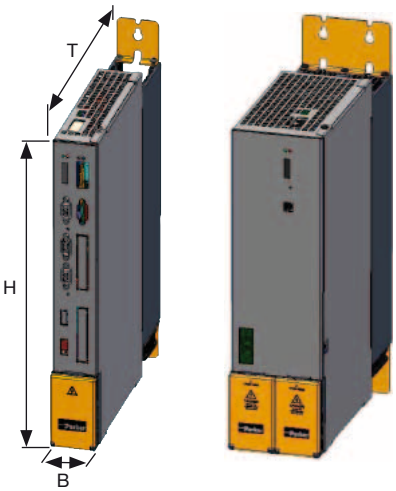

| Device: | Dimensions [mm] | | | | Weight [kg] |
|---|---|---|---|---|---|
| Compax3 | H | B | T | H2 | |
| S025V2 | 216 | 84 | 172 | 203 | 2.0 |
| S063V2 | | 100 | | | 2.5 |
| S100V2 | 273 | 115 | | 259 | 4.3 |
| S150V2 / S150V4 | | 158 | | | 6.8 |
| S015V4 | | 84 | | | 3.1 |
| S038V4 | | 100 | | | 3.5 |
| S075V4 | | 115 | | | 4.3 |
| S300V4 | 380 | 175 | | 391 | 10.9 |

### Compax3H




| Device: | Dimensions [mm] | | | Weight [kg] |
|---|---|---|---|---|
| Compax3 | H | B | T | |
| H050V4 | 453 | 252 | 245 | 17.4 |
| H090V4 | 669 | 257 | 312 | 32.5 |
| H125V4 | 720 | 257 | 355 | 41.0 |
| H155V4 | 720 | 257 | 355 | 41.0 |

### PSUP & Compax3M




| Device: | Dimensions [mm] | | | Weight [kg] |
|---|---|---|---|---|
| Compax3 | H | B | T | |
| M050D6 | 360 | 50 | 263 | 3.5 |
| M100D6 | 360 | 50 | 263 | 3.6 |
| M150D6 | 360 | 50 | 263 | 3.6 |
| M300D6 | 360 | 100 | 263 | 5.25 |
| **Power module** | | | | |
| PSUP10D6 | 360 | 50 | 263 | 3.95 |
| PSUP20D6 | 360 | 100 | 263 | 6.3 |
| PSUP30D6 | 360 | 100 | 263 | 6.3 |

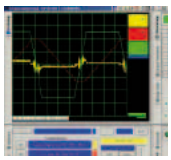
| | |
|---|---|
| **Housing** | Insulation:<br>VDE 0160 / Protection class IP20 in accordance with EN 60 529 (not for C3H1xxV4) |

# Accessories and Options

## Software and Tools

### C3 ServoManager

- Guided configuration
  - Automatic querying of all necessary entries
  - Graphical support
- Setup mode
  - Manual motion of individual axes
  - Predefined profiles
  - Convenient operation
  - Storage of defined profiles
  - Automatic determination of the moment of inertia
- integrated 4-channel oscilloscope
  - Signal tracking directly on the PC
  - Various modes (single/normal/auto/roll)
  - Zoom function
  - Export as image or table (for example to Excel)



### MotorManager

- Complete library for Parker motors
  - Integration of customer motors
  - Determination of motor characteristics and of the motor position feedback

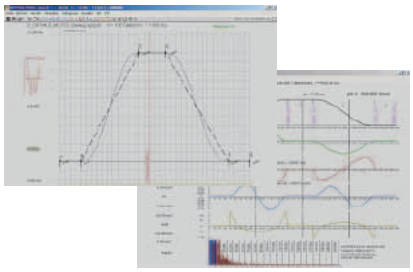
### HydraulicsManager

- Valve library for Parker valves
- Integration of customer valves

### CamDesigner

Cam creation tool

- Standard and expert mode
- Evaluation of the motion profiles
- Verification of the drive selection
- Transition laws from the VDI directive 2143



## Programming

### CoDeSys

CoDeSys is a development environment for programming that saves a significant amount of time as applications are created.

- Powerful developing environment, worldwide established
- Universal programming platform for various devices
- Complete offline simulation
- Visual elements
- Library management for user-defined applications
- Context-sensitive help wizard
- Data exchange between devices from different manufacturers
- Complete online functionality
- Sophisticated technological features
- Free of charge

### IEC 61131-3

IEC 61131-3 is the only company- and product independent programming language with world-wide support for industrial automation devices.
IEC 61131-3 includes graphical and textual programming languages:

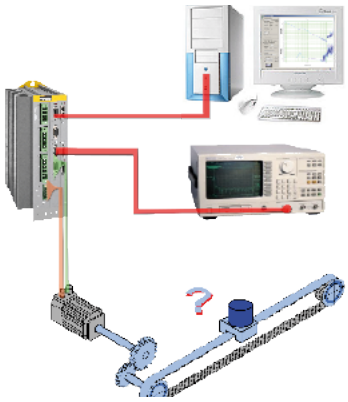
- Instruction list
- Structured text
- Ladder diagram
- Sequential function chart
- Function block diagram
- Integrated standards offer:
  - a trusted programming environment
  - standardized programming
- Integrated standards reduce:
  - the overhead of development
  - maintenance costs
  - software upkeep
  - training overhead
- Integrated standards increase:
  - productivity
  - software quality
  - concentration on core competence

### PLCopen

PLCopen is an organization that plays a significant role in supporting the IEC 61131-3 programming language. It is independent of individual companies or products. Its specific tasks also include defining basic processes relevant to motion. The PLCopen organization consists of both users and manufacturers of automation components.
Parker Hannifin is an active member of the “Motion Control” task force. This represents a great advantage to users of Parker drive technology, since they are constantly able to profit directly from the latest developments in PLCopen.

**Parker is a member of the ”CoDeSys Automation Alliance"**

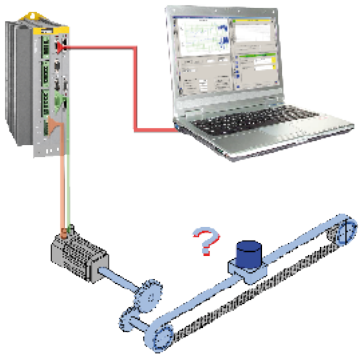
## Signal Analysis for the System Identification



**Formerly**

**Implementation prerequisites:**

- Expensive and complex measurement technology required
- Special knowledge required
- Implementation only possible in an open control loop (=dangerous)



**Today**

**Implementation prerequisites:**

- Implementation with a common PC
- Simple and safe operation with the Compax3 ServoManager Software
- No special knowledge required
- The safety functions implemented in the servo drive ensure safe measurement in a closed position control loop

### What purposes do the new functions serve?

| | |
|---|---|
| **Analysis and optimization of the mechanical system** | |
| Transmission behavior of the mechanic system | • Simple measurement of the mechanic dynamic behavior, therefore:<br>  • Possibilities to improve the mechanic construction can be spotted.<br>  • Increased stiffness and precision of the entire system. (improved mechanic system = improved controller performance) |
| Modal analysis | • Vibration analysis of the mechanic construction by specification of a sinusoidal motor force with a defined frequency.<br>• It is often possible to work without additional excitation by electrodynamic shakers or pulse hammers. |
| **Analysis and optimization of the control** | |
| Transmission behavior of the mechanic system | • Better and faster controller optimization due to the knowledge of the transmission behavior of the control path.<br>• Specific suppression of disturbances at the mechanic resonance points with the aid of notch or low-pass filters. |
| Transmission behavior of the control | • Quality assessment of the control with respect to the response behavior:<br>  • In the time range by step response<br>  • In the frequency range by frequency response<br>  • Optimization of the control by application of stability criteria from the control theory (e.g. Nyquist criterion or Hurwitz criterion)<br>• Quality assessment of the control with respect to the disturbance behavior:<br>  • In the time range by the disturbance current - step response[1]<br>  • In the frequency range by measurement and analysis of the resilience - frequency response[2] |

[1] Emulation of an external volatile change in the disturbance force.

[2] The compliance frequency response states the size of the control deviation caused by a disturbance force depending on it's frequency.

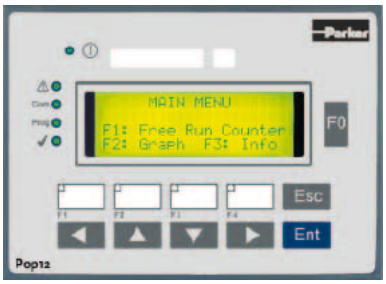
# Automation Operation and Monitoring

## Parker Operator Panel - Pop

We supplies operator panels for all text and graphical applications in industrial environments.

### Text and graphics-oriented Operating Systems

- Pop12
  - 4 function keys with insertable labels
  - 5 user LEDs
  - Multi-lingual projects possible
  - Connection to various bus systems
  - RS232, RS422, RS485, CL20 mA, CANopen
  - 512 kB user program memory
  - Monochrome graphics display
  - 4 lines of 20 characters for text
  - Downloadable font
  - Scalable text



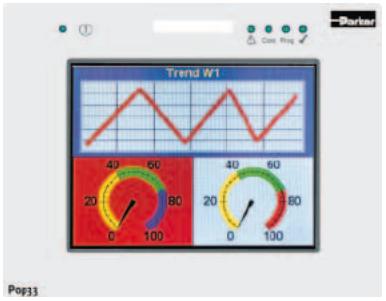

### Operator panels with Graphics display

- Pop22
  - Monochrome graphics display
  - 4 lines of 20 characters for text
  - Downloadable font
  - 12 function keys with insertable labels
  - 13 user LEDs
  - Multi-lingual projects possible
  - RS232, RS422, RS485, CL20 mA, CANopen
  - 512 kB user program memory
  - 512 kB expanded memory
  - 32 kB recipe memory
  - Alarms, real-time clock, battery backup


- Pop23
  - 8 lines of 40 characters for text
  - 23 function keys
  - 24 user LEDs
  - Printer interface
  - 16 kB recipe memory
  - Alarms, real-time clock, battery backup


### Visualisation with Touch-Screen

- Pop33
  - 1/4 VGA display (320x240 Pixel), 5.6" diagonal
  - 16 lines of 40 characters for text
  - Resistive touch screen
  - Can be connected to various bus systems
  - Multi-lingual projects possible
  - RS232, RS422, RS485, CL20 mA, CANopen
  - Printer interface
  - 32 kB recipe memory
  - Real-time clock, battery backup
  - Event list for alarms
  - Screensaver
  - LCD-Display STN Colour
  - 8 MB Flash memory on memory card



# Order Code

## Devices: Compax3

| | 1 | 2 | 3 | | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Order example | **C3** | **S** | **025** | **V2** | **F10** | **I10** | **T10** | **M00** | |

| | | |
|---|---|---|
| **1** | **Device family** | |
| | **C3** | Compax3 |
| **2** | **Device type** | |
| | **S** | Single axis |
| | **H** | High power |
| | **M** | Multi-axis device |
| | **F** | Hydraulics controller (C3F001D2F12) |
| **3** | **Device currents static/dynamic; supply voltage** | |
| | | **Compax3S** |
| | **025 V2** | 2.5 A / 5 A; 230 VAC (single phase) |
| | **063 V2** | 6.3 A /12.6 A; 230 VAC (single phase) |
| | **100 V2** | 10 A / 20A; 230 VAC (3 phase) |
| | **150 V2** | 15 A / 30 A; 230 VAC (3 phase) |
| | **015 V4** | 1.5 A / 4.5 A; 400 VAC (3 phase) |
| | **038 V4** | 3.8 A / 9 A; 400 VAC (3 phase) |
| | **075 V4** | 7.5 A / 15.0 A; 400 VAC (3 phase) |
| | **150 V4** | 15.0 A / 30.0 A; 400 VAC (3 phase) |
| | **300 V4** | 30.0 A / 60.0 A; 400 VAC (3 phase) (1) |
| | | **Compax3H** |
| | **050 V4** | 50 A / 75 A; 400 VAC (3 phase) |
| | **090 V4** | 90 A / 135 A; 400 VAC (3 phase) |
| | **125 V4** | 125 A / 187.5 A; 400 VAC (3 phase) (2) |
| | **155 V4** | 155 A / 232.5 A; 400 VAC (3 phase) (2) |
| | | **Compax3M** |
| | **050 D6** | 5.0 A / 10.0 A; 400 VAC (3 phase) |
| | **100 D6** | 10 A / 20 A; 400 VAC (3 phase) |
| | **150 D6** | 15 A / 30 A; 400 VAC (3 phase) |
| | **300 D6** | 30 A / 60 A; 400 VAC (3 phase) |
| | | **Compax3F** |
| | **001 D2** | 24 VDC |
| **4** | **Feedback** | |
| | **F10** | Resolver (not for C3F) |
| | **F11** | SinCos© (Hiperface) (not for C3F) |
| | **F12** | Encoder, Sine-cosine with/without hall |
| **5** | **Interface** | |
| | **I10** | Step/direction / analog input (only I10T10) |
| | **I11** | Positioning via inputs/outputs (only I11T11) |
| | **I12** | Positioning via I/Os or RS232 / RS485 / USB |
| | **I20** | PROFIBUS DP V0/V1/V2 (12 Mbaud) |
| | **I21** | CANopen |
| | **I22** | DeviceNet |
| | **I30** | Ethernet Powerlink |
| | **I31** | EtherCAT |
| | **I32** | PROFINET |
| | **C20** | C3 powerPLmC (Multi-axis control) |

| | | |
|---|---|---|
| **6** | **Technology function** | |
| | **T10** | Servo controller (only I10) |
| | **T11** | Positioning |
| | **T30** | Motion control programmable in accordance with IEC 61131-3 |
| | **T40** | Motion control programmable in accordance with IEC 61131-3 & electronic cam |
| **7** | **Options** | |
| | **M00** | No additional supplement |
| | **M10** | Extension by 12 digital I/Os & HEDA Motionbus (not for T10, T11, C20) |
| | **M11** | HEDA Motionbus (not for T10, T11, C20) |
| | **M12** | Extension by 12 digital I/Os (not for T10, T11, C20) |
| **8** | **Optional safety technology for C3M** | |
| | **S1** | Safe torque off (furnished with the device) |
| | **S3** | Extended safety technology |

(1) Operation of the C3S300V4 with condenser module C4.
(2) external voltage supply for ventilator fan required. Available in two versions for single phase feed. Standard: 220/240 VAC: 140 W, on request: 110/120 VAC: 130 W

# Accessories

## Power module: PSUP

| | 1 | 2 | 3 | | 4 | 5 |
|---|---|---|---|---|---|---|
| Order example | **PSU** | **P** | **10** | **D6** | **USB** | **M00** |

| | | |
|---|---|---|
| **1** | **Device family** | |
| | **PSU** | Power module |
| **2** | **Device type** | |
| | **P** | Power module |
| **3** | **Nominal power; supply voltage** | |
| | **10 D6** | 10 kW; 400 VAC (3 phase) |
| | **20 D6** | 20 kW; 400 VAC (3 phase) |
| | **30 D6** | 30 kW; 400 VAC (3 phase) (1) |
| **4** | **Interface** | |
| | **USB** | USB connection |
| **5** | **Options** | |
| | **M00** | no additional supplement |

(1) Operation of the PSUP30 only with mains choke
Required line choke for the PSUP30: 0.45 mH / 55 A
**We offer the following mains chokes:**
**LCG-0055-0.45 mH**
(WxDxH: 180x140x157 mm; 10 kg)
**LCG-0055-0.45 mH-UL**
(with UL certification, WxDxH: 180x170x157 mm; 15 kg)

## Connection set for Compax3 and PSUP

Mating plug connector (furnished with the device)

| | 1 |
|---|---|
| Order example | **ZBH02/02** |

| | | |
|---|---|---|
| **1** | **Accessories** | |
| | **ZBH02/01** | for C3S0xxV2 |
| | **ZBH02/02** | for C3S0xxV4 / S150V4 / S1xxV2 |
| | **ZBH02/03** | for C3S300V4 |
| | **ZBH02/04** | for C3F00xD2 |
| | **ZBH04/01** | for C3M050D6, C3M100D6, C3M150D6 |
| | **ZBH04/02** | for C3M300D6 |
| | **ZBH04/03** | for PSUP10 |
| | **ZBH04/04** | for PSUP20/PSUP030 |

## Display and diagnostics:

**Operator control module BDM01/01**

- Can be plugged in while in operation
- Supply via Compax3

## Operating Module

| | 1 |
|---|---|
| Order example | **BDM01/01** |

| | | |
|---|---|---|
| **1** | **Accessories** | |
| | **BDM01/01** | Operating module for Compax3S |

## Motor cable

| | 1 | 2 |
|---|---|---|
| Order example | **MOK** | **55/02** |

| | | |
|---|---|---|
| **1** | **Accessories** | |
| | **MOK** | Motor cable (2) |
| **2** | **Type** | |
| | | **for SMH / MH56 / MH70 / MH105** (3) |
| | **55/....**(1) | (1.5 mm²; to 13.8 A) |
| | **54/....**(1) | 1.5 mm²; up to 13.8 A cable chain compatible |
| | **56/....**(1) | (2.5 mm²; to 18.9 A) |
| | **57/....**(1) | 2.5 mm²; up to 18.9 A cable chain compatible |
| | | **for MH145 / MH205** (4) |
| | **60/....**(1) | (1.5 mm²; to 13.8 A) |
| | **63/....**(1) | 1.5 mm²; up to 13.8 A cable chain compatible |
| | **59/....**(1) | (2.5 mm²; to 18.9 A) |
| | **64/....**(1) | 2.5 mm²; up to 18.9 A cable chain compatible |
| | **61/....**(1) | 6 mm²; up to 32.3 A cable chain compatible |
| | **62/....**(1) | 10 mm²; up to 47.3 A cable chain compatible |

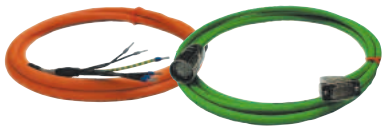
MOK55 and MOK54 can also be used for linear motors LXR406, LXR412 and BLMA.

## Feedback cable

| | 1 |
|---|---|
| Order example | **REK42/02** |

| | | |
|---|---|---|
| **1** | **Accessories** | |
| | | **for MH/SMH motors** |
| | **REK42/....**(1) | Resolver cable (2) |
| | **REK41/....**(1) | Resolver cable (2) cable chain compatible |
| | **GBK24/....**(1) | SinCos© feedback cable (2) cable chain compatible |
| | **GBK38/....**(1) | EnDat 2.1 feedback cable (2) cable chain compatible |
| | **GBK23/....**(1) | Encoder cable (2) |
| | | **for linear motors** |
| | **GBK33/....**(1) | Feedback cable to LXR cable chain compatible |
| | **GBK32/....**(1) | Feedback cable to BLMA cable chain compatible |

(1) - (4) ... see page 32



## Order code for interface cables and connectors

| | 1 |
|---|---|
| Order example | **SSK01/01** |

| 1 | Accessories | |
|---|---|---|
| | **SSK01/....**[1] | RS232 (PC-Compax3) |
| | **SSK33/....** [1] | USB (PC-PSUP) |
| | **SSK21/....**[1] | Ref / analog - with flying leads (X11, X13 @ C3F001D2) |
| | **SSK22/....**[1] | Digital I/Os with flying leads (X12 / X22) |
| | **SSK23/....**[1] | Ref /analog for I/O terminal block (X11) |
| | **SSK24/....**[1] | Digital I/Os for I/O terminal block (X12, X22) |
| | **SSK25/....**[1] | RS232 (PC-Pop) |
| | **SSK27/../..**[6] | RS485 (C3-Pop for more than one C3H on request) |
| | **SSK28/....**[5] | RJ45 crossover cable (C3 HEDA-HEDA, PC-C3 powerPLmC, C3M-C3M communication, PROFINET, EtherCAT, Ethernet Powerlink |
| | **SSK29/....**[1] | Encoder coupling of 2 axes (X11-X11) |
| | **SSK31/....** [1] | Modem-Compax3 X10 |
| | **SSK32/20** | Adapter cable for C3H to SSK01 (15 cm furnished with the device) |
| | **VBK17/01** | RS232 connection controller-programming interface (furnished with the device for C3H X10) |
| | **BUS07/01** | Bus terminal connector (1st. and last C3 in the HEDA bus/or multi-axis system) |
| | **SSL01** | PROFIBUS cable [2] not prefabricated (Length are pieces in metre) |
| | **BUS08/01** | Profibus connector Plug with 2 cable inputs (1 arriving, 1 continuing PROFIBUS cable), as well as a switch for activating the terminal resistor. |
| | **SSL02** | CAN Bus cable [2] not prefabricated; (Length are pieces in metre) |
| | **BUS10/01** | CAN bus connector Plug with 2 cable inputs (1x arriving, 1x continuing CANbus cable), as well as a switch for activating the terminal resistor. |

**DeviceNet**
A mating plug is included in the delivery. Additional information on DeviceNet wiring can be found under:
www.odva.org.

## Parker I/O System - PIO

| | 1 | | 2 |
|---|---|---|---|
| Order example | **PIO** | **-** | **337** |

| 1 | Series | |
|---|---|---|
| | **PIO** | Parker I/O system |
| **2** | **Fieldbus coupler** | |
| | **337** | CANopen coupler |
| | **347** | CANopen coupler ECO |
| | **Bus terminals** | |
| | **Digital inputs** | |
| | **400** | 2DI 24 VDC 3.0 ms |
| | **402** | 4DI 24 VDC 3.0 ms |
| | **430** | 8DI 24 VDC 3.0 ms |
| | **Analog inputs** | |
| | **456** | 2AI ±10 VDC differential input |
| | **468** | 4AI 0-10 VDC S.E. |
| | **480** | 2AI 0-20 mA differential input |
| | **Digital outputs** | |
| | **501** | 2DO 24 VDC 0.5 A |
| | **504** | 4DO 24 VDC 0.5 A |
| | **530** | 8DO 24 VDC 0.5 A |
| | **Analog outputs** | |
| | **550** | 2AO 0-10 VDC |
| | **552** | 2AO 0-20 mA |
| | **556** | 2AO ±10 VDC |
| | **System terminals** | |
| | **600** | Bus terminal (required as terminal for each fieldbus node) |
| | **602** | Power supply terminal 24 VDC |
| | **Accessories** | |
| | **PIO quick designation system** (designation indicators for manual labeling) | |
| | 501 weiß | White |
| | 501 gelb | Yellow |
| | 501 rot | Red |
| | 501 blau | Blue |
| | 501 grau | Grey |
| | 501 orange | Orange |
| | 501 hellgrün | Light green |

## Length code for cables

[1] Length code 1 (Example: SSK01/09 = length 25 m)

| Length [m] | 1.0 | 2.5 | 5.0 | 7.5 | 10.0 | 12.5 | 15.0 | 20.0 | 25.0 | 30.0 | 35.0 | 40.0 | 45.0 | 50.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Order code | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 |

[2] Colors according to DESINA,
[3] With motor connector
[4] With cable eye for motor terminal box,
[5] Length code 2 for SSK28

| Length [m] | 0.17 | 0.25 | 0.5 | 1.0 | 3.0 | 5.0 | 10.0 |
|---|---|---|---|---|---|---|---|
| Order code | 23 | 20 | 21 | 01 | 22 | 03 | 05 |

[6] Order code: SSK27/nn/..
Length A (Pop - 1st. Compax3) variable (the last two numbers corresponding to the cable length code for example SSK27/nn/01)
Length B (1st. Compax3 - 2nd. Compax3 - ... nth. Compax3) fixed 50 cm (only if there is more than 1 Compax3, i.e. nn greater than 01)
Number n (the last two digits)

## Braking resistors

| | 1 | 2 |
|---|---|---|
| Order example | **BRM** | **05/01** |

| 1 | Accessories | |
|---|---|---|
| | **BRM** | Braking resistor |
| **2** | **Type** | |
| | **05/01** | 56 Ω / 0.18 $kW_{cont.}$ (for C3S063V2, C3S075V4) |
| | **05/02** | 56 Ω / 0.57 $kW_{cont.}$ (for C3S075V4) |
| | **08/01** | 100 Ω / 60 $W_{cont.}$ (for C3S025V2, C3S038V4) |
| | **10/01** | 47 Ω / 0.57 $kW_{cont.}$ (for C3S150V4) |
| | **04/01** | 15 Ω / 0.57 $kW_{cont.}$ (for C3S150V2, C3S300V4) |
| | **04/02** | 15 Ω / 0.74 $kW_{cont.}$ (for C3S150V2, C3S300V4) |
| | **04/03** | 15 Ω / 1.5 $kW_{cont.}$ (for C3S300V4) |
| | **09/01** | 22 Ω / 0.45 $kW_{cont.}$ (for C3S100V2) |
| | **11/01** | 27 Ω / 3.5 $kW_{cont.}$ (for C3H0xxV4) |
| | **13/01** | 30 Ω / 0.5 $kW_{cont.}$ for PSUP10D6, for PSUP20D6 (2x30Ω parallel) |
| | **14/01** | 15 Ω / 0.5 $kW_{cont.}$ for PSUP10D6 (2 x 15 Ω in series) for PSUP20, PSUP30 |
| | **12/01** | 18 Ω / 4.5 $kW_{cont.}$ (for C3H1xxV4, PSUP30) |

## Mains filter

For radio interference suppression and compliance with the emission limit values for CE conform operation.

| | 1 | 2 |
|---|---|---|
| Order example | **NFI** | **01/01** |

| 1 | Accessories | |
|---|---|---|
| | **NFI** | Mains filter |
| **2** | **Type** | |
| | **01/01** | for C3S025V2 or S063V2 |
| | **01/02** | for C3S0xxV4, S150V4 or S1xxV2 |
| | **01/03** | for C3S300V4 |
| | **02/01** | for C3H050V4 |
| | **02/02** | for C3H090V4 |
| | **02/03** | for C3H1xxV4 |
| | **03/01** | for PSUP10 Reference axis combination 3x480 V 25 A 6x10 m motor cable length |
| | **03/02** | for PSUP10 Reference axis combination 3x480 V 25 A 6x50 m motor cable length |
| | **03/03** | for PSUP20, PSUP30 Reference axis combination 3x480 V 50 A 6x50 m motor cable length |

## Motor output choke

For disturbance suppression when the motor connecting cables are long

| | 1 | 2 |
|---|---|---|
| Order example | **MDR** | **01/04** |

| 1 | Accessories | |
|---|---|---|
| | **MDR** | **Motor output choke** (for Compax3S, Compax3M >20 m motor cable) |
| **2** | **Type** | |
| | **01/01** | up to 16 A rated motor current |
| | **01/02** | up to 30 A rated motor current |
| | **01/04** | up to 6.3 A rated motor current |

## Condenser module

| | 1 |
|---|---|
| Order example | **Module C4** |

| 1 | Accessories | |
|---|---|---|
| | **Module C4** | Condenser module for C3S300V4 |

## Inputs/Outputs:

**Terminal block: EAM06/..**

For additional wiring of the inputs/outputs:

- Can be mounted in the control cabinet via top hat rail
- Connection EAM06/.. via SSK23/.. to X11, SSK24/.. to X12

## Terminal block

| | 1 | 2 |
|---|---|---|
| Order example | **EAM** | **06/01** |

| 1 | Accessories | |
|---|---|---|
| | **EAM** | Terminal block |
| **2** | **Type** | |
| | **06/01** | I/Os without luminous indicator (for X11, X12, X22) |
| | **06/02** | I/Os without luminous indicator (for X12, X22) |

# With our devices you get:

**The requested**

## Compax3 device

**with the most important information in printed form**

- Installation manual in German / English, French and
- Startup guide in German / English

**+**

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- Parker Integrated Engineering Tool (Software tool) for the project management of several Parker Motion Control products.
- Software tool for supporting the software installation
- Bus Files
- C3M_USB_driver
- CamDesigner
- CoDeSys

**+**

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- Catalogs
- Detailed manuals (PDF) and help files (CHM))
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  - in German, English and French
  - with over 80 manuals and help files containing more than 20000 pages
  - Help files feature to some extent explanatory videos

# Training portfolio:


## Compax3 training

**Our portfolio ranges from an introduction into the Compax3 device technology to Compax3 powerPLmC control technology.**

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**Additional information on: www.parker-eme.com/seminar**

# 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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