ABB motion control and drives for machine builders, OEMs and system integrators
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Machine builders, original equipment manufacturers (OEMs) and system integrators can now specify variable-speed drives, motion control products, PLCs, HMIs and other related equipment and devices from ABB. All products within this catalogue can be seamlessly integrated to offer exceptional performance, efficiency and reliability.
Technology highlights

**ABB industrial drive, ACS880**
Available initially from 0.55 kW to 250 kW at 208 to 690 V, this drive range is designed to tackle any challenge in any motor-driven application across any industry.

The range is the first low voltage AC drive to use ABB’s new common architecture that features the same control panel, harmonised parameters and functions, universal accessories and engineering tools. The architecture brings faster commissioning, minimal operator training and a familiarity across all ABB drives to be launched in the future.

**AC500 PLC**
AC500 is the PLC of choice when scalability, flexibility, performance, integration and communication are mandatory. Numerous I/O modules, carefully specified powerful CPUs and realtime communication couplers are key features of the PLC. The AC500 is one of the fastest PLCs on the market. This can be experienced when programming, running precise calculations, transferring data, serving the I/Os and presenting web server contents. New communications software blocks allow easy connectivity between the AC500 PLC and the ABB machinery drive. In addition, the PLC can perform complex motion control with ABB motion control products.

**AC500-XC PLC**
The XC range of PLCs are designed for extreme conditions (XC) and can operate over a temperature range of -40°C to +70°C. The new AC500-XC series is typically used for wind power plants, solar trackers, water and sewage treatment plants, construction machines, cranes, robot cells, tunnel safety technology and rail-bound automatic vehicles. Almost every module in the AC500 family is now available in the XC version. The dimensions, electrical specifications and software compatibility match the standard range.
CP600 HMI
The CP600 series is ABB’s latest HMI operator panel, allowing users better interaction with production plants and machines. It is highly flexible and is designed to complement advanced applications in complex systems or processes. The panel offers easy functionality and displays comprehensive operational information, allowing an operator to intervene manually at any time to stop or modify the production process.

MicroFlex™ e150
The MicroFlex e150 servo drive combines Ethernet technology, advanced multi-tasking programming and single-phase operation in a compact package.

The MicroFlex e150 can operate from 105 to 250 V AC single or three-phase and is available in multiple current / power ratings.

Ethernet and motor encoder feedback interfaces are fully integrated and optimised for demanding motion applications.

Safe torque-off is a standard feature, to meet the new European machinery directives.

The integrated Ethernet interface offers EtherCAT® for real-time control of multi-axis systems. In addition, EtherNet/IP™, Modbus TCP and RAW Ethernet are supported to enable control possibilities with other controllers such as PLC and Industrial PCs.

Synchronous reluctance motor and drive package
ABB’s new, highly energy-efficient synchronous reluctance motor and drive package represents a breakthrough that combines best-in-class energy efficiency and customer value. The new innovative motor design has no rotor windings, unlike traditional synchronous designs. The rotor, therefore, suffers virtually no power losses and the rotor temperature remains lower than in conventional rotors, helping to achieve better power density and higher energy efficiency. The package includes a matched motor and drive with dedicated software. Optimised for variable-speed operation it offers smooth, efficient process control and optimal use of energy.
What is an ABB micro drive, ACS55?
The ABB micro drive is a component that is bought, together with other components, from a logistical distributor. The aim is for the ABB micro drive to be so small and simple that users of contactors and soft starters are encouraged to move to the benefits of variable-speed control. The ACS55 is a simple drive, programmed by switches. Extended programming is possible via a PC if required, as is programming without power.

Highlights
- Quick and easy installation - less than 5 minutes
- No programming - easy and descriptive interface
- Can be programmed via DriveConfig if needed to access extended functions (useful to OEMs)
- Compact size and narrow shape
- Ideal drive for DIN-rail mounting
- 110 V single phase – input gives 240 V, 3-phase output
- Two mounting orientations
- IP20 as standard
- No control panel required
- User interface via three rotary switches and a further eight on/off function DIP switches located on panel front
- Potentiometer option
- Integral EMC filter for 1st environment (EN61800-3), unrestricted distribution (C1)

For more details, please refer to Technical Catalogue 3AFE68899842

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
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</table>
| No programming if required | Inverter parameter settings with DIP switches and potentiometers. Extended programming is possible via DriveConfig if needed | Faster set-up  
Easyer configuration  
Easy drive for new users |
| Compact size and narrow shape | Up to 0.37 kW, 45 mm width; 2.2 kW, 67.5 mm width | Less space required for installation |
| Removable mounting clip | Removable clip allows DIN-rail and wall-mounting from back and side of the unit | Flexible and easy mounting |
| DriveConfig kit | Fast and safe configuration of an unpowered drive | Simple programming for high volume OEMs - programming in the box, no mains power needed |
| EMC | First environment. C1 EMC filters as standard (‘E’ model) | Low EMC emissions |
| Automatic switching frequency | Increases switching frequency automatically, when drive temperature is decreased | Provides lowest possible noise without derating the drive |
| 110-240 V AC, single phase supplies | Output always capable of full 240 V, 3-phase, regardless of supply voltage | Can easily replace single phase cap start motors |
| RoHS compliance | Compliance achieved in 2007 | Environmentally friendly drives |
Options and interfaces

Potentiometer

Potentiometer with two switches: start/stop and forward/reverse direction. No external power source is needed for the potentiometer.

DriveConfig programming with no power

To increase the number of applications possible with the ACS55, the DriveConfig kit can be used to access an extended parameter set. It is still possible to programme in the usual way, if these extended features are not required. DriveConfig also allows programming in the box, with no need to apply power to the drive.

Suitable for use in a wide range of applications including pumps, fans, material handling systems, automatic gates, solar trackers, treadmills and whirlpool baths.
What is an ABB micro drive, ACS150?
The ABB micro drive is a component that is bought, together with other components, from a logistical distributor. ABB micro drives are designed to encourage users of contactors and soft starters to move to the benefits of variable-speed control. The ACS150 extends the capability of the ACS55 (see page 6), by adding an extended power range and programmability. The ACS150 can solve more difficult tasks like PID functionality. To retain the simplicity of an ABB micro drive, the ACS150 does not have a serial communications interface or extended options but does have a fixed keypad and speed control potentiometer.

Highlights

- PID controller built-in
- DC hold stop ensures stationary motor shaft
- IR compensation improves starting torque for heavy loads
- Parameter lock prevents tampering by unauthorised staff
- DIN rail or screw mounting as standard
- IP20 enclosure
- Drive branding available for volume users
- Fixed basic control panel
- Dedicated control potentiometer
- Two-year warranty
- Flashdrop - parameter programming whilst still in its box - excellent for OEMs
- Protected against wiring errors: shows fault if power cable is inadvertently connected to motor terminals
- Automatic noise reduction
- Optional short or long parameter mode for standard or advanced users
- Unified height across the power range simplifies cabinet design

For more details, please refer to Technical Catalogue 3AFE68596114

### Feature

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>FlashDrop</td>
<td>Faster and easier drive set-up and commissioning for volume manufacturing</td>
<td>No need for high voltage safe programming areas Parameters can be hidden for clarity Programme the drive during machine production build-up</td>
</tr>
<tr>
<td></td>
<td>- programming in the box</td>
<td></td>
</tr>
<tr>
<td>Fixed interface</td>
<td>Simple drive with comfortable and robust interface.</td>
<td>Integrated control panel with clear LCD display, backlight and buttons for editing and control</td>
</tr>
<tr>
<td></td>
<td>- Easy to navigate parameter structure</td>
<td></td>
</tr>
<tr>
<td>Fixed potentiometer</td>
<td>Intuitive speed setting</td>
<td>Integrated potentiometer. Settings shown on the control panel</td>
</tr>
<tr>
<td>Programmable functions</td>
<td>Useful control functions like PID, accelerating rates and start/stop modes included</td>
<td>Take control of the motor and reduce cost in the installation</td>
</tr>
<tr>
<td>Built-in EMC filter</td>
<td>No need for external filtering</td>
<td>2nd environment built-in filter. Complying with IEC 61800-3 as standard</td>
</tr>
<tr>
<td>Built-in brake chopper</td>
<td>Reduced cost, saved space and simple wiring</td>
<td>100 percent braking capability</td>
</tr>
<tr>
<td>Flexible installation</td>
<td>Optimum layout and efficient cabinet space usage</td>
<td>Screw, DIN-rail, sideways and side-by-side mounting Unified height and depth</td>
</tr>
<tr>
<td>Drive protection</td>
<td>Latest solutions to protect the drive and offer trouble-free use and the highest quality</td>
<td>The drive protects itself when power is connected to the motor terminals. I/O protected against short-circuit. Coated boards included as standard</td>
</tr>
<tr>
<td>Brand labelling</td>
<td>Drive logo, control panel logo, manuals and box can be printed with machine builders logo and name</td>
<td>Drives and packaging badged to your design</td>
</tr>
<tr>
<td>RoHS compliance</td>
<td>Compliance achieved in 2007</td>
<td>Environmentally friendly drives</td>
</tr>
</tbody>
</table>
Cabinet-mounted drives (UL open), wall mounted drives (NEMA 1)

<table>
<thead>
<tr>
<th>Frame size</th>
<th>IP20 UL open</th>
<th>NEMA 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>H2</td>
<td>H3</td>
</tr>
<tr>
<td>R0</td>
<td>169</td>
<td>202</td>
</tr>
<tr>
<td>R1</td>
<td>169</td>
<td>202</td>
</tr>
<tr>
<td>R2</td>
<td>169</td>
<td>202</td>
</tr>
</tbody>
</table>

H1 = Height without fastenings and clamping plate
H2 = Height with fastenings but without clamping plate
H3 = Height with fastenings and clamping plate
H4 = Height with fastenings and NEMA 1 connection box
H5 = Height with fastenings, NEMA 1 connection box and hood
W = Width
D = Depth

Options available
– Input and output chokes
– Brake chopper resistors (all drives in the ACS150 range have integral chopper)
– 1st. environment EMC filters - footprint style
– Low leakage EMC filters < 30mA leakage
– FlashDrop - programming without power
– NEMA 1 kit for tidier installations

ABB micro drives bring speed control benefits to a wide variety of applications including mixing, conveyors, heat pump systems and fans.
ABB general purpose drive for pumps and fans

0.37 kW to 22 kW, ACS310
Motor control method – Scalar (quadratic/squared torque only)
200/240 V, 3-phase supply, 0.37 kW - 11 kW
380/480 V, 3-phase supply, 0.37 kW - 22 kW

What is an ABB general purpose drive for fans and pumps?

ABB general purpose drives include a dedicated fan and pump controller designed for squared-torque applications such as pumps, booster pumps and centrifugal fans.

The drive design includes a powerful set of features which benefit pump and fan applications including built-in PID controllers and PFC (pump and fan control). The drives also have pre-programmed protection functions such as pipe cleaning (anti-jam) and duty standby functionality.

These features, combined with pre-programmed application macros, an intuitive user interface and several assistant screens, speed up the installation, parameter setting and commissioning of the drive.

Highlights
- Pump and fan features such as pump and fan control (PFC) and soft pump and fan control (SPFC) for multi-pump and soft fill control
- Pipe cleaning (anti-jam) and pipe fill functions
- Multiple PID set points, allowing for automatic duty/assist/standby schemes to be implemented
- Energy efficiency counters, real-time clock
- Energy optimiser – optimises the motor control for the application
- Load analyser for optimised dimensioning of the drive, motor and process
- Embedded Modbus RS-485 fieldbus interface
- FlashDrop tool for fast parameter setting, without mains power

<table>
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<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
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<tr>
<td>Pump and fan control (PFC) feature to control pumps and fans in parallel</td>
<td>One drive controls several pumps or fans and eliminates the need for an external programmable logic controller</td>
<td>Saves cost of additional drives and external PLC Longer life for pump or fan system while reducing maintenance time and costs. Maintenance can be carried out safely without stopping the process</td>
</tr>
<tr>
<td>Soft pump and fan control feature (SPFC)</td>
<td>Reduces unwanted pressure peaks in pumps and pipelines when an auxiliary motor is started</td>
<td>Reduces maintenance costs Longer life for pump or fan system</td>
</tr>
<tr>
<td>Pump protection functions</td>
<td>Pre-programmed features like: Pipe cleaning (anti-jamming), inlet/outlet pressure supervision and detection of under- or over-load for preventive maintenance</td>
<td>Reduces maintenance costs Smoother processes: improved and optimised system Longer life for pump and fan system, reduced maintenance costs</td>
</tr>
<tr>
<td>Energy monitoring and optimising features</td>
<td>Drive monitors the saved energy compared to equivalent DOL operation</td>
<td>Energy savings presented in local currency and CO₂ Consumed energy optimised across the speed and load range</td>
</tr>
<tr>
<td>Full output current at 50°C ambient</td>
<td>Drive can be operated in ambient temperatures up to 50°C without de-rating the output current</td>
<td>Optimised drive dimensioning for wide temperature range</td>
</tr>
<tr>
<td>Unified height and depth</td>
<td>Optimum installation layout, as all drive frames are the same height – only the width changes</td>
<td>Space savings. Easier to layout the cabinet back panel</td>
</tr>
<tr>
<td>Best-in-class user interfaces</td>
<td>Assistant and Basic keypads with intuitive operation. Short and long menus, Assistants and wizards for ease of use</td>
<td>Users are supported as they program the drive. Can tailor the open menu views to suite customer needs</td>
</tr>
<tr>
<td>FlashDrop</td>
<td>Faster and easier drive set up and commissioning for volume manufacturing</td>
<td>Fast, safe and trouble-free method to set up and commission without powering up the drive - patented</td>
</tr>
<tr>
<td>RoHS compliance</td>
<td>Compliance achieved in 2007</td>
<td>Environmentally friendly drives</td>
</tr>
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For more details, please refer to Technical Catalogue 3AUA0000051082
ABB general purpose drive for pumps and fans

ACS310 – Dimensions and options

<table>
<thead>
<tr>
<th>Frame size</th>
<th>H1 (mm)</th>
<th>H2 (mm)</th>
<th>H3 (mm)</th>
<th>W (mm)</th>
<th>D (mm)</th>
<th>Weight (Kg)</th>
<th>H4 (mm)</th>
<th>H5 (mm)</th>
<th>W (mm)</th>
<th>D (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0</td>
<td>169</td>
<td>202</td>
<td>239</td>
<td>70</td>
<td>161</td>
<td>1.1</td>
<td>257</td>
<td>280</td>
<td>70</td>
<td>169</td>
<td>1.5</td>
</tr>
<tr>
<td>R1</td>
<td>169</td>
<td>202</td>
<td>239</td>
<td>70</td>
<td>161</td>
<td>1.3</td>
<td>257</td>
<td>280</td>
<td>70</td>
<td>169</td>
<td>1.7</td>
</tr>
<tr>
<td>R2</td>
<td>169</td>
<td>202</td>
<td>239</td>
<td>105</td>
<td>165</td>
<td>1.5</td>
<td>257</td>
<td>282</td>
<td>105</td>
<td>169</td>
<td>169</td>
</tr>
<tr>
<td>R3</td>
<td>169</td>
<td>202</td>
<td>236</td>
<td>169</td>
<td>169</td>
<td>2.9</td>
<td>260</td>
<td>299</td>
<td>169</td>
<td>177</td>
<td>3.5</td>
</tr>
<tr>
<td>R4</td>
<td>181</td>
<td>202</td>
<td>244</td>
<td>260</td>
<td>169</td>
<td>4.4</td>
<td>270</td>
<td>320</td>
<td>260</td>
<td>177</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Options available

- Input and output chokes
- ACS310 has no braking options
- 1st environment EMC filters - footprint style
- Low leakage EMC filters < 30mA leakage
- FlashDrop
- An extensive range of user interfaces is available - refer to page 14
- NEMA kit for tidier installation

Ideal for meeting the variable-torque loads demanded by centrifugal fans and pumps including booster pump systems, irrigation, level control and wood drying kilns.
ABB machinery drive

0.37 kW to 22 kW, ACS355
Motor control method - scalar, vector (open and closed loop)
200/240 V, 1-phase supply, 0.37 kW - 2.2 kW
200/240 V, 3-phase supply, 0.37 kW - 11 kW
380/480 V, 3-phase supply, 0.37 kW - 22 kW

What is an ABB machinery drive?
ABB machinery drives are designed for the machine building sector. In serial type manufacturing the consumed time per unit is critical. The drive is designed to be optimal in terms of installation, setting parameters, available machinery features and commissioning. The basic product has been made as user-friendly as possible, yet providing high intelligence. The drive offers diverse functionality to cater for the most demanding needs. The drive is also equipped with a safe torque-off interface to SIL3/PL e.

Highlights
– FlashDrop - parameter programming with drive still in its box - excellent for OEMs
– Sequence programming designed for food and beverage and materials handling applications - Eight-steps included
– Impressive software and compact hardware
– Unified height and depth across the power range simplifies cabinet design
– Optimised interfaces for users and machines (can select Basic or Assistant control panel)
– Protected against wiring errors: shows fault if power cable is inadvertently connected to motor terminals
– Automatic noise reduction
– Drive branding available for volume users

For more details, please refer to Technical Catalogue 3AFE68596106

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<th>Feature</th>
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<th>Benefit</th>
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<tbody>
<tr>
<td>FlashDrop*</td>
<td>Faster and easier drive set up and commissioning for volume manufacturing</td>
<td>Fast, safe and trouble-free method to set up and commission without powering up the drive - patented</td>
</tr>
<tr>
<td>Safe torque-off</td>
<td>Built-in compliance to new Machinery Directive</td>
<td>SIL3/PL e certified dual channel input - TÜV approved</td>
</tr>
<tr>
<td>Sequence programming</td>
<td>Application specific 8-state programming with</td>
<td>Logic programming included as standard</td>
</tr>
<tr>
<td></td>
<td>comprehensive triggering conditions</td>
<td>Reduces the need for external PLC</td>
</tr>
<tr>
<td>Common DC link</td>
<td>Connection to existing DC power sources</td>
<td>Easy integration into high performance machines</td>
</tr>
<tr>
<td>User interfaces</td>
<td>Wide range, including assistant panel - see options</td>
<td>Cost efficient approach - according to requirements of OEM</td>
</tr>
<tr>
<td>Fieldbus</td>
<td>Extensive range of industrial fieldbus option modules available</td>
<td>Connectability to all of the most popular fieldbuses in use</td>
</tr>
<tr>
<td>24 V ‘live keypad’ operation</td>
<td>Connect 24 V to the drive via the MPOW option</td>
<td>Keep fieldbus, control card and I/O healthy while able to remove the main supply - safer maintenance</td>
</tr>
<tr>
<td>Built-in EMC filter</td>
<td>2nd environment filter complying with IEC 61800-3 as standard</td>
<td>No extra space, parts, time or cost required</td>
</tr>
<tr>
<td>Built-in brake chopper</td>
<td>100 percent braking capability</td>
<td>Reduces cost, saves space and simplifies wiring</td>
</tr>
<tr>
<td>Drive protection</td>
<td>Latest solutions to protect the drive and offer trouble-free use and the highest quality</td>
<td>The drive protects itself when power is connected to the motor terminals. I/O protected against short-circuit Coated boards included as standard</td>
</tr>
<tr>
<td>IP66/69k enclosure option</td>
<td>Makes drive suitable for hose down applications</td>
<td>Meets food hygiene standards in a wall-mounted enclosure</td>
</tr>
<tr>
<td>Brand labelling</td>
<td>Drive logo, control panel logo, manuals and box can be printed with machine builders logo and name</td>
<td>Drives and packaging badged to your design</td>
</tr>
<tr>
<td>RoHS compliance</td>
<td>Compliance achieved in 2007</td>
<td>Environmentally friendly drives</td>
</tr>
</tbody>
</table>

* For details of FlashDrop, see user interfaces in ABB drive section (page 14)
ABB machinery drive
ACS355 – Dimensions and options

Options available
- Input and output chokes
- Brake chopper resistors (all drives in the ACS355 range have integral chopper)
- 1st. environment EMC filters - footprint style
- Low leakage EMC filters < 30mA leakage
- FlashDrop
- Fieldbus modules
- An extensive range of user interfaces is available - refer to page 14
- IP66/69 designed to the relevant hygiene specs for food and beverage
- NEMA kit for tidier installation

Suitable for a wide range of applications including mixing, conveyors, decanters and packaging machines in industries from food & beverage, textiles, printing, rubber & plastics.
Assistant control panel
The assistant control panel features a multilingual alphanumeric display for easy drive programming. The control panel has various assistants and a built-in help function to guide the user. It includes a real-time clock, which can be used during fault logging and in controlling the drive, such as start/stop. The control panel can be used for copying parameters for backup or for downloading to another drive. A large graphical display and soft keys make it extremely easy to navigate.

Basic control panel
The basic control panel features a single line numeric display. The panel can be used to control the drive, set the parameter values or copy them from one drive to another, or view changes.

Panel cover
The panel cover protects the drive when no control panel is used. The ABB machinery drive is delivered with a panel cover as standard. In addition, there are two alternative control panels available as options, see above.

NEMA 1 kit
The NEMA 1 kit is a convenient cover which is added to the drive and enables easy wall-mounting. It includes a connection box for finger protection, conduit tube installation and a hood for protection against dirt and dust.

Panel mounting kit, IP54 and IP66
The panel mounting kits enable mounting of control panels onto cabinet doors. These kits include a 3 m extension cable, a gasket, mounting screws and a mounting template - two versions are now available, IP54 and IP66. The IP66 has an additional keypad membrane cover.

Relay extension module (ACS355 only)
Add an additional three relays to the ACS355 to allow greater use of the drives program. Fits behind the keypad.

Potentiometer (ACS355 only)
Potentiometer with two switches: start/stop and forward/reverse direction. No external power source is needed for the potentiometer. Fits to the drive.

FlashDrop
Programme the drive whilst still in the box, with no power. Perfect for OEMs and machine builders. FlashDrop is a powerful palm-sized tool for fast and easy parameter selecting and setting. It gives the possibility to hide selected parameters to protect the machine. The tool stores 20 parameter sets, which can be moved between a PC and a drive. Safe programming during machine building production.

Fieldbus interfaces (ACS355 only)
Extensive range of plug-in fieldbus interfaces, allowing connection to Profibus, DeviceNet, CanOpen, Modbus RTU and Ethernet and others.

24V “live keypad” options (ACS355 only)
There are two ways of powering the fieldbus modules, so that they operate when the main power is removed.

FEPA - maintains power to the fieldbus module only

MPOW - Powers the fieldbus module, the control card, the drive I/O and the drive keypad, generating the functionality commonly known as ‘live keypad’ operation.

DriveWindow Light PC tool
DriveWindow Light is a parameterisation and commissioning tool used to set-up and commission the drive. Monitoring and diagnostic facilities are included, as well as a local control panel. Wizards are included to guide the user through the most commonly performed tasks.
### What is the ABB machinery drive?

ABB machinery drives are designed to meet the production and performance needs of machine builders, system integrators, panel builders and end users in a broad range of applications. The compact design of the ACS850 low voltage AC drive makes it ideal for cabinet installation. Direct torque control (DTC) provides highly accurate motor torque and speed control without any encoder feedback. Depending on the challenges of the application, the drive can be programmed in a variety of ways. The drive’s integrated safety function helps to enhance the safe operation of the application.

### Highlights

- Compact size, ideal for cabinets
- IP20 as standard
- Easy access to power terminals in cabinet installations
- Direct torque control (DTC) as standard for highly accurate motor torque and speed control
- Wide range of options including fieldbuses and PC tools
- Safe torque-off (STO) as standard
- Maintenance and diagnostic assistants
- Removable memory unit

### Feature

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact size, side-by-side mounting</td>
<td>Smallest frame size is only 93 mm (4 in) wide.</td>
<td>Optimum installation layout and efficient cabinet space usage.</td>
</tr>
<tr>
<td></td>
<td>More drives can be placed in the same cabinet.</td>
<td>Space and cost savings.</td>
</tr>
<tr>
<td>Modular design</td>
<td>Many standard features and a wide range of options allow different system configurations.</td>
<td>Fits many application needs. Offers flexibility in system design.</td>
</tr>
<tr>
<td>Safe torque-off</td>
<td>Built-in compliance to new Machinery Directive</td>
<td>SIL3/PL e certified dual channel input - TÜV approved</td>
</tr>
<tr>
<td>Intuitive human-machine interface</td>
<td>Large alphanumeric display showing different assistants and macros.</td>
<td>Faster and more accurate drive configuration.</td>
</tr>
<tr>
<td>Drive programming and configuration</td>
<td>Can replace relays and small PLCs with function block programming.</td>
<td>Optimal drive settings as assistants offer interactive help.</td>
</tr>
<tr>
<td>Memory unit for easy drive management</td>
<td>Complete drive configuration and settings are stored in a separate memory unit.</td>
<td>Drive functionality can be easily configured, modified or updated with the memory unit.</td>
</tr>
<tr>
<td></td>
<td>Power or control unit can be replaced without parameter setting.</td>
<td>Offers quick and easy after-sales service.</td>
</tr>
<tr>
<td>Robust main circuit design</td>
<td>Enhanced reliability. Coated boards and long lifetime components.</td>
<td>Less process interruptions.</td>
</tr>
<tr>
<td></td>
<td>Cooling supervision (depending on frame size).</td>
<td>Lower maintenance costs.</td>
</tr>
<tr>
<td>Extensive protection</td>
<td>Advanced thermal protection of the drive semiconductors and motor.</td>
<td>Higher process uptime.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Early warning of any production interruptions.</td>
</tr>
<tr>
<td>Maintenance assistant</td>
<td>Indicates preventive maintenance needs of drive, motor or machine.</td>
<td>Helps with maintenance schedules and cost control of maintenance.</td>
</tr>
<tr>
<td>Diagnostic assistant</td>
<td>Helps in locating failures or reasons for performance changes and suggests remedies.</td>
<td>Reduced process downtime.</td>
</tr>
<tr>
<td>Energy saving calculator</td>
<td>Monitors used and saved energy, displayed in kWh, currency (€ or $) or volume of CO₂ emission.</td>
<td>Easy to check the return on investment.</td>
</tr>
</tbody>
</table>

For further information see Technical Catalogue 3AUA0000041481
ABB machinery drive modules

ACS850 – Dimensions and options

Notes
All dimensions and weights are without additional options.

1)  Height is the maximum measure without clamping plates.
2)  An additional 50 mm (2 in) should be reserved for feedback cabling if FEN-01, -11 or -21 options are used (except for frame G1 and G2 with integrated control unit).
3)  Assistant control panel adds 23 mm (0.9 in) to the depth (except for frame G1 and G2 with integrated control unit).
4)  G frames include separately mounted control section, 325 mm (12.8 in) H x 114 mm (4.5 in) D x 94 mm (3.7 in) W, 1.3 kg (3 lb) (except for frame G1 and G2 with integrated control unit).
5)  With +H381 optional cabling panel

Options available
– Control and communication modules
– Control panel
– G1 and G2 frames - larger frames on wheeled modules - easy install
– 1st and 2nd environment EMC filters
– Choice of mains chokes and braking options
– Crane control programming option
– SynRM (synchronous reluctance) motor control

Suitable for meeting the production and performance needs of a broad range of applications including cranes, extruders, winches, conveyors, winders, pumps, fans and mixers.
What is a SynRM, synchronous reluctance motor?

ABB offers two high-performance variable-speed motor and drive packages for industrial applications such as fans and pumps. Both packages are based on perfectly controlled synchronous motor technology without permanent magnet materials, combined with the ACS850 (previous page). The packages are optimised for quadratic torque loads.

- The IE4 super premium efficiency package is designed to meet increasing demands of green energy use in general industrial applications.
- The high output SynRM motor and drive package offers machine builders a highly powerful, yet compact solution that improves machine performance and enables more cost efficient machine designs. Equivalent motors can be two frame sizes smaller.

**SynRM super premium efficiency class IE4**

160 to 315 cast iron frame, 11 kW to 200 kW combined with ABB machinery drive.

This package, consisting of a super premium efficiency synchronous motor and matched frequency converter, is designed for maximum efficiency.

**Highlights**

- Energy saver – IE4 efficiency
- Swappable with induction motors – same size and output
- Reliable – cooler bearings and windings
- Service friendly – no permanent magnets
- Optimised for VSD operation
- Advanced ABB open loop control software (no feedback device needed)
- Global ABB support

**High output SynRM motor**

90 to 132 aluminium frame, 1 kW to 55 kW combined with ABB machinery drive.

160 to 315 cast iron frame, up to 315 kW combined with ACS850 machinery drive.

This package, a high-performance synchronous motor and matched frequency converter, is designed for maximum performance.

**Highlights**

- Up to two frame sizes smaller compared to induction motors
- Competitive product offering compared to traditional or other new technologies
- Minimum IE2 efficiency
- Optimised for VSD operation up to 6000 rpm
- Simplicity – no permanent magnets
- Extended bearing service intervals
- Advanced ABB open loop control software
- Global ABB support

---

**Standard for LV motor efficiency classes**

Motors covered by standard include:

- Single-speed, three-phase, 50 and 60 Hz
- 2, 4 or 6-pole
- Rated output from 0.75 kW to 375 kW
- Rated voltage $U_N$ up to 1000 V
- Duty type S1 (continuous duty) or S3 (intermittent periodic duty) with a rated cyclic duration factor of 80 percent or higher
- Capable of operating direct-on-line 50 and 60 Hz

<table>
<thead>
<tr>
<th>Efficiency Level</th>
<th>Code</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super premium efficiency</td>
<td>IE4</td>
<td></td>
</tr>
<tr>
<td>Premium efficiency</td>
<td>IE3</td>
<td>Premium</td>
</tr>
<tr>
<td>High efficiency</td>
<td>IE2</td>
<td>Comparable to Eff1</td>
</tr>
<tr>
<td>Standard efficiency</td>
<td>IE1</td>
<td>Comparable to Eff2</td>
</tr>
</tbody>
</table>
ABB offers solutions to a variety of machine control applications in many industries. Our capability includes intelligent programmable drives, plug-in controller options for drives, real-time Ethernet controllers, PLC systems and standard analogue and stepper-based control products.

EtherCAT solutions using AC500

ABB’s extensive AC500 PLC product line provides industry standard PLCopen motion functions within the IEC61131-3 programming environment and a broad line of expansion options such as distributed I/O and fieldbus networks. When combined with the ACSM1 high power motion drives, the new MicroFlex e150 or the ACS355 standard drives, the PLC offers machine control based on real-time EtherCAT technology.

Ethernet POWERLINK solutions

The NextMove e100 machine controller, MotiFlex e100 and MicroFlex e100 motion drives are optimised as a family to solve complex motion for up to 16 axes of interpolated motion utilising Ethernet POWERLINK. e100 products feature integrated Ethernet, CAN manager for I/O expansion and are programmable in MINT, a high level language for motion applications.

Intelligent drives solutions

MicroFlex e100 and MotiFlex e100 are programmable in MINT Lite and provide solutions to simple motion tasks such as indexing or flexible solutions to distributed control from PLCs where the behaviour of each axis can be tailored.

MicroFlex e150 supports multi-tasking MINT programming with support for software CAMs, flying shears and registration control, offering a single device solution to applications such as cut-to-length and labelling.

A plug-in MINT motion controller option for MotiFlex e100 provides five axes of coordinated motion, eliminating the need for an external controller thereby saving panel space and reducing cabling.
<table>
<thead>
<tr>
<th>Controllers</th>
<th>Multiaxis real-time Ethernet</th>
<th>Single axis motion</th>
<th>Simple motion</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC500</td>
<td>EtherCAT Solutions</td>
<td>POWERLINK Solutions</td>
<td>Multi axis intelligent drives</td>
<td>-- Scalable GPU family</td>
</tr>
<tr>
<td>MINT Module</td>
<td>4 axes</td>
<td>4 x e100</td>
<td>1 x analogue</td>
<td>-- IEC61131-3 programming</td>
</tr>
<tr>
<td>NextMove e100</td>
<td>16 axes</td>
<td>3 x analogue</td>
<td>4 x stepper</td>
<td>-- PLCopen motion functions</td>
</tr>
<tr>
<td>NextMove ESB-2</td>
<td>8 axes</td>
<td>4 x analogue</td>
<td>4 x stepper</td>
<td>-- Plug-in controller for MotiFlex e100</td>
</tr>
<tr>
<td>MicroFlex e100</td>
<td>+/-10 V or</td>
<td>As an axis</td>
<td>MINT Lite</td>
<td>-- 4 axes on POWERLINK + 1 x analogue</td>
</tr>
<tr>
<td>MicroFlex 150</td>
<td>Step &amp; Dir'</td>
<td>with MINT module</td>
<td></td>
<td>-- CANopen</td>
</tr>
<tr>
<td>MicroFlex e150</td>
<td>Integrated Ethernet</td>
<td>Advanced MINT</td>
<td></td>
<td>-- Multi axis machine controller</td>
</tr>
<tr>
<td>MicroFlex e100</td>
<td>Integrated Ethernet</td>
<td>MINT module</td>
<td>MINT Lite</td>
<td>-- Real-time Ethernet POWERLINK</td>
</tr>
<tr>
<td></td>
<td>4 +1 axes</td>
<td>4 +1 axes</td>
<td>+/-10V</td>
<td>-- MINT programmable</td>
</tr>
<tr>
<td>ACS855</td>
<td>Fieldbus option</td>
<td>SPC</td>
<td>+/-10V</td>
<td>-- CANopen RS232/RS485</td>
</tr>
</tbody>
</table>

- CANopen
- EtherCAT, Ethernet/IP, Modbus TCP/IP
- Universal encoder interface
- STO SIL 3 PL e
- EtherCAT, Ethernet/IP, Modbus TCP/IP
- Universal encoder interface
- Feedback, fieldbus and I/O options
- AC servo motor control
- Ethernet POWERLINK, Modbus TCP/IP
- Universal encoder interface
- Feedback, fieldbus and I/O options
- Plug-in 5 axes controller option
- SPC motion function blocks
- Broad power range/line regen option
- Feedback, fieldbus and I/O options
- STO SIL 3 PL e
- Flexible inverter drives for auxiliary axes
- Feedback, fieldbus and I/O options
- STO SIL 3 PL e
What is an ABB motion control drive?
ABB motion control drives provide high performance torque, speed and motion control for demanding machines. The following is an overview. For more information please contact ABB.

**Highlights**
- One drive for all motor types
- Memory unit for easy drive management and re-commissioning
- Wide range of feedback interfaces
- Solution programming to extend drive functions, DriveStudio (IEC61131 compatible)
- Safe torque-off (SIL3 rated), TÜV approved

**Common DC link and regenerative capability**
The ABB motion control drive can be supplied with an active rectifier. This allows common DC link schemes to be designed. Other drives can be supplied by this common DC link, including the ABB machinery drive. Full regenerative capability is possible with the rectifier and renewable energy applications become possible.

**Lift/elevator control**
Specific lift/elevator application control programme available, tailored for the lift industry

**Speed and torque control**
- Open and closed loop DTC
- For synchronous and asynchronous motors

**Motion control**
In addition to speed and torque control, ABB motion control drive also offers:
- Point-to-point positioning with extensible positioning profile sets
- Synchronisation (encoder feedback or drive-to-drive link)
- Register control based on fast probe inputs
- Multiple homing methods
- Pre-written motion blocks for ABB PLCs

**DTC (direct torque control)**
ABB’s highly accurate motor control platform, has gained extensive acceptance from ABB industrial drive customers for over a decade. DTC fulfils demanding machine builders’ requirements.

**Motors**
ABB can supply suitable motors and cable sets to complete the machinery drive offering.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Various control arrangements</td>
<td>Speed and torque control variant as well as motion control variant. High bandwidth for torque, speed and position control</td>
<td>Suitable for wide range of standard and demanding applications</td>
</tr>
<tr>
<td>Asynchronous and synchronous motor compatibility</td>
<td>Various motor types from asynchronous motors (standard induction motors, servo) to synchronous motors (servo, high torque), can be controlled in open or closed loop mode</td>
<td>Saves capital costs through purchase of one drive type to control various motor types</td>
</tr>
<tr>
<td>System offering from one supplier</td>
<td>ABB has a wide offering for products and expertise in motion control applications with PLCs, servo motors and other low voltage products.</td>
<td>Reduces supplier selection, design, installation and commissioning time</td>
</tr>
<tr>
<td>Wide range of feedback interfaces</td>
<td>Speed and position feedback needs of virtually all applications can be readily accommodated. Each feedback interface option has two inputs and one output</td>
<td>Use one drive type for variety of applications, saving time and cost in finding alternative suppliers and purchasing a variety of different drives</td>
</tr>
<tr>
<td>Safe torque-off</td>
<td>Built-in compliance to new Machinery Directive</td>
<td>SIL3/PL e certified dual channel input - TÜV approved</td>
</tr>
</tbody>
</table>

**ABB motion control drive**
0.75 kW to 355 kW, ACSM1
Motor control method - Enhanced DTC
380/480 V 3-phase supply, 0.75 kW - 110 kW

For more details, please refer to Technical Catalogue 3AFE68675073
Options available

- Regenerative supply to feed ACSM1 drive modules with full braking power capacity
- Optionally drives can be powered from 230 V AC UPS or a 48 to 96 V back-up battery supply
- Mains filters to meet EMC requirements
- Mains chokes to limit total harmonic distortion (THD)
- Braking resistors for various braking power needs
- Possibility for different common DC configurations
- Extensive range of servo motors and cable sets

Notes
All dimensions and weights are without options.
1) Height is the maximum measure without clamping plates.
2) Depth will increase by 23 mm with options. Additionally, 50 mm should be reserved for feedback cabling if FEN-xx options are used.
3) Depth or weight is for ACSM1 with the cold plate variant

H = Height
W = Width
D1 = Standard depth

<table>
<thead>
<tr>
<th>Frame size</th>
<th>Height1 mm</th>
<th>Width mm</th>
<th>Depth2 mm</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0</td>
<td>169</td>
<td>202</td>
<td>239</td>
<td>70</td>
</tr>
<tr>
<td>R1</td>
<td>169</td>
<td>202</td>
<td>239</td>
<td>70</td>
</tr>
<tr>
<td>R2</td>
<td>169</td>
<td>202</td>
<td>239</td>
<td>105</td>
</tr>
<tr>
<td>R3</td>
<td>169</td>
<td>202</td>
<td>236</td>
<td>169</td>
</tr>
<tr>
<td>R4</td>
<td>181</td>
<td>202</td>
<td>244</td>
<td>260</td>
</tr>
</tbody>
</table>
What is a MicroFlex Analogue servo drive?
The ABB MicroFlex Analogue is a compact servo drive, available in single – or three-phase 105 to 250 V AC or 3-phase 230 V AC operation in current ratings of 3, 6 and 9 A.

The motor feedback is software programmable, accepting encoder, SSI (Synchronous Serial Interface) or Halls only. Resolver feedback is available as a factory fit option.

Motors can be tuned using the intuitive software tools, MINT Workbench, which provides full auto-tuning capabilities and wizard based configuration. Extended capabilities include programmable notch filters to reduce or remove resonance in a machine.

Where can it be used?
The ABB MicroFlex Analogue provides high performance servo control for both rotary and linear brushless motors with its powerful DSP (digital signal processor) core.

Highlights
- Brushless servo drive
- Control of rotary and linear servo motors
- Single or 3-phase 105-250 V AC
- 3, 6 or 9 A continuous with 2x overload for 0.5 seconds.
- Panel-mounting enclosure
- Software selectable encoder, SSI (Synchronous Serial Interface) or Hall only feedback
- Optional resolver feedback

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>External 24V logic supply</td>
<td>Supports control electronics even when the main power is off</td>
<td>Maintains drive status and simulated encoder output to an external controller to reduce the need to re-datum after main AC power is removed</td>
</tr>
<tr>
<td>Built-in brake chopper</td>
<td>On-board braking capability</td>
<td>More dynamic movements possible</td>
</tr>
<tr>
<td>Resolver or encoder options</td>
<td>Ability to interface with all industry standard feedback devices</td>
<td>No need to alter present preferred feedback device on site</td>
</tr>
<tr>
<td>RS232 and serial - communications</td>
<td>RS232 for configuration and customer PC</td>
<td>Improved application interfaces (supported by free ActiveX components)</td>
</tr>
</tbody>
</table>
ABB motion control drive

**MicroFlex Analogue**
Motor control, AC vector and scalar modes

110/230 V 1-phase and 3-phase supply

<table>
<thead>
<tr>
<th>Frame size</th>
<th>H</th>
<th>W</th>
<th>D</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP20</td>
<td>180</td>
<td>80</td>
<td>157</td>
<td>1.5 Kg</td>
</tr>
</tbody>
</table>

The drive comes in one frame size, IP20 and 3, 6 and 9 A rms with 200 percent for 3 s.

**Options available**
The drive comes complete, including all of the items it requires to operate.

The following options are available to allow system integration:

- Brake resistors
  - RG56 44 W regen resistor for use with 3 A MicroFlex
  - RG39 100 W regen resistor for use with 6 A and 9 A MicroFlex
- RS485 serial port
- RS232 programming cables
- Footprint EMC filters
- Force vent fan kits
What is a MicroFlex e100 servo drive?
The ABB MicroFlex e100 is a compact servo drive, available in single-phase from 105 to 250 V AC or 3-phase 230 V AC operation in current ratings of 3, 6 and 9 A. It provides high performance servo control for rotary and linear brushless motors.

The MicroFlex e100 integrates the advanced capabilities of real-time Ethernet POWERLINK to provide superior performance, network integration and cost savings. The drive is compatible with the ABB NextMove e100 motion controller to provide a fully integrated solution using real-time Ethernet.

Where can it be used?
The ABB MicroFlex e100 drives can be used as a stand alone single-axis machine controller, fully programmable in MINT and with Ethernet connectivity combined with on-board I/O and a serial port for a simple HMI interface. A cost competitive solution to simple single axis applications requiring cut to length, infeed control, or point-to-point positioning.

The ABB MicroFlex e100 can be integrated with the NextMove e100 motion controller which integrates management of a real-time Ethernet network of drives for multi-axis motion control solutions.

Highlights
- Brushless servo drive with onboard Ethernet POWERLINK for real-time control
- Integrated Ethernet 2 port hub allows simple daisy chaining connection
- CAN in automation (CiA) DS402 positioning drive profile
- CANopen port with network manager function for low cost I/O expansion
- Control of rotary and linear servo motors
- Direct-on-line single-phase 105-250 V AC or 3-phase 230 V AC
- 3, 6 or 9 A continuous with 2x overload for 3 seconds
- Universal encoder interface supporting: incremental encoder, BiSS, synchronous serial interface (SSI), EnDat v2.1/v2.2 and 1V Sin/Cos encoders
- Panel-mounting enclosure
- 4 digital inputs. Opto-isolated 24V. Two inputs can be programmed to capture axis position within one micro-second
- 2 digital outputs. Opto-isolated 24V PNP. 50 mA per channel
- Auto-tuning wizard and software oscilloscope facilities via MINT Workbench for Windows
- Notch filters to eliminate mechanical resonance
- LED status indicators for error and communications notification
- USB port for configuration
- ActiveX libraries supplied free of charge

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
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</thead>
<tbody>
<tr>
<td>Ethernet POWERLINK</td>
<td>Real-time control single Ethernet cable – no need for additional Fieldbus. High speed real time communications</td>
<td>Reduced hardware requirements, less cabling, reduced system design requirements and cheaper cabling solutions</td>
</tr>
<tr>
<td>MINT Lite motion control</td>
<td>Simple motion programming</td>
<td>Powerful MINT multi-tasking software. Motion capability including linear motion, indexing, registration and more</td>
</tr>
<tr>
<td>External 24 V logic supply</td>
<td>Support the control electronics even when the main power is off</td>
<td>Maintain present positional information in a power outage. Allows immediate restart without the need to datum</td>
</tr>
<tr>
<td>Built-in brake chopper</td>
<td>On-board braking capability</td>
<td>More dynamic movements possible</td>
</tr>
<tr>
<td>Motor feedback - universal encoder</td>
<td>Ability to interface with all industry standard feedback devices</td>
<td>No need to alter present preferred feedback device on site</td>
</tr>
<tr>
<td>USB and serial communications</td>
<td>USB for configuration and customer PC</td>
<td>Improved application interfaces (supported by free ActiveX components), RS485 serial comms for PLC, HMI or other device communications</td>
</tr>
<tr>
<td>CANopen Port</td>
<td>Simple expansion port for additional I/O etc.</td>
<td>CANopen network manager allows the drive to expand the system I/O via the drive</td>
</tr>
</tbody>
</table>
ABB motion control drive

MicroFlex e100
Motor control, AC vector and scalar modes
Ethernet POWERLINK solution

105/250 V 1-phase and 3-phase supply

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<td>80</td>
<td>157</td>
<td>1.5</td>
</tr>
</tbody>
</table>

The drive comes in one frame size, IP20 and 3, 6 and 9 A rms with 200 percent for 3 s.

Options available
The drive comes complete, including all of the items it requires to operate.

The following options are available to allow system integration:
- Brake resistors
  - RG56 44 W regen resistor for use with 3 A MicroFlex
  - RG39 100 W regen resistor for use with 6 A and 9 A MicroFlex
- CANopen I/O extension
- Ethernet cables
- Footprint EMC filters
- Force vent fan kits
What is a MotiFlex e100 servo drive?
The ABB MotiFlex e100 is part of the e100 real-time Ethernet POWERLINK solution from ABB. System architecture is simplified by a single, highly configurable drive and motion control platform.

The drive is designed to control a wide range of motion applications from simple point-to-point motion to more complex applications. POWERLINK offers real-time control of many axes and Modbus TCP and Ethernet RAW offer a wide variety of control possibilities with PLCs, industrial PCs and other controllers.

Where can it be used?
The ABB MotiFlex e100 can be used as a single axis machine controller, fully programmable in MINT and with Ethernet connectivity, on board I/O and serial port for a simple HMI interface. Suitable for applications requiring cut-to-length, infeed control or indexing.

For more complex motion a plug-in controller for MotiFlex provides coordinated motion of up to four e100 drives and one analogue axis.

<table>
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<tr>
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<tr>
<td>Ethernet POWERLINK</td>
<td>Real-time control single Ethernet cable – no need for additional Fieldbus. High-speed real-time communications</td>
<td>Reduced hardware requirements, less cabling, reduced system design requirements and cheaper cabling solutions</td>
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<tr>
<td>MINT Lite motion control</td>
<td>Simple motion programming</td>
<td>Powerful MINT multi-tasking software. Motion capability including linear motion, indexing, tuning, registration and more</td>
</tr>
<tr>
<td>External 24 V logic supply</td>
<td>Support control electronics even when the mains power is off</td>
<td>Maintain present positional information in a power outage. Allows immediate restart without the need to datum</td>
</tr>
<tr>
<td>Built-in brake chopper</td>
<td>On-board braking capability</td>
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<td>CANopen Port</td>
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<td>CANopen network manager allows the drive to expand the system I/O via the drive</td>
</tr>
<tr>
<td>Two expansion slots</td>
<td>Plug in options available</td>
<td>Allow onboard expansion of analogue and digital I/O</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Also allows the drive to have a MINT controller plugged in</td>
</tr>
<tr>
<td>Plug in MINT Motion controller</td>
<td>On-board motion controller</td>
<td>Cost effective motion controller for medium sized projects. The MINT module can be used to control the host drive and up four other drives (five axis in total)</td>
</tr>
<tr>
<td>DC bus connection</td>
<td>Connect an existing DC bus system directly to the drive</td>
<td>Easy integration into high performance machines, allow regeneration onto the DC bus network, reducing losses to the overall system</td>
</tr>
</tbody>
</table>

Highlights
- Integrated hub for simple ‘daisy chain’ of Ethernet between drives and controller
- TCP/IP Ethernet operation for less demanding applications
- Rotary or linear brushless servo motors with 200 percent and 300 percent overloads for dynamic control
- Closed loop AC vector motor control with 150 percent / 60 s overload mode
- V/Hz operation (open loop control)
- Universal encoder interface supporting: incremental encoder, synchronous serial interface (SSI), EnDat v2.1/v2.2, 1V Sin/Cos and BiSS encoders. Optional resolver interface and secondary encoder interface for dual loop control via option cards
ABB motion control drive

MotiFlex
Motor control, AC vector and scalar modes
Ethernet POWERLINK solution
180/528 V 3-phase supply

<table>
<thead>
<tr>
<th>Frame size</th>
<th>H (mm)</th>
<th>W (mm)</th>
<th>D (mm)</th>
<th>Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>350</td>
<td>79</td>
<td>260</td>
<td>1.9 to 5.8</td>
</tr>
<tr>
<td>B</td>
<td>350</td>
<td>129</td>
<td>260</td>
<td>6.5</td>
</tr>
<tr>
<td>C</td>
<td>362</td>
<td>212</td>
<td>260</td>
<td>12.45</td>
</tr>
</tbody>
</table>

The drive comes in three frame sizes, IP20 and is rated, from 1.5 to 65 A rms with variable overloads

Size A : 1.5, 3.0, 6.0, 10.5, and 16 A rms
Size B : 21.5, and 26 A
Size C : 34.5 and 65 A

Options available
- Analogue I/O +/-10V 16-bit, 4 In, 4 Out
- Digital I/O 12-24V operation, 6 digital inputs and 4 digital outputs
- Encoder, resolver, scalable encoder modules
- Encoder management brackets
- Dual axis programmable MINT Machine Module
- Multi-axis programmable MINT Machine Module
- Fieldbus gateway carrier card, which allows interface to many industry standard fieldbus interface modules, including:
  - DeviceNet
  - Profield DP
  - Modbus RTU
  - Ethernet/IP
  - Modbus TCP
  - Profinet I/O
- DC busbar kits
- Line reactors
What is a MicroFlex e150 servo drive?
The ABB MicroFlex e150 servo drive combines Ethernet technology, advanced multi-tasking programming and single-phase operation in a compact package.

Ethernet and motor encoder feedback interfaces are fully integrated and optimised for demanding motion applications.

Safe torque-off is a standard feature, to meet the new European machinery directives.

ABB MicroFlex e150 is ideally suited to integration with the AC500 PLC line with EtherCAT or Modbus TCP control.

Where can it be used?
The integrated Ethernet interface offers EtherCAT for real-time control of multi-axis systems. In addition, EtherNet/IP™, Modbus TCP and RAW Ethernet are supported to enable control possibilities with other controllers such as PLC and industrial PCs.

The intelligent drive offers MINT programming as standard. MINT is a high-level multi-tasking language, tailored for motion applications. This powerful but simple programming language within MINT WorkBench provides control of communications, logic, motion and HMI interactions to solve a variety of applications such as labellers and flying shears.

Highlights
- Embedded Ethernet including EtherCAT, Modbus/TCP and Ethernet/IP
- EtherCAT conformance certified by ETG
- Advanced MINT programming as standard
- Safe torque-off (STO) as standard - to IEC 61800-5-2, SIL3 PlE
- 2 / 4 wire RS485 with optional termination and Modbus RTU support
- MINT Workbench provides configuration via USB or Ethernet TCP/IP
- AC servo drive 3, 6 or 9 A with 200 percent overload
- Single or three-phase 105 - 250 V AC operation (maximum limits)

---

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe-torque off (STO)</td>
<td>Built in machine safety features to SIL3 PL e.</td>
<td>Able to integrate into safety systems without extra equipment</td>
</tr>
<tr>
<td>Ethernet POWERLINK</td>
<td>Real-time control single Ethernet cable – no need for additional Fieldbus. High-speed real-time communications</td>
<td>Reduced hardware requirements, less cabling, reduced system design requirements and cheaper cabling solutions</td>
</tr>
<tr>
<td>MINT motion control</td>
<td>Advanced motion programming</td>
<td>Powerful MINT multi-tasking software. Motion capability including linear motion, indexing, tuning, registration and more</td>
</tr>
<tr>
<td>External 24 V logic supply</td>
<td>Support control electronics even when mains power is off</td>
<td>Maintain present positional information in a power outage. Allows immediate restart without the need to datum</td>
</tr>
<tr>
<td>Built-in brake chopper</td>
<td>On-board braking capability</td>
<td>More dynamic movements possible</td>
</tr>
<tr>
<td>Motor feedback - universal encoder</td>
<td>Ability to interface with all industry standard feedback devices</td>
<td>No need to alter present preferred feedback device on site</td>
</tr>
<tr>
<td>USB and serial - communications</td>
<td>USB for configuration and customer PC</td>
<td>Improved application interfaces (supported by free ActiveX components), RS485 serial comms for PLC, HMI or other device communications</td>
</tr>
<tr>
<td>CANopen port</td>
<td>Simple expansion port for additional I/O etc.</td>
<td>CANopen network manager allows the drive to expand the system I/O via the drive</td>
</tr>
</tbody>
</table>
Options available

The drive comes complete, including all of the items it requires to operate.

The following options are available to allow system integration:
- Expansion I/O and simulated encoder outputs
- Forced cooling options
- Brake resistors
  - RG56 44 W regen resistor for use with 3 A MicroFlex
  - RG39 100 W regen resistor for use with 6 A and 9 A MicroFlex
- CANopen I/O extension
- Ethernet cables
- Footprint EMC filters
ABB motion control products

NextMove e100 real-time Ethernet motion controller
NextMove ESB-2 high performance motion controller
MINT Machine Module

ABB motion controllers
ABB offers a range of motion control modules.
The NextMove ESB-2 motion controller is an analogue controller; the NextMove e100 predominantly interfaces using Ethernet POWERLINK. The MINT Machine Module plugs into the top of a MotiFlex e100 drive and offers a local five-axes motion controller. The motion controllers are suitable for a range of different applications. Motion controllers are available in PCI format, as standalone units with USB, CANopen, serial and Ethernet interfaces and as intelligent programmable drives for use in single or multi-axis systems.

The NextMove ESB-2 high performance motion controller
NextMove ESB-2 is a compact panel mount motion controller for the control of up to 8 axes - 4 servo, 4 open loop stepper. NextMove ESB-2, coupled with MINT motion programming, offers a high speed and flexible motion controller. On board I/O can be used to control many parts of the machine. This can be further expanded with ABB's range of CAN I/O modules operating over the CAN bus, or alternatively, CANopen devices conforming to the standard DS401 I/O profile.

NextMove e100 high performance motion controller
The NextMove e100 builds on the proven NextMove controller family of products, integrating the management of real-time Ethernet using the industry standard protocol Ethernet POWERLINK. Drives, I/O devices, sensors, absolute encoders can all be added to the POWERLINK network and controlled from the MINT programming language. This greatly simplifies system design and installation, and simultaneously expands the capabilities of the NextMove e100 as a machine control platform.

MINT Machine Module
The MINT machine module transforms MotiFlex e100 drives into powerful intelligent drive systems. It assumes complete control of the drive on-board I/O, communications and networking features, allowing the design of five-axis control in a compact local module.

Highlights – NextMove ESB-2
- Panel mount configuration with two-part connectors and D-type connector for encoder connections
- 1 MB SRAM for user programs and data
- 1 MB FLASH for firmware and user program storage
- 32 kB FRAM for non-volatile parameter storage
- Product variants available for 3 or 4-axes of servo control and 4-axes of stepper control. MicroFlex can be used in step and direction mode for additional ‘open loop’ servo axis
- 20 PNP/NPN opto-isolated digital inputs
  Programmable for hardware limits, home input, stop input and error input. Four of the inputs can be programmed for high speed capture of position with one microsecond
- 12 PNP opto-isolated digital outputs
- 24 V/150 mA relay output to signal system error conditions
- 2 x 12-bit analogue inputs
- 12-bit analogue output for 3-axes variant
  Two auxiliary encoder interfaces for position following or position verification with 3-axes servo variant. One additional auxiliary encoder interface for 4-axes servo variant
- USB programming interface
- RS232 (115,200 baud) and (optional RS485)
ABBmotion control and drives for machine builders, OEMs and system integrators

– CAN interface for I/O expansion and HMI interfaces. Can be used to provide full peer-to-peer networking capabilities with other MINT based controllers
– Multi-tasking programming capability with MINT-MT. Number of tasks limited only by available memory
– Comprehensive move types including: linear, circular and helical interpolation; software cams; flying shears; splines; synchronisation with positional offsets and virtual axes
– ActiveX libraries supplied free of charge
– Compatible with MINT NC and HPGL
– RoHS compliant

Highlights – NextMove e100
– Ethernet POWERLINK for real-time control of up to 16 axes of interpolated motion
– Control of additional Ethernet POWERLINK devices, including drives, I/O and encoders
– Compatible with MicroFlex e100 - providing a complete motion control solution
– Integrated Ethernet hub for ease of wiring - simple daisy chain units together
– Panel mount configuration with two part connectors
– 32-bit 120MHz Digital Signal Processor
– 1MB SRAM for user programmes and data
– 1MB FLASH for firmware and user programme storage
– 32kB FRAM for non-volatile parameter storage
– Onboard control for 3 axes of servo (+/-10V interface) & 4 axes of stepper (Pulse and direction)
– 20 uncommitted PNP/NPN opto-isolated digital inputs Programmable for hardware limits, home input, stop input and error input. 4 of the inputs can be programmed for high speed capture of position within 1 microsecond
– 12 uncommitted PNP opto-isolated digital outputs Programmable for drive enable and high speed position compare output.
– 4 V/150 mA relay output to signal system error conditions
– 2 x 12-bit uncommitted analogue inputs
– Uncommitted 12-bit analogue output
– RS232 & RS485 (User selectable. 115,200 Baud) and USB programming interfaces
– USB drivers compatible with Windows 2000/XP
– CAN interface for I/O expansion and HMI interfaces. Can be used to provide full peer-to-peer networking capabilities with other MINT based controllers
– Multitasking programming capability with MINT. Number of tasks limited only by available memory
– Comprehensive move types including: linear, circular and helical interpolation; software cams; flying shears; splines; synchronisation with positional offsets and virtual axes
– ActiveX libraries supplied free of charge
– Compatible with MintNC and HPGL

Highlights – Mint Machine Module
– Plug-in intelligent drive module for machine control
– Powerful MINT ® multitasking programming
– CANopen manager for system expansion
– Non-volatile RAM for user data storage and Flash program storage
– Control of one auxiliary closed loop analogue axis
– Compact solution, requiring less panel space and wiring
– Elimination of external controller or PLC saving cost and reducing complexity
– Real-time Ethernet technology
– CAN interface for I/O expansion and HMI interfaces. Can be used to provide full peer-to-peer networking capabilities with other MINT based controllers
– Multitasking programming capability with MINT.
– Comprehensive move types including: linear, circular and helical interpolation; software cams; flying shears; splines; synchronisation with positional offsets and virtual axes
– ActiveX libraries supplied free of charge
– Compatible with MINT-NC and HPGL
ABB motion control products
NextMove e100 real-time Ethernet motion controller
NextMove ESB-2 high performance motion controller
Mint Machine Module

Main features

<table>
<thead>
<tr>
<th>Feature</th>
<th>NextMove ESB-2</th>
<th>NextMove e100</th>
<th>MINT Machine Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Format</td>
<td>Panel Mount</td>
<td></td>
<td>Plug-in controller for MotiFlex e100</td>
</tr>
<tr>
<td>Number of axis</td>
<td>7</td>
<td>16</td>
<td>4 x Ethernet + 1 x analogue</td>
</tr>
<tr>
<td>Servo axis</td>
<td>3 or 4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Stepper axis</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Battery backup</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Non-volatile memory</td>
<td>32 kB FRAM</td>
<td>32 kB FRAM</td>
<td>32 kB FRAM</td>
</tr>
<tr>
<td>RS232 ports</td>
<td>1</td>
<td>Yes (5)</td>
<td>xxx</td>
</tr>
<tr>
<td>RS485 ports</td>
<td>optional</td>
<td>Yes (5)</td>
<td>xxx</td>
</tr>
<tr>
<td>USB ports</td>
<td>1</td>
<td>1</td>
<td>1 (via drive)</td>
</tr>
<tr>
<td>CAN ports</td>
<td>1</td>
<td>1</td>
<td>1 (via drive)</td>
</tr>
<tr>
<td>Digital inputs</td>
<td>20</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>Opto-isolated</td>
<td>PNP/NPN</td>
<td>PNP/NPN</td>
<td>PNP/NPN</td>
</tr>
<tr>
<td>High speed position inputs</td>
<td>4 (1)</td>
<td>4 (1)</td>
<td>2</td>
</tr>
<tr>
<td>Digital outputs</td>
<td>12</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Opto-isolated</td>
<td>PNP</td>
<td>PNP</td>
<td>PNP</td>
</tr>
<tr>
<td>High speed position compare outputs</td>
<td>4 (3)</td>
<td>4 (3)</td>
<td>0</td>
</tr>
<tr>
<td>Analogue outputs</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Analogue inputs</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Relay outputs</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Master encoder inputs</td>
<td>1 or 2 (4)</td>
<td>0-3 (6)</td>
<td>1</td>
</tr>
<tr>
<td>RoHS compliant</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

(1) Shared with the digital inputs. First four inputs can be used for position latching to within 1μs
(2) One fast latch to within 1μs. 3 to within 1ms.
(3) Uses first four digital outputs for fast position compare.
(4) Two available with three-axis servo unit. One available with four-axes servo unit.
(5) RS232/485 switch selectable
(6) NextMove e100 has 3 encoder inputs for analogue axes which can be used as master encoders
What is an AC500-eCo PLC?
The AC500-eCo from ABB is a range of scalable PLCs offering unrivalled cost effectiveness for modern industrial automation applications where small-scale PLC solutions often represent the ideal solution. These extremely compact, entry-level PLCs offer the most flexible and economical configuration available, low cost and straightforward servicing and all of the requirements of a modern control system for small applications – without compromising on power and support.

Highlights
- 128 kB user memory makes programme optimisation obsolete
- Programme processing time 0.1 μs/ instruction provides the performance your application needs
- RS485 communication with additional Ethernet port
- CoDeSys programming environment across the entire AC500 range
- All analogue inputs on CPU PM564 can be configured as digital inputs to allow for individual customer solutions
- AC500-eCo comes with an easily integrated network configuration based on CoDeSys - ultimately saving time and money
- An integrated serial interface parameterised as a Modbus master/slave or CS31 master provides an easy means of exchanging data. A second serial interface and SD card holder can optionally be attached
- IEC 61131-3 compliant programming software as standard

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>128 kB memory capacity</td>
<td>Programmers can create a plethora of functions and function blocks, variables and data from the running programme</td>
<td>Flexible programming</td>
</tr>
<tr>
<td>Fieldbus</td>
<td>Extensive range of industrial fieldbus option modules available</td>
<td>Connects to Modbus RS485, ASCII and upgrade to Ethernet TCP/IP</td>
</tr>
<tr>
<td>CoDeSys programming</td>
<td>Masks created within the programming system can be utilised in all operational forms without having to be modified</td>
<td>Allow the user to eliminate many costly PLC’s in their architectures</td>
</tr>
<tr>
<td>Extensive support of communication protocols</td>
<td>CS31, Modbus RTU, RCOM, Ethernet and Internet</td>
<td>Can be connected to a wide range of machinery</td>
</tr>
<tr>
<td>ABB PS501Control Builder Plus</td>
<td>Single smart engineering tool to help make programming simple</td>
<td>Makes installation and commissioning much faster</td>
</tr>
<tr>
<td>Convenient diagnostic and debugging</td>
<td>Smart online diagnostic and debugging for simple online use, multiple watch lists offering superior overview</td>
<td>Issues can be recognised quickly helping to maintain performance levels</td>
</tr>
<tr>
<td>CPU flexibility</td>
<td>Upgrading CPU modules lets operators increase the processing performance while other PLC parts remain untouched</td>
<td>Future proofing installation as performance can be enhanced at a later stage</td>
</tr>
</tbody>
</table>
What is an AC500 PLC?
The AC500 PLC range offers latest generation levels of performance and scalability. It also supports most industry standard communications variants making it an ideal solution for multi-protocol or multi-domain fieldbus environments. The PLC is a very flexible range which offers different levels of CPU performance in a simple product portfolio without the need to supply several disparate platforms to support the same range of applications. This also means that upgrades to meet increasing system performance demands are extremely simple and low cost. The PS501 Control Builder programming software provides a standard programming package for the whole platform.

Highlights
– Scalable control
– Wide choice of communication and fieldbus couplers
– User-selectable coupler types for simultaneous operation
– Fast replacement thanks to plug-in modules
– A single software package for the entire range
– Seamless integration of control system and field devices
– Attractive price-performance ratio

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huge memory capacity</td>
<td>Programmers can create a plethora of functions and function blocks, variables and data from the running programme</td>
<td>Improved flexibility and performance</td>
</tr>
<tr>
<td>Fieldbus</td>
<td>Extensive range of industrial fieldbus option modules available</td>
<td>Connectability to all of the most popular fieldbuses in use</td>
</tr>
<tr>
<td>Web server for remote control</td>
<td>Global access and easy maintenance of the system</td>
<td>User can get information about the system at any given time</td>
</tr>
<tr>
<td>Extensive support of communication protocols</td>
<td>PROFINET, PROFIBUS DP, CANopen, DeviceNet, CS31, Modbus RTU, RCOM, Ethernet and Internet, EtherCat</td>
<td>Can be connected to a wide range of machinery</td>
</tr>
<tr>
<td>ABB PS501 Control Builder Plus</td>
<td>Single smart engineering tool to help make programming simple</td>
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</tr>
</tbody>
</table>
Programmable logic controllers (PLCs)

AC500 PLC

Local extension capabilities for I/O and communication

AC500 CPU: High-level functionality and industry leading performance with extensive range of communication modules and industrial interfaces

1. Terminal base:
   - Easy snap-on of CPU and optional communication module
   - CPU performance upgrade is convenient and fast
   - Pre-wiring of CPU connections

2. Communication module:
   - Up to four modules in numerous combinations to communicate with nearly everything

3. FieldBusPlug connector:
   - Slaves for Profibus DP, CANopen, DeviceNet

4. Onboard Ethernet (optional)
   - Programming via PC
   - SMTP e-mail, FTP file transfer, HTTP web server, SNTP time synchronisation, DHCP IP address assignment, socket programming for project-specific protocols, IEC60870-5-104 for substraction automation, PING request and reply, DNS

5. COM2 (Sub-D9, RS232/RS485)
   - Programming via PC
   - ASCII protocol
   - Modbus-RTU (master or slave)

6. COM1 (spring terminal, RS232/RS485)
   - Programming via PC
   - CS31 bus (master)
   - ASCII protocol
   - Modbus-RTU (master or slave)
Programmable logic controllers (PLCs)
AC500-XC

What is an AC500-XC PLC?
AC500 is ABB’s highly scalable PLC, offering many different I/O, all major fieldbus interfaces and a wide range of powerful CPU modules. The AC500-XC is designed for indoor or outdoor extreme conditions (XC) and is capable of withstanding harsh environments during operations and storage. Suitable markets include marine, wastewater, solar, high-altitude, cold and high-humidity areas. Built-in internet technology allows remote maintenance and remote programming.

Highlights
- Extended operating temperature
  - operating temperature -30°C up to +70°C (two couplers, regular mounting, display readable above 0°C)
  - reliable system start at -40°C
- Extended immunity to vibration
  - 4 g root mean square random vibration up to 500Hz
  - 2 g sinusoidal vibration up to 500Hz, including SD-Card
- Extended immunity to hazardous gases and salt mist
  - G3 as often requested by water treatment
  - 3C2 immunity for chemical gases
  - Salt mist EN 60068-2-52 / EN 60068-2-11
  - Hazardous gases from the standard IEC60721-3.3 3C2 mean for example:
    - H2S - SO2/S
    - Cl2 - NOX
- Use at high-altitudes
  - Operating altitude up to 4,000m above sea level
- Extended EMC requirements
  - EN 61000-4-5 Surge immunity test
  - EN 61000-4-4 Transient / burst immunity test

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>No expensive housing</td>
<td>PLC works in simple cabinet designs</td>
<td>Lower cost</td>
</tr>
<tr>
<td>Expensive extras removed</td>
<td>Sealings at cable entrance and doors not required. PLC free from oil, wear and tear HVAC panel not required Cabinets free from EMC shielding springs</td>
<td>Avoids brittle sealings Lower environmental impact Lower energy and maintenance costs Reduced EMC protection</td>
</tr>
<tr>
<td>Mechanical and electrical specs</td>
<td>Same as for AC500 series</td>
<td>Re-use cabinet layouts and wiring harnesses Training requirements lower</td>
</tr>
<tr>
<td>Compatible functionality</td>
<td>Same as for AC500 series</td>
<td>Less training as configuration, programming and commissioning are identical</td>
</tr>
</tbody>
</table>
Programmable logic controllers (PLCs)

AC500-S

What is an AC500-S PLC?

AC500-S is the new safety PLC that fulfills the highest safety requirements and standards. The PLC is TÜV certified up to SIL3 (IEC62061) and PL e (ISO13849). Separate safety and non-safety application programming provides flexibility and scalability for customized solutions by using the complete AC500 CPU range.

ABB’s new AC500-S safety PLC sets new standards in the field of safety engineering by bringing a powerful set of functions for trigonometric operations, including COS, SIN, TAN, ASIN, ACOS and LOG. The PLC is suited for tasks such as the creation of safe motion control systems for cranes, hoists and a vast array of automated machinery.

Highlights

- SIL3 (IEC 62061, IEC 61508) and PL e (ISO 13849) certified
- Safety I/O modules are certified up to SIL3 (IEC 62061, IEC 61508) and PL e (ISO 13849)
- Standardised architecture makes adding safety functionality to existing application easy - simply plug AC500-S modules onto the busbar alongside other AC500 components
- Features same easy-to-learn programming environment – based on CoDeSys – for safety and non-safety application programming
- Suitable for creating safe motion control systems for cranes, hoists and a vast array of automated machinery

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy to install</td>
<td>Pluggable in standard AC500 terminal bases without any wiring or installation effort.</td>
<td>Fast and low cost installation.</td>
</tr>
<tr>
<td>Easy to commission</td>
<td>Various diagnostics messages.</td>
<td>Reduces commissioning time and costs.</td>
</tr>
<tr>
<td>Easy to program</td>
<td>Configuration and programming via one Ethernet interface. Direct data mapping between safety and non-safety CPUs.</td>
<td>Allows quick and easy access to the CoDeSys programming environment. Simplifies data exchange and programming efforts which saves engineering time and costs.</td>
</tr>
<tr>
<td>Easy to maintain</td>
<td>Download of firmware and/or user program via SD card.</td>
<td>No need for an additional programming tool - reduces maintenance time and costs.</td>
</tr>
<tr>
<td>Easy to protect</td>
<td>User program protection.</td>
<td>Saves intellectual property and investments.</td>
</tr>
</tbody>
</table>
**PLC and controller**

Scalable AC500 PLC and Pluto safety controller

---

### Automation with AC500

**Easy to learn**

Providing all the advantages you would expect from a modern automation system, the AC500 family delivers an impressive set of powerful programming features. In addition, the use of a common CoDeSys-based programming system for the entire AC500 family, makes it easy to learn and configure.

**Easy to program**

The IEC 61131-3 compliant programming software makes the automation system easy to programme. Based on the AC500 concept, all existing AC500 libraries are compatible and immediately available for use within the complete AC500 CPU range.

**Easy to commission**

ABB’s advanced simulation mode allows programmes to be debugged without the need for PLC hardware, thereby reducing on-site testing requirements. ABB’s user-configurable I/O system provides the flexibility to make decisions and modifications right up to the last minute. Likewise, a graphical diagnosis environment speeds up commissioning to keep you on schedule.

### Pluto Manager

Pluto is programmed in ladder-diagram format or using Boolean algebra with time units, flags, registers, sequence programming and function blocks that are certified. The Pluto Manager programming software can be downloaded from ABB’s website free of charge. The safety programme can be loaded into all Pluto units in a project via one of them and the bus. For free software see www.abb.de/stotz-kontakt

---

1. The scalable AC500 PLC can be configured and expanded flexibly according to your requirements. Decentralised structures and simple integration into existing systems are made possible by various standard fieldbuses and Ethernet interfaces. These multifaceted communication options allow easy exchange of data between the AC500 PLC and the Pluto safety controller.

2. The Pluto safety controller is a system for dynamic and static safety circuits in which the inputs and other information can be distributed by means of a bus.

3. Gateways are used for the bilateral data transfer between Pluto and higher level controls.

4. It is possible to communicate with operator desks and other equipment via the USB/RS232 programming interface.

5. If the protocol converter is configured in bridge mode, the following are possible:
   - Optimisation of the bus length
   - Use of different bus speeds at each end
   - Filtration of data at one end to reduce the bus load at the other end

6. Absolute encoders (single-turn or multi-turn) can be connected directly to the safety bus. Thanks to the existing, certified function blocks, various safety applications can be implemented easily and conveniently.

7. Pluto AS-i is a Pluto version with an AS-i bus connection option. The controller can be used as a master, monitor or slave. Digital and analogue signals can be processed using Pluto AS-i. Safe outputs enable P1. e to be achieved in accordance with ISO 13849-1.
Human machine interface

CP600 HMI

What is a CP600 series HMI?
The CP600 series is now available in a broader range from the entry level (4.3”) to the high-end panel (15”). It is highly flexible and is specifically designed for advanced applications in complex systems or processes. Using premium graphic panels created with either the PB610 engineering software or the web browser panels via the PLC web server, the CP600 series gives better information representation to ease human-machine interaction.

The engineering software is based on XML technology, enabling you to create easy intuitive graphics. Visual objects created with the Scalable Vector Graphics (SVG) are totally independent of the operating system, providing high customisation flexibility and easy integration with your automation system, as well as the easy creation of dynamic objects with configurable properties, the ability to interconnect objects, transformation or easy resizing.

Highlights
- Wide screen formats, complex operating screens can be clearly displayed and divided into sections for application control and application monitoring
- USB interface on side, for projects downloaded without connecting a computer
- Easy commissioning: all Ethernet settings of the panel are made while configuring; simply insert the system card into another device to transfer data from one device to another.
- Marine approval to use your panels in many sectors and regions : (DNV), C-tick
- Approvals : RoHS, (cUL),

Additional features of the CP600 Series:
- Data acquisition and trend presentation
- 64k colours
- User memory RAM 128 MB flash disk and 256 MB DDR
- Recipe data storage
- Multi-language applications
- Powerful macro editor using Java script based on standard
- ECMA-262 execute widgets and pages events to get more capabilities
- Alarms and historical alarm list
- Eight level password protection
- Report printing to serial printer
- Vector graphic capabilities including the support of multiple layers and object transparency
- Data display in numerical, text, bargraph, analogue gauges and graphic image formats. Dynamic object properties supported
- RSS feeds, rotating menu, scheduler.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>XML technology</td>
<td>Simple to create graphic displays</td>
<td>Users can display information however they want, making it simple for them to interpret what is going on.</td>
</tr>
<tr>
<td>Low development cost</td>
<td>Users can import pages by using the ‘drag and drop’ symbol from the library, reducing development and maintenance costs</td>
<td>More productivity</td>
</tr>
<tr>
<td>CoDeSys</td>
<td>Produce native machine code for a large number of common processors and adhere to international industrial standard IEC61131-3</td>
<td>Native machine code is inherently faster and more reliable than interpreted solutions</td>
</tr>
<tr>
<td>Common interface, PS501</td>
<td>Designed for efficient PLC programming according to all languages of IEC 61131-3 and Continuous Function Chart</td>
<td>Simple integration with a wide range of PLCs</td>
</tr>
<tr>
<td>Control Builder Plus</td>
<td>Intuitive user guidance Users can set up the HMI by simply following the easy to follow user guidance</td>
<td>Fast commissioning</td>
</tr>
</tbody>
</table>
Human machine interface

CP600 HMI

Dimensions and weights

<table>
<thead>
<tr>
<th></th>
<th>CP620</th>
<th>CP630</th>
<th>CP635</th>
<th>CP650</th>
<th>CP660</th>
<th>CP675</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size (inches)</strong></td>
<td>4.3&quot;</td>
<td>5.7&quot;</td>
<td>7&quot;</td>
<td>10.4&quot;</td>
<td>12.1&quot;</td>
<td>15&quot;</td>
</tr>
<tr>
<td><strong>Weight (per piece kg)</strong></td>
<td>0.950</td>
<td>1.150</td>
<td>1.100</td>
<td>2.100</td>
<td>2.900</td>
<td>3.800</td>
</tr>
<tr>
<td><strong>Protection class front</strong></td>
<td>IP66</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>480 x 272</td>
<td>320 x 240</td>
<td>800 x 480</td>
<td>800 x 600</td>
<td>800 x 600</td>
<td>1024 x 768</td>
</tr>
<tr>
<td><strong>Dimensions (L x H x D) (mm)</strong></td>
<td>149 x 109 x 56</td>
<td>187 x 147 x 51</td>
<td>187 x 147 x 51</td>
<td>287 x 232 x 46</td>
<td>337 x 267 x 46</td>
<td>392 x 307 x 50</td>
</tr>
<tr>
<td><strong>Cut out (mm)</strong></td>
<td>136 x 96</td>
<td>176 x 136</td>
<td>176 x 136</td>
<td>276 x 221</td>
<td>326 x 256</td>
<td>381 x 296</td>
</tr>
<tr>
<td><strong>CP600</strong></td>
<td>Windows CE 6.0 with runtime licence for PB610 Panel Builder 600</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CP600-WEB</strong></td>
<td>Windows CE 6.0 with microbrowser for AC500 WebServer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Backlight</strong></td>
<td>LED</td>
<td>LED</td>
<td>LED</td>
<td>LED</td>
<td>CCFL</td>
<td>CCFL</td>
</tr>
<tr>
<td><strong>Upright installation</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>LED</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Interfaces</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ethernet ports number, type</strong></td>
<td>2 - 100 Mbit (with integrated Switch function)</td>
<td>1 - 10/100 Mbit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>USB ports number, type</strong></td>
<td>1 - host interface, version 2.0</td>
<td>2 - host interface, version 2.0</td>
<td>1 - host interface, version 2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Serial ports number, type</strong></td>
<td>1 - RS-232, RS-485, RS-422, software configurable</td>
<td>2 - RS-232, RS-485, RS-422, software configurable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Additional ports number, type</strong></td>
<td>1 - Expansion slot for optional modules, for optional modules</td>
<td>2 - Expansion slot for optional modules</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Card slot number, type</strong></td>
<td>1 - SD card slot</td>
<td>1 - aux port</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>User memory</strong></td>
<td>128MB Flash</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RAM</strong></td>
<td>256 MB DDR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* in preparation
Software tools

ABB offers several software tools to facilitate and enhance the use of ABB drives. Especially when straightforward routines cannot be applied, these tools provide a user-friendly and easy-to-use approach for the selection, commissioning and use of AC drives.

DriveStudio (ACSM1 and ACS850)
A user-friendly PC environment for simple drive commissioning tasks as well as more demanding drive tuning and programming tasks. DriveStudio is used with the ABB machinery drive and includes:

- Start-up and maintenance tools
  DriveWindow
  A Windows application used for commissioning and maintenance. Functions include local control, monitoring, parameter edits, fault logging, trending, back-up and restore
  - Shows actual status of the connected drive
  - Edit and show the drive parameters
  - Save and load drive parameters
  - Back-up and restore drive parameters
  - Offline configuration of drive parameters
  - Read fault loggers and diagnostic data

  Used with ABB industrial drives equipped with high-speed fibre optic communication, or remotely via the Internet.

  DriveWindow Light
  Available for ABB standard drives and ABB machinery drives, has the same functions as DriveWindow but is designed for point-to-point communication, via control panel port.

  Commissioning and tuning
  - Drive overview screen for fast parameter and function block navigation
  - Parameter setting and signal monitoring
  - Data logger and on-line signal monitoring for tuning
  - Back-up and restore tool for drive parameter cloning and support

  Solution programme composer
  - Simple, easy-to-understand function block interface to drive firmware functions for signal monitoring and parameter setting
  - Function block programming with standard function block library
  - Professional programming environment: hierarchy levels, custom circuits, user parameters, copy protection etc.

  DriveConfig
  Dedicated programming tool for the ABB micro drive, ACS55. Allows access to the extended parameter set of ACS55 and allows un-powered programming.

  Drive PM flashdrop
  Drive PM (program manager) is a dedicated PC tool for use with Flashdrop. It allows parameter sets to be named and managed. Parameters and groups can be hidden for customised views for OEM users. Parameter sets can be uploaded and downloaded between PC and Flashdrop handset.

  To download software tools, go to: www.abb.com > drives > drive PC tools.
Software tools

Control Builder Plus
The PS501 Control Builder Plus enables configuration of all standard intelligent automation devices for machine builders. This covers the vital areas of programming, parameterisation, debugging and diagnostics, and network and fieldbus configuration. Parameterisation is made simple by the ability to access your networked devices from your laptop or PC connected to any node on the network. The PS501 Control Builder Plus offers huge savings in terms of time and effort compared to conventional systems, particularly for applications where a distributed arrangement of drives has been integrated into a complex control and visualisation system.

Features include:
- Combination of all of the tools you require for configuring, programming, debugging and maintaining your PLCs, drives and control panels
- Easy and fast programming
- Parameterisation including many ABB drives diagnostics setup automatically for online monitoring of inputs and outputs
- Debugging and diagnostics with multiple, comprehensive watch list
- Recipe management provide rapid factory adaptation to changed market requirements
- Internet, network and fieldbus configuration within one comfortable tool
- ABB PROFINET drives, Ethernet-PLCs and Ethernet-panels can be simply hooked up to single Ethernet
- ABB PROFIBUS or PROFINET drives connected to AC500 are all accessible by engineering tool
- Huge savings in terms of time for drives in distributed arrangement
- One single engineering tool for the entire ABB range, from AC500-eCo through the complete AC500 family.

MINT Workbench
MINT® WorkBench is a Windows-based front end which is used as a commissioning and setup tool, allowing you to tune a motor in minutes.

MINT WorkBench offers an easy to use Windows development front end for MINT programming, with its colour highlighting of keywords and context sensitive help. The Program Navigator makes it easy to navigate and organize the source code, no matter how complicated. MINT® WorkBench is suitable for ABB’s range of motion control products, including; Motiflex, MicroFlex, e100 MINT, NextMove e100 and NextMove ESB-2.

Features include:
- Full screen editor with colour syntax highlighting of MINT keywords
- Command line interface to interrogate the controller even when the programme is running
- Spy window to monitor common motion variables and I/O
- Software oscilloscope - digital capture of six channels.
- Watch window for monitoring variables and tasks
- SupportMe function with automatic email generation for rapid technical support
- Web updates of firmware within the MINT WorkBench
- Easy management of firmware files
- Commissioning wizard for step-by-step setup of drive, motor and control parameters.
Drive technology extends the motor speed range from zero to high above the rated speed, increasing the productivity of the driven process. With lower output demand, the drive reduces the machine speed and saves energy. ABB drives are available directly from ABB or through the ABB drives distribution network. www.abb.com/drives

AC drives
ABB offers a wide range of AC drives designed for various applications and industries such as the food & beverage, converting, wire drawing, mixer, extruders, test rigs, ski lifts, metals, cement, mining, pulp & paper and printing.

ABB AC drives are available as complete drives and as modules to meet the requirements of the end-users, OEMs and system integrators.

DC drives
ABB DC drives continue to be an attractive alternative for machine suppliers. The modern DC converters are easy to operate, compact and low in maintenance. DC drives can be used in most industrial applications as well as for the modernisation of old plants. ABB offers the complete portfolio of three-phase DC drives - from 9 kW up to 18 MW.

Power supplies, CP range
Modern power supply units are a vital component in most areas of energy management and automation technology. As your global partner in this area, ABB pays close attention to corresponding requirements. Innovation is the key to the substantial enlargement of its power supply product range.
ABB offers four different product lines for single and three-phase supplies, output voltages 5/12/24, and 48 V DC in plastic and metal enclosure, as well as various accessories.

For more information, refer to the following brochure:
“Primary switch mode power supplies CP range”
document number: 2CDC114038B0205
www.abb.com/lowvoltage
Other ABB offering for factory automation
AC drives and DC drives, electronic products and relays

Interface relays and optocouplers, CR range and R600

Interface relays and optocouplers are widely used in various industrial applications. As an interface, they link the controller, e.g., PLC (programmable logic controller), PC or fieldbus systems to the sensor/actuator level. Here, they have various functions: switching AC or DC loads with different resistive, inductive and capacitive parts, switching voltages from a few mV up to 250 V, switching currents from a few mA up to 16 A, amplification of weak control signals, electrical isolation of control and load circuits and signal multiplying.

For more information, refer to the following brochure:
“Electronic Products and Relays - Selection Table Interface Relays CR-Range and R600 Range” document number: 2CDC110070C0201 www.abb.com/lowvoltage

Signal converters, CC range and ILPH

The ABB serial data converters allow communication to be established between units with different communication standards. In order to assure process continuity, existing systems must be updated consistently or connected to new devices. Serial data enables communication to be established if the communication standard of the existing system and the connected device vary. As well as converting signals, analogue signal converters and serial data converters can amplify, filter or separate signals.

For more information, refer to the following brochure:
“Electronic Products and Relays - Selection Table Signal Converters CC-Range” document number: 2CDC110069C0201 www.abb.com/lowvoltage
Useful servo drive calculations
Correctly rating a servo motor and drive application often involves mechanical calculations. Overleaf are typical examples of some of the commonly occurring formula that are often encountered. These are provided for general guidance only and any results may need to be modified to take into account specific application details such as mechanical losses, inclined angles and duty cycles etc.

Time to accelerate a rotating mass
\[
M(\text{acc}) = \text{Accelerate torque, Nm} \\
J(\text{tot}) = \text{Total inertia, kgm}^2 \\
J(\text{mot}) = \text{Motor inertia, kgm}^2 \\
J(\text{load}) = \text{Load Inertia, kgm}^2 \\
Z = \text{Gearbox ratio (speed reducing)} \\
t(\text{acc}) = \text{Acceleration time, sec} \\
\alpha = \text{Angular acceleration, rad.sec}^{-2} \\
\varpi = \text{Angular speed, rad.sec}^{-1} \\
n = \text{Angular speed, rpm} \\
\]

\[
M(\text{acc}) = J(\text{tot}) \times \alpha \text{ or } \alpha = M(\text{acc})/J(\text{tot}) \\
\]

\[
\alpha = \varpi/t(\text{acc}) \text{ or } t(\text{acc}) = \varpi/\alpha \\
\]

\[
\varpi = (n/60) \times 2\pi \\
\]

\[
J(\text{tot}) = J(\text{mot}) + (J(\text{load})/Z^2) \\
\]

Example
\[
J(\text{load}) = 0.05 \text{ kgm}^2 \\
J(\text{mot}) = 5.0 \text{ kgcm}^2 = 0.00050 \text{kgm}^2 \\
Z = 30:1 \\
n = 1500 \text{ rpm} \\
M(\text{acc}) = 15 \text{ Nm} \\
\]

\[
J(\text{tot}) = 0.00050 + (0.5/30^2) \\
J(\text{tot}) = 0.00106 \text{ kgm}^2 \\
\alpha = M(\text{acc})/J(\text{tot}) \\
\alpha = 15/0.00106 \\
\alpha = 14,150 \text{ rad.sec}^{-2} \\
\varpi = (1500/60) \times 2\pi \\
\varpi = 157 \text{ rad.sec}^{-1} \\
t(\text{acc}) = \varpi/\alpha \\
t(\text{acc}) = 157/14,150 \\
t(\text{acc}) = 0.0111 \text{ sec (11.1mS)} \\
\]

Useful inertia formula
Servo drives are often employed in highly dynamic applications where rapid and accurate positioning is required. To obtain the ultimate performance in any system, the reflected load inertia (taking into account any gearbox or pulley ratios) should equal the motor inertia. This is often not possible, but ratio mismatches of typically 5:1 are not normally significant. The greater this mismatch between reflected load inertia and motor inertia, the lower will be the dynamic performance of the system.

Solid cylinder rotating about axis XX
\[
J = (mR^2)/2 \\
\]

Hollow cylinder rotating about axis XX
\[
J = m(R^2 + r^2)/2 \\
\]

Equivalent inertia of slide mass on a ballscrew
\[
J = m(s/2\pi)^2 \\
\]

Effect of gear ratio on reflected inertia
\[
J = J(\text{load})/Z^2 \\
\]

Torque required to produce a force on a leadscrew
\[
M = \text{Required torque, Nm} \\
F = \text{Linear force, N} \\
Z = \text{Gearbox ratio (speed reducing)} \\
(Z = 1 \text{ for direct drive}) \\
s = \text{Ballscrew pitch, m} \\
\eta = \text{Efficiency} \\
M = Fs/2\pi R\eta \\
\]

Example
\[
F = 10,000 \text{ N} \\
s = 10 \text{ mm (0.01m)} \\
Z = 2:1 \\
\eta = 0.9 \\
\]

Required motor torque \( M = (10,000 \times 0.01)/(2\pi \times 2 \times 0.9) \)
\[
= 8.85 \text{ Nm} \\
\]

NB: The required force is often provided in kg's or kgf. This implies the force exerted on the mass by gravity (g) and must be multiplied by 9.81 to obtain the force in N (newtons); eg A “force” of 100 kg is 981 N.