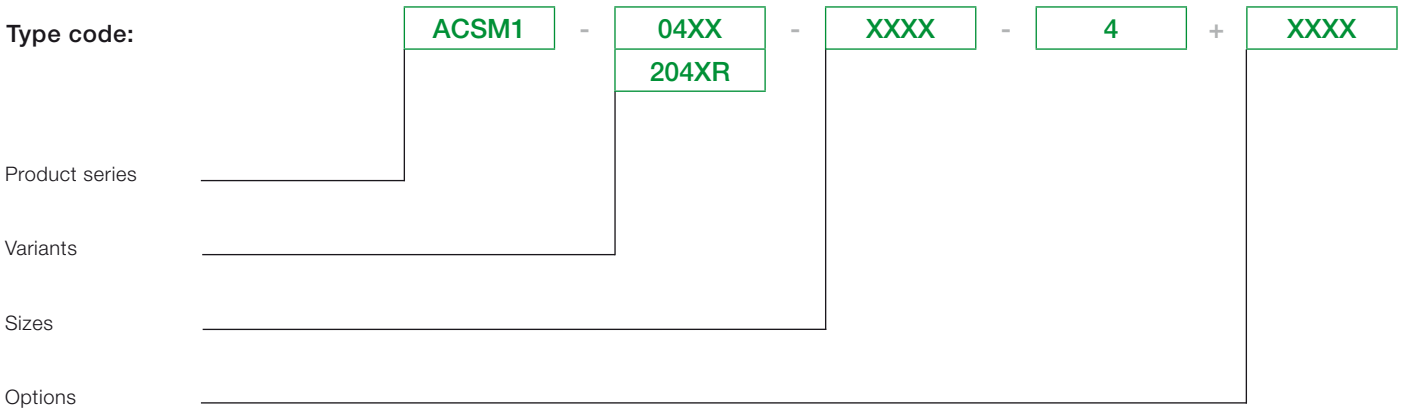
Low voltage AC drives

# ABB high performance machinery drives
# ACSM1
# 0.75 to 160 kW / 1 to 200 hp
# Catalog

Power and productivity
for a better world™

# Selecting and ordering your drive

Build up your own ordering code using the type code key below or contact your local ABB drives sales office and let them know what you want. Use page 3 as a reference section for more information.



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# ABB high performance machinery drives, ACSM1


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# ABB high performance machinery drives

| ACSM1 | - | 04XX<br>204XR | - | XXXX | - | 4 | + | XXXX |
|---|---|---|---|---|---|---|---|---|

## ABB high performance machinery drives

ABB high performance machinery drives provide speed, torque and motion control for demanding applications. They can control induction, synchronous and asynchronous servo and high torque motors with various feedback devices. The compact hardware, different variants and programming flexibility ensure the optimum system solution. The innovative memory unit concept enables flexible drive configuration.

## Highlights

- Designed for demanding machinery applications with synchronous and induction motors
- Compact design for single and multidrive systems
- Regenerative supply for applications with high braking power duty cycles
- Functionality can be easily extended using a block programming tool
- Functional safety as standard

## Industries and applications

The high performance machinery drives are ideal for

- **Plastics and rubber**
  - Extruders
  - Calenders
  - Injection moulding machines
  - Winders & unwinders
  - Blow moulding machines

- **Printing**
  - Sheet-fed printing
  - Commercial printing
  - Label printing
  - Web printing
  - Bindery machines

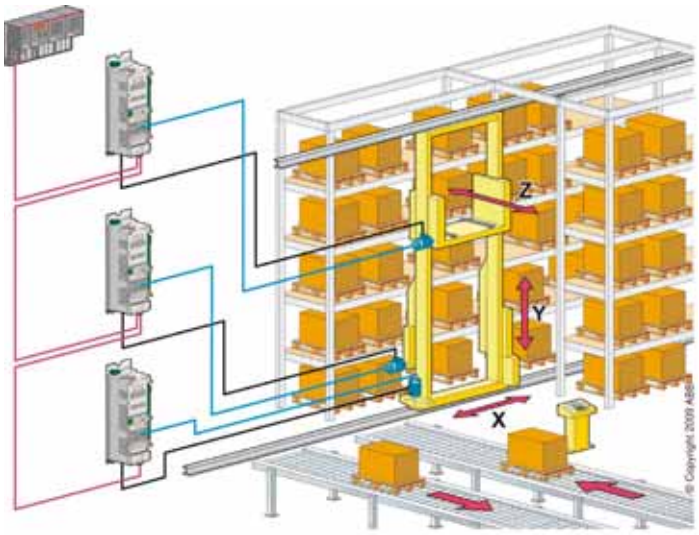
- **Paper & paperboard, film & foil converting**
  - Calendering
  - Slitter
  - Coating
  - Sheeter
  - Laminating
  - Winders

- **Material handling**
  - Automatic storage
  - Elevators
  - Pick and place systems
  - Conveyors
  - Palletising

- **Textile**
  - Knitting/weaving machines
  - Needle punching machines
  - Non-woven machines
  - Fibre processing machines
  - Spinning/speeder machines
  - Textile coating machines

- **Food and beverage**
  - Conveyors, mixers and extruders
  - Rolling, pressing and cutting
  - Stamping
  - Slicing
  - Bottling and labeling
  - Packaging

- **Other industries and applications**
  - Woodworking machinery
  - Plywood and chipboard industry
  - Flying and rotary shear
  - Packaging machinery
  - Wire & cable drawing machines



# Features, advantages and benefits

| Feature | Advantage | Benefit |
|---|---|---|
| **Control and performance** | | |
| Various control arrangements | Speed and torque control variant as well as motion control variant. High bandwidth for torque, speed and position control. | Suitable for wide range of standard and demanding applications. |
| Asynchronous and synchronous motor compatibility | 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. | Saves capital costs through purchase of one drive type to control various motor types. |
| System offering from one supplier | ABB has a wide offering for products and expertise in motion control applications with PLCs, servo motors and other low voltage products. | Reduces supplier selection, design, installation and commissioning time |
| Wide range of feedback interfaces | Speed and position feedback needs of virtually all applications can be readily accommodated. Each feedback interface option has two inputs and one output. | Use one drive type for variety of applications, saving time and cost in finding alternative suppliers and purchasing a variety of different drives. |
| Drive-to-drive link as standard | Enables daisy-chaining multiple drives to control machine axes. | Fast and powerful drive-to-drive link allows synchronized peer-to-peer communication. |
| Communication options for master communication | Drive supports fieldbus and Ethernet communication and real-time synchronous communication. | Flexibility with master communication enabling selection of network standard that best suits the application. |
| Integrated safe torque-off (STO) function | Safe torque-off prevents unexpected start up and can be used for other safety related stopping functions. | Improves machine operator safety.<br>Cost-effective and certified solution for safe machine maintenance. |
| Emergency supply | Drives can be powered from a 230 VAC UPS or a 48 to 96 V battery supply back up, ensuring control in critical machinery when power supply is lost. | Improves end-user safety and machine performance in situations when power supply is lost. |
| Optional I/O extensions | Plug-in I/O extensions available to add analog and digital inputs/outputs. | Drive's functionality can be easily extended at a low cost. |
| Ready-made application programs | Application specific programs available or can be modified or new ones developed using technology function libraries. | Saves time and engineering design costs. |
| **Modular and compact design** | | |
| Regen supply modules | Feeds power via common DC bus to drives, or braking power can be fed back to supply network. | No need for braking resistors with continuous braking. Energy saving and size reduction. Low network emissions due to dedicated regen filter module. |
| Modular design | Drive has three main parts - power, control and memory units. External options like mains choke, mains filter and braking resistors are available for different system configurations. | Drive can be tailored to meet specific application needs. |
| Integrated braking chopper | Braking chopper as standard. | Compact and cost-effective design. |
| Several mounting and cooling options | DIN-rail, back plate, side-by-side, cold plate, push through and liquid cooling. | Installation flexibility as a variety of cabinet designs can be used. |
| Common DC link | Several drives can be connected with a common DC link to have one AC input connection for several drives. Power is transferred between accelerating and decleratting motors via the DC bus. Compact installation can be made by using ABB's Smissline power distribution system. | Saves on cabling costs, reduces line currents, provides simpler braking arrangements and lowers the component count while increasing system efficiency, reliability and space savings. |
| **User interface and programming** | | |
| Simple and flexible human-machine interface | 7-segment display shows the drive status.<br>DriveStudio PC tools offer easy access to drive programming and start-up features.<br>Advanced control panel can be used for general service routines. | Time savings with easy to use human-machine interfaces for all user access levels, from programming and start up to drive maintenance. |
| Drive programming | Application control programming with IEC-61131 function blocks or structured text provide an easy and innovative method for extending drive firmware functionality. | Create tailor-made applications thereby avoiding additional hardware or software costs. |
| Memory unit for easy drive management | Complete drive configuration and settings are stored in a separate memory unit. – Power or control unit can be replaced without parameter setting. | Drive functionality can be easily configured, modified or updated with the memory unit. Offers quick and easy after-sales service. |

# ABB high performance machinery drives
# Overview

The ACSM1 series of ABB high performance machinery drives offers versatile features for machinery applications.

## Designed for machine builders

The ACSM1 is the optimum choice for machine builders. The ACSM1 can control with or without feedback induction motors, asynchronous and synchronous servo motors. It uses proven DTC (direct torque control) motor control technology to guarantee high performance. The mechanical design is very compact and drives can be installed side-by-side. In addition to covering standard features there are three slots for control and communication options. Drive tools support commissioning, tuning and programming. The ACSM1 offers optimum selection for each machine control philosophy.

## Modular and compact design

– **Five compact frame sizes**
  - 0.75 kW (1 Hp) to 160 kW (200 Hp) / 380 to 480 V
  - IP20
  - AC or DC supply
  - Motor and braking resistor connection from bottom
  - Built-in braking chopper as standard

– **Optimum assembly and cooling solutions**
  - Side-by-side installation
  - Air-cooled variant including support for DIN-rail mounting or back plate mounting
  - Cold-plate variant for external cooling method
  - Push-through variant to separate power side cooling from control side cooling
  - Liquid-cooled variant
  - Removable control terminals and power terminals enables fast assembly and maintenance

– **Flexibility with different external options**
  - 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 harmonic distortion (THD)
  - Braking resistors for various braking power needs
  - Possibility for different common DC configurations

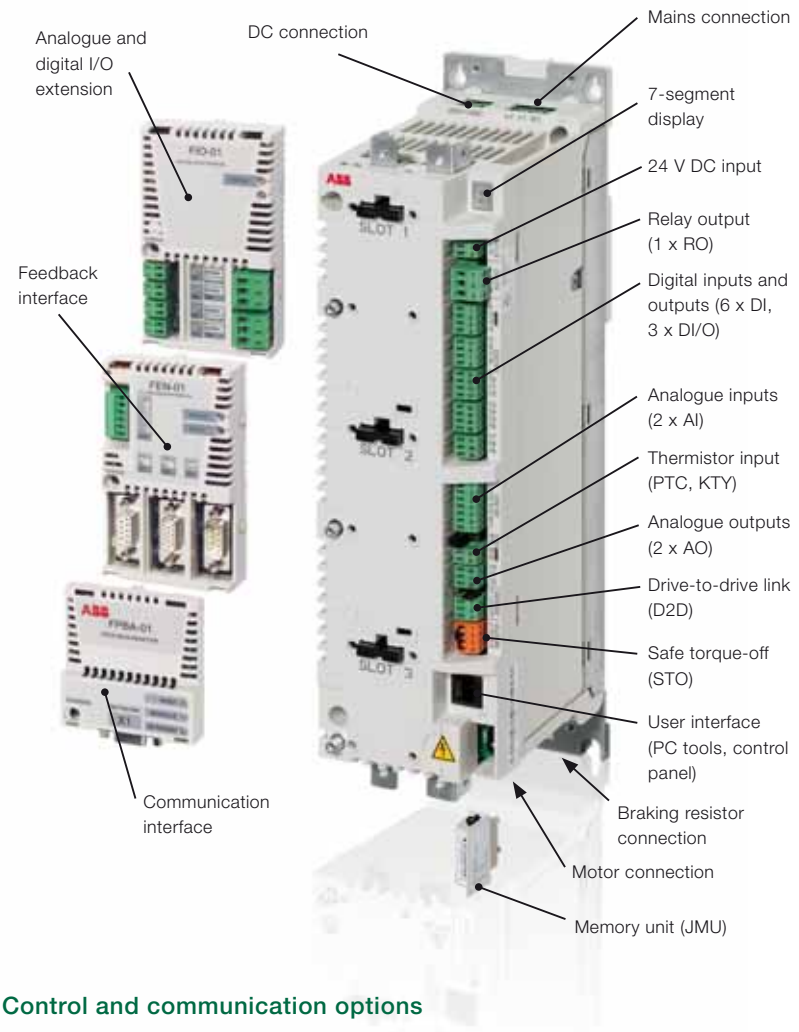
– **Global compatibility with machinery environment and standards**
  - Standard approvals for CE, UL, cUL, CSA, C-Tick
  - With external mains filter: EN 61800-3, category C2 (A-limits)
  - Integrated safe torque-off (STO) function (SIL3), which is certified by TÜV
  - Coated boards as standard to meet environmental requirement

## Control and communication

– **Control interface with versatile standard connections**
  - Digital input/output: 6DI, 3DI/O, 1 relay output
  - Analogue input/output: 2AI + 2AO
  - Motor thermistor input (PTC/KTY)
  - Drive-to-drive communication link (RS 485)
  - Complete drive configuration and settings are stored in memory unit

– **Scalability with different plug-in control options**
  - Three options slots for control options
  - Analogue and digital I/O extension modules
  - Interfaces for different feedback types (TTL, Resolver, Sin/Cos, Endat, Hiperface, SSI)
  - Master communication via typical fieldbusses (PROFIBUS, DeviceNet, CANOpen), Ethernet or real-time synchronous communication (PROFINET, EtherCAT, SERCOS)

# Options
# Internal




## Description of control unit (JCU) connections

| | | |
|---|---|---|
| | | X1 |
| External power input<br>24 V DC, 1.6 A | +24VI<br>GND | 1<br>2 |
| | | X2 |
| Relay output<br>250 V AC / 30 V DC<br>2 A | NO<br>COM<br>NC | 3<br>4<br>5 |
| | | X3 |
| +24 V DC | +24VD | 1 |
| Digital I/O ground | DGND | 2 |
| Digital input 1 | DI1 | 3 |
| Digital input 2 | DI2 | 4 |
| +24 V DC | +24VD | 5 |
| Digital I/O ground | DGND | 6 |
| Digital input 3 | DI3 | 7 |
| Digital input 4 | DI4 | 8 |
| +24 V DC | +24VD | 9 |
| Digital I/O ground | DGND | 10 |
| Digital input 5 | DI5 | 11 |
| Digital input 6 | DI6 | 12 |
| +24 V DC | +24VD | 13 |
| Digital I/O ground | DGND | 14 |
| Digital input/output 1 | DIO1 | 15 |
| Digital input/output 2 | DIO2 | 16 |
| +24 V DC | +24VD | 17 |
| Digital I/O ground | DGND | 18 |
| Digital input/output 3 | DIO3 | 19 |
| | | X4 |
| Reference voltage (+) | +VREF | 1 |
| Reference voltage (-) | -VREF | 2 |
| Ground | AGND | 3 |
| Analogue input 1 (Current or voltage,selectable by jumper J1) | AI1+<br>AI1- | 4<br>5 |
| Analogue input 2 (Current or voltage,selectable by jumper J2) | AI2+<br>AI2- | 6<br>7 |
| AI1 current/voltage selection | | J1 |
| AI2 current/voltage selection | | J2 |
| Thermistor input | TH | 8 |
| Ground | AGND | 9 |
| Analogue output 1 (current) | AO1 (I) | 10 |
| Analogue output 2 (voltage) | AO2 (U) | 11 |
| Ground | | 12 |
| | | X5 |
| Drive-to-drive link termination J3 | | |
| Drive-to-drive link. | B<br>A<br>BGND | 1<br>2<br>3 |
| | | X6 |
| Safe torque-off. Both circuits must be closed for the drive to start. | OUT1<br>OUT2<br>IN1<br>IN2 | 1<br>2<br>3<br>4 |
| PC tools, control panel connection (RS 232) | | |
| Memory unit connection | | |

## Control and communication options

| Options | Data | Slot 1 | Slot 2 | Slot 3 |
|---|---|---|---|---|
| **Analogue & digital extension** | | | | |
| FIO-01 | 4 x DI/O, 2 x RO | O | O | – |
| FIO-11 | 3 x AI, 1 x AO, 2 x DI/O | O | O | – |
| **Feedback interface** | | | | |
| FEN-01 | 2 inputs (TTL incremental encoder), 1 output | O | O | – |
| FEN-11 | 2 inputs (SinCos absolute, TTL incremental encoder), 1 output | O | O | – |
| FEN-21 | 2 inputs (Resolver, TTL incremental encoder), 1 output | O | O | – |
| FEN-31 | 1 input (HTL incremental encoder), 1 output | O | O | – |
| **Communication** | | | | |
| FPBA-01 | PROFIBUS DP | – | – | O |
| FCAN-01 | CANopen | – | – | O |
| FDNA-01 | DeviceNet | – | – | O |
| FENA-01/-11* | EtherNet/IP, Modbus/TCP, PROFINET IO | – | – | O |
| FSCA-01 | Modbus RTU | – | – | O |
| FECA-01* | EtherCAT | – | – | O |
| FSEA-01* | SERCOS II | – | – | O |

O = option
– = not available
* = in preparation

# Supply modules with full regenerative capability

| ACSM1 | - | 204XR | - | XXXX | - | 4 | + | XXXX |
|---|---|---|---|---|---|---|---|---|

## Regen supply for ACSM1 drives

The ACSM1 regen supply can be used in single drive and multidrive configurations. The regen filter module on the supply side keeps the line side harmonics at a very low level. The filter module includes EMC filtering to meet category C2 emission levels.

## Compact supply for different systems

The regen supply modules cover a power range from 5 to 60 kW with four frame sizes. Regen supply needs only two modules, the regen filter module and the regen supply module. These modules take care of all supply side functions.

## Highlights

- Full braking power (100% rated power)
- Line side power factor controlled to 1
- Clean power with very low harmonic content (THD < 5%) and integrated EMC filtering (category C2)
- Immunity to supply voltage due to controlled DC voltage
- Connect and run. Started automatically, when supply connected
- No need for large braking resistors with continuous braking power

**Regen filter module WFU-22 and regen supply module ACSM1-204 (frame D).**

**Regen filter module WFU-02 and regen supply module ACSM1-204 (frame B).**

| Regen supply module type | ACSM1-204xR- | 07A0-4 | 016A-4 | 031A-4*) | 046A-4 | 090A-4 |
|---|---|---|---|---|---|---|
| Regen supply module, frame size | | A | B | C | C | D |
| Regen filter module | | WFU-01 | WFU-02 | WFU-11 *) | WFU-21 | WFU-22 |
| **Input connection (AC)** | | | | | | |
| Supply voltage | $U_2$ (V AC) | 3-phase 380 to 480 V AC +10/-15% | | | | |
| Rated supply power at 400 V AC | $S_N$ (kVA) | 5.5 | 12.5 | 24 | 34 | 64 |
| Rated supply current at 400 V AC | $I_2$ (A) | 8 | 18 | 35 | 50 | 93 |
| Rated supply current at 480 V AC | $I_2$ (A) | 6.7 | 15 | 29 | 41 | 77 |
| Frequency | $f_2$ (Hz) | 50 to 60 Hz +/-5% | | | | |
| **Output connection (DC)** | | | | | | |
| DC voltage | $U_{DC}$ (V DC) | 548 to 692 V DC +/-10% ($U_{DC} \geq 1{,}442 \times U_2$) | | | | |
| Rated power (DC) | $P_{DC}$ (kW) | 5.3 | 12 | 23 | 33 | 61 |
| Rated power (DC) | $P_{DC}$ (hp) | 7 | 16 | 30 | 44 | 81 |
| Rated DC current ($U_2$ = 400 V AC, $U_{DC}$ = 577 V DC) | $I_{DC}$ (A) | 9 | 21 | 40 | 58 | 107 |
| Rated DC current ($U_2$ = 480 V AC, $U_{DC}$ = 692 V DC) | $I_{DC}$ (A) | 7.6 | 17 | 34 | 47 | 88 |
| **Braking resistor connection** | | | | | | |
| Braking chopper | | As standard in all types | | | | |
| Braking resistor | | External resistor connected to supply module | | | | |
| **Dimensions and weights** | | | | | | |
| Regen supply module | H x W x D (mm) | 364 x 90 x 146 | 380 x 100 x 223 | 467 x 165 x 225 | | 467 x 220 x 225 |
| | Weight (kg) | 3 | 5 | 10 | | 17 |
| Regen filter module | H x W x D (mm) | 315 x 213 x 218 | | 386 x 288 x 272 | 406 x 318 x 299 | |
| | Weight (kg) | 11 | 14 | 35 | 45 | 51 |

Power ratings apply to the line voltage range from 400 to 480 V AC.
Regen supply modules dimensions are without options.
*) In preparation

# Options
# External

### Mains choke

The ACSM1 drive does not necessarily need a mains choke for operation. Each individual case should be checked to ascertain whether a mains choke needs to be installed. Mains chokes are typically used to:

- Reduce harmonics in the mains current
- Achieve a reduction in the r.m.s. mains current
- Reduce mains disturbance and low-frequency interference
- Increase the allowed DC bus continuous power

A mains choke series is available to meet different system design needs.

### Mains filter (EMC)

The EMC product standard (EN 61800-3 + Amendment A11 (2000)) covers the specific EMC requirements stated for drives (tested with motor and cable) within the EU. EMC standards such as EN 55011, or EN 61000-6-3/4, apply to industrial and household equipments and systems including drive component inside. Drive units complying with requirements of EN 61800-3 are always complient with comparable categories in EN 55011 and EN 61000-6-3/4, but not necessarily vice versa. EN 55011 and EN 61000-6-3/4 do not specify cable length nor require a motor to be connected as a load. The emission limits are comparable according to the following table, EMC standards.

### EMC standards in general

| EN 61800-3/A11 (2000), product standard | EN 61800-3 (2004), product standard | EN 55011, product family standard for industrial, scientific and medical (ISM) equipment |
|---|---|---|
| 1st environment, unrestricted distribution | Category C1 | Group 1<br>Class B |
| 1st environment, restricted distribution | Category C2 | Group 1<br>Class A |
| 2nd environment, unrestricted distribution | Category C3 | Group 2<br>Class A |
| 2nd environment, restricted distribution | Category C4 | Not applicable |

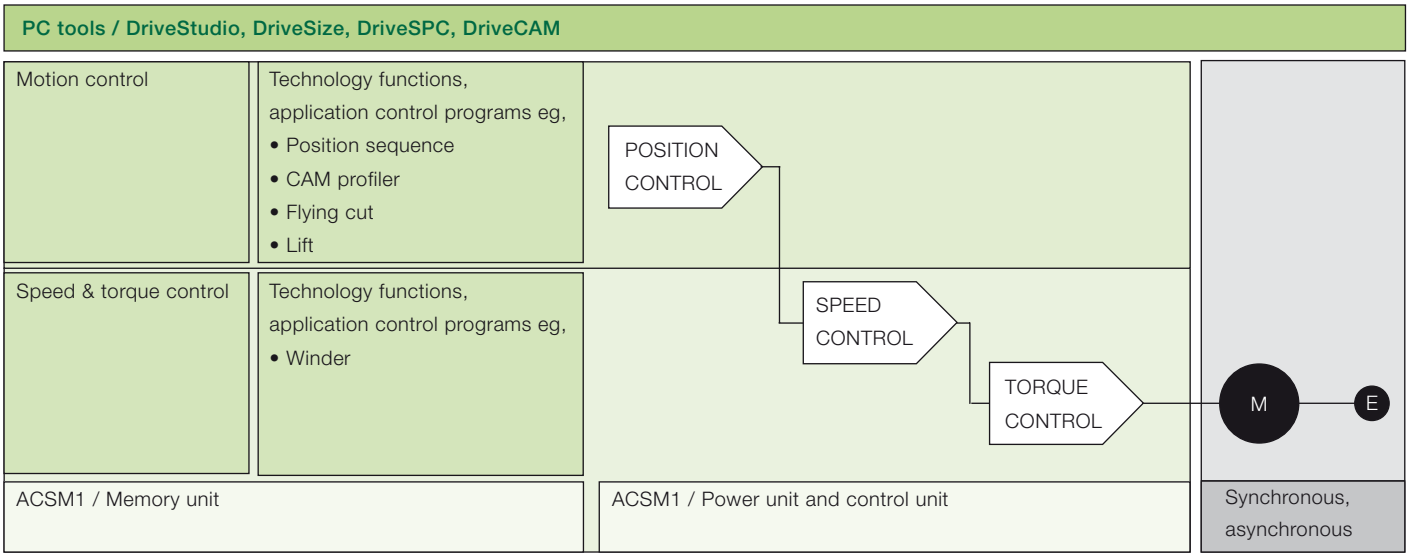
Mains filters are available to meet category C2 level with the ACSM1 drive installation, including a motor with a max. 50 m cable. This level corresponds to the A limits for Group 1 equipment according to EN 55011.

### Braking resistors

Depending on the application, an external braking resistor may be needed to convert the kinetic energy generated into thermal energy. A selection of resistors is available for different kinds of pulse duty performance. All braking resistors are equipped with a thermal sensor as standard.

# Control and programming

## Scalable control and programming environment




### Two control variants
- Speed and torque control
- Motion control

### Speed and torque control
- Open and closed loop DTC (direct torque control)
- Synchronous and asynchronous motors
- Ideal for high bandwidth of speed or torque control application

### Motion control
- In addition to speed and torque control
- High bandwidth of position and synchronization control
- Point-to-point positioning with extensible positioning profile sets
- Synchronization (encoder feedback or drive-to-drive link)
- Register control based on fast probe inputs
- Multiple homing methods

### Application control programming
In addition to multiple parameter programmable speed and position control functions, drive functionality can be easily modified or extended using application control programming of the DriveSPC tool.

- Standard function blocks to modify a basic control interface or make extensible PLC-tasks
- Technology function blocks to meet machine-specific application requirements. Technology function block libraries are optional.
- Application control programs, ready-made solutions for dedicated applications such as winding, lift control and CAM profiler applications using the corresponding technology function library. Easy to modify with parameters or additive function blocks.
- Drive functionality is defined and delivered with memory unit
- Compatible with ABB's AC500 PLC offering

# Drive tools

### DriveStudio
User-friendly PC environment both for simple drive commissioning tasks and for the more demanding drive tuning and programming tasks.

- Drive overview screen for fast parameter and function block navigation
- Parameter setting and signal monitoring
- Parameter set comparison
- Data logger and on-line signal monitoring for drive tuning (multiple signal channels and triggering conditions)
- Back-up and restore tool for drive parameter cloning and life time support
- Case sensitive help with detailed drive parameter, event and function descriptions
- Wizards for configuring communications options (PROFIBUS, CANopen) and motor setup.

### DriveSPC
- Simple, easy-to-understand solution program composer connecting a function block interface with drive firmware functions for signal monitoring and parameter setting
- Same interface enables the adding of user-defined function block programs even on the fastest time levels of the drive control
- Function block programming with standard function block library
- Structured text programming
- Optional and customizable function block library expands the variety of functions
- Professional programming environment allowing: hierarchy levels, custom circuits, user defined parameters, etc.
- Copy protection prevents users from uploading or viewing password protected parameters

### DriveCAM
- Cam control program for designing electronic cams (flying shear, flying cut, traverse control, etc.)
- Built-in cam function library
- Upload/download multiple profiles to drive memory

### Assistant control panel
The assistant control panel features a multilingual alphanumeric display for easy drive configuration.
It is an ideal tool for service engineers providing the following main features:

- A large graphical display
- Extremely easy to navigate
- Soft and convenient keys
- Local control keys (start/stop/reference)
- Parameter setting and monitoring
- Status and history data

The control panel is an external option and can be connected by cable to the ACSM1 drive. The panel mounting kit enables mounting of control panels on cabinet doors or inside the control cabinet.

### Sizing tool
DriveSize helps the machine designer select the optimum ACSM1 drive, motor and gear combination for the required motion and speed profiles, and for typical mechanical applications.

Ready defined input sheets make it very easy to specify the dimensions of different kinds of linear or rotary movement mechanisms such as

- lead screws
- rack and pinion combinations
- belt and pulley
- conveyor
- feed roll
- rotating table

# Technical data

| ACSM1 | - | 04XX | - | XXXX | - | 4 | + | XXXX |
|---|---|---|---|---|---|---|---|---|

| Main connections | |
|---|---|
| **Supply voltage** | 3-phase 380 to 480 V AC +10 /-15% |
| **Frequency** | 50 to 60 Hz +/- 5% |
| **Total harmonic distortion (THD)** | With mains choke to meet limits acc. to EN 61000-3-2, IEC 61000-3-12, IEC 61000-3-4. |
| **DC connection** | |
| **DC voltage level** | 485 to 648 V DC ± 10 % |
| **Charging circuit** | Internal, A to D frames / External, E frame |
| **Common DC** | See Engineering Manual |
| **Motor connection** | |
| **Motor types** | Asynchronous motors (standard induction, servo) and synchronous motors (servo, high torque) |
| **Output frequency** | 0 to 500 Hz |
| **Switching frequency ($f_{sw}$)** | 1 to 16 kHz, 4 kHz as default. Output current derating above 4 kHz |
| **Braking power connection** | |
| **Braking chopper** | As standard in all types |
| **Braking resistor** | External resistor connected to drive |

| Operating conditions | |
|---|---|
| **Degree of protection** | IP20 acc. to EN 60529; Open Type acc. to UL 508. |
| **Ambient temperature** | -10 to +55 °C, derating above 40 °C |
| **Installation altitude** | 0 to 4000 m, derating above 1000 m |
| **Relative humidity** | max. 95% |
| **Climatic/environmental conditions** | Class 3K3, 3C2 acc. to EN 60721-3-3. Oil mist, formation of ice, moisture condensation, water drops, water spray, water splashes and water jets are not permissible (EN 60204, Part 1). |
| **Vibration** | Class 3M4 acc. to EN 60721-3-3 |
| **EMC (According to EN 61800-3)** | With mains filter: Category C2 |
| **Functional safety** | Safe torque-off function (STO acc. EN 61800-5-2). IEC 61508: SIL 3 EN 954-1: Category 4 IEC 62061: SILCL 3 EN ISO 13849-1: PL e Certified by TÜV |
| **Compliance** | CE, UL, cUL, CSA, C-Tick, GOST R |

# Types, ratings, dimensions and weights

ACSM1 - 04XX - XXXX - 4 + XXXX

| Feature / frame size | A | B | C | D | E |
|---|---|---|---|---|---|
| **Current & Power** | | | | | |
| Nominal current | 2.5 to 7.0 A | 9.5 to 16 A | 24 to 46 A | 60 to 90 A | 110 to 210 A |
| Maximum current | 5.3 to 14.7 A | 16.6 to 28 A | 42 to 81 A | 105 to 150 A | 165 to 351 A |
| Typical motor power | 0.75 to 3 kW | 4 to 7.5 kW | 11 to 22 kW | 30 to 45 kW | 55 to 110 kW / 160 kW [1] |
| Braking chopper | ● | ● | ● | ● | ● |
| Braking resistor | □ | □ | □ | □ | □ |
| Mains choke | □ | □ | □ | □ | ● |
| Mains filter (EMC) | □ | □ | □ | □ | ● |
| **Mounting and cooling** | | | | | |
| Removable power connectors | ● | ● | – | – | – |
| Removable control connectors | ● | ● | ● | ● | ● |
| Air-cooled variant | ■ | ■ | ■ | ■ | ■ |
| - Back plate mounting | ● | ● | ● | ● | ● |
| - DIN-rail mounting | ● | ● | – | – | – |
| - Horizontal mounting | ● | ● | ● | ● | – |
| Push-through variant | – | – | ■ | ■ | □ |
| Cold plate variant | – | – | ■ | ■ | – |
| Liquid-cooled variant | – | – | – | – | ■ |

[1] Power range up to 160 kW with the liquid-cooled variant.

● = standard □ = option, external
■ = product variant – = not available

### Ratings[7] ($U_N$ = 400 V AC)

| Typical motor power | | $f_{sw}$ = 4 kHz | | Type code | Frame Size | $f_{sw}$ = 8 kHz | | $f_{sw}$ = 16 kHz | |
|---|---|---|---|---|---|---|---|---|---|
| $P_N$ [1] kW | $P_N$ [1] hp | $I_2$ [2] A | $I_{2max}$ [3] A | ACSM1-04x[4]x[5] | | $I_2$ A | $I_{2max}$ A | $I_2$ A | $I_{2max}$ A |
| 0.75 | 1 | 3 | 5.3 | -02A5-4 | A | 2.5 | 5.3 | 2 | 5.3 |
| 1.1 | 1.5 | 3.6 | 6.3 | -03A0-4 | A | 3 | 6.3 | 2.2 | 5.8 |
| 1.5 | 2 | 4.8 | 8.4 | -04A0-4 | A | 4 | 8.4 | 2.4 | 5.8 |
| 2.2 | 3 | 6 | 10.5 | -05A0-4 | A | 5 | 8.4 | 2.5 | 5.8 |
| 3 | 3 | 8 | 14.7 | -07A0-4 | A | 5.5 | 11.3 | 3 | 7.5 |
| 4 | 5 | 10.5 | 16.6 | -09A5-4 | B | 9.5 | 13.2 | 5 | 9 |
| 5.5 | 7.5 | 14 | 21 | -012A-4 | B | 12 | 21 | 6 | 15.2 |
| 7.5 | 10 | 18 | 28 | -016A-4 | B | 13 | 22 | 7.5 | 15.2 |
| 11 | 15 | 27 | 42 | -024A-4 | C | 24 | 42 | 18 | 29 |
| 15 | 20 | 35 | 54 | -031A-4 | C | 31 | 43 | 20 | 29 |
| 18.5 | 25 | 44 | 70 | -040A-4 | C | 35 | 63 | 22 | 42 |
| 22 | 30 | 50 | 81 | -046A-4 | C | 38 | 63 | 24 | 42 |
| 30 | 40 | 65 | 105 | -060A-4 | D | 55 | 84 | 28 | 57 |
| 37 | 50 | 80 | 130 | -073A-4 | D | 60 | 117 | 31 | 78 |
| 45 | 60 | 93 | 150 | -090A-4 | D | 65 | 117 | 34 | 78 |
| 55 | 75 | 110 | 165 | -110A-4 | E | 75 | 125 | - | - |
| 75 | 100 | 135 | 202 | -135A-4 | E | 90 | 150 | - | - |
| 90 | 125 | 175 | 282 | -175A-4 | E | 115 | 206 | - | - |
| 110 | 150 | 210 | 326 | -210A-4 | E | 135 | 232 | - | - |
| 160[6] | 200[6] | 260 | 351 | -260A-4 | E | 165 | 232 | - | - |

[1] $P_N$: Typical motor power at 400 V AC (kW) and 460 V AC (hp). A and B frame sizes with or without mains choke, C and D frame sizes with mains choke.
[2] $I_2$: Continuous output current with given switching frequency ($f_{sw}$ = 4/8/16 kHz)
[3] $I_{2max}$: Maximum short time output current with given switching frequency ($f_{sw}$ = 4/8/16 kHz)
[4] Cooling variant (A = Air-cooling, C = Cold plate, L = Liquid-cooled, P = Push-through)
[5] Control variant (S=Speed & Torque, M=Motion)
[6] Motor power defined with $f_{sw}$ = 3 kHz ($I_2$ = 304 A).
[7] Output current values are derated by factor 0.86 at 480 V AC.

### Dimensions

| Frame size | Height[1] mm | Width mm | Depth[2] mm | Weight kg |
|---|---|---|---|---|
| A | 364 | 90 | 146 | 3 |
| B | 380 | 100 | 223 | 5 |
| C | 467 | 165 | 225/161[3] | 10/8[3] |
| D | 467 | 220 | 225/161[3] | 17/14[3] |
| E | 700 | 314 | 398 | 67 |

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.

# Services

All industries face a common goal: to maximize their production output at the lowest possible cost, while maintaining the highest quality end products. One of ABB's key objectives is to maximize the uptime of its customers' processes by ensuring optimum lifetime of all ABB products in a predictable, safe and low cost manner.

The services offered for ABB low voltage drives span the entire value chain, from the moment a customer makes the first enquiry through to disposal and recycling of the drive. Throughout the value chain, ABB provides training and learning, technical support and contracts. All of this is supported by one of the most extensive global drive sales and service networks.

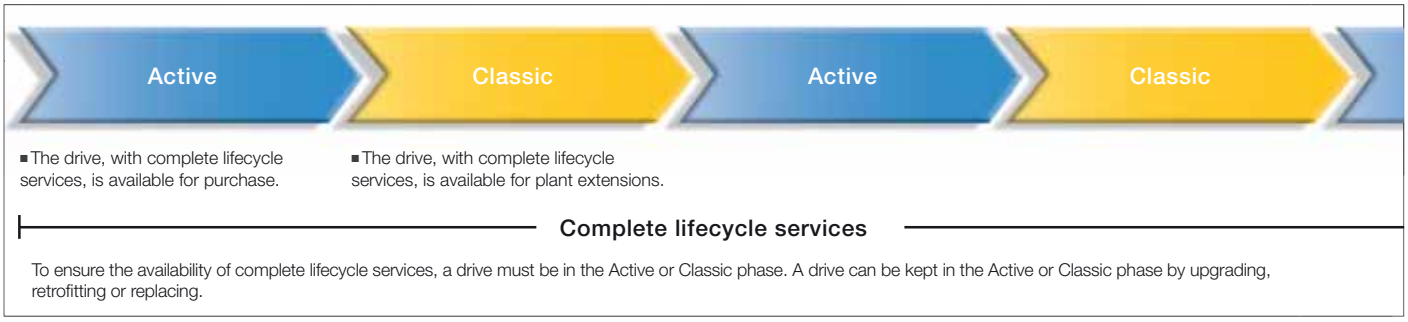
## Maximizing return on investment

At the heart of ABB's services is its drive lifecycle management model. All services available for ABB low voltage drives are planned according to this model. For customers it is easy to see which services are available at which phase.

Drive specific maintenance schedules are also based on this four-phase model. Thus, a customer knows precisely the timing of the part replacements plus all other maintenance related actions. The model also helps the customer when deciding about upgrades, retrofits and replacements.

Professional management of the drive's lifecycle maximizes the return on any investment in ABB low voltage drives.

### ABB drive lifecycle management model



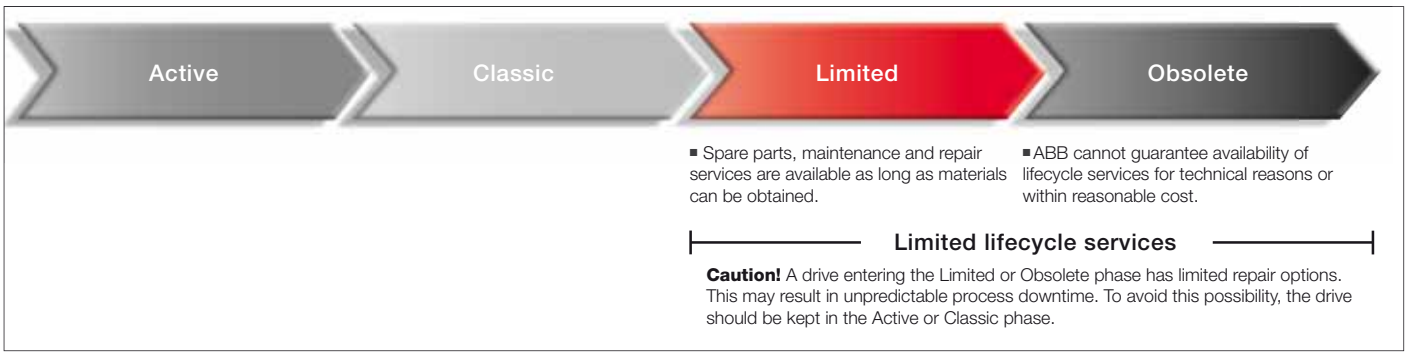




ABB follows a four-phase model for managing drive lifecycles, which brings enhanced customer support and improved efficiency.

Examples of lifecycle services are: selection and dimensioning, installation and commissioning, preventive and corrective maintenance, remote services, spare part services, training and learning, technical support, upgrade and retrofit, replacement and recycling.

# Notes

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