

Low voltage AC drives

ABB high performance machinery drives for lifts

ACSM1

0.75 to 110 kW / 1 to 150 hp



A dedicated low voltage AC drive for lifts offers smooth travel and accurate floor positioning for goods and passenger lifts.

Part of the ABB high performance machinery drive range, this drive has functions that address some of the key challenges facing lift original equipment manufacturers (OEMs).

Highly accurate lift control

Accurate lift control is achieved through ABB drives' motor control platform, direct torque control (DTC). A benefit of DTC is that it can provide high levels of speed and torque accuracy demanded by the lift motors, without the need for a feedback device from the motor shaft. Should the lift system

require an even higher speed or torque control accuracy, then a selection of different feedback devices can be used. Together with a comprehensive load compensation function, the drive enables the lift to adapt its control technique to virtually all operating conditions.

Easy start-up

Start-up of the ABB high performance machinery drive is achieved by setting the ready-made parameters using the drives' assistant control panel or user-friendly PC tool, DriveStudio. The drive can be fully pre-configured by using the four different user sets, which store all parameter settings including application and motor data needed for start-up. Parameter selection is made easy by

using lift-specific terminology and units familiar to the lift industry.

Highlights

- Ideal solution for demanding lift applications
- For use with geared and gearless lift systems
- Excellent control performance in open- and closed-loop control through use of direct torque control (DTC)
- Versatile control interface with wide range of feedback interfaces
- Safe torque-off function (SIL 3) as standard
- UPS and DC battery back-up supply in case of network power failure
- Regenerative supply for energy efficient braking

Reaching new heights in lift travel and floor positioning accuracy



Below are some key functions that highlight the reasons why the ABB high performance machinery drive is optimal solution for demanding lift applications.

Geared and gearless lifts benefit from one drive type

The ABB drive can work with asynchronous and synchronous motors. This makes the drive suitable for geared lifts as well as gearless lifts, where synchronous motors, such as permanent magnet types, are generally used.

DTC benefits a gearless lift control system by providing the dynamic speed and high torque control required. This ensures that the lift maintains a high control performance at all times.

Advanced speed profile brings a comfortable ride

Accurate and steady speed and torque control is essential to achieve a comfortable ride, arriving at the requested floor quickly and in the correct position.

This is achieved through the drive's built-in speed profile, which offers a wide range of settings for acceleration/ deceleration and jerk. The lift's traveling sequences between floors can be flexibly configured using the drive's inputs/ outputs or serial communication interface.

Smart short distance operation minimizes travel time

Smart slowdown function is used in short distance operation, when the normal running speed is not reached between floors. It optimizes the leveling path of the lift and hence minimizes the traveling time from floor-to-floor. The smart slowdown function can be used in open- and closed-loop mode.

Self-checking built-in brake control enhances reliability

Accurate and reliable mechanical brake control is essential for correct and safe lift operation. The drive incorporates a built-in brake control function which eliminates the need for external brake control. The function includes torque proving and checking for brake slip detection.

Torque proving ensures that the drive and motor are able to produce torque before the drive releases the brake and starts operating the lift.

Brake slip detection checks that the brake has enough friction for proper lift operation and no slip exists.

Evacuation mode leads to rapid rescue

If the network power supply fails and there is a need to rescue people, the drive features an evacuation mode. With this smart evacuation mode the lift can run to the next floor, automatically finding the lower load direction and minimizing the power needed. The ABB drive supports an uninterrupted power supply (UPS) and DC

battery back-up supply which operate in the case of a network power failure.

Safe torque-off offers a cost-effective safety solution

The drives feature a built-in safe torque-off (STO) function (SIL 3) as standard which disables the power semiconductors. As such, the drive can not power the motor making it torque-free. The STO function can replace one motor contactor. All of this contributes to make a cost-effective safety function for a lift, which is in line with the safety requirements of EN 81-1 for electric lifts.

Regenerative drive helps save energy

The ABB drive has an optional regenerative unit, which offers significant energy savings compared with traditional resistor braking. One regenerative unit can be used with single lift or with a group of lifts, when power is transferred between accelerating and decelerating motors via the DC bus of the drives. Among the main benefits are full braking power without braking resistors and clean power with very low harmonic content.

Advanced programming extends lift's functionality

The drive features a programming tool, DriveSPC (Solution Program Composer), which allows users to develop additional lift-related functionality. Lift control is based on ready-made lift technology functions and with the DriveSPC tool can be easily modified and extended using IEC-61131 function blocks.

ABB high performance machinery drive

Compact and modular drive with versatile control interface

The ABB drive provides a compact and modular unit for demanding lift applications.

The 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 and therefore can be tailored to meet application needs. A braking chopper is integrated as standard and enables compact and cost-effective design. Optimum assembly and cooling solutions include side-by-side installation and air-cooled, cold-plate and push-through variants.

The control interface features versatile standard connections. Among these include a wide range of digital and analog inputs and outputs (I/Os), which

can be easily extended with plug-in I/O options and speed feedback interface options (HTL, TTL, Resolver, Sin/Cos, Endat, Hiperface, SSI).

Complete drive configuration and settings are stored in the memory unit, which offers quick and easy maintenance.



Technical specification

Mains connection	
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
Motor connection	
Motor types	Asynchronous motors and synchronous motors
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%
EMC (According to EN 61800-3)	With mains filter: Category C2
Compliance	CE, UL, cUL, CSA, C-Tick, GOST R

Control interface	
Control voltage supply	Internal or 24 V DC external
PC-tools / control panel	Connection as standard
Status display	7-segment display as standard
Memory unit	Standard
Drive to drive link	Galvanic RS-485 as standard
Digital I/O	6 x DI, 3 x DI/O, 1 x RO
Analog I/O	2 x AI, 2 x AO
Thermistor input	PTC, KTY
Safe torque-off (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
Option slots	Three slots for analog and digital I/O, feedback and communication plug-in options
Control options	
Analog & digital extension	
FIO-01	4 x DI/O, 2 x RO
FIO-11	3 x AI, 1 x AO, 2 x DI/O
Feedback interface	
FEN-01	2 inputs (TTL incremental encoder), 1 output
FEN-11	2 inputs (SinCos absolute, TTL incremental encoder), 1 output
FEN-21	2 inputs (Resolver, TTL incremental encoder), 1 output
FEN-31	1 input (HTL incremental encoder), 1 output

Types, ratings and dimensions

Feature / frame size	A	B	C	D	E
Current and power					
Continuous current ¹⁾	3 to 8 A	10.5 to 18 A	27 to 50 A	65 to 93 A	110 to 210 A
Maximum current ¹⁾	5.3 to 14.7 A	16.6 to 28 A	42 to 81 A	105 to 150 A	165 to 326 A
Typical motor power	0.75 to 3 kW 1 to 3 hp	4 to 7.5 kW 5 to 10 hp	11 to 22 kW 15 to 30 hp	30 to 45 kW 40 to 60 hp	55 to 110 kW 75 to 150 hp
Dimensions *) (H x D x W)	364 x 146 x 90 mm	380 x 223 x 100 mm	467 x 225 x 165 mm	467 x 225 x 220 mm	700 x 398 x 314 mm
Weight	3 kg	5 kg	10 kg	17 kg	67 kg
Braking chopper	●	●	●	●	●
Braking resistor	□	□	□	□	□
Mains choke	□	□	□	□	●
Mains filter (EMC)	□	□	□	□	●
Regen supply	□	□	□	□	-
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	-	-	■	■	-

¹⁾ Ratings with 400 V AC supply and 4 kHz switching frequency.
Derating needed with higher values.

- = standard
- = product variant
- = option, external
- = not available

*) All dimensions and weights are without options.

Ratings⁶⁾ (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			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	-	-

- 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⁾ I₂: 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, P = Push-through)
- ⁵⁾ Motor power defined with f_{sw} = 3 kHz (I₂ = 304 A).
- ⁶⁾ Output current values are derated by factor 0.86 at 480 V AC.

For more information please contact:

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