ABB standard drives

ACS310, 0.37 to 22 kW / 0.5 to 30 hp

Technical catalogue

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ABB

Two ways to select your drive

Choice 1: Simply contact your local ABB drives sales office (see page 17) and let them know what you want. Use page 3 as a reference section for more information.

OR

Choice 2: Build up your own ordering code using the simple 7-step approach below. Each step is accompanied by a reference to a page that is filled with useful information.

Type code stucture:

| ACS310 | - | 03E | - | 02A6 | - | 2 | + | J400 |

1 Product series

2 Rating and types

3 Voltages

4 Construction

5 Dimension

6 Options

7 Technical data
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8 Services

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ABB standard drives

| ACS310 | - | 03E | - | 02A6 | - | 2 | + | J400 |

ABB standard drives

An extension to the ABB standard drives family is a series of drives specifically designed for variable torque applications such as pumps and fans. The specific design includes a powerful set of features which benefit pump and fan applications including built-in PID controllers and PFC (pump and fan control) that varies the drive's performance in response to changes in pressure, flow or other external data.

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.

Applications

- Booster pumps
- Submersible pumps
- Irrigation pumps
- Supply and return fans

Highlights

- Pump and fan features
- Unified height and depth
- Energy efficiency calculators
- Advanced or basic control panel depending on application
- Embedded Modbus RS-485 fieldbus interface
- FlashDrop tool for fast parameter setting

Feature	Advantage	Benefit
Pump and fan control (PFC) macro to control pumps and fans in parallel	One drive controls several pumps or fans and eliminates the need for an external programmable logic controller.	Saves cost of additional drives and external PLC.
	Reduces motor stress and increases lifetime when auxiliary motors are driven according to the needed pump/fan capacity.	Longer life for pump or fan system while reducing maintenance time and costs.
	Interlock function enables one motor to be disengaged from the mains supply while others continue operating in parallel.	Maintenance can be carried out safely without stopping process.
Soft pump and fan control macro (SPFC)	Reduces unwanted pressure peaks in pumps and pipelines when an auxiliary motor is started.	Reduces maintenance costs. Longer life for pump or fan system. Smoother processes.
Pump protection functions	Improved protection with pre-programmed features for preventive maintenance. Helps avoid corrosion in the pump systems.	Reduces maintenance costs. Longer life for pump system.
Embedded Modbus RS-485 fieldbus interface	No need for external fieldbus options. Integrated and compact design.	Saves costs of external fieldbus devices. Increases reliability.
On/off cooling fan control	Cooling fan rotates only when the drive is modulating, thereby cooling only when needed.	Silent operation. Improves drive's energy efficiency.
Software controlled phase inversion	Fast and easy way to change the phase order of the motor rotation.	Time savings as there is no need to change the output cable order manually.
Short parameter menu view	Only the most needed drive parameters are shown on the drive's parameter view. Complete parameter view can be changed by setting one parameter.	Time savings as user can quickly see the most important parameters. Fast commissioning of the drive.
Energy optimizer	Improved motor efficiency with intelligent drive control method, especially while operating on partial loads.	Boosts energy efficiency due to lower motor currents. Reduces audible noise from the motor.
Energy efficiency tools	Several tools to illustrate saved energy (kWh), carbon-dioxide emissions (CO_2) and cost in local currency.	Shows direct impact on energy bill and helps control operational expenditure (OPEX).
Full output current at 50 °C ambient	Drive can be operated in ambient temperatures up to 50 °C without de-rating the output current.	Optimized drive dimensioning for wide temperature range.
Load analyzer	Load analyzer saves process data, such as current and torque values, which can be used to analyze the process and dimensioning of the drive and motor.	Optimized dimensioning of the drive, motor and process.

Technical specification

| ACS310 | - | 03E | - | 02A6 | - | 2 | + | J400 |

Mains connection

Voltage and power range	3-phase, 200 to 240 V ± 10% 0.37 to 11 kW (0.5 to 15 hp) 3-phase, 380 to 480 V ± 10% 0.37 to 22 kW (0.5 to 30 hp)
Frequency	48 to 63 Hz

Motor connection

Voltage	3-phase, from 0 to U_{supply}
Frequency	0 to 500 Hz
Continuous loading capability	I_{2N} maximum continuous output current at ambient temperature of +40 °C. No overloadability, derating 1% for every additional 1 °C up to 50 °C. I_{LD} continuous output current at max ambient temperature of +50 °C. 10% overloadability for one minute every ten minutes.
Switching frequency Default Selectable	4 kHz 4 to 16 kHz with 4 kHz steps
Acceleration time	0.1 to 1800 s
Deceleration time	0.1 to 1800 s

Environmental limits

Ambient temperature	-10 to 50 ºC (14 to 122 ºF), no frost allowed
Altitude Output current	Rated current available at 0 to 1000 m (0 to 3281 ft) reduced by 1% per 100 m (328 ft) over 1000 to 2000 m (3281 to 6562 ft)
Relative humidity	Lower than 95% (without condensation)
Degree of protection	IP20 / optional NEMA 1 enclosure
Enclosure colour	NCS 1502-Y, RAL 9002, PMS 420 C
Contamination levels Transportation Storage Operation	IEC721-3-3 No conductive dust allowed Class 1C2 (chemical gases) Class 1S2 (solid particles) Class 2C2 (chemical gases) Class 2S2 (solid particles) Class 3C2 (chemical gases) Class 3S2 (solid particles)

Product compliance

Low Voltage Directive 2006/95/EC
Machinery Directive 98/37/EC
EMC Directive 2004/108/EC
Quality assurance system ISO 9001
Environmental system ISO 14001
CE and C-Tick approvals
UL, cUL and GOST R pending
RoHS compliant

EMC

Class C3 (2nd environment unrestricted distribution) inbuilt as standard
Class C2 and C1 with external optional EMC filters

Programmable control connections

Two analog inputs Voltage signal Unipolar Bipolar Current signal Unipolar Bipolar Resolution Accuracy	0 (2) to 10 V, R_{in} > 312 kΩ -10 to 10 V, R_{in} > 312 kΩ 0 (4) to 20 mA, R_{in} = 100 Ω -20 to 20 mA, R_{in} = 100 Ω 0.1% ± 1%
One analog output	0 (4) to 20 mA, load < 500 Ω
Auxiliary voltage	24 V DC ± 10%, max. 200 mA
Five digital inputs Input impedance	12 to 24 V DC with internal or external supply, PNP and NPN, pulse train 0 to 16 kHz 2.4 kΩ
One relay output Type Maximum switching voltage Maximum switching current Maximum continuous current	NO + NC 250 V AC/30 V DC 0.5 A/30 V DC; 5 A/230 V AC 2 A rms
One digital output Type Maximum switching voltage Maximum switching current Frequency Resolution Accuracy	Transistor output 30 V DC 100 mA/30 V DC, short circuit protected 10 Hz to 16 kHz 1 Hz, 0.2%

Serial communication

Fieldbus Cable Termination Isolation Transfer rate Communication type Protocol	Modbus RS-485, embedded Schielded twisted pair, impedance 100 to150 ohms Trunk line, drop lines allowed Bus interface isolated from drive 1.2 to 76.8 kbit/s Serial, asynchronous, half duplex Modbus

Chokes

AC input chokes	External option For reducing THD in partial loads and to comply with EN 61000-3-2.
AC output chokes	External option To achieve longer motor cables

Ratings, types, voltages and construction

| ACS310 | - | 03E | - | 02A6 | - | 2 | + | J400 |

Type code

This is the unique reference number (shown above and in column 4, right) that clearly identifies your drive by power rating and frame size. Once you have selected the type code, the frame size (column 6) can be used to determine the drive dimensions, shown on the next page.

Voltages

ACS310 is available in two voltage ranges:
2 = 200 - 240 V
4 = 380 - 480 V
Insert either "2" or "4", depending on your chosen voltage, into the type code shown above.

Construction

"03E" within the type code (shown above) varies depending on the drive phase and EMC filtering. Choose below the one you need.

03 = 3-phase
E = EMC filter connected, 50 Hz frequency
U = EMC filter disconnected, 60 Hz frequency (In case the filter is required it can easily be connected.)

Ratings				Type code	Frame size
P_N kW	P_N hp	I_{2N} [1] A	I_{LD} [2] A		
3-phase supply voltage 200 - 240 V units					
0.37	0.5	2.6	2.4	ACS310-03X-02A6-2	R0
0.55	0.75	3.9	3.5	ACS310-03X-03A9-2	R0
0.75	1.0	5.2	4.7	ACS310-03X-05A2-2	R1
1.1	1.5	7.4	6.7	ACS310-03X-07A4-2	R1
1.5	2.0	8.3	7.5	ACS310-03X-08A3-2	R1
2.2	3.0	10.8	9.8	ACS310-03X-10A8-2	R2
3.0	4.0	14.6	13.3	ACS310-03X-14A6-2	R2
4.0	5.0	19.4	17.6	ACS310-03X-19A4-2	R2
5.5	7.5	26.8	24.4	ACS310-03X-26A8-2	R3
7.5	10.0	34.1	31.0	ACS310-03X-34A1-2	R4
11.0	15.0	50.8	46.2	ACS310-03X-50A8-2	R4
3-phase supply voltage 380 - 480 V units					
0.37	0.5	1.3	1.2	ACS310-03X-01A3-4	R0
0.55	0.75	2.1	1.9	ACS310-03X-02A1-4	R0
0.75	1.0	2.6	2.4	ACS310-03X-02A6-4	R1
1.1	1.5	3.6	3.3	ACS310-03X-03A6-4	R1
1.5	2.0	4.5	4.1	ACS310-03X-04A5-4	R1
2.2	3.0	6.2	5.6	ACS310-03X-06A2-4	R1
3.0	4.0	8.0	7.3	ACS310-03X-08A0-4	R1
4.0	5.0	9.7	8.8	ACS310-03X-09A7-4	R1
5.5	7.5	13.8	12.5	ACS310-03X-13A8-4	R3
7.5	10.0	17.2	15.6	ACS310-03X-17A2-4	R3
11.0	15.0	25.4	23.1	ACS310-03X-25A4-4	R3
15.0	20.0	34.1	31	ACS310-03X-034A-1	R4
18.5	25.0	41.8	38	ACS310-03X-41A8-4	R4
22.0	30.0	48.4	44	ACS310-03X-48A4-4	R4

X within the type code stands for E or U.

[1] I_{2N} maximum continuous output current at ambient temperature of +40 °C. No overloadability, derating 1% for every additional 1 °C up to 50 °C.

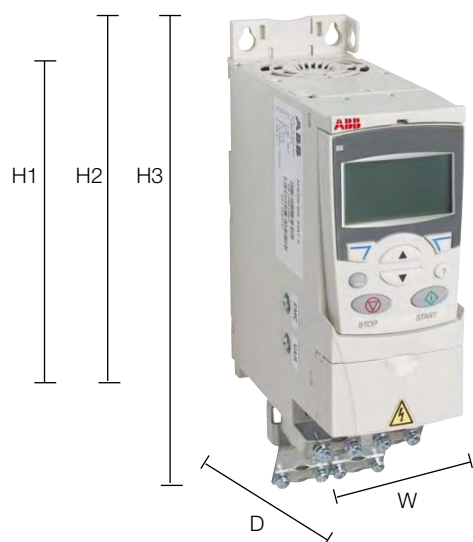[2] I_{LD} continuous output current at max ambient temperature of +50 °C. 10% overloadability for one minute every ten minutes.

Dimensions

| ACS310 | - | 03E | - | 02A6 | - | 2 | + | J400 |

Cabinet-mounted drives (IP20 UL open)

Wall-mounted drives (NEMA 1)

Frame size	IP20 UL open						NEMA 1				
	H1 mm	H2 mm	H3 mm	W mm	D mm	Weight kg	H4 mm	H5 mm	W mm	D mm	Weight kg
R0	169	202	239	70	161	1.2	257	280	70	169	1.6
R1	169	202	239	70	161	1.2	257	280	70	169	1.6
R2	169	202	239	105	165	1.5	257	282	105	169	1.9
R3	169	202	236	169	169	2.5	260	299	169	177	3.1
R4	181	202	244	260	169	4.4	270	320	260	177	5.0

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

| ACS310 | - | 03E | - | 02A6 | - | 2 | + | J400 |

How to select options

The options shown in the table are available within the ACS310 range. The control panels have an associated 4-figure option code, which is shown in the second column. It is this code that replaces J400 in the type code above.

Options	Ordering code	Description	Model
Protection class	*)	NEMA 1 (R0, R1, R2)	MUL1-R1
	*)	NEMA 1 (R3)	MUL1-R3
	*)	NEMA 1 (R4)	MUL1-R4
Control panel	J400	Assistant control panel	ACS-CP-A [2]
	J404	Basic control panel	ACS-CP-C [1]
Panel mounting kit	*)	Panel mounting kit	ACS/H-CP-EXT
	*)	Panel holder mounting kit	OPMP-01
Extension module	*)	Relay output extension module	MREL-01
Tools	*)	FlashDrop tool	MFDT-01
	*)	DriveWindow Light 2	DriveWindow Light 2
External options	*)	Input chokes	
	*)	EMC filters	
	*)	Output chokes	
Remote monitoring	*)	Ethernet adapter	SREA-01

*)   = Ordering with a separate MRP code number.
[1]   The ACS310 is compatible with ACS-CP-C basic control panel Rev M or later.
[2]   The ACS310 is compatible with ACS-CP-A assistant control panel Rev E or later.
     (New panel series manufactured since 2007 with serial number XYXXRXXXX,
     where year Y = 7 or greater and revision R = E, F, G, …)

Options
Interfaces

Panel cover
(included as standard)

Basic control panel

Assistant control panel

Panel mounting kits

User interfaces

Panel cover

The purpose of the panel cover is to protect the drive's connection surfaces. The ACS310 drive is delivered with a panel cover as standard. In addition there are two alternative control panels available as options.

Basic control panel

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

Assistant control panel

The assistant control panel features a multilingual alphanumeric display for easy drive programming. The control panel has various assistants and an inbuilt 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 back up or for downloading to another drive. A large graphical display and soft keys make it extremely easy to navigate.

Panel mounting kits

To attach the control panel to the outside of a larger enclosure, two panel mounting kits are available. A simple and cost-efficient installation is possible with the ACS/H-CP-EXT kit, while the OPMP-01 kit provides a more user-friendly solution, including a panel platform that enables the panel to be removed in the same way as a drive-mounted panel. The panel mounting kits include all hardware required, including 3 m extension cables and installation instructions.

Options

Interfaces

ACS310	-	03E	-	02A6	-	2	+	J400

Machine interfaces

The embedded Modbus RS-485 fieldbus brings connectivity to major automation systems. A single twisted pair cable avoids large amounts of conventional cabling, thereby reducing costs and increasing system reliability.

Extension module

MREL-01

ACS310 has one relay output as standard. The optional MREL-01 module offers three additional relay outputs. The outputs can be configured for different functions by setting selected parameters.

Protection and installation

NEMA 1 kit

The NEMA 1 kit includes a connection box for finger protection, conduit tube installation, and a hood for protection against dirt and dust.

Terminal cover

The terminal cover is for protection of the I/O connections.

Clamping plates

The clamping plates are used for protection against electrical disturbances. The clamping plates with the clamps are included in the drive package as standard.

Removable clip for labeling

Panel connector

FlashDrop connection

LEDs

EMC filter grounding screw (EMC)

Varistor grounding screw (VAR)

Fieldbus connection Modbus RS-485

Analog I/O

Relay output

Digital output

Digital inputs
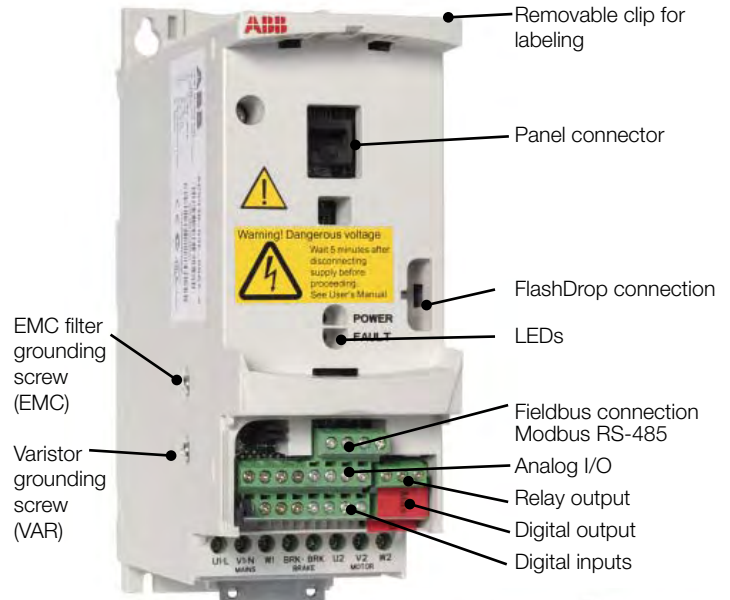
Terminal cover (included as standard)

Clamping plates (included as standard)

MREL-01 module

Options
External

A separate order line and type code is required for any of these external options.

FlashDrop tool

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. Only the parameters needed in the application are shown. The tool can copy parameters between two drives or between a PC and a drive. All the above can be done without a power connection to the drive – in fact, it is not even necessary to unpack the drive.

DrivePM

DrivePM (Drive parameter manager) is a tool to create, edit and copy parameter sets for FlashDrop. For each parameter/group the user has a possibility to hide it, which means that the drive user does not see the parameter/group at all.

DrivePM requirements
- Windows 2000/XP
- Free serial port from a PC

FlashDrop package includes
- FlashDrop tool
- DrivePM software on a CD-rom
- User's manual in English and in pdf-format on the CD-rom
- Cable OPCA-02 for connection between the PC and FlashDrop tool
- Battery charger

SREA-01 Ethernet adapter

SREA-01 Ethernet adapter with remote monitoring access can send process data, data logs and event messages independently, without a PLC or a dedicated on-site computer. It has an internal web server for configuration and drive access.

Options
External

A separate order line and type code is required for any of these external options.

EMC filters

The ACS310's internal EMC filter is designed to meet category C3 requirements of EN/IEC 61800-3 standard. External EMC filters are used to enhance the drives electromagnetic performance in conjunction with its internal filtering. Maximum motor cable length depends on required electromagnetic performance, according to the table below.

Type code ACS310-	Frame size	Filter type	Cable length with EMC filter			Cable length without EMC filter	
			C1 [m]	C2 [m]	C3 [m]	C3 [m]	C4 [m]
3-phase supply voltage 200 - 240 V units							
03X-02A6-2	R0	RFI-32	10	30	-	30	30
03X-03A9-2	R0	RFI-32	10	30	-	30	30
03X-05A2-2	R1	RFI-32	10	30	50	30	50
03X-07A4-2	R1	RFI-32	10	30	50	30	50
03X-08A3-2	R1	RFI-32	10	30	50	30	50
03X-10A8-2	R2	RFI-32	10	30	50	30	50
03X-14A6-2	R2	RFI-33	10	30	50	30	50
03X-19A4-2	R2	RFI-33	10	30	50	30	50
03X-26A8-2	R3	RFI-34	10	30	50	30	50
03X-34A1-2	R4	RFI-34	10	30	50	30	50
03X-50A8-2	R4	RFI-34	10	30	50	30	50
3-phase supply voltage 380 - 480 V units							
03X-01A3-4	R0	RFI-32	30	30	-	30	30
03X-02A1-4	R0	RFI-32	30	30	-	30	30
03X-02A6-4	R1	RFI-32	50	50	50	30	50
03X-03A6-4	R1	RFI-32	50	50	50	30	50
03X-04A5-4	R1	RFI-32	50	50	50	30	50
03X-06A2-4	R1	RFI-32	50	50	50	30	50
03X-08A0-4	R1	RFI-32	50	50	50	30	50
03X-09A7-4	R1	RFI-32	50	50	50	30	50
03X-13A8-4	R3	RFI-33	40	40	40	30	50
03X-17A2-4	R3	RFI-33	40	40	40	30	50
03X-25A4-4	R3	RFI-33	40	40	40	30	50
03X-034A-1	R4	RFI-34	-	30	-	30	50
03X-41A8-4	R4	RFI-34	-	30	-	30	50
03X-48A4-4	R4	RFI-34	-	30	-	30	50

EMC standards in general

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

Options
Software tools

A separate order line and type code is required for any of these software tool options.

DriveWindow Light 2

DriveWindow Light 2 is an easy-to-use start-up and maintenance tool for ACS310 drives. It can be used in an offline mode, which enables parameter setting at the office even before going to the actual site. The parameter browser enables viewing, editing and saving of parameters. The parameter comparison feature makes it possible to compare parameter values between the drive and saved parameter files. With the parameter subset you can create your own parameter sets. Controlling the drive is one of the features in DriveWindow Light. With this software tool, you can monitor up to four signals simultaneously. This can be done in both graphical and numerical format. Any signal can be set to stop the monitoring from a predefined level.

Start-up wizards

Start-up wizards make the setting of parameters easy. Simply launch the wizard, select an appropriate assistant e.g. for setting analog outputs, and all parameters related to this function are shown together with help pictures.

Highlights
- Editing, saving and downloading parameters
- Graphical and numerical signal monitoring
- Drive control
- Start-up wizards

DriveWindow Light requirements
- Windows NT/2000/XP
- Free serial port from a PC
- Free control panel connector
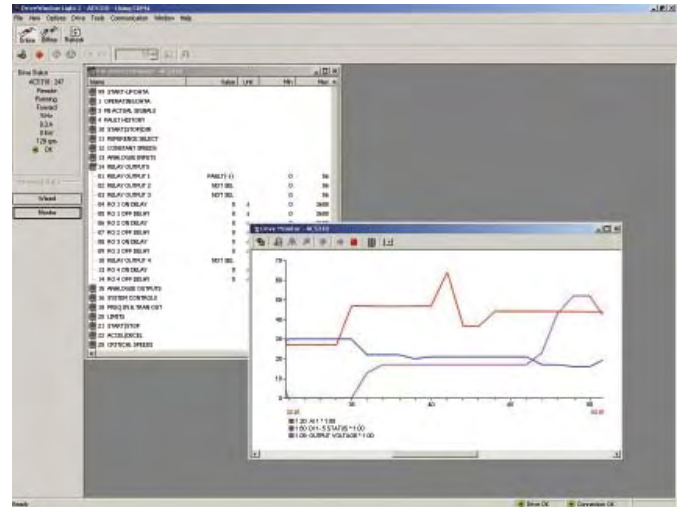
Technical data

Cooling

ACS310 is fitted with cooling fans as standard. The cooling air must be free from corrosive substances and must not be above the maximum ambient temperature of 50 °C. For more specific limits see the Technical specification - Environmental limits in this catalogue.

Cooling air flow

Type code	Frame size	Heat dissipation		Air flow	
		w	BTU/Hr	m³/h	ft³/min
3-phase supply voltage 200 - 240 V units					
ACS310-03X-02A6-2	R0	42	142	-*)	-*)
ACS310-03X-03A9-2	R0	54	183	-*)	-*)
ACS310-03X-05A2-2	R1	64	220	24	14
ACS310-03X-07A4-2	R1	86	295	24	14
ACS310-03X-08A3-2	R1	88	302	21	12
ACS310-03X-10A8-2	R2	111	377	21	12
ACS310-03X-14A6-2	R2	140	476	52	31
ACS310-03X-19A4-2	R2	180	613	52	31
ACS310-03X-26A8-2	R3	285	975	71	42
ACS310-03X-34A1-2	R4	328	1119	96	57
ACS310-03X-50A8-2	R4	488	1666	96	57
3-phase supply voltage 380 - 480 V units					
ACS310-03X-01A3-4	R0	35	121	-*)	-*)
ACS310-03X-02A1-4	R0	40	138	-*)	-*)
ACS310-03X-02A6-4	R1	50	170	13	8
ACS310-03X-03A6-4	R1	60	204	13	8
ACS310-03X-04A5-4	R1	69	235	13	8
ACS310-03X-06A2-4	R1	90	306	19	11
ACS310-03X-08A0-4	R1	107	364	24	14
ACS310-03X-09A7-4	R1	127	433	24	14
ACS310-03X-13A8-4	R3	161	551	52	31
ACS310-03X-17A2-4	R3	204	697	52	31
ACS310-03X-25A4-4	R3	301	1029	71	42
ACS310-03X-034A-1	R4	408	1393	96	57
ACS310-03X-41A8-4	R4	498	1700	96	57
ACS310-03X-48A4-4	R4	588	2007	96	57

X within the type code stands for E or U.
*) Frame size R0 with free convection cooling.

Fuses

Standard fuses can be used with ABB standard drives. For input fuse connections see table below.

Selection table

Type code	Frame size	IEC Fuses		UL Fuses	
		A	Fuse type*)	A	Fuse type*)
3-phase supply voltage 200 - 240 V units					
ACS310-03X-02A6-2	R0	10	gG	10	UL class T
ACS310-03X-03A9-2	R0	10	gG	10	UL class T
ACS310-03X-05A2-2	R1	10	gG	15	UL class T
ACS310-03X-07A4-2	R1	16	gG	15	UL class T
ACS310-03X-08A3-2	R1	16	gG	15	UL class T
ACS310-03X-10A8-2	R2	16	gG	20	UL class T
ACS310-03X-14A6-2	R2	25	gG	30	UL class T
ACS310-03X-19A4-2	R2	25	gG	35	UL class T
ACS310-03X-26A8-2	R3	63	gG	60	UL class T
ACS310-03X-34A1-2	R4	80	gG	80	UL class T
ACS310-03X-50A8-2	R4	100	gG	100	UL class T
3-phase supply voltage 380 - 480 V units					
ACS310-03X-01A3-4	R0	10	gG	10	UL class T
ACS310-03X-02A1-4	R0	10	gG	10	UL class T
ACS310-03X-02A6-4	R1	10	gG	10	UL class T
ACS310-03X-03A6-4	R1	10	gG	10	UL class T
ACS310-03X-04A5-4	R1	16	gG	15	UL class T
ACS310-03X-06A2-4	R1	16	gG	15	UL class T
ACS310-03X-08A0-4	R1	16	gG	20	UL class T
ACS310-03X-09A7-4	R1	20	gG	25	UL class T
ACS310-03X-13A8-4	R3	25	gG	30	UL class T
ACS310-03X-17A2-4	R3	35	gG	35	UL class T
ACS310-03X-25A4-4	R3	50	gG	50	UL class T
ACS310-03X-034A-1	R4	80	gG	80	UL class T
ACS310-03X-41A8-4	R4	100	gG	100	UL class T
ACS310-03X-48A4-4	R4	100	gG	100	UL class T

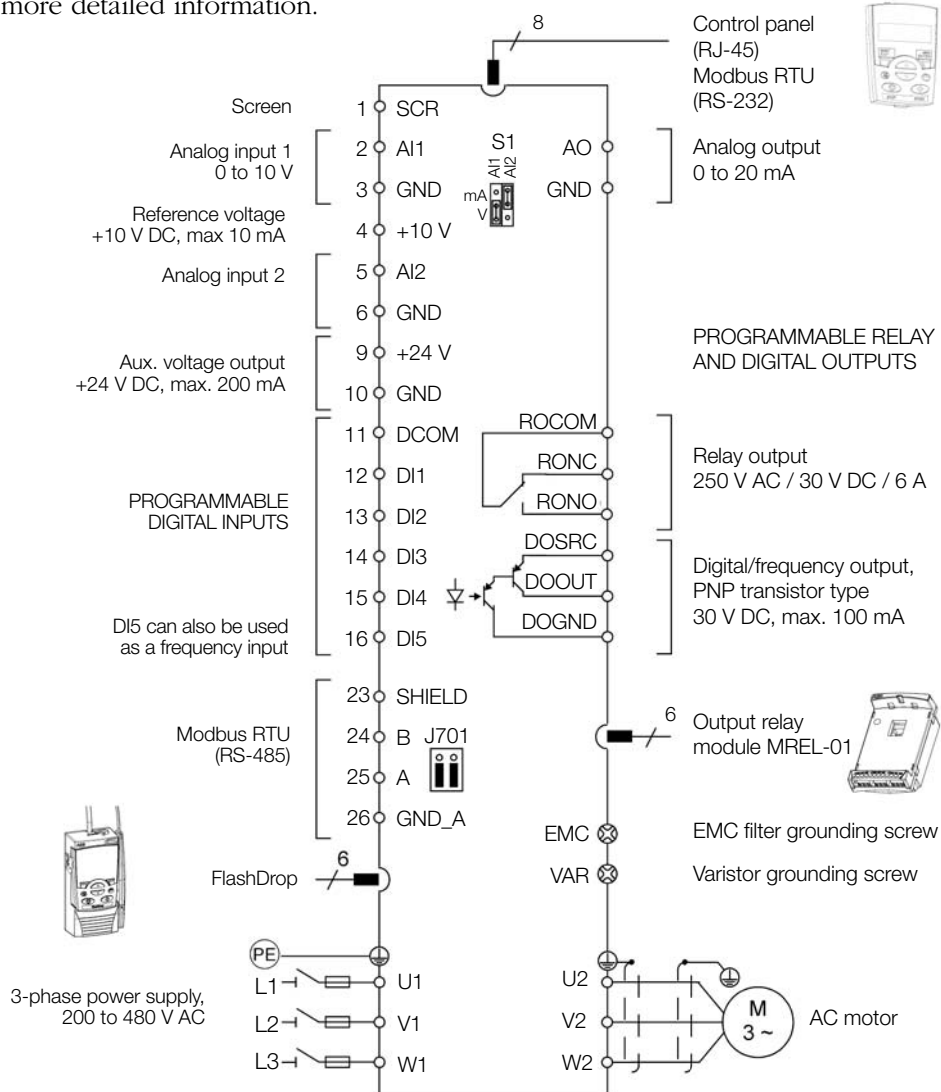X within the type code stands for E or U.
*) According to IEC-60269 standard.

Free space requirements

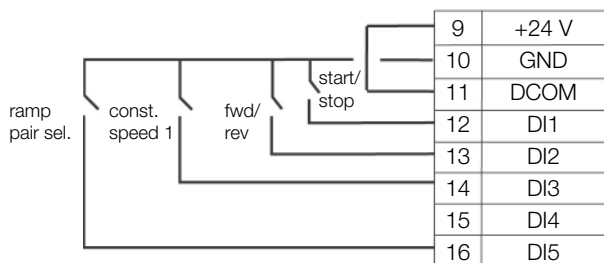| Enclosure type	Space above mm	Space below mm	Space on left/right mm
All frame sizes	75	75	0

Control connections
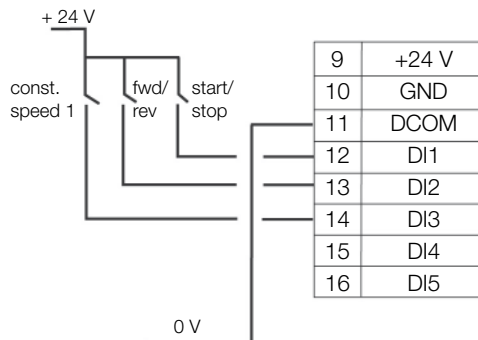
The diagram below gives an overview of ACS310 control connections. Please refer to the ACS310 User's Manual for more detailed information.

Terminal		Description
	8	Control panel (RJ-45) Modbus RTU (RS-232)
Screen	1 SCR	
Analog input 1 0 to 10 V	2 AI1	S1 / AO — Analog output 0 to 20 mA
	3 GND	GND
Reference voltage +10 V DC, max 10 mA	4 +10 V	
Analog input 2	5 AI2	
	6 GND	
Aux. voltage output +24 V DC, max. 200 mA	9 +24 V	PROGRAMMABLE RELAY AND DIGITAL OUTPUTS
	10 GND	
	11 DCOM	ROCOM
PROGRAMMABLE DIGITAL INPUTS	12 DI1	RONC — Relay output 250 V AC / 30 V DC / 6 A
	13 DI2	RONO
	14 DI3	DOSRC
	15 DI4	DOOUT — Digital/frequency output, PNP transistor type 30 V DC, max. 100 mA
DI5 can also be used as a frequency input	16 DI5	DOGND
	23 SHIELD	
Modbus RTU (RS-485)	24 B J701	6 — Output relay module MREL-01
	25 A	
	26 GND_A	
		EMC — EMC filter grounding screw
FlashDrop	6	VAR — Varistor grounding screw

3-phase power supply, 200 to 480 V AC
PE — L1 / L2 / L3 → U1 / V1 / W1 ... U2 / V2 / W2 → M 3~ AC motor

DI configuration NPN connected (sink)

	9	+24 V
start/ stop	10	GND
	11	DCOM
ramp pair sel. / const. speed 1 / fwd/ rev	12	DI1
	13	DI2
	14	DI3
	15	DI4
	16	DI5

DI configuration PNP connected (source) with external power supply

+ 24 V

	9	+24 V
const. speed 1 / fwd/ rev / start/ stop	10	GND
	11	DCOM
	12	DI1
	13	DI2
	14	DI3
	15	DI4
	16	DI5

0 V

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.

| Pre-purchase | Order and delivery | Installation and commissioning | Operation and maintenance | Upgrade and retrofit | Replacement and recycling |

Training and learning

Technical support

Contracts

Complete lifecycle management maximizes 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 product lifecyle 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.

More detailed information on services can be found in the brochure "ABB drives - Lifecycle services for low voltage drives."

ABB drive lifecycle management model

Drive lifecycle phases:

| Active | Classic | Limited | Obsolete |

- The drive, with complete lifecycle services, is available for purchase.
- The drive, with complete lifecycle services, is available for plant extensions.
- Spare parts, maintenance and repair services are available as long as materials can be obtained.
- ABB cannot guarantee availability of lifecycle services for technical reasons or within reasonable cost.

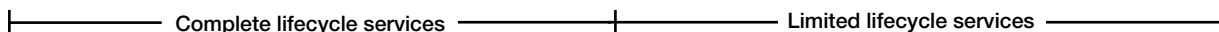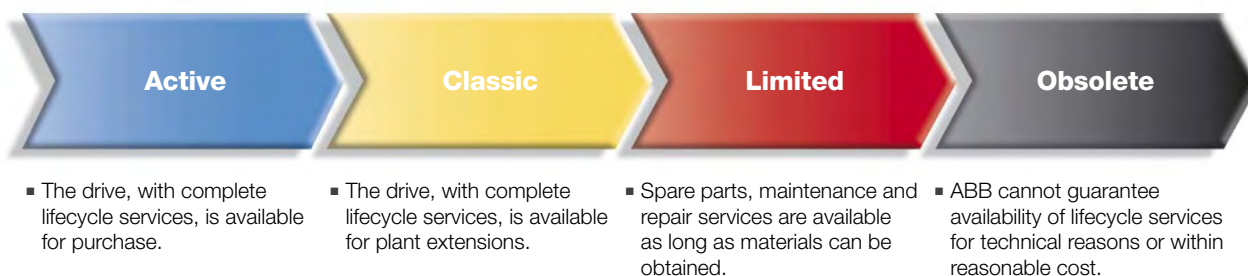⊢———— Complete lifecycle services ————⊢———— Limited lifecycle services ————⊣

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.