Catalog

ABB industrial drives
ACS850, drive modules, 1 to 600 Hp / 1.1 to 500 kW

Power and productivity
for a better world™

Contents

Type code stucture:

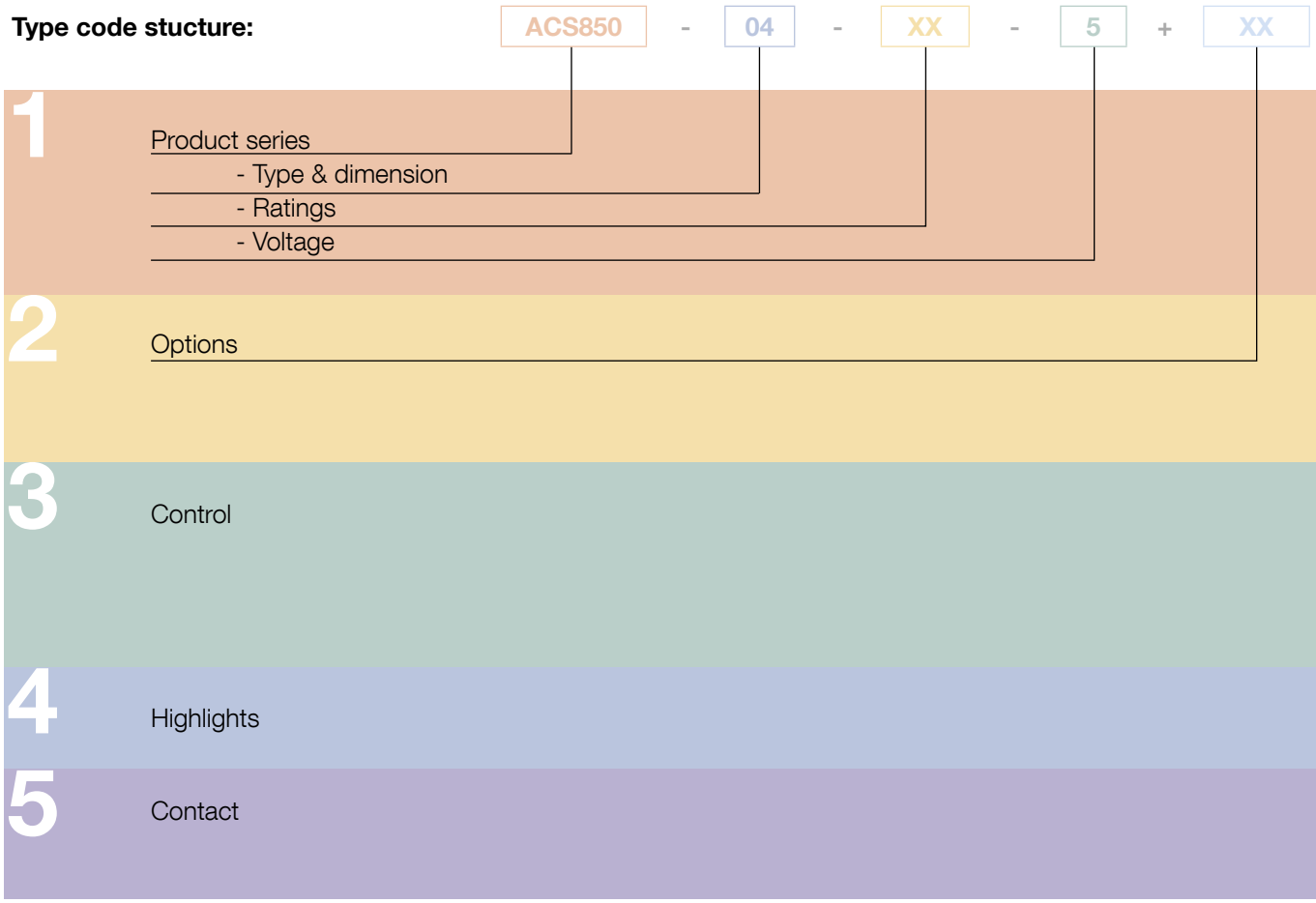


ABB industrial drives, ACS850, drive modules, 1 to 600 Hp

ABB industrial drives

ACS850 - 04 - XX - 5 + XX

ABB industrial drives

ABB industrial drives are highly flexible AC drives, designed for industrial applications, specifically for those in process industries such as the pulp & paper, metals, mining, cement, power, chemical, and oil & gas industries.

The drives can be configured to meet the precise needs of these industries, and hence order-based configuration is an integral part of the offering. Covering a wide power and voltage range and with a vast array of standard and optional features, the drives are readily programmable, making their adaptation to different applications easy.

Robust design

The current ratings of ABB industrial drives are designed for applications that have a high overload requirement.

At the heart of the drive is the motor control platform, Direct Torque Control (DTC) that provides accurate static and dynamic speed and torque control, high starting torque and long motor cables.

Furthermore, built-in drive options make the drive installation fast and easy.

The drive is designed for a long working life and as such, parts like fans and capacitors have been selected to maximize their lifetime. This, together with the extensive protection features and design details, such as coated circuit boards, results in excellent reliability for the demanding industrial market.

Drive modules

Drive modules are designed to be built into a customer's own cabinet. The ACS850-04 units are complete single drive modules that are optimized for this purpose, using minimal cabinet space while ensuring cabinet assembly is as easy as possible.

ABB industrial drive modules are suitable for system integrators and/or OEMs which are making their own systems. The modules typically have an IP20 enclosure class.

ACS850-04 single drive modules

ACS850-04 modules are UL listed in compliance with UL508C-2003. They offer a wide range of internal options such as extended I/O and high speed communications. In addition to these, a wide selection of external accessories is also available.

Because the modules are specifically designed for cabinet assembly, they can be mounted side-by-side. Cabinet assembly documentation is included. The documentation gives examples of different cabinet configurations, examples of drawings and hints on the selection of auxiliary equipment. The flexibility and programmability of the modules makes them an ideal choice for many applications in a variety of industries.

Type code

The type code is a unique reference number that clearly identifies the drive by construction, power, voltage rating and selected options. Using the type code you can specify your drives from the wide range of available selections. Customer-specific options are added to the type code using the corresponding + code.

Safe Torque Off

The Safe Torque Off (STO) function disables the control voltage of the power semiconductors in the drive output stage, thus preventing the inverter from generating the voltage required to rotate the motor.

With this function, the power supply does not need to be turned off while doing cleaning or maintenance on the non-electrical parts of the machinery.

The function meets the requirements of these safety standards:

Safety Integrity Level 3 (SIL 3) according to IEC 61508
Safety Category 3 acc. to EN 954-1

Drive modules main features

Features	Advantage	Benefits
Modular and compact design		
Compact size	Smallest frame size is only 3-1/2 inches wide. More drives can be placed in the same cabinet.	Optimum installation layout and efficient cabinet space usage. Space and cost savings in the cabinets and electrical rooms.
Side by side mounting	Minimized cabinet wall space. No need to remember correct air gaps.	Space and cost savings in the cabinets and electrical rooms.
Modular design	Many standard features and a wide range of options allow different system configurations.	Fits many application needs. Offers flexibility in system design.
Optimal location of power terminals	Top-down power flow in frames A to D enables the most optimal cabinet layout in many cases.	Easy connection of power cables. Optimum installation layout and efficient cabinet space usage. Optimized design from an EMC point of view.
Integrated braking chopper	Braking chopper as standard up to 60 Hp (frames A to D) and a built-in option for other frame sizes.	Compact and cost-effective design.
User interface and programming		
Intuitive human-machine interface	Large alphanumeric display showing different assistants and macros. Extremely easy to use and commission the drive. DriveStudio PC-program offers easy access to drive parameter setting and start-up features.	Faster and more accurate drive configuration. Optimal drive settings as assistants offer interactive help.
Drive programming and configuration	Can replace relays and small PLCs with function block programming.	Lower investment cost. Higher flexibility in system design.
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.
Designed for reliability		
Robust main circuit design	Enhanced reliability. Coated boards and long life time components. Cooling supervision (depending on frame size).	Less process interruptions. Lower maintenance costs.
Extensive protection	Advanced thermal protection of the drive semiconductors and motor. Several adjustable protections for the drive and adjoining equipment ensure a reliable operation.	Higher process uptime. Early warning of any production interruptions.
Maintenance assistant	Indicates preventive maintenance needs of drive, motor or machine. User-set alarms and triggering limits. Monitors running hours, cooling fan running hours, number of relay switchings etc.	Helps with maintenance schedules and cost control of maintenance. Fewer unexpected process interruptions.
Diagnostic assistant	Drive helps in locating failures or reasons for performance changes and suggest remedies.	Reduced process downtime. Faster recovery to drive's optimum performance.
Optimized use		
Energy saving calculator	Monitors used and saved energy by the motor in kWh, Euros and $.	Easy check of the return on investment.
Load analyzer	Shows the load profile of the drive.	Easy process analysis.
Energy optimizer	Maximizes efficiency by optimizing the motor flux.	Improves motors performance therefore makes process more efficient. Energy savings are realised and money saved.

Drive modules main features

Features	Advantage	Benefits
Control and performance		
Standard induction (asynchronous) and permanent magnet motors compatibility	Same drive can be used to control different motor types.	Savings in investment costs. Savings in spares stockholding.
Wide range of speed feedback interfaces	In the rare case a speed feedback device is needed, almost any type of device can be connnected.	Additional hardware flexibility. Unmatched open-loop performance.
Embedded Modbus link or drive-to-drive link is standard	No additional hardware needed for master-follower communication or Modbus. Galvanic isolation.	Lower investment cost. More reliable, disturbance-free isolation.
Different communication options	Flexibility with master communication - drive supports PROFIBUS, CANopen, DeviceNet, Modbus, Modbus TCP and Ethernet / IP communication.	Drive can be applied to many existing processes.
Integrated Safe Torque-Off function (SIL 3)	Safe Torque-Off is used to prevent unexpected start-up. High SIL class means high reliability of the safety function. Can also be used to implement Emergency Stop without contactors.	Enhances safety of the machines. Cost-effective and certified solution for safe machine maintenance. Satisfies new safety directives IEB 61508, IEC 62061 and EN ISO 13489-1.
Extensive configurable standard I/Os.	Optimized accessibility. No need for extra I/O.	Lower cost. Fewer parts and installation work needed for cabinet assembly.
Optional I/O extensions	Plug-in analog and digital I/O extensions.	Extends drives' scope, performance and applications opportunities.
Direct Torque Control	Accurate, dynamic and static speed and torque control. Excellent process control even without pulse encoder. Power interruption ride-through using kinetic energy of load. Fast reaction to load or voltage variations. No shock torques. No torque ripple - minimized risk for torsional vibration. Less noise during motor operation. Output frequency up to 500 Hz. Enhanced motor identification at stand still.	Improves product quality, productivity and reliability Lower investment cost. No unnecessary trips or process interruptions Lower mechanical stress. Suitable for use where audible noise is an issue. Applicable in high speed applications. Better process control due to more accurate identification. Can do motor identification without decoupling the load.
High overload and high starting torque	Smooth start without over-dimensioning the drive.	Longer motor and gear lifetime thereby reduced maintenance costs.
Made by ABB		
Global market leader in AC drives Long experience	Well proven, safe and reliable solutions. Application know-how.	Highly reliable drives.
World wide service and support network	Professional support available around the world.	High quality service and support wherever you need it.

Note: some of the features will be available during 2009

Technical specifications

Mains connection	
Supply voltage	3-phase 380 to 500 V +10 /- 15%
Frequency	50 to 60 Hz ± 5%
DC connection	
DC voltage level	485 to 675 V DC ± 10%
Charging	Internal
Motor connection	
Motor types	Induction motors and permanent magnet motors
Output frequency	0 to 500 Hz
Motor cable length	A&B frames 150 m (with 2nd env. Filter 100 m) C-G frames: 300 m (with 2nd env. Filter 100 m)
Motor control	ABB´s Direct Torque Control
Torque control: **Open loop** **Closed loop** **Open loop** **Closed loop** **Speed control:** **Open loop** **Closed loop** **Open loop** **Closed loop**	Torque step rise time: <5ms with nominal torque <5ms with nominal torque Non-linearity: ±4% with nominal torque ±3% with nominal torque Static accuracy: 10% of motor slip 0.01% of nominal speed Dynamic accuracy 0.3 to 0.4%sec. with 100% torque step 0.1 to 0.2%sec. with 100% torque step
Braking power connection	
Braking chopper	Standard in frames A to D, built-in option in the other frame sizes
Braking resistor	External resistor connected to drive

Operating conditions	
Degree of protection	IP20 as per EN 60529 (G frame IP00); Open type as per UL 508.
Ambient temperature	-10 to +55 °C (G frame +50 °C), derating above 40 °C No frost allowed
Installation altitude	0 to 4000 m (IT network: 2000 m), derating above 1000 m: 1% / 100 m
Relative humidity	max. 95%, no condensation allowed
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 as per EN 60721-3-3
EMC (According to EN 61800-3)	Categories C2 and C3 with optional filter
Functional safety	(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	Frames A - D: CE, GOST R, UL, cUL; pending: CSA, C-Tick Frames E0 - G: CE, GOST R; pending: UL, cUL, CSA, C-Tick

Shown with optional control panel (+J400)

Types, ratings and dimensions

Feature / frame size	A	B	C	D	E0	E	G
Current & Power							
Nominal current (400 V)	3 to 8 A	10.5 to 18 A	25 to 50 A	61 to 94 A	103 to 144 A	166 to 210 A	430 to 720 A
Maximum current (400 V)	4.4 to 10.5 A	13.5 to 21 A	33 to 66 A	78 to 124 A	131 to 170 A	202 to 348 A	588 to 1017 A
Typical motor power (400 V)	1.1 to 3 kW	4 to 7.5 kW	9 to 22 kW	30 to 45 kW	55 to 75 kW	90 to 160 kW	200 to 400 kW
Braking chopper	●	●	●	●	□	□	□
Braking resistor	■	■	■	■	■	■	■
Input choke	■	■	●	●	●	●	●
EMC filter / C3 *	■	■	□	□	□	□	□
EMC filter / C2	■	■	■	■	□	□	–
Mounting and cooling							
Air cooling	●	●	●	●	●	●	●
Side-by-side mounting	●	●	●	●	●	●	–
DIN-rail mounting	●	●	–	–	–	–	–
Removable power connectors	●	●	–	–	–	–	–
Removable control connectors	●	●	●	●	●	●	●

● = standard □ = option, internal ■ = option, external – = not available * External EMC filters are plug-in type filters that fit to the drive within its installation footprint.

Ratings (U_N = 480V)

Type Code	Frame Size	Input RMS Current		Nominal Ratings			Light Duty		Heavy Duty		Noise level	Air Flow @ 60 Hz
		I_{1N}	$*I_{1N}$	continuous current I_{2N}	rated power P_{2N}	maximum current I_{MAX}	continuous current I_{LD}	rated power P_{LD}	continuous current IHD	rated power PHD		
		A	A	A	HP	A	Adc	HP	Adc	HP	dBA	ft3/min
ACS850-04--03A0-5	A	2.3	4	3	1.5	4.4	2.8	1	2.5	1	47	10
ACS850-04--03A6-5	A	3.1	6	3.6	2	5.3	3.4	2	3	1.5	47	10
ACS850-04--04A8-5	A	4	7	4.8	3	7	4.5	2	4	2	47	10
ACS850-04--06A0-5	A	5.5	9	6	3	8.8	5.5	3	5	3	47	10
ACS850-04--08A0-5	A	6.6	11	8	5	10.5	7.6	5	6	3	47	10
ACS850-04--010A-5	B	8.7	13	10.5	5	13.5	9.7	5	9	5	39	30
ACS850-04--014A-5	B	12	18	14	7.5	16.5	13	7.5	11	7.5	39	30
ACS850-04--018A-5	B	16	23	18	10	21	16.8	10	14	10	39	30
ACS850-04--025A-5	C	20	–	25	15	33	23	15	19	10	63	80
ACS850-04--030A-5	C	26	–	30	20	36	28	20	24	15	63	80
ACS850-04--035A-5	C	30	–	35	25	44	32	20	29	20	71	120
ACS850-04--044A-5	C	36	–	44	30	53	41	30	35	25	71	120
ACS850-04--050A-5	C	42	–	50	30	66	46	30	44	30	71	120
ACS850-04--061A-5	D	55	–	61	40	78	57	40	52	40	70	170
ACS850-04--078A-5	D	65	–	78	60	100	74	50	69	50	70	170
ACS850-04--094A-5	D	82	–	94	60	124	90	60	75	50	70	170
ACS850-04-103A-5	E0	100	–	103	75	138	100	75	88	60	65	100
ACS850-04-144A-5	E0	142	–	144	100	170	141	100	100	75	65	240
ACS850-04-166A-5	E	163	–	166	125	202	155	125	115	75	65	240
ACS850-04-202A-5	E	198	–	202	150	282	184	150	141	100	65	240
ACS850-04-225A-5	E	221	–	225	150	326	220	150	163	125	65	240
ACS850-04-260A-5	E	254	–	260	200	326	254	200	215	150	65	240
ACS850-04-290A-5	E	283	–	290	200	348	286	200	232	150	65	240
ACS850-04--430A-5	G	423	–	430	350	588	425	350	340	250	72	720
ACS850-04--521A-5	G	501	–	521	450	588	516	450	370	300	72	720
ACS850-04--602A-5	G	581	–	602	500	840	590	500	477	400	72	720
ACS850-04--693A-5	G	674	–	693	550	1017	679	550	590 1)	500	72	720
ACS850-04--720A-5	G	705	–	720	600	1017	704	600	635 2)	500	72	720

1) For ambient temperature of less than 95 deg. F (35 C), maximum overload is 150% of IHD. For ambient temperature of 104 deg. F (40 C), maximum overload is 145% of IHD.
2) For ambient temperature of less than 86 deg. F (30 C), maximum overload is 150% of IHD. For ambient temperature of 104 deg. F (40 C), maximum overload is 140% of IHD.

Nominal ratings:
I_{2N}: rated current available continuously without overloading at 40 °C.
I_{max}: maximum output current. Available for 10 s at start, otherwise as long as allowed by drive temperature. Note: max. motor shaft power is 150% P_{hd}.

Typical ratings:
No-overload use
P_N: typical motor power in no-overload use.
Light-duty use
I_{Ld}: continuous current allowing 110% I_{Ld} for 1min / 5 min at 40 °C.
P_{Ld}: typical motor power in light-duty use.
Heavy-duty use
I_{hd}: continuous current allowing 150% I_{hd} for 1min / 5 min at 40 °C.
P_{hd}: typical motor power in heavy-duty use.

The current ratings are the same regardless of the supply voltage within one voltage range.
The ratings apply at 40 °C ambient temperature.

Dimensions

Frame size	Height 3)		Depth 4)		Width		Weight	
	in	mm	in	mm	in	mm	lb	kg
A	14.3	364	7.8	197	3.7	93	7	3
B	15.0	380	10.8	274	4.0	101	11	5
C	22.3	567	10.9	276	6.5	166	35	16
D	22.3	567	10.9	276	8.7	221	51	23
E0	23.7	602	13.9	354	10.9	276	77	35
E	27.6	700	17.4	443	12.3	312	147	67
G6	61.6	1564	22.4	568	22.1	562	441	205

Notes
All dimensions and weights are without options.
3) Height is the maximum measure without clamping plates.
4) An additional 50 mm should be reserved for feedback cabling if FEN-01, 11 or 21 option is used.
5) Control panel adds 0.9in (23mm) to the depth
6) Frame G drives include separately mounted control section, 12.8h x 4.5d x 3.7w, 3 lb.

Brake options

Brake chopper

The ACS850 has built in brake choppers for all types. Therefore, no additional space or installation time is needed. The brake chopper is part of the standard delivery for the frame sizes A-D. For the other frames a brake chopper is a selectable option.

Braking control is integrated into the ACS850 through frame G. It controls the braking, supervises the system status and detects failures such as brake resistor and resistor cable short circuits, chopper short circuit, and calculated resistor overtemperature.

Brake resistor

Brake resistors are separately available for all ACS850 drives. Resistors other than the standard resistors may be used providing the specified resistance value is not decreased, and the heat dissipation capacity of the resistor is sufficient for the drive application.

For ACS850 units, no separate fuses in the brake circuit are required if the following conditions are met:

- The ACS850 mains cable is protected with fuses
- No mains cable/fuse overrating takes place

Dynamic Braking Table - 380-480V applications, stopping duty only

Drive P/N ACS850-04-	HP ND	Duty Cycle = 3sec on / 27sec off				Duty Cycle = 10sec on / 50sec off			
		Resistor Part No.	Ohms	Watts	Dimensions	Resistor Part No.	Ohms	Watts	Dimensions
06A0-5	3	P14494-61	120	300	12Wx5Dx5H	P14494-61	120	300	12Wx5Dx5H
08A0-5	5	P14494-61	120	300	12Wx5Dx5H	ABB-48431-110	120	600	12Wx7Dx5H
10A0-5	5	ABB-48431-050	80	400	12Wx5Dx5H	ABB-48431-052	80	800	12Wx7Dx5H
014A-5	7.5	ABB-41152	45	600	12Wx7Dx5H	P14494-25	45	800	12Wx7Dx5H
018A-5	10	ABB-41152	45	600	12Wx7Dx5H	P14494-26	45	1260	12Wx10Dx5H
025A-5	15	ABB-48431-002	22	819	12Wx7Dx5H	ABB-48431-004	22	1408	12Wx13Dx5H
030A-5	20	ABB-41154	22	900	12Wx10Dx5H	ABB-48431-005	22	1862	12Wx16Dx5H
035A-5	20	ABB-48431-003	22	1140	12Wx10Dx5H	ABB-44472	22	1904	12Wx16Dx5H
044A-5	30	ABB-48431-030	13	1433	12Wx13Dx5H	ABB-48431-033	13	3328	19Wx10Dx5H
050A-5	30	ABB-48431-030	13	1433	12Wx13Dx5H	ABB-48431-033	13	3328	19Wx10Dx5H
061A-5	40	ABB-48431-031	13	1872	12Wx16Dx5H	ABB-48431-033	13	3328	19Wx10Dx5H
078A-5	50	ABB-48431-033	13	3328	19Wx10Dx5H	ABB-44495	13	4153	26.5Wx10Dx5H
094A-5	60	ABB-48431-033	13	3328	19Wx10Dx5H	ABB-48431-036	13	6292	26.5Wx13Dx5H
103A-5	75	ABB-41170	8	4600	26.5Wx10Dx5H	ABB-48431-120	8	6272	26.5Wx16Dx5H
144A-5	100	ABB-41161	6	4600	26.5Wx10Dx5H	ABB-44499	6.1	9444	28Wx10Dx10H
166A-5	125	ABB-48431-183	4.3	6209	26.5Wx13Dx5H	ABB-48431-184	4.3	10750	28Wx10Dx10H
202A-5	150	ABB-44479	4.26	9872	26.5Wx16Dx5H	ABB-44480	4.26	11696	28Wx10Dx10H
225A-5	150	ABB-44479	4.26	9872	26.5Wx16Dx5H	ABB-44480	4.26	11696	28Wx10Dx10H
260A-5	200	ABB-44479	4.26	9872	26.5Wx16Dx5H	ABB-48431-185	4.3	17067	28Wx13Dx10H

Drive P/N ACS850-04-	HP ND	Duty Cycle = 30sec on / 180sec off				Duty Cycle = 60sec on / 180sec off			
		Resistor Part No.	Ohms	Watts	Dimensions	Resistor Part No.	Ohms	Watts	Dimensions
06A0-5	3	ABB-48431-110	120	600	12Wx7Dx5H	P14494-17	150	900	12Wx10Dx5H
08A0-5	5	ABB-48431-110	120	600	12Wx7Dx5H	P14494-18	150	1200	12Wx13Dx5H
10A0-5	5	ABB-48431-052	80	800	12Wx7Dx5H	ABB-48431-053	80	1600	12Wx13Dx5H
014A-5	8	P14494-26	45	1260	12Wx10Dx5H	P14494-27	45	1920	12Wx16Dx5H
018A-5	10	P14494-26	45	1260	12Wx10Dx5H	P14494-28	45	2450	19Wx13Dx5H
025A-5	15	ABB-48431-005	22	1862	12Wx16Dx5H	ABB-48431-008	22	3168	19Wx13Dx5H
030A-5	20	ABB-48431-007	22	2426	19Wx10Dx5H	ABB-48431-009	22	5632	26.5Wx10Dx5H
035A-5	23	ABB-44515	22	2910	19Wx13Dx5H	ABB-48431-009	22	5632	26.5Wx10Dx5H
044A-5	30	ABB-44474	13	3558	19Wx10Dx5H	ABB-48431-036	13	6292	26.5Wx13Dx5H
050A-5	30	ABB-44474	13	3558	19Wx10Dx5H	ABB-48431-036	13	6292	26.5Wx13Dx5H
061A-5	40	ABB-44517	13.3	5093	26.5Wx13Dx5H	ABB-48431-037	13	8125	26.5Wx16Dx5H
078A-5	50	ABB-48431-036	13	6292	26.5Wx13Dx5H	ABB-48431-038	13	11700	28Wx13Dx10H
094A-5	60	ABB-48431-037	13	8125	26.5Wx16Dx5H	ABB-48431-038	13	11700	28Wx13Dx10H
103A-5	75	ABB-48431-122	8	11552	28Wx10Dx10H	ABB-48431-123	8	15488	28Wx16Dx10H
144A-5	100	ABB-44500	6.44	10892	28Wx10Dx10H	ABB-44544	6.39	21955	28Wx16Dx10H
166A-5	125	ABB-48431-185	4.3	17067	28Wx13Dx10H	ABB-48431-187	4.3	27520	30Wx18Dx24H
202A-5	150	ABB-48431-186	4.3	21070	28Wx16Dx10H	ABB-48431-188	4.3	34830	30Wx18Dx24H
225A-5	150	ABB-48431-186	4.3	21070	28Wx16Dx10H	ABB-48431-188	4.3	34830	30Wx18Dx24H
260A-5	200	ABB-48431-187	4.3	27520	30Wx18Dx24H	ABB-48431-189	4.3	43000	30Wx18Dx24H

Brake options

Dynamic Braking Table - 380-480V applications, stopping duty only

Drive P/N ACS850-04-	HP ND	Duty Cycle = 3sec on / 27sec off				Duty Cycle = 10sec on / 50sec off			
		Resistor Part No.	Ohms	Watts	Dimensions	Resistor Part No.	Ohms	Watts	Dimensions
290A-5	200	ABB-48431-271	2.9	14210	28Wx10Dx10H	ABB-48431-272	2.9	16313	28Wx10Dx10H
	300	ABB-48431-330	2.2	14080	28Wx16Dx10H	ABB-48431-332	2.2	26620	30Wx18Dx24H
430A-5	350	ABB-48431-331	2.2	17820	28Wx13Dx10H	ABB-48431-333	2.2	31680	30Wx18Dx24H
	400	ABB-48431-392	1.7	17000	28Wx13Dx10H	ABB-48431-394	1.7	30983	30Wx18Dx32H
521A-5	450	ABB-48431-393	1.7	24480	30Wx18Dx16H	ABB-44508	1.72	43916	30Wx18Dx32H
602A-5	500	ABB-48431-450	1.35	24604	30Wx18Dx16H	ABB-48431-453	1.35	46204	30Wx18Dx32H
693A-5	550	ABB-48431-512	1	27225	30Wx18Dx24H	ABB-48431-516	1	50625	30Wx18Dx24H
720A-5	600	ABB-48431-512	1	27225	30Wx18Dx24H	ABB-48431-516	1	50625	30Wx18Dx24H

Drive P/N ACS850-04-	HP ND	Duty Cycle = 30sec on / 180sec off				Duty Cycle = 60sec on / 180sec off			
		Resistor Part No.	Ohms	Watts	Dimensions	Resistor Part No.	Ohms	Watts	Dimensions
290A-5	200	ABB-48431-273	2.9	23490	28Wx16Dx10H	ABB-48431-275	2.9	41760	30Wx18Dx32H
	300	ABB-48431-334	2.2	40095	30Wx18Dx32H	ABB-43503	2.27	68450	30Wx18Dx48H
430A-5	350	ABB-48431-334	2.2	40095	30Wx18Dx32H	ABB-43503	2.27	68450	30Wx18Dx48H
	400	ABB-44508	1.72	43916	30Wx18Dx32H	ABB-43504	1.72	82280	30Wx18Dx40H
521A-5	450	ABB-48431-396	1.7	58183	30Wx18Dx32H	ABB-43504	1.72	82280	30Wx18Dx40H
602A-5	500	ABB-48431-455	1.35	68344	30Wx18Dx32H	ABB-44553	1.38	104527	30Wx18Dx72H
693A-5	550	ABB-48431-517	1	67600	30Wx18Dx40H	ABB-48431-519	1	122500	(2) 30Wx18Dx40H
720A-5	600	ABB-48431-518	1	90000	30Wx18Dx48H	ABB-48431-519	1	122500	(2) 30Wx18Dx40H

* Requires two resistor assemblies each rated as show and connected in series. (Order quantity 2)

Options

Optional Inputs and Outputs

The ACS850 drive modules have one of the most extensive offering of standard Inputs and Outputs (I/O) in the market. In addition, optional I/O extension modules are available, providing additional connection possibilities. Options include analog and digital extension modules and pulse encoder interface modules which are mounted in the slots on the ACS850 control board. The control board has two slots available for I/O extension modules. Additionally, there is a third slot available for communication buses.

Options	Data	Install in
Analogue & digital extension		
FIO-01	4xDI/O, 2xRO	Slot 1 or 2
FIO-11	3xAI (mA/V), 1xAO (mA), 2xDI/O	
FIO-21	1xAI (mA/V), 1xAO (mA), 1XDI, 2xRO	
Feedback interface		
FEN-01	2 inputs (TTL incremental encoder), 1 output *	Slot 1 or 2
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	
Communication		
FPBA-01	PROFIBUS-DP, DPV0/DPV1	Slot 3
FCAN-01	CANopen	
FDNA-01	DeviceNet	
FENA-01	Ethernet/IP, Modbus TCP	
FSCA-01	Modbus	
FLON-01	LONWORKS®	

* When this module is used, the lower part of the control unit cover is not used

Fieldbus control

The ACS850 drive modules have an embedded Modbus link as standard. This RS-485 link is galvanically isolated for trouble-free operation and can be alternatively configured as a high speed drive-to-drive link for master-follower operation.

Other fieldbus protocols are also supported, enabling connectivity to major automation systems. This is achieved using dedicated interface modules between the different fieldbus systems and ABB drives.

The fieldbus interface module can easily be mounted inside the drive. Because of the wide range of fieldbus gateways, your choice of automation system is independent of your decision to use ABB AC drives.

This allows manufacturing flexibility and reduced installation and engineering effort via:

- Drive control (using a 16-bit word)
- Drive monitoring
- Drive diagnostics (via alarms, limit and fault words)
- Drive parameter handling
- Optimized design
- Precommissioning
- Fast and easy assembly

Currently available interfaces

Fieldbus	Protocol	Device profile	Baud rate
PROFIBUS (+K454) FPBA-01	DP, DPV0, DPV1	PROFIdrive ABB Drives	9.6 kbit/s - 12 Mbit/s
DeviceNet (+K451) FDNA-01	-	AC/DC drive ABB Drives	125 kbit/s - 500 kbit/s
CANopen (+K457) FCAN-01	-	Drives and motion control ABB Drives	50 kbit/s, 1 Mbit/s
Modbus (+K458) FSCA-01	RTU	ABB Drives	9.6 kbit/s - 115.2 kbit/s
Ethernet (+K464) FENA-01	Modbus/TCP Ethernet / IP	ABB Drives	10/100 Mbit/s

Options

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 features:

- A large alphanumeric display
- Extremely easy to navigate
- Soft and convenient keys
- Local control keys (start/stop/reference)
- Set and monitor parameters
- Status and history data
- Real-time clock

ACS850's unique holder enables mounting of the control panel either on the drive itself or on the cabinet door.

Control Panel Options

Without control panel
(standard)

Control panel on the drive. Includes control panel, holder and internal interface cable
(+J400)

Control panel and holder for cabinet door mounting, with IP54 kit and 10 ft cable
(+J410)

Holder and cover, without control panel, mounted on the drive. Cover has "power" and "fault" indicators
(+J414)

No control panel and without control unit cover. This decreases overall depth of the drive module by 2 inches.
(+OC168)

Options

du/dt filters

Du/dt filtering suppresses inverter output voltage spikes and rapid voltage changes that stress motor insulation.

Additionally, du/dt filtering reduces capacitive leakage currents and high frequency emission of the motor cable as well as high frequency losses and bearing currents in the motor.

The need for du/dt filtering depends on the motor age and insulation. For information on the construction of the motor insulation, consult the motor manufacturer. If the motor does not fulfil the requirements of the filter selection table, the lifetime of the motor might decrease. Insulated N-end (non-driven end) bearings and/or common mode filters are also required for motor bearing currents with motors bigger than 100 kW. For more information please see the ACS850 hardware manual.

External du/dt filters

500V	du/dt filter type (3 filters included in kits marked *) Unprotected (IP00)							
	NOCH0016-60	NOCH0030-60	NOCH0070-60	* NOCH0120-60	* NOCH0260-60	FOCH0260-70	FOCH0320-50	FOCH0610-70
ACS850-04-03A0-5 ACS850-04-03A6-5 ACS850-04-04A8-5 ACS850-04-06A0-5 ACS850-04-08A0-5 ACS850-04-010A-5 ACS850-04-014A-5 ACS850-04-018A-5	1							
ACS850-04-025A-5 ACS850-04-030A-5 ACS850-04-035A-5		1						
ACS850-04-044A-5 ACS850-04-050A-5 ACS850-04-061A-5 ACS850-04-078A-5			1					
ACS850-04-094A-5 ACS850-04-103A-5 ACS850-04-144A-5 ACS850-04-166A-5				1				
ACS850-04-202A-5					1			
ACS850-04-225A-5 ACS850-04-260A-5 ACS850-04-290A-5						1		
ACS850-04-430A-5							1	
ACS850-04-521A-5 ACS850-04-602A-5 ACS850-04-693A-5 ACS850-04-720A-5								1

Filter selection table for ACS850

Motor type	Nominal mains voltage (U_N)	Motor insulation requirement
ABB M2 and M3 motors	$U_N \leq 500$ V	Standard insulation system.
ABB form-wound HXR and AM motors	380 V < $U_N \leq 500$ V	Standard insulation system.
ABB random-wound HXR and AM motors	380 V < $U_N \leq 500$ V	Check motor insulation system with the motor manufacturer.
Non-ABB Random-wound and form-wound	$U_N \leq 420$ V	If the insulation system withstands $\hat{U}_{LL}$=1600 V and Δt=0.2 µs, du/dt filtering is not required. With du/dt filtering the insulation system must withstand $\hat{U}_{LL}$=1300 V.

Symbol	Explanation
U_N	Nominal mains voltage.
$\hat{U}_{LL}$	Peak line to line voltage at motor terminals.
Δt	Rise time, i.e. interval during which line to line voltage at motor terminals changes from 10% to 90% of full voltage range.

Dimensions and weights of the du/dt filters

du/dt filter	Height in	Width in	Depth in	Weight lb
NOCH0016-60	7.7	5.5	4.5	5.28
NOCH0030-60	8.5	6.5	5.1	10.34
NOCH0070-60	10.3	7.1	5.9	20.9
NOCH0120-60*	7.9	6.1	4.2	15.4
NOCH0260-60*	15.1	7.3	4.4	26.4
FOCH0260-70	15.0	7.5	10.0	103.4
FOCH0320-50	26.1	12.6	11.1	143
FOCH0610-70	26.1	12.6	11.1	143

* 3 filters included, dimensions apply for one filter.

Mains chokes

Mains chokes are typically used to reduce harmonics in the mains current.

Frames C to G are equipped with built-in choke as standard. For frames A and B, the ACS850 drive modules do not necessarily need a separate mains choke for operation. If however separate mains choke are needed they are available to meet different system design needs.

Standard I/O

Control unit

		XPOW
External power input 24 V DC, 1.6 A	+24VI	1
	GND	2
		XRO1, XRO2, XRO3
Relay output RO1 [Ready] 250 V AC / 30 V DC 2 A	NO	1
	COM	2
	NC	3
Relay output RO2 250 V AC / 30 V DC 2 A	NO	4
	COM	5
	NC	6
Relay output RO3 250 V AC / 30 V DC 2 A	NO	7
	COM	8
	NC	9
		XD24
+24 V DC*	+24VD	1
Digital input ground	DIGND	2
+24 V DC*	+24VD	3
Digital input/output ground	DIOGND	4
Ground selection jumper		
		XDI
Digital input DI1 [Stop/Start]	DI1	1
Digital input DI2	DI2	2
Digital input DI3 [Reset]	DI3	3
Digital input DI4	DI4	4
Digital input DI5	DI5	5
Digital input DI6 or thermistor input	DI6	6
Start interlock (0 = Stop)	DIIL	A
		XDIO
Digital input/output DIO1 [Output: Ready]	DIO1	1
Digital input/output DIO2 [Output: Running]	DIO2	2
		XAI
Reference voltage (+)	+VREF	1
Reference voltage (–)	-VREF	2
Ground	AGND	3
Analog input AI1 (Current or voltage, selectable by jumper AI1) [Speed reference 1]	AI1+	4
	AI1-	5
Analog input AI2 (Current or voltage, selectable by jumper AI2)	AI2+	6
	AI2-	7
AI1 current/voltage selection jumper		AI1
AI2 current/voltage selection jumper		AI2
		XAO
Analog output AO1 [Current %]	AO1+	1
	AO1-	2
Analog output AO2 [Speed %]	AO2+	3
	AO2-	4
		XD2D
Drive-to-drive link termination jumper		T
Drive-to-drive link.	B	1
	A	2
	BGND	3
		XSTO
Safe Torque-Off. Both circuits must be closed for the drive to start.	OUT1	1
	OUT2	2
	IN1	3
	IN2	4
Control panel connection		
Memory unit connection		

*Total maximum current: 200 mA

Standard I/O

- Control voltage supply: external supply (24V DC) input for the control unit
- Digital I/O: 6xDI, 2xDI/O (can be used also for pulse train inputs or outputs, max 32 kHz), 3xRO
- Analog I/O: 2xAI (mA or V), 2xAO
- Thermistor input: motor thermistor (PTC, KTY)
- Start interlock: drive interlock input
- Drive-to-drive link: galvanically isolated, can also be used for ModBus
- Safe Torque-Off (STO): designed for Safety Integrity Level 3 (SIL 3) according to IEC 61508 and Safety Category 4 acc. to EN 954-1
- Control panel connection: PC tools and control panel connection (RJ45). Can be used also as a Modbus link for monitoring
- Memory unit connection: complete drive configuration and settings are stored in the removable memory unit

EMC filters

1st environment vs 2nd environment

1st environment (category C1 & C2)
1st environment includes domestic premises. It also includes establishments directly connected without intermediate transformer to a low-voltage power supply network which supplies buildings used for domestic purposes.

2nd environment (category C3 & C4)
2nd environment includes all establishments other than those directly connected to a low-voltage power supply network which supplies buildings used for domestic purposes.

EMC - Electromagnetic Compatibility and modules

The electrical/electronic equipment must be able to operate without problems within an electromagnetic environment. This is called immunity. The ACS850 is designed to have adequate immunity against interference from other equipment. Likewise, the equipment must not disturb or interfere with any other product or system within its locality. This is called emission. Each ACS850 model can be equipped with an built-in filter to reduce high frequency emission.

EMC standards

The EMC product standard (EN 61800-3 (2004)) 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, are applicable to industrial and domestic equipments and systems including drive component inside. Drive units complying with requirements of EN 61800-3 are compliant 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.

Selecting an EMC filter

The following table gives the correct filter selection.

EMC standards

Option / Frame	A&B	C&D	E0&E	G
Built-in C3 filter, earthed/unearthed network*			●	●
Built-in C3 filter, earthed network only*		●		
External, plug-in C3 filter, earthed network only*	●			
Built-in C2 filter, earthed network only*			●	
External C2 filter, earthed network only*	●	●		

* Max. cable length 100 m

EN61800-3 (2004) product standard	EN 55011, product family standard for industrial, scientific and medical (ISM) equipment	EN61000-6-4, generic emission standard for industrial environments	EN61000-6-3, generic emission standard for residential, commercial and light-industrial environment
Category C1 (1st environment)	Group 1 Class B	Not applicable	Applicable
Category C2 (1st environment)	Group 1 Class A	Applicable	Not applicable
Category C3 (2nd environment)	Group 2 Class A	Not applicable	Not applicable
Category C4 (2nd environment)	Not applicable	Not applicable	Not applicable

Programming

Based on Direct Torque Control technology, the ACS850 offers highly advanced features as standard. The ACS850 standard program provides solutions to virtually all AC drives applications such as mixers, separators, extruders and conveyors, to name few.

Fast and easy commissioning

The standard ACS850 program offers flexibility and extensive parameter settings. It consists of a simple, ready-made program that can easily be modified to meet specific application needs. Commissioning is also simplified with the help of the start-up assistant that come standard with every drive.

Pre-programmed protection functions

A wide range of features provides protection for the drive, motor and the process.

- Ambient temperature
- DC overvoltage
- DC undervoltage
- Drive temperature
- Input phase loss
- Overcurrent
- Power limits
- Short circuit

Furthermore the standard application program offers an integrated emergency stop and supports the functionality of prevention of unexpected start-up.

Programmable protection functions

- Adjustable power limits
- Control signal supervision
- Critical frequencies lock-out
- Current and torque limits
- Earth fault protection
- External fault
- Motor phase loss
- Motor stall protection
- Motor thermal protection
- Motor underload protection
- Panel loss

Program customization

Using DriveSPC allows fine-tuning of the standard program to fit any application. In addition to parameters, ABB industrial drives offer function block programming, this makes it possible to replace relays or even a PLC, in some applications.

Removable memory block

A removable memory block provides easy maintenance by storing the complete firmware, including all user settings and motor data. Thus, if the power unit or control unit is replaced, the drive can be re-commissioned without any reprogramming, just move the memory block.

- Stores the drive firmware and parameter settings
- Fast and easy recommissioning
- Enables firmware and parameter configuration at work-shop instead of doing it on-site

Software features

ABB industrial drive modules have many features to enhance their reliability and durability as well as the ease of use. Among those, several macros for parameter settings and several advanced functions such as short and long parameter menus, I/O mapping and changed parameters list, makes the drive simple to use.

All these functions can be accessed either via the user-friendly control panel or DriveStudio PC tool.

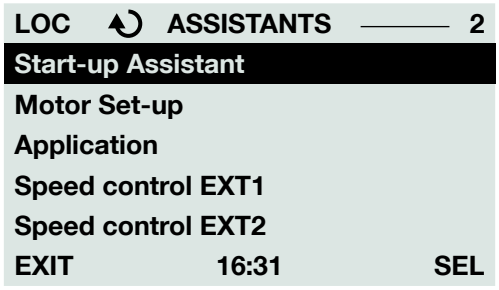
Macros

Several macros which have pre-set, application-specific parameter settings are available as standard in each drive. These pre-programmed parameter settings enable fast and easy commissioning by adjusting all the relevant parameters in just a couple of clicks.

Start-up assistant

The intelligent and intuitive start-up assistant allows first-time users to quickly get up-to-speed and customize the drive according to their needs. This is complemented by a built-in help function to make parameter-by-parameter setting easy. This way the drive can be quickly commissioned, even without manuals.

Maintenance assistant



The maintenance assistant reminds the user about the drive's preventive maintenance schedule or routine, or that of its associated components such as motor, cabinet air inlet filters and input contactors. It reminds users of planned maintenance needs based on running hours, operating hours, relay switching to reduce unplanned process interruptions.

Diagnostic assistant

Each ACS850-04 drive module is equipped with a diagnostic assistant that helps in locating the cause of any disturbance to the drive and even suggests possible remedies. This reduces process downtime
by making repair or adjustments quicker and easier.

Energy saving calculator

This feature consists of three functionalities:

- An energy efficiency optimizer that adjusts the motor flux in such a way that the total efficiency is maximized
- A counter that monitors used and saved energy by the motor and displays them in kWh, currency ($ or €) or volume of CO_2 emission
- A load analyzer showing the load profile of the drive

Short/long menus

The user interface can be configured so that it displays only the most common parameters. This short menu allows users to quickly access the parameters they need without having to go through all the drive's parameters.

A long menu is available, displaying the complete list of parameters for a more advanced configuration.

I/O mapping

This functionality allows user to easily go through the I/O configuration of the drive.

List of changed parameters

This feature allows users to go through the list of changed parameters. This way, the user does not have to go through all the drive's parameters and it is quickly possible to identify the ones recently changed.

PC tools

DriveStudio

User-friendly PC tool for quick drive startup, drive tuning and advanced programming tasks.

Start-up and maintenance tools:

- Fast parameter navigation
- Parameter setting
- Data logging and online drive signal monitoring of multiple signal channels for drive tuning
- Back-up and restore tool for drive parameter and DriveSPC program cloning
- Case sensitive help with detailed descriptions of drive parameters, events and functions
- Overview of the drive performance and status

DriveSPC

DriveSPC is a programming tool that enables easy modification or extension of drive functionality:

- Simple, easy-to-learn function block interface showing drive firmware functions, signals and parameters
- Easy addition of user-defined function block programs even on the fast time levels of the drive control
- Function block programming with standard IEC61131 function block library
- Professional programming environment with hierarchy levels, custom circuits, user parameters and copy protection of DriveSPC programs

DriveSize

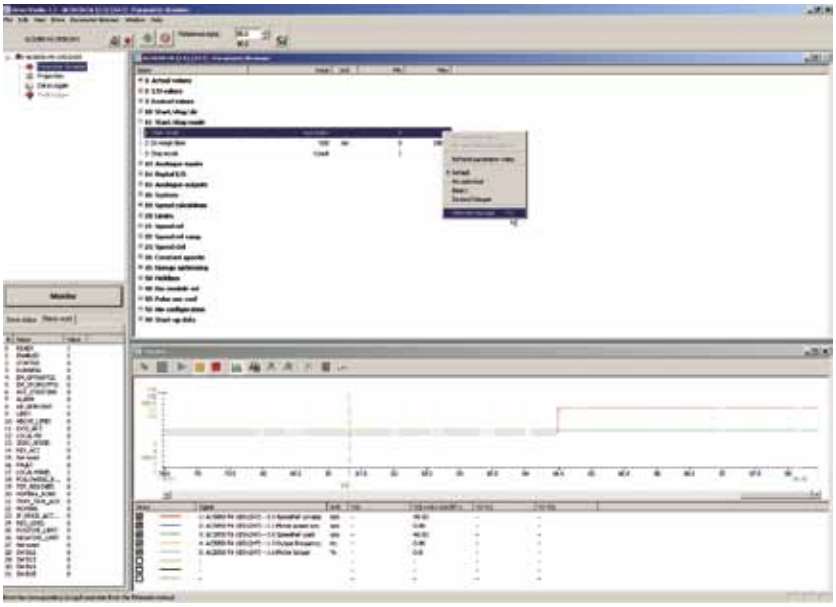
DriveSize is a PC program for helping the user select the optimal motor, frequency converter and transformer, especially in the case where a straightforward selection from a catalogue is not possible. Additionally it can be used to compute currents, network harmonics and to create documents about the dimensioning based on actual load.

DriveSize contains the current versions of the ABB motor and AC drive catalogues.

The default values make DriveSize simple to use, and the user is provided with ample options for drive selection. The shortcut keys make drive selection
easy while giving the optimal dimensioning result.
A manual selection mode is also supported.

DriveSize features:

- Selects the optimal motor, drive unit, supply unit and transformer
- Calculates network harmonics for a single supply unit or for the whole system
- Allows importation of own motor database
- Supplies dimensioning results in graphical and numerical format
- Prints and saves the results



DriveStudio parameter browser and monitor.

Remote monitoring and diagnostic tools

SREA-01 enables remote access

With drives increasingly being installed in remote locations, operational data needs to be acquired from the process for sending to a central location for process monitoring and further analysis. Furthermore, with no qualified service people on site it is vital to be able to monitor the drive remotely.

ABB's SREA-01 Ethernet adapter performs all these remote access tasks. Designed as an optional remote interface module for the drives, the SREA-01 can send process data, data logs and event messages independently, without a PLC or a dedicated on-site computer, and has an internal web server for configuration and drive access.

Connect a maximum of 10 drives to an Ethernet or GPRS network

In addition to a standard Ethernet port, the SREA-01 is equipped with an additional serial port for connecting to a standard GSM/GPRS modem for Internet connectivity in isolated places. The modem connection can be used for sending e-mail or SMS messages, uploading data files by FTP or accessing the Web pages of the module.

The SREA-01 is connected to the panel port, or alternatively to the Modbus interface, of a drive. A maximum of 10 drives can be connected to a single SREA-01 module, although an additional RS-485 converter is needed for each drive if several drives are connected by their panel port interfaces.

Collect data logs and integrate drive data in SCADA applications

For collecting data from the drive for further analysis, the SREA-01 has a fully configurable data logger that can store values from the drives to a file, with sample intervals from ten seconds to one hour. The files are stored in the standard Comma Separated Values (CSV) format that can be imported to applications such as Microsoft Excel for processing.

The collected data logs can be sent by e-mail or FTP, either on a local area network or the Internet. The sending interval can also be configured by the user, with logs being sent, for example, every hour or once a week.

In addition to providing data logging functionality, the SREA-01 also has an internal Modbus TCP gateway, providing a standard interface that can be used by SCADA (Supervisory Control And Data Acquisition) applications to display drive information in real-time.

Receive alarms and access the drive remotely

The SREA-01 unit can be used to monitor the drive for abnormal situations, such as too high process temperatures,

and send alarm messages to maintenance personnel. The event and alarm messages can be sent as SMS messages or by e-mail. The event conditions and messages can be configured by the user to make them suitable for a number of applications.

If emergency situations or faults occur, the internal web server of the SREA-01 provides an easy-to-use user interface for accessing the drives. Travel to sites can often be avoided by using a regular web browser to view and change the drive parameters, monitor the status of all connected drives and browse the fault history of the installation.

Summary of features and options

Easy and cost efficient cabinet assembly

- Compact size
- Side-by-side installation
- Optimal location of power and I/O terminals

Safety as standard

- Integrated Safe Torque-Off function (SIL 3)
- Solutions for other safety functions available

Customizable to meet all needs

- Wide selection of options - "order what you need"
- Extensive standard I/O offering and extensions available
- Flexible software: extensive parameter settings
- Good programmability (also function block programming)

Precise and reliable control

- DTC with enhanced features
- Drive-to-drive link as standard

Save money and the environment

- Energy optimizer
- Energy-saving calculator

Maximized process uptime

- Diagnostic assistant to identify and solve potential problems
- Maintenance assistant for preventive maintenance
- Coated boards as standards
- Advanced thermal protection of power semiconductors
- Fast and advanced over/under voltage and load protections
- Cooling fan supervision (up to 45 kW)

Services and support

- Extensive support documentation and support material
- Advanced PC tools available for dimensioning, programming, commissioning and maintenance
- Worldwide service network by ABB and partners

Fast and easy commissioning

- Intuitive multilingual user interface
- Intelligent and intuitive start-up assistant with built-in help function
- Removable memory unit

Contact us

441 024
Printed matter
ABB09_00220/2009

ACS850-PHTC01U-EN REV A 10/01/2009

Power and productivity
for a better world™