Ultra low harmonic, wall mounted

ACS800-U31, 7.5 to 125 Hp

Simple low harmonic solution

There is increasing concern among end users and power companies about the harmful effects of harmonics. Harmonic distortion may disturb or even damage sensitive equipment connected in the same environment. Harmonic standards are thus becoming stricter and there is a growing demand for low harmonic solutions.

The ACS800-U31 drive offers an easy solution to the problem of harmonics. The solution itself is incorporated in the drive, eliminating the need for any additional filtering equipment or complicated and large multi-pulse transformer arrangements.

Meets the strictest standards

The ACS800-U31 eliminates low order harmonics with the active converter controlled with DTC, and high order harmonics with an LCL line filter. The result is exceptionally low harmonic content in the network; exceeding the requirements set by standard IEEE519 at the drive input terminals even on the weakest AC line network. The ACS800-U31 provides you with a simple, compact and complete solution to meet stringent power quality standards.

Beats external solutions

The ACS800-U31 does not require a dedicated multi-pulse transformer and thus is simpler in terms of cabling arrangements and requires less floor space. Harmonic performance is better than with 12- and 18-pulse solutions. Passive or active external filtering devices are avoided with the ACS800-U31, making the solution compact and simple. Other advantages of the ACS800-U31 is that it always operates with unity power factor 1 and is impervious to AC Line Voltage imbalances up to and over 3%. The system efficiency is also better than 12 and 18-pulse solutions due to the simplified transformer.

Main standard features

- Meets IEEE519-1992 at Drive input terminals
- Wall mounting
- Compact design
- UL Type 1 protection class
- Built in low harmonic LCL filter
- Coated boards
- Extensive, programmable I/O
- Long lifetime cooling fan and capacitors
- Inputs galvanically isolated
- 3 I/O and fieldbus extension slots inside
- Alphanumeric multilingual control panel with a start-up assistant feature

Options for ACS800-U31

- Braking chopper
- EMC filter for 1st environment, restricted distribution according to EN 61800-3
- EMC filter for 2nd environment, unrestricted distribution according to EN 61800-3
- Analog and digital I/O extension modules
- Fieldbus modules
- Pulse encoder interface module
- Resolver interface (limited SW Support)

Ratings and dimensions

ACS800-U31

ACS800 - U31 - XXXX - 25 + XXXX

Type code	Frame size	Input A	I_{max} A	Normal Duty I_{2N} A	Normal Duty P_N Hp	Heavy-duty use I_{2HD} A	Heavy-duty use P_{HD} Hp	Noise Level dBA	Air flow ft³/min	Heat Dissipation BTU/hr
3-phase supply voltage 208, 220, 230, 240. The power ratings are valid at nominal voltage, 240Vac (50 & 60Hz)										
ACS800-U31-0011-2	R5	32	52	32	10	26	7.5	70	206	1730
ACS800-U31-0016-2	R5	44	68	45	15	38	10	70	206	2380
ACS800-U31-0020-2	R5	55	90	56	20	45	10	70	206	3110
ACS800-U31-0025-2	R5	70	118	69	25	59	15	70	206	3760
ACS800-U31-0030-2	R5	82	144	83	30	72	20	70	206	4500
ACS800-U31-0040-2	R6	112	168	114	40	84	25	73	238	5420
ACS800-U31-0050-2	R6	140	234	143	50	117	30	73	238	7260
ACS800-U31-0060-2	R6	157	264	157	60	132	40	73	238	8650
3-phase supply voltage 380, 400, 415, 460, 480, 500. The power ratings are valid at nominal voltage, 480Vac 60Hz										
ACS800-U31-0020-5	R5	29	52	29	20	25	15	70	206	2240
ACS800-U31-0025-5	R5	33	61	34	25	30	20	70	206	2600
ACS800-U31-0030-5	R5	44	68	45	30	37	25	70	206	3420
ACS800-U31-0040-5	R5	54	90	55	40	47	30	70	206	4140
ACS800-U31-0050-5	R5	65	118	67	50	57	40	70	206	4960
ACS800-U31-0060-5	R5	76	144	78	60	62	50	70	206	5980
ACS800-U31-0070-5	R6	112	168	114	75	88	60	73	238	8030
ACS800-U31-0100-5	R6	129	234	132	100	114	75	73	238	9570
ACS800-U31-0120-5	R6	145	264	156	125	125	100	73	238	11620
3-phase supply voltage 525, 575, 600. The power ratings are valid at nominal voltage, 575Vac 60Hz										
ACS800-U31-0060-7	R6	53	62	54	50	43	40	73	238	5980
ACS800-U31-0070-7	R6	73	79	75	60	60	50	73	238	8030
ACS800-U11-0100-7	R6	86	99	88	75	71	60	73	238	9570

Frame size	UL Type 1 Height (in)	Width (in)	Depth (in)	Weight (lbs)
R5	32.1	10.4	15.4	143
R6	38.2	11.8	17.3	220.5

Enclosure

Degree of Protection:
UL Type 1(Standard)
Paint color:
NCS 1502-Y (RAL 90021/PMS 420C)

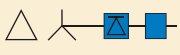
NOTES:

- I_{max} current available for 10 seconds at start.
- I_{2N} continuous base current at 40°C (104°F). Overload cycle 110% I_{2N} for 1 minute / 5 minutes allowed.
- I_{2hd} continuous base current at 40°C (104°F). Overload cycle 150% I_{2hd} for 1 minute / 5 minutes allowed.

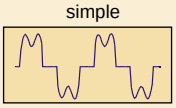
- Current ratings do not change with different supply voltages.
- Horsepower ratings are based on NEMA motor ratings for typical 4-pole motors (1800 rpm). Check motor nameplate current for compatibility.

Alternatives in reducing AC line harmonics

6 pulse rectifier

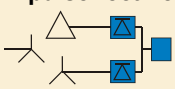


Transformer and cabling simple

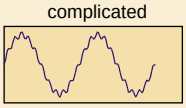


Current very distorted >Ithd 30%

12 pulse rectifier

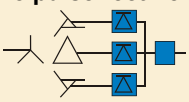


Transformer and cabling complicated

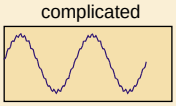


Current distorted >Ithd 12%

18 pulse rectifier

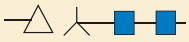


Transformer and cabling complicated

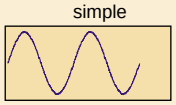


Current wave form good >Ithd 6%

ACS800-U31



Transformer and cabling simple



Current wave form best Ithd ~ 4.5%

Ithd= Total Harmonic Distortion Current

Single drive main features

Features	Benefits	Notes
Compact and complete		
Compact size, everything integrated	Less space and installation work required.	No need to install extra components such as input chokes or EMC filter.
Built in harmonic filter in all ACS800 drives	Low harmonics, meaning less interference and less heating in cables and transformers. Filter also protects the drive from line side transients.	For the lowest harmonic level, ACS800-37 offers almost a harmonic free solution.
Wide range of options available	Standard solutions available from ABB to meet most customers application needs.	Custom made solutions are available in the ACS800-U7/07/17/37
Versatile braking options	Optimal braking options are always available. No need for an external braking chopper thus reducing size and installation cost.	Brake chopper built inside all frame sizes (standard/optional). Regenerative braking with ACS800-U11 and ACS800-17.
User interface		
User friendly customer interface	Easy and fast commissioning and operation.	Clear, alphanumeric display with start-up assistant that guides through the start-up procedure. Easy to use PC tools available for commissioning, maintenance, monitoring and programming.
Versatile connections and communications	Standard I/O covers most requirements. Connectable to commonly used fieldbuses.	Extensive standard and optional I/O.
Extensive programmability	Flexibility. Possible to replace relays or even a PLC in some applications.	Two levels of programmability: 1. Parameter programming (standard) 2. Adaptive programming (free block programming) - standard feature - more blocks available as options - all I/Os are programmable
Industrial design		
Wide power and voltage range	One product series can be used to meet all application needs, meaning less training and spare parts and standardized interface to drives.	0.75 to 3000 Hp 208 to 690 Vac
Wide range of robust enclosures available	Industrial suitable solutions available for different environments.	UL Type 1, UL Type 1 filtered, UL Type 12
Robust main circuit design	Suitable for heavy industrial use. Reliable. Long motor cables can be used without extra output filters.	Components dimensioned for heavy duty and long lifetime. Advanced thermal model allows high overloadability.

Single drive main features

Features	Benefits	Notes
Industrial design		
Extensive protection features	Enhanced reliability, fewer process interruptions. Possibility to also protect motors and process.	Several adjustable limits to protect other equipment included.
Galvanic isolation of I/O	Safe and reliable operation without separate isolators and relays.	Isolated input signals and relay outputs as standard.
All terminals designed for industrial use	Sufficient size even for large aluminum cables. No need for special tools in I/O cabling.	
Worldwide approvals: CE, UL, cUL, CSA, C-Tick, GOST R	Products that can be used everywhere in the world.	
Right performance for every application		
DTC, accurate dynamic and static speed and torque control	Excellent process control even without speed feedback device - improved product quality, productivity, reliability and lower investment cost.	
DTC - allows high overloadability and gives high starting torque	Reliable, smooth start without overdimensioning the drive.	
DTC, fast control	No unnecessary trips or process interruptions.	Fast reaction to load or voltage variations prevents tripping. Rides through power interruptions by using kinetic energy of the load.
DTC, flux optimization and sophisticated motor model	Excellent motor and drive efficiency - cost savings for non-dynamic applications like pumps or fans.	Optimal flux in the motor reduces losses on applications where Dynamic Response requirements are minimal.
DTC, mechanics friendly	Less stress for mechanics improves reliability.	No shock torques. No torque ripple - minimized risk for torsional vibration. Active oscillation damping.
DTC, line supply control	High performance and robust control in active supply unit with programmable power factor.	Applies for ACS800-U11, ACS800-17, ACS800-U31, and ACS800-37
Made by ABB		
Global market leader in AC drives. Long experience.	Well proven, safe and reliable solutions. Application know-how.	
World wide service and support network	Professional support available around the world.	

Technical specification

Mains connection

Voltage and power range	3-phase, U_{2IN} = 208 to 240 V, ± 10%, except -U2,-U7,-07,-17,-37 3-phase, U_{5IN} = 380 to 500 V, ± 10% 3-phase, U_{7IN} = 525 to 690 V, ± 10% (600 V UL, CSA)
Short Circuit Current Rating (SCCR)	ACS800-U1,-U11,-U31 = 65ka ACS800-PC,-U2,-U7/07,-17,-37 = 100ka
Frequency	48 to 63 Hz
Nominal Impedance	3% Nominal Impedance R2-R3, DC Bus Choke R4 and greater, AC Reactor
Power factor	
ACS800-U1,-PC,-U2,-U7/07	$\cos\varphi_1$ = 0.98 (fundamental) $\cos\varphi$ = 0.93...0.95 (total)
ACS800-U11,-17,-U31,-37	$\cos\varphi_1$ = 1 (fundamental) $\cos\varphi$ = 0.99 (total)
Efficiency (at nominal power)	
ACS800-U1,-PC,-U2,-U7/07, 07LC	98%
ACS800-U11,-17,-U31,-37	97%

Motor connection

Voltage for > 500 V units	3-phase output voltage 0...U_{2IN}/U_{5IN}/U_{7IN} please see “Filter selection table for ACS800” under the du/dt filters on page 33
Frequency	0...±300 Hz (0...±120 Hz for -U7/-07 frames R6-R8 with
du/dt	du/dt filters and external du/dt filters)
Field weakening point	8...300 Hz
Motor control	ABB’s exclusive Direct Torque Control (DTC)
Torque control	Torque step rise time
Open loop	<5 ms with nominal torque
Closed loop	<5 ms with nominal torque
	Non-linearity:
Open loop	±4% with nominal torque
Closed loop	±1% with nominal torque
Speed control	Static accuracy
Open loop	10% of motor slip
Closed loop	0.01% of nominal speed
	Dynamic accuracy
Open loop	0.3...0.4% sec. with 100% torque step
Closed loop	0.1...0.2% sec. with 100% torque step

Environmental

Ambient temperature	
Transport	-40...+70°C
Storage	-40...+70°C
Operation	-15...+50°C, no frost allowed 40...50°C at reduced output current (1% / 1°C)
Operation (ACS800-07LC)	0 to +55°C, no frost allowed +45 to 55°C, at reduced output current (1% / 1°C)
Cooling method	Dry clean air
Altitude	
0...1000 m	without derating
1000...4000 m	with derating ~ (1% / 100 m) (690 V units 1000...2000 m with derating)
Relative humidity	5 to 95%, no condensation allowed
Protection class	
UL Type 1	standard for -U1,-PC,-U2,-U7/07,07LC, -U11, -17,-U31,-37
UL Type 1 filtered	option for -U7/07,-17,-37
UL Type 12	option for -U1,-PC,-U7/07,07LC, -17,-37
Paint color	-PC,-U7/07,07LC, -17,-37: RAL 7035 -U1,-U11,-U2,-U31: NCS 1502-Y (RAL 90021, PMS 420 C)
Contamination levels	No conductive dust allowed
Storage	IEC60721-3-1, Class 1C2 (chemical gases), Class 1S2 (solid particles)
Transportation	IEC60721-3-2, Class 2C2 (chemical gases), Class 2S2 (solid particles)
Operation	IEC60721-3-3, Class 3C1/3C2* (chemical gases), Class 3S2 (solid particles)

C = chemically active substances
S = mechanically active substances

Product compliance

UL & cUL (508A or 508C) and CSA C22.2 NO.14-95, C-Tick, GOST R
NEC 430.126(A)(2) Motor Overtemperature Protection
Quality assurance system ISO 9001 and
Environmental system ISO 14001
CE (Available)
Low Voltage Directive 73/23/EEC with amendment 93/68/EEC
Machinery Directive 98/37/EC
EMC Directive 89/336/EEC with amendment 93/68/EEC

EMC (according to EN 61800-3)

2nd environment, unrestricted distribution category C3 as standard in -07 (frame size nxR8i), 07LC, -17 and -37 (frame sizes R7i-nxR8i), option in the others
1st environment, restricted distribution category C2 as option up to 1000 A input current

NOTE: Available options are shown in the Summary of features options table. Please see pages 48-49.