



Frequently Asked Questions

ABB low voltage drives

Low Harmonic AC drives, 7.5 to 2800Hp

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Contact ABB Inc, Low Voltage Drives

ABB Inc - Low Voltage Drives

16250 W. Glendale Drive
New Berlin, WI 53151
Tel: (800) 752-0696
Fax: (262) 785-0397
Web: <http://www.abb.us/drives>

Technical Support

Tel: (800) 435-7365
Fax: (262) 780-5135
Email: DrivesSupportLine@us.abb.com

Customer Service

Tel: (800) 752-0696
Fax: (800) 648-2072
Email: abb.drives.customerservice@us.abb.com

ACS800 Ultra Low Harmonic AC drive Frequently Asked Questions

Q What is a harmonic?

A A harmonic is a sinusoidal component of the voltage wave from and is a multiple of the fundamental frequency (60Hz in the US). Non-linear loads such as diode and thyristor rectifiers, other power electronic converters and fluorescent lights cause some distortion of AC line voltage and current. This distortion is called electrical harmonic. High harmonic content may disturb or damage the sensitive electronic equipment connected to the same AC line network.

Q What is a low harmonic AC drive?

A A low harmonic AC drive is a drive or drive package that produces less harmonic distortion to the AC line than conventional AC drives.

Q What is special in ABB's ultra low harmonic drive?

A ABB's ultra low harmonic drive solution uses advanced harmonics mitigation technology that does not require external filters or multi-pulse transformer. These drives utilize an active front-end rectifier with a LCL (inductor - capacitor - inductor) filter. The low line harmonic content of the ACS800-U31 and -37 AC drives fulfil the strictest harmonic requirements including IEEE519-1992 at the drive's input terminals. This makes ABB's ultra low harmonic drive a simple and compact solution for low harmonic AC drive.

Q What is the meaning of Ultra Low Harmonic AC Drive?

A Ultra Low Harmonic is a marketing name applied to the ACS800-U31 and -37 products for indication that these products offer a new alternative to the conventional low harmonic drive products and the ACS800-U31 and -37 have lower harmonic distortion levels than an equivalent power 18-pulse solution.

Q What is an LCL filter?

A An LCL filter is a filter which consists of an inductor (L), a capacitor (C), and another inductor (L) arranged in a T-section configuration. Each input phase of the ACS800-U31 and -37 includes a symmetrical set of these components. The inductors are series power components that carry the full current of the drive.

Q Why should I use a low harmonic drive?

A As usage of electronic and electrical equipment increases, users and utilities are becoming more concerned about the harmful effects of harmonics. This is leading to more stringent power quality requirements.

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Q Do harmonics only come from AC drives?

A No, AC line harmonics are caused by many electrical devices and are an overall system issue, not just associated with AC drives. The goal of low harmonic AC drives is to contribute less harmonic distortion to the overall system.

Q Which one is more important, current or voltage harmonic distortion?

A In principle, one can consider the current distortion generated by an AC drive as fixed, i.e. it does not depend on the character of the network. The voltage distortion depends on the quality of the network. The higher the impedance of the network (weaker the network), the higher voltage distortion is caused by a given current distortion. That is why harmonic requirements are typically given as current distortion. For example, IEEE519-1992 gives maximum allowed current distortion values based on a network's short-circuit ratio.

Q What is the line harmonic content of ACS800 ultra low harmonic drive?

A Typical value of the total current distortion is 3.5-4.5% of the drive's nominal current. The value varies slightly depending on the rating of the drive. ACS800-U31 and -37 low harmonic drives fulfil the total harmonic distortion requirement of IEEE519-1992 regardless of the network's short-circuit ratio and are typically lower than most other harmonic solutions on the market today for AC drives.

IEEE519
Table of
allowed
distortion
levels

$V_n \leq 69kV$						
I_{sc} / I_L	$h < 11$	$11 \leq h < 17$	$17 \leq h < 23$	$23 \leq h < 35$	$35 \leq h$	TDD
<20	4.0	2.0	1.5	0.6	0.3	5.0
20-50	7.0	3.5	2.5	1.0	0.5	8.0
50-100	10.0	4.5	4.0	1.5	0.7	12.0
100-1000	12.0	5.5	5.0	2.0	1.0	15.0
>1000	15.0	7.0	6.0	2.5	1.4	20.0

6 pulse rectifier	12 pulse rectifier	18 pulse rectifier	ACS800-37
Transformer and cabling simple	Transformer and cabling complicated	Transformer and cabling complicated	Transformer and cabling simple
Current very distorted >lthd 30%	Current distorted >lthd 12%	Current wave form good >lthd 6%	Current wave form best lthd ~ 4%

lthd= Total Harmonic Distortion Current

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Q Why does the line current look distorted at no load?

A The absolute value of the current harmonics generated by the drive is independent of the load current, meaning that the absolute value of the harmonics is nearly the same at no load as at nominal load. That is why the current waveform looks distorted even when the load current is very low. This is not an issue as the harmful effects of harmonics depend on the absolute harmonic content based on nominal load. For example, the standards like IEEE519-1992 refer to harmonic content as a percentage of the total load current.

Q What is the type code designation of the ACS800 ultra low harmonic drive?

A The type code designations for the wall-mounted type of low harmonic drive are ACS800-31 and ACS800-U31. The ACS800-U31 is specifically designated for the US market and includes the US conduit box with the drive and is defaulted for horse power and 60Hz configuration.

A The type code designation for the cabinet-built type of low harmonic drive is ACS800-37. The type code designation of the drive specifically designated for the US market includes +C129 at lower power end and +C129+H359 at high power end in its designation. +C129 is for UL specific design and +H359 for common motor terminal cabinet, the latter is required in frames 2xR8i ... 6xR8i.

Q What is included as standard in ACS800-U31 drive?

A A complete low harmonic drive with active supply unit and LCL filter integrated in the drive, protection class NEMA1/IP21, control panel CDP312R, fiber optic interface card RDCO-03, standard software (US), cable conduit entry, control boards with coating and one set of default language documents. The drive has product markings CE, UL, CSA (pending) and C-tick (pending) as standard.

Q What is included as standard in ACS800-37-xxxx-x+C129 drive?

A A complete low harmonic drive with active supply unit and LCL line filter built in cabinet. It has the following hardware features as standard:

- UL listing. 115Vac auxiliary power supply
- Fast aR semi-conductor fuses on AC line side
- Main contactor (frames R7i-R8i) or air circuit breaker (nxR8i)
- EMC 2nd Environment, Common mode filter
- Du/dt limitation of the output voltage by chokes in parallel connected types (nxR8i) and additionally in 690Vac types of frame R8i.
- RDCO-03 adapter for fiber optic interface
- Top entry and exit of cables with US conduit plate
- Coated boards

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Q Why does the ACS800-37 drive have main contactor (up to R8i) or main air circuit breaker as a standard (nxR8i)?

A The main contactor or circuit breaker is used as part of the pre-charging circuit of the DC bus capacitors.

Q Is there a cabinet version available for the frame R6 ACS800-U31?

A Yes, a frame R6 is available in the ACS800-37 cabinet package. ie, There is a frame R6 ACS800-U31 and a frame R6 ACS800-37 where the -U31 is mounted in a cabinet. Contact factory sales for information and pricing.

Q What options are available for the ACS800-U31 and -37?

A All of the “common” options listed in the stand-alone drives price list are available for the ACS800-U31 and -37 products. Additional kVA specific options are also available, including 2nd environment and 1st environment filters for most power sizes.

Q Can Nxxx type option modules be used with the ACS800-U31 and -37?

A Yes most legacy Nxxx type I/O extension and FieldBus option modules can be used with all ACS800 family products. The Nxxx type option modules will require a RDCO module that is standard with the ACS800-U31 and -37.

Q Why do the ACS800-U31 and -37 drives have two control boards?

A The ACS800-U31 and -37 AC drives have two control boards in the complete package. One control board is for the active supply unit and the other for the inverter. Only the motor side (inverter) control board is accessible from the front of the drive in the ACS800-U31. The active supply control board is internal to the drive and requires no external connections. All I/O and support connectivity is through the motor control board at the front of the drive.

Q Do I need to do any setup to the active supply unit?

A No, the active supply does not need additional configuration to operate. All supply line side configuration is automatic, Start-up of the drive is similar to any other ACS800 standard drive. There are, however, some parameters that can be set separately for the active supply unit.

ACS800 Ultra Low Harmonic AC drive Frequently Asked Questions

Q Can the parameters of the line controller be adjusted with the CDP312R keypad?

A Yes, the parameters of the line side controller can be accessed by changing the node number on the CDP312R keypad.

Q Does the fiber optic connection (RDCO) for the ACS800 product family need to be purchased separately for the ACS800-U31 /-37?

A No, the RDCO-03 is included in all ACS800-U31/-37 drives as standard and does not need to be ordered separately. The RDCO is used to communicate between the 2 RMIO control boards included in the drive.

Q Can the ACS800-U31 and -37 be used in common DC bus applications?

A Yes, contact ABB Application Engineering for support in common DC bus applications for proper sizing, product mix, and application rules.

Q Can the ACS800-U31 be flange mounted?

A No, flange mounting is not available.

Q Is ACS800-U31 UL listed?

A Yes, The ACS800-U31 has product markings for UL and CE, marking for CSA and C-tick are pending.

Q Is ACS800-37 UL listed?

A Yes, for US usage the drive is typically ordered with +C129 for inclusion of UL listed marking. If CE marking is required, the drive should be ordered without +C129. The US price list includes the +C129 plus code for UL listed marking.

Q What type of fuses do I need to use as input protection with the ACS800-U31?

A UL class T (ie Bussman JJS) fuses are recommended. See the ACS800-U31 hardware manual for sizing recommendation.

ACS800 Ultra Low Harmonic AC drive Frequently Asked Questions

Q Can a circuit breaker be used instead of fuses to protect the drive?

- A** No, for the ACS800-U31 circuit breakers do not provide sufficient short circuit protection. Fast blow fuses (semiconductor fuses) are recommended for drive protection such as Bussman type JJS T-class fuses. See the drive hardware manual for recommended fuse sizing and types.
For the ACS800-37 aR fuses are included and must be used as supplied. Contact ABB logistics or Bussman directly for replacement.

Q Can fuses other than manufacturer's given in the manual be used?

- A** Yes. Most manufacturers give cross references to other manufacturers' types, but must be equivalent semi-conductor type fast blow fuses. Please use those cross reference tables and compare to types given in ABB's manuals.

Q Why is an external UPS needed for power loss ride-through in ACS800-37?

- A** In ACS800-37, the auxiliary power for the control is taken from the AC supply. Thus, auxiliary supply needs to be secured if ride-through is required. This will be changed in future so that auxiliary power is taken from the DC link to be consistent with other ACS800 stand-alone drives. When implemented, an external UPS supply will not be needed. (solution is in process)

Q Is ACS800-U31 available with NEMA Type 12 enclosure?

- A** The ACS800-U31 is not available in a NEMA Type 12 enclosure. For NEMA Type 12 application requirements, it is recommended to apply the ACS800-U31 in a separate enclosure rated for the level of protection needed. Please contact engineered drives, your local panel shop or system integrator for further information.

Q Is a braking chopper available for the low harmonic drives?

- A** Yes. The ACS800-U31 includes DC bus connection terminals and an external braking chopper (NBRA type) may be applied.
For ACS800-37, cabinet built choppers and resistors are available and may be ordered with a plus code.

Q Are there other types of low harmonic AC drive solutions available from ABB?

- A** Yes. External filters and multi-pulse solutions are available. Contact your local ABB sales representative.

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Contact us

ABB Inc.

Low Voltage Drives
16250 W. Glendale Drive
New Berlin, WI 53151 USA
Phone: (800) 752-0696
Fax: (262) 785-0397
Web: www.abb.us/drives

ABB Inc.

Low Voltage Drives- Canada
3299 J.B. Deschamps Blvd
Lachine, Quebec H8T 3E4
Phone: (800) 215-3066
Fax: (514) 420- 3137
Web: www.abb.com

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