

ABB AC Drives

ACS880-01...+C212 Extension Box,

1 – 60 HP at 230V

1 – 150 HP at 480V

7.5 – 125 HP at 575V

Document No. 3AXD50000043508

ACS880-01...+C212 Extension Box Installation Quick Guide

The ACS880-01...+C212 Extension Box is an ACS880-01 wall-mounted variable frequency AC drive on a back panel with an electrical box for additional devices. Standard devices include line fuses to protect the drive and a power distribution block. Optional devices includes a line disconnect switch, control power transformer, switches and pilot lights as well as ACS880-01 options for fieldbus, input/output adapters, special software, etc.

1. Safety in installation and maintenance

Electrical safety

These warnings are intended for all who work on the drive, motor cable or motor.

- WARNING! Ignoring the following instructions can cause physical injury or death, or damage to the equipment:
- Only qualified electricians are allowed to install and maintain the drive.
  - Never work on the drive, motor cable or motor when main power is applied. After disconnecting the input power, always wait for 5 minutes to let the intermediate circuit capacitors discharge before you start working on the drive, motor or motor cable.
  - Always ensure by measuring with a multimeter (impedance at least 1 Mohm) that:
    - Voltage between drive input phases L1, L2 and L3 and the frame is close to 0 V
    - Voltage between terminals UDC+ and UDC- and the frame is close to 0 V.
  - Do not work on the control cables when power is applied to the drive or to the external control circuits. Externally supplied control circuits may cause dangerous voltages inside the drive even when the main power on the drive is switched off.
  - Do not make any insulation or voltage withstand tests on the drive.
  - Do not connect the drive to a voltage higher than what is marked on the type designation label. Higher voltage can activate the brake chopper and lead to brake resistor overload, or activate the overvoltage controller what can lead to motor rushing to maximum speed.

Note:

- The motor cable terminals on the drive are at a dangerously high voltage when the input power is on, regardless of whether the motor is running or not.
- The DC terminals (UDC+, UDC-) carry a dangerous DC voltage (over 500 V) when internally connected to the intermediate DC circuit.
- Depending on the external wiring, dangerous voltages (115 V, 220 V or 230 V) may be present on the terminals of relay outputs (XRO1, XRO2 and XRO3).
- The Safe torque off function does not remove the voltage from the main and auxiliary circuits. The function is ineffective against deliberate sabotage or misuse.

IMPORTANT: Other Safety Information

Before handling the equipment or connecting voltage to the drive, see ACS880 Hardware Manual (3AUA0000078093) Chapter 1 Safety instructions for additional information on grounding, lifting, starting up and operating the equipment.

This guide instructs briefly how to install the drive. For more detailed instructions, engineering guide lines, technical data and complete safety instructions, see the ACS880 Hardware Manual in the accompanying CD or available here: [www.abb.com/drives](http://www.abb.com/drives): Select Document Library and search for document number 3AUA0000078093 [English].

2. List of related manuals

Drive hardware manuals and guides	Code (English)
ACS880-01 hardware manual	3AUA0000078093
ACS880-01 quick installation guide for frames R1 to R3	3AUA0000085966
ACS880-01 quick installation guide for frames R4 and R5	3AUA0000099663
ACS880-01 quick installation guide for frames R6 to R9	3AUA0000099689
ACS880-01 drives for cabinet installation (option +P940, +P944) supplement	3AUA0000145446
ACS880-01 assembly drawings for cable entry boxes of P21 frames R5 to R9	3AUA0000119627
ACS-AP-x assistant control panels user’s manual	3AUA0000085685
Vibration dampers for ACS880-01 drives (frames R4, R5, option +C131) installation	3AXD50000010497
Vibration dampers for ACS880-01 drives (frames R6, R9, option +C131) installation	3AXD50000013389
ACS880-01 marine type-approved drives (option +C132) supplement	3AXD50000010521
Drive firmware manuals and guides	
ACS880 standard control program firmware manual	3AUA0000085967
Quick start-up guide for ACS880 drives with primary control program	3AUA0000098062
Option manuals and guides	
FDIO-01 digital I/O extension module user’s manual EN	3AUA0000124966
Other manuals and quick guides for I/O extension modules, fieldbus adapters, etc.	Multiple

You can find manuals and other product documents in PDF format on the Internet. See section manuals not available in the Document library, contact your local ABB representative

The QR code below opens an online listing of the manuals applicable to this product.



ACS880-01 manuals

3. Packing List

The following items are included in the box:

1. ACS880 Extension Box drive unit (See ratings chart for size and variants)
2. ACS880 Extension Box Quick Guide (this document)
3. ACS880 Quick Start Guide
4. ACS880 Manuals on CD
5. ACS880 Extension Box schematic diagram and layout drawing

4. Drive Ratings Table and Plus Code Variants

Type code	Nominal ratings						UL Type 1	
	Light duty (110% overload for 1 min)			Heavy duty (150% overload for 1 min)			Frame size	Weight (lb)
ACS880-01-	I <sub>Ld</sub> A	P <sub>Ld</sub> HP	P <sub>Ld</sub> kW	I <sub>2Hd</sub> A	P <sub>Hd</sub> HP	P <sub>Hd</sub> kW		
240 VAC (range 208 to 240 VAC); Power ratings are valid at nominal voltage 230 VAC, 60 Hz								
04A6-2+C212	4.4	1	0.75	3.7	0.75	0.55	F2-R1	57
06A6-2+C212	6.3	1.5	1.1	4.6	1	0.75	F2-R1	57
07A5-2+C212	7.1	2	1.5	6.6	1.5	1.1	F2-R1	57
10A6-2+C212	10.1	3	2.2	7.5	2	1.5	F2-R1	57
16A8-2+C212	16	5	4	10.6	3	3	F2-R2	62
24A3-2+C212	23.1	7.5	5.5	16.8	5	4	F3-R2	54
031A-2+C212	29.3	10	7.5	24.3	7.5	5.5	F3-R3	58
046A-2+C212	44	15	11	38	10	7.5	F4-R4	82
061A-2+C212	58	20	15	45	15	11	F4-R4	84
075A-2+C212	71	25	18.5	61	20	15	F5-R5	118
087A-2+C212	83	30	22	72	25	18.5	F5-R5	118
115A-2+C212	109	40	30	87	30	22	F5-R6	166
145A-2+C212	138	50	37	105	40	30	F5-R6	166
170A-2+C212	162	60	45	145	50	37	F6-R7	210
500 VAC (range 380 to 500 VAC); Power ratings are valid at nominal voltage 460 VAC, 60 Hz								
02A1-5+C212	2.1	1	0.75	1.7	0.75	0.55	F2-R1	57
03A0-5+C212	3	1.5	1.1	2.1	1	0.75	F2-R1	57
03A4-5+C212	3.4	2	1.5	3	1.5	1.1	F2-R1	57
04A8-5+C212	4.8	3	2.2	3.4	2	1.5	F2-R1	57
07A6-5+C212	7.6	5	4	5.2	3	3	F2-R1	57
11A0-5+C212	11	7.5	5.5	7.6	5	4	F2-R1	57
014A-5+C212	14	10	7.5	11	7.5	5.5	F2-R2	62
021A-5+C212	21	15	11	14	10	7.5	F3-R2	54
027A-5+C212	27	20	15	21	15	11	F3-R3	58
034A-5+C212	34	25	18.5	27	20	15	F3-R3	58
040A-5+C212	40	30	22	34	25	18.5	F4-R4	84
052A-5+C212	52	40	30	40	30	22	F4-R4	84
065A-5+C212	65	50	37	52	40	30	F5-R5	118
077A-5+C212	77	60	45	65	50	37	F5-R5	118
096A-5+C212	96	75	55	77	60	45	F5-R6	166
124A-5+C212	124	100	75	96	75	55	F6-R6	188
156A-5+C212	156	125	90	124	100	75	F6-R7	210
180A-5+C212	180	150	110	156	125	90	F6-R7	210
600 VAC (range 525 to 690 VAC); Power ratings are valid at nominal voltage 575 VAC, 60 Hz								
07A3-7+C212	9	7.5	5.5	6.1	5	4	F5-R5	118
09A8-7+C212	11	10	7.5	9	7.5	5.5	F5-R5	118
14A2-7+C212	17	15	11	11	10	7.5	F5-R5	118
018A-7+C212	22	20	15	17	15	11	F5-R5	118
022A-7+C212	27	25	18.5	22	20	15	F5-R5	118
026A-7+C212	32	30	22	27	25	18.5	F5-R5	118
035A-7+C212	41	40	30	32	30	22	F5-R5	118
042A-7+C212	52	50	37	41	40	30	F5-R5	118
049A-7+C212	52	50	37	41	40	30	F5-R5	118
061A-7+C212	62	60	45	52	50	37	F5-R6	166
084A-7+C212	77	75	55	62	60	45	F5-R6	166
098A-7+C212	99	100	75	77	75	55	F6-R7	210
119A-7+C212	125	125	90	99	100	75	F6-R7	210

Notes:  
Ratings apply at an ambient temperature of 40°C (104°F) unless otherwise noted.  
To achieve the rated motor power given in the table, the rated current of the drive must be higher than or equal to the rated motor current.

Definitions:  
I<sub>Lo</sub> Continuous rms output current allowing 110% overload for 1 minute every 5 minutes.  
P<sub>Lo</sub> Typical motor power in light-overload use.  
I<sub>Ho</sub> Continuous rms output current allowing 150% overload for 1 minute every 5 minutes.  
P<sub>Ho</sub> Typical motor power in heavy-duty use.

Variant	Plus Code
Back panel and electrical box below the drive with line fuses and power distribution block	C212
Drive output (dV/dt) filter (10 hp max)	E205
Input disconnect switch and handle (replaces power distribution block)	F253
Control power transformer (CPT)	G304
CPT and digital I/O extension; provides 115 VAC digital inputs and outputs. Field wiring required.	G304+L526

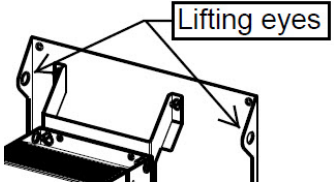
5. Installation

1. Unpacking the unit  
Detach the protective wrapping from the shipping pallet. Remove the unit by unscrewing the four bolts.
2. Mounting:
  - a. See Technical Specifications section for environmental conditions.
  - b. The unit must be installed in an upright position with the back panel against a wall.
  - c. The mounting wall must be vertical, non-flammable and strong enough to hold the weight of the unit. The material below and above the unit should be non-flammable.
  - d. Unit has four (4) mounting holes. (Frame F3 has five (5).) The recommended method is to mount the units on horizontal strut channel. The table below shows mounting dimensions.

Frame	Horizontal distance between holes	Vertical distance between holes**	Overall width	Overall height	Depth without Disconnect Switch	Depth with Disconnect Switch
	(in)	(in)	(in)	(in)	(in)	(in)
F2	11-1/4	29-3/8	12-3/4	30-1/4	10-1/8	12
F3*	12-1/2	29-1/8	14	30	10-1/8	12
F4	12-1/2	32-1/8	14	33	12-3/8	13
F5	18-1/2	43-1/8	20	44	14-1/4	15-3/8
F6	18-1/2	47-3/8	20	48-1/4	17-3/8	18-1/2
F12	14-1/2	50	16	51	12-1/2 to 13-1/2	14-5/8

Recommended hardware: Four (4) bolts, 3/8 in. (10mm) diameter  
\* F3 has 3rd hole at top center  
\*\* Slots at bottom

3. Lifting  
Lift the unit into place. See ratings table for weight. Lifting equipment may be required. Use the back panel lifting eyes which are on units F5 and above. Do NOT use the base drive lifting eyes which are not rated for the additional weight of the back panel.



4. Minimum Clearance
  - a. Above unit: 8 inches (area becomes hot!)
  - b. Below unit: 12 inches
  - c. Left side: 0 inches
  - d. Right side: 2 inches to allow for door swing
  - e. Between units: 2 inches to allow for door swing

5. Additional Clearance
  - a. Air flows from bottom to top. Allow enough free space above and below the drive for cooling air flow, service and maintenance.
  - b. Allow enough free space in front of the drive for operation, service and maintenance.

6. Cable entry and exit connections
  - a. The unit is designed for connection to the top and/or the bottom of the box for both the motor and the line connections\*. Conduit knockouts are provided for this purpose. There are four (4) knocks on the top and four (4) on the bottom.
  - b. Knockout Dimensions:

Frame	Control Cables		Line & Motor Cables	
	Qty	Nominal Size (in)	Qty	Nominal Size (in)
F2	2	1/2	2	3/4
F3	2	1/2	2	3/4
F4	2	1/2	2	3/4
F5	2	1/2	2	1 or 1 1/2
F6	2	1/2	2	1 or 1 1/2

\* **NOTE:** For Frame F6-R6 or F6-R7, top cable entry is suggested.

7. Internal wiring connections

- a. Line: Phases L1, L2, and L3 bolt to the power distribution block or the disconnect switch (if equipped). IMPORTANT: When not equipped with the disconnect switch, the unit must be protected with class J fuses to provide a 100 kA short circuit current rating (SCCR). Fuses to be installed upstream of the unit; supplied by others. See fuse table below.
- b. Motor (no filter): Motor leads bolt to terminals T1U, T2V, and T3W located on the base drive. Remove the base drive cover for easier access using a Torx screwdriver. See ACS880 Quick Guide and Hardware Manual for more information.
- c. Motor (dV/dt filter): Motor leads bolt to terminals A2, B2 and C2 located on the dV/dt filter.
- d. Control: Connect control wires to the colored terminal blocks on the base drive as needed. See ACS880 Quick Guide and Hardware Manual for more information.
- e. Control Power Transformer: If equipped, the secondary of the control power transformer will be wired to the white 10-position terminal block. Terminals 1 & 2: L1 (hot); Terminals 3 & 4: L2 (neutral)
- f. Digital I/O Extension, FDIO-01: See the FDIO-01 user manual (3AUA0000124966).

- 8. Prior to power up
  - a. IMPORTANT: Prior to power up, carefully review the ACS880 Quick Guide and the ACS880 Hardware Manual.

6. Wire Size and Tightening Torque

- 1. The list below shows the minimum and maximum wire size each terminal is designed to hold.
- 2. For cable size recommendations, see ACS880-01 Hardware Manual, chapter: Planning the Electrical Installation, Section: Selecting the Power Cables.

Frame Size	Rating @ 480 V (HP)	Power Distribution Block (L1, L2, L3)		Disconnect Switch (L1, L2, L3)		Motor Terminals (T1/U, T2/V, T3/W)	
		Wire Size allowed (ga)	Torque (in-lb)	Wire Size allowed (ga)	Torque	Wire Size allowed (ga)	Torque
F2-R1	1 - 7.5	14 to 2	40 in-lb	18 to 8	7 in-lb	18 to 10*	5 in-lb
F2-R2	10	14 to 2	40 in-lb	18 to 8	7 in-lb	18 to 10**	5 in-lb
F3-R2	15	14 to 2	40 in-lb	18 to 8	7 in-lb	18 to 10	5 in-lb
F3-R3	20 - 25	14 to 2	40 in-lb	14 to 4	18 in-lb	20 to 6	15 in-lb
F4-R4	30 - 40	14 to 2	40 in-lb	14 to 4	18 in-lb	20 to 2	28 in-lb
F5-R5	50 - 60	14 to 2	40 in-lb	M8 x 25 bolt	11 ft-lb	6 to 1/0	11 ft-lb
F5-R6	75	14 to 2/0	10 ft-lb	M8 x 25 bolt	11 ft-lb	4 to 300 MCM	22 ft-lb
F6-R6	100	14 to 2/0	10 ft-lb	4 to 300MCM	23 ft-lb	4 to 300 MCM	22 ft-lb
F6-R7	125 - 150	4 to 500 MCM	31 ft-lb	4 to 300MCM	23 ft-lb	3/0 to 400 MCM	29 ft-lb
F6-R7	100 - 125 @ 575V	4 to 500 MCM	31 ft-lb	4 to 300MCM	23 ft-lb	4 to 300 MCM	22 ft-lb
F12-R1	1 - 7.5	14 to 2	14-10: 35 in-lb 8:	14 to 4	35 in-lb	14 to 2	14-10: 35 in-lb 8:
F12-R2	10 - 15		40 in-lb	14 to 4	35 in-lb		40 in-lb
F12-R3	20 - 25		6-4: 45 in-lb	8 to 1/0	55 in-lb		6-4: 45 in-lb
F12-R4	30 - 40		2: 50 in-lb				2: 50 in-lb

\* with filter, 14 - 12 ga, 10 in-lb  
\*\* with filter 12 - 4 ga, 20 in-lb

Control		
10-position terminal block	22 - 10 ga	4.5 in-lb
base drive terminal blocks	24 - 12 ga	5.3 in-lb

Frame Size	Rating @ 480 V	Panel Ground Terminal		DB Resistor (R-, R+)	
		Wire Size (ga)	Torque	Wire Size	Torque
F2-R1	1 - 7.5 HP	14 to 2	35 - 50 in-lb	18 to 10	5 in-lb
F2-R2	10 HP	14 to 2	35 - 50 in-lb	18 to 10	5 in-lb
F3-R2	15 HP	14 to 2	35 - 50 in-lb	18 to 10	5 in-lb
F3-R3	20 - 25 HP	14 to 2	35 - 50 in-lb	20 to 6	15 in-lb
F4-R4	30 - 40 HP	14 to 2	35 - 50 in-lb	20 to 2	28 in-lb
F5-R5	50 - 60 HP	14 to 2	35 - 50 in-lb	6 to 1/0	11 ft-lb
F5-R6	75 HP	14 to 2	35 - 50 in-lb	4 to 3/0	14 ft-lb
F6-R6	100 HP	14 to 2	35 - 50 in-lb	4 to 3/0	14 ft-lb
F6-R7	125 - 150 HP	14 to 2	35 - 50 in-lb	4 to 300 MCM	22 ft-lb
F6-R7	100 - 125 HP @ 575V	14 to 2	35 - 50 in-lb	4 to 300 MCM	22 ft-lb
F12-R1	1 - 7.5 HP	8 to 14	40 in-lb	18 to 10	5 in-lb
F12-R2	10 - 15 HP	8 to 14	40 in-lb	18 to 10	5 in-lb
F12-R3	20 - 25 HP	8 to 14	40 in-lb	20 to 6	15 in-lb
F12-R4	30 - 40 HP	8 to 14	40 in-lb	20 to 2	28 in-lb

7. Control Power Transformer (G304)

- 1. Optional control power transformer ratings
  - a. Input voltage: 208\*, 230, 480, 575 Vac 1ph.  
\*for 208V, convert a 240V unit by changing the wiring to the transformer primary as indicated below.
  - b. Output voltage: 115 Vac
  - c. Rated power: 100 VA
  - d. Available power: 100 VA (drive control power is not fed from this device)
  - e. Heat dissipation: 21 Watts
- 2. Primary wiring connections: 230V and 480V units using Micron B100MBT13RK
  - a. 480 Volt: H1 and H4
  - b. 230 Volt: H2 and H4
  - c. 208 Volt: H3 and H4
- 3. Primary wiring connections: 575V units using Micron B150WZ13RKF
  - a. 575 Volt: H1 and H4

8. Drive Output (dV/dt) Filter (E205) - UL Type 1 only

- 1. Optional output (dV/dt) filter heat dissipation

Type Code	Rating at 480 V (HP)	Filter Loss (Watts)	Replacement Part
ACS880-01-02A1-5+C212	1	75	TCI - V1K3A00
ACS880-01-03A0-5+C212	1.5	75	TCI - V1K3A00
ACS880-01-03A4-5+C212	2	75	TCI - V1K4A00
ACS880-01-04A8-5+C212	3	80	TCI - V1K6A00
ACS880-01-07A6-5+C212	5	95	TCI - V1K12A00
ACS880-01-11A0-5+C212	7.5	95	TCI - V1K12A00
ACS880-01-014A-5+C212	10	95	TCI - V1K16A00
- 2. External output (dV/dt) filter: Below are recommendations for a filter located outside the extension box. Filters shown are for 480V motors. 230V motors typically do not require filters. Filters are not readily available for 575V motors.

Type Code	Rating at 480 V (HP)	Recommended Filter
ACS880-01-021A-5+C212	15	TCI - V1K21A01
ACS880-01-027A-5+C212	20	TCI - V1K27A01
ACS880-01-034A-5+C212	25	TCI - V1K35A01
ACS880-01-040A-5+C212	30	TCI - V1K45A01
ACS880-01-052A-5+C212	40	TCI - V1K55A01
ACS880-01-065A-5+C212	50	TCI - V1K80A01
ACS880-01-077A-5+C212	60	TCI - V1K80A01
ACS880-01-096A-5+C212	75	TCI - V1K110A01
ACS880-01-124A-5+C212	100	TCI - V1K130A01
ACS880-01-156A-5+C212	125	TCI - V1K160A01
ACS880-01-180A-5+C212	150	TCI - V1K200A01



9. Technical Specifications

- 1. In addition to the following, see ACS880-01 Hardware Manual, chapter: Technical Specifications.
  - a. Environment: -15 to 40°C (5 to 104°F). -15 to 55°C (5 to 131°F) w/ derate. No frost allowed.
  - b. Cooling, UL Type 1 (IP21): 3 - 10 HP: forced air via VFD; 15 HP and above: non-ventilated
  - c. Input voltage range – standard: 208-240 V; 380-500 V; 525-690 V
  - d. Input voltage range – with optional control power transformer (G304): 208 V, 240 V; 480 V; 575 V
  - e. Short circuit rating (UL 508c) – standard: 100,000 rms symmetrical Amperes up to 600 V when protected by class J fuses. Fuses to be installed upstream of the supplied drive; supplied by others.
  - f. Short circuit rating (UL 508c) – with optional input disconnect (F253): 100,000 rms symmetrical amperes up to 600 V
  - g. Frequency – standard: 0 - 500 Hz
  - h. Frequency – with optional dV/dt filter (E205): 0 - 60 Hz
  - i. Approvals – The ACS880 Extension Box is cULus Listed per UL508A

10. Fuses

- 1. Control power transformer
  - a. Primary: (2) FNQR-1-½
  - b. Secondary: (1) FNM-2

2. Drive input fuses and overload protection fuses

ACS880 Extension Box Drive Rating ACS880-01...			Maximum Overcurrent Protection Fuse (Amps) <sup>1</sup>	Internal Line Fuses <sup>2</sup>
230 V	480 V	575 V	UL Class J	UL Class T
	02A1-5		200	JJS-3
	03A0-5		200	JJS-6
	03A4-5		200	JJS-6
	04A8-5		200	JJS-10
	05A2-5		200	JJS-10
04A6-2	07A6-5		200	JJS-15
06A6-2			200	JJS-15
07A5-2		07A3-7	200	JJS-15
10A6-2	11A0-5	09A8-7	200	JJS-20
16A8-2	014A-5		200	JJS-25
		14A2-7	200	JJS-30
	021A-5		200	JJS-35
24A3-2	027A-5	018A-7	200	JJS-40
031A-2	034A-5	022A-7	200	JJS-50
		026A-7	200	JJS-50
	040A-5	035A-7	200	JJS-60
046A-2	052A-5	042A-7	200	JJS-80
		049A-7	200	JJS-80
	065A-5		200	JJS-90
061A-2			200	JJS-100
	077A-5	061A-7	200	JJS-110
075A-2			200	JJS-125
087A-2			200	JJS-125
115A-2	096A-5	084A-7	200	JJS-150
		098A-7	200	JJS-150
145A-2	124A-5	119A-7	200	JJS-200
	156A-5		600	JJS-225
170A-2			600	JJS-250
	180A-5		600	JJS-300

1. Only needed when disconnect switch option is omitted, the table shows the maximum Amperage rating of branch circuit fuses to be installed upstream of the supplied drive. Required to maintain 100 kA SCCR. Fuses supplied and installed by others.  
2. Line fuses are included inside the Extension Box

11. Main Cooling Fan Replacement

- 1. R1 to R5: The main cooling fan is located on the top of the base drive. Removal and replacement can be done without removing the base drive from the back panel. Follow the instructions in the ACS880-01 Hardware Manual, chapter: Fans.
- 2. R6 & R7: The main cooling fan is located on the bottom of the base drive.
  - a. Disconnect the drive from the power line. Lock the main disconnecting device and ensure by measuring that there is no voltage.
  - b. Method 1: Remove the fan mounting screws (2) with a screwdriver by reaching behind the extension box from below.
  - c. Method 2: After disconnecting the wires, remove the base drive from the back panel by removing only the two mounting nuts at the top. (Nuts at the bottom should not be removed.) Use the lifting eyes on the base drive to remove and lift the unit to gain access to the cooling fan at the bottom. To remount the base drive, slide the slots at the bottom over the two lower studs and drop the base drive onto the top two studs. Reattach the two nuts. Reconnect the wires.
  - d. For fan replacement, follow the instructions in the ACS880-01 Hardware Manual, chapter: Fans.

12. Drive Removal Procedure

Use the same procedure as Method 2 above to remove the base drive for all of the frames.