

ABB wind turbine converters

Supplement to hardware manual ACS800-67 upgrade kits



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List of related manuals

ACS800-67 manuals

Code (English)

<i>ACS800-67 wind turbine converters for asynchronous slip ring generators hardware manual</i>	3AFE68392454
<i>ACS800-67 wind turbine converters system description and start-up guide</i>	3AUA0000095094
<i>ACS800-67 upgrade wind turbine converters supplement</i>	3AXD50000131303
<i>ACS800-67 upgrade kits supplement to hardware manual</i>	3AXD50000226726

Firmware manuals and guides

<i>ACS800 IGBT supply control program firmware manual</i>	3AFE68315735
<i>ACS800 grid-side control program firmware manual</i>	3AUA0000075077
<i>ACS800-67(LC) doubly-fed induction generator control program firmware manual</i>	3AUA0000071689

Option manuals and guides

Manuals and quick guides for I/O extension modules, fieldbus adapter, etc.

For manuals, contact your local ABB representative.

Supplement to hardware manual

ACS800-67 upgrade kits

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3. Installation



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About this manual

Contents of this chapter

This chapter describes the intended audience, purpose and contents of the manual.

Safety instructions

For the safety instructions, see *ACS800-67 wind turbine converters for asynchronous slip-ring generators hardware manual* (3AFE68392454 [English]). Obey the safety instructions when installing, operating and maintaining the wind turbine converter. If ignored, physical injury or death may follow, or damage may occur to the converter, the generator or driven equipment. Read the safety instructions before you work on the converter cabinet.

Target audience

This manual is intended for people who install and service the converter. Read the manual before working on the converter. You are expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols.

Contents of this manual

The chapters of this manual are briefly described below.

[About this manual](#) introduces this manual.

[Hardware description](#) describes the cabinet layout and shows the positions where the upgrade kits are installed.

[Installation](#) points out the order of installation and describes where to find the detailed installation instructions for each kit.

Maintenance describes the maintenance procedures insofar as they differ from the maintenance without the upgrade kits.

Technical data includes the power consumption of the upgrade kit components. There are no changes in technical ratings of the converter.

Applicability and scope

This supplement contains additional information for the *ACS800-67 hardware manual* (3AFE68392454 [English]). The supplement covers the following upgrade kits:

- ACS800-67 Remote connection kit
- ACS800-67 3G Modem kit
- ACS800-67 ISU APBU kit
- ACS800-67 Crowbar kit
- ACS800-67 NAMU kit
- ACS800-67 Fuses kit
- ACS800-67 ISU contactor AF305 kit
- ACS800-67 Crowbar ACBU-A2 heating system kit
- ACS800-67 ACU extra heater kit

In addition to this supplement, there is a separate installation instructions document for each kit.

Terms and abbreviations

AMC	Application and Motor Controller Board. Part of the NDCU Drive Control Unit See NDCU and NAMC
APBU	PPCS branching unit. Used with parallel connected converters.
DDCS	Distributed Drives Communication System. Communication protocol used with fibre optic link.
IGBT	Insulated Gate Bipolar Transistor. A voltage controlled semiconductor type widely used in converters due to their easy controllability and high switching frequency.
INU	Inverter Supply Unit, i.e. rotor-side converter
ISU	IGBT Supply Unit, i.e. grid-side converter
NAMU-01C	Auxiliary measuring unit. Performs voltage and current measurement
NDBU	DDCS Branching Unit
NDCU	Drive Control Unit. Consists of a NAMC board and NIOC board built into a metal housing. NDCU-33 unit controls the rotor-side converter
NETA-21	Ethernet Adapter Module
NEXA-21	Extension module for NETA-21, allows drive to be connected to NETA-21 through fiber optic channel
NIOC	Input/Output Board. Part of the NDCU Drive Control unit
NTAC-02	Pulse Encoder Interface Module
NUIM-62C	Voltage and Current Measurement Unit
RDCO	DDCS Communication Option with optic fibre channels
RDCU	Drive Control Unit which contains an RMIO (Motor Control and I/O) board. An RDCU unit controls the grid-side converter.
RMIO	Motor Control and I/O Board. Part of the RDCU Drive Control Unit
Stress Check	ABB Stress Check service surveys and analyzes the impact of stress from the environment on the converter, thus giving maintenance recommendations and valuable operational advice.

2

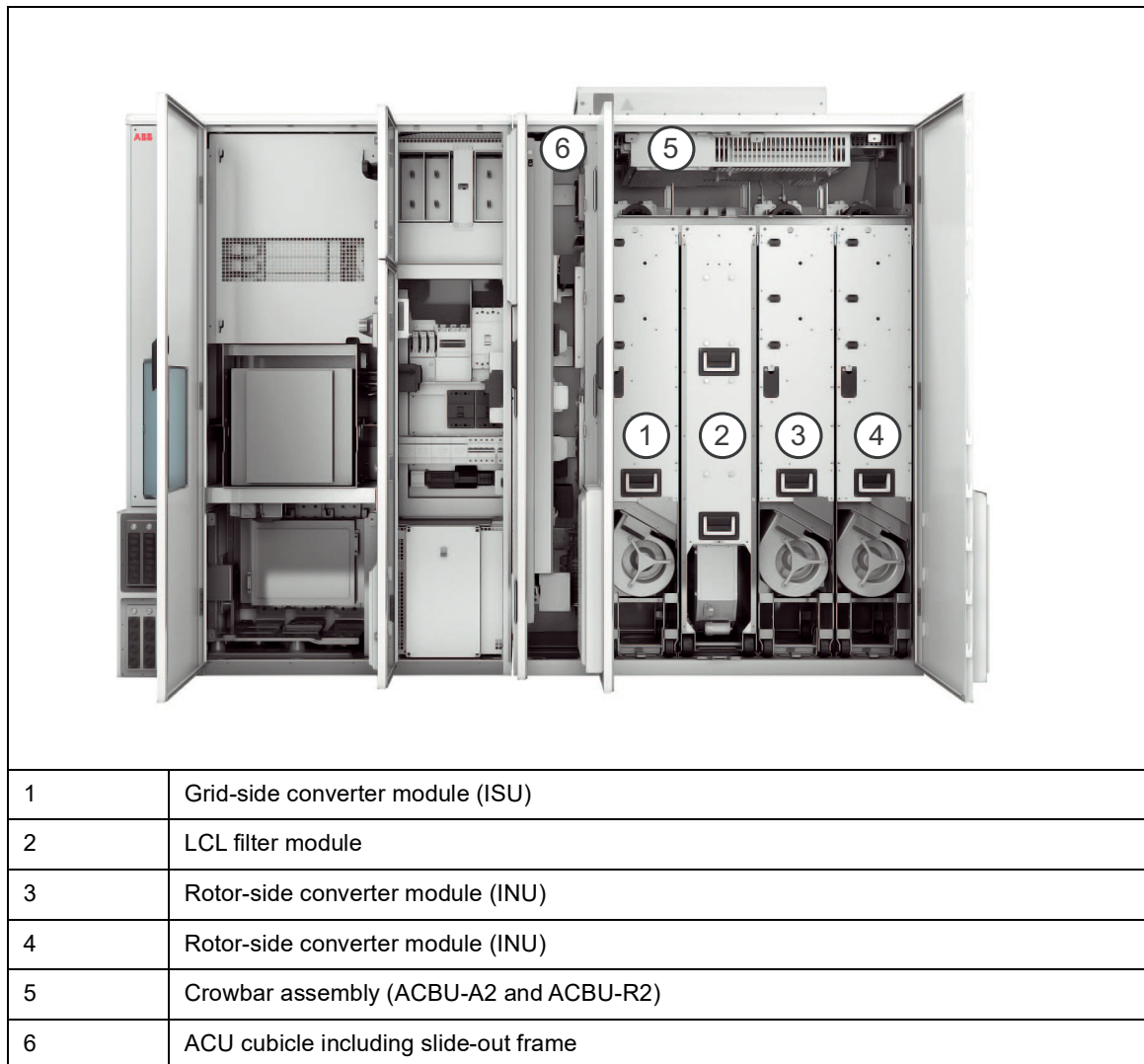
Hardware description

Contents of this chapter

This chapter describes the cabinet layout and the purpose of the upgrade kits.

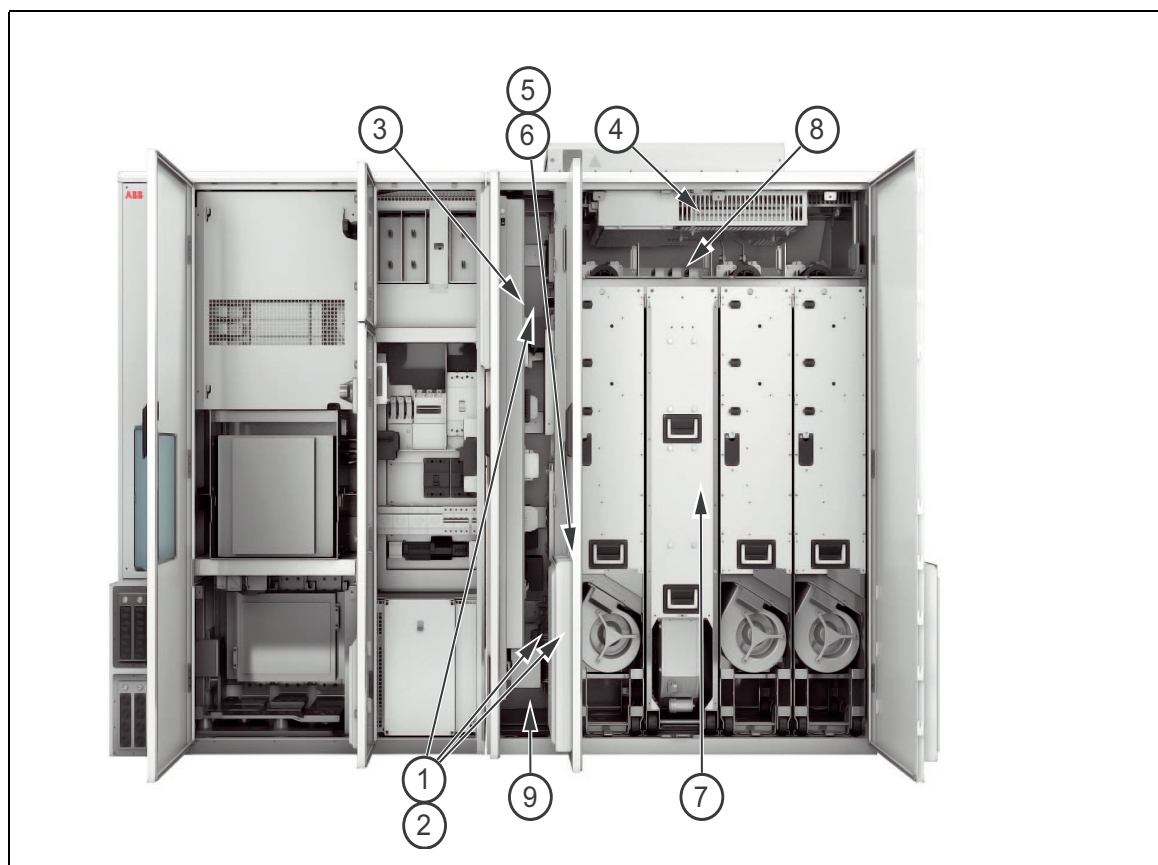
Cabinet layout

An example layout of the converter is presented in the following figure.



Upgrade kits

The following figure shows the installation position of the kits in the cabinet.



No	Name	Description
1	ACS800-67 Remote connection kit	The kit enables constant monitoring and analysis of the performance of the converter. With the new NETA-21 ethernet adapter module robust local data storage is possible.
2	ACS800-67 3G Modem kit	The kit provides remote mobile connection when a wired local internet connection is not available.
3	ACS800-67 ISU APBU kit	Extra datalogger unit APBU gathers high-frequency data for any fault in the grid-side converters for precise fault tracing.
4	ACS800-67 Crowbar kit	The new Active crowbar unit (ACBU-A2) has a fully-enclosed design that accommodates the latest revisions of IGBT and PCBA technology. The crowbar uses cutting edge self-protection, which enhances its durability and performance against various grid-transient behaviors, thus significantly increasing system availability. The kit also includes crowbar resistor ACBU-R2.
5	ACS800-67 NAMU kit	NAMU-01C board measures the grid phase voltages accurately improving the performance related to grid voltage monitoring.
6	ACS800-67 Fuses kit	Fuses kit includes NAMU-01C and NUIM-62C voltage measurement boards' protection fuses. If a power cabinet G8x is included in the installation, the fuses are installed in it to replace the protection contactors FG001 and FG003. If no power cabinet exists, it is possible to include the protection fuses on NAMU and NDBU installation plate, opposite to slide-out frame. The protection fuses are normally installed during the same installation as the NAMU units.

7	ACS800-67 ISU contactor AF305 kit	A new, fully-compatible and redesigned version of contactor, AF305. The kit includes new busbars.
8	ACS800-67 Crowbar ACBU-A2 heating system kit	A heating resistor kit for new Active crowbar unit, installed above LCL filter module.
9	ACS800-67 ACU extra heater kit	Auxiliary control unit extra heater is required for heating of NETA-21, 3G Modem, NAMU-01C and NDBU-95 units in cold conditions. These units have been typically installed in ACS800-67 upgrade package.

Other upgrades

■ Optional kits

Brake chopper ABRU-25 & resistor (68958661)

Slide-out frame fixing kit (3AXD50000043604)

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Installation



Contents of this chapter

This chapter describes the order of installation and describes where to find the detailed installation instructions for each kit.

Safety instructions



WARNING! Only qualified electrical professionals are allowed to carry out the work described in this document.



WARNING! Before you start installing make sure by disconnecting that no voltage cannot be connected to the converter from any power source, ie:

- from the power grid
- from the generator (rotor or stator)
- from an external auxiliary power supply.

Lock and tack the disconnecting devices. If there is no disconnecting device between the rotor and the wind turbine converter, lock the rotor reliably.

After switching off the power, wait for at least 5 minutes so that the voltage of the intermediate circuit capacitors gets lower than the safety level. Confirm that the DC-voltage is less than 5 V with a multimeter. Ignoring the safety instructions can cause injury or even death.

Installation process with stress check period

This section describes the installation order for the kits. For the actual installation instructions for each kit, see the appropriate installation instructions, see section [Installation instructions](#)

1. Install Remote connection kit, 3G Modem kit and ISU APBU kit are first to enable stress check period, before installing the other upgrades.
2. After the stress check period, continue the installation by uninstalling and removing first all three R8i power modules and LCL filter module.
3. Uninstall the old crowbar and install the new Crowbar Kit.
4. Uninstall the ISU contactor (placed behind LCL filter module) and its busbars. Install the new ISU Contactor AF305 Kit.
5. Install the new R8i modules and new LCL filter module.
6. Install the Crowbar ACBU-A2 Heating System Kit.
7. Install the NAMU 1 Kit and Fuses Kit.
8. Load in the new INU and ISU firmware packages and update the parameters.



Installation process when all installations are done simultaneously (no stress check period)

This section describes the installation order for the kits. For the actual installation instructions for each kit, see the appropriate installation instructions, see section [Installation instructions](#)

1. Install upgrades into ACU field: Install Remote connection kit, 3G Modem kit and ISU APBU kit. Install the NAMU 1 kit and Fuses kit.
 2. Continue the installation by uninstalling and removing all three R8i power modules and LCL filter module.
 3. Uninstall the old crowbar and install the new Crowbar kit.
 4. Uninstall the ISU contactor (placed behind LCL filter module) and its busbars.
 5. Install the new ISU Contactor AF305 kit.
 6. Install the new R8i modules and new LCL filter module.
 7. Install the Crowbar ACBU-A2 heating system kit.
 8. Load in the new INU and ISU firmware packages and update the parameters.
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Installation instructions

The detailed instructions for installing the kits are presented in the following documents:

ACS800-67 Remote connection kit installation instruction
ACS800-67 3G Modem kit installation instruction
ACS800-67 ISU APBU kit installation instruction
ACS800-67 Crowbar kit installation instruction
ACS800-67 NAMU kit installation instruction
ACS800-67 Fuses kit installation instruction
ACS800-67 ISU Contactor AF305 kit installation instruction
ACS800-67 Crowbar ACBU-A2 heating system kit installation instruction
ACS800-67 ACU extra heater kit installation instruction





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Maintenance

Contents of this chapter

This chapter contains the updated preventive maintenance instructions for ACS800 wind turbine converters that have the upgrade kits installed. For the complete maintenance instructions, see *ACS800-67 Wind turbine converters for asynchronous slip ring generators hardware manual* (3AFE68392454 [English]).

Safety instructions



WARNING! Only qualified electrical professionals are allowed to carry out the work described in this document.



WARNING! Before you start installing make sure by disconnecting that no voltage cannot be connected to the converter from any power source, ie:

- from the power grid
- from the generator (rotor or stator)
- from an external auxiliary power supply.

Lock and tack the disconnecting devices. If there is no disconnecting device between the rotor and the wind turbine converter, lock the rotor reliably.

After switching off the power, wait for at least 5 minutes so that the voltage of the intermediate circuit capacitors gets lower than the safety level. At the same time, confirm that the DC-voltage is less than 5 V with a multimeter. Ignoring the safety instructions can cause injury or even death.

Air circuit breaker (maintenance according to manufacturer instructions)	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Fiber optic cables (connections)			I			I			I			I			I			I			I
Dustiness, corrosion and temperature	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Improvements																					
Based on product notes	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Measurements																					
Basic measurements with supply voltage	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Quality of supply voltage	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Spare Parts																					
Spare Parts	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I

3AXD10000613694

1) Depending on actual load and ambient conditions, up to 9 years can be reached with long-life inverter module fans.

2) If filter is not replaced, the filter shall be inspected after 3 years from the last inspection.

Maintenance instructions

■ Active crowbar A2 and/or crowbar resistor replacement

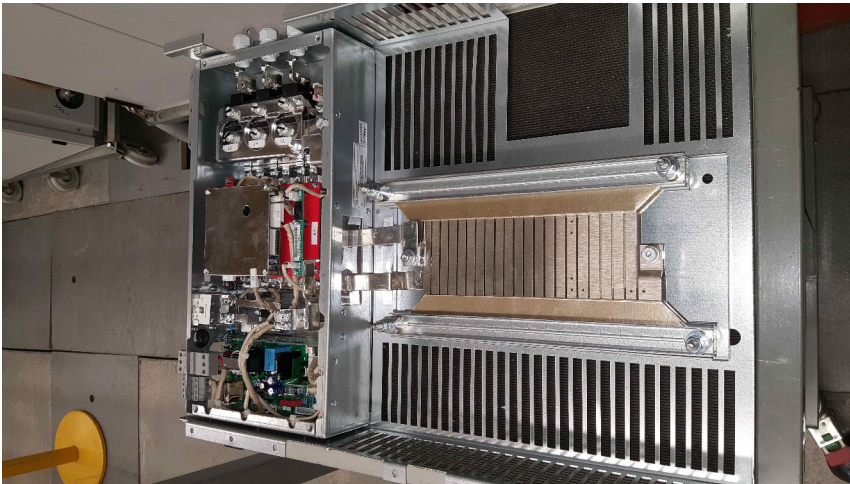
Note: Make sure that the crowbar resistor has cooled down before maintenance.

This replacement instruction is applicable when upgrade kits for crowbar ACBU-A2 and resistor ACBU-R2 kit have been installed.

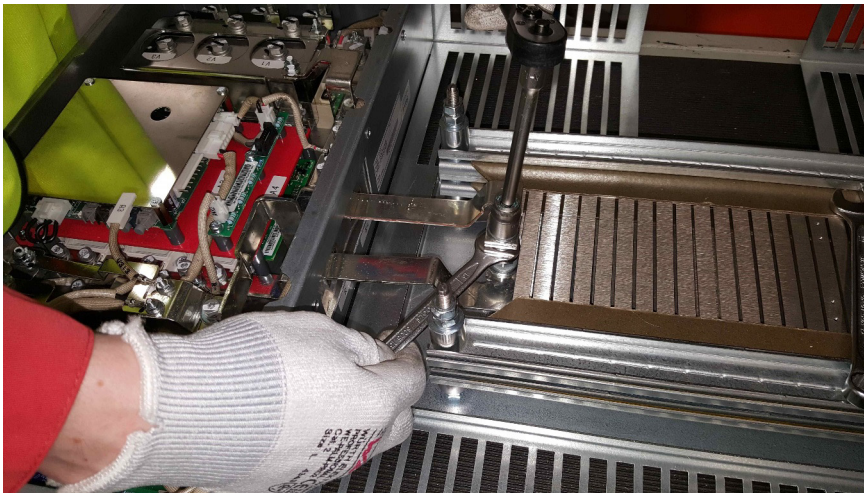
Note before you start the replacement work:

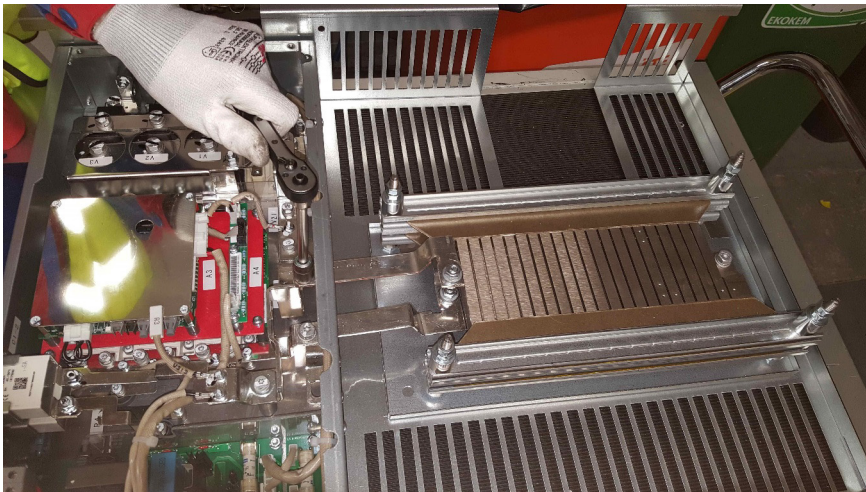
- The assembly weighs 15 kg. Be careful not to drop it.
 - - To avoid scratches or other damage inside the cabinet, we recommend that you use a suitable protective/support board (eg, piece of plywood) on the busbars below the assembly to be removed.
 - - You need a sturdy working base, and proper reach to the assembly. We recommend that you use bench ladders.
1. Detach the crowbar assembly from the cabinet.
 - i. Unfasten crowbar screws on the front side
 - ii. Unfasten screw on left side
 - iii. Unfasten screw on right side
 - iv. Lower the crowbar assembly on the protective board on the busbars above inverter modules

3. Uninstall the crowbar heat shielding plate (3AXD50000104062). Unfasten screws and remove the heat shielding plate by pulling it out from the locking mechanism.
4. Uninstall the DC measurement cables and overtemperature protection wires from terminals in the crowbar assembly.
5. Open the crowbar cover by unfastening four flathead screws. Use short ratchet wrench with a flathead screw bit. Remove the crowbar cover from cabinet.
6. When the crowbar cover is removed, uninstall the optical cable inside the crowbar.
7. Uninstall the 3-phase rotor cable wires from crowbar connectors.
8. Lift the crowbar assembly out from the cabinet and place it onto a stable surface.



9. Disconnect the busbars (3AXD50000103942 and 3AXD50000103959) from the resistor.





10. Depending on the situation, uninstall and replace with a new unit: either crowbar unit, crowbar resistor, or both. The photo below shows how to detach the crowbar resistor assembly from the base plate.





■ Installing the crowbar assembly back to cabinet

See Instruction for the crowbar ACBU-A2 and resistor ACBU-R2 kit installation for ACS800-67 wind turbine converter.

1. Prepare the crowbar ACBU-A2 and resistor ACBU-R2. Install the resistor shielding plate (3AXD50000104079) with screws on resistor.
2. Lift base plate (3AXD50000103805) on the new crowbar and attach it with screws. Turn the entity around and open the crowbar cover by unscrewing the four flathead screws.
3. Install the crowbar resistor assembly on base plate.
4. Lift the crowbar assembly on the busbars above inverter modules. A separate support board can be used under the assembly to avoid scratches. Use bench ladder to make the installation easier.
5. Connect the 3-phase rotor cable wires on crowbar connectors.
6. Connect the optical cable inside crowbar.
7. Screw the crowbar cover back to its original place with four flathead screws. Use short ratchet wrench with a flathead screw bit.
8. Connect the DC measurement cables and overtemperature protection wires on terminals.
9. Install the crowbar heat shielding plate (3AXD50000104062). Use the locking mechanisms and two front screws.
10. Attach the new crowbar assembly to converter cabinet.
11. Check the installation after assembling: After finishing the connections check with a multimeter that all electrical connections are correct and that fiber optic cable connections are as described.

The following table describes fiber optic connections.

Function	Designation		Designation		Remarks
DDCS comms	Device	Con.	Device	Con.	
	ACBU-A2	A3: V1 TxD	AMC-33C	A719	
		A3: V1 RxD		A720	

The following table describes control wirings and DC voltage measurement wirings.

Function	Designation		Designation		Remarks
	Device	Con.	Device	Con.	
DC voltage measurement	ACBU-A2	X11-	DC	DMC:2	
		X11+		DCP:2	
Crowbar active		X1:1	NIOC-01	-X22:7	
		X1:2		-X22:5	
Main CB fast OFF		X2:4	-K3	31	*)
		X2:6		32	*)
Crowbar temperature		X12:1	-F12	11	
		X12:2	-K6	11	

*) In ACS800-67-0480/0770-7 the crowbar X2:4 is connected instead of -K3:31 to -K5:21 and crowbar X2:6 instead of -K3:32 to -K21:11.

The following table describes 3-phase wiring to inverter modules.

Function	Designation		Designation		Remarks
	Device	Con.	Device	Con.	
3-phase connection	ACBU-A2	U2	INU	U2	
		V2		V2	
		W2		W2	

■ NDBU and NAMU plate replacement

Follow the instructions given in Instruction for the NAMU kits installation for ACS800-67 wind turbine converter.

1. Unmount auxiliary supply filter (-z3), ACU cabinet fan (-E11) and temporized relay (-k3.1) in order to make room to install the support plate installation.
2. Unscrew the NAMU/NDBU plate fixing screws. Use ratchet wrench set with extensions and sockets for rear screw.
3. Remove the NAMU/NDBU plate from the cabinet.
4. Replace NAMU-01C or NDBU-95C on installation plate DIN rail. Do the jumper settings according to the table below.

Terminal	Jumper
X8	1-2
X11	1-2, 3-4
X12	1-2, 3-4
X13	1-2, 3-4
X14	1-2, 3-4
X15	1-2
X21	1-2, 3-4, 5-6, 7-8, 9-10

Terminal	Jumper
X22	1-2, 3-4, 5-6, 7-8, 9-10
X23	1-2, 3-4, 5-6, 7-8, 9-10
X24	1-2, 3-4, 5-6, 7-8, 9-10
X31	3-4
X32	3-4
X33	3-4
X34	3-4
S1	0
S2	0

5. Make the cable connections according to the tables below. Route all the wires through the cable ducts.

Function	Designation		Designation	
DDCS comms	Device	Con.	Device	Con.
	NAMU	V11 TxD	RDCO	CH2 RxD
		V12 RxD		CH2 TxD

Function	Designation		Designation	
	Device	Con.	Device	Con.
Supply	U10, 24 V DC	+	NAMU	X6.1
	U10, 0 V DC	-	NAMU	X6.2
	PE	PE	NAMU	X6.3

Function	Designation		Designation	
	Device	Con.	Device	Con.
Supply	-1X2	3	NAMU	X1.7
	-1X2	2	NAMU	X1.5
	-1X2	1	NAMU	X1.3
	TE	TE		X1.1

6. Install the NAMU/NDBU plate in the opposite order than it was uninstalled: Move the plate inside the cabinet, attach it with the screws and mount auxiliary supply filter (-z3), ACU cabinet fan (-E11) and temporized relay (-k3.1) back to their original positions.

■ Replacing ISU contactor

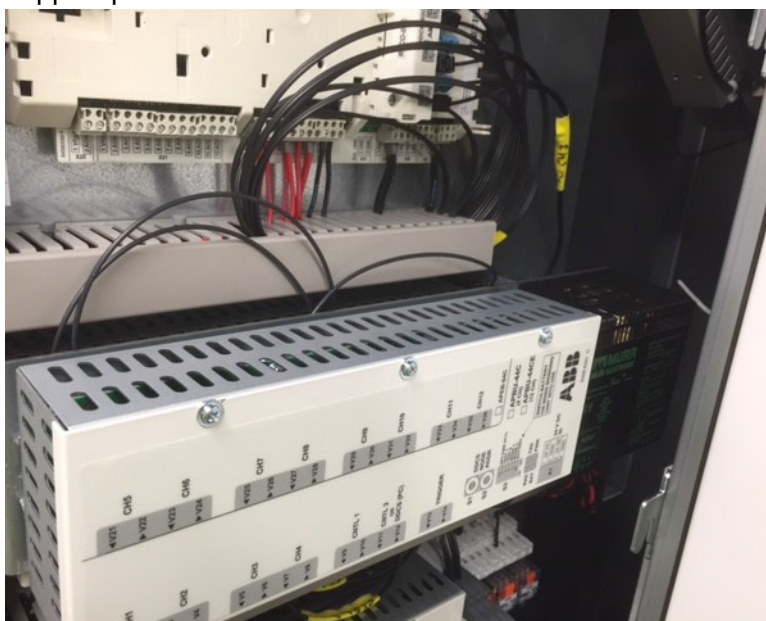
See ACS800-67 ISU contactor AF305 kit installation instruction for additional information.

1. Remove first the LCL filter module. The ISU contactor AF305 is behind it.
2. Uninstall four measurement wires, 2 above and 2 under the contactor to allow moving of the busbars.
3. To remove the upper busbars uninstall first the insulation plate. Use special ring spanner or corresponding tool for the nut behind busbar. Remove all three busbars.
4. Remove also the busbar bolts for the three busbars under the contactor and remove the contactor.
5. Install the new contactor, then remount the upper busbars, measurement wires and insulation plate. Use the correct torque 28 Nm, when tightening the contactor bolts.
6. After installation measure the connections with a multimeter.
7. Reinstall the LCL filter module.

■ Replacing APBU boards

APBU boards are installed on slide-out frame. APBU unit for INU is installed on DIN rail located directly on slide-out frame. When Remote connection kit is installed, also ISU APBU kit can be installed on a support plate (3AXD50000104222) on top of INU APBU unit.

ISU APBU unit and power supply on support plate. INU APBU unit is located behind the support plate.



The support plate without ISU APBU unit.



INU APBU when the support plate is removed.



■ Replacing ISU APBU unit

1. ISU APBU unit can be unmounted easily by detaching cables and taking the unit out from the DIN rail.
 2. Before installing new ISU APBU unit, set the node address to 41 with S1 and S2 switches.
 3. Install the APBU on the DIN rail on the support plate (3AXD50000104222).
 4. Connect cables according to following tables.
-

Function	Designation		Designation	
	Device	Con.	Device	Con.
Supply	-X500+24 V DC	+	ISU APBU	X1.1
	-X500 0 V DC	-	ISU APBU	X1.2

Function	Designation		Designation	
	Device	Con.	Device	Con.
DDCS comms	ISU APBU	DDCS TXT	NDBU	CH3
		DDCS RXD		CH3
		CNTL RXD	RDCU	TXD
		CNTL TXD		RXD
		TRIG OUT	INU APBU	TRIG IN
		TRIG IN		TRIG OUT
		CH1TXD	ISU 1 (R8i module)	A42:V2
		CH1 RXD		A42:V1

5. After commissioning, set S3 DIP switch 6: Battery to position ON.

Note:

Do not set S3 DIP switch to ON before commissioning. Check that ISU parameter 112.16 PBU board type = APBU.

■ Replacing INU APBU unit

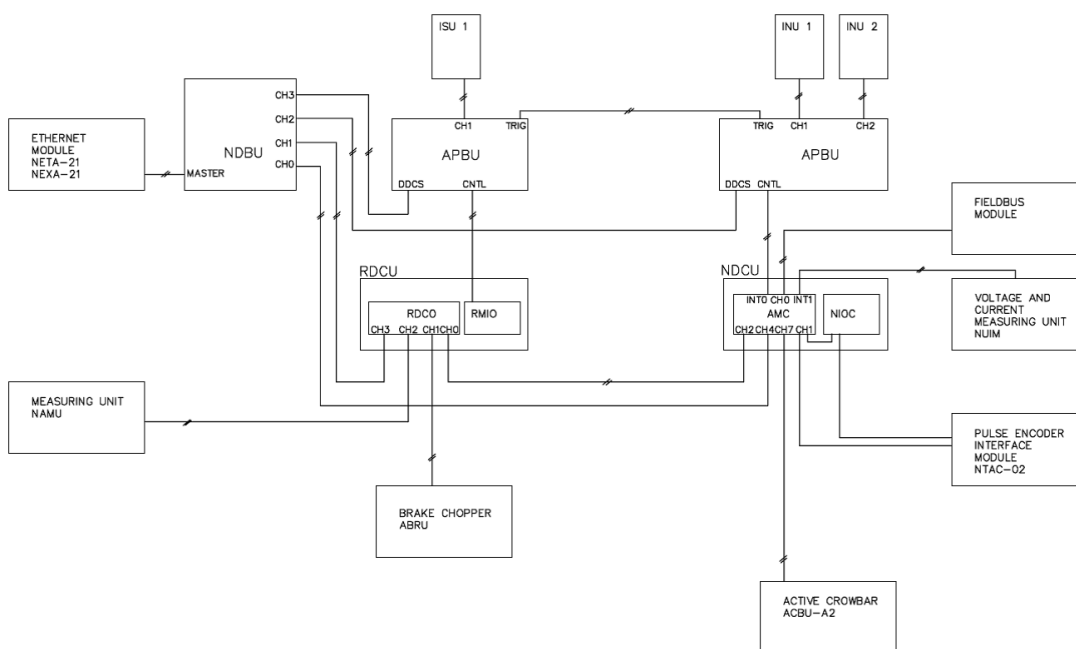
INU APBU unit is located behind ISU APBU unit and the support plate (3AXD50000104222). ISU APBU unit and power supply (64209426) can be detached first from DIN rail.

1. Support plate needs to be removed first in order to get access to INU APBU. Detach M6 self-tapping screws (5 pcs) and take out the support plate.

2. INU APBU unit is mounted on DIN rail. Replace the unit. Fiber optic connections of INU APBU unit are presented in the table below.

Function	Designation		Designation	
	Device	Con.	Device	Con.
DDCS comms	ISU APBU	DDCS TXT	NDBU	CH2
		DDCS RXD		CH2
		CNTL RXD	RDCU	TXD
		CNTL TXD		RXD
		TRIG OUT	ISU APBU	TRIG IN
		TRIG IN		TRIG OUT
		CH1TXD	INU 1	A42:V2
		CH1 RXD		A42:V1
		CH2TXD	INU 2	A42:V2
		CH2 RXD		A42:V1

The following figure describes the fiber optic connection diagram.



3. Reinstall the support plate (3AXD50000104222) with five M6 self-tapping screws.
4. Mount ISU APBU unit and power supply back on the support plate.

■ Replacing batteries

Replace NETA-21 battery every 5 years. Refer to NETA-21 manual (3AUA0000096939 Rev E).

■ Replacing NAMU-01C and NUIM-62C protection fuses

NAMU and NUIM protection fuses are placed in power cabinet. Refer to ACS800-67 Fuses kit installation instruction.

Remark: For ACS800-67-0480/0770-7 the protection fuses are in ACU field on the same support plate as NDBU and NAMU, opposite to the slide-out frame.

Type	ABB MRP	In	Un	Qty
A070GRB2T13, Z330003	68379270	2 A	700 V	6

■ Crowbar heating

For replacement of the crowbar heating kit parts, please refer to ACS800-67 Crowbar ACBU-A2 heating system kit installation instruction.

■ ACU Cabinet extra fan heater replacement

ACU extra fan heater is located on a support plate, close to the back of the ACU cubicle.

1. Unmount the air guide plate in front of the fan heater. The guide plate is attached with a screw in front of fan heater.
 2. Unmount the screw attaching the fan heater assembly on the cabinet floor.
 3. Lift the fan heater assembly outside the ACU cabinet and uninstall its power supply wires.
 4. Loosen the four screws of the fan heater attachment frame and replace the fan heater with a new one.
 5. Tighten the fan frame screws, install the power supply wires and mount the fan heater assembly and air guide back inside the ACU cabinet to their original places.
-

5

Technical data

Contents of this chapter

ACS800-67 upgrade kits do not affect the converter's technical ratings. Technical ratings are given in *ACS800-67 Wind turbine converters for asynchronous slip ring generators hardware manual* (3AFE68392454 [English]).

Converter types

Converter type	Grid-side converter frame size	Grid-side converter nominal rating I _{cont.max} (AC) [A]	Rotor-side converter frame size	Rotor-side converter nominal rating I _{cont.max} (AC) [A]
ACS800-67-0480/0580-7	R8i	400	R8i	486
ACS800-67-0480/0770-7	R8i	400	2xR8i	645
ACS800-67-0480/1160-7	R8i	400	2xR8i	953

Note that the type code for the R8i converter module used in the ACS800-67 deliveries today is ACS800-104-0585-7+C123+C124+C126+E205+E212+V991.

Control upgrade

The upgrade kits described in this manual require software update for R8i modules, see *ACS800-67 upgrade wind turbine converters supplement* (3AXD50000131303 [English]).

Power consumption of auxiliary devices

■ Boards, Un 24 V DC

Module	Amount (pcs)	In [mA]	I _{max} [mA]
RDCU-12	1	250	1200
AMC	1	500	500
NIOC	1	300	600
APBU-44C	2	400	400
NDBU	1	250	320
NUIM-62C	1	200	200
NAMU-01C	1	100	150
NTAC-02	1	250	250
NCAN-02C	1	30	30
NETA-21 & NEXA-21	1	200	500
3G Modem	1	200	200
TOTAL		2680	4350

Further information

Product and service inquiries

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to www.abb.com/searchchannels.

Product training

For information on ABB product training, navigate to www.abb.com/service/training.

Providing feedback on ABB Drives manuals

Your comments on our manuals are welcome. Go to www.abb.com/drives/manuals-feedback-form.

Contact us

www.abb.com/windconverters

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