

ABB INDUSTRIAL DRIVES

ACS580MV Synchronized Bypass Unit

Hardware manual



List of related manuals

Drive hardware manuals and guides

Code (English)

ACS580MV hardware manual	2UBB004520
ACS580MV Engineering Guideline	2UBB013672
ACS580MV Base frame & TEU layout design	2UBB020751
ACS580MV Wiring Diagram of system 0	2UBB005084
ACS580MV Wiring Diagram of system 1	2UBB005085
ACS580MV Wiring Diagram of system 2	2UBB005086
ACS580MV Engineering Guideline for SBU	2UBB005656
ACS580MV Wiring Diagram of SBU	2UBB005212
ACS580MV Layout Design of Drive with SBU	2UBB005536
ACS580MV Layout Design of Drive with SBM	2UBB005537

You can find manuals and other product documents in PDF format on the Internet. See <http://www.abb.com/motors&drives>. For manuals not available in the Document library, contact your local ABB representative.

For more information, please refer to [ACS580 MV Hardware Manual](#) (2UBB004520) which can be found by scanning the QR code below.

APP version (IOS/Android)



Web page version



Hardware manual

ACS580MV Synchronized Bypass Unit








Table of contents		
Safety instructions		
Transportation		
Mechanical installation		
Electrical installation		
Operation		
Maintenance		

Table of contents

Terms	9
Trademarks	10

1. Safety instructions

Contents of this chapter	11
User's responsibilities	12
General safety information	12
Possible residual risks	13
Safety labels	14
General safety in installation, start-up and maintenance	14
Electrical safety in installation, start-up and maintenance	15
Precautions before electrical work	15
Additional instructions and notes	16
Grounding	16

2. Introduction to the manual

Contents of this chapter	17
Applicable products	17
Contact information	17
Equipment covered by the manual	18
Target groups and required qualifications	18
Related manuals	18
User's responsibilities	18
Intended equipment use	18
Cyber security disclaimer	18
Categorization by frame size and option code	18

3. Function and hardware description

Contents of this chapter	19
Function introduction	19
SBU function Description	19
Transfer sequence	20
Options	21
Product overview	21
Output Choke	22
PT	22
Space heater	22
RSYC- 01 unit	22
Overall view of the unit	22
Operation	22
HMI	22
MAU (Marshalling unit) layout	25
Doorlock	26
Cooling system	26
Function	26
Air flow inside MAU and SBU	27



4. Customer interfaces

Contents of this chapter	29
I/O interfaces	29
Customer control and process I/Os	29
Communication interfaces	31

5. Transportation

Contents of this chapter	33
Safety	33
Lifting and transportation	33
Dimensions and weights	33

6. Mechanical installation

Contents of this chapter	37
Safety	37
Installing air outlet	37
Installation	38

7. Electrical installation

Contents of this chapter	39
Safety	39
Overview of installation work	39
Cable requirements	40
Parallel routing of power cables	40
Terminal sizes for auxiliary and control connections	40
Ground cable and cable shield connections	42
Grounding of the bypass - drive system	42
Cable entries for external connections	43
Control and auxiliary cable entry in SBU	44
Control and auxiliary cable entry in MAU	44

8. Installation checklist

Contents of this chapter	45
Checklist	46

9. Operation

Contents of this chapter	51
Operating conditions	51
Safety	51
Overview	51
Overview on bypass - drive status and sequences	52
Start sequence of SBU	52

10. Maintenance

Contents of this chapter	55
Preparation for maintenance work	56
Shutting down the drive for maintenance	57



Connecting a grounding set	57
Replacing cooling fan in SBU	58
Procedure	58
Maintenance schedule	59

11. Technical data

SBU technical data	61
Product and service inquiries	63
Product training	63
Document library on the Internet	63





Terms and trademarks

Terms

The following table lists the terms and abbreviations you should be familiar with when using the manual. Some of the terms and abbreviations used in the manual are unique to ABB and might differ from the normal usage.

Term / Abbreviation	Meaning
Bypass - drive	Short form for ACS580MV frequency converter with bypass function Unit.
Converter	Short form for frequency converter.
COU	Control unit Short form for control compartment of the drive.
Drive	Short form for ACS580MV frequency converter.
Drive system	The drive system includes all equipment used to convert electrical into mechanical power to give motion to the machine.
MAU	Marshalling unit
MB	Motor Breaker
MCB	Main Circuit Breaker The MCB is a major protection device of the drive system and connects / disconnects the main power supply to the drive. The MCB is controlled entirely by the drive.
MSS	Motor starting switch
PE	Protective Earth
PT	Potential Transformer
SBU	Synchronizing bypass unit
TEU	Terminal Unit Short form for terminal compartment of the drive.

Trademarks

Names that are believed to be trademarks of other companies and organizations are designated as such. The absence or presence of such a designation should however not be regarded as an offence of the legal status of any trademark. The following registrations and trademarks are used in this manual:

Term / Abbreviation	Meaning
Windows®	Registered trademark of Microsoft Corporation
Ethernet®	Registered trademark of Xerox Corporation
Profibus®	Registered trademark of Profibus International (P.I.)
Modbus®	Registered trademark of the Modbus IDA organization

1

Safety instructions



Contents of this chapter

This chapter contains the safety instructions which you must obey when you install, operate or do maintenance on the bypass - drive system. If you ignore the safety instructions, injury, death or damage can occur.

Safety instructions are used to highlight a potential hazard when working on the equipment. Safety instructions must be strictly followed! Non-compliance can jeopardize the safety of personnel, the equipment and the environment.



DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

The safety instructions are derived from the following standards:

- ISO 3864-2:2004 (E)

Graphical symbols – Safety colors and safety signs – Part 2: Design principles for product safety labels.

- ANSI Z535.6

American National Standard for Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials.

User's responsibilities

It is the responsibility of those in charge of the bypass - drive system to ensure that each person involved in the installation, operation or maintenance of the bypass - drive system has received the appropriate training and has thoroughly read and clearly understood the instructions in this manual and the relevant safety instructions.

General safety information

To maintain safety and minimize hazards observe the following:

- Before the drive is energized, make sure that:
 - all foreign objects are removed from the bypass - drive system.
 - all internal and external covers are securely fastened and all doors are closed, locked and / or bolted.
 - the manual release of the door safety switches is in the locked position.
- Before starting to conduct maintenance on the bypass - drive system, make sure that:
 - the main and auxiliary power supply to the drive and bypass is switched off, locked out, and tagged out.
 - the bypass - drive is in non-operating state and after de-energizing.
 - safety ground connections are in place for both input and output of the drive.
 - MB and MSS connection are in right place.
 - appropriate personal protective equipment is provided and used when required.
 - everyone involved is informed.
- When working near the running drive protective earmuffs should be worn.
- Before work is carried out simultaneously on the bypass - drive and on other drive system equipment, make sure that,
 - the relevant safety codes and standards are observed.
 - all energy sources of the equipment are turned off.
 - lock-out and tag-out devices are in place.
 - barriers and appropriate covers are used on equipment which is still live.
 - everyone involved is informed.
- In case of fire in the drive room:
 - Observe the established rules and regulations for fire protection.
 - Only firemen with appropriate protective equipment are allowed to enter the bypass - drive room.



Possible residual risks

The following risks can arise from a bypass - drive system and pose a hazard to people. These risks must therefore be taken into account by the system integrator and / or the plant owner when assessing the risks of the machinery.

- Electric power equipment generates electro-magnetic fields which can cause a hazard to people with metal implants and / or a pacemaker.
- Bypass - drive system components can move unintentionally when being commissioned, operated, or serviced due to, for example:
 - Operation of the equipment outside the scope of the specifications.
 - Incorrectly assembled or installed equipment.
 - Wrongly connected cables.
 - External influence on, or damage of the equipment.
 - Wrong parameter settings.
 - Software errors.
 - Faulty hardware.
- Hazardous touch voltages can be present on bypass - drive system components caused by, for example:
 - Operation of the equipment outside the scope of the specifications.
 - External influence on, or damage of the equipment.
 - Induced voltages by external equipment (e.g. induced voltage from a spinning rotor).
 - Condensation on equipment components, or pollution.
 - Faulty hardware.
- High temperatures, noise, particles, or gases can be emitted from bypass - drive system components caused by, for example:
 - Operation of the equipment outside the scope of the specifications.
 - External influence on, or damage of the equipment.
 - Wrong parameter settings.
 - Software errors.
 - Faulty hardware.
- Hazardous substances can be emitted from bypass - drive system components due to, for example:
 - Incorrect disposal of components.



Safety labels

Safety labels are attached to the cabinet where necessary to alert personnel of potential hazards when working on the equipment. The instructions on the safety labels must always be followed, and the labels must be kept in a perfectly legible condition.



General safety in installation, start-up and maintenance

These instructions are for all personnel that install the drive and do maintenance work on it:

- If you select an external source for the start command and it is on, the drive will start immediately after fault reset unless you configure the drive for pulse start. See the firmware manual.
- When the control location is not set to Local, the stop key on the control panel will not stop the drive.

Electrical safety in installation, start-up and maintenance

■ Precautions before electrical work

These warnings are for all personnel who do work on the bypass - drive, motor cable or motor.



DANGER

High voltage!

Before starting to work on the bypass - drive, make sure:

- that the main and auxiliary power supply to the drive is switched off, locked out, and tagged out.
- that bypass - drive is in non-operating state and after de-energizing.
- that safety ground connections are in place.
- that personal protective equipment is provided and used when required.
- that everyone involved is informed.

Before energizing the bypass - drive system, make sure:

- that all foreign objects are removed from the bypass - drive system.
- that all internal and external covers are securely fastened and all doors are closed, locked and / or bolted.
- that the release dials of safety switches are in the locked position.



Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrician, do not do installation or maintenance work. Go through these steps before you begin any installation or maintenance work.

1. Clearly identify the work location.
2. Disconnect all possible voltage sources.
 - Open the main circuit breaker of the drive.
 - Wait until internal circuits are discharged completely and doors are unlocked (15 minutes).
 - Open the upstream disconnecter to disconnect the supply voltage from the input busbars.
 - Disconnect any external power sources from the control circuits before you do work on the control cables.
3. Protect any other energized parts in the work location against contact.
4. Take special precautions when close to bare conductors (e.g. when the protective plate between COU and TEU is removed).

5. Measure that the installation is de-energized.
 - Use only instrumentation (e.g., meters, oscilloscopes, etc.) intended for high voltage measurements.
6. Always discharge equipment and verify that it is neither electrically alive nor thermally hot.
7. Always install temporary grounding as required by the local regulations for both input and output of the drive.
8. Ask for a permit to work from the person in control of the electrical installation work.

■ **Additional instructions and notes**

- Do not connect the drive to a voltage higher than what is on the rating plate.
- The MSS cable terminals of the bypass - drive system are at a dangerous voltage when the input power is on, regardless of whether the motor is running or not.
- External wiring can supply dangerous voltages to the terminals of relay outputs.

■ **Grounding**

- Always ground the bypass - drive, the motor and adjoining equipment according to the maintenance instructions in this manual. Assure that the drive is grounded on both sides, i.e. on supply and converter output side. This is necessary for the personnel safety. Proper grounding also reduces electromagnetic emission and interference.
- Make sure that the cross-section of the grounding conductors is sufficient. See the [ACS580MV Engineering Guideline](#) (2UBB013672). Obey the local regulations.



2

Introduction to the manual

Contents of this chapter

This manual documents the operation and maintenance of the SBU feature which is in-line with ACS580MV medium voltage drive.

This manual and parts thereof must not be reproduced or copied, or disclosed to third parties, nor used for any unauthorized purpose without written permission from ABB Beijing Drive Systems Company Ltd.

The hardware and software described in this manual is provided under a license and may be used, copied, or disclosed only in accordance with the terms of such license.

Applicable products

SBU cabinet covers system voltage ranging from 3.3 kV-11 kV.

Contact information

Address:

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Chaoyang District
Beijing, 100015

Phone +86 10 5821 7788

Fax +86 10 5821 7618

E-mail mvdrives.supportline@cn.abb.com

Web [http:// www.abb.com/motors&drives](http://www.abb.com/motors&drives)

Equipment covered by the manual

For detailed information, see ACS580MV hardware manual.

Target groups and required qualifications

This manual is intended for people who have a thorough knowledge of the bypass- drive system and the industrial environment and have obtained the required qualification.

■ Related manuals

See [List of related manuals](#) on the inside of the front cover.

User's responsibilities

It is the responsibility of those in charge of the bypass- drive to ensure that each person involved in the handling, installation, operation or maintenance of the bypass- drive has received the appropriate training and has thoroughly read and clearly understood the instructions in this manual and the relevant safety instructions.

Intended equipment use

Those in charge of the bypass- drive must ensure that the bypass- drive is only used as specified in the contractual documents, operated under the conditions stipulated in the technical specifications and on the rating plate of the drive, and serviced in the intervals as specified by ABB.

Use of the bypass- drive outside the scope of the specifications is not permitted.

Intended equipment use also implies that only spare parts recommended and approved by ABB must be used.

Unauthorized modifications and constructional changes of the bypass- drive are not permitted.

Cyber security disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is Customer's sole responsibility to provide and continuously ensure a secure connection between the product and Customer network or any other network (as the case may be). Customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Categorization by frame size and option code

Some instructions, technical data and dimension drawings which concern only certain frame sizes are marked with the symbol of the frame size (e.g. 6R6, 10R6). The frame size is not marked on the rating plate. To identify the frame size of your drive, see [ACS580MV catalogue](#) (3BHT490775R0001).

3

Function and hardware description

Contents of this chapter

This chapter provides information on the power equipment and cabinet design and briefly describes the operation principle of the bypass - drive.

Function introduction

■ SBU function Description

The synchronized bypass unit (SBU) control the transfer of a motor from the drive to a fixed frequency line. The unit supports the following synchronization method:

Make - before - break (bumpless): Need a decoupling choke is added between the converter and the motor. The transfer occurs without a power interruption to the motor.

The SBU is designed for use with ACS580MV medium voltage drive and can be equipped for the transfer of up to 8 motors. It provides all necessary hardware for the communication with the drive and the remote control place. Information on the project-specific communication method is provided on the electrical drawings.

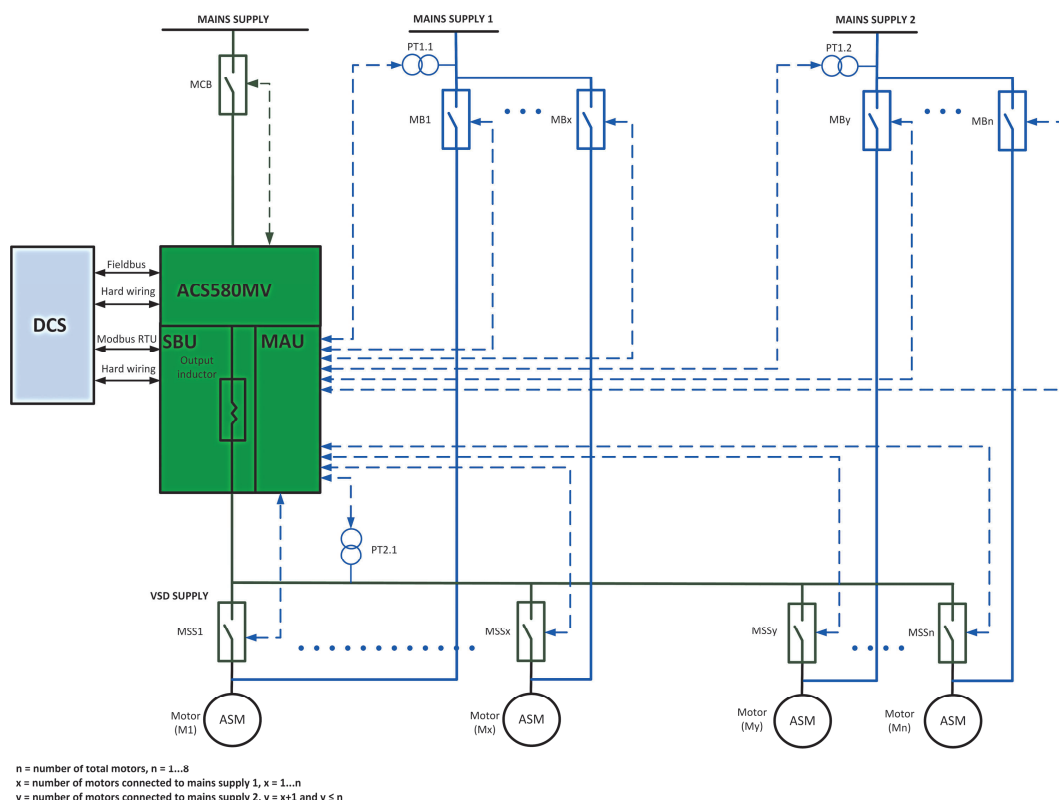
The interposing relays for the circuit breakers, which connect/disconnect the motor to the drive and the line, are mandatory for SBU functionality as well as the inputs for monitoring the position of these switches. Each motor requires its own set of circuit breakers:

- The motor starting switch (MSS) connects and disconnects the motor to and from a drive.
 - The motor breaker (MB) connects and disconnects the motor to and from the line.
-

The Motor Starting Switch (MSS) and Motor Breaker (MB) are not supplied. They must be rated according to the specification of ABB.

Equipment requirements: The output voltage of the drive and line voltage are measured by potential transformers (PT). The synchronizing device uses the measurements to determine the exact transfer instant of the motor to the line.

The PTs can be supplied either by ABB or customer, in case the PTs are supplied by customer, they must be rated according to the specification of ABB.



System overview and single line diagram of SBU with multiple motors and two grids

Transfer sequence

The transfer of the motor to the line starts with the selection of the motor to be transferred. After the selection, bypass control checks the positions of the MSS and the MB.

When the motor start command is given, the corresponding MSS is closed, the motor is started by the drive and operated in speed control mode.

When the drive receives the synchronizing command, the motor is accelerated to a preset speed (frequency), and then gradually adjusted to around the detected line frequency, when magnitude, frequency and phase angle between drive output voltage and line voltage are within the required limit, SYNC conditions are achieved and the corresponding motor breaker is closed, which connects the motor to the line, and after a preset waiting time (fixed value in software, normally in the range of a few seconds) the corresponding motor starting switch is opened.

When the synchronizing sequence has finished, another motor can be transferred to the line supply.

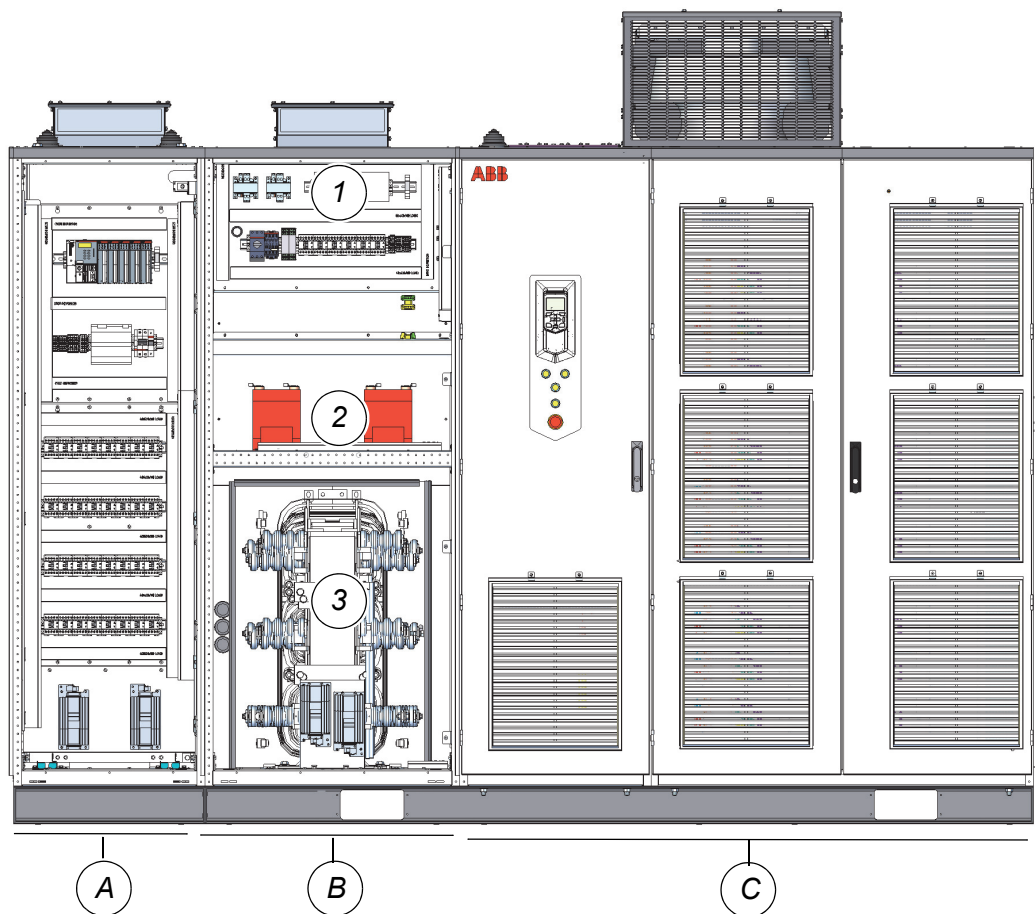
Options

Following options are available:

- PT offering.
- Number of networks.
- One motor (SBU) / more than one motor (MAU).
- Space heater.
- HMI on MAU.

Product overview

For information on the power and voltage range of your drive, see the *ACS580MV catalogue* and the Rating plate of the drive. For further information on the general drive characteristics, refer to the ACS580MV catalog.



Typical drive line-up

A	Marshalling unit (MAU)
B	Synchronizing bypass unit (SBU)
C	Drive unit
1	RSCY board
2	Potential Transformer (PT)
3	Output Choke

The dimensions and weight of the cabinet depend on the drive power.

■ Output Choke

As SBU of ACS580MV is taking the **Make - before - Break** (Bumpless) method, so an output choke at the VSD output is needed to limit the inrush current during the synchronizing period.

An output choke can be used to make a VSD soft-starter line friendly and motor friendly during startup and synchronization. Such a soft starter would ensure that a minimized inrush current flows in on the line side and a smooth transfer from VSD operation to DOL operation occurs on the motor side (no transient torques and no speed oscillation).

■ PT

The synchronization PTs can provide supply voltage and VSD output voltage, since voltage magnitude and phase angle are required for synchronization, the PT on the main supply must measure the same phases as the PT measures on the converter output.

Two pieces of PT can be provided either by customer, or provided by ABB as an option. In case PT is provided by ABB, the SBU only supports single grid.

■ Space heater

To prevent condensation being produced inside the cabinet, the cabinet can be equipped with a space heater for both SBU and MAU cabinet. The SBU space heaters are controlled on and off together with the ACS580MV heating cable, while the space heaters in MAU are always running.

■ RSYC- 01 unit

Overall view of the unit



RSYC - 01 unit

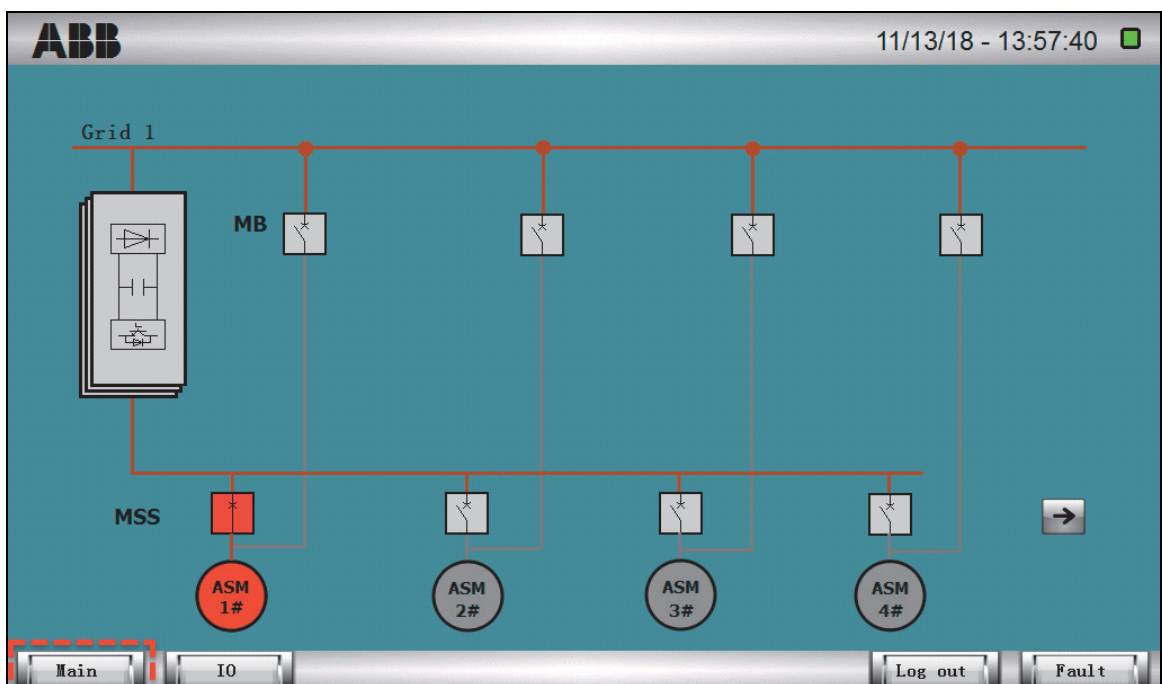
Operation

The RSYC unit monitors two voltage signals, one measured from the supply line and other from the drive output. The signals indicate the phase shift and frequency.

The unit output signal indicates the synchronization status for the drive. When the signal reaches specific voltages, the supply line and the drive output voltages are synchronic, i.e. the phasing and frequency are the same.

■ HMI

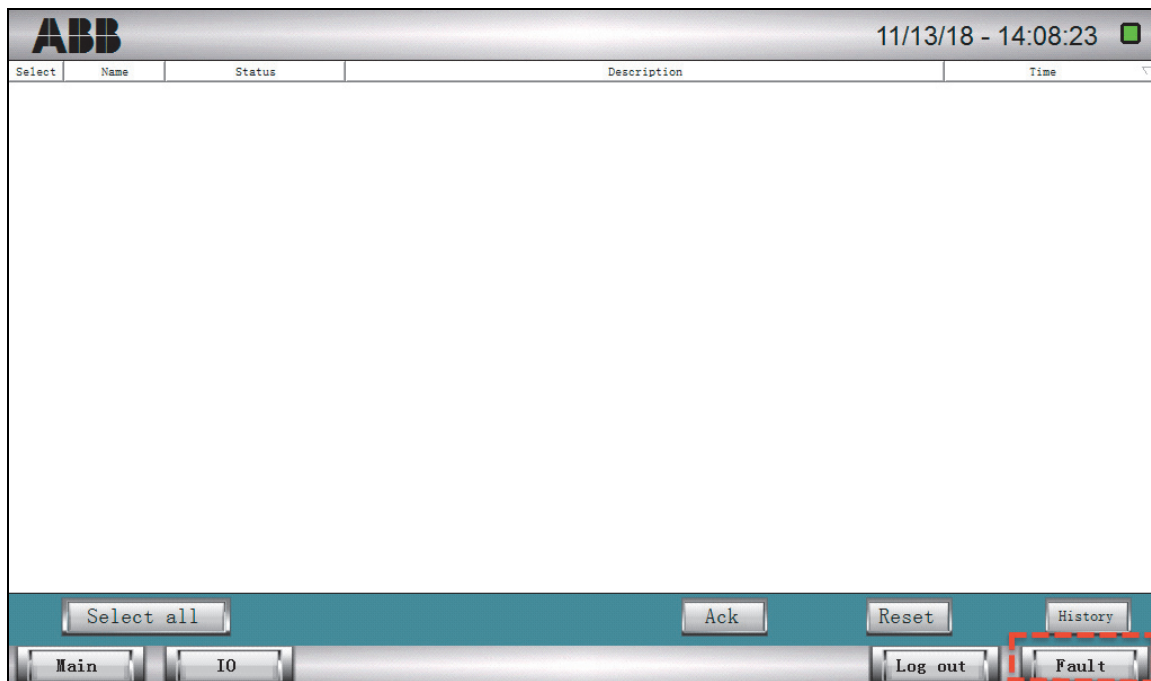
HMI is an option and mounted on MAU. It can display all MSS and MB status (in Main page), IO status (in IO page), active fault (in Fault page).



HMI display Main page



HMI display IO page



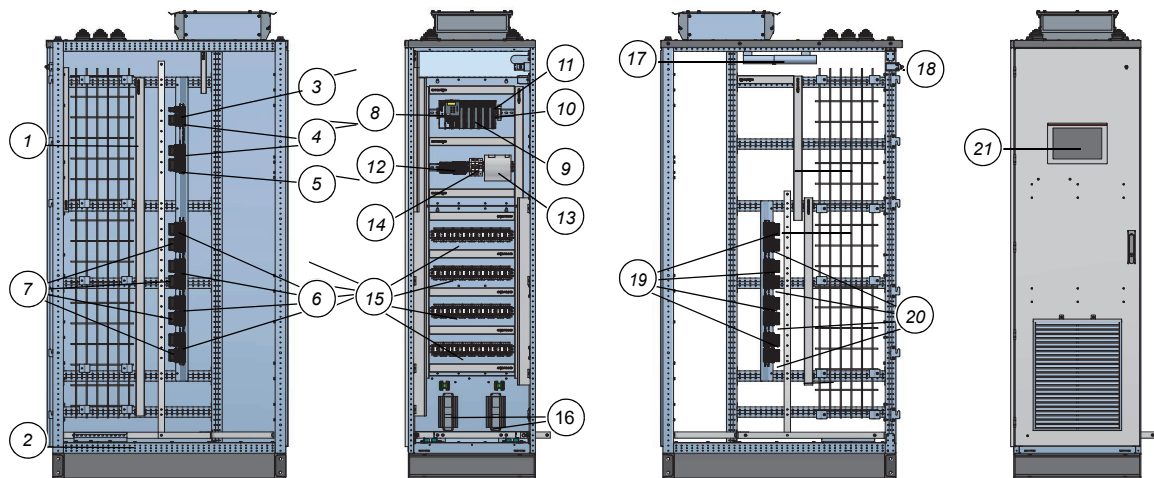
HMI display Fault page

If the parameter setting of marshalling PLC control source is “Panel”, motor selection and MB DOL command are coming from HMI in *Control* page.



HMI display Control page

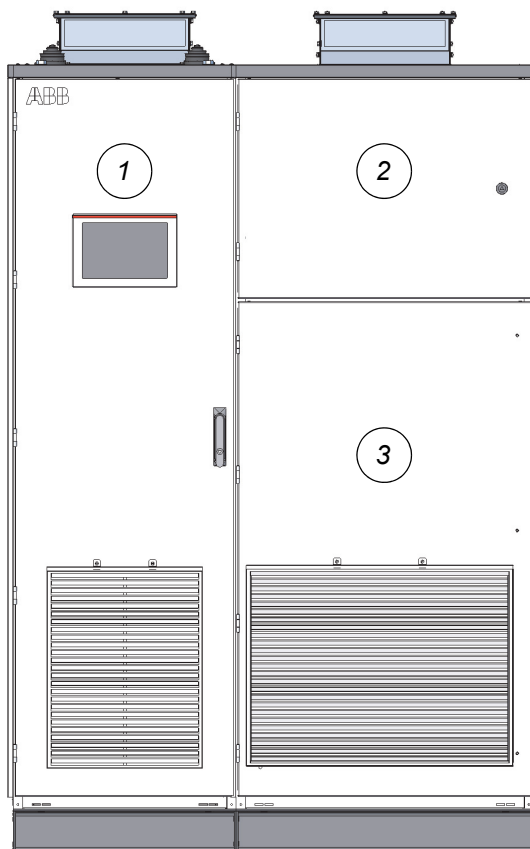
■ MAU (Marshalling unit) layout



Left wall	
1	Cable duct
2	Ground bus bar
3	230VAC auxiliary power supply
4	Motor 1-8 selection
5	Main control signal
6	Motor 1-4 feedback signal
7	Motor 1-4 control signal
Front	
8	Processor Module PM556
9	Digital Input Module DI562
10	Digital Input/Output Module DX571
11	Customer interface, FAULT signal
12	24V+ distributor with fuse/ 24V- distributor/ PE terminal
13	24VDC power supply
14	Protection switch for power supply/ Protection switch for lamp
15	Motor MB/MSS close/open command
16	Space heater
Right wall	
17	Lamp
18	Limit switch
19	Motor 5-8 feedback signal
20	Motor 5-8 control signal
21	HMI CP610

Doorlock

All doors and removable cover plates of the Marshalling and the SBU cabinet are either lockable or bolted.



1	Door of Marshalling cabinet: lockable
2	Top Door of SBU cabinet: lockable
3	Bottom Door of SBU cabinet: bolted

Door locks

Cooling system

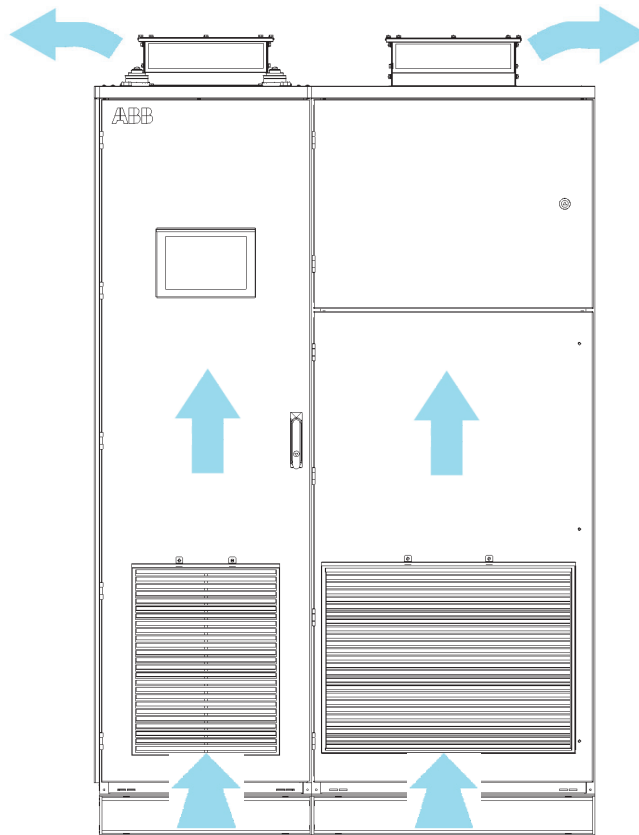
The MAU is natural air cooling and the SBU has a fan on the top of the output choke in the cabinet.

■ **Function**

The fan in the SBU cabinet is switched on and off together with the fans in drive and Transformer Unit (TRU).

■ Air flow inside MAU and SBU

The air enters the MAU and SBU through the louvered panels at the front, passes the electrical parts and then exits through the outlet of the roof of the cabinet.



Air flow through the MAU and SBU

4

Customer interfaces

Contents of this chapter

This chapter contains an overview of the default I/O connection, descriptions of the terminals and contains references to related manuals and documentation.

I/O interfaces

■ Customer control and process I/Os

This chapter provides an overview of the hardwired I/Os. For details refer to [ACS580MV Engineering Guideline](#) (2UBB013672) and [ACS580MV Catalog](#) (3BHT490775R0001).

Customer control signals**X101** Digital inputs

1	motor 1 selection	connect contact from customer, 24VDC, 5mA
2		
3	motor 2 selection	
4		
5	motor 3 selection	
6		
7	motor 4 selection	
8		

X102 Digital inputs

1	motor 5 selection	connect contact from customer, 24VDC, 5mA
2		
3	motor 6 selection	
4		
5	motor 7 selection	
6		
7	motor 8 selection	
8		

X106

1	Sync to mains 1(0) /	connect contact from customer, 24VDC, 5mA
2	Sync to mains 2(1)	
3	reset	
4		
7	fault	Floating contact to customer isolation rated voltage 400VAC maximum making current: 15A thermal current: I _{th} = 8A rated operational voltage: U _e = 250V rated operational current: DC-12: I _e = 8A(24V) U _{min} = 5V, I _{min} = 5mA(AgNi), 2mA(AgNi/Au)
8		

Signals to and from motor starter and motor breaker switches

Connection	Terminal	Control voltage
Status signals from MSS 1 and MB 1	-X110	24V(DC)
Control signals to MSS 1 and MB 1	-X111	
Status signals from MSS 2 and MB 2	-X120*	24V(DC)
Control signals to MSS 2 and MB 2	-X121*	
Status signals from MSS 3 and MB 3	-X130*	24V(DC)
Control signals to MSS 3 and MB 3	-X131*	
Status signals from MSS 4 and MB 4	-X140*	24V(DC)
Control signals to MSS 4 and MB 4	-X141*	
Status signals from MSS 5 and MB 5	-X150*	24V(DC)
Control signals to MSS 5 and MB 5	-X151*	
Status signals from MSS 6 and MB 6	-X160*	24V(DC)
Control signals to MSS 6 and MB 6	-X161*	
Status signals from MSS 7 and MB 7	-X170*	24V(DC)
Control signals to MSS 7 and MB 7	-X171*	
Status signals from MSS 8 and MB 8	-X180*	24V(DC)
Control signals to MSS 8 and MB 8	-X181*	

* Presence depends on number of motors

■ Communication interfaces

See the [ACS580MV primary control program firmware manual](#) and the [ACS580MV hardware manual](#) (2UBB004520).

5

Transportation

Contents of this chapter

This chapter provides information and instructions for transportation of the bypass - drive.



Safety

The bypass - drive must only be handled by personnel who are skilled and experienced in unpacking and transporting heavy equipment.

All work must be carried out by qualified personnel according to the site and equipment requirements and in compliance with the local regulations.

Lifting and transportation

■ Dimensions and weights

Choose the load capacity according to the following table, for center of gravity see the [ACS580MV Base frame & TEU layout design](#) (2UBB020751).

Type	Depth (mm)	Height (mm)	SBU + converter unit		Marshalling + SBU + converter unit	
			Width (mm)	Weight (kg)	Width (mm)	Weight (mm)
3.3R4	1198	2821	3330	3660	3930	4660
3.3R5	1198	2821	3330	3930	3930	4930
3.3R6	1198	2821	3330	4250	3930	5250
3.3R7	1398	2571	3015	2330	3615	3390
3.3R8	1398	2571	3015	2425	3615	3485
3.3R9	1398	2571	3015	2615	3615	3675
4.16R4	1198	2821	3330	4010	3930	5010
4.16R5	1198	2821	3330	4270	3930	5270
4.16R6	1198	2821	3330	4800	3930	5800
4.16R7	1398	2571	3015	2480	3615	3540
4.16R8	1398	2571	3015	2590	3615	3650
4.16R9	1398	2571	3015	2810	3615	3870
6/6.3R3	1198	2571	2615	1900	3215	2160
6/6.3R4	1198	2571	2615	2050	3215	2310
6/6.3R5	1198	2571	2615	2050	3215	2310
6/6.3R6	1198	2571	2615	2150	3215	2410
6/6.3R7	1398	2571	3815	3250	4415	3540
6/6.3R8	1398	2571	3815	3450	4415	3740
6/6.3R9	1398	2571	3815	3700	4415	3990
6.6R3	1198	2571	2615	1950	3215	2210
6.6R4	1198	2571	2615	2100	3215	2360
6.6R5	1198	2571	2615	2150	3215	2410
6.6R6	1198	2571	2615	2250	3215	2510
6.6R7	1398	2571	4215	3750	4815	4040
6.6R8	1398	2571	4215	3900	4815	4190
6.6R9	1398	2571	4215	4300	4815	4590
10R3 A/B/C	1198	2571	2615	2000	3215	2260
10R3 D	1198	2571	2615	2050	3215	2310
10R4	1198	2571	3015	2300	3615	2560
10R5	1198	2571	3015	2350	3615	2610
10R6	1198	2571	3015	2450	3615	2710
10R7	1398	2571	4615	4350	5215	4640
10R8	1398	2571	4615	4500	5215	4790
10R9	1398	2571	4615	4900	5215	5190
10.5/11R3	1198	2571	2615	2050	3215	2310
10.5/11R4	1198	2571	3015	2350	3615	2610
10.5/11R5	1198	2571	3015	2400	3615	2660
10.5/11R6	1198	2571	3015	2500	3615	2760
10.5/11R7	1398	2571	5415	4950	6015	5240



10.5/11R8	1398	2571	5415	5200	6015	5490
10.5/11R9	1398	2571	5415	5600	6015	5890

Note: This dimension and weight information only include SBU, marshalling (if choose) and converter as a transportation unit. For other transportation units, storage and disposal information, please refer to [ACS580MV hardware manual](#) (2UBB004520).





6

Mechanical installation

Contents of this chapter

This chapter describes the mechanical installation procedure of air outlet. See [ACS580MV hardware manual](#) (2UBB004520) for others information of mechanical installation.

Safety

All installation work must be carried out by qualified personnel according to the site and equipment requirements and in compliance with the local regulations.

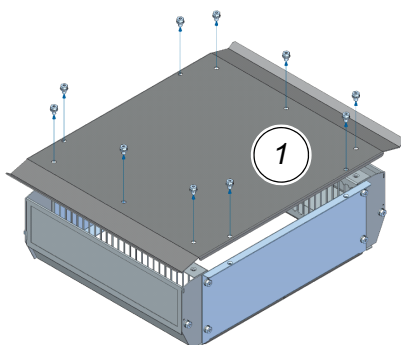
■ Installing air outlet

In case the air outlet need to be installed in the field.

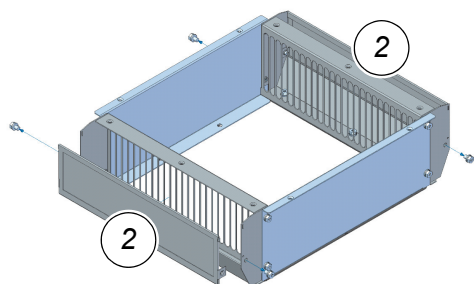


Installation

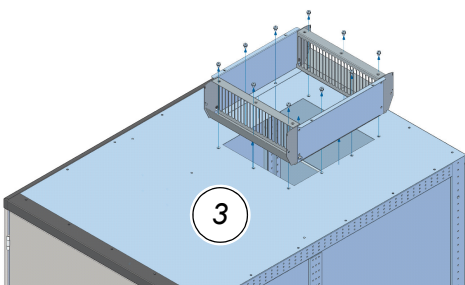
1. Remove 10 hex-head combination screws (M6X10) on the top cover plate (1). Lift the top cover plate and pull it away from the air outlet.



2. Remove the 4 hex-head combination screws (M6X10) on the sides, remove the stainless-steel mesh (2).



3. Assemble the air outlet on the cabinet roof plate (3) with 10 hex-head combination screws (M6X10).



4. Re-assemble stainless-steel mesh and top cover plate in reverse order of removal.

7

Electrical installation

Contents of this chapter

This chapter gives instructions on the installation of the power cables and wiring of control and auxiliary power.

For information on the power cables, see the *ACS580MV hardware manual*.

Safety



WARNING Hazardous voltage!

Improper work could lead to life-threatening injury or death.

The electrical installation must be carried out by qualified personnel according to the site and equipment requirements, and the relevant electrical codes.

When the electrical installation is completed, the main and auxiliary power supply to the drive must not be switched on without the consent of the ABB commissioning personnel.

Take appropriate measures to prevent main and auxiliary power supply from being switched on during installation.



Overview of installation work

The electrical installation includes the following wire and cable connections:

- Power cables, ground cables.
 - Auxiliary power, control and serial communication cables.
 - Power supply and signal cables for fans in transformer unit.
-

Cable requirements

For information on the requirements for power cables and the ground cable see the [ACS580MV Engineering Guideline](#).

For information on the requirements for the auxiliary power cable and the control cables, see table below.

Parallel routing of power cables

Cables between drive and motor can be laid in parallel. The number of cables laid in parallel is limited by the number of entry holes of the entry plate.

For information on the supply voltages, see Rating label of the bypass - drive system.

Terminal sizes for auxiliary and control connections

SBU

Customer I/O terminal		
Terminal	wire cross-section (mm ²)	
	Solid wire	Flexible wire
X107:1	0.75...4 mm ²	
X107:2		
X108:1		
X108:2		
X109:1		
X109:2		
X110:5		
X110:6		
X110:9		
X110:10		
X111:1	1.5...4 mm ²	
X111:2		
X111:3		
X111:4		
X111:5		
X111:6		
X111:7		
X111:8		
X111:9		
X111:10		



MAU

Customer I/O terminal		
Terminal	Wire cross-section (mm ²)	
	Solid wire	Flexible wire
X101:1	0.75...2.5 mm ²	
X101:2		
X101:3		
X101:4		
X101:5		
X101:6		
X101:7		
X101:8		
X102:1		
X102:2		
X102:3		
X102:4		
X102:5		
X102:6		
X102:7		
X102:8	0.75...2.5 mm ²	
X106:1		
X106:2		
X106:3		
X106:4		
X106:7		
X106:8		
X110:1		
X110:2		
X110:3		
X110:4		
X110:5		
X110:6		
X110:7		
X110:8		
X110:9		
X110:10		



Customer I/O terminal		
Terminal	Wire cross-section (mm ²)	
	Solid wire	Flexible wire
X100:L	1.5...2.5 mm ²	
X100:N		
X100:PE		
X111:1		
X111:2		
X111:3		
X111:4		
X111:5		
X111:6		
X111:7		
X111:8		
X111:9		
X111:10		

Ground cable and cable shield connections

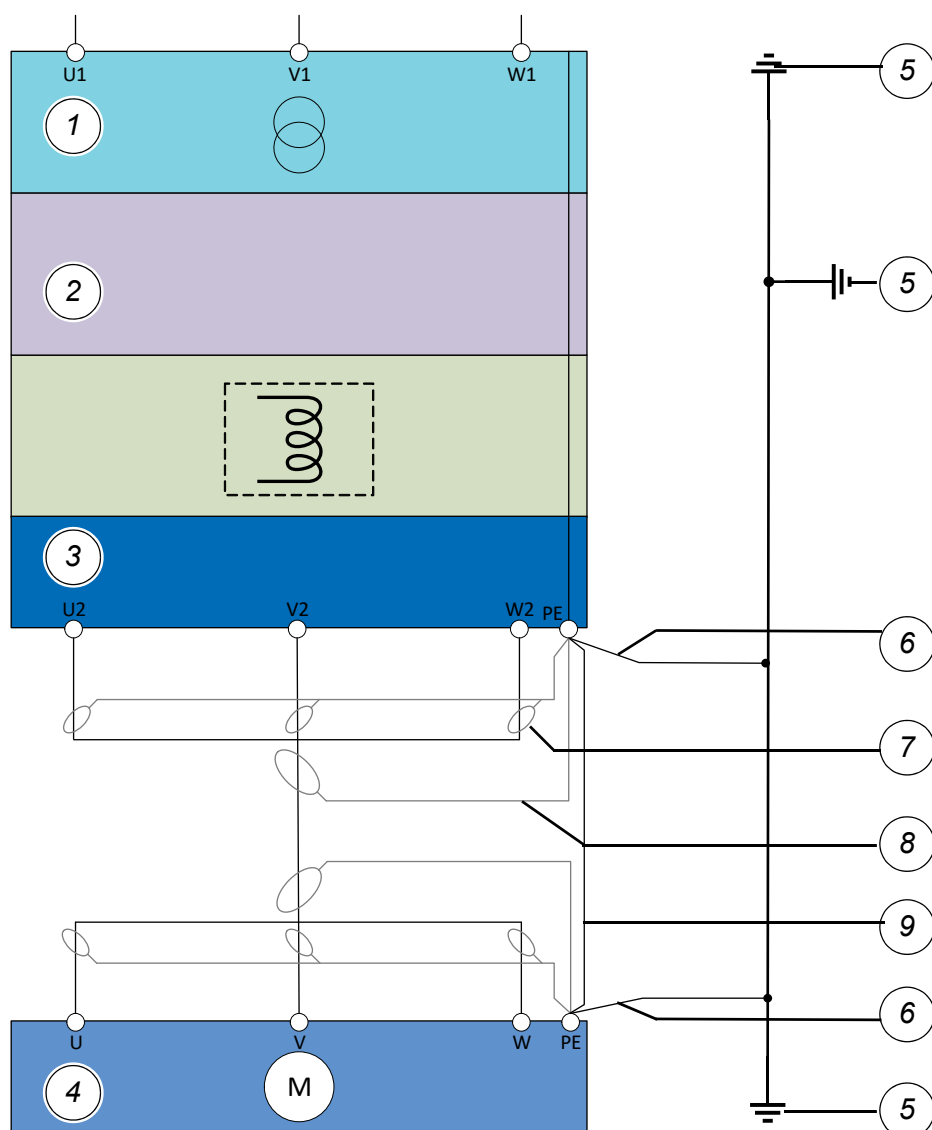
The cabinet is equipped with ground buses (marked PE, Protective Earth) for grounding the armor and shields of the cables, and for the connection of the ground cable.

To identify the ground buses, see [ACS580MV Wiring Diagram of SBU](#).

■ Grounding of the bypass - drive system

Grounding of the bypass - drive system must be in line with the [ACS580MV Engineering Guideline](#)





1	Input transformer (TRU)
2	Drive
3	SBU / SBU+MAU
4	Motor
5	Earth electrode
6	Ground cable
7	Cable screen
8	Cable shield
9	Equipotential bonding conductor

Grounding bypass - drive system and integrated transformer

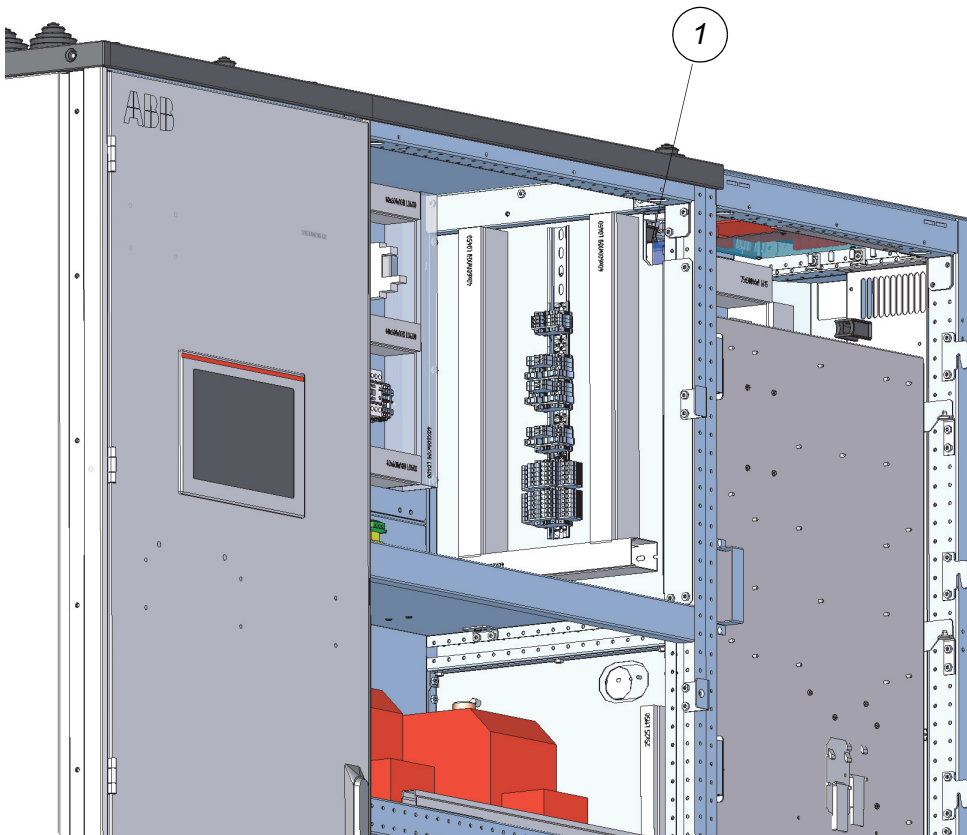
Cable entries for external connections

For detailed information, see [ACS580MV hardware manual](#).



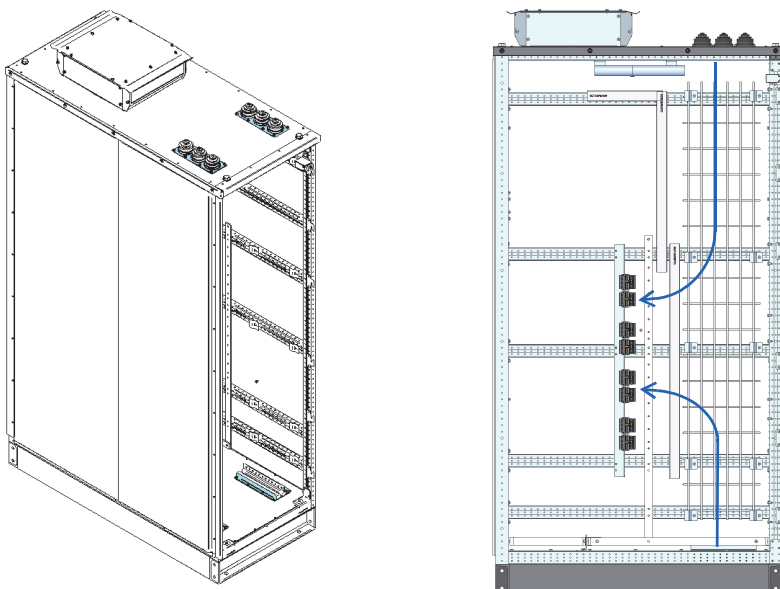
■ Control and auxiliary cable entry in SBU

Cable entry can be from bottom or top in COU to SBU through the hole (1) between COU and SBU.



■ Control and auxiliary cable entry in MAU

Cable entry can be from bottom or top in MAU.



Terminals on right cabinet wall

Further information, see [ACS580MV Wiring Diagram](#).

A large green square with rounded corners, containing a large black number 8 in the center.

Installation checklist

Contents of this chapter

This chapter contains an installation checklist which you must complete before commissioning can take place.

Safety



DANGER

High voltage!

Obey the instructions in chapter [Safety instructions](#). If you ignore them, injury or death, or damage to the equipment can occur.

Before starting to work on the drive, make sure:

- that the main and auxiliary power supply to the drive is switched off, locked out, and tagged out.
- that bypass - drive is in non-operating state and after de-energizing.
- that safety ground connections are in place for both input and output terminals of converter.
- that personal protective equipment is provided and used when required.
- that everyone involved is informed.

Before energizing the drive, make sure:

- that all foreign objects are removed from the drive.
- that all internal and external covers are securely fastened and all doors are closed, locked and / or bolted.
- that the release dials of safety switches are in the locked position.



WARNING! Obey the instructions in chapter [Safety instructions](#). If you ignore them, injury or death, or damage to the equipment can occur.

Checklist

Do the steps in section [Precautions before electrical work](#) on page 15 before you start the work. Go through the checklist together with another person.

Mechanical installation

1. Ambient operating conditions meet the specifications given in chapter ACS580MV hardware manual. ☐
2. Drive installed according to the instructions in this manual (Chapters [Mechanical installation](#) and [Electrical installation](#)). ☐
3. Drive securely fastened to the floor. ☐
4. Fan units installed. ☐

5. Visual inspection:
 - no badly affixed or damaged components
 - no foreign objects inside cabinet
 - no dirt, dust and humidity inside cabinet

☐

Electrical installation

1. Types and cross-sections of control cables suitable for the signal type and signal level
2. Types and cross-sections of power cables selected according to the [ACS580MV Engineering Guideline](#)
3. Pulse encoder cable screens connected to **screen grounding point** and not connected directly to the pulse encoder interface (only applicable for drives with pulse encoder interface)
4. Internal cabling to integrated transformer (power, auxiliary, control and heater cables) made according to the instructions in [ACS580MV hardware manual](#) (2UBB004520)
5. Cable entry made according to the instructions in this manual (Chapter [Electrical installation](#))
6. All control cable screens and conductors are connected according to the instructions in this manual (Chapter [Electrical installation](#)), appropriately labeled, and the customer-side connections are completed
7. Heating cable (if supplied) installed according to wiring diagram.
8. Ground cable of drive securely connected at both ends
9. Input and motor cables not connected at both ends (cables must be meggered before connection, drive optional - recommended in case of long storage time, humid environment or visible transportation damages)

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Door interlocking

1. Door locks tested and in operation
2. The manual release of the door safety switch(es) is in the **locked** position.

☐
☐

Main circuit breaker (MCB)

1. Type of MCB selected as per [ACS580MV Engineering Guideline](#)

☐

48 Installation checklist

- | | |
|--|--------------------------|
| 2. High voltage connections completed | <input type="checkbox"/> |
| 3. MCB ready to be tested with drive | <input type="checkbox"/> |
| 4. MCB interposing relay settings tested | <input type="checkbox"/> |
| 5. Safety devices checked and in operation | <input type="checkbox"/> |

Motor breaker (MB)

- | | |
|--|--------------------------|
| 1. Type of MB selected as per ACS580MV Engineering Guideline for SBU | <input type="checkbox"/> |
| 2. High voltage connections completed | <input type="checkbox"/> |
| 3. MB ready to be tested with bypass – drive | <input type="checkbox"/> |
| 4. MB interposing relay settings tested | <input type="checkbox"/> |
| 5. Safety devices checked and in operation | <input type="checkbox"/> |

Main starting switch (MSS)

- | | |
|---|--------------------------|
| 1. Type of MSS selected as per ACS580MV Engineering Guideline for SBU | <input type="checkbox"/> |
| 2. High voltage connections completed | <input type="checkbox"/> |
| 3. MSS ready to be tested with bypass – drive | <input type="checkbox"/> |
| 4. MSS interposing relay settings tested | <input type="checkbox"/> |
| 5. Safety devices checked and in operation | <input type="checkbox"/> |
-

Motor

1. Motor installed, aligned and alignment protocol available ☐
2. Motor decoupled from driven load ☐
3. Ground connection completed ☐
4. Customer side motor protection set and ready (e.g. winding temperature, vibration) ☐
5. Motor auxiliaries (e.g. bearing lubrication, heater cooling) ready ☐

Insulation tests

1. All power cables to drive, and from drive to motor are meggered, and measured values are within the required limits. ☐
2. Test report of the megger test available ☐
Note: If the test is carried out by the commissioning engineer of the drive, an additional day per drive motor combination needs to be reserved. After the test, the feeder cables can be connected, except at the drive end. The test must comply with the specification.
3. Optional insulation tests of the drive are completed and documented. Insulation tests of the drive recommended in case: long storage time (>4 months), humid environment or visible damages due to transportation/installation. ☐

Power supply

1. Medium voltage available for start-up of drive ☐
2. Low voltage auxiliary power available for start-up of drive ☐

Miscellaneous

1. Sufficient number and correct type of spare parts available ☐
 2. Cooling of drive room ready for load run of drive ☐
 3. Optional equipment ready ☐
-

50 Installation checklist

4. Drive room properly dust filtered (dust filters at air inlet), see [ACS580MV Engineering Guideline](#)

☐

9

Operation

Contents of this chapter

This chapter contains the start-up procedure of the drive. The default device designations (if any) are given in brackets after the name, for example “main switch-disconnector (Q1)”. The same device designations are also used in the [ACS580MV Wiring Diagram of SBU](#), typically.

Operating conditions

The operating conditions for the drive are according to IEC 60721-3-3 ‘Stationary use at weather-protected locations’ (unless indicated otherwise). For details see [Technical data](#).

Safety

The drive must only be operated by qualified and authorized personnel, i.e. personnel who are familiar with the operation of the bypass - drive system and the hazards involved.



Overview

The chapter outlines the local operation of the bypass - drive. For additional details on using the local control panel see [ACS-AP-X assistant control panels user's manual](#).

Control of the drive via a PLC or a higher-level control system is not described in this chapter. If the drive is controlled from remote, see the appropriate manuals for information.

The panel messages and parameter settings used in this chapter are typical examples to illustrate the related instructions and display functions and may therefore differ from the actual messages and parameter settings in the drive.

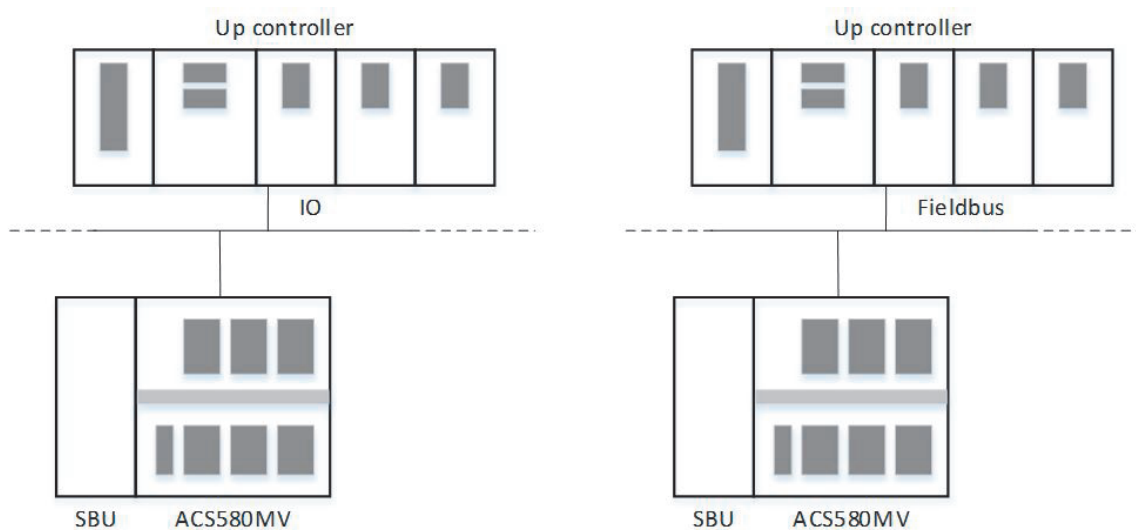
Overview on bypass - drive status and sequences

The following section lists the main operating states of the bypass – drive and the related indications on the local control panel when the bypass - drive is put into operation, when it is stopped (see [Start sequence of SBU](#)) or when a fault condition has occurred.

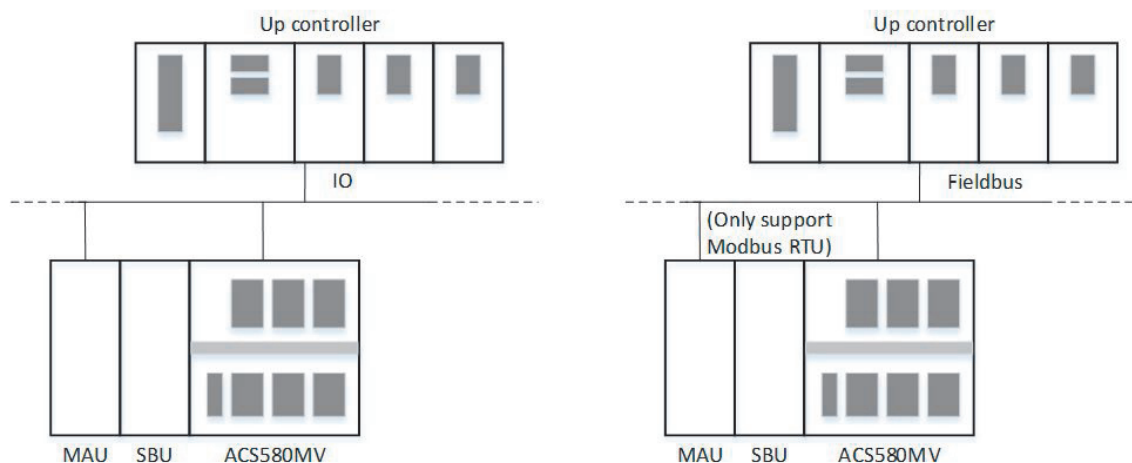
For information on other status messages, such as fault status messages in particular, see the [ACS580MV primary control program firmware manual](#).

■ Start sequence of SBU

For single motor, the drive can be configured to receive all of its control information through the IOs or fieldbus.



For multi motors, up controller needs to send control command to drives and marshalling PLC through IOs or fieldbus (marshalling PLC just support fieldbus of Modbus RTU). If “Panel” is selected, motor selection and MB DOL command can come from HMI.





10

Maintenance

Contents of this chapter

This chapter contains instructions for component replacements, for more information, see *ACS580MV hardware manual*.



Safety



DANGER

High voltage!

Obey the instructions in chapter [Safety instructions](#). If you ignore them, injury or death, or damage to the equipment can occur.

Before starting to work on the drive, make sure:

- that the main and auxiliary power supply to the drive is switched off, locked out, and tagged out.
- that bypass - drive is in non-operating state and after de-energizing.
- that safety ground connections are in place for both input and output terminals of converter.
- that personal protective equipment is provided and used when required.
- that everyone involved is informed.

Before energizing the drive, make sure:

- that all foreign objects are removed from the drive.
- that all internal and external covers are securely fastened and all doors are closed, locked and / or bolted.
- that the release dials of safety switches are in the locked position.

NOTICE

Foreign matter and particularly metallic dust can cause failure and damage when the drive is energized.

Ensure that foreign matter cannot enter the cabinet:

- Close the doors and cover openings completely when the work is discontinued.
- Retrieve any foreign matter accidentally dropped into the cabinet.

NOTICE

All maintenance tasks that are listed in the maintenance schedule, but are not described in detail in this manual, may only be carried out by ABB.

Call ABB service if such a task is due.



Preparation for maintenance work

This part must be in line with the [ACS580MV hardware manual](#) (2UBB004520). MB and MSS status must be checked before maintenance.

For further information, see [ACS580MV hardware manual](#) (2UBB004520) and must be in line with it.

Shutting down the drive for maintenance



DANGER

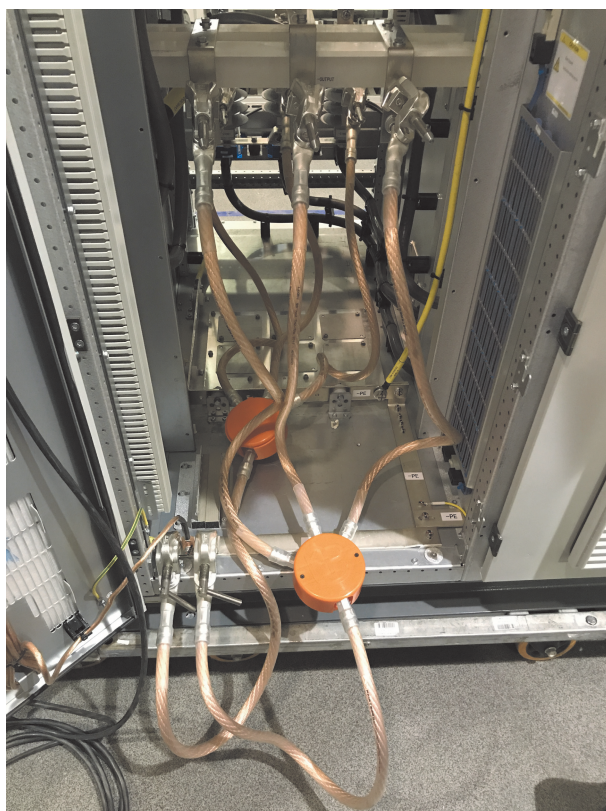
Hazardous voltages!

For work in the medium voltage circuit of the drive the connection of grounding equipment at the appropriate locations is a must. The grounding equipment ensures that hazardous voltages cannot be fed into the drive neither from the main power supply nor the motor.

■ Connecting a grounding set

Before starting to work on the drive, you must ground the three input and three output terminals in the terminal unit (TEU). Always ground the drive on both sides, i.e. on supply and motor side. Grounding on motor side is needed to avoid induced voltage from a spinning rotor or malfunction of MSS.

For this purpose, two grounding harnesses are needed.



WARNING

MSS cannot connect to ground in case of MB is closed.

Grounding of MSS on the motor side would lead to a direct short circuit when MB is closed. This could result in death, serious injury, or severe damage to the system.

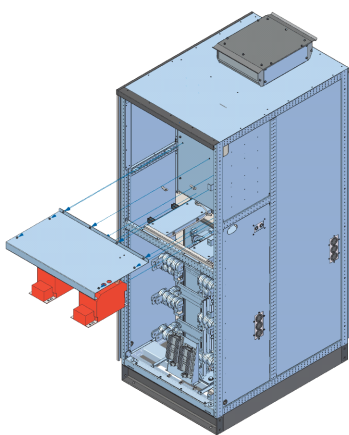
- Grounding harness is mandatory when converter is in maintenance.
- An isolator at the output of converter is recommended for safety purpose.



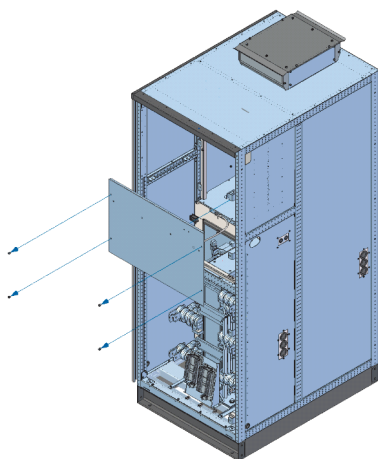
Replacing cooling fan in SBU

■ Procedure

1. Stop, de-energize and ground the drive following the steps in section *Shutting down the drive for maintenance* before you start the work.
2. Switch off the motor starter of the fan unit to isolate the fan unit from the auxiliary power supply. To identify the motor starter, see the [ACS580MV Wiring Diagram of SBU](#).
3. Disconnect the wires on the PT, remove the screws that fix the PT, move out the PT from cabinet.
4. Remove 2 safety blocks on the middle plate, remove the eight hex-head combination screws (M6x12) that attach the horizontal plate, move out the horizontal plate.

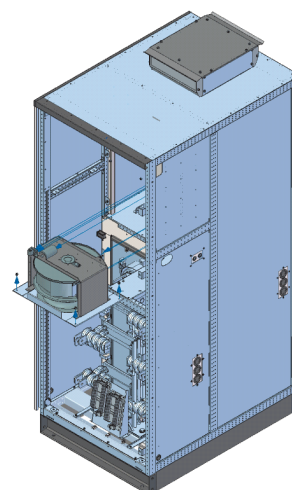
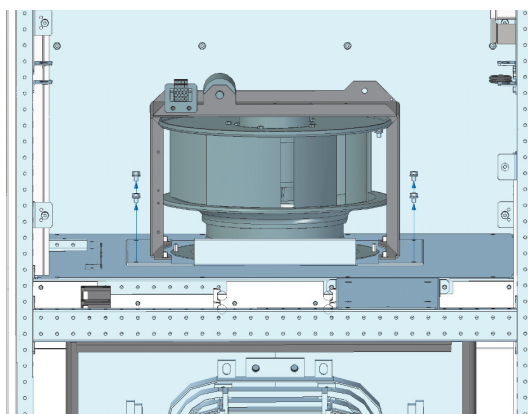


5. Remove the four hex-head combination screws (M6x12) that attach the vertical plate, move out the vertical plate.



6. Disconnect the wires on the fan kit, remove the screws that fix the fan kit, move out the fan kit from cabinet.





7. Proceed in reverse order as previously described to reinstall the new fan kit.

■ Maintenance schedule

The recommended intervals for maintenance and component replacement are based on the normal operating conditions of the drive. The drive should be checked at least every two years by qualified personnel whose recommendations should be followed. Depending on the actual condition of the drive, the maintenance work can be carried out before or after the recommended interval.

For detailed inspect and replacement time interval. See [ACS580MV Preventive Maintenance Schedule](#) (2UBB004520).





11

Technical data

For the technical specifications of the bypass - drive, e.g. ratings sizes and technical requirements see the following documents:

For technical data, drive types and options refer to ACS580MV Catalog.

For mechanical layout, dimensions and required free space see [ACS580MV Base frame & TEU layout design](#) (2UBB020751).

For motor and cable selection and for the technical requirements for the protection and control of the medium voltage supply refer to [ACS580MV Engineering Guideline](#) (2UBB013672).

The list of available general documents is provided in [List of related manuals](#) on the inside of the front cover of this manual.

SBU technical data

Items	
Power loss of main and control components	see ACS580MV Engineering Guideline for SBU (2UBB005536)
Dimension an weight	see Transportation
Time for synchronization from rated speed	≤ 20 s
Inrush current	120% motor nominal current
Max Grid numbers	2
Max motor numbers	8
Standard compliance	IEC 61800-5-1, IEC 61800-4, IEC 61800-3
DV/DT	< 1 kV/us for ACS580MV; < 500 V/us for ACS580MV with SBU
Voltage drop over SBU output choke	< 300 V

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/drives and select *Training courses*.

Document library on the Internet

You can find manuals and other product documents in PDF format on the Internet. Go to www.abb.com/drives and select *Document Library*. You can browse the library or enter selection criteria, for example a document code, in the search field.



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