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OPTIONS FOR ABB DRIVES

# **RSYC-01 synchronizing unit for ACS580 and ACS880 drives**

User's manual



# RSYC-01 synchronizing unit for ACS580 and ACS880 drives

User's manual

Table of contents



1. Safety instructions



4. Mechanical installation



5. Electrical installation



6. Start-up





# Table of contents

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## **1 Safety instructions**

Contents of this chapter .....	7
Use of warnings and notes .....	7
Safety in installation, start-up and maintenance .....	8
Electrical safety precautions .....	8

## **2 Introduction to the manual**

Contents of this chapter .....	11
Applicability .....	11
Target audience .....	11
Terms and abbreviations .....	11
Related documents .....	12

## **3 Operation principle and hardware description**

Contents of this chapter .....	13
Overview .....	13
Operation principle .....	13
Layout .....	14

## **4 Mechanical installation**

Contents of this chapter .....	15
Examining the delivery .....	15
Installing the unit .....	16

## **5 Electrical installation**

Contents of this chapter .....	17
Warnings .....	17
Required components .....	17
Switch-over contactors [K1] and [K2] .....	17
Control relay [K4] .....	18
Contactor [K7] .....	18
Other components .....	18
Wiring requirements .....	18
Connection diagrams .....	19
ACS580 drives with CCU control unit .....	19
ACS880 drives with BCU control unit .....	20
ACS880 drives with ZCU control unit .....	21
Control unit terminal connections .....	22
RSYC-01 terminals .....	22

## **6 Start-up**

Contents of this chapter .....	23
Commissioning the synchronizing unit .....	23
Start up the system .....	23

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6 *Table of contents*

Check the synchronizing unit operation .....	24
Check the trim function and synchronization .....	24
Complete the installation .....	25
Disabling or resetting the synchronization circuit .....	25
Parameter settings .....	25

**7 *Fault tracing***

Contents of this chapter .....	29
Fault tracing .....	29
Measuring with an oscilloscope .....	30

**8 *Technical data***

Contents of this chapter .....	33
Technical data .....	33

**9 *Dimension drawings***

Contents of this chapter .....	35
Cover .....	36
Enclosure body .....	37

*Further information*



# 1

## Safety instructions

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### Contents of this chapter

This chapter contains the safety instructions which you must obey when you install, start up, operate and do maintenance work on the synchronizing unit and synchronization circuit. If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

### Use of warnings and notes

Warnings tell you about conditions which can cause injury or death, or damage to the equipment. They also tell you how to prevent the danger. Notes draw attention to a particular condition or fact, or give information on a subject.

The manual uses these warning symbols:

**WARNING!**

Electricity warning tells about hazards from electricity which can cause injury or death, or damage to the equipment.

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**WARNING!**

General warning tells about conditions, other than those caused by electricity, which can cause injury or death, or damage to the equipment.

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**WARNING!**

Electrostatic sensitive devices warning tells you about the risk of electrostatic discharge which can cause damage to the equipment.

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## Safety in installation, start-up and maintenance

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### **WARNING!**

Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation or maintenance work.

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This manual does not contain the complete safety instructions of the drive. It only includes the instructions related to the scope of this manual. For the complete safety instructions, refer to the drive hardware manual.

Only a qualified electrical professional is permitted to install, start up and do maintenance on the drive, the synchronizing unit and synchronization circuit.

## Electrical safety precautions

These electrical safety precautions are for all personnel who do work on the drive, motor cable or motor.

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### **WARNING!**

Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur.

If you are not a qualified electrical professional, do not do installation or maintenance work.

Go through these steps before you begin any installation or maintenance work.

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1. Clearly identify the work location and equipment.
  2. Disconnect all possible voltage sources. Make sure that re-connection is not possible. Lock out and tag out.
    - Open the main disconnecting device of the drive.
    - Open the charging switch if present.
    - Open the disconnecter of the supply transformer. (The main disconnecting device in the drive cabinet does not disconnect the voltage from the AC input power busbars of the drive cabinet.)
    - Open the auxiliary voltage switch-disconnector (if present), and all other possible disconnecting devices that isolate the drive from dangerous voltage sources.
    - If you have a permanent magnet motor connected to the drive, disconnect the motor from the drive with a safety switch or by other means.
    - Disconnect all dangerous external voltages from the control circuits.
    - After you disconnect power from the drive, always wait 5 minutes to let the intermediate circuit capacitors discharge before you continue.
  3. Protect any other energized parts in the work location against contact.
  4. Take special precautions when close to bare conductors.
-

5. Measure that the installation is de-energized. If the measurement requires removal or disassembly of shrouding or other cabinet structures, obey the local laws and regulations applicable to live working (including – but not limited to – electric shock and arc protection).
  - Before and after measuring the installation, verify the operation of the voltage tester on a known voltage source.
  - Make sure that the voltage between the drive input power terminals (L1, L2, L3) and the grounding (PE) busbar is zero.
  - Make sure that the voltage between the drive output terminals (T1/U, T2/V, T3/W) and the grounding (PE) busbar is zero.
  - Make sure that the voltage between the drive DC terminals (UDC+ and UDC-) and the grounding (PE) terminal is zero. In cabinet-built drives, measure between the drive DC busbars (+ and -) and the grounding (PE) busbar.
6. Install temporary grounding as required by the local regulations.
7. Ask for a permit to work from the person in control of the electrical installation work.





# 2

## Introduction to the manual

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### Contents of this chapter

This chapter gives basic information on the manual.

### Applicability

This manual is applicable to the RSYC-01 synchronizing unit, which is compatible with ACS580 and ACS880 drives.

The drive parameter data refers to ACS580 standard control program and ACS880 primary control program.

### Target audience

This manual is intended for the people who are responsible for installing, commissioning, using and troubleshooting the synchronization circuit with the RSYC-01 synchronizing unit.

You are expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols.

### Terms and abbreviations

Term	Description
ACS-AP-I	Industrial assistant non-Bluetooth control panel
ACS-AP-S	Standard assistant control panel
ACS-AP-W	Industrial assistant control panel with Bluetooth interface
BCU	Type of control unit
CCU	Type of control unit
Drive	Frequency converter for controlling AC motors
Inverter	Converts direct current and voltage to alternating current and voltage.

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Term	Description
Parameter	In the drive control program, user-adjustable operation instruction to the drive, or signal measured or calculated by the drive. In some (for example fieldbus) contexts, a value that can be accessed as an object, eg, variable, constant, or signal.
ZCU	Type of control unit

## Related documents

Manual	Code
<b>Drive hardware manuals and guides</b>	
ACS580-07 drives (75 to 500 kW) hardware manual	3AXD50000045815
ACS880-07 drives (45 to 710 kW, 50 to 700 hp) hardware manual	3AUA0000105718
ACS880-07 drives (560 to 2800 kW) hardware manual	3AUA0000143261
<b>Drive firmware manuals</b>	
ACS580 standard control program firmware manual	3AXD50000016097
ACS580 drives with standard control program quick start-up guide	3AXD50000048035
ACS880 primary control program firmware manual	3AUA0000085967
ACS880 drives with primary control program quick start-up guide	3AUA0000098062
<b>Drive option manuals and guides</b>	
ACX-AP-x assistant control panels user's manual	3AUA0000085685
Drive composer start-up and maintenance PC tool user's manual	3AUA0000094606

You can find manuals and other product documents in PDF format on the Internet at [www.abb.com/drives/documents](http://www.abb.com/drives/documents).

# 3

## Operation principle and hardware description

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### Contents of this chapter

This chapter contains a description of the synchronizing unit.

### Overview

The RSYC-01 synchronizing unit is designed for applications where a large constant-speed motor must be started from a weak supply line. A drive with the RSYC-01 unit starts the motor with a low current draw and a high torque. When the output frequency of the drive reaches the supply line frequency, the RSYC-01 unit bypasses the drive and connects the motor directly to the supply line.

### Operation principle

The RSYC-01 unit uses switch-over contactors to control the connections between the motor, the drive, and the supply line. It 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 (BUF OUT, 0 ... 10 V) indicates the synchronization status for the drive. When the BUF OUT signal is at 5 volts, the frequency and phasing of the supply line and the drive output are synchronized.

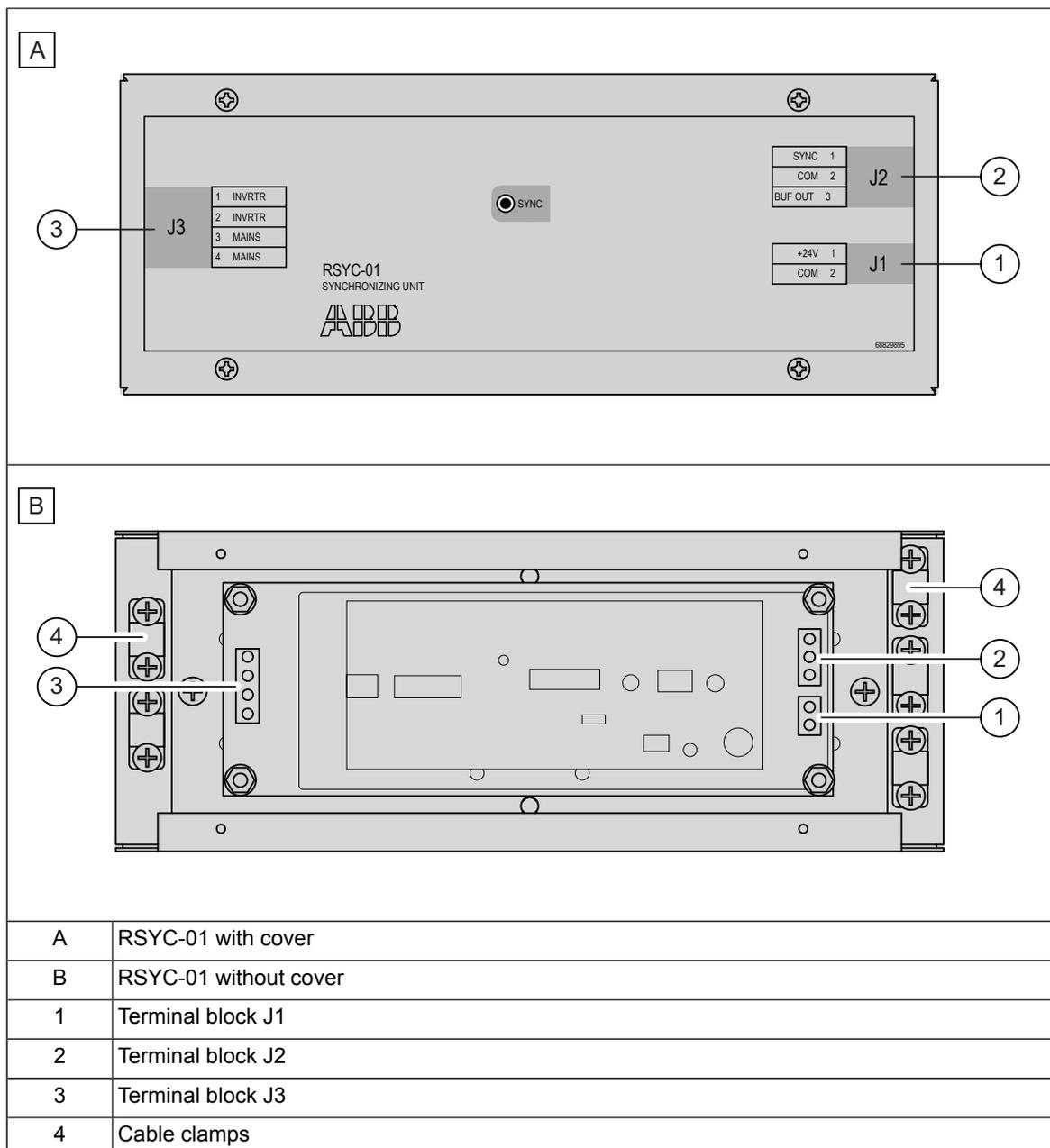
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## 14 Operation principle and hardware description

The drive control program constantly corrects the drive frequency reference (set to 50 Hz or 60 Hz) on basis of the BUF OUT signal by using the trim function. When the supply line and the drive output are synchronized:

- BUF OUT signal is at 5 V, indicating "synchronized" status for the drive application program
- the RSYC-01 unit sends a signal to the contactor control circuit
- the drive control logic stops the inverter modulation
- the contactor control circuit opens contactor K1, which disconnects the motor from drive
- the contactor control circuit closes contactor K2, which connects the motor to the supply line.

## Layout



# 4

## Mechanical installation

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### Contents of this chapter

This chapter contains instructions for installing the unit to a mounting rail and lists the contents of the RSYC-01 kit.

### Examining the delivery

Make sure that the package contains these items:

- RSYC-01 unit
- 2 synchronizing transformers
- 8 m (26 ft) of cable
- this manual.

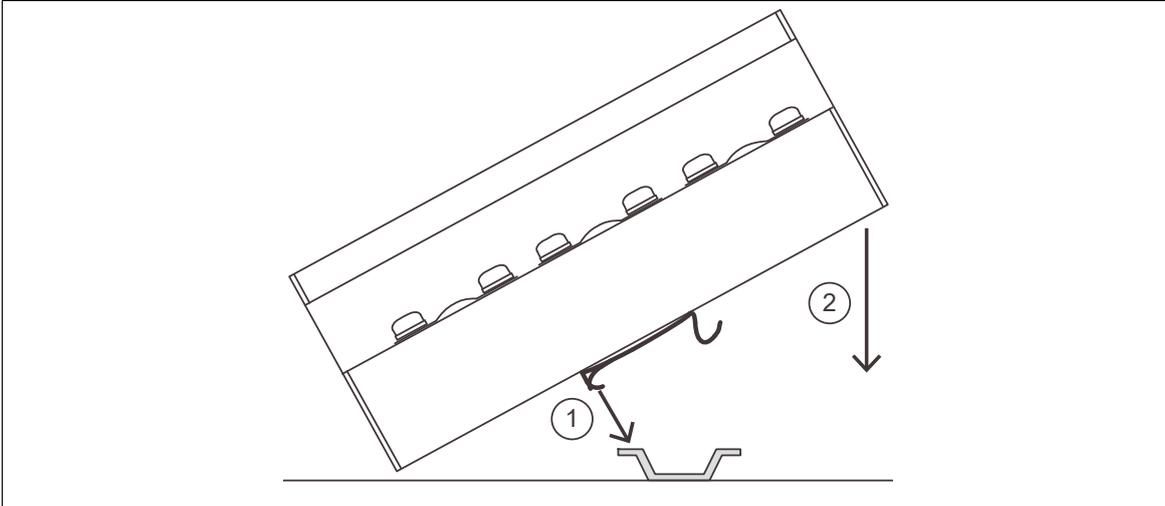
Make sure that there are no signs of damage to the items.

**Note:** The package does not contain all the necessary items for installing and commissioning the unit. You must get some components separately. Refer to the electrical installation instructions in this manual.



## Installing the unit

Install the unit to a 7.5 × 35 mm top hat type rail. Push the feet onto the rail as shown in the illustration.



# 5

## Electrical installation

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### Contents of this chapter

This chapter contains connection diagrams and a list of items required in the electrical installation.

### Warnings

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**WARNING!**

Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation or maintenance work.

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### Required components

You must get these components separately:

- switch-over contactors (K1 and K2)
- relays and contactors of the control circuit (K1...K7)
- cables and fuses between transformer T1 and main circuit
- cables and fuses between transformer T2 and main circuit.

#### ■ Switch-over contactors [K1] and [K2]

Select the drive switch-over contactor [K1] according to the drive specifications. The contactor must be suitable for use with a drive. Using the incorrect type of contactor can cause damage to the equipment.

Select the motor switch-over contactor [K2] according to the motor specifications.

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### ■ Control relay [K4]

Select a relay that has a maximum coil current of less than 200 mA.

### ■ Contactor [K7]

Select an applicable type of contactor that agrees with the network voltage and frequency.

For a supply voltage of 250 ... 500 V AC and a frequency of 50 or 60 Hz, you can use, for example, ABB AF09-30-10-14.

### ■ Other components

For more information about component selection, contact ABB.

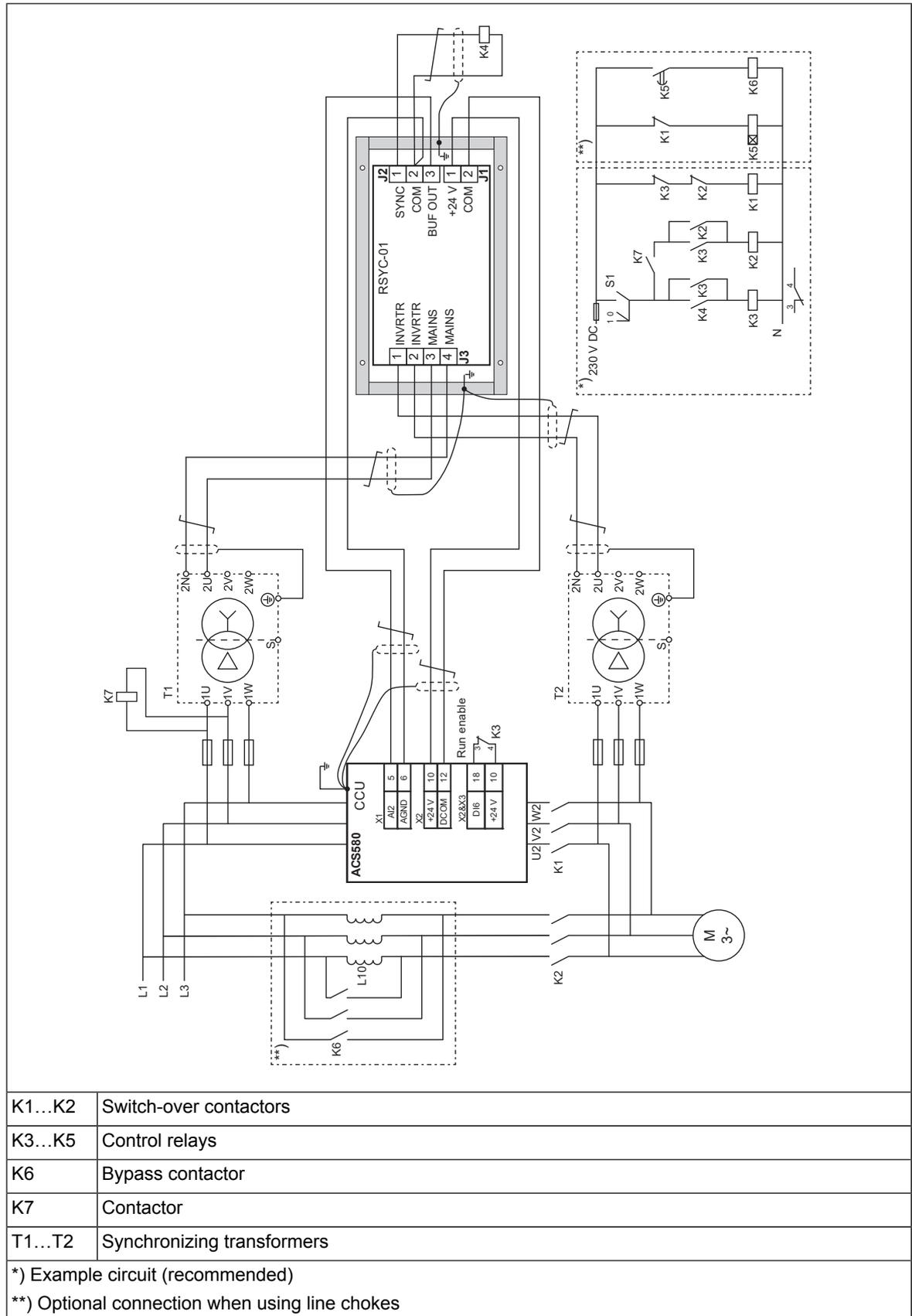
## Wiring requirements

- Obey the wiring instructions in the drive hardware manual.
- Keep a minimum of 0.5 m (20 in) space between the unit, the power cables, and the drive module. If you cannot keep this much distance between them, keep as much distance as possible.
- Use shielded twisted-pair cables between the transformers and the synchronizing unit. Ground the shields at the cable clamps, with as short pigtailed as possible. Cut and insulate all unused conductors at both ends of the cables.
- Use shielded twisted-pair cables between the synchronizing unit and the drive. Ground the shields at the drive module end according to the instructions given in the drive hardware manual.
- Use shielded twisted-pair cables between the synchronizing unit and the contactor control circuitry. Ground the shields at the cable clamps, with as short pigtailed as possible.
- Dimension the cable in between the main circuit and the synchronizing transformers according to the main circuit voltage. If necessary, protect the cable with fuses.

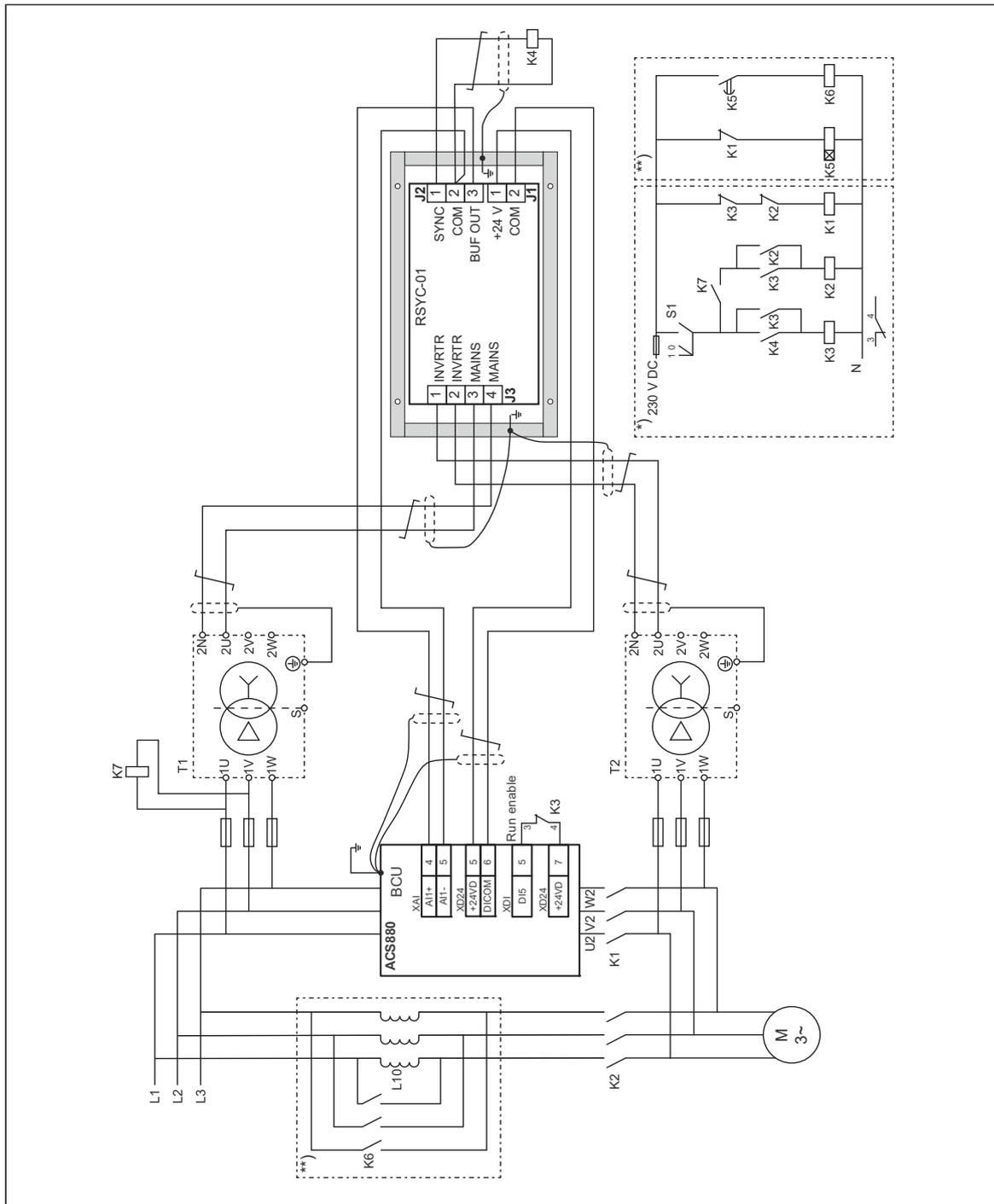


## Connection diagrams

### ■ ACS580 drives with CCU control unit

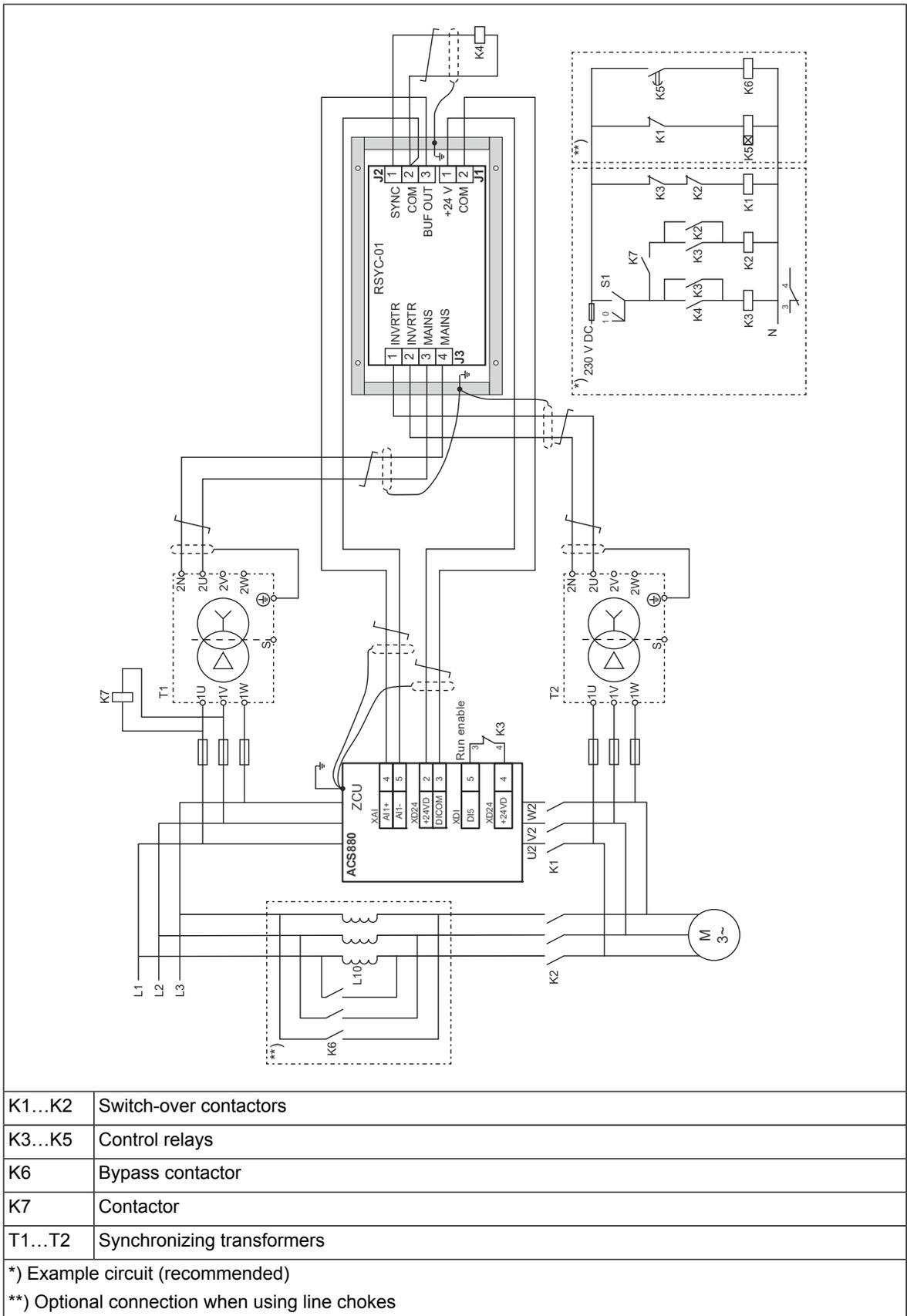


■ ACS880 drives with BCU control unit



K1...K2	Switch-over contactors
K3...K5	Control relays
K6	Bypass contactor
K7	Contactors
T1...T2	Synchronizing transformers
*) Example circuit (recommended)	
**) Optional connection when using line chokes	

■ ACS880 drives with ZCU control unit



## ■ Control unit terminal connections

Function	Terminals		
	ACS580 CCU	ACS880 BCU	ACS880 ZCU
Synchronization status indication	A12 (X1:5)	A1+ (XAI:4)	A1+ (XAI:4)
	AGND (X1:6)	A1- (XAI:5)	A1- (XAI:5)
24 V for run enable	+24V (X2:10)	+24VD (XD24:7)	+24VD (XD24:4)
Run enable	DI6 (X3:18)	DI5 (XDI:5)	DI5 (XDI:5)
Power supply for RSYC-01	+24V (X2:10)	+24VD (XD24:5)	+24VD (XD24:2)
	DCOM (X2:12)	DICOM (XD24:6)	DICOM (XD24:3)

## ■ RSYC-01 terminals

Terminal	Name	Description
J1	1	+24 V
	2	COM
J2	1	SYNC
	2	COM
		COM
3	BUF OUT	
J3	1	INVRTR
	2	
	3	MAINS
	4	



## 6

## Start-up

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### Contents of this chapter

This chapter contains instructions for commissioning the unit and setting the drive parameters.

### Commissioning the synchronizing unit

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**WARNING!**

Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation or maintenance work.

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This section tells you how to commission a drive with the synchronizing unit.

■ **Start up the system**

<b>Action</b>	<input checked="" type="checkbox"/>
Make sure that the drive is disconnected from the supply line and that all other precautions given in the safety instructions are taken into consideration.	<input type="checkbox"/>
Make sure that the electrical installation of the drive, the synchronizing unit and the synchronization circuit is completed.	<input type="checkbox"/>
Disconnect the contactor control circuit cable from terminal J2 of the RSYC-01 unit.	<input type="checkbox"/>
Power up the drive. Refer to the drive hardware manual.	<input type="checkbox"/>
Set the drive parameters according to the instructions given in this manual. Refer to <i>Parameter settings (page 25)</i> .	<input type="checkbox"/>

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## ■ Check the synchronizing unit operation

<b>Action</b>	<input checked="" type="checkbox"/>
Disable the trim function (set parameter <i>40.51 Set 1 trim mode</i> to <i>Off</i> ).	<input type="checkbox"/>
Use the LOC/REM key to select local control mode.	<input type="checkbox"/>
Select these actual values to the panel display: <ul style="list-style-type: none"> <li>• <i>01.02 Motor speed estimated</i></li> <li>• <i>01.06 Output frequency</i></li> <li>• <i>ACS580 drives: 12.21 AI2 actual value. *)</i></li> <li>• <i>ACS880 drives: 12.11 AI1 actual value. *)</i></li> </ul> *) This is the 0 ... 10 V DC status signal from the synchronizing unit.	<input type="checkbox"/>
<u>50 Hz systems</u> : Start the drive and increase the speed reference until the output frequency is as close to 50 Hz as possible. Record the actual speed and speed reference at this output frequency. <u>60 Hz systems</u> : Start the drive and increase the speed reference until the output frequency is as close to 60 Hz as possible. Record the actual speed and speed reference at this output frequency.	<input type="checkbox"/>
<u>50 Hz systems</u> : Decrease the speed reference until the output frequency is 45 ... 47 Hz. Make sure that the status signal is 8 ... 10 V DC. <u>60 Hz systems</u> : Decrease the speed reference until the output frequency is 55 ... 57 Hz. Make sure that the status signal is 8 ... 10 V DC.	<input type="checkbox"/>
<u>50 Hz systems</u> : Increase the speed reference until the output frequency is 52 ... 55 Hz. Make sure that the status signal is 0 ... 2 V DC. <u>60 Hz systems</u> : Increase the speed reference until the output frequency is 62 ... 65 Hz. Make sure that the status signal is 0 ... 2 V DC.	<input type="checkbox"/>
Stop the drive.	<input type="checkbox"/>

## ■ Check the trim function and synchronization

This check makes sure that the trim function affects the speed control of the drive in the correct way. Finding the correct value for trim range adjustment (parameter *40.55 Set 1 trim adjust*) is necessary for stable control and fast synchronization. The system then reaches synchronization with decreasing oscillations around 50 Hz or 60 Hz and the status signal for the trim function settles at approximately 5 V DC.

<b>Action</b>	<input checked="" type="checkbox"/>
Make sure that you have the recorded values of the actual speed and speed reference available.	<input type="checkbox"/>
Make sure that the trim function is disabled (parameter <i>40.51 Set 1 trim mode</i> is set to <i>Off</i> ).	<input type="checkbox"/>
Use the LOC/REM key to select remote control. The drive is now ready to be controlled externally with the control panel.	<input type="checkbox"/>
Start the drive.	<input type="checkbox"/>
<u>50 Hz systems</u> : Set the speed reference to the value that was equivalent to 50 Hz output frequency. <u>60 Hz systems</u> : Set the speed reference to the value that was equivalent to 60 Hz output frequency.	<input type="checkbox"/>
<u>50 Hz systems</u> : Check the output frequency from the display. If it is not 50 Hz, adjust the reference in small steps until the output frequency from the display is 50 Hz. Record this value. <u>60 Hz systems</u> : Check the output frequency from the display. If it is not 60 Hz, adjust the reference in small steps until the output frequency from the display is 60 Hz. Record this value.	<input type="checkbox"/>
Stop the drive.	<input type="checkbox"/>

<b>Action</b>	<input checked="" type="checkbox"/>
Enable the trim function (set parameter <i>40.51 Set 1 trim mode</i> to <i>Direct</i> ).	<input type="checkbox"/>
Start the drive. Monitor the control panel and the synchronizing unit status LED. The following indicates a successful Trim control loop: <ul style="list-style-type: none"> <li>•the drive accelerates to the speed reference that was defined before</li> <li>•<b>50 Hz systems:</b> the output frequency starts oscillating around 50 Hz</li> <li>•<b>60 Hz systems:</b> the output frequency starts oscillating around 60 Hz</li> <li>•<b>ACS580 drives:</b> AI2 is 2.5 ... 7 V</li> <li>•<b>ACS880 drives:</b> AI1 is 2.5 ... 7 V</li> <li>•status LED flashes the first time after 5 ... 20 seconds</li> <li>•status LED starts flashing in shorter time intervals and finally it is continuously on for several seconds.</li> </ul>	<input type="checkbox"/>
If faster synchronization is required, increase the value of parameter <i>40.55 Set 1 trim adjust</i> slightly (e.g. 0.01 ... 0.05). <b>Note:</b> A value that is too high can cause unstable control.	<input type="checkbox"/>
Stop the drive.	<input type="checkbox"/>

## ■ Complete the installation

<b>Action</b>	<input checked="" type="checkbox"/>
Connect the contactor control circuit cable to terminal J2 of the RSYC-01 unit.	<input type="checkbox"/>
Power up the system and do a test to make sure that it operates correctly.	<input type="checkbox"/>

When the system is correctly installed and commissioned, it synchronizes in less than 15 seconds and stays synchronized for dozens of seconds.

## Disabling or resetting the synchronization circuit

The information in this section is applicable when the contactor control circuit is implemented as shown in this manual.

To disable the synchronization circuit:

1. Change the external control location in the drive application program from EXT2 to EXT1 (parameter *19.11 Ex1/Ext2 selection*) or switch the drive to local control mode with the LOC/REM key on the control panel.
2. Turn the operating switch [S1] in the contactor control circuit to the OFF position.

To reset the synchronization circuit, turn the operating switch [S1] in the contactor control circuit to the OFF position, and then to ON again (1-0-1). This resets the relay logic and starts another synchronizing cycle.

## Parameter settings

The table that follows gives the parameter settings for starting a 4-pole motor (50 or 60 Hz). With these settings, the trim control can have an effect of  $\pm 20$  rpm to the final speed reference (1% of the defined maximum speed limit).

ABB recommends to use the control panel as an external control signal interface for start-up. If necessary, you can later change to I/O or fieldbus control. For instructions on using the control panel, refer to *ACX-AP-x assistant control panels user's manual* (3AUA0000085685 [English]).

These inputs are reserved for the synchronization application:

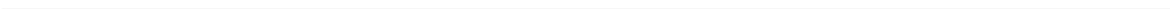
- ACS580: AI2 and DI6
- ACS880: A1 and DI5.

<input checked="" type="checkbox"/>	Task	ACS580 standard control program	ACS880 primary control program	Additional information
Control location and signal sources				
<input type="checkbox"/>	Select the source for external control location.	19.11 Ext1/Ext2 selection = EXT2		The trim function can be used from external control location Ext1 or Ext2.
<input type="checkbox"/>	Select the source of control commands for external control location EXT2.	20.06 Ext2 commands = Control panel		
<input type="checkbox"/>	Select the speed reference source for external control location EXT2.	22.12 Ext Speed ref2 = Control panel (ref saved)		
<input type="checkbox"/>	Fix the motor rotation in the forward direction.	20.21 Direction = Forward	20.24 Negative speed enable = Not selected	-
<input type="checkbox"/>	Connect process PID to additive speed reference.	Not applicable	22.15 Speed additive 1 source = PID	-
<input type="checkbox"/>	Deactivate constant speed selections.	22.22 Constant speed sel1 = Always off	22.22 Constant speed sel1 = Not selected	-
<input type="checkbox"/>	Select the source of the run enable signal.	20.12 Run enable 1 source = DI6	20.12 Run enable 1 source = DI5	Refer to <a href="#">Connection diagrams (page 19)</a> .
<input type="checkbox"/>	Define the minimum and maximum allowed motor speed.	30.11 Minimum speed = 0 rpm 30.12 Maximum speed = 2000 rpm		Maximum speed must be higher than motor nominal speed.
<input type="checkbox"/>	Select the way the motor should stop when a stop command is received.	21.03 Stop mode = Coast		The drive will stop modulating immediately after Run enable is switched off.
Settings of PID controller used by the trim function, parameter group 40 Process PID set 1				
<input type="checkbox"/>	Activate error value inversion.	40.31 Set 1 deviation inversion = Inverted (Fbk – Ref)		RSYC-01 unit feature.
<input type="checkbox"/>	Define the analog input scaling.	12.29 AI2 scaled at AI2 min = 0 12.30 AI2 scaled at AI2 max = 100	12.19 AI1 scaled at AI1 min = 0 12.20 AI1 scaled at AI1 max = 100	-
<input type="checkbox"/>	Configure the basic PID controller settings.	40.07 Process PID operation mode = On when drive running 40.15 Set 1 output scaling = 100 40.52 Set 1 trim selection = Speed		-
<input type="checkbox"/>	Select the process actual value for the process PID controller.	40.10 Set 1 feedback function = In1		-



<input checked="" type="checkbox"/>	Task	ACS580 standard control program	ACS880 primary control program	Additional information
<input type="checkbox"/>	Select the source of process feedback.	40.08 Set 1 feedback 1 source = AI2 scaled	40.08 Set 1 feedback 1 source = AI1 scaled	BUF OUT signal from RSYC-01 unit, 0 ... 10 V: <ul style="list-style-type: none"> <li>• &lt; 5 V = supply line frequency is lower than drive output frequency.</li> <li>• 5 V = supply line frequency and drive output frequency are equal and phases match.</li> <li>• &gt; 5 V = supply line frequency is higher than drive output frequency.</li> </ul>
<input type="checkbox"/>	Define the minimum limit for the process PID controller output.	40.36 Set 1 output min = -100.0		-
<input type="checkbox"/>	Define the maximum limit for the process PID controller output.	40.37 Set 1 output max = 100.0		-
<input type="checkbox"/>	Disable the integration term of PID controller.	40.33 Set 1 integration time = 0.0 s		-
<input type="checkbox"/>	Activate the trim function and define trimming relative to maximum speed.	40.51 Set 1 trim mode = Direct		PID controller output is relative to maximum speed limit defined in parameter 30.12 <i>Maximum speed</i> .
<input type="checkbox"/>	Set trim reference to 50%.	40.21 Set 1 internal setpoint 1 = 50.00		Trim reference is equal to actual signal when the synchronization conditions are valid, that is, when AI1 (ACS880) / AI2 (ACS580) = 5 V.
<input type="checkbox"/>	Select Set 1 trim source to PID output.	40.56 Set 1 trim source = PID output		The trim function uses Process PID as input.
<input type="checkbox"/>	Define the maximum effect of trim (that is added to the drive reference).	40.55 Set 1 trim adjust = 0.010		0.010 = 1.0%
<b>Macro selection and motor control mode</b>				
<input type="checkbox"/>	Select factory macro.	96.05 Macro active = ABB standard	96.05 Macro active = Factory	Other macros except PID CTRL are also possible (PID cannot be used, because the PID controller is reserved for the trim function).
<input type="checkbox"/>	Select motor control mode.	99.04 Motor control mode = Vector	99.04 Motor control mode = DTC	-
<input type="checkbox"/>	Define the motor parameters.	99.06 ... 99.11	99.06 ... 99.11	Refer to the firmware manual.





## 7

## Fault tracing

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### Contents of this chapter

This chapter lists faults, possible causes and corrective actions.

### Fault tracing

Fault	Possible cause	Actions
All connections and parameters are correct, but the RSYC-01 unit operates incorrectly.	Electromagnetic interference (EMI) has an effect on the BUF OUT signal. Thus, synchronization is not possible.	Make sure that all cables connected to the unit are shielded and that the shields are properly grounded. Power cables, drive modules, contactor coils and high-current single-core conductors can cause electromagnetic interference (EMI). To reduce EMI, you can: <ul style="list-style-type: none"> <li>•install an additional metal shield between the source of the interference and the unit</li> <li>•increase the distance between the source of the interference and the unit.</li> </ul>
BUF OUT signal from the RSYC-01 unit is constantly low (0 ... 1 V DC).	Signals from synchronizing transformers are cross-connected at the unit.	Examine and correct the connections.
Drive output frequency remains too close to 50 Hz and occasional short synchronization pulses take place.	The value of parameter <i>40.55 Set 1 trim adjust</i> is too small. The drive cannot control the speed (and output frequency) loosely enough.	Increase the value of parameter <i>40.55 Set 1 trim adjust</i> .

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Fault	Possible cause	Actions
The speed control is unstable.	The value of parameter <i>40.55 Set 1 trim adjust</i> is too large. This causes the control to overcompensate.	Decrease the value of parameter <i>40.55 Set 1 trim adjust</i> .
Excessive motor current peak at synchronization.	Rotor decelerates too fast and phase difference between stator and motor fluxes increase too much.	Make contactors operate faster if possible. Contactors can operate simultaneously.  Connect a serial inductor (3-phase choke) to the motor AC input. Equip the choke with a bypass contactor. The contactor must be dimensioned according to continuous current. It is not necessary to dimension the choke according to continuous current, but it must not saturate through. Refer to <a href="#">Connection diagrams (page 19)</a> .
	Motor flux decreases too much during the operation of switch-over contactors. High current is needed to re-magnetize the motor.	Examine and correct the transformer connection.
	Supply line (motor) and drive output are 180° out of phase due to wrong connection of the synchronization transformer.	Examine and correct the transformer connection.
	Supply line and drive output are 180° out of phase, because the phasing between motor and supply line is different from the phasing between motor and drive output.	Examine and correct the connections.

## Measuring with an oscilloscope



### WARNING!

Use a grounding wristband when you handle printed circuit boards. Do not touch the boards unnecessarily. The boards contain components sensitive to electrostatic discharge.

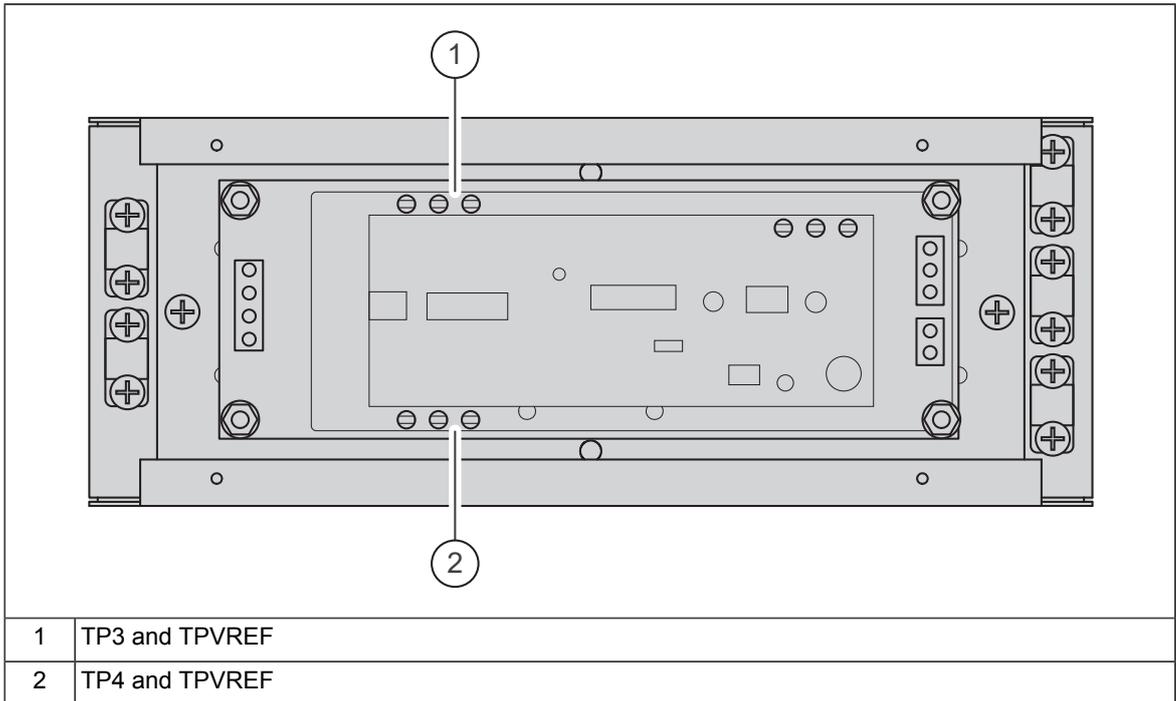
If there is no SYNC signal, you can examine the supply line (MAINS) and inverter output (INVRTR) signals from the unit with an oscilloscope.

Note that the measuring probes can conduct interference to the circuits of the unit. Keep all loops as small as possible and route the measuring circuits as far away from the drive and other cables as possible.

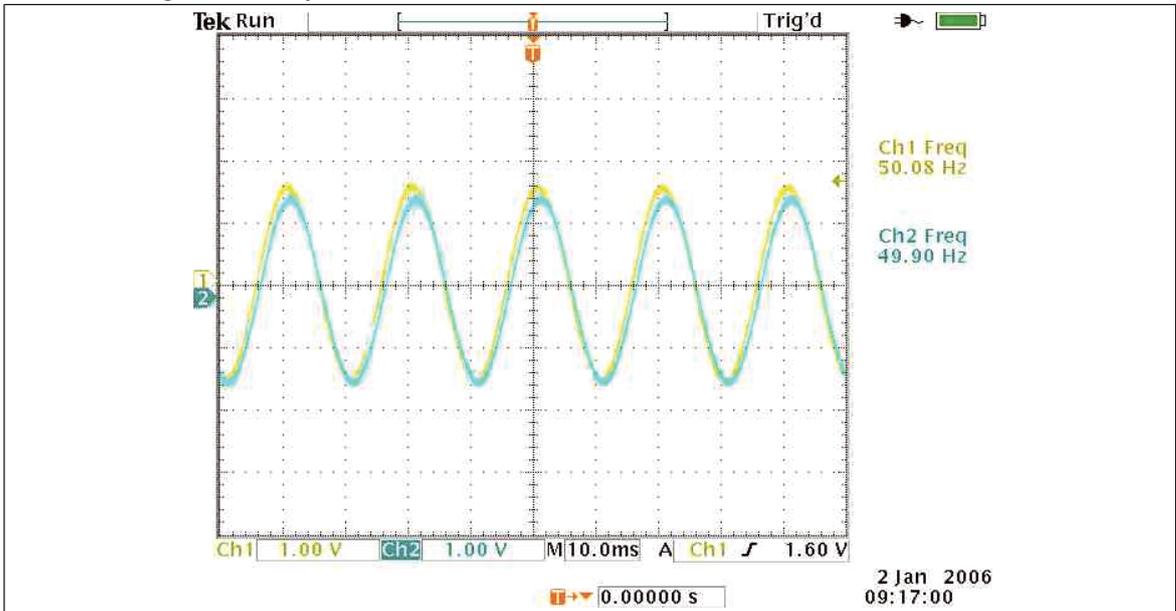
With the measuring probes, measure as follows:

- between TP3 and the adjacent TPVREF
- between TP4 and the adjacent TPVREF.

Refer to the illustration below for the locations.

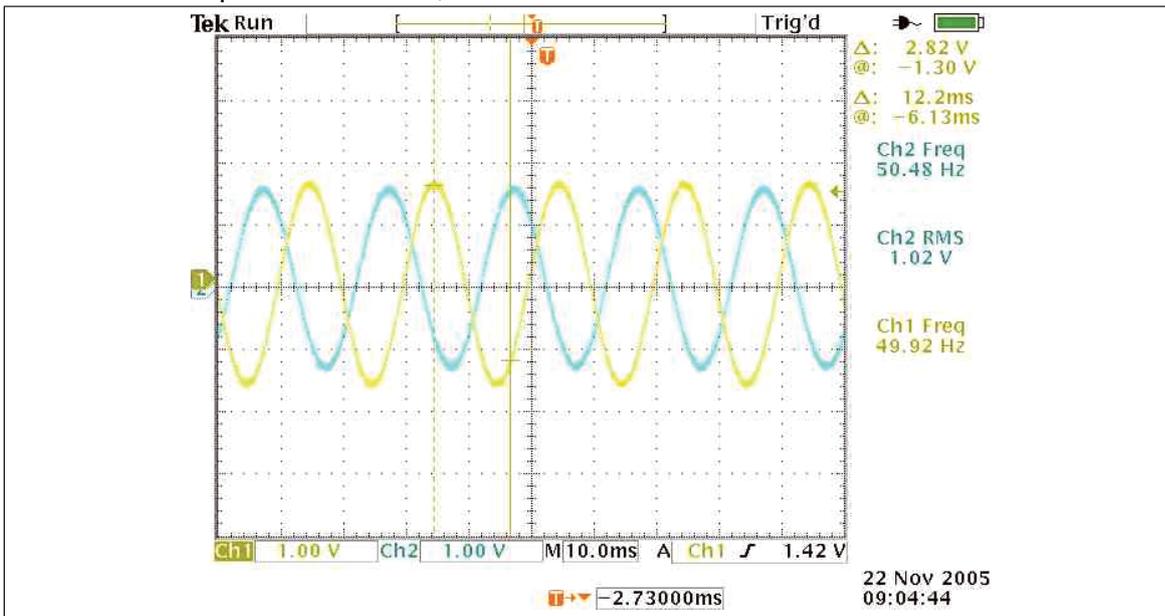


When the signals are synchronized, the waveforms are as follows:



### 32 Fault tracing

When there is a phase difference, the waveforms are as follows:



When the waveforms match, the unit gives a SYNC signal.

# 8

## Technical data

### Contents of this chapter

This chapter contains the technical data for the RSYC-01 synchronizing unit.

### Technical data

<b>RSYC-01</b>	
<b>Power supply voltage</b>	24 V DC (-5...+5%)
<b>Power consumption</b>	25 ... 35 mA
<b>Coil voltage</b>	24 V DC
<b>Maximum permitted coil current</b>	200 mA
<b>Input voltage range for terminal J3</b>	10 ... 120 V AC
<b>Signal cable<sup>1)</sup></b>	Shielded twisted-pair cable (Draka JAMAK 2 × (2+1) × 0.5 mm <sup>2</sup> or equivalent)
<b>Synchronization accuracy</b>	-21...+21°
<b>Transformer cable<sup>2)</sup></b>	Maximum cross-section: 4 mm <sup>2</sup> (12 AWG)
<b>Mounting rail</b>	7.5 × 35 mm (EN 50022)

1) Connection between the RSYC-01 unit and the drive, transformers and control relays.

2) Connection between the synchronizing transformers and main circuit, at drive output and input.

<b>Synchronizing transformers</b>	
<b>Type</b>	ABB 690/43.3 V, 3 VA, 45 ... 65 Hz (58125130)
<b>Primary voltage</b>	690 V AC 45 ... 65 Hz
<b>Secondary voltage</b>	43.3 V AC 45 ... 65 Hz
<b>Power</b>	3 VA

34 *Technical data*

<b>Synchronizing transformers</b>	
<b>Winding connection</b>	Dyn 11
<b>Winding separation</b>	Static screen

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## **Dimension drawings**

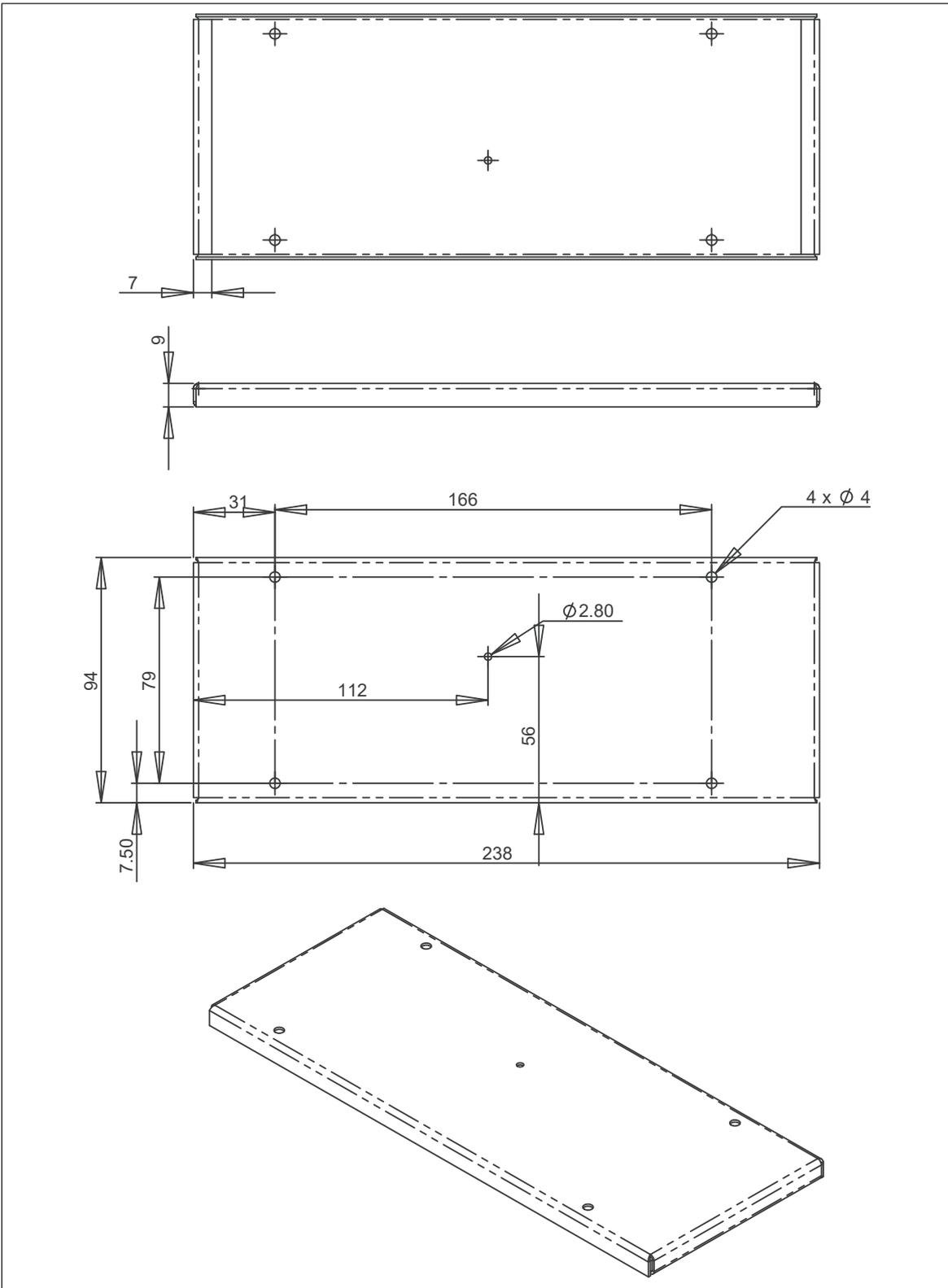
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### **Contents of this chapter**

This chapter shows dimensions of the RSYC-01 unit.

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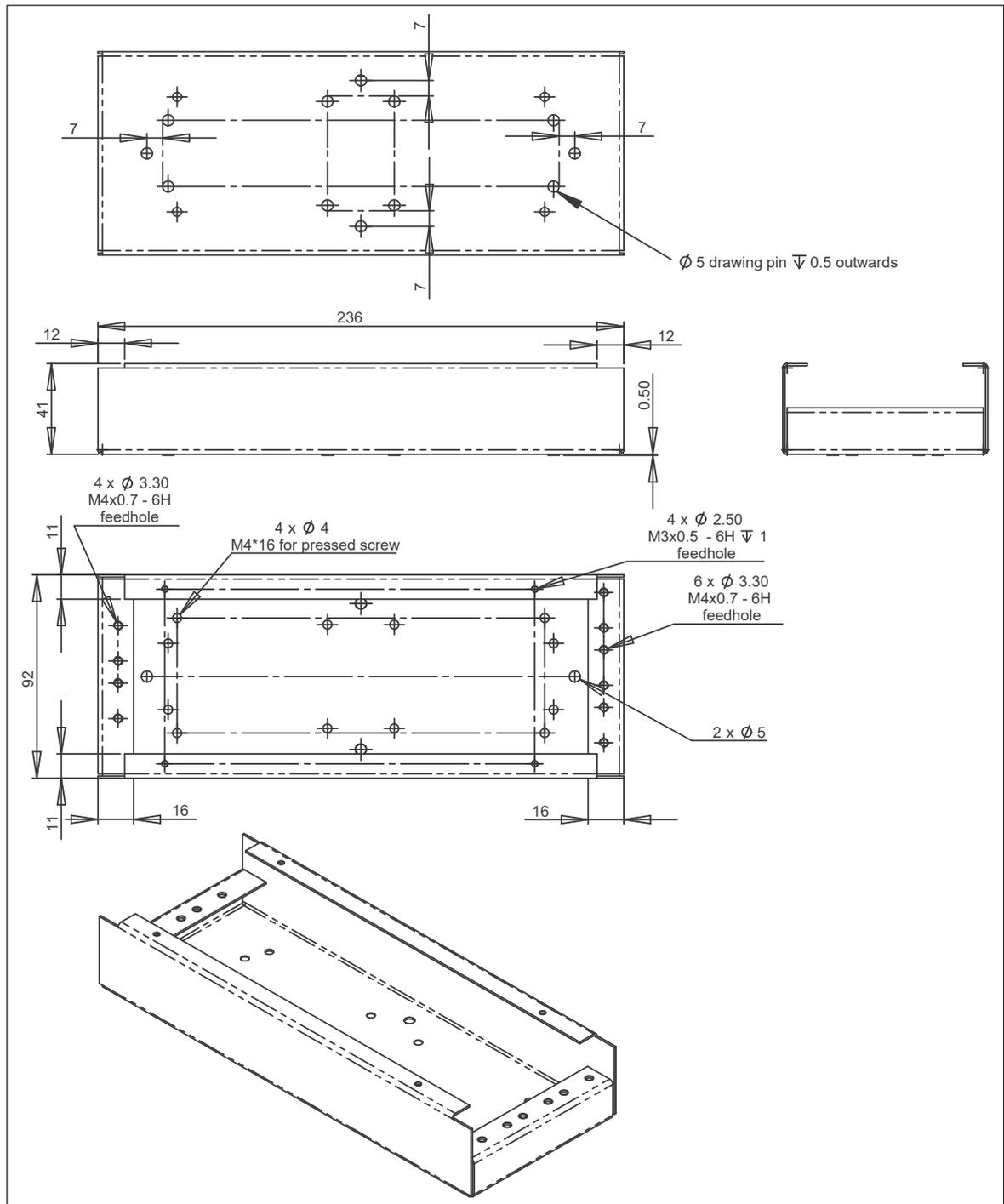
# Cover



Dimensions in mm.

1 mm = 0.0394 in

# Enclosure body



Dimensions in mm.

1 mm = 0.0394 in



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# 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](http://www.abb.com/searchchannels).

## **Product training**

For information on ABB product training, navigate to [new.abb.com/service/training](http://new.abb.com/service/training).

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