SIEMENS

Medium-Voltage AC Converters

SINAMICS GL150 Commissioning Manual

Commissioning Manual

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Appendix A

12/2009
A5E01098517

Introduction 1

1.1 Purpose of this document

This documentation facilitates the safe handling of the SINAMICS GL150 medium-voltage converter and contains comprehensive information on the commissioning and operating utilization phases and the tools available for them.

- This Commissioning Manual is valid for:
  - Software version SINAMICS V2.6.XX
  - STARTER version 4.1.XX

Table 1-1 Overview

Usage phase	Document/tool
Commissioning	Parameterization and Startup Tool STARTER List Manual GL150

Connectivity of the SINAMICS software and STARTER version

Table 1-2 Connectivity of the SINAMICS software and STARTER version

SINAMICS software	STARTER version	
	4.1.2	4.1.2 HF1
V 2.5 SP1	X	X
V 2.6 SP1	-	X
V 2.6 SP1 HF4	-	X

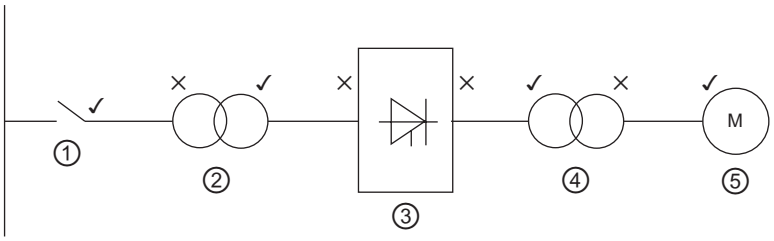
Documentation scope

In the interests of clarity, this documentation does not contain all the detailed information for all product types and cannot take into account every possible aspect of installation, operation, or maintenance.

Commissioning (hardware) 3

The following requirements must be met:

- The system must be set up as described in the operating instructions and connected according to the circuit diagram.
- The CompactFlash Card must be inserted in the CU320.
- The shields must be connected as shown in the diagram. Please note that the shields must not be connected to the converter.



①	Circuit breaker	✓	Connect shield
②	Line-side transformer	X	Do not connect shield
③	Converter		
④	Load-side transformer		
⑤	Motor		

Figure 3-1 Shield connection

- The converter must be clean. If necessary, clean the converter. Make sure that there are no dust deposits / dirt inside the converter.
- The power cable must be correctly connected.

Note

Grounding concept

Generally, it is assumed that the 24 V DC supply in the system is grounded. If the 24 V DC supply provided by the customer is equipped with a ground fault monitoring device, incoming DC/DC converters must be used.

3.1 Checklist for commissioning the hardware

Introduction

We recommend working through the steps and checks listed in the checklist before commissioning.

This checklist does not purport to be exhaustive. Depending on the system, it may be necessary to perform further steps or checks.

Checklist

Note

Tool

The tool required for commissioning depends on the particular system.

For high voltages, appropriate equipment must be used for isolated measured value acquisition.

- Required tools
  - Oscilloscope
  - Multimeter
  - Phase frequency meter
  - CompactFlash card reader
  - Battery compartment
  - High-voltage probe
  - Rogowski coil
  - Laptop
  - Insulation tester
- Insulation test with insulation tester
  - Disconnect the ground fault detection in front of the resistors ①.
  - Then perform an insulation test, for example, with an Isometer.

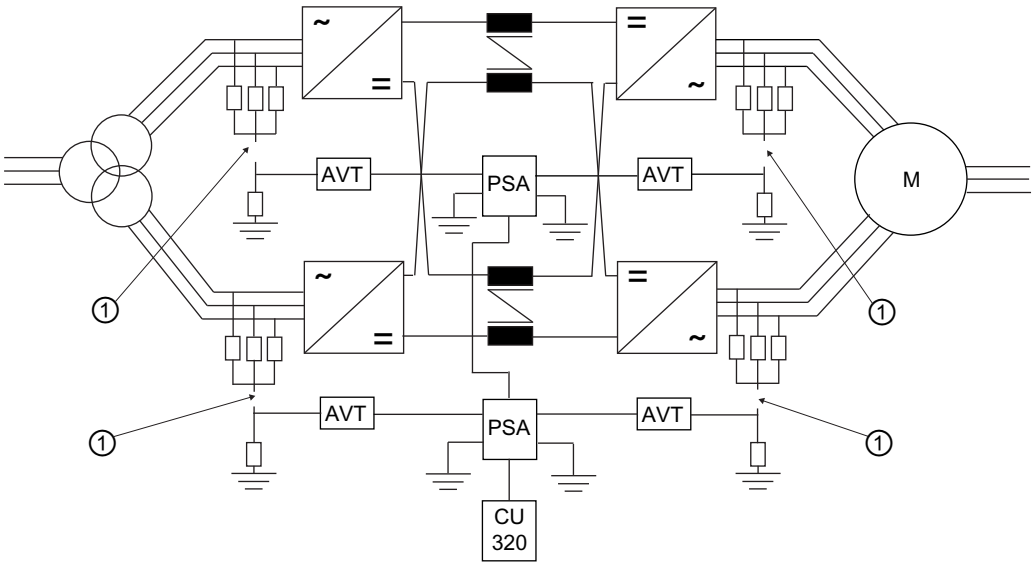


Figure 3-2 Example: Insulation test

- Make a back-up copy of the CompactFlash card.
- Apply the auxiliary voltage and gradually add the power supply.
  - Check whether the correct voltages are applied.
- After system start-up, check whether the firmware has been automatically updated.
- Check the ACX file on the CompactFlash card.
  - The CF card contains the file "Auftragsnummer_ Auftragsname.pdf" in which the ACX data are stated in plain text in directory ADDON\SINAMICS\DATA\HW_DESC\014. The GUID given in this file must match the r6545 parameter.
- Rectify the errors indicated.

- Rename the DRIVE-CliQ components according to the circuit diagram.
  - Check the DRIVE-CLiQ topology, for example using the flashing LED "RDY" on the components affected.
  - In OFFLINE mode, rename the components according to the circuit diagram and download the changes to the target device.
  - Save the changes from RAM to ROM. That is essential because the changes would otherwise be lost when the converter was switched off.
- Check the door limit switch.
- Check the electromagnetic door interlocking system (if installed).

⚠ WARNING

Dangerous high voltages

High voltages can cause death or serious injury if safety rules are not observed or if equipment is handled improperly.

Even when door interlocking is released, dangerous voltages could still be present on the auxiliary circuits (fans, anti-condensation heating, closed-loop control, etc.).

Check the function of the door limit switch on each door.

- Check the secure position and FO assignment if there are two or more transport units.
- Check the actual-value channels (U_m sensing, ground-fault detection, actual-current sensing).
  - Input voltage of the AVT combination module ≤ 3 V.
- Check the "emergency stop" function.
  - The converter goes into the fault state.
- Check connection with the higher-level controller (S7): Transformer and motor signals.
- Check the auxiliaries:
  - DMU
  - Switch
  - Disconnector, excitation
  - Fans.

Parameterizing/addressing 4

4.1 Important parameters

Introduction

This chapter contains the most important parameters for commissioning the converter.

You will find detailed information in the relevant section of chapter "Commissioning", in the List Manual on the CD supplied with the converter, and in the Help under the parameter in question

Important parameters for the test mode of the sequential control

Table 4-1 Important parameters for the test mode of the sequential control

Parameters	Description
p0840	Setting of the signal source for control word 1 bit 0 (ON/OFF1)
p1055	Setting of the signal source for inching 1
p1056	Setting of the signal source for inching 2
p1300	Setting the open-loop and closed-loop control mode of a drive
p1501	Setting of the signal source for switchover between speed and torque control
p6650	Setting for activation / deactivation of the test mode
p6651	Setting of the signal source for switching the test on/off
p6674	Setting of the checkback timeout on closing the circuit breaker
p6675	Setting of the checkback timeout on opening the circuit breaker
p6676	Setting the maximum permissible break-time of the circuit breaker
p6677	Setting of the signal type for the close command of the circuit breaker
p6678	Setting of the signal type for the open command of the circuit breaker
p6679	Setting of the pulse type for closing the circuit breaker
p6680	Setting of the pulse type for opening the circuit breaker
p6681	Setting of the pulse time for the open/close commands of the circuit breaker. Setting of the pulse time for the open/close commands of the circuit breaker
p6682	Setting of the blocking time for the circuit breaker
p6683	Setting of the bounce time of the circuit breaker used

Important parameters for the test mode of the auxiliaries

Table 4-2 Important parameters for the test mode of the auxiliaries

Parameters	Description
p6060	Setting of the signal source for the external command "Switch on fan"
p6577	Setting of the signal sources for the circuit monitoring functions

Parameters	Description
p6794	Setting of the monitoring time for switching on the fans
p6797	Setting of the switch-off delay after switching off the fans

Important parameters for the test mode of the outgoing disconnectors

Table 4-3 Important parameters for the test mode of the outgoing disconnectors

Parameters	Description
p6021	Setting of the signal source for switch-on enables 2 and 3 of the internal outgoing disconnector

Important parameters for testing communication with the excitation unit

Table 4-4 Important parameters for testing communication with the excitation unit

Parameters	Description
p2051	Selection of the PCD (actual values) with word format to be transmitted to the PROFIBUS master
p2061	Selection of the PCD (actual values) with double-word format to be transmitted to the PROFIBUS master

Important parameters for the test mode of demagnetization of the output transformer

Table 4-5 Important parameters for the test mode of demagnetization of the output transformer

Parameters	Description
p6000	Setting of the signal source for the ON command of the demagnetization equipment of the output transformer
p6001	Setting of the signal source for the ON checkback of the demagnetization equipment of the output transformer
p6002	Setting of the signal source for the checkback "demagnetization completed" of the demagnetization equipment of the output transformer
p6003	Setting of the signal source for the checkback "disconnector open" of the demagnetization equipment of the output transformer
p6004	Setting of the signal source for the checkback "fault" of the demagnetization equipment of the output transformer
r6005	Display of the status word of the demagnetization equipment of the output transformer
p6006	Setting of the timeout for the demagnetization equipment of the output transformer
p6008	Setting for enabling/disabling the demagnetization equipment of the output transformer
p6015	Execute and display BICO interconnections for existing options

Important parameters for the test mode of the motor sequential control

Table 4-6 Important parameters for the test mode of the motor sequential control

Parameters	Description
Test mode of the motor sequential control	
p6265	Setting of the mode for test mode for the motor sequential control

Important parameters for test mode for determination of line offset angle

Table 4-7 Important parameters for test mode for determination of line offset angle

Parameters	Description
p0971	Saving the parameters of each drive object in the non-volatile memory (CompactFlash Card)
p6067	Setting of the offset angle of the input transformer
r6068	Display of the offset angle

Important parameters for test mode for location

Table 4-8 Important parameters for test mode for location

Parameters	Description
p6240	Setting of the number of location cycles

Important parameters for test mode of current-control operation

Table 4-9 Important parameters for test mode of current-control operation

Parameters	Description
p6270	Setting of the minimum frequency of the motor control
p6285	Setting of the frequency of the load-side converter in test mode
p6350	Setting of the mode for manual operation
p6351	Setting of the standby generating frequency for mode "controlled operation without line voltage"
p6352	Setting of the delay angle for mode "controlled operation with/without line voltage"
p6353	Setting of the current setpoint for mode "current-controlled operation"

Fault history

You can call the fault history with parameter p0949.

4.2 Setting the motor parameters

4.2.1 Motor data sheet and equivalent circuit diagram

General information

Problem-free operation of the motor requires the data in the motor data sheet and in the equivalent circuit diagram.

Alarm, error and system messages 7

7.1 Evaluation of thyristor alarms

Description

In addition to the fault messages in STARTER or AOP, further information is displayed in parameters p6072 to p6077.

Thyristors are numbered as follows:

- The first number states the number of the system (1 to 4).
- The second describes the thyristor location (1 to 6).
- The third figure states the location in the series connection (1 to 6).

Example

In the following figure, for example, there is a faulty thyristor in system 1, arm 5, the third in the series connection.

Parameter	D	+	+	Parameter text	Online value VECTORGL_02
//Thyristor monitoring					
r6069			+	PU sequence control enable signals for valve monitoring	0H
p6070[0]		-		PU thyristor monitoring operating mode, Line side	Thyristor monitoring test mode (1)
p6070[1]				PU thyristor monitoring operating mode, Motor side	Thyristor monitoring normal operation (2)
r6071			+	CO: PU thyristor monitoring status word	4000H
r6072[0]			+	CO: PU LSC thyristor location fault arm 1/4	0H
r6073[0]			+	CO: PU LSC thyristor location fault arm 3/6	0H
r6074[0]			-	CO: PU LSC thyristor location fault arm 5/2	400H
r6074[0].0				Arm 2 thyristor location 1	OK
r6074[0].1				Arm 2 thyristor location 2	OK
r6074[0].2				Arm 2 thyristor location 3	OK
r6074[0].3				Arm 2 thyristor location 4	OK
r6074[0].4				Arm 2 thyristor location 5	OK
r6074[0].5				Arm 2 thyristor location 6	OK
r6074[0].6				Reserved	0
r6074[0].7				Reserved	0
r6074[0].8				Arm 5 thyristor location 1	OK
r6074[0].9				Arm 5 thyristor location 2	OK
r6074[0].10				Arm 5 thyristor location 3	Defect
r6074[0].11				Arm 5 thyristor location 4	OK
r6074[0].12				Arm 5 thyristor location 5	OK
r6074[0].13				Arm 5 thyristor location 6	OK
r6074[0].14				Reserved	0
r6074[0].15				Reserved	0
r6075[0]			+	CO: PU MSC thyristor location fault arm 1/4	0H
r6076[0]			+	CO: PU MSC thyristor location fault arm 3/6	0H
r6077[0]			+	CO: PU MSC thyristor location fault arm 5/2	0H

Figure 7-1 Example: Thyristor V153 defective

For comparison, the following figure shows a 24/12-pulse system. Here, each parameter for the line side appears with four and each parameter for the load side, with two indices. These indicate the individual thyristor locations as shown in the figure above.

Parameter	D	+	+	Parameter text	Value Drive
r6072[0]		+	+	CO: PU LSC thyristor location fault arm 1/4	0H
r6073[0]		+	+	CO: PU LSC thyristor location fault arm 3/6	0H
r6074[0]		-	+	CO: PU LSC thyristor location fault arm 5/2	0H
r6074[1]			+	CO: PU LSC thyristor location fault arm 5/2	0H
r6074[2]			+	CO: PU LSC thyristor location fault arm 5/2	0H
r6074[3]			+	CO: PU LSC thyristor location fault arm 5/2	0H
r6075[0]		+	+	CO: PU MSC thyristor location fault arm 1/4	0H
r6076[0]		+	+	CO: PU MSC thyristor location fault arm 3/6	0H
r6077[0]		-	+	CO: PU MSC thyristor location fault arm 5/2	0H
r6077[1]			+	CO: PU MSC thyristor location fault arm 5/2	0H

Figure 7-2 Example of four systems on the line side, two systems on the load side

7.2 Hardware trace

Description

Each time there is a fault trip, the drive dumps data to the CompactFlash card; these data are required by Customer Support in the case of a fault.

Save your data as follows:

1. Switch off the drive.
2. Remove the Compact Flash card from the CU.
3. Save all data (TRACE***.bin and TRACE_INFO.txt) in the directory "user/sinamics/data".
4. Send these data to Customer Support.

Troubleshooting/FAQs 8

8.1 FAQs

Question	Response
I cannot obtain sufficient torque / power. What can I do?	Check parameter p1520 (upper torque limit) / p1530 (motoring power limit). If automatic default values are entered here, you can input values up to 1.2 times the default values.

8.2 Contacts and technical support

Competent personnel

Note

Siemens-trained personnel

Certain components described in this documentation may be replaced or repaired only by personnel trained by Siemens. This guarantees that the product is safe.

Work carried out incorrectly can result in damage to the equipment and in breakdown during operation.

Ensure that only personnel trained by Siemens carry out work on the equipment. Siemens accepts no liability for any damage that occurs because these instructions have not been observed e.g. if an untrained person carries out a repair or replaces components.

For information on training courses and help with technical questions please contact the persons listed in the following section.

Spare parts and repairs

You can find the spare parts list for your converter online at:

- **https://b2b-extern.automation.siemens.com/spares_on_web**

If you wish to request a spare parts list, you must provide the order number and serial number of your converter. You can find the required information on the converter rating plate.

The spare parts service keeps a stock of key spare parts for round-the-clock delivery. You can find out online whether the spare part you require is currently in stock:

- **www.weblogxparts.industry.siemens.com**

Spare parts service in Germany (at weekends: emergency service)

- **Tel.: +49 (0)180 50 50 448**

Note

Always indicate the part number and - if known - the order number (MLFB) of the spare part required.

Where to find these:

On the side of each component, its item code is attached to the cabinet wall. Find out which item code the required spare part has. The parts list supplied with the converter indicates the part number and, where appropriate, the order number (MLFB) corresponding to the item code.

Online support

The homepage to the complete Siemens I DT service for external customers and for Siemens I IS can be found under:

www.siemens.com/automation/service&support

Technical inquiries

You can send your inquiries directly via the Internet to a specialist in Technical Support. Technical support is available round the clock 365 days a year. Your inquiries are delivered directly to the responsible specialist. If you have all relevant data available, Technical Support can respond to your inquiry as quickly as possible. Furthermore, you can send records, screen shots and photos to the specialists. You thus support the fault analysis.

www.siemens.com/automation/support-request

Technical Support (Hotline)

Technical advice from experts or the initiation of the necessary actions are accessed **exclusively** via Siemens AG I DT Technical Support.

Inquiries can be made worldwide at three Technical Support Centers.

Telephone inquiries

- Europe and Africa time zone:
  Tel.: **+49 (0)180 50 50 222**
- Asia and Australia time zone:
  Tel.: **+86 1064 719 990**
- America time zone:
  Tel.: **+1 423 262 2522**

On the Internet worldwide:

www.siemens.com/automation/support-request

The contacts may change. Please find the current contact partners in the Siemens AG I DT service catalog: www.automation.siemens.com/partner

Country-specific phone numbers

You will find the country-specific phone numbers on our Internet page:

http://support.automation.siemens.com/WW/view/en/16604318

8.3 Software update from version 2.5.1 to version 2.6.1

Notes

- The hardware description (ACX file) of version 2.5.1 on the CompactFlash card is not compatible with version 2.6.1.
- The evaluation of the ground switches has been changed.

SINAMICS software	Ground switch open	Ground switch closed
V 2.5.1	1	0
V 2.6.1	0	1

- The firmware of the Power Stack Adapter must be updated.
- A project that has already been parameterized with software version V2.5.1 cannot be transformed to a project in software version V2.6.1. The project must be re-parameterized in software version V2.6.1 (where appropriate via script).

Procedure

1. Disconnect the DRIVE-CliQ components
2. Replace the existing CompactFlash card in the CU320 with the new CompactFlash card that contains software version 2.6.1.
3. Switch on the voltage to the DRIVE-CliQ components.
4. Create a new project with software version 2.6.1 in the STARTER and go online.
5. Monitor the alarm window. While the update is in progress, alarm 1306 is present showing the relevant fault value for the component.



Figure 8-1 Alarm 1306