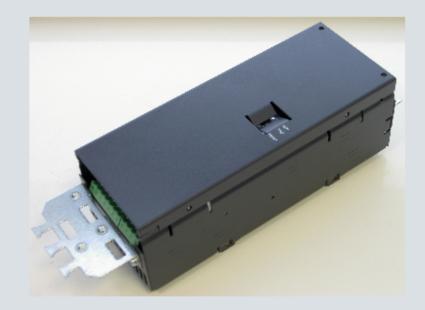
# SINAMICS G120

# CM240NE chemical industry module

Operating Instructions 01/2010



# **SINAMICS**

Answers for industry.



# SIEMENS

Introduction	1
Safety instructions	2
Description	3
Assembling	4
Connecting	5
Operation (hardware)	6
Commissioning the chemical industry inverter	7
Functions	8
Technical data	9
Dimension drawings	10
Accessories	11
Appendix	Α
List of abbreviations	В

1

SINAMICS

# SINAMICS G120 CM240NE chemical industry module

**Operating Instructions** 

Valid for: SINAMICS G120 from software release 3.0

### Legal information

### Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

#### 

indicates that death or severe personal injury will result if proper precautions are not taken.

#### 

indicates that death or severe personal injury **may** result if proper precautions are not taken.

#### 

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

### CAUTION

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

#### NOTICE

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

#### **Qualified Personnel**

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation for the specific task, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

#### Proper use of Siemens products

Note the following:

#### 

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

#### Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

#### **Disclaimer of Liability**

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

# Table of contents

1	Introdu	uction	7
	1.1	Terms and definitions	7
	1.2	Documents for the chemical industry inverter	8
	1.3	Service and support information	9
2	Safety	instructions	11
3	Descri	iption	17
	3.1	The chemical industry inverter	17
	3.2	The chemical industry module	19
4	Assem	nbling	21
	4.1	General	21
	4.2	Cover mounting	
	4.3	Rail mounting	25
5	Conne	ecting	
	5.1 5.1.1	Interfaces of the chemical industry module	
	5.1.2	Description	
	5.2	CU interfaces	
	5.3 5.3.1 5.3.2 5.3.3	Connecting the CM to the CU General Connecting for cover mounting Connecting for rail mounting	
	5.4	Grounding the chemical industry module	
	5.5	Connecting the field-side signals to the CM	
	5.6	24V supply voltage protection	40
	5.7	Connecting PROFIBUS DP	40
6	Operat	tion (hardware)	41
	6.1	Operator control elements	41
	6.2	Display elements	42
7	Comm	nissioning the chemical industry inverter	
	7.1	Commissioning information	43
	7.2	Configuring the CU	44
	7.3	Commissioning with script file	44
	7.4	Commissioning using the Drive Wizard	48
8	Function	ons	55

	8.1	Analog value de-coupling	55
	8.2	Thermal motor protection	55
9	Technica	al data	59
10	Dimensi	on drawings	63
11	Accesso	ries	65
А	Appendi	x	67
	A.1 A.1.1 A.1.2 A.1.3	Electromagnetic compatibility Electromagnetic Compatibility Definition of EMC environment and classes Overall EMC behavior	67 67
	A.2	Standards	70
	A.3 A.3.1 A.3.2 A.3.3 A.3.3.1 A.3.3.2 A.3.4	ATEX application Introduction Marking Installation Inverters for explosion-protected motors in hazardous zones Explosion-protected motors in hazardous zones Safe commissioning	71 71 73 73 74
в	List of al	bbreviations	79
	Glossary	/	81
	Index		83

## Introduction

### 1.1 Terms and definitions

### Chemical industry module (CM)

The CM240NE chemical industry module is a supplementary module for the SINAMICS G120 inverter with the following features:

- Isolated PTC thermistor connection (motor side) with PTC thermistor evaluation
- NAMUR terminal strip according to NE 37

### Chemical industry inverter (SD chemical industry inverter)

The chemical industry inverter is a combination of the chemical industry module with components from the SINAMICS G120 series of inverters, which provide safety-oriented functions.

Voltage range	Configuration
500 V to 690 V	CM240NE + PM260 + CU240S DP-F
400 V	CM240NE + PM250 + CU240S DP-F + LC output filter
400 V	CM240NE + PM240 + CU240S DP-F + LC output filter + line reactor + possibly a braking resistor

### NAMUR

NAMUR is an association of automation technology users in the process industry. The association issues recommendations that are designated with "NE xx".

### NE 37

NAMUR recommendation NE 37 "Inverter version - standard terminal strip for variable-speed drives" describes the special arrangement of the terminal strips.

1.2 Documents for the chemical industry inverter

### 1.2 Documents for the chemical industry inverter

### Technical documentation that is available for installation, commissioning, and operation

The following document classes are available for SINAMICS inverters:

- Getting Started Sufficient for commissioning simple applications with STARTER
- Operating Standard reference with detailed information for commissioning instructions
- Hardware Description of the Power Module installation
   Installation Manual
- Function Manual Detailed description of all of the inverter functions drive knowhow is required
- List Manual Description of the settings and display parameters drive knowhow is required

### Useful Internet addresses for SINAMICS inverters

- Information and support tools: http://support.automation.siemens.com
- Documentation for SINAMICS G120: http://www.siemens.com/sinamics-g120 http://support.automation.siemens.com/WW/view/en/22339653/133300
- Application examples can be found at: http://support.automation.siemens.com/WW/view/en/20208582/136000

### Documentation for the components used in the chemical industry inverter

Hardware Installation Manual PM260 Power Module PM250 Power Module PM240 Power Module Operating instructions Control Units CU240S, CU240S DP, CU240S DP-F Control Units CU240S, CU240S DP, CU240S DP-F (Compact) Chemical industry module List Manual Control Units CU240S, CU240S DP, CU240S DP-F Getting Started SINAMICS G120 Power Module SINAMICS G120 Control Unit SINAMICS G120 Control Units CU240S, CU240S DP, CU240S DP-F, CU240S PN Installation instructions SINAMICS G110/G120 PC connection kit SINAMICS G120 screen termination kit PM240 Power Modules SINAMICS G120 DIN rail fitting instructions SINAMICS G120 fan replacement frame sizes A to F SINAMICS G120 Nema 1 installation instructions PM 240 Power Modules SINAMICS G120 Input Choke installation instructions FS A-C Braking resistors for SINAMICS G120 frame size B (FSB) instruction sheet SINAMICS G120 Brake Module instructions Relay Brake Module, Safe Brake Module

### 1.3 Service and support information

### I DT Technical support

24-hour technical support is provided by three main centers worldwide.



Figure 1-1 I DT Global service and support

### Online Service and support

In the first instance for customer-support, contact should always be made with the regional (country based) sales/marketing/service organisations.

http://support.automation.siemens.com

For technical-support, the most optimised way to do this is via the Internet based Support-Request.

http://www.siemens.com/automation/support-request

1.3 Service and support information

### Europe/Africa (Erlangen)

Internet Support-Request: http://www.siemens.com/automation/support-request

Tel: +49 (180) 5050 222 Fax: +49 (180) 5050 223 e-Mail: support.automation@siemens.com

### America (Johnson City)

Internet Support-Request: http://www.siemens.com/automation/support-request

Tel: +1 (423) 262 2552 Fax: +1 (423) 262 2589 e-Mail: support.usa.automation@siemens.com

### Asia/Pacific (Beijing)

Internet Support-Request: http://www.siemens.com/automation/support-request

Tel: +86 (1064) 757 575 Fax: +86 (1064) 747 474 e-Mail: support.asia.automation@siemens.com

### Contact address

Should any questions or problems arise while reading this manual, please contact Siemens at the following address:

Siemens AG I DT SD SPA PM4 Postfach 3269 D-91050 Erlangen Germany

e-Mail: documentation.sd@siemens.com

#### **Regional contacts**

For questions regarding services, prices and conditions of technical support, please contact your local Siemens partner.

# Safety instructions

### Safety Instructions

The following Warnings, Cautions and Notes are provided for your safety and as a means of preventing damage to the product or components in the connected machines. This section lists Warnings, Cautions and Notes, which apply generally when handling the inverter, classified as General, Transport and Storage, Commissioning, Operation, Repair and Dismantling and Disposal.

Specific Warnings, Cautions and Notes that apply to particular activities are listed at the beginning of the relevant sections in this manual and are repeated or supplemented at critical points throughout these sections.

Please read the information carefully, since it is provided for your personal safety and will also help prolong the service life of your inverter and the equipment to which it is connected.

### General

### 

These devices are at hazardous voltage levels and control rotating mechanical parts, which in some circumstances, can be dangerous. Non-observance of the warnings or non-compliance with the instructions in this manual can lead to danger to life, serious injury or substantial damage to property.

Protection against direct contact is only provided in dry indoor areas. If these conditions are not fulfilled, other protective measures against electric shock are to be taken, e.g., protective insulation.

Only suitably qualified personnel who have previously familiarized themselves with all the instructions regarding safety, installation, operating and maintenance as set out in this manual are permitted to work on these devices. Successful and safe operation of these devices depends on their proper handling, installation, operation and maintenance.

The thermistor cable (sensor cables) can be at hazardous voltages even if the inverter is not operational. It must be ensured that the sensor cable is in a no-voltage condition. Even if the display element at the device goes dark, this does not mean that the sensor cable is in a no-voltage condition. Only then may installation work be carried out.

The device must be isolated from the power supply before any connections at the device are established or changed.

The general and regional installation and safety regulations for working on equipment at hazardous voltage levels (e.g. EN 50178) as well as the relevant stipulations regarding the correct use of tools and personal protective equipment (PPE) are especially to be observed.



Static discharge on surfaces or at interfaces which are not generally accessible (e.g. terminals or connector pins) can cause malfunctions or defects. ESD protective measures should therefore be observed when working with inverters or inverter components.

### 

It is forbidden for children and other unauthorized persons to access these devices!

It is only permissible to use these devices for the purpose specified by the manufacturer. Unauthorized changes and the use of spare parts and accessories, which are not sold or recommended by the manufacturer of the device, can lead to fire, electric shock and injury.

### NOTICE

This manual is to be kept somewhere close to the devices and must be easily accessible for all users.

If measurements or tests have to be carried out on the live device, the stipulations of safety regulation BGV A2 are to be complied with, especially § 8 "Permissible deviations when working on live parts". Suitable electronic tools are to be used.

Before installation and commissioning, please read these safety instructions and the warnings carefully as well as the warning signs fitted to the devices. It must be ensured that the warning labels are always legible; any signs that are damaged or missing should be replaced.

### Transport and storage

### 

Correct transport, storage as well as careful operation and maintenance are essential for the proper and safe operation of the equipment.

### 

Protect the equipment against physical shocks and vibration during transport and storage. It is important that the equipment is protected from water (rainfall) and excessive temperatures.

### Commissioning

### 

Working on the equipment by unqualified personnel or failure to comply with warnings can result in severe personal injury or serious damage to material. Only suitably qualified personnel trained in the setup, installation, commissioning and operation of the product should carry out work on the equipment.

### 

### Cable connection

The control cables must be laid separately from the power cables. Carry out the connections as shown in the installation section in this manual, to prevent inductive and capacitive interference from affecting the correct function of the system.

### NOTICE

When the thermal motor protection relay (TMP) responds, then the inverter must also be directly shut down. This must be implemented in the circuitry.

### In operation

SINAMICS G120 inverters operate with high voltages.
When operating electrical devices, hazardous voltages at certain parts of the devices cannot be avoided.
Therefore, EMERGENCY STOP equipment in accordance with EN 60204, IEC 204 (VDE 0113) must be functional in all operating modes of the control equipment. Shutting down an EMERGENCY STOP device must not lead to an uncontrolled or undefined restart of the system.
Certain parameter settings (for example, the functions for automatic restart) can cause the SINAMICS G120 inverter to automatically restart following a power supply failure.
For the areas of the control equipment in which faults can cause considerable damage to property or even serious injury, additional external precautions must be taken or devices installed to ensure safe operation even if a fault occurs (for example, independent limit switches, mechanical interlocks, etc.).
The device may only be operated together with a CU240S DP-F. The CM evaluates the temperature sensor and makes the information available to the CU. The CU240 reliably trips the inverter power unit. This should be ensured by appropriately parameterizing the CU. Thermal motor protection is only available for motors in which temperature-dependent resistors (PTC thermistors with type A charactersistics according to EN 60947-8) have been directly integrated into the motor winding.
When connecting the sensor cable, it must be ensured that the connector involved is correctly inserted (up to its endstop). At the connector of the sensor cable, stranded conductors may only be used in conjunction with insulated end sleeves. It must be carefully ensured that the individual wires of the stranded conductor are located within the end sleeve. When using solid conductors, the insulation of the conductor must, as a minimum, extend to or into the connector.
The device itself must not be installed in a hazardous area. Only the sensor cable in conjunction with the corresponding motors may be located in the hazardous zone.
After installing the sensor cable, when commissioning or after modifications/maintenance work (assembly, disassembly) of the system, the sensor resistor must be measured using a suitable measuring instrument. For resistances < 50 Ohm, the sensor circuit should be checked for a short-circuit condition.
The effectiveness of the protection function must be checked before commissioning. It is recommended that the control voltage should be separately monitored.
The appropriate notes regarding thermal motor protection should be carefully observed when used in hazardous zones.

### Repair

### 

Repairs on equipment may only be carried out by Siemens Service, by repair centers authorized by Siemens or by authorized personnel who are thoroughly acquainted with all the warnings and operating procedures contained in this manual.

Any defective parts or components must be replaced using parts contained in the relevant spare parts list.

Disconnect the power supply before opening the equipment for access.

### **Dismantling and disposal**

### CAUTION

The packaging of the inverter is re-usable. Retain the packaging for future use.

Easy-to-release screw and snap connectors allow you to break the unit down into its component parts. You can recycle these component parts, dispose of them in accordance with local requirements or return them to the manufacturer.

Safety instructions

# Description

### 3.1 The chemical industry inverter

### Design

The chemical industry inverter comprises the SINAMICS G120 series of inverters and the chemical industry module.

The CU240S DP-F is used as Control Unit. This is a CU with integrated safety-oriented functions and PROFIBUS-DP interface.

The following Power Modules versions are used:

- PM240 Power Module with DC braking function, 400 V line supply voltage
- PM250 Power Module with energy recovery capability, 400 V line supply voltage
- PM260 Power Module with energy recovery capability, 500 690 V line supply voltage

Depending on the power unit, additional components may be necessary to complete the system.



Figure 3-1 Chemical industry inverter (example)

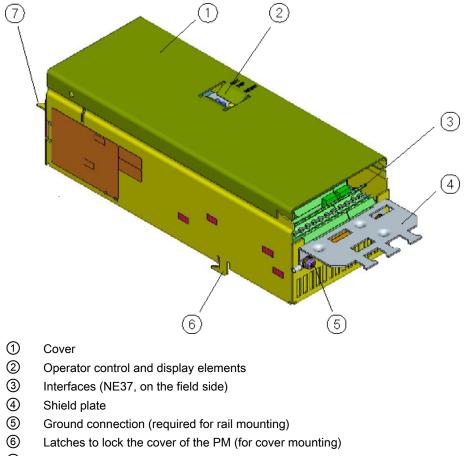
3.1 The chemical industry inverter

### Characteristics

- Compact, modular inverter
- A series of inverters for the complete voltage (400 V to 690 V) and power range
- Isolated analog values in the chemical industry module (1 setpoint / 2 measured values)
- Isolated binary inputs and outputs in the CU
- Protective separation of the motor sensor cable with respect to the enclosurte and other connections using reinforced insulation of the creepage and clearances (rated impulse voltage 12 kV) acc. to EN 60664-1.
- Certified power disconnection (94/9/EC, ATEX) of the inverter without main contactor
- Terminal strip acc. to NE37 (if fulfilled)
- The integrated or external LC filter permits non-shielded motor cables up to 300 m, shielded motor cables are possible up to 200 m
- Special features of the PM250 and PM260:
  - A line reactor is not required
  - A braking resistor is not required
  - PM260 has an integrated LC filter
  - Favorably-priced, integrated energy recovery allows energy saving
  - Compact design of the complete unit when using the PM260 (FSD, FSF) by directly mounting the CM on the PM
- The standard pulse frequency of 16 kHz, the integrated LC filter for the PM260 and the fact that there is no line reactor permit quiet operation of the motors and inverters

### 3.2 The chemical industry module

The chemical industry module is an essential component of the chemical industry inverter.



⑦ Locking lugs to lock and screw to the CU (for cover mounting)

Figure 3-2 Chemical industry module

### Functions

- Thermal motor protection (TMP) using the the PTC thermistor integrated in the motor (incl. protective separation)
- Electrical isolation of the analog values (MW1 to 3)
- Provision of the NAMUR interface (-X2; -X3)

#### Description

3.2 The chemical industry module

### Block diagram

The functionality of the chemical industry module in the chemical industry inverter is shown in a simplified form in the following block diagram.

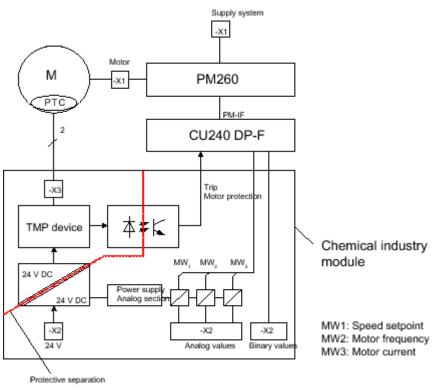


Figure 3-3 Block diagram of the chemical industry inverter

# Assembling

### 4.1 General

The chemical industry module can be mounted in the following ways:

- 1. Mounting on the cover: Mounted directly on the Power Module cover (essentially the same as the CU)
- 2. Rail mounting: Mounted on a rail (acc. to EN 50022) in the electrical cabinet using the option kit.

The actual mounting option is selected depending on the version of the Power Module and the version of the device cover. This is the reason that the following tables should be observed.

Power Module	F	SA	FS	SB	FS	SC	F٤	SD	F	SE	F	SF	FS	GX
	а	b	а	b	а	b	а	b	а	b	а	b	а	b
PM240	h	h	h	h	h	h	х	h	х	х	h	h	-	h
PM250	h	h	h	h	h	h	х	h	х	х	h	h	-	-
PM260	-	-	-	-	-	-	х	х	-	-	х	х	-	-
Кеу	а	filtere	-											
	b	unfilte	ered											
	-	devic	e not a	availab	ole									
	h	rail m	ountin	g										
	х	Cove	r mour	nting										

Table 4-1 Overview of G120 device covers of the Power Modules

### Assembling

4.2 Cover mounting

Designation	MLFB	
PM240		
PM240 IP20 FSD A 400V 15kW	6SL3224-0BE31-5AA0	
PM240 IP20 FSD A 400V 18.5kW	6SL3224-0BE31-8AA0	
PM240 IP20 FSD A 400V 22kW	6SL3224-0BE32-2AA0	
PM240 IP20 FSE U 400V 30kW	6SL3224-0BE33-0UA0	
PM240 IP20 FSE U 400V 37kW	6SL3224-0BE33-7UA0	
PM240 IP20 FSE A 400V 30kW	6SL3224-0BE33-0AA0	
PM240 IP20 FSE A 400V 37kW	6SL3224-0BE33-7AA0	
PM250		
PM250 IP20 FSD A 400V 15kW	6SL3225-0BE31-5AA1	
PM250 IP20 FSD A 400V 18.5kW	6SL3225-0BE31-8AA1	
PM250 IP20 FSD A 400V 22kW	6SL3225-0BE32-2AA1	
PM250 IP20 FSE A 400V 30kW	6SL3225-0BE33-0AA1	
PM250 IP20 FSE A 400V 37kW	6SL3225-0BE33-7AA1	
PM250 IP20 FSE U 400V 30kW	6SL3225-0BE33-0UA1	
PM250 IP20 FSE U 400V 37kW	6SL3225-0BE33-7UA1	
PM260		
PM260 IP20 FSD A 690V 7.5kW	6SL3225-0BH27-5AA1	
PM260 IP20 FSD A 690V 11kW	6SL3225-0BH31-1AA1	
PM260 IP20 FSD A 690V 15kW	6SL3225-0BH31-5AA1	
PM260 IP20 FSD U 690V 7.5kW	6SL3225-0BH27-5UA1	
PM260 IP20 FSD U 690V 11kW	6SL3225-0BH31-1UA1	
PM260 IP20 FSD U 690V 15kW	6SL3225-0BH31-5UA1	
PM260 IP20 FSF A 690V 22kW	6SL3225-0BH32-2AA1	
PM260 IP20 FSF A 690V 30kW	6SL3225-0BH33-0AA1	
PM260 IP20 FSF A 690V 37kW	6SL3225-0BH33-7AA1	
PM260 IP20 FSF U 690V 22kW	6SL3225-0BH32-2UA1	
PM260 IP20 FSF U 690V 30kW	6SL3225-0BH33-0UA1	
PM260 IP20 FSF U 690V 37kW	6SL3225-0BH33-7UA1	

Table 4-2 Power Module for cover mounting of the chemical industry module

### 4.2 Cover mounting

### Prerequisites

- A Power Module with a G120 device cover, sizes FSD, FSE or FSF are used.
- The CU240S DP-F is already mounted.

### **Tools required**

Phillips screwdriver, Size 2

### Procedure

- 1. Locate the locking lug in the CU by tilting the CM
- 2. Locate the CM with the latches in the elongated holes of the PM device cover

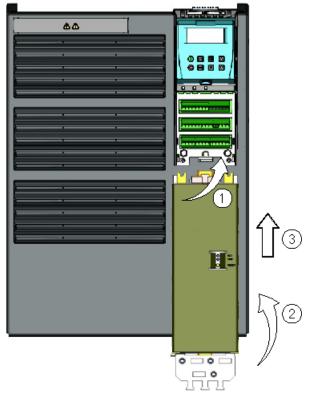


Figure 4-1 Mounting on the cover of the PM

### 4.2 Cover mounting

- 3. Push the CM towards the CU until it latches into place The Sub-D Profibus connection is closed.
- 4. Screw the CM to the CU (tightening torque: 0.8 Nm)

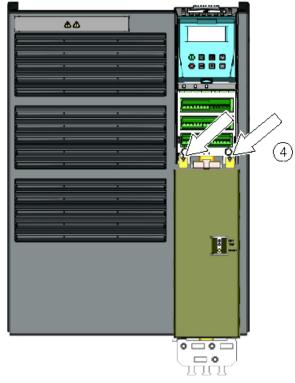


Figure 4-2 Screw the CM to the CU

Mounting has been completed. The CM/CU cable group and the field side can now be connected.

### See also

Grounding the chemical industry module (Page 38)

### 4.3 Rail mounting

### Prerequisites

The rail adapter is screwed to the lower side of the CM using the screw (M3x6) provided in the mounting kit.

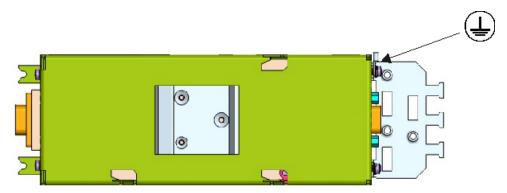


Figure 4-3 Rail mounting

#### NOTICE

Only the original parts (mounting rail adapter) and the supplied screws may be used.

### **Tools required**

Torx screwdriver to screw onto the mounting rail adapter

#### Procedure

Locate the chemical industry module on a mounting rail according to EN 50022 and snap into place.

#### Note

The extended cable harness of the mounting kit should be used for the CM/CU connection.

When using a Power Module, Size FSGx. the cable harness of the mounting kit must be appropriately extended in the electrical cabinet using individual conductors having the same cross-section. The screw terminals must be tightened with 0.25 Nm.

The grounding cable must be screwed to the position marked on the CM housing and connected to ground potential.

Profibus can be directly connected to the CU.

#### See also

Grounding the chemical industry module (Page 38)

Assembling

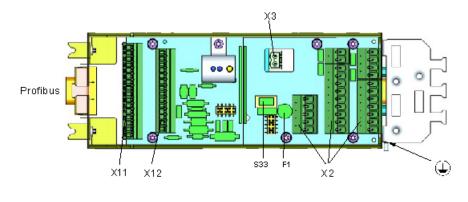
4.3 Rail mounting

# Connecting

### 5.1 Interfaces of the chemical industry module

### 5.1.1 Overview

The following interfaces are available at the chemical industry module:



F1FuseS33Commissioning switch

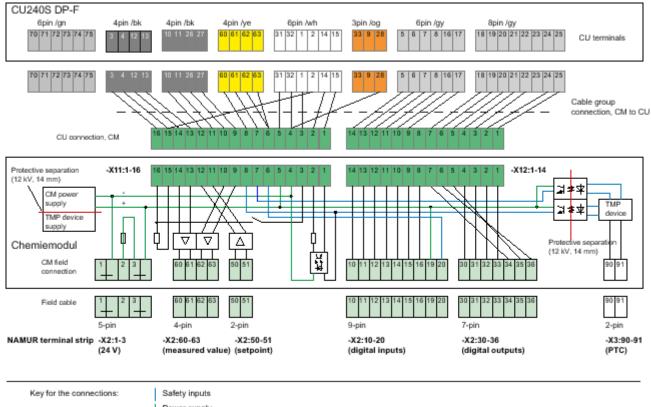
Figure 5-1 Interfaces at the CM

Designation	Description
Profibus	9-pin Sub-D connector or socket to connect Profibus
X11 and X12	Parallel connection between the CM and the CU
X2	Terminal strip in accordance with NAMUR recommendation NE37 (2.5 mm <sup>2</sup> screw terminals)
	General terminals
	Binary inputs and outputs
	Analog inputs and outputs
X3	Terminal strip in accordance with NAMUR recommendation NE37 (2.5 mm <sup>2</sup> screw terminals) to connect the motor temperature sensor
0	Ground

5.1 Interfaces of the chemical industry module

### 5.1.2 Description

### **Connection diagram**



Power supply

Other connections

Figure 5-2 Connection diagram

Connecting

5.1 Interfaces of the chemical industry module

### Terminal assignment, X2 and X3

The assignment of terminals X2 and X3 is orientated to NAMUR recommendation NE37.

Terminal	
1	GND 24 VDC
2	+24 VDC
3	+24 VDC Si
10	on [dyn], on/off [stat] (digital input)
11	off [dyn] (digital input)
12	faster (digital input)
13	slower (digital input)
14	Reset (digital input)
15	Interlocking (digital input)
16	Counter-clockwise rotation (optional)
19	Forced inverter inhibit (safe digital input, closed-circuit principle)
20	Forced inverter inhibit (safe digital input, closed-circuit principle)
30	Ready for operation (digital output)
31	Ready for operation (digital output)
32	Motor rotates (digital output)
33	Motor rotates (digital output)
34	Fault, NC contact (digital output)
35	Fault, common (digital output)
36	Fault, NO contact (digital output)
50	+ speed (setpoint 0/4-20 mA)
51	- speed (setpoint 0/4-20 mA)
60	+ motor frequency (measured value 0/4-20 mA)
61	- motor frequency (measured value 0/4-20 mA)
62	+ motor current (measured value 0/4-20 mA)
63	- motor current (measured value 0/4-20 mA)

Table 5-2 Terminal assignment, X2

Table 5-3 Terminal assignment X3

Terminal	
90	Temperature sensor (PTC+)
91	Temperature sensor (PTC-)

### See also

Connecting the field-side signals to the CM (Page 39) 24V supply voltage protection (Page 40)

5.2 CU interfaces

### 5.2 CU interfaces

### Overview

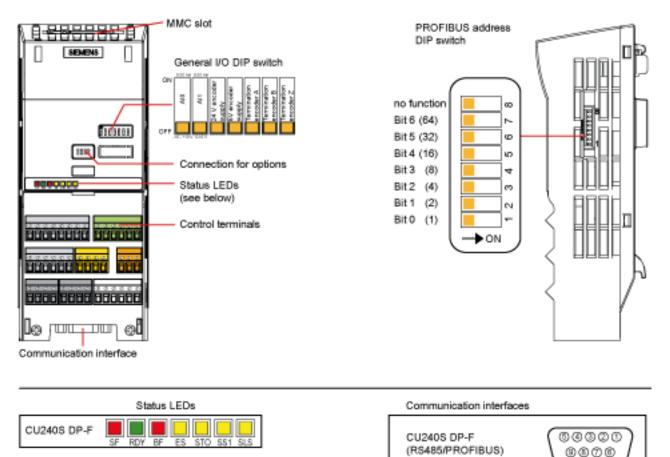


Figure 5-3 CU240S DP-F interfaces

### **Option interface**

The OP is connected to the inverter via the option interface. The interface can also be used to connect a PC via the PC-inverter connection kit in order to parameterize using STARTER.

### **Control terminals**

The connection between the CM and CU is established via the control terminals.

DOO NC	DOO NO	DOO COM	DO1 NO	DO1 COM	DO2 NC	DO2 NO	DO2 COM	ENC A P	ENC A	EN CB P	EN CB N	ENCZ P	ENCZ N
$\mathcal{O}$	$\mathcal{O}$	$\mathcal{O}$	$\mathcal{O}$	$\mathcal{O}$	$\mathcal{O}$	$\mathcal{O}$	$\mathcal{O}$	Ø	Ø	Ø	Ø	Ø	$\mathcal{O}$
	19/	20/			23/	24		Ш	ľ		V3	74	
FAIL-SAFE DIGITAL INPUTS													
DIO	D11	D12	В	DI4	D15	FDIO	A FDIOB	FDI1A F	DI1 B		ENC+ SUPPL`	U24 V Y	UOV
Ø	Ø	Ø	${\mathcal O}$	Ø	Ø	Z	Ø	Ø	Ø		Ø	Ø	Ø
5	6	H	Ľ		Ц		ĨŰ	62	63/		33	Ľ	28
AI0+	A10-	A00+	A00-	AI1+	Al1-	AO1	+ AO1-	+24V IN	+OV IN	+10V	٥V	PTC +	PTC -
Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	$\oslash$
Ŋ <sup>3</sup>	4									H	Ц		

Figure 5-4 Control terminals of the CU240S DP-F

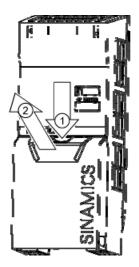
Connecting

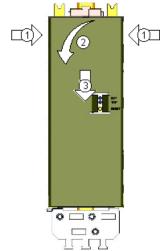
5.3 Connecting the CM to the CU

### 5.3 Connecting the CM to the CU

### 5.3.1 General

In order to connect the CU and CM, the terminal covers of both devices must be removed.





Removing the CU terminal cover

Removing the CM terminal cover

Connecting 5.3 Connecting the CM to the CU

### 5.3.2 Connecting for cover mounting

### Prerequisite



Figure 5-5 CM and CU without terminal cover

The CU is wired to the CM using the cable harnesses included in the scope of delivery.

### Note

### Cable configuration for counter-clockwise rotation

If the chemical industry inverter is to be operated with the counter-clockwise function, then terminal X12:12 should be changed over to X12:8.

### Connecting

5.3 Connecting the CM to the CU

### Procedure

- Connect connector strip X11 to the CM
- Insert the connector strip of cable harness X11 into the terminal strip of the CU corresponding to the marking (color and terminal designation).

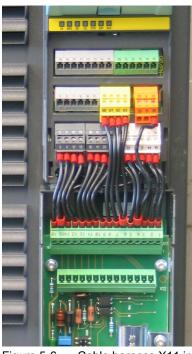


Figure 5-6 Cable harness X11 inserted at both ends

• Connect connector strip X12 to the CM

• Insert the connector strip of cable harness X12 into the terminal strip of the CU corresponding to the marking (color and terminal designation).



Figure 5-7 CM/CU wiring has been completed

• Re-attach the terminal covers of the CU and the CM.

The chemical industry inverter can now be either operated via Profibus or the field terminals.

#### Note

When controlling the inverter via Profibus, on the field side, the "forced inverter inhibit" function, the 24 V supply and the TMP function (X3) must be connected.

### See also

Connecting the field-side signals to the CM (Page 39)

5.3 Connecting the CM to the CU

### 5.3.3 Connecting for rail mounting

### Connecting the long cable harness

For rail mounting, the CM is connected to the CU using the long cable harness included in the supplementary kit.

The following must be observed:

• Insert connector strips X12 and X11 into the CM



Figure 5-8 Connecting the long cable harness

• Attach the strain relief (attach the cable harness to the strain relief provided using a cable tie)

### Note

The cable harness insulation must extend up to the CM housing.

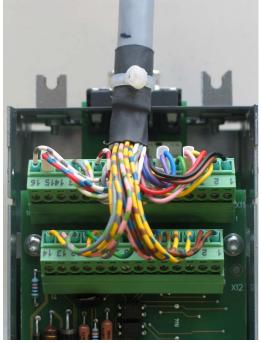


Figure 5-9 Strain relief

- Locate the CM cable cover
- Insert the connector strips of the cable harness corresponding to the marking on the CU
- Attach the CU cable cover

5.4 Grounding the chemical industry module

# 5.4 Grounding the chemical industry module

The CM is grounded depending on its mounting.

# Note

Only the CM base is grounded. All other metallic parts have protective separation with areas under voltage.

# **Cover mounting**

For the cover mounting, grounding is realized via the locking lugs screwed to the CU. The connecting screws should be tightened with 0.8 Nm. It is not necessary to connect an additional grounding cable.

## **Rail mounting**

For rail mounting, it is absolutely necessary to connect a grounding cable ( $\geq 2.5 \text{ mm}^2$  green/yellow). The protective conductor is connected at the retaining screw of the shield plate as marked. The other end of the grounding cable should be connected to the ground potential of the electrical equipment.

It is recommended to use an insulated ring cable lug M3 for a conductor cross-section of 2.5 mm<sup>2</sup>.

The protective conductor connection must be tightened to a torque of 0.8 - 1.0 Nm and suitable measures must be applied so that it cannot become loose.

#### NOTICE

The protective conductor connection must be periodically checked within the scope of the actual regulations (BGV A3 check)

# See also

Rail mounting (Page 25) Cover mounting (Page 22)

#### Connecting

5.5 Connecting the field-side signals to the CM

# 5.5 Connecting the field-side signals to the CM

The CM is connected on the field side via terminal strips X2 and X3. The terminals are marked according to NAMUR recommendation NE 37.

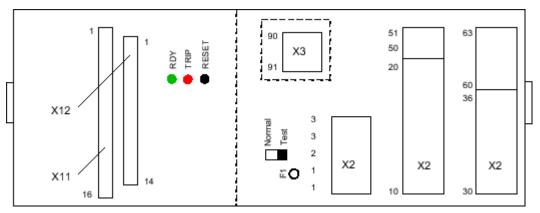


Figure 5-10 Overview of the terminal strips

# Procedure

- Remove the CM cover
- Connect and observe the following:
  - Tightening torque of the connecting terminals: 0.5 to 0.6 Nm
  - Maximum cable cross-section: 2.5 mm<sup>2</sup>
  - Maximum cable length 30 m for analog and digital cables (X2: 10-20; 30-36; 50-51; 60-63)
- Re-attach the terminal cover.

# NOTICE

When connecting the temperature sensor to X3, the safety instructions from Chapter "Safety instructions, in operation" should be observed.

#### See also

Description (Page 28) Safety instructions (Page 11) 5.6 24V supply voltage protection

# 5.6 24V supply voltage protection

The fuse is located close to the X2 terminals and is accessible under the CM cover. This is marked with F1 (type MST250).

# See also

Description (Page 28)

# 5.7 Connecting PROFIBUS DP

#### General

The function of the PROFIBUS DP interface is to establish a connection between inverters of the SINAMICS G120 product series and a higher-level automation system, e.g. SIMATIC S7 based on PROFIBUS DP.

Technical data and measures to establish the connection should be taken from the CU240S DP-F manual. The rules and notes of the points described in the CU240S DP-F manual apply.

## Note

If the CU and the CM are mounted on the housing cover of the Power Module, PROFIBUS DP is connected at the CM.

Profibus must be directly connected at the CU when the CM is mounted on a rail. In this case, the Sub-D connector of the CM remains unconnected.

# 6

# **Operation (hardware)**

# 6.1 Operator control elements

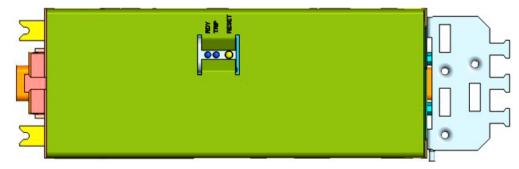


Figure 6-1 Operator control and display elements

# TMP acknowledgement "RESET"

For the TMP function, the CM has the "RESET" button for acknowledgement. If tripped by an excessively hot motor, wire breakage or short-circuit of the sensor cable, after the fault has been removed or the motor has cooled down, the trip must be locally acknowledged, i.e. at the CM. This means that the inverter is brought into the fault-free state.

A trip also remains even if the supply voltage temporarily fails (24 V). The device (CM) operates in a non-volatile fashion.

A self-test is initiated if the button is kept pressed for longer than 2 s (this simulates a motor trip via the PTC thermistor).

# Commissioning change-over switch "normal test"

"S33" slide switch is located under the CM cover and is used to change over between the "Normal" and "Test" operating modes.

The "Normal" operating mode allows the inverter to either be operated via PROFIBUS or terminals.

In the "Test" operating mode, the chemical industry inverter can be commissioned and/or locally controlled using the Basic Operator Panel (BOP, see manual).

# See also

Thermal motor protection (Page 55)

6.2 Display elements

# 6.2 Display elements

# TMP display elements

Two LEDs are provided at the front of the device to display the operating states.

Table 6-1 Operating states	Table 6- 1	Operating states
----------------------------	------------	------------------

Labeling	Color	Significance
RDY	Green	Ready
TRIP	Red	Tripped

The green LED signals that the TMP function in the CM is ready. The state of the fuse is also indirectly displayed using this LED (displays a tripped fuse or if the 24 V DC is missing, LED off).

The red LED indicates that the TMP function has responded (the motor is too hot). Shortcircuit and wire breakage are also monitored. In the case of a short-circuit in the sensor circuit of the PTC thermistor, the red LED flickers. For a wire breakage, this LED flashes.

# Commissioning the chemical industry inverter

# 7.1 Commissioning information

# General

Only the special features and issues when commissioning the chemical industry inverter are described in this chapter. It is based on the SINAMICS G120 documentation.

# 

An EMERGENCY STOP button must be located close by so that in the case of danger it can be used to initiate a pulse inhibit. The effectiveness of the EMERGENCY STOP function should be checked before starting commissioning.

The STARTER commissioning program is unsuitable for disconnecting the unit in the case of danger.

# Parameterizing the CM

The chemical industry module does not have to be parameterized. Parameterization is realized via the CU.

# Parameterizing the CU

The CU240S DP-F must be parameterized when used in the chemical industry inverter, For parameterization using STARTER, a basic configuration (functions according to NE 37) are available in a script. This parameterizing file (script) can be sourced via PRODIS (http://support.automation.siemens.com/WW/view/de/30814192).

# Commissioning prerequisites

- 1. The components of the chemical industry inverter have been mounted and connected.
- 2. The script file for parameterizing using STARTER is available.
- 3. The operating voltage is present.

# **Commissioning procedure**

The chemical industry inverter is commissioned in three main steps. The following sequence must be maintained.

- 1. Configuring the CU240S DP-F
- 2. Commissioning with script (parameterizing the CU that matches CM using STARTER)
- 3. Commissioning using the Drive Wizard (drive configuration with STARTER)

The steps described in these instructions refer to the first drive data set (DDS 0).

# 7.2 Configuring the CU

The chemical industry inverter is configured by making the appropriate settings at the CU240S DP-F.

# General I/O DIP switch of the CU240S DP-F

DIP switches 1 and 2 must be set to "OFF" (0 ... 10 V) (refer to the following table).

Table 7-1 Settings of the general I/O DIP switch

DIP switc	h	1	2	3	4	5	6	7
Significan	се	AI0	AI1	24 V DC encoder supply	5 V DC encoder supply	Terminatio n, encoder A	Terminatio n, encoder B	
ON		0 mA 20 mA	0 mA 20 mA	24 V	5 V	Encoder A ON	Encoder B ON	Encoder Z ON
OFF		-10 V +10 V	0 V 10 V	0 V	0 V	Encoder A OFF	Encoder B OFF	Encoder Z OFF

See also

CU interfaces (Page 30)

# 7.3 Commissioning with script file

# Prerequisite

The STARTER commissioning tool (Version 4.1.2.0 or higher), which is installed on the PC, is used for commissioning. The PC is connected to the CU via the PC connection kit (Order No. 6SL3255-0AA00-2AA0).



Figure 7-1 Connection using the PC connection kit

7.3 Commissioning with script file

A STARTER project for the chemical industry inverter (SINAMICS G120; drive unit CU240S DP-F; power unit PM...) is set-up and called.

Note

Please refer to the operating instructions of the CU240S Control Unit for detailed information about commissioning using STARTER and the configuration when using PROFIBUS.

## Procedure

#### 1. Creating the script folder

In STARTER, using the righthand mouse key (1)a script folder is inserted (2) in the project archive.

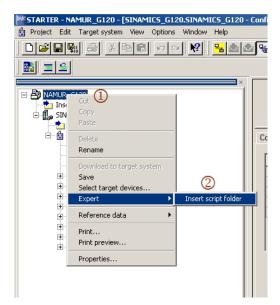


Figure 7-2 Creating a script folder

#### 2. Importing the script

Using the righthand mouse key (1), the script (NAMUR\_G120\_xxx.txt) to configure the chemical industry module, which is available as text file, is imported into the script folder (2). After it has been successfully imported the file can be seen in the script folder.

7.3 Commissioning with script file

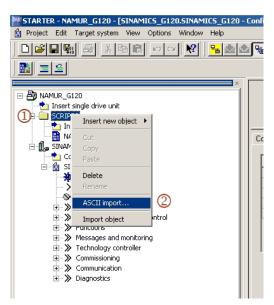


Figure 7-3 Importing a file

#### 3. Executing a script

After a connection has been established to SINAMICS G120 (1), the script can be opened with a double click (2) and then executed (3).

TO CTARTER NAMER CLOS IC. L. DIAMUR CLOS MANUE CO		
STARTER - NAMUR_G120 - [Script - [NAMUR_G120/NAMUR_G12	U_¥2_U	1011
Project Edit Target system View Options Window Help		
	骝	**
1×	1	'Chemic:
🖃 🖓 NAMUR_G120		'CM240 1
	2	'Autor:
🖻 🛄 SCRIPTS	4	'Versio
📩 Insert script	5	1
	6	1
E 4 5 SINAMICS_G120	7	1
- 📩 Configure drive unit	8	
🖻 💼 SINAMICS_G120	9	1
💥 Drive navigator	10	1
	11	
- S- Inputs/outputs	12	
😟 ≫ Setpoint channel	13	'Antriel
😟 ≫ Open-loop/closed-loop control	14	For Eacl
🕀 ≫ Functions	15	Drivel
😟 ≫ Messages and monitoring	16	Set d:
😟 ≫ Technology controller	17	For E:
🗄 ≫ Commissioning	18	CuN
🕀 🗩 Communication	19	Set
😟 ≫ Diagnostics	20	If MagB
5.0002482 82	21	Time mou

Figure 7-4 Executing the script

### 4. Commissioning using the script

Using the script, the inverter circuitry is selected that matches the chemical industry module. Execution of the script is shown step-by-step in the following.

#### Note

The response time between the individual steps varies considerably and can take up to one minute.

The script is executed. Commissioning with the script is started by acknowledging the input dialog box with "Yes".

SELECT DRIVE	×
Soll das Skript für folgenden Antrieb angewandt werden	2
Do you want to apply this script for following drive?	
SINAMICS_G120 / SINAMICS_G120	

Figure 7-5 Input dialog box

 Acknowledge the acceptance of the factory settings with "Yes" (this is recommended when commissioning for the first time)

RESET	×
Soll eine Werkseinstellung hergestellt werden?	
Do you want to reset to factory setting?	
<u>]a</u> <u>N</u> ein	

- Figure 7-6 Factory setting
- When using the temperature sensing in the motor (temperature sensor) acknowledge with "Yes".

Function 1
Möchten Sie die Motortemperaturerfassung über einen PTC Widerstand aktivieren?
Do you want to activate the collection of motor temperature via PTC resistance?
<u>]a</u> <u>N</u> ein

Figure 7-7 Temperature sensing

• Choosing the options

For each option, two functions are listed for selection, but only one can be used. The following options can be selected one after the other:

- The counter-clockwise or faster/slower function

The note regarding the connecting the cable harness, displayed after selection, must be observed under all circumstances.

OPTION 1	×
Wählen Sie eine Option JA: Links-/Rechtslauf NEIN: Schneller/Langsamer	
Choose an option YES: Forward/Reverse NO: Quicker/Slower	
<u>la</u> <u>N</u> ein	

Figure 7-8 Option 1

- The "Flying restart after fault" function should be activated for systems that have a long run-on time. This means that a restart after acknowledging the fault is still made possible in the run-on time.
- The on/off steady-state or or/on dynamic function

OPTION 2	×					
Wählen Sie eine Option JA: Ein/Aus statisch NEIN: Ein/Aus dynamisch						
Choose an op YES: On/Off s NO: On/Off d	tatic					
<u>]</u> a	Nein					
Figure 7-9	Option 2					

- The safety settings at the inverter corresponding to NAMUR specifications are made automatically. The corresponding message must be acknowledged.
- This commissioning step is completed when saving the configuration ("Acknowledge start RAM to ROM") and acknowledging the "Ready!" message.

# 7.4 Commissioning using the Drive Wizard

After the script has been executed, the motor and system data must be entered into the STARTER project. This is realized using the Drive Wizards. Basic settings for the system are made using pull-down menus. The next point is selected with "Continue".

The screenshots in the subsequent sequence have been taken from a configuration example with the chemical industry inverter.

# Procedure

Anwenderdoku 1 Insert single drive unit SKRIPTE Insert script		Drive data set: DD Command data set		Wia	zard	
NAMUR_G120_beta10	Configuration Drive	e data sets 🛛 Command data :	sets   Reference parame	er		
	Name:	SINAMICS_G120			Control type: Interfaces	V/f with line:
		SINAMICS_G120.Closed	d-loop control module			
	1	Туре:	G120 CU240S DP	F		
		Order no.:	6SL3244-0BA21-1PA0			
		Firmware version:	3.20			
		SINAMICS_G120.Powe	r_unit			
		Type:	G120 PM260			
		Order no.:	6SL3225-0BH27-5UA0			
		Input voltage:	690	٧		
		Power:	11.00	k₩		
		SINAMICS_G120.Motor				
		Motor type Asynchro	onous rotational motor (1)			
	6 DO M	Motor rated speed:	1455	RPM		
		Motor rated current:	8.80	A		
	Barren Barr	Motor rated power:	7.50	k₩		
		Motor rated voltage:	690	V		
		Motor rated frequency:	50.00	Hz		
	0:1 CDS:0(	Activ 💌 DDS: 0 (Activ 💌	]			
۱	SINAMICS_G120					

# 1. Open the Wizards (1) to configure the drive units

Figure 7-10 Start the Wizards

- 2. Select the appropriate drive using the drop-down menu:
  - V/f with linear characteristic (P1300=0), or (depending on the technology)
  - V/f with square-law characteristic (P1300=2)

	Juit of Scructure			E
	NAMICS_G120, DDS	), CDS 0		
Setpt.	Control method:			
	V/f with linear ch	aracteristic (0	) <u> </u>	┥╢╷
				(M)
				C
Previ	ously made settings an	e lost through	a reconfiguration;	it is not
possi	ble to cancel the confi	guration onlin	e. –	
	< Back	Next >	Cancel	Help
	Drive: SII Setpt.	Setpt. Control <u>m</u> ethod: V/f with linear ch Previously made settings an possible to cancel the confi	Drive: SINAMICS_G120, DDS 0, CDS 0 Setpt. Control method: V/f with linear characteristic (C V/f with linear characteristic (C Previously made settings are lost through possible to cancel the configuration onlin	Drive: SINAMICS_G120, DDS 0, CDS 0 Setpt. Control method: V/f with linear characteristic (0)  Previously made settings are lost through a reconfiguration; possible to cancel the configuration online.

Figure 7-11 Control structure

- 3. Bypass the command sources
- 4. Drive setting (P100=0 for Europe)

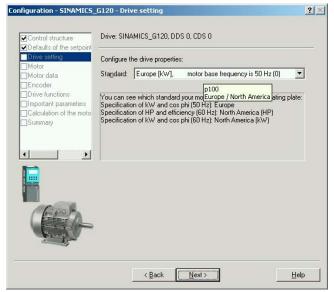


Figure 7-12 Base motor frequency

5. Select an induction motor (P300=1)

onfiguration - SINAMICS	_G120 - Motor		? 🗵
Control structure	Drive: SINAMICS_G12	0, DDS 0, CDS 0	
O efaults of the setpoint     O trive setting     Motor data     Encoder     Drive functions     Inportant parameters     Calculation of the moto     Summary	Configure the drive prop Select motor type Motor data	Derties: Asynchronous rotational motor (1) Retain/enter C Enter from order no. list	T
	< Back	<u>Next&gt;</u>	Help

Figure 7-13 Motor type

6. Enter the motor data corresponding to the rating plate

ve setting Motor d	ata:		
tor data Paran	ne Parameter text	Value	Unit
er p304[0	] Rated motor voltage, Drive Dataset 0 (DDS0)	690	V
nctions p305[0	] Rated motor current, Drive Dataset 0 (DDS0)	8.80	А
parameters p307[0	Rated motor power, Drive Dataset 0 (DDS0)	7.50	KVV
n of the moto p308[0	Rated motor cosPhi, Drive Dataset 0 (DDS0)	0.820	
p310[0	Rated motor frequency, Drive Dataset 0 (DD	50.00	Hz
p311[0	] Rated motor speed, Drive Dataset 0 (DDS0)	1455	RPM
p335[(	] Motor cooling, Drive Dataset 0 (DDS0)	Self-co	
▶ p625[0	Ambient motor temperature, Drive Dataset 0 (	20.0	°C
F 87	Hz calculation		

Figure 7-14 Motor data

7. No encoder (P400=0)

nfiguration - SINAMICS	G120 - Encoder	<u>? ×</u>
Control structure Control structure Orive setting Motor Motor data Encoder Important parameters Calculation of the moto Summary	Drive: SINAMICS_G120, DDS 0, CDS 0 Which encoder do you want to use? Disabled (0)	
	< Back	<u>H</u> elp

Figure 7-15 Encoder

8. Motor identification locked (P1900=0)

figuration - SINAMICS_	_G120 - Drive functio	ពទ	?
Control structure	Drive: SINAMICS_G1	20, DDS 0, CDS 0	
✓Drive setting ✓Motor	A motor identification	is recommended for the initial commissioning	
Motor data  Cncoder  Drive functions  Important parameters  Calculation of the moto Summary	<u>M</u> otor identification:	Disabled (0)	•
۹ <u>ـــــــــــ</u> ۲			
- Port			
	<u> </u>	< <u>N</u> ext>	<u>H</u> elp

Figure 7-16 Motor identification

9. Enter important parameters (P640=0, the remaining parameters depend on the particular system)

onfiguration - SINAMICS	_G120 - Important parameters		<u>?</u> ×
Control structure	Drive: SINAMICS_G120, DDS 0, CDS 0		
✓Drive setting ✓Motor	Set the values for the most important pa	rameters:	
✓Motor data ✓Encoder	Motor overload factor:	100.0	%
Drive functions	Min. frequency:	5.00	Hz
Important parameters Calculation of the moto	Max. frequency:	50.00	Hz
Summary	Ramp-up time:	15.00	s
	Ramp-down time:	15.00	s
	OFF3 ramp-down time:	14.00	s
		,	
	< Back Next >		<u>H</u> elp

Figure 7-17 Important parameters

10.Only calculate motor data

nfiguration - SINAMICS	_G120 - Calculation of the motor data	<u>?</u> ×
Control structure	Drive: SINAMICS_G120, DDS 0, CDS 0	
Drive setting     Motor     Motor	Exit motor commissioning.	
<ul> <li>✓ Encoder</li> <li>✓ Drive functions</li> <li>✓ Important parameters</li> </ul>	C Restore factory setting and calculate motor data	
Calculation of the moto Summary	<ul> <li>Calculate motor data only</li> </ul>	
1 <u>)</u>		
	< <u>B</u> ack <u>N</u> ext >	<u>H</u> elp

Figure 7-18 Calculate the motor data

11.Complete and save data in the drive

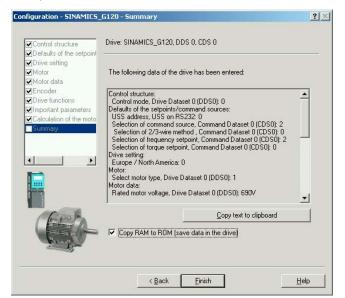


Figure 7-19 Summary

Subsequently, when required, P1310 (fixed voltage boost) can be increased to values > 50 %.

This means that the chemical industry inverter has been commissioned together with the corresponding drive.

# NOTICE

If the script file is re-executed, then this overwrites the motor data that have already been entered. Commissioning with the Drive Wizards **must** be carried out again.

# **Functions**

# 8.1 Analog value de-coupling

3 analog values can be connected-up in the chemical industry module. These involve, from the system perspective (field side) one setpoint (frequency/speed) and two measured values (motor current, motor frequency). Current signals DC 0/4 to 20 mA on the field side are used as carrier signals for these values. On the field and CU side, the analog values have a common reference potential. The setpoints and the two measured values are de-coupled from one another through a high-ohmic path (>10 M\Omega).

In the CM, the analog values are isolated between the field (motor side) and the CU (inverter side). Maximum insulation voltages of 891 V (peak value, continuous operation) and 1670 V (peak value, max. 1 s, discharge) are reached.

# 8.2 Thermal motor protection

Thermal motor protection (TMP) is used to directly monitor the motor winding temperature. To realize this, the motor manufacturer integrates temperature-dependent resistors (PTC) directly in the motor winding. When it reaches its limit temperature, the resistance of the PTC suddenly changes (as a step function).

An evaluation unit is integrated in the chemical industry module for motors with integrated temperature protection (type A PTC sensor). This ensures that the motor operating temperature (when responding and switching back) is in conformance with IEC 60034-11-2 (DIN EN 60947-8).

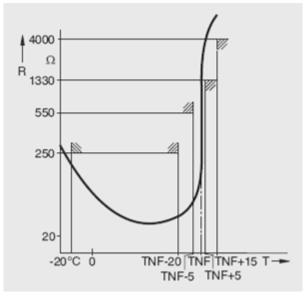


Figure 8-1 TMP characteristic

The following function is implemented:

# 8.2 Thermal motor protection

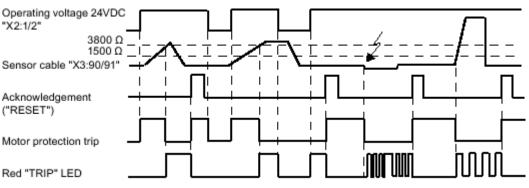


Figure 8-2 Control supply voltage

The device operates in a non-volatile fashion. This means that also when the control supply voltage fails (24 V DC), the previous trip is saved. When the control voltage fails, the trip signal is redundantly issued (voltage must be available at the signal if no fault is present). The sensor cable has a short-circuit and no-load detection function. The module has been designed so that the temperature sensor (not the device itself) at the motor can be connected in hazardous zones.

The sensor cable (X3) has protective separation with respect to the 24VDC supply, the other terminals and the housing (PELV/SELV). The sensor cable can be connected to motors for TN and IT line supplies up to 690 V.

The measuring circuit cables must be routed as separate control cables. It is not permissible to use the cores of the motor supply cable or other main supply cables. Shielded control cables should be used if extremely inductive or capacitive interference is expected as a result of power cables routed in parallel.

#### Use in hazardous zones with the danger of gas explosion

The TMP functionality is permitted as associated equipment of device group II, Category (2) G, i.e. for use in areas where explosive gas atmospheres can occur in normal operation (Zone 1). Conformance with Directive 94/9 EC Appendix II is confirmed with PTB 09 ATEX 3008. The safety switching devices, with the appropriate settings, are required for safe operation of motors, type of protection "Increased safety" (Ex e) and "Flameproof enclosure" (Ex d) and are used outside hazardous zones.

## PTB 09 ATEX 3008 Ex II (2) GD

The increased danger in hazardous zones demand that the following are carefully observed - the operating instructions, the safety and commissioning notes and standard (EN 60 079-14) for electrical equipment for hazardous zones with explosive gas atmospheres. A risk analysis must be drawn-up for the complete plant/system or machine. This device may not be used for plants/systems or machines with a higher potential of danger than indicated in the specified ATEX certification.

# Use in hazardous areas with explosive dust atmospheres

# PTB 09 ATEX 3008 Ex II (2) GD

The TMP functionality of the CM can be used as protective equipment for motors in hazardous zones with explosive gas atmospheres to protect against inadmissible temperature rise as a result of overload. When the ATEX marking is extended to include "D:=Dust", these devices can also be used as protective device for motors in hazardous zones with explosive dust atmospheres (EN 61241-0 and EN 61241-1). Additional information can be taken from the EC type-examination certificate in the Internet.

## See also

Operator control elements (Page 41)

Functions

8.2 Thermal motor protection

# **Technical data**

# 9

# Supply

Characteristic	Data
Operating voltage	External 24 V DC (20.4 to 28.8 V DC) at terminals X2:1(GND) and 2 (24 V DC)
Integrated inverse polarity protection	
Fuse (F1)	2.5 A time-lag (TR5 fuse, e.g. type MST250 from the Wickmann company)
Power loss	<3.0 W
Maximum cable length	Dependent on the cable cross-section and source, the voltage at X2:1 and 2 must be $\geq$ 20.4 V DC)

# Sensor cable to connect to motors with 690V (3-phase), TN and IT line supplies (sensor circuit)

Characteristic	Data
Sensor circuit voltage	at R <sub>F</sub> =1 kΩ: 0.3 V
Sensor circuit current	at R <sub>F</sub> =1 kΩ: 0.29 mA
Sensor circuit power drain	at R <sub>F</sub> =1 kΩ: 87 μW
Current for short-circuited sensor circuit	0.31 mA
Voltage for measuring sensor breakage	6.6 V DC
Measuring sensor, short-circuit detection	Disconnection: 12.8 Ohm Reclosing:13.5 Ohm
Response temperature (specified by the sensor)	60 180 °C
Coupling time (defined by how the sensor is integrated)	approx. 5 s
Total resistance when cold (for each sensor loop)	<1.5 kΩ
Response tolerance	±6 °C
Maximum length of the sensor cable (X3) with short-circuit detection (<20 $\Omega$ ), copper conductor	<ul> <li>at 2.5 mm<sup>2</sup> 300 m</li> <li>at 1.5 mm<sup>2</sup> 150 m</li> <li>at 0.5 mm<sup>2</sup> 50 m</li> </ul>

# Environmental conditions (Class 3K3 acc. to 60721-3-3)

Characteristic	Data
Operating temperature	0 °C…55 °C (up to 1000 m installation altitude)
Maximum temperature change	< 0.5 K/min (as average over 5 min; corresponding to 30 K/h)
Humidity	Relative: > 5% to $\leq$ 90 %
	Absolute: < 25 g/m <sup>3</sup>
Maximum variation of the relative air humidity	< 0.1 %/min; corresponding to 6 %/h
Condensation and ice formation	Not permissible
Dripping water, spray, splash water, jet-water	Not permissible
Thermal radiation	Can be neglected
Movement of the air	<1 m/s
Minimum air pressure	> 920 hPa (920 mbar) or ≤ 1000 m above sea level
Minimum air pressure	> 620 hPa (620 mbar) or ≤ 4000 m above sea level with derating of 3.5 K/500 m of the max. operating temperature
Maximum air pressure	< 1060 hPa (1060 mbar) or ≥ 0 m above sea level
Mechanically active	1.5 mg/(m²h) dust deposit
environmental conditions, Class 3S2 according to EN 60721-3-3	0.2 mg/m <sup>3</sup> suspended solids in air
Biological environmental conditions, Class 3B1 acc. to EN 60721-3-3	Mold, mold growth, slime, rodents, termite and other animal vermin are not permissible.
Chemically active environmental	Sea salt: Occurrence of salt-laden mist
conditions, Class 3C2 according to EN 60721-3-3	Additional values: Refer to the following table

Table 9- 1	Chemically active environmenta	al conditions, C	Class 3C2 according to EN 60721-3-3
------------	--------------------------------	------------------	-------------------------------------

	Mean value	Limit value
Sea salt: Occurrence of salt- laden mist		
Sulfur dioxide	0.3 mg/m <sup>3</sup> & 0.11 cm <sup>3</sup> /m <sup>3</sup>	1.0 mg/m <sup>3</sup> & 0.37 cm <sup>3</sup> /m <sup>3</sup>
Hydrogen sulfide	0.1 mg/m <sup>3</sup> & 0.071 cm <sup>3</sup> /m <sup>3</sup>	0.5 mg/m <sup>3</sup> & 0.36 cm <sup>3</sup> /m <sup>3</sup>
Chlorine	0.1 mg/m <sup>3</sup> & 0.034 cm <sup>3</sup> /m <sup>3</sup>	0.3 mg/m <sup>3</sup> & 0.1 cm <sup>3</sup> /m <sup>3</sup>
Hydrogen chloride	0.1 mg/m <sup>3</sup> & 0.066 cm <sup>3</sup> /m <sup>3</sup>	0.5 mg/m <sup>3</sup> & 0.33 cm <sup>3</sup> /m <sup>3</sup>
Hydrogen fluoride	0.01 mg/m <sup>3</sup> & 0.012 cm <sup>3</sup> /m <sup>3</sup>	0.03 mg/m <sup>3</sup> & 0.036cm <sup>3</sup> /m <sup>3</sup>
Ammonia	1.0 mg/m <sup>3</sup> & 1.4 cm <sup>3</sup> /m <sup>3</sup>	3.0 mg/m <sup>3</sup> & 4.2 cm <sup>3</sup> /m <sup>3</sup>
Ozone	0.05 mg/m <sup>3</sup> & 0.025 cm <sup>3</sup> /m <sup>3</sup>	0.1 mg/m <sup>3</sup> & 0.05 cm <sup>3</sup> /m <sup>3</sup>
Nitrogen oxide (specified as equivalent values to nitrogen dioxide)	0.5 mg/m <sup>3</sup> & 0.26 cm <sup>3</sup> /m <sup>3</sup>	0.1 mg/m <sup>3</sup> & 0.52 cm <sup>3</sup> /m <sup>3</sup>

## Note

The values specified in cm<sup>3</sup>/m<sup>3</sup> are calculated from the values specified in mg/m<sup>3</sup>, referred to a temperature of 20 °C and an air pressure of 101.3 kPa (sea level). The values are rounded-off. Mean values are the average values that can be expected (long-term values). The limit values are peak values. They do not occur for longer than 30 min daily.

# Protective separation between the sensor circuit (X3) with respect to the housing/control terminals (X2) (insulation data)

- Pollution degree 2
- Overvoltage category III
- Base of the housing, protection class 1 according to EN 61140 protective conductor connection (≥2.5 mm<sup>2</sup>) necessary
- Cover, mounted components, sensor cables, protection class II characteristics
- Maximum installation altitude: 2000 m above sea level
- · Sensor cable for motors up to 690 V connected to IT and TN line supplies
- Rated impulse voltage 12 kV (1.2/50 µs) up to 2000 m

## Digital inputs and outputs

- Designed according to Chapter 5.1 and NAMUR recommendation NE 37
- Electrical parameters, refer to the user documentation for CU240S DP-F

# Analog values

- 4-20 mA at terminals X2:50/51 and 60/61/62/63
- Maximum cable lengths, refer to analog and digital control cables: 30 m
- Analog value transfer: Accuracy referred to a final value <1 % Electrical isolation: Peak value: 891 V continuous load / 1670 V for max. 1 s

# Sound pressure level and degree of protection

Characteristic	Data
Sound pressure level (LpA)	~0 dB(A)
Degree of protection	IP 20 in the mounted and connected state

# Storage conditions (in transport packaging)

Characteristic	Data
Long-term storage	-2555 °C
Transport	-4070 °C
Humidity	595 %

# Weight/dimensions

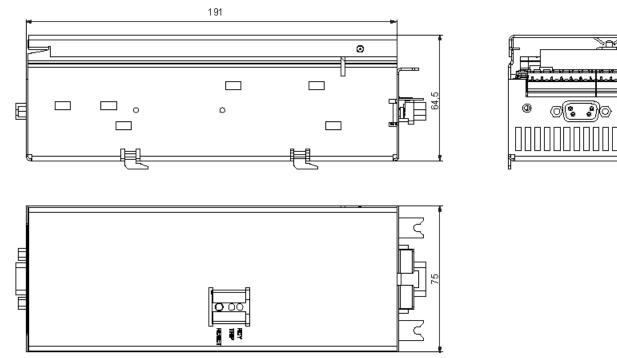
Characteristic	Data
Housing	Sheet steel, galvanized
Weight	approx. 850 g
Dimensions (WxHxD)	191 mm x 75 mm x 64.5 mm
Color	IT gray (dark gray), surface is powder-coated

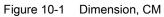
# 10

0

# **Dimension drawings**

# Chemical industry module





Dimension drawings

# Accessories

# Chemical industry module and accessories

The chemical industry module can be ordered under the following MLFB:

Chemical industry module			
MLFB	Designation		
6SL3255-0BT01-0PA0	CM240NE chemical industry module		
6SL3260-4TA00-1AA6	Supplementary kit for rail mounting comprising:		
	Adapter to mount on rails (according to DIN 50022, 35x15 mm)		
	Long cable harness		

Accessories

# Appendix

# A.1 Electromagnetic compatibility

# A.1.1 Electromagnetic Compatibility

# Electromagnetic compatibility

All manufacturers/assemblers of electrical apparatus which "performs a complete intrinsic function and is placed on the market as a single unit intended for the end user" must comply with the EMC directive EC/89/336.

There are three routes for the manufacturer/assembler to demonstrate compliance:

## Self-certification

This is a manufacturer's declaration that the European standards applicable to the electrical environment for which the apparatus is intended have been met. Only standards that have been officially published in the Official Journal of the European Community can be cited in the manufacturer's declaration.

### Technical construction file

A technical construction file can be prepared for the apparatus describing its EMC characteristics. This file must be approved by a 'Competent Body' appointed by the appropriate European government organization. This approach allows the use of standards that are still in preparation.

# **EMC Standards**

The SINAMICS G120 drives have been tested in accordance with the EMC Product Standard EN 61800-3:2004.

# A.1.2 Definition of EMC environment and classes

# Categories of EMC behavior

The EMC environment and the EMC classes are defined in the EMC product standard EN 61800-3 as follows:

#### Appendix

A.1 Electromagnetic compatibility

### **First environment**

An environment that contains residential areas and facilities which are directly connected to a public low-voltage supply system without an intermediate transformer.

#### Note

Example: Apartment blocks, flats, business and commercial units or offices within a residential building.

#### Second environment

An environment that includes business and commercial areas and facilities which are not directly connected to a public low-voltage supply system.

#### Note

Example: Business or commercial units that have been constructed and other utility areas that are supplied through a dedicated transformer.

#### Class C1

Power Drive System (PDS) with a rated voltage less than 1000 V for use in residential buildings.

## Class C2

Power Drive System (PDS) with a rated voltage of less than 1000 V that is neither equipped with a plug-in connection nor intended for (simple) transport and that is only intended to be installed and commissioned in residential buildings by a qualified person.

#### Note

A qualified person is a person or organization that is capable of installing and/or commissioning a Power Drive System (PDS) including its EMC aspects.

### **Class C3**

Power Drive System (PDS) with a rated voltage less than 1000 V for use in business or commercial environments and not for use in residential buildings.

#### Note

All of the drives must be installed and commissioned in conformance with the manufacturers and EMC Directives.

For additional information, refer to SIEMENS application information "EMC design guidelines".

# A.1.3 Overall EMC behavior

# EMC interference emission

The SINAMICS G120 drives were tested in accordance with the requirements regarding emitted interference for Class C2 environments (residential areas).

Table A- 1	Conducted and	radiated interference	emission

EMC impact	Standard	Step
Radiated emissions	EN 55011 EN61000-6-4	Class A

# EMC interference immunity

SINAMICS G120 drives were tested in accordance with the interference immunity requirements for Class C3 environments (commercial).

EMC impact	Standard	Step	Performance criterion
Electrostatic discharge (ESD)	EN 61000-4-2	4 kV discharge by contact	В
		8 kV discharge in air	В
Electromagnetic high frequency field	EN 61000-4-3	80 MHz … 1000 MHz 10 V/m	A
Amplitude modulated		80 % AM at 1 kHz	
Transient overvoltages	EN 61000-4-4	2 kV at 5 kHz	В
Surge voltage (synchronous)	EN 61000-4-5	1 kV (1.2/50 µs)	В
Conducted	EN 61000-4-6	0.15 MHz 80 MHz 10 V/rms	A
High frequency common mode		80 % AM at 1 kHz	
Line supply interruptions and voltage dips	EN 61000-4-11	100 % voltage dip (of 20.4 V) for 3 ms	A

A.2 Standards

# A.2 Standards

Standards

 European Low-Voltage Directive
 The SINAMICS G120 product series meets the requirements of the Low-Voltage Directive 2006/95/EC. The devices are certified that they comply with the following standards:
 EN 61800-5-1 - Semiconductor power converters - General requirements and line-commutated converters
 EN 60204-1 - Safety of machinery - Electrical equipment of machines

#### **European Machinery Directive**

The SINAMICS G120 inverter series does not fall within the area covered by the Machinery Directive. However, the use of the products in a typical machine application has been fully assessed for compliance with the main regulations in this directive concerning health and safety. A declaration regarding the acceptance is available upon request.

#### **European EMC Directive**

When installed in accordance with the recommendations specified in this manual, the SINAMICS G120 complies with all regulations of the EMC Directive according to the definition provided by EN 61800-3 "EMC Product Standard for Power Drive Systems".

#### ISO 9001

Siemens AG uses a quality management system that meets the requirements of ISO 9001.

#### EN 60947-8 Type A

Evaluation device in the sense of this standard

# Directives

Directive 94/9/EC

Devices according to Device Group 2 of Category 2G and extension to D for temperature sensor X3

## NAMUR Recommendation NE 37

Inverter design, standard terminal strip for variable-speed drives

#### Certificates

Certificates can be downloaded from the Internet under the following link: http://support.automation.siemens.com/WW/view/en/22339653/134200

# A.3 ATEX application

# A.3.1 Introduction

This document describes the use of a thermistor motor protection device to sense the motor overtemperature of an explosion-protected motor with integrated PTC thermistor in conjunction with a connected inverter with integrated, safe shutdown.

The shutdown for a motor overtemperature condition is achieved by safely shutting down the motor control pulses of the inverter - and not by disconnecting from the main power supply using a motor contactor. The following Ex classification is achieved for this application according to ATEX directive 94/9/EC.

Ex II (2) GD

# A.3.2 Marking

# Inverters for explosion-protected motors in hazardous zones

Inverters for explosion-protected motors in a hazardous zone must always be located outside the hazardous zone. This is the reason that there is no special marking for explosion-protected motors regarding their use in hazardous zones.

```
Appendix
```

A.3 ATEX application

# Thermistor motor protection device for explosion-protected motors in hazardous zones

The thermistor motor protection device for explosion-protected motors in hazardous zones must always be mounted outside the hazardous zone. The TMS 3RN1013 (**PTB 01 ATEX 3218**) and the CM240NE chemical industry module (**PTB 09 ATEX 3008**) are certified. The following diagram shows an example of a certified thermistor motor protection device (in this case, CM240 NE) with the corresponding ATEX marking (lower right).

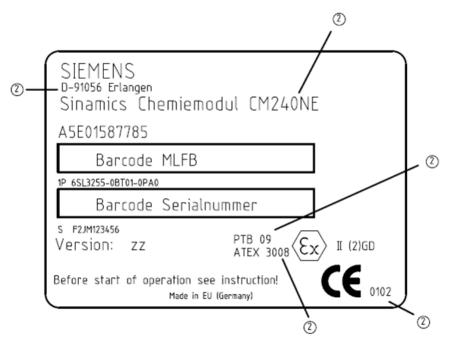


Figure A-1 Type plate of the CM240NE

# Explosion-protected motors in hazardous zones

In principle, all explosion-protected motors may be used with the appropriate ATEX certification and marking. They must be certified for inverter operation and have at least one PTC thermistor to measure the motor overtemperature.



Figure A-2 Rating plate of an explosion-protected motor for inverter operation

#### A.3.3 Installation

#### A.3.3.1 Inverters for explosion-protected motors in hazardous zones

#### 

Inverters must not be installed in hazardous zones. This can result in explosions. Inverters must only be installed in safe areas.

These devices are at hazardous voltage levels and control rotating mechanical parts, which in some circumstances, can be dangerous. Non-observance of the warnings or non-compliance with the instructions in this manual can lead to danger to life, serious injury or substantial damage to property.

Protection for direct contact using SELV/PELV is only permitted in areas with equipotential bonding and in dry indoor areas. If these conditions are not fulfilled, other protective measures against electric shock are to be taken, e.g., protective insulation.

Only suitably qualified personnel who have familiarized themselves with all the instructions regarding safety, installation, operating and maintenance as set out in this manual are permitted to work on these devices. Successful and safe operation of these devices depends on their proper handling, installation, operation and maintenance.

The line supply, DC voltage and motor terminals as well as the brake cables and thermistor cables can be at hazardous voltage levels even when the inverter is not operational. Once the line supply has been disconnected, wait at least 5 minutes until the device has discharged itself. Only then can you start the installation work.

It is strictly forbidden to disconnect the motor from the inverter. Disconnection from the line supply must always be made on the line side of the inverter. Before the power supply for the inverter is connected, ensure that the terminal box of the motor is closed.

If an LED or similar indicator does not light up or is not active when a function is switched from ON to OFF, this does not mean that the unit has been switched off or is current-free.

The inverter must always be properly grounded.

The device must be disconnected and isolated from the line supply before any cables, plugs or wires are connected to the device or altered.

Make sure that the inverter has been configured for the correct supply voltage. It must be ensured that the inverter is not connected to a higher supply voltage.

Static discharge on surfaces or at interfaces which are not generally accessible (e.g. terminals or connector pins) can cause malfunctions or defects. ESD protective measures should therefore be observed when working with inverters or inverter components.

The general and regional installation and safety regulations for working on equipment at high hazardous voltage levels (e.g. EN 50178) as well as the relevant stipulations regarding the correct use of tools and personal protective equipment (PPE) are especially to be observed.

A.3 ATEX application

#### A.3.3.2 Explosion-protected motors in hazardous zones

Special rules and regulations apply - and which must be strictly observed - when operating motors in hazardous zones.

#### Rules

- 1. The motor must be certified for the particular hazardous zone. The appropriate marking is stamped on the motor rating plate.
- 2. The motor must be equipped with type A PTC thermistors (PTC) according to DIN 44081, DIN 44082 and EN 60947-8. These PTC thermistors are connected to the certified thermistor motor protection device (e.g. Sirius thermistor motor protection trip unit (TMS) module 3RN1013 or chemical industry module CM240NE). When the safety functions are appropriately parameterized, then the motor is protected against inadmissible temperature rises as a result of overload (according to DIN EN 60079-14/VDE 0165-1).
- The safety regulations, which apply from the use of motors with increased safety (Ex e) or flameproof enclosure (Ex d) (Directive RL94/9/EG and EN 60079-14 or EN 60079-17) must be maintained.
- 4. The motor must be certified for inverter operation. The motor rating plate should be checked.
- 5. The motor must only be operated in the speed control range for which it is intended. In addition to the motor parameters, the parameter for f<sub>max</sub> must also be specified for this purpose.
- 6. The maximum motor cable length must not be exceeded, as otherwise inadmissible voltage peaks can occur.
- 7. For EX(e) motors, the motor must be tested together with the inverter in the manufacturer's factory. It is not permissible that the system is commissioned without a test report.
- For Ex(e) and Ex(n) motors, the value for I<sub>rated</sub> must be set to the values specified by the motor manufacturer (refer to the data on the rating plate). These values must not be changed without first consulting the motor manufacturer.
- 9. Inverter fed motors in hazardous zones must be protected by using a PTC thermistor. This is the reason that an evaluation circuit must be used for the motor PTC thermistor according to the application description attached. The inverter is electronically shut down (contactlessly). A risk analysis according to ISO 14121 has indicated that protection against hazardous currents flowing through the human body is not guaranteed as opposed to shutdown using a contactor where it is guaranteed. As a result of the electronic shutdown path with a diverse two-channel structure, shutdown is still guaranteed even when a single fault occurs in the electronic shutdown path! Proof of functional safety regarding the shutdown path from the PTC to the inverter is realized according to IEC 61508:2000 and ISO 13849:2007. An analysis of multiple faults with common cause indicated that if at least two IGBTs fail (breakdown of the depletion layer) then this can result in a short-circuit and in some cases, a short-circuit can even flow through the motor. This current must be limited or interrupted using suitable fuses so that the motor temperature cannot increase any

further.

10.For Ex(e) motors (increased safety) a notified body (e.g. PTB) must test the motor together with the inverter in the manufacturer's factory (see EN 60079-7, Section 5.2.4.5). The motor manufacturer is then issued an EC type test certificate with the defined parameter data for the inverter.

#### A.3.4 Safe commissioning

The relevant instructions must be read and understand before installation, operation, or maintenance of the device.

- Installation instructions: Explosion-protected motors (are included with the particular motor)
- Installation instructions: Thermistor motor protection trip unit
- Operating instructions: Thermistor motor protection trip unit
- Installation instructions: SINAMICS G120 PM240 (for configurations with PM240)
- Installation instructions: SINAMICS G120 PM250 (for configurations with PM250)
- Installation instructions: SINAMICS G120 PM260 (for configurations with PM260)
- Operating instructions: SINAMICS G120 Control Units
- Operating instructions: CM240NE chemical industry module

The relevant rules and regulations in the associated operating instructions must be carefully observed.

#### Connecting the inverter

Connecting the inverter to the thermistor motor protection devices (TMS) and their interconnection are shown in Fig. 3.

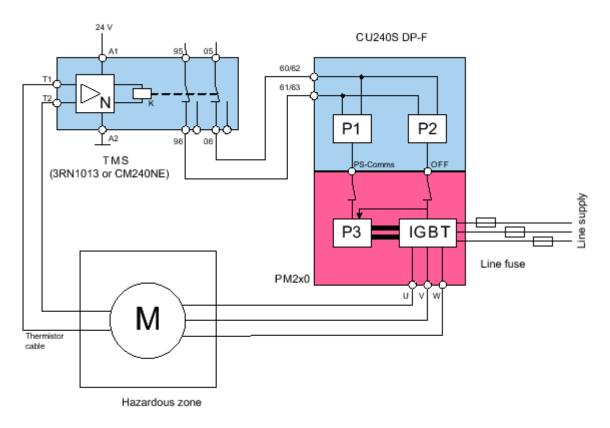


Figure A-3 Inverter, ATEX application

CM240NE chemical industry module Operating Instructions, 01/2010, A5E02297888B AA A.3 ATEX application

Install the TMS (e.g. CM240NE) corresponding to the installation instructions of the thermistor motor protection trip unit.

Install the inverter power unit corresponding to the PM240, PM250 or PM260 installation instructions.

Install the fail-safe control module (e.g. CU240S DP-F) corresponding to the operating instructions of the SINAMICS G120 Control Unit.

24V DC must be connected to the safe input terminals (60-61 or 62-63) of the fail-safe control module via the TMS output terminals (the 24 V output of the inverter should be used for this purpose in order to avoid the formation of parasitic voltages). The wiring must be realized so that a short-circuit can be completely ruled-out (conductors must be separately routed). The terminal pair used must be parameterized with the safety function - Safe Torque Off (STO) - according to the operating instructions for G120 Control Units.



Figure A-4 ATEX wiring

In the case of an overtemperature, the TMS initiates a fault and shuts down the 24 V at the outputs. In the inverter, this initiates the parameterized STO safety function, which immediately cancels the pulses. A restart is interlocked corresponding to the rules that apply for a safe standstill. The STO safety function represents a safe state for the inverter. In this state, the motor is in a no-current condition; however, the line supply voltage is still connected to the inverter. In order to be able to handle the multiple fault associated with a short-circuit in the inverter, the inverter must be protected using line fuses at its input. The line fuses recommended in the catalog for the particular power class should be used.

#### NOTICE

By applying suitable measures (e.g. line fuse), the operating company must ensure that the motor also remains in a no-current condition even for a multiple fault (special short-circuit) in the power circuit (PM). For this purpose, the maximum DC current, which can flow through the motor when a short-circuit occurs, must quickly rupture the line fuses described above.

#### Example

- Rated motor current : In = 2 A
- DC link voltage: Z<sub>u</sub> = 600 V
- Winding resistance:R<sub>w</sub> = 100 Ohm

In the case of a short-circuit, for this particular motor, a short-circuit current of 6 A would flow. In this particular case, a 16 A fuse would not rupture - and the temperature would continue to increase and with it the danger an explosion.

An overview of the recommended fuses as example for various motors when using a PM260 power unit is shown in the following table.

Motor, 690 V		Rated device current, PM260			Securing	
P <sub>N</sub> [kW]	l <sub>N</sub> [A]	MLFB	P <sub>N</sub> , cl. Ü. [kW]	l <sub>N</sub> , cl. Ü. [A]	MLFB	I <sub>N</sub> [A]
1.1	1.4	6SL3225-0BH27-5xA0	11	14	3NA3 801-6	6
1.5	1.9	6SL3225-0BH27-5xA0	11	14	3NA3 801-6	6
2.2	2.7	6SL3225-0BH27-5xA0	11	14	3NA3 801-6	6
3	3.7	6SL3225-0BH27-5xA0	11	14	3NA3 803-6	10
4	4.8	6SL3225-0BH27-5xA0	11	14	3NA3 805-6	16
5.5	6.6	6SL3225-0BH27-5xA0	11	14	3NA3 805-6	16
7.5	8.8	6SL3225-0BH27-5xA0	11	14	3NA3 807-6	20
11	12.4	6SL3225-0BH27-5xA0	11	14	3NA3 810-6	15
15	16.5	6SL3225-0BH31-1xA0	14	19	3NA3 814-6	35
18.5	20.5	6SL3225-0BH31-5xA0	18.5	23	3NA3 814-6	35
22	23.9	6SL3225-0BH32-2xA0	30	35	3NA3 822-6	63
30	31.7	6SL3225-0BH32-2xA0	30	35	3NA3 822-6	63
37	38.1	6SL3225-0BH33-0xA0	37	42	3NA3 824-6	80
45	46.2	6SL3225-0BH33-7xA0	55	62	3NA3 830-6	100
55	57.7	6SL3225-0BH33-7xA0	55	62	3NA3 830-6	100

Table A-3 Recommended fuses for the PM260

Appendix

A.3 ATEX application

# List of abbreviations

# Β

Abbreviation	Status		
A			
ASIC	Application Specific Integrated Circuit		
ATEX	"Atmosphère explosible", implementation of EC Directive 94/9/EC		
В			
BOP	Basic Operator Panel		
Braking R	Braking resistor at the inverter		
С			
CE	Communauté Européenne		
СМ	Chemical industry module		
CU	Control Unit		
D			
DC	Direct Current		
DP	Distributed I/Os		
DP-V1	Non-cyclic data transfer (extended PROFIBUS function)		
E			
ELV	Protective separation		
F			
F3E filter	Type of filter in the Power Module that results in low line harmonics for the inverter		
FAQ	Frequently Asked Questions		
FSx	Frame Size (i.e. the inverter power rating)		
FSA	Frame size A		
FSB	Frame size B		
FSC	Frame size C		
FSD	Frame size D		
FSE	Frame size E		
FSF	Frame size F		
FSG	Frame size G		
G			
G120	Series of inverters		
1			
I/O	Input/output		
IBN	Commissioning		
IGBT	Insulated gate bipolar transistor		
IT system	Type of ground connection of a distribution system (neutral point of the supply transformer non-grounded)		
L			
LCD	Liquid Crystal Display		

Abbreviation	Status		
LC filter	Coil-capacitor arrangement for filtering		
LED	Light Emitting Diode		
м			
MW	Measured value (general)		
N			
NAMUR	Association of users of process control systems		
NE xx	NAMUR recommendation		
0			
OPI	Operating Instructions		
Р			
PELV	Extra low-voltage circuit with protective separation (with protective conductor)		
PM	Power Module (power unit)		
PROFIBUS	Fieldbus in automation technology (serial, often with RS485)		
PTB	Physikalisch Technische Bundesanstalt in Braunschweig (certified authority 94/9/EC)		
PTC	Positive temperature coefficient		
S			
SELV	Extra low-voltage circuit with protective separation (without protective conductor)		
STO	Safe Torque Off (STO)		
Sub-D	Connector type		
т			
TIA	Totally Integrated Automation (concept for extensive networking and automation)		
ТМР	Thermal Motor Protection (for temperature sensors in motors)		
TN system	Type of ground connection of a distribution system (neutral point of the supply transformer grounded, neutralization at the neutral point)		
V			
VIK	Verband der industriellen Energie- und Kraftwirtschaft (German Association of Industrial Energy Users and Self-Generators)		

# Glossary

#### NAMUR

NAMUR is an association of automation technology users in the process industry. The association issues recommendations that are designated with "NE xx".

#### NE 37

NAMUR recommendation NE 37 "Inverter version - standard terminal strip for variable-speed drives" describes the special arrangement of the terminal strips.

Glossary

# Index

# Α

A&D Technical support, 9 America (Johnson City), 10 Asia/Pacific (Beijing), 10 Europe/Africa (Erlangen), 10 Online Service and support, 9 Accessories, 67 Analog value de-coupling, 57 Analog values, 63

# В

Block diagram, 20

# С

Cable configuration for counter-clockwise rotation, 33 Cable harness, 33 Cable harness, long, 36 Categories of EMC behavior, 70 Chemical industry inverter, 7 Characteristics, 18 Design, 17 Chemical industry module, 7, 19 Commissioning, 43 Commissioning change-over switch "normal test", Commissioning with script file, 45 Commissioning with STARTER Drive Wizard, 49 Script file, 45 Configuring the CU, 44 Connecting the CU and CM, 32 for cover mounting, 34 For rail mounting, 36 Connecting the field side, 39 Connection diagram, 28 CU interfaces, 30

# D

Digital inputs and outputs, 63 Dimension drawing, 65 Display elements, 41

#### Е

Electromagnetic compatibility, 69 EMC interference emission, 71 EMC interference immunity, 71 EMC Standards, 69 Environmental conditions, 62 European EMC Directive, 72 European Low-Voltage Directive, 72 European Machinery Directive, 72

# G

Grounding, 38

# I

Insulation data, 63 Interfaces at the CM, 27 ISO 9001, 72

# Μ

Mounting Cover mounting, 23 Rail mounting, 25 Mounting options, 21

#### Ν

NAMUR, 7

# 0

Operating states, 42 Operator control elements, 41 Overview of the terminal strips, 39

# Ρ

Parameterization Chemical industry module, 43 CU240S DP-F, 43

#### S

Safety notes Commissioning, 13 Dismantling and disposal, 15 Repair, 15 Safety Instructions, 11 Transport and storage, 13 Self certification, 69 Sensor cable, 61 Standards, 69 Strain relief, 36

#### Т

Technical construction file, 69 Technical data, 61 Terminal assignment X3, 29 Terminal assignment, X2 and X3, 29 Thermal motor protection (TMP), 57 TMP acknowledgement "RESET", TMP display elements, 42

Siemens AG Industry Sector P.O. Box 48 48 90026 NUREMBERG GERMANY Subject to change without prior notice © Siemens AG 2010

www.siemens.com/automation