

SIEMENS

SINUMERIK

SINUMERIK 828D PPU

Manual

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Valid for: SINUMERIK 828D
PPU 24x.2 BASIC T
PPU 24x.2 BASIC M
PPU 26x.2
PPU 28x.2

11/2010

6FC5397-2DP10-1BA0

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.

DANGER

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

WARNING
--

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

CAUTION
--

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:

WARNING
--

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.

Preface

SINUMERIK documentation

The SINUMERIK documentation is organized in three parts:

- General documentation
- User documentation
- Manufacturer/service documentation

Information on the following topics is available under the link (<http://www.siemens.com/motioncontrol/docu>):

- Ordering documentation

Here you can find an up-to-date overview of publications.

- Downloading documentation

Links to more information for downloading files from Service & Support.

- Researching documentation online

Information on DOConCD and direct access to the publications in DOConWEB.

- Customizing documentation based on Siemens content using My Documentation Manager (MDM) (<http://www.siemens.com/mdm>).

- My Documentation Manager provides you with a range of features for generating your own machine documentation.

- Training and FAQs

Information on our range of training courses and FAQs (frequently asked questions) is available via the page navigation.

Target group

This documentation is intended for manufacturers of machine tools, particularly:

- Project engineers, electricians and installers
- Maintenance and service personnel

Benefits

The information in this manual facilitates installation and connection of the SINUMERIK 828D numerical control.

Standard version

This documentation only describes the functionality of the standard version. Extensions or changes made by the machine manufacturer are documented by the machine manufacturer.

Other functions not described in this documentation might be executable in the control. However, no claim can be made regarding the availability of these functions when the equipment is first supplied or in the event of servicing.

Further, for the sake of simplicity, this documentation does not contain all detailed information about all types of the product and cannot cover every conceivable case of installation, operation or maintenance.

Questions about this documentation

If you have any queries (suggestions, corrections) in relation to this documentation, please send a fax or e-mail to the following address:

Fax: +49 9131 98 2176
E-mail (mailto:docu.motioncontrol@siemens.com)

SINUMERIK Internet address (<http://www.siemens.com/sinumerik>)

Service & Support

If you have any technical questions, please contact our hotline:

	Europe / Africa
Phone	+49 911 895 7222
Fax	+49 911 895 7223
For connections to German landline numbers dialed from outside Germany, the regional telephone rates and conditions apply.	
Internet (http://www.siemens.com/automation/support-request)	

	Americas
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	Asia / Pacific
Phone	+86 1064 75 75 75
Fax	+86 1064 74 74 74
E-mail (mailto:techsupport.asia@siemens.com)	

Note

Country-specific telephone numbers for technical support are provided on the Internet (<http://www.siemens.com/automation/partner>).

EC Declaration of Conformity

The EC Declaration of Conformity for the EMC Directive can be found on the Internet (<http://support.automation.siemens.com>) under the Product Order No. 15257461 or at a local office of the I DT MC Division of Siemens AG.

CompactFlash Cards

- The SINUMERIK CNC supports the file systems FAT16 and FAT32 for CompactFlash cards. You may need to format the memory card if you want to use a memory card from another device or if you want to ensure the compatibility of the memory card with the SINUMERIK. However, formatting the memory card will permanently delete all data on it.
- Do not remove the memory card while it is being accessed. This can lead to damage of the memory card and the SINUMERIK as well as the data on the memory card.
- If you cannot use a memory card with the SINUMERIK, it is probably because the memory card is not formatted for the control system (e.g. Ext3 Linux file system), the memory card file system is faulty or it is the wrong type of memory card.
- Insert the memory card carefully with the correct orientation into the memory card slot (take note of arrows, etc.). This way you avoid mechanical damage to the memory card or the device.
- Only use memory cards that have been approved by Siemens for use with SINUMERIK. Even though the SINUMERIK keeps to the general industry standards for memory cards, it is possible that memory cards from some manufacturers will not function perfectly in this device or are not completely compatible with it (you can obtain information on compatibility from the memory card manufacturer or supplier).
- For SINUMERIK 828D, only the memory card (1 GB) with order number 6FC5313-5AG00-0AA1 is permitted.

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Safety notes

1

1.1 Danger notices

The following notices are intended firstly for your personal safety and secondly to prevent damage occurring to the product described or any connected devices and machines. Non-observance of the warnings can result in severe personal injury or property damage.

DANGER

Only appropriately qualified personnel may commission/start-up SINUMERIK equipment.

The personnel must take into account the information provided in the technical customer documentation for the product, and be familiar with and observe the specified danger and warning notices.

When electrical equipment and motors are operated, the electrical circuits automatically conduct a dangerous voltage.

When the system is operating, dangerous axis movements may occur throughout the entire work area.

A potential fire hazard exists due to the energy being transferred in the equipment and the work materials used.

All work on the electrical system must be performed after the system has been switched off and disconnected from the power supply.

DANGER

Proper transportation, expert storage, installation and mounting, as well as careful operation and maintenance are essential for this SINUMERIK device to operate correctly and reliably.

The details in the catalogs and proposals also apply to the design of special equipment versions.

In addition to the danger and warning information provided in the technical customer documentation, the applicable national, local, and system-specific regulations and requirements must be taken into account.

Only class DVC A protective extra-low voltages (PELVs) may be connected to connections and terminals up to 60 V DC in accordance with EN 61800-5-1.

Should it be necessary to test or take measurements on live equipment, then the specifications and procedural instructions defined in Accident Prevention Regulation BGV A2 must be adhered to, in particular § 8 "Permissible deviations when working on live components". Suitable electric tools should be used.

 DANGER

Repairs to devices that have been supplied by our company may only be carried out by SIEMENS customer service or by repair centers authorized by SIEMENS.

When replacing parts or components, only use those parts that are included in the spare parts list.

EMERGENCY STOP/EMERGENCY OFF devices according to EN 60204-1 (VDE 0113 Part 1) must remain active in all modes of the automation equipment. Resetting the EMERGENCY STOP/EMERGENCY OFF device must not cause an uncontrolled or undefined restart.

Anywhere in the automation equipment where faults might cause physical injury or major material damage, in other words, where faults could be dangerous, additional external precautions must be taken, or facilities must be provided, that guarantee or enforce a safe operational state, even when there is a fault (e.g. using an independent limit value switch, mechanical locking mechanisms, EMERGENCY STOP/EMERGENCY OFF devices).

 DANGER

External power supply units for supplying components of the drive control must have safety isolation from circuits with dangerous voltages (DVC A according to EN 61800-5-1; SELV/PELV). In addition only power units with control circuits that have safety isolation from circuits with dangerous voltages may be connected.

1.2 ESD notices

CAUTION

The modules contain electrostatically sensitive devices. Discharge yourself of electrostatic energy before touching the components. The easiest way to do this is to touch a conductive, grounded object immediately beforehand (for example, bare metal parts of control cabinet or the protective ground contact of a socket outlet).

NOTICE

Handling ESD modules:

- When handling electrostatically sensitive devices, make sure that operator, workplace and packing material are properly grounded.
- Generally, electronic modules must not be touched unless work has to be carried out on them. When handling PC boards make absolutely sure that you do not touch component pins or printed conductors.
- Touch components only if:
 - you are constantly grounded via an ESD arm band,
 - ESD shoes or ESD shoe grounding strips if there is an ESD floor.
- Boards/modules must only be placed on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).
- Keep modules away from visual display units, monitors or TV sets (minimum distance from screen 10 cm).
- Do not bring ESD-sensitive modules into contact with chargeable and highly-insulating materials, such as plastic, insulating table tops or clothing made of synthetic materials.
- Measurements on modules are allowed only if:
 - The measuring instrument is properly earthed (e.g., protective conductor) or
 - Before measuring with a floating measuring instrument, the probe is briefly discharged (e.g., touch the bare metal parts of the control housing).

System overview

Features

SINUMERIK 828D is a tailor-made CNC solution for milling and turning machines in the medium performance range.

SINUMERIK 828D is a panel-based CNC (panel processing unit). A CNC, PLC, operator panel and axis control for 6 drives (standard) are combined in one unit. This design provides a high degree of robustness by eliminating the need for hardware interfaces between the CNC electronics board and the operator panel. In order to guarantee that operation is as low-maintenance as possible, there are no wearing parts such as fans or back-up batteries.

- CNC operator panel with tailor-made system software versions for turning and milling technologies.
- 2 operator panel versions for horizontal and vertical operator panel housings.
- Integrated full QWERTY CNC keyboard with mechanical short-stroke keys.
- USB, CompactFlash card and Ethernet interface on operator panel front.
- Additional Ethernet interface on rear of CNC for fixed factory network.
- PLC I/O Interface based on PROFINET for the connection of PLC I/O devices and a machine control panel.
- PP 72/48D PN and PP 72/48D 2/2A PN as PLC I/O module.
- 2 connectable handwheels.
- Optional GSM modem connection possible.
- Versions: PPU 260/261, PPU 280/281 and PPU 240/241 in the versions BASIC T and BASIC M
- Up to 6 axes/spindles for milling applications and up to 8 axes/spindles for turning applications.
- 1 machining channel/mode group.
- Integrated PLC based on the SIMATIC S7-200 command set with Ladder Steps programming

System configuration

The SINUMERIK 828D PPU (Panel Processing Unit) combines CNC, PLC, HMI, drive control and communication tasks in a single component.

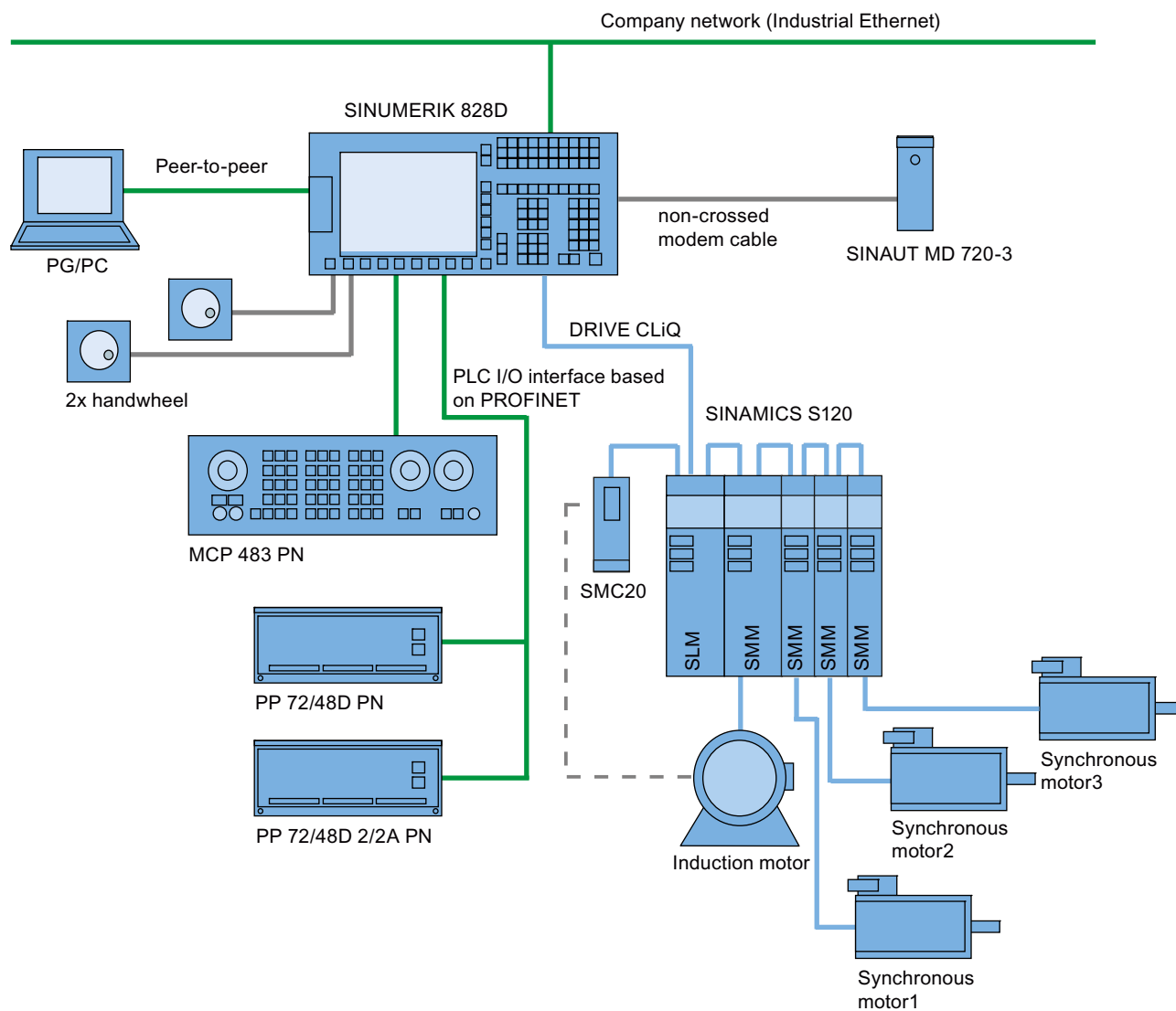


Figure 2-1 SINUMERIK 828D system example

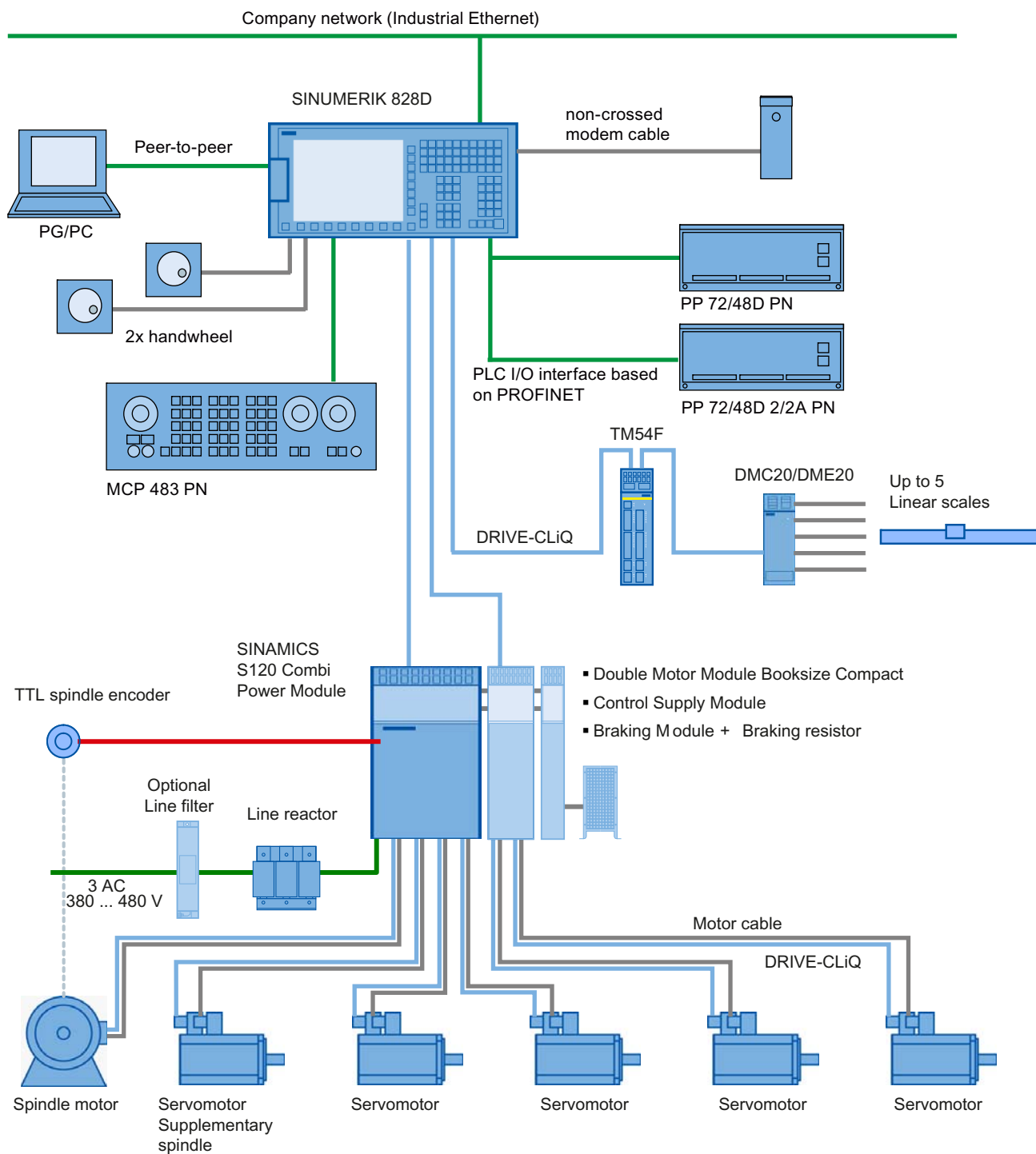


Figure 2-2 System example with SINAMICS S120 Combi

Components

The following components can be connected to the PPU:

- **MCP 310C PN, MCP 483C PN Machine Control Panels**

Contains the keys and switches required for the operation of a machine (turning or milling machine).

- **PLC I/O devices PP 72/48D PN, PP 72/48D 2/2A PN**

The modules are used to connect digital inputs/outputs and have the following key features:

- Max. transfer rate 100 MBit/s
- 72 digital inputs and 48 digital outputs
- Onboard status display on 6 LEDs
- An additional two analog inputs and two analog outputs for PP 72/48D 2/2A PN

To supply the module and the outputs, an external power supply unit (24 V DC) is required, which provides safety isolation from dangerous voltages.

- **SINAMICS S120 drive system**

Only the SINAMICS S120 Line and Motor Modules are used for drive control. The following **feed and main spindle motors** can be connected via the Motor Modules:

- 1FT7/1FK7/1FE1/2SP1 synchronous motors
- 1PH/1PM asynchronous motors

- **GSM modem**

Optional connection of a SINAUT MD720-3 GSM modem for sending and receiving SMS messages (Easy Message).

- **Handwheels**

A maximum of 2 handwheels can be connected.

- **Mini handheld unit**

A mini HHU can be integrated into the SINUMERIK 828D system using a connection kit.

- **PN/PN coupler**

A PN/PN bus coupler can be connected in order to link a SINUMERIK 828D to PROFINET networks.

Communication

The following interfaces can be used for communication between the SINUMERIK 828D system components:

- **X100, X101, X102:**DRIVE-CLiQ
- **PN1, PN2:**PLC I/O Interface
- **X127, X130:**Industrial Ethernet
- **X140:**RS232

Note

MAC addresses

The MAC addresses required for establishing the PLC I/O Interface and Industrial Ethernet communication networks are printed on the type plate of the PPU. This is located on the rear side of the PPU.

For the PPU components that can be connected, such as machine control panels and I/O modules, the same facts essentially apply.

2.1 Variants

Overview

The SINUMERIK 828D is available in different versions (horizontal or vertical; turning or milling) as well as with different performance levels.

For the PPU 24x.2 a distinction is made between the turning and milling versions. When booting, the preconfigured technology-specific system software automatically scales itself as a result of the hardware that is found. As a consequence, e.g. a PPU 24x.2 BASIC T cannot be used for milling.

The SINUMERIK 828D is available in the following versions:

- PPU 240.2 BASIC T (vertical operator panel)
- PPU 240.2 BASIC M (vertical operator panel)
- PPU 241.2 BASIC T (horizontal operator panel)
- PPU 241.2 BASIC M (horizontal operator panel)
- PPU 260.2 (vertical operator panel)
- PPU 261.2 (horizontal operator panel)
- PPU 280.2 (vertical operator panel)
- PPU 281.2 (horizontal operator panel)

Performance

The following table shows the difference between the different versions based on characteristic technical data/features:

Table 2- 1 Performance

Function	PPU 240.2 / 241.2		PPU 260.2 / 261.2		PPU 280.2 / 281.2	
	BASIC T	BASIC M	Turning	Milling	Turning	Milling
DRIVE-CLiQ ports	3	3	3	3	3	3
Basic quantity of axes/spindles	3	4	3	4	3	4
Maximum number of axes/spindles	5	5	6	6	6 / 8 *	6
Maximum number of axes with Safety Integrated	5	5	6	6	6 / 8 *	6
IPO cycle for max. configuration	9 ms	9 ms	6 ms	6 ms	6 ms	3 ms
Position-control cycle	3 ms	3 ms	3 ms	3 ms	1.5 ms	3 ms
Speed/current regulation cycle	125 µs	125 µs	125 µs	125 µs	125 µs	125 µs
Buffered work memory:						
• for OEM cycles:	512 kB	512 kB	512 kB	512 kB	512 kB	512 kB
• For user data	1 MB	1 MB	3 MB	3 MB	5 MB	5 MB
Numeric Control Extension NX10.3	0	0	0	1	1	1
I/O module (digital)	3	3	4	4	5	5
I/O module (analog)	3	3	4	4	5	5

*) Using an NX10.3 the maximum number of axes can be increased up to 8.

2.2 Ordering data

Ordering

SINUMERIK 828D is generally marketed in sales packages with drives, motors and accessories. For orders, please contact your local Siemens sales representative.

Table 2- 2 Components

Designation	Order number (MLFB)
Panel Processing Unit without system software	
• PPU 240.2: BASIC T	6FC5370-4AT20-0AA0
• PPU 240.2: BASIC M	6FC5370-4AM20-0AA0
• PPU 241.2: BASIC T	6FC5370-3AT20-0AA0
• PPU 241.2: BASIC M	6FC5370-3AM20-0AA0
• PPU 261.2 horizontal	6FC5370-5AA20-0AA0
• PPU 260.2 vertical	6FC5370-6AA20-0AA0
• PPU 281.2 horizontal	6FC5370-7AA20-0AA0
• PPU 280.2 vertical	6FC5370-8AA20-0AA0
CompactFlash Card with system software and license	
• for PPU 241.2 / PPU 240.2: Turning	6FC5835-1GY40-0YA0
• for PPU 241.2 / PPU 240.2: Milling	6FC5835-2GY40-0YA0
• for PPU 261.2 / PPU 260.2: Turning	6FC5834-1GY40-0YA0
• for PPU 261.2 / PPU 260.2: Milling	6FC5834-2GY40-0YA0
• for PPU 281.2 / PPU 280.2: Turning	6FC5833-1GY40-0YA0
• for PPU 281.2 / PPU 280.2: Milling	6FC5833-2GY40-0YA0
Axis extension:	
• Numeric Control Extension NX10.3	6SL3040-1NC00-0AA0
Machine control panels:	
• MCP 483C PN	6FC5303-0AF22-0AA1
• MCP 310C PN	6FC5303-0AF23-0AA1
Mini handheld unit:	
• with spiral connection cable	6FX2007-1AD03
• with straight cable	6FX2007-1AD13
I/O modules:	
• PP 72/48D PN (digital)	6FC5311-0AA00-0AA0
• PP 72/48D 2/2A PN (analog)	6FC5311-0AA00-1AA0

Table 2- 3 Accessories

Designation	Order number (MLFB)
SINAUT MD720-3 GSM/GPRS MODEM	6NH9720-3AA00
SINAUT ANT 794-4MR ANTENNA	6NH9860-1AA00
RS232 modem cable	6NH7701-5AN
USB-FlashDrive, 2 GB	6ES7648-0DC40-0AA0
SIMATIC DP PN/PN coupler	6ES7158-3AD00-0XA0
Terminal strip converter, 50-pin	6EP5406-5AA00
Cable set comprising: • 6 m ribbon cable, 50-pin • 8 insulation displacement connectors, 50-pin	6EP5306-5BG00
IP20 PLC I/O Interface connecting cable (corresponds to DRIVE-CLiQ signal cable)	6FX2002-1DC00-...

Table 2- 4 Spare parts

Designation	Order number (MLFB)
Set of tensioners (9 units)	6FC5248-0AF14-0AA0
CompactFlash Card (empty), 1 GByte	6FC5313-5AG00-0AA1