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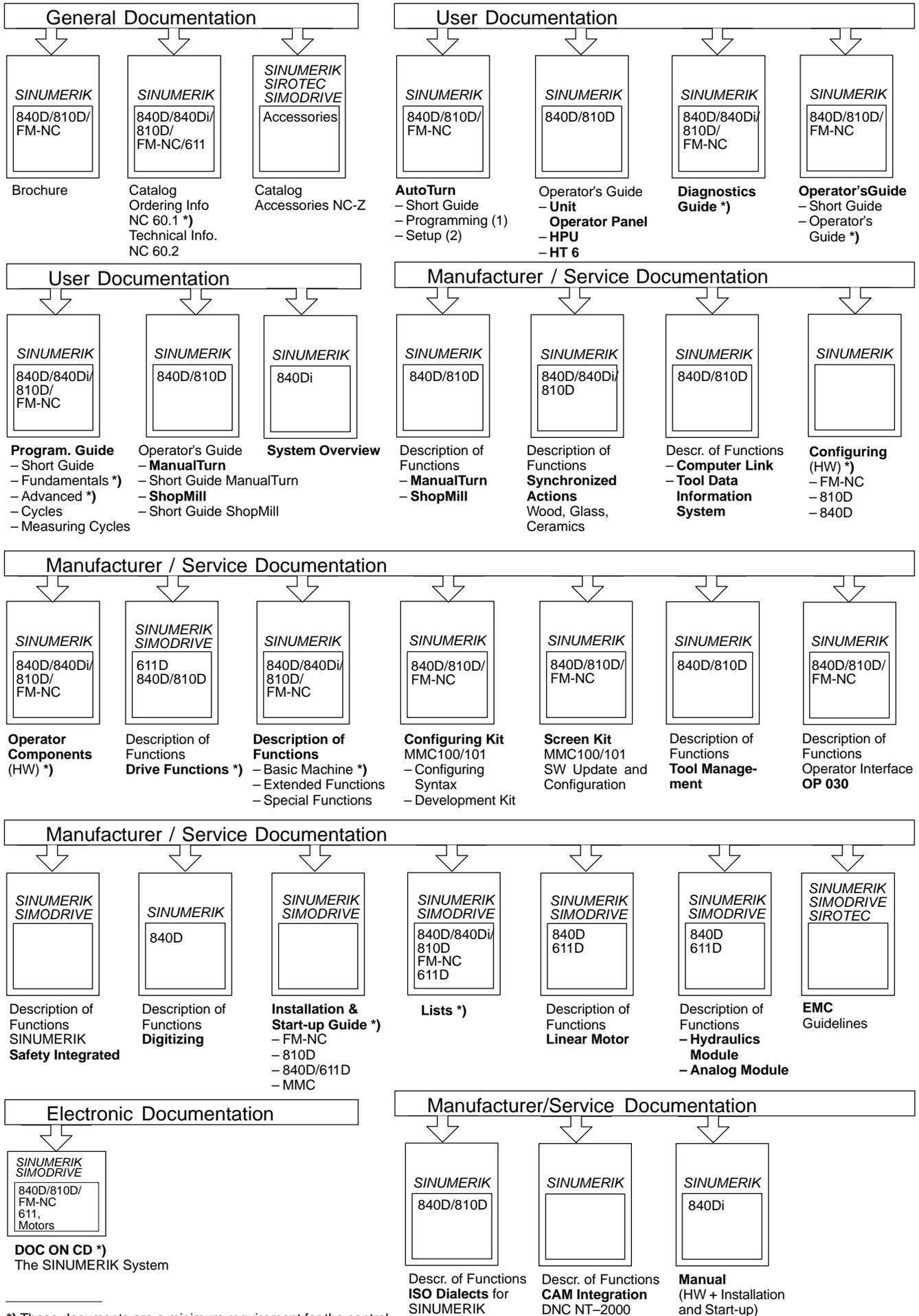
**SINUMERIK 840D
SIMODRIVE 611 digital**

Description of Functions

02.2000 Edition

ANA Module

Overview of SINUMERIK 840D/840Di/810D/FM-NC Documentation (04.00)



*) These documents are a minimum requirement for the control

SIEMENS

SINUMERIK 840D SIMODRIVE 611 digital

ANA Module

Description of Functions

Valid for

Control	Software version
SINUMERIK 840D	5
SINUMERIK 840DE (export version)	5

02.00 Edition

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SINUMERIK® Documentation

Printing history

Brief details of this edition and previous editions are listed below.

The status of each edition is shown by the code in the "Remarks" column.

Status code in the "Remarks" column:

A New documentation.

B Unrevised reprint with new Order No.

C Revised edition with new status.

If factual changes have been made on the page in relation to the same software version, this is indicated by a new edition coding in the header on that page.

Edition	Order No.	Remarks
02.00	6SN1197-0AB80-0BP0	A

This manual is included in the documentation on CD-ROM (**DOCONCD**)

Edition	Order No.	Remarks
04.00	6FC5 298-5CA00-0BG2	C

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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 for service cases.

We have checked that the contents of this document correspond to the hardware and software described. Nonetheless, differences might exist and therefore we cannot guarantee that they are completely identical. The information contained in this document is, however, reviewed regularly and any necessary changes will be included in the next edition. We welcome suggestions for improvement.

Subject to changes without prior notice.

Preface

Notes for the reader

Structure of the documentation

The SIMODRIVE 611/SINUMERIK 840D documentation is organized on 3 levels:

- General Documentation
- User Documentation
- Manufacturer/Service Documentation

The description of functions for the ANA-module belongs to the SIMODRIVE/SINUMERIK documentation.

For further information about publications included in the documentation overview and other available SIMODRIVE/SINUMERIK documents, please contact your local Siemens sales office.

This publication does not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

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Target group

This document is intended for machine manufacturers and service personnel who use or service “ANA modules”.

Should you require further information or should any problems arise that are not described in detail in this publication, please contact your local Siemens sales office.

How to find information in this description

The following guides are provided to help you access information faster:

- General table of contents
- Header (as orientation guide):
 - The header on the top line contains the main section number
 - The header on the second line contains the subsection number
- Appendix containing
 - Abbreviations, Terms and List of References
 - Glossary (Index)

If you require information about a particular term or subject, please refer to the glossary for the page number on which the relevant information can be found.

**Definition:
Who are qualified
personnel?**

For the purpose of this description and product labels, a “qualified person” is one who is familiar with this installation, mounting, start-up and operation of the product and the hazards involved. He or she must have the following qualifications:

- Trained and authorized to energize, de-energize, ground and tag circuits and equipment in accordance with established safety practices.
- Trained in the proper care and use of protective equipment in accordance with established safety practices.
- Trained in rendering first aid.

Software versions

The SW versions specified in this documentation refer to the SINUMERIK 840D control system.

The Description of Functions applies only to the software versions specified. When a new software version is released, the Description of Functions for that version must be ordered.

**Important**

This documentation applies to:

- SINUMERIK 840D control system and SIMODRIVE 611 digital drive, software version 5
-

Explanation of symbols



Important

This symbol always appears in the documentation when important information is being conveyed.



Ordering data option

In this documentation, you will find this symbol with a reference to an ordering option. The function described is executable only if the control contains the designated option



Machine manufacturer

This symbol appears in this documentation whenever the machine manufacturer can influence or modify the described functional behavior. Please observe the information provided by the machine manufacturer.



Danger

This symbol appears whenever death, severe physical injury or substantial material damage **will** occur if the appropriate precautions are not taken.



Caution

This symbol appears whenever minor physical injury or material damage **can** occur if the appropriate precautions are not taken.



Warning

This symbol appears whenever death, severe physical injury or substantial material damage **can** occur if the appropriate precautions are not taken.

Technical information



Warning

Operational electrical equipment has parts and components which are at hazardous voltage levels.

Incorrect handling of this units, i.e. failure to observe the warning information, can therefore result in severe bodily injury or property damage.

Only appropriately qualified personnel may start up this equipment.

This personnel must have in-depth knowledge regarding all the warning information and service instructions contained in this Guide.

Perfect and safe operation of this equipment assumes professional transport, storage, mounting and installation as well as careful operator control and servicing.

Hazardous axis movements can occur while you are working on the equipment.

Note

When installing cables, please observe the following:

- They must not be damaged.
 - They must not be stressed.
 - They must not come into contact with rotating components.
-



Warning

When voltage tests are performed on installed electrical equipment of machinery, all connections of the SIMODRIVE drive must be disconnected (EN 60204-1 (VDE0113-1), Pkt. 20.4).

This measure must be taken so as to avoid further stressing insulation of the SIMODRIVE equipment.



Warning

Start-up is absolutely prohibited until it has been ensured that the machine, in which the components described here are to be installed, fulfills the specification of Machinery Directive 89/392/EEC.



Warning

The information and instructions in all the documentation supplied and any other instructions must always be observed to eliminate the risk of hazards and equipment damage.

- The information given in catalogs and quotations applies additionally to special versions of machines and equipment.
 - Furthermore, all relevant national, local and plant-specific regulations and specifications must also be taken into account.
 - All work must be undertaken with the system in a no-voltage condition (powered down!)
-

Instructions for ESD-sensitive components



Components sensitive to ElectroStatic Discharge

Components which can be destroyed by electrostatic discharge are individual components, integrated circuits or boards which, when handled, tested or transported, could be destroyed by electrostatic fields or electrostatic discharge. These components are designated as **ESDS (ElectroStatic Discharge Sensitive Devices)**.

Handling ESDS boards:

- When handling components which can be destroyed by electrostatic discharge, it must be ensured that personnel, the workstation and packaging are well grounded.
 - As a general rule, electronic boards should only be touched when absolutely necessary.
 - You may only touch ESDS components if
 - you are continuously grounded via an ESDS bracelet,
 - you are wearing ESDS shoes or ESDS shoud grounding strips in conjunction with an ESDS floor surface.
 - Boards may only be placed on conductive surfaces (desk with ESDS surface, conductive ESDS foam rubber, ESDS packing bag, ESDS transport containers).
 - Boards may not be brought close to data terminals, monitors or television sets (a minimum of 10 cm should be kept between the board and the screen).
 - Boards may not be brought into contact with materials which can be charged and are high insulating, e.g. plastic foils, insulating desktops, articles of clothing manufactures from man-made fibers.
 - Measuerments may be taken on the boards only if
 - the measuring equipment is grounded (e.g. via the protective conductor) or
 - in the case of floating measuring instruments, the probe is briefly discharged before a measurement is taken (e.g. through contact with bare control housing).
 - Closed-loop control boards, option modules and memory modules may only be held by the front plate or at the edges.
-



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1.1 Application

Fields of application

The ANA control is based on an HLA closed-loop control module. By appropriately configuring the drive communication bus, it is possible to operate up to two analog axes using the closed-loop control module.

Plugged into the 50 mm (1.97 in) wide universal basic housing, the unit acts as a control module which allows the operation of external drives with analog speed set-point interface of ± 10 V at the SINUMERIK 840D control via the digital drive bus. In the following, this is referred to as the ANA module.

The standard two-axis closed-loop control module can be configured either for two analog axes or for mixed operation for one analog ANA axis and one hydraulic HLA axis.

The function of an analog ANA axis mainly consists of the conversion of the digital to an analog ± 10 V speed set-point and of the conditioning of the actual position value for communication via the drive bus.

This allows external drives to be integrated as interpolating path axes or main spindles into the digital drive combination.

Straight functions of the digital drive control SIMODRIVE 611 are naturally not possible for external drive units coupled via analog speed set-point interfaces. (These are functions which are dependent upon feedback within the axis and communication by means of the drive bus, e.g. Safety Integrated or system-relevant start-up aids). Where necessary, separate EMC measures should also be taken in respect of the external drive units.

The SINUMERIK 840D system offers a range of NCU modules with scaled functionality to meet the different needs and requirements. This allows optimum adaptation to the individual machine and the machining tasks as well as equipping entire machine sets.

1.2 Configuration of an analog controlled drive axis

1.2 Configuration of an analog controlled drive axis

1.2.1 Overview

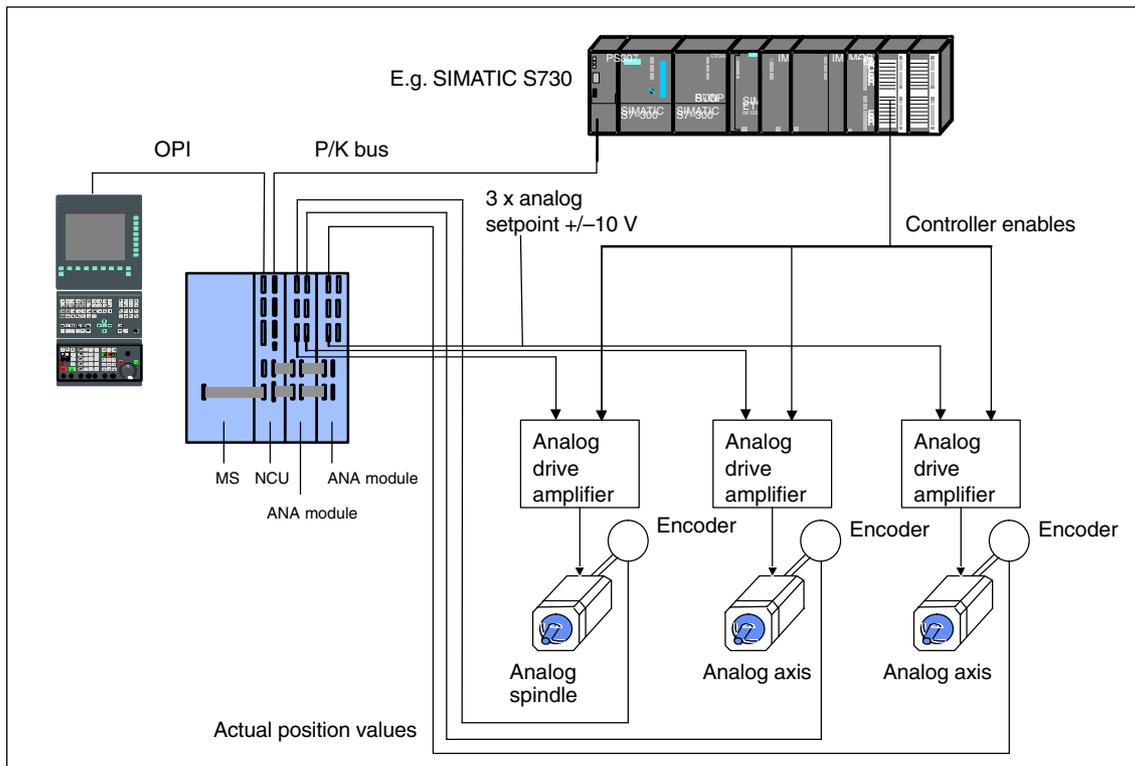


Fig. 1-1 Example analog drives axes and spindle with SINUMERIK 840D and ANA module

1.2.2 SINUMERIK 840D/SIMODRIVE 611 digital

The SINUMERIK controls and SIMODRIVE drive systems are specifically designed for machine tools, manipulators and special machines.

The numerical control processes the machine program, converts it into control commands and continuously monitors execution of commands.

The ANA module represents the interface between the SINUMERIK 840D and an analog drive amplifier.

1.2.3 Required FW packages

- SINUMERIK 840D NCK software \geq 5.2
incl. SIMODRIVE 611 digital ANA module \geq HLA 1.01.10
- SINUMERIK 840D MMC software $>$ 5.1

1.2.4 Hardware requirements

- MMC 103
- NCU 561.2, 571.2, 572.2, 573.2



Configuration

2.1 Configuration

Note

For information on configuring and detailed ordering information, please refer to Catalogs NC 60.1 and NC Z.

2.2 Integration in SINUMERIK 840D/SIMODRIVE 611 digital

2.2.1 System overview

Components

A complete 840D control with ANA module consists of various individual components. The table below provides an overview of the components.

Table 2-1 Components for 840D with ANA module (number, component, description)

No.	Component	Description
A	NCU box	<ul style="list-style-type: none"> Housing for NC-CPU
B	NC-CPU	<ul style="list-style-type: none"> Central processing unit for 840D, Execution of the NC program, Contains modules with e.g. PLC/communication function Fan module for NCU 573.2
B1	Cable distributor	<ul style="list-style-type: none"> Can be connected to NCU
C ¹⁾	Operator panel	<ul style="list-style-type: none"> Display, keyboard, power supply and operation of NC
D ¹⁾	MMC module	<ul style="list-style-type: none"> Operator panel calculator (is integrated in operator panel), MMC 103 with hard disk
E	Mains supply (MS)	References: /PJ1/ SIMODRIVE 611
F ¹⁾	Machine control panel	<ul style="list-style-type: none"> Machine operation
G1 1)	ISA adapter	<ul style="list-style-type: none"> Allows operation of AT modules together with MMC module MMC 103 (is integrated in operator panel)
G2 1)	Full CNC keyboard	<ul style="list-style-type: none"> Full keyboard can be connected to MMC module

2.2 Integration in SINUMERIK 840D/SIMODRIVE 611 digital

Table 2-1 Components for 840D with ANA module (number, component, description)

No.	Component	Description
G3	Memory card (PCMCIA)	<ul style="list-style-type: none"> Contains the system program, Can be plugged into NCU 561.2, 571.2, 572.2, 573.2
G4	Disk device (accessories)	<ul style="list-style-type: none"> Rack-mounting unit for connection to MMC module
H1 to H9	Cable	References: /Z/, Accessories Catalog NC Z
H10 to H12	Cable	See Section 7, I/Os, accessories
I	ANA module	<ul style="list-style-type: none"> Analog set-point ± 10 V
	50 mm housing module (universal basic housing)	<ul style="list-style-type: none"> For housing the ANA closed-loop control plug-in unit (see Fig. 2-4)
I1	Phoenix cable connection	<ul style="list-style-type: none"> 24 V switching 24 V external supply BERO input "Pulse enable"
J	SIMATIC components	References: /S7H/, Manual
K	Terminator	Terminator drive bus (connected to last module in drive group)
L ¹⁾	Handheld unit	<ul style="list-style-type: none"> Connect HHU to K bus via MPI Handwheel emergency stop button, keyswitches, override, enable keys, display, unassigned keys
M ¹⁾	Distributor box	<ul style="list-style-type: none"> For connection of the handheld unit to the MPI bus Connection for emergency stop circuit, enabling, handwheel, 24 V DC
N	Cable distributor	<ul style="list-style-type: none"> 24 V supply for connection to MPI connector
O	Analog axis	<ul style="list-style-type: none"> Analog feed axis and spindles
P	External 24 V supply; only necessary when external components are to be supplied via the terminals of the ANA module.	<ul style="list-style-type: none"> Stabilized power supply module SITOP References: Catalog SITOP power Order no. E80001-V0752-A253

1) These components are described in:

References: /BH/, Operator Components Manual

Note

Operating an ANA module just with a SIMODRIVE monitoring module is not permissible; i.e. there must always be a mains infeed module.

For operation of additional SIMODRIVE monitoring modules when using multiple ANA modules, please refer to Planning Guide SIMODRIVE 611 (/PJ1/).

With multi-tier configurations, all infeed units must be connected to the system at the same time.

2.2 Integration in SINUMERIK 840D/SIMODRIVE 611 digital

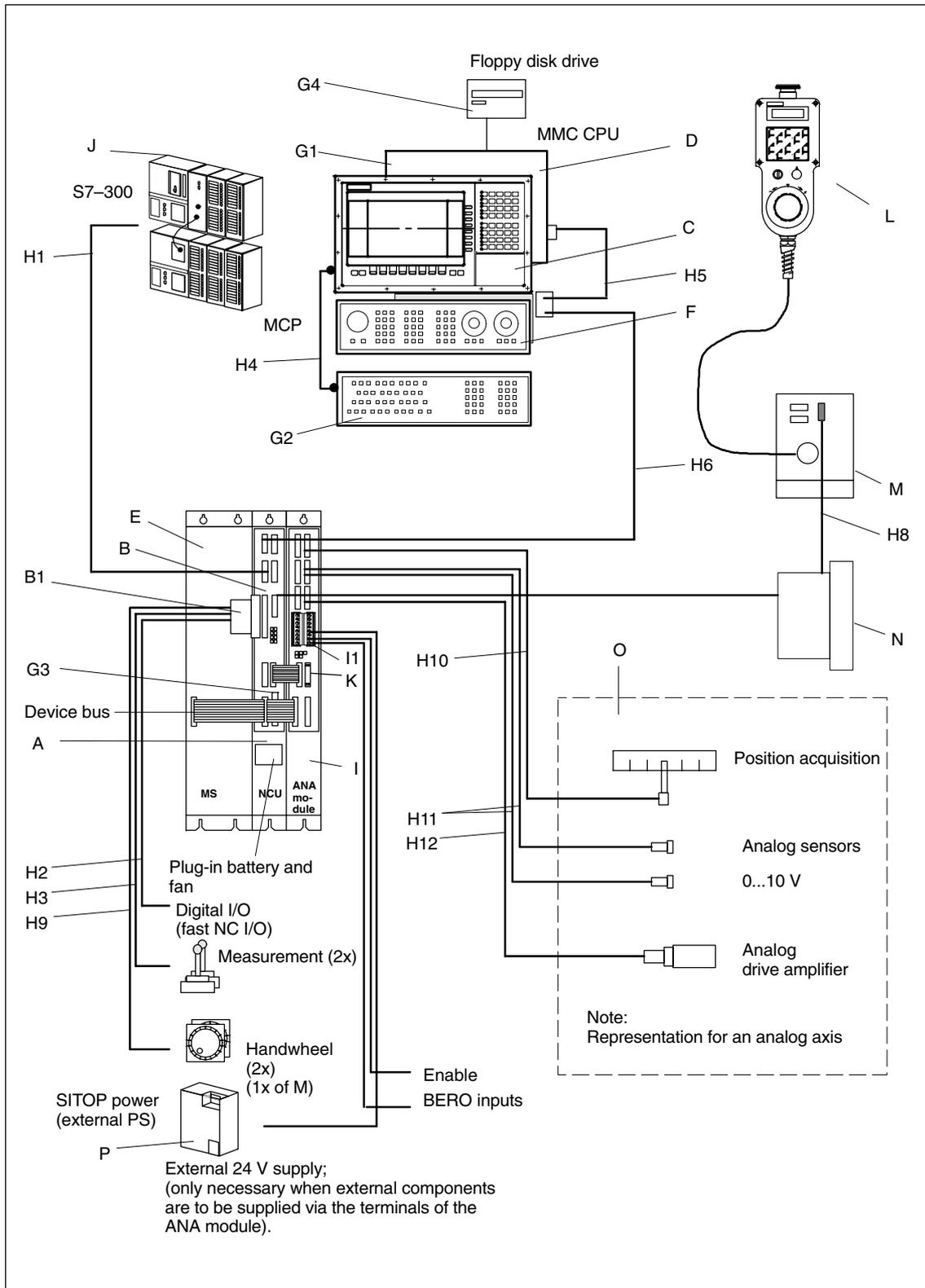


Fig. 2-1 System components

2.3 System framework

Power supply

SINUMERIK 840D and ANA module are supplied by the SIMODRIVE mains supply or by the SIMODRIVE monitoring module (only permissible as power supply expansion for an installed MS module) via the device bus. Any other type of voltage supply is not advisable and can cause damage to the device.

Note

Operating an ANA module just with a SIMODRIVE monitoring module is not permissible!

The power for electrical axes connected in series is supplied via the DC link busbars (40 mm²) of the subrack module.

For more information about the electrical connection conditions of the MS module and monitoring module, as well as advice on circuits, technical data and setting options, please refer to Chapter 2 and

References: /PJ2/ SIMODRIVE Planning Guide

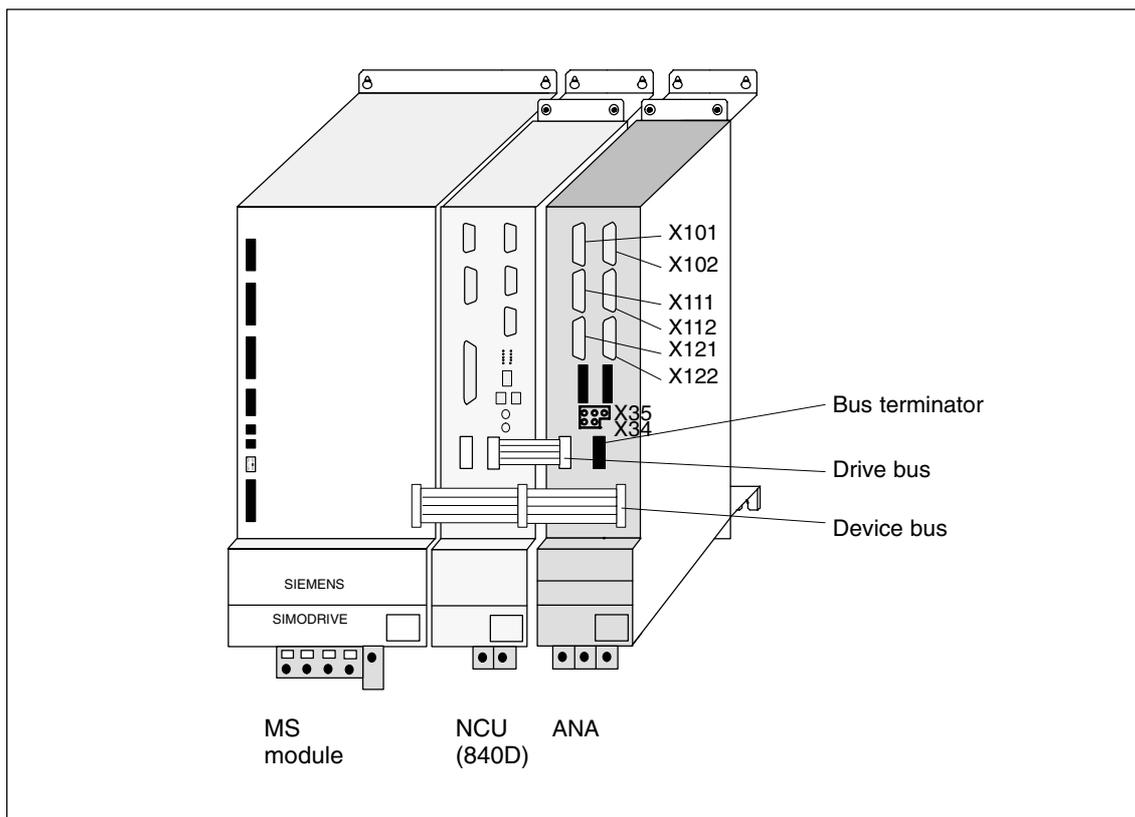


Fig. 2-2 Design of components for analog axes

ANA closed-loop control plug-in unit

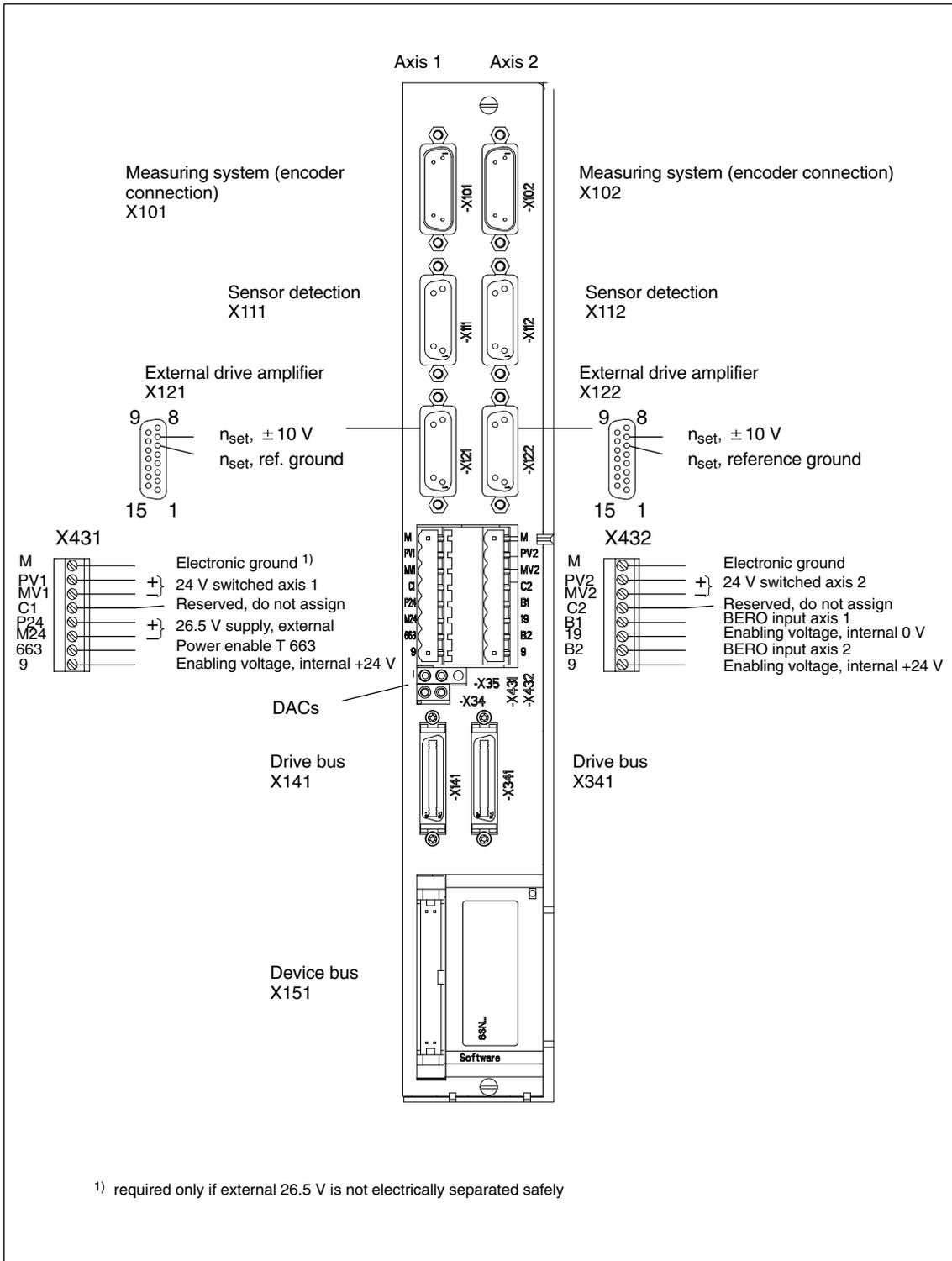


Fig. 2-3 ANA closed-loop control plug-in unit (2-axis)

2.3 System framework

**Mounting ANA
closed-loop control
plug-in unit**

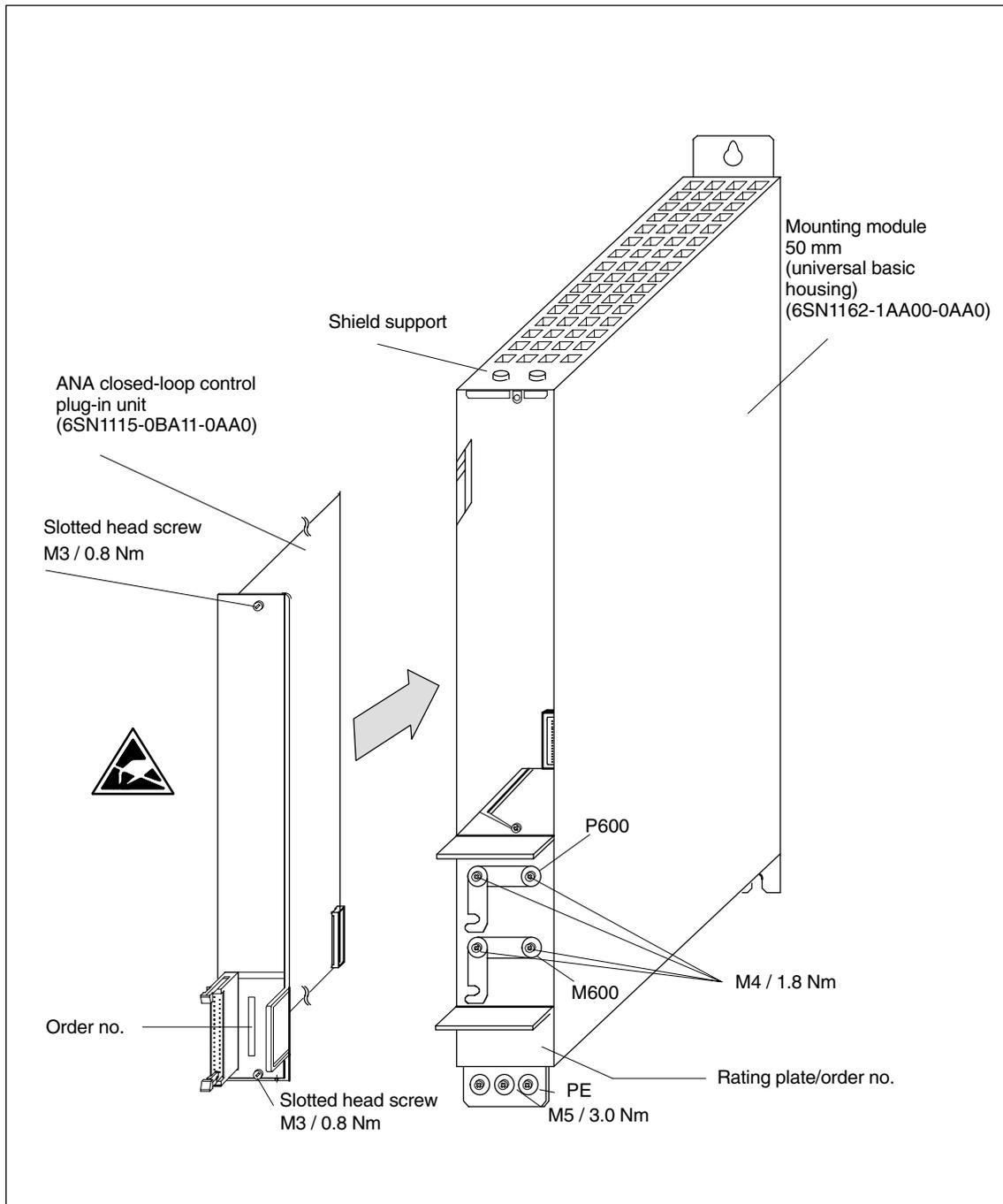


Fig. 2-4 Mounting ANA closed-loop control plug-in unit in 50 mm housing module (universal basic housing)

Mains infeed

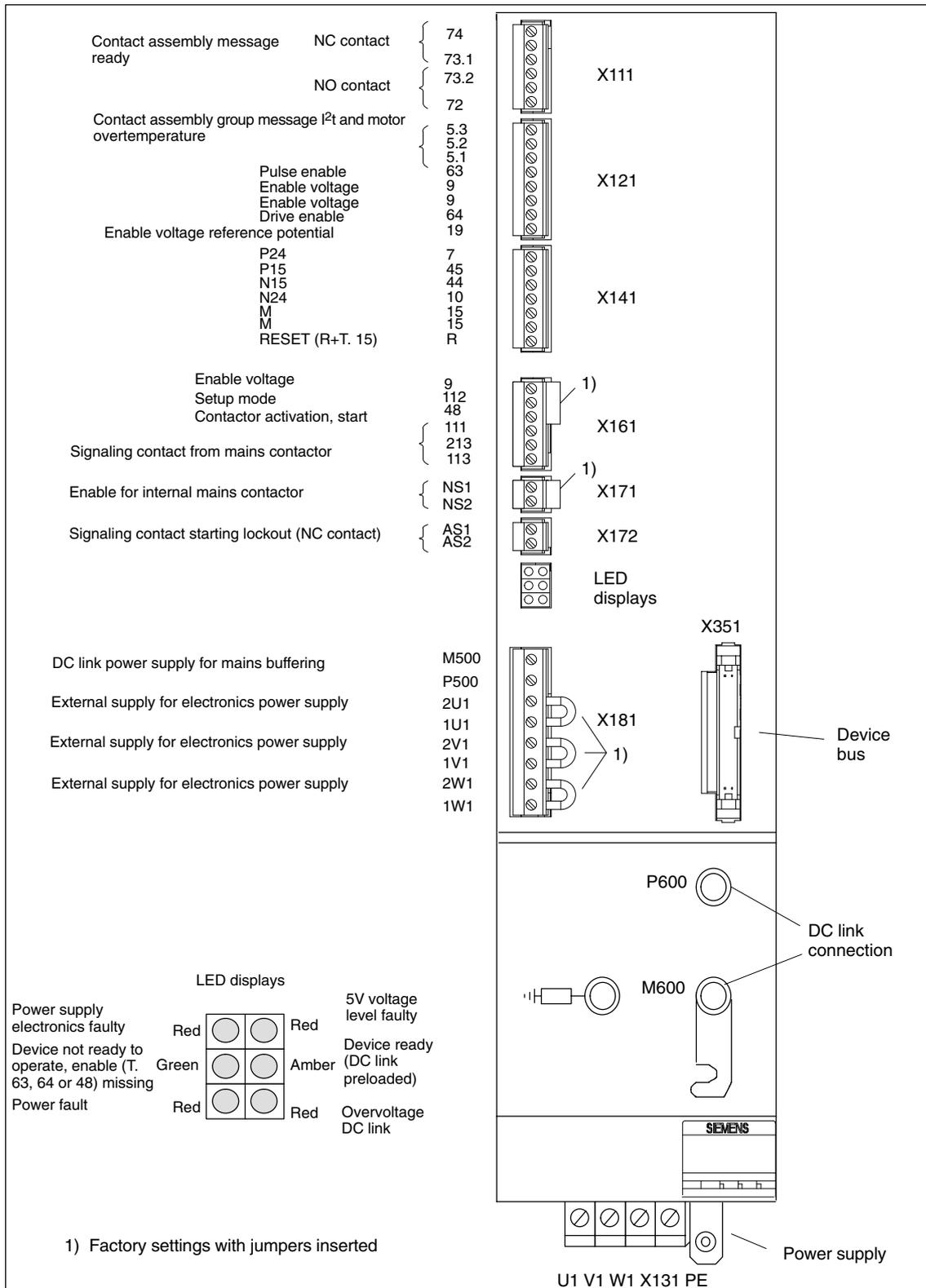


Fig. 2-5 MS module interfaces (OI and I/RF modules)

2.4 Interconnection

2.4.1 Internal power supply

Important information

Note

The NC CPU is supplied by the SIMODRIVE power supply via the device bus. Any other type of voltage supply is not advisable and can cause damage to the device.

NCU connected load and power dissipation calculation

The ANA module is integrated into the group of SIMODRIVE modules (power supply/infeed module, feed module if required and/or main spindle module) and 840D as a single module. Power is supplied via the device bus.

It is necessary to calculate the gross power requirements for the entire module group. It must not exceed the power provided by the power supply module.

Each module has a weighting factor to facilitate the calculation.

Please refer to Chapter 9 in the following reference manuals for more information about the weighting factor:

References: /NC60.1/, Catalog SINUMERIK & SIMODRIVE

The total of the electronic/control points must not be greater than specified in the power supply data sheet.

2.4.2 External power supply

Requirements for external 26.5 V supply

It is only necessary to connect an external power supply if external components are to be supplied with switched or constant 24 V voltage via the terminals of the ANA module (see Fig. 2-6).

In principle, it is possible to use stabilized or non-stabilized power supplies and switched-mode or linear power supplies.

However, the following must be taken into account:

- If terminals PV1/MV1 or PV2/MV2 are used, then the voltage must correspond to 26.5 V \pm 2%. The required voltage tolerance can practically only be achieved with regulation and preferably in switched mode with the existing currents. The ripple when using a non-stabilized power supply may activate the lower monitoring threshold.
- The ANA closed-loop control modules have 24000 μ F input capacity per module, that can be best be charged with a stabilized power supply (with current limiting).
- If it is necessary to connect the external 26.5 V supply, external "precharging" (e.g. relay with timer and resistor) should be used.

**Caution**

Terminal X431 must not be connected or switched after the external 24 V power supply has been powered on, as the high charging currents can cause considerable damage to the module or the external switch.

**Warning**

- The DC supply must have **secure electrical insulation**. See also

References: /PHD/, Configuring NCU 561.2-573.2

- The DC current supply must be connected to the electronic ground of the control at **one** location (e.g. X131 on I/RF module). In general, this connection has already been made as standard in the S7-300 I/Os. See also

References: /EMC/, SINUMERIK, SIROTEC, SIMODRIVE, EMC Installation guideline

Recommended PS

It is advisable to use the 26.5 V **SITOP power** external supply range from SIEMENS.

References: Catalog, SITOP Power from 2 to 40 A
Order no. E800001-V0752-A253

- **SITOP power supply**

The SITOP power supply types listed in the following table are recommended (24 V DC/10 A; 20 A; 30 A, 40 A three-phase):

Table 2-2 SITOP power supply

Input		Output		Order no.
Voltage $V_{i \text{ rated}}$	Voltage range	Voltage $V_{o \text{ rated}}$	Current $I_{o \text{ rated}}$	
3 AC 400 V to 500 V	3 AC 360 V to 550 V	24 V DC $\pm 3\%$	10 A	6EP1 434 – 2BA00
			20 A	6EP1 436 – 2BA00
			30 A	6EP1 437 – 2BA00
			40 A	6EP1 437 – 2BA10

- **SITOP power for DC link connection**

(available soon)

2.4 Interconnection

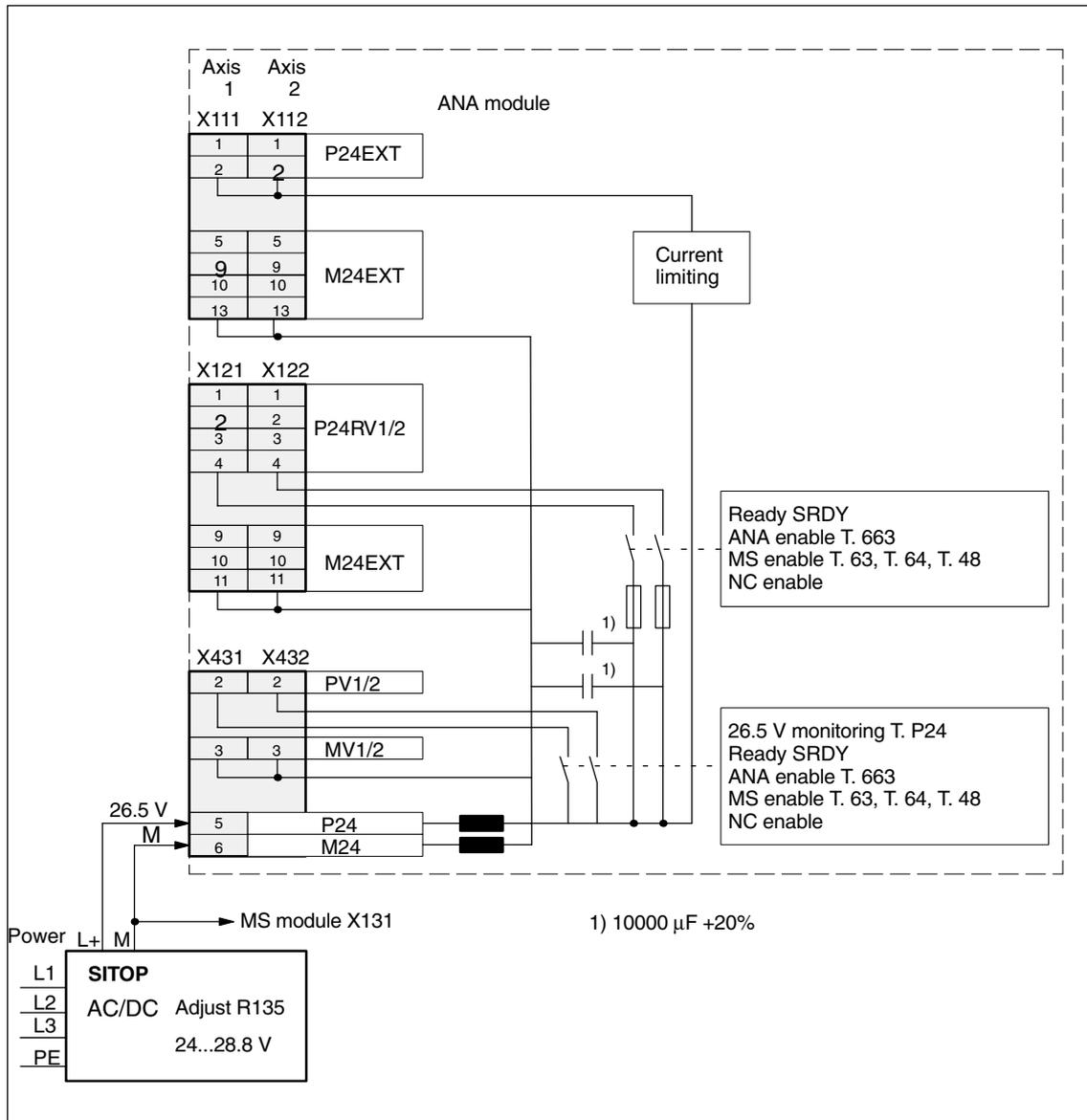


Fig. 2-6 Connection of external power supply, internal processing in ANA module

2.4.3 Grounding concept/electromagnetic compatibility (EMC)

The 840D system with ANA module consists of several individual components. The individual components are:

- Mains infeed module I/RF
- NCU box
- ANA module
- Machine control panel MCP
- Qwerty keyboard
- Operator panel components (various monitors with different MMC CPUs)
- Terminal box (NCU and L2-DP)
- Distributor box and handheld unit

The individual modules are screwed to the metal cabinet side. In the area where the screws are attached, there may be a low impedance contact between the NCU box and the side of the cabinet. If possible, avoid the use of insulating varnishes.

The electronic groundings of the modules are connected to one another via the device and drive bus and at the same time directed to Terminal X131 on the I/RF module.

The internal electronic ground of the ANA module is directly connected with the metal front plate (of the module).

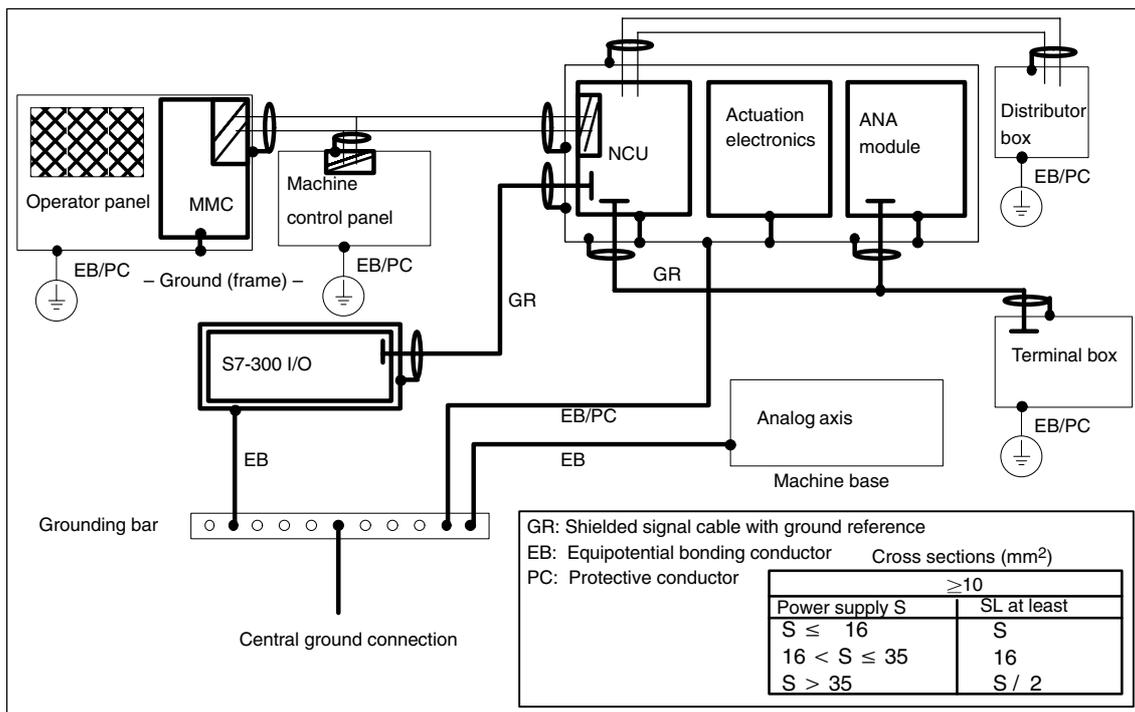


Fig. 2-7 Grounding concept

With regard to electromagnetic compatibility, please refer to the following:

References: /EMC/, EMC Installation Guideline
 Standards for declaration of conformity (appendix C)

2.4.4 System integration

Overview of system integration

The following figure shows how the ANA module is primarily integrated between the control and the analog drive¹⁾. The main functions of the ANA module consist of processing the measuring system signal and conversion of the digital speed set-point to an analog ± 10 V signal.

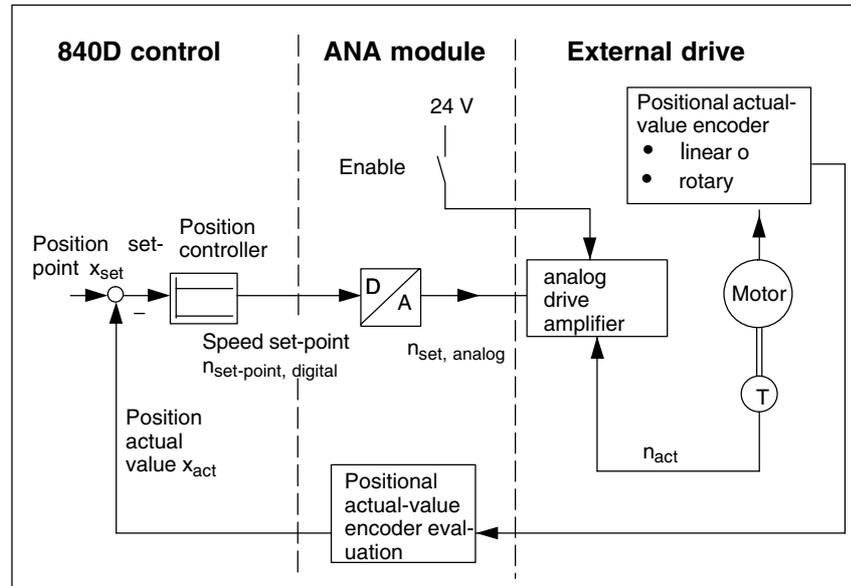


Fig. 2-8 Overview block diagram NC – ANA module – external drive

Function

Analog axes can be used for the same application fields as digital axes. There are no restrictions. The axes are not dependent upon channels, that is, the analog axes can be in different channels and axes can be swapped between channels. All the standard NC axes/spindle functions are available for analog axes, such as:

- Programming from part programs
- Traversing from PLC
- Manual traversing, etc.

Speed set-point

Speed set-points for two different analog drive amplifiers can be picked up from the ANA module's terminals (X121, X122).

Actual value

The ANA module offers one measuring system input for each axis (X101, X102). A position measuring system is not necessary with axes/spindles that are not position-controlled.

1) External drive is to be treated separately with regards to configuration, start-up and EMC.

Servo enable

When issuing the servo enable for the analog drive, the speed control loop of the axis/spindle is closed. With a position-controlled axis/spindle, the servo loop must be closed at the same time.

Setting and cancellation of the servo enable for the analog drive can be performed from the following:

1. Via the PLC user program with an interface signal from the SIMATIC I/O.
2. Via the terminals of the ANA module.

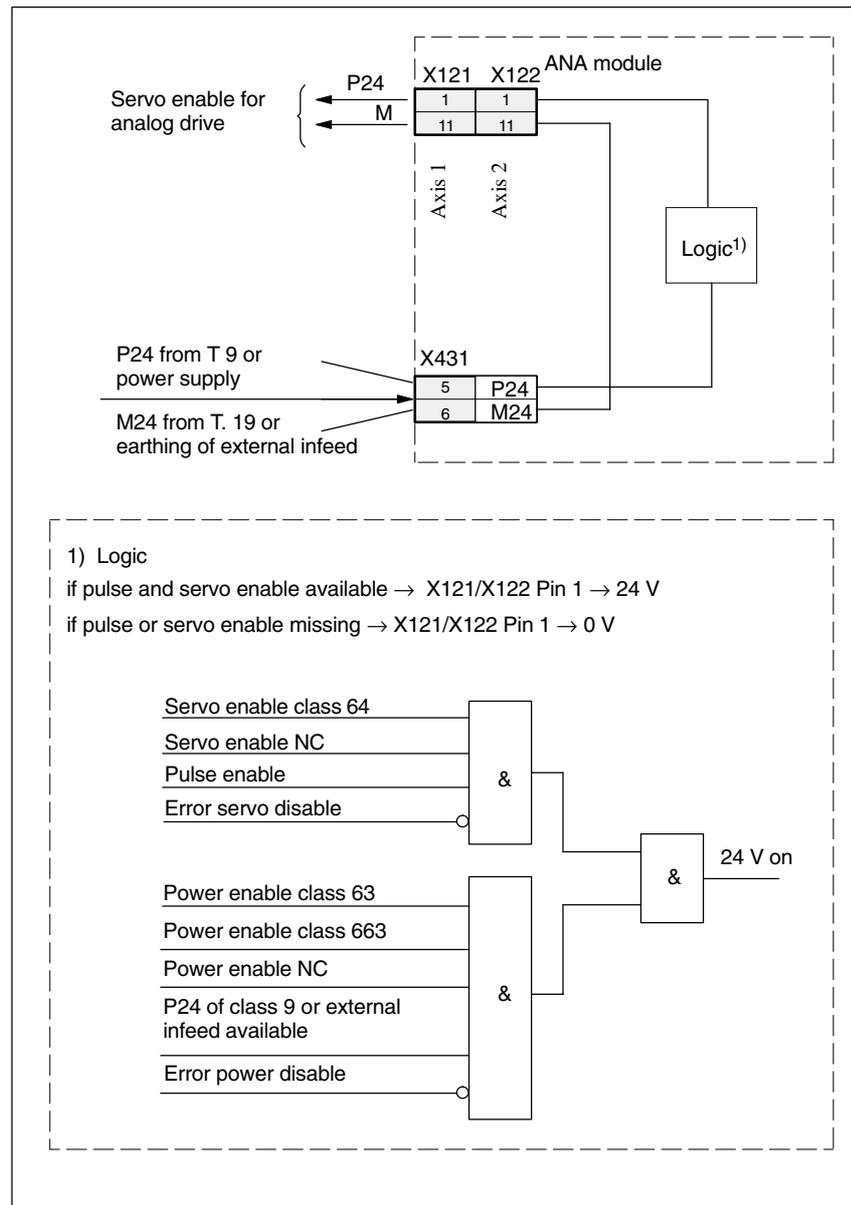


Fig. 2-9 Servo enable via terminals on the ANA module

2.4 Interconnection

**Sensor actuation,
enable logic**

The voltage supplied to terminals P24/M24 (X431.5/.6) can be used for different purposes on the terminals of the ANA module (see Fig. 2-6):

1. Terminal P24EXT (X111.1 to X111.2 and X112.1 to X112.2)
Terminal M24EXT (X111.5/.9/.10/.13 and X112.5/.9/.10/.13)
The supplied current is carried via electronic current limiting, the entire charge must be max. 200 mA.
2. Terminal P24V1 and P24V2 (X121.1 to X121.4 and X122.1 to X122.4)
Terminal M24EXT (X121.9 to X121.11 and X122.9 to X122.11)
The supplied voltage is switched through to these terminals if:
 - The ANA closed-loop control module is ready,
 - Enable (T. 663) is present on the ANA module,
 - Enables (T. 63, T. 64, T. 48) are present on the MS module,
 - NC enable is present.Terminals P24V1/V2 are protected against short circuits with fuses.
3. Terminal PV1 and PV2 (X431.2 and X432.2)
Terminal MV1 and MV2 (X431.3 and X432.4)
The supplied voltage is switched through to these terminals if:
 - The voltage is 26.5 V \pm 2% (ripple 240 mVpp),
 - The ANA closed-loop control module is ready,
 - Enable (T. 663) is present on the ANA module,
 - Enables (T. 63, T. 64, T. 48) are present on the MS module,
 - NC enable is present.

Start-Up

3.1 Start-up overview

The menu displays for start-up are provided by the SINUMERIK 840D control system.

How to display these menus is described in:

References: /IAD/, Installation Guide

Machine configuration

The analog axis (ANA) is offered in addition to the electrical drives (SRM, ARM and SLM) as shown below in the “Machine configuration” screen (basic display for start-up):

Machine axis		DRIVE		Channel
Index	Name	Type	Number	Type
1	X1	Linear axis	1	HLA
2	Y1	Linear axis	2	HLA
3	Z1	Linear axis	3	ANA
4	A1	Linear axis	4	ANA
5	B1	Linear axis	5	SRM(FDD)

Current access level: Manufact.

Fig. 3-1 Machine configuration (basic display for start-up)

3.2 Configuration

3.2 Configuration

It is necessary to configure the drive bus before the drives can be started up. To do this, press the softkey “Drive configuration”.

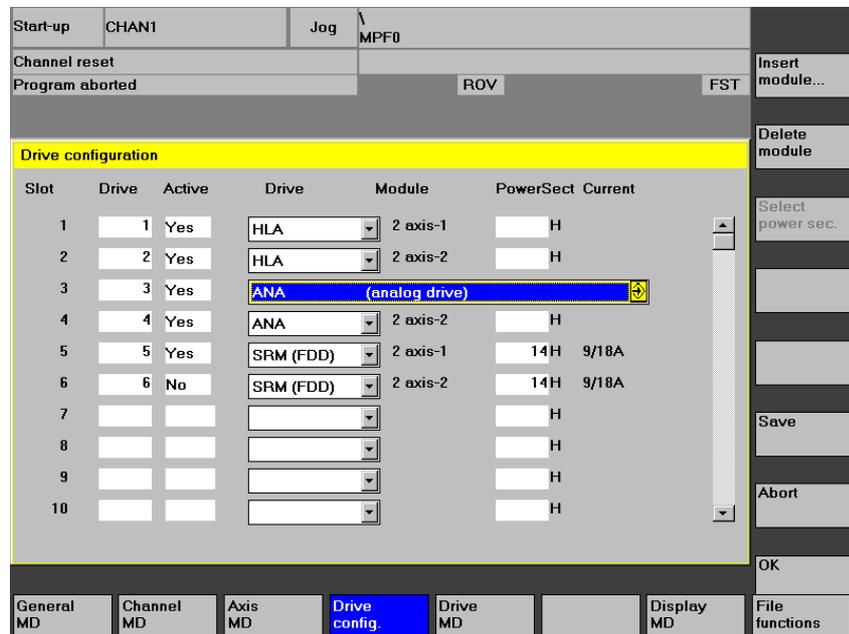


Fig. 3-2 Menu display “Drive configuration”

The selected drive type (here analog drive) is stored in NC machine data MD 13040: DRIVE_TYPE.

Table 3-1 Abbreviations for drive types

Drive	Motors	Contents MD 13040 DRIVE_TYPE
SRM (FDD)	Synchronous rotation motor (1FT6...)	1
ARM (MSD)	Asynchronous rotation motor (1PH...)	2
SLM	Synchronous linear motor (1FN...)	3
HLD	Hydraulic linear drive	5
ANA	Analog drive	4
PER	Peripherals//Os	0

3.3 Set-point

Set-point configuration

When using the ANA module, analog axes are treated like digital axes.

30100	CTRLOUT_SEGMENT_NR [n]: 0...0				Cross ref.:
	Set-point assignment: Drive type			Relevant:	Protection level: 2/7
Unit: –	Standard: 1	Minimum: 0	Maximum: 1	Data type: BYTE	Effectiveness: Power On
30110	CTRLOUT_MODULE_NR [n]: 0...0				Cross ref.:
	Set-point assignment: Drive no./module no.			Relevant:	Protection level: 2/7
Unit: –	Standard: 1	Minimum: 1	Maximum: 31	Data type: BYTE	Effectiveness: Power On
30120	CTRLOUT_NR [n]: 0...0				Cross ref.:
	Set-point assignment: Set-point output on drive module/ Module			Relevant:	Protection level: 2/7
Unit: –	Standard: 1	Minimum: 1	Maximum: 3	Data type: BYTE	Effectiveness: Power On
30130	CTRLOUT_TYPE [n]: 0...0				Cross ref.:
	Output type for set-point			Relevant:	Protection level: 2/7
Unit: –	Standard: 1	Minimum: 0	Maximum: 3	Data type: BYTE	Effectiveness: Power On

MD 30100 :CTRLOUT_SEGMENT_NR = 1 Bus segment 840D
MD 30110: CTRLOUT_MODULE_NR= Must be the module number of
a module that is not yet
assigned.
MD 30120: CTRLOUT_NR = 1 Always 1 for 840D
MD 30130: CTRLOUT_TYPE = 1 Set-point transfer to 611D

Standardize set-point

32250	RATED_OUTVAL [n]: 0...0				Cross ref.:
	Rated output voltage			Relevant:	Protection level: 0/0
Unit: %	Standard: 80.0	Minimum: 0.0	Maximum: Plus	Data type: DOUBLE	Effectiveness: NEW CONF
32260	RATED_VELO [n]: 0...0				Cross ref.:
	Rated motor speed			Relevant:	Protect. level: 1/1
Unit: rpm	Standard: 3000	Minimum: 0.0	Maximum: Plus	Data type: DOUBLE	Effectiveness: NEW CONF

3.3 Set-point

The axial machine data MD 32250: RATED_OUTVAL and MD 32260: RATED_VELO are for standardizing and limiting the output voltage. The maximum motor speed is specified in rpm in MD 32260. The percent value in MD 32250 indicates the voltage at maximum motor speed in relation to +/- 10 V. The entry 80% with maximum motor speed +/- 8 V on the ANA module. The percent value must be adapted to the analog drive amplifier used.

Example:

Maximum motor speed 6000 rpm MD 32260: RATED_VELO = 6000
8V with motor speed 6000 rpm MD 32250: RATED_OUTVAL = 80

With motor speed 3000 rpm, 4 V are applied on the ANA module.

Drift compensation

36700	DRIFT_ENABLE				Cross ref.: –
Automatic drift compensation				Relevant:	Protection level: 2/7
Unit: –	Standard: 0	Minimum: ***	Maximum: ***	Data type: BOOLEAN	Effectiveness: NEW CONF
36710	DRIFT_LIMIT [n]: 0...0				Cross ref.: –
Compensation limit value for automatic drift compensation				Relevant:	Protection level: 2/7
Unit: %	Standard: 1	Minimum: 0.0	Maximum: Plus	Data type: DOUBLE	Effectiveness: NEW CONF
36720	DRIFT_VALUE [n]: 0...0				Cross ref.: –
Basic drift value				Relevant:	Protection level: 1/1
Unit: %	Standard: 0.0	Minimum: –5.0	Maximum: 5.0	Data type: DOUBLE	Effectiveness: NEW CONF

There is a drift in each analog drive which has to be compensated by the position controller. The function “analog axis” offers two different compensations for the drift. One compensation consists of a constant drift value that is entered in MD 36720: DRIFT_VALUE. In each position controller cycle this value is added to the set-point of the position controller and output.

The second compensation is automatic drift compensation. It is activated via machine data MD 36700: DRIFT_ENABLE = 1. A maximum drift value is specified in for the automatic compensation MD 36710: DRIFT_LIMIT. As soon as the analog axis is in control, there are no set-points present from the interpolator and the axis has stopped moving, the drift is automatically compensated. If the axis is traversed again, the last compensation value is frozen and added to the set-point in each position controller cycle. If the compensation value is greater than the value specified in MD 36710: DRIFT_LIMIT, alarm 75110 “Axis X1 has reached drift limit” is set and the drift value is limited.

3.4 Actual value

Actual value of hardware

The position actual value of the analog axis is acquired via a signal generator. Connector X101/X102 is used as measured value input.

Encoder specification

The ANA module is designed for evaluation of

- **Incremental measuring system** with sinusoidal signals (A, B) and a reference signal (R)
or
- **Absolute measuring system** with sinusoidal signals (A, B) and EnDat interface for absolute position sensing
(see Section 6.1).

30200	NUM_ENCS				Cross ref.: –
Number of encoders				Relevant:	Protection level: 2/7
Unit: –	Standard: 1	Minimum: 0	Maximum: 2	Data type: BYTE	Effectiveness: POWER ON
30210	ENC_SEGMENT_NR [n]: 0...max. encoder–1				Cross ref.: –
Actual value assignment: Drive type				Relevant:	Protection level: 2/7
Unit: –	Standard: 1, 1	Minimum: 0	Maximum: 1	Data type: BYTE	Effectiveness: POWER ON
30220	ENC_MODULE_NR [n]: 0...max. encoder–1				Cross ref.: –
Actual value assignment: Drive number/measuring circuit number				Relevant:	Protection level: 2/7
Unit: –	Standard: 1, 1	Minimum: 1	Maximum: 31	Data type: BYTE	Effectiveness: POWER ON
30230	ENC_INPUT_NR [n]: 0...max. encoder–1				Cross ref.: –
Actual value assignment: Input on drive module/measuring circuit card				Relevant:	Protection level: 2/7
Unit: –	Standard: 1, 2	Minimum: 1	Maximum: 3	Data type: BYTE	Effectiveness: POWER ON
30240	ENC_TYPE [n]: 0...max. encoder–1				Cross ref.: –
Type of actual value acquisition 0: Simulation 1: Signal generator, high-resolution 2: Square-wave encoder, standard encoder (pulse multiplication) 3: Encoder for stepper motor 4: Absolute encoder with EnDat interface				Relevant:	Protection level: 2/7
Unit: –	Standard: 0, 0	Minimum: 0	Maximum: 4	Data type: BYTE	Effectiveness: POWER ON

3.4 Actual value

Example

MD 30200: NUM_ENCS = 1	Analog axis has a measuring system
MD 30210: ENC_SEGMENT_NR = 1	Bus segment 840D
MD 30220: ENC_MODULE_NR =	Module number of active digital drive
MD 30230: ENC_INPUT_NR[0] = 1	Measuring system 1
MD 30240: ENC_TYPE[0] = 1	Encoder type: Signal generator

The first measuring system is activated with the PLC signal to axis DB31–48, DBX1.5.

3.5 Necessary parameter presettings

“Dynamic stiffness control” (DSC) must **not** be activated (MD 32640: STIFFNESS_CONTROL_ENABLE=0).

3.6 System variables

The NC control can read in measuring signals that are present at connectors X121/X122 or X111/X112 via system variables.

Table 3-2 Assignment of system variables

Name	Connector	Pin
\$VA_VALVELIFT[X]	X121/X122	14 and 15
\$VA_PRESSURE_A[X]	X111/X112	11 and 12
\$VA_PRESSURE_B[X]	X111/X112	14 and 15

3.7 Start-up functions

3.7.1 General

- Measuring functions
 - Measuring speed control loop
 - Measuring position control loop
- Function generator
- Circularity test
- Servo trace
- DAC configuration



Fig. 3-3 “Start-up functions” menu display

Disabled softkeys

The softkey “Current control loop” in the “Start-up functions” menu is disabled for axes with ANA, as this is a special function for FDD/MSD.

Also, the softkey “Aut. control setting” in the “Start-up functions” menu is disabled for axes with ANA, as the implemented algorithms are designed for automatic control setting for electrical digital drives.

3.7 Start-up functions

3.7.2 Measuring function

The measuring functions allow on-screen evaluation of the most important dimensions of speed and position control loop in the time and frequency domain without external measuring devices.

The measuring functions are executed in the position control cycle.

The following measuring functions can be performed with ANA:

- Speed control loop measurements
 - Reference frequency response
 - Set-point step change
- Position control loop measurements
 - Reference frequency response
 - Set-point step change
 - Set-point ramp

Speed control loop measurement

Table 3-3 Measuring types and measured variables in speed control loop measurements

Measurement	Starting	Measured variables
Reference frequency response	Speed set-point, speed control loop closed	Speed actual value/ speed set-point
Set-point step change	Speed set-point, speed control loop closed	Measured variable 1: Speed set-point Measured variable 2: Speed actual value

Position control loop measurement

Table 3-4 Measuring types and measured variables in position control loop measurements

Measurement	Starting	Measured variables
Reference frequency response	Position set-point, position control loop closed,	Position actual value/position set-point
Set-point step change	Position set-point, position control loop closed,	Measured variable 1: Position set-point Measured variable 2: <ul style="list-style-type: none"> • Position actual value • Control deviation • Following error • Speed actual value
Set-point ramp		

3.7.3 Function generator

The function generator activates the drive with a periodic signal; the signal type can be parameterized. External measuring devices can be connected via DAC output sockets, for example, oscillographs to evaluate system responses.

The following signals (operating modes) and signal types are possible with ANA:

- Signals (operating modes)
 - Speed set-point
 - Position actual value
- Signal type
 - Square-wave
 - Noise signal (only meaningful with DAC output of signals and external analyzing units for frequency response analyses)

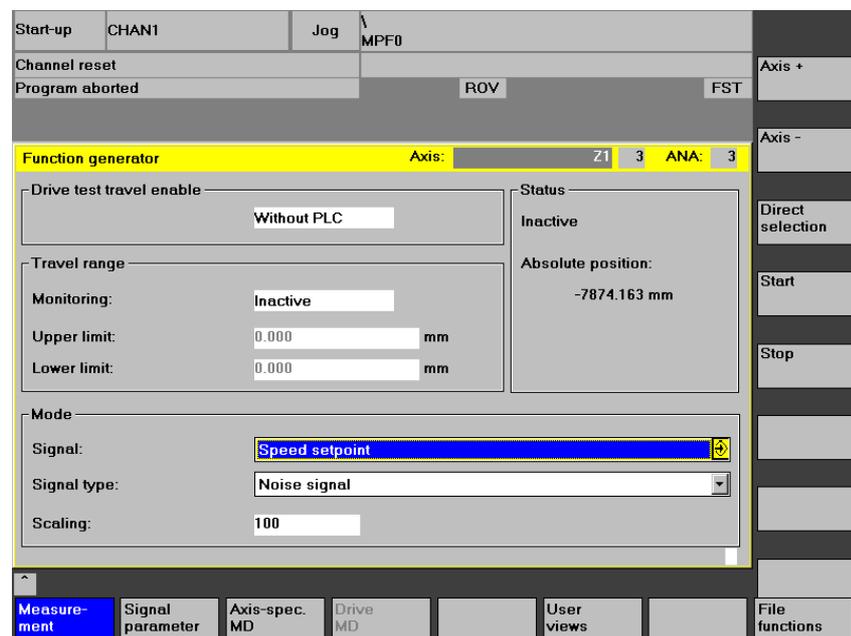


Fig. 3-4 “Function generator selection signal” menu display

For information on using the function generator, please refer to

References: /FBA/, DD2 “Speed control loop”

3.7.4 Circularity test

The circularity test is among other things a control function for the contour precision achieved. The actual positions are measured in a circular movement. The deviation from the programmed radius (especially on the quadrant transitions) is displayed graphically. For more detailed information, see:

References: /FB/ Part 2, K3, Section 2.7 “Circularity test”

3.8 Servo trace

The servo trace function serves for the graphic display of signals and operating states.

A signal list (servo signals) is provided to support axes with ANA module.

The following signals are supported by the servo trace:

- Following error
- Control deviation
- Contour deviation
- Position actual value measuring system 1
- Position actual value
- Speed actual value active encoder
- Speed set-point for drive
- Controller mode
- Active measuring system
- Position set-point controller input
- Speed set-point controller input
- Acceleration set-point controller input
- Speed actual value measuring system 1
- Signal interpolation terminated
- Signals exact stop fine
- Signals exact stop coarse

3.9 DAC parameterization (available soon)

DAC measuring sockets see Chapter 4.1.5.

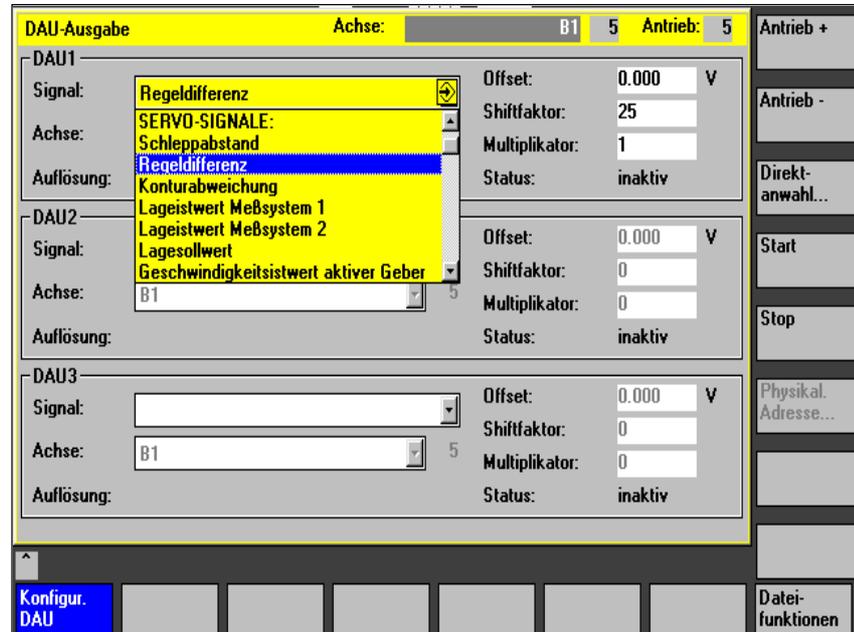


Fig. 3-5 “DAC parameterization” menu display

Functionality

Three 8-bit digital/analog converter (DAC) channels are available on the ANA module. An analog image of various servo signals can be switched to a measuring socket via these channels.

With the 8 bits (=1 byte) of the DAC it is only possible to display a section of the selected signal, see Fig. 3-6. Therefore, it is necessary to set the required fineness for quantization of the selected signal via the shift factor. The normalization factor is determined when the parameters are set and displayed for the user.

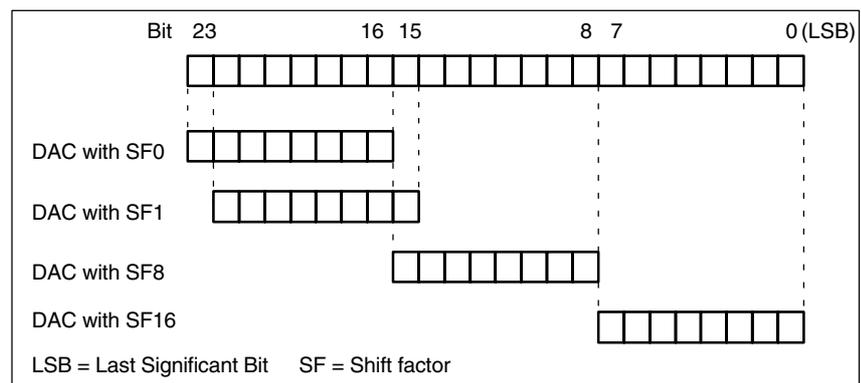


Fig. 3-6 Representation of shift factor

3.9 DAC parameterization (available soon)

Activation of analog output

The screen for activation and parameterization of the DAC outputs is accessed from the basic machine display via softkeys **Start-Up / Drive/servo / Configur. DAC**.

The configuration is activated by pressing **Start**. Active DACs are highlighted in the left-hand side of the screen (active/inactive). Display is terminated by pressing **Stop** (active/inactive).

The selected signals are also active after POWER ON.

Output voltage range

The DAC operates with a voltage of 0 V to +5 V. The output voltage of 2.5 V corresponds to the zero value of the represented signal. The two's complement is used for the digital/analog conversion, see Fig. 3-6.

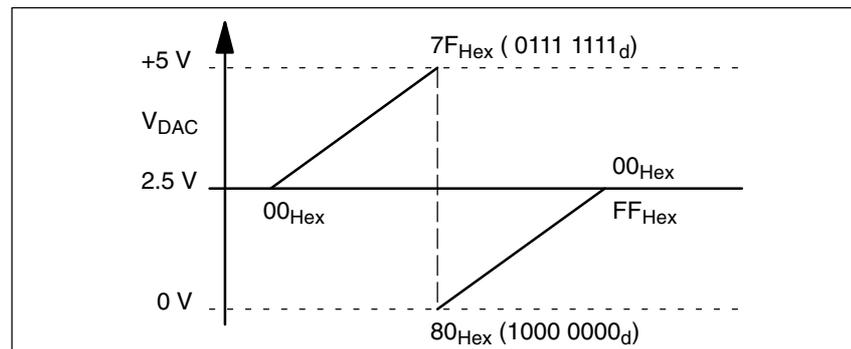


Fig. 3-7 Analog output voltage range



Hardware

4.1 Overview of interfaces

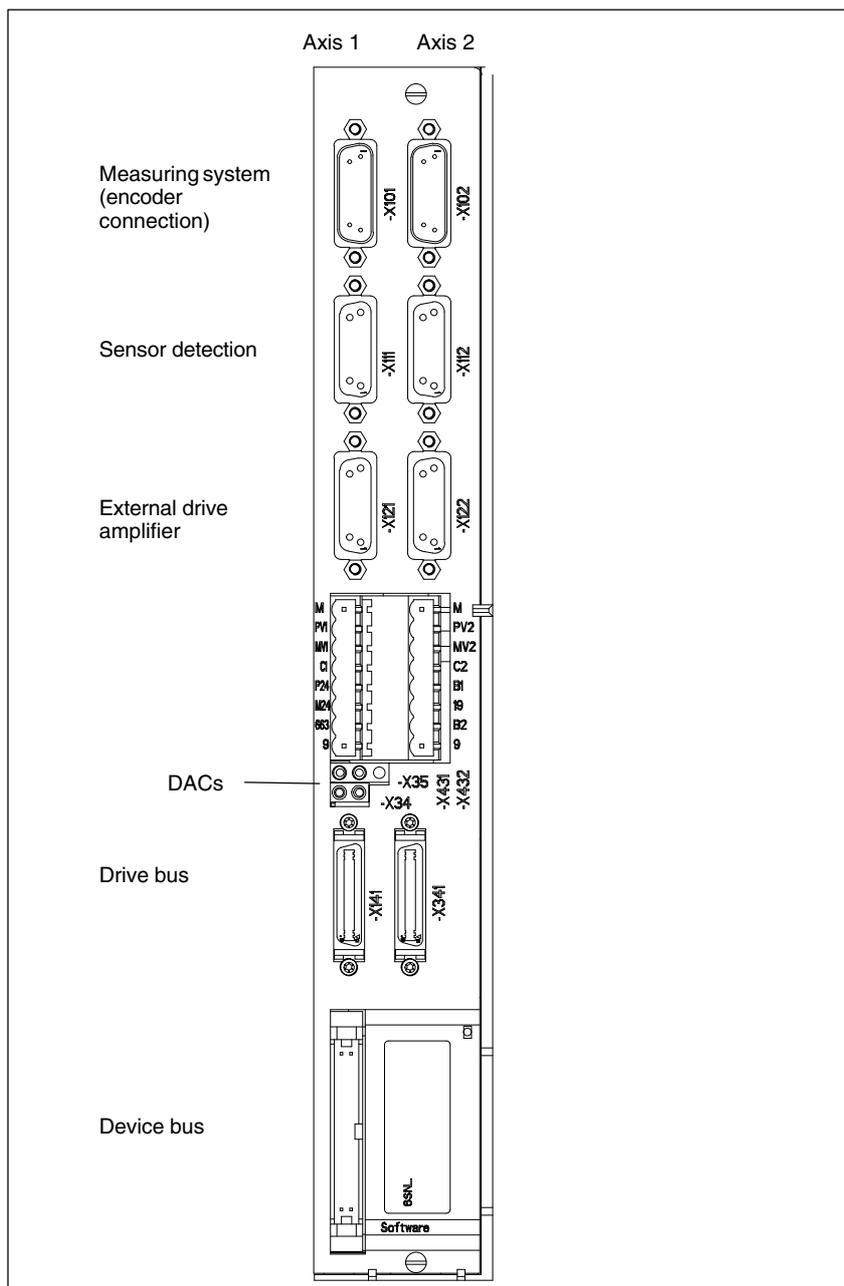


Fig. 4-1 ANA closed-loop control plug-in unit (2-axis)

4.1 Overview of interfaces

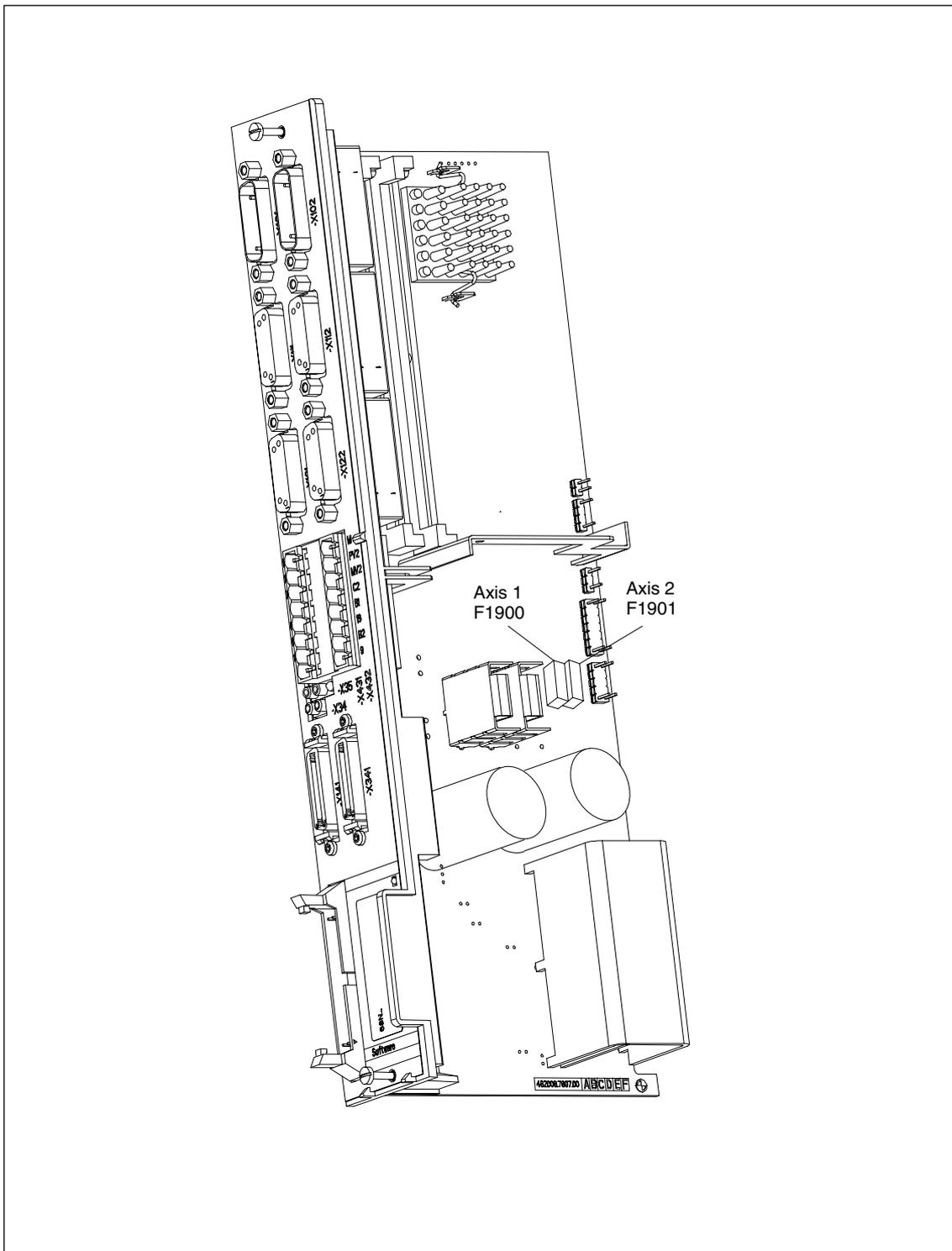


Fig. 4-2 Layout of ANA closed-loop control plug-in unit

4.1.1 Measuring system

Measuring systems

One measuring system can be evaluated on the module per axis.

- X101: Axis 1
- X102: Axis 2

The measuring system must always be plugged into the connector for the associated axis.

For more information, please refer to Chapter 6.1.

Table 4-1 Connector X101, X102; both 15-pin D-sub two-tier connector

Pin	X101	X102	Function
1	PENC0	PENC2	Encoder power supply
2	M	M	Ground for encoder power supply
3	AP0	AP2	Incremental signal A
4	AN0	AN2	Inverse incremental signal A
5	BMIDAT0	BMIDAT2	Data signal EnDat interface
6	BP0	BP2	Incremental signal B
7	BN0	BN2	Inverse incremental signal B
8	XB MIDAT0	XB MIDAT2	Inverse data signal EnDat interface
9	PSENSE0	PSENSE2	Remote sense encoder power supply (P)
10	RP0	RP2	Incremental signal R
11	MSENSE0	MSENSE2	Remote sense encoder power supply (M)
12	RN0	RN2	Inverse incremental signal R
13	M	M	Ground (for inner shields)
14	BMICK0	BMICK2	Clock signal EnDat interface
15	XB MICK0	XB MICK2	Inverse clock signal EnDat interface

4.1 Overview of interfaces

4.1.2 Analog sensors

Connection for 2 sensors per axis

- X111: Axis 1 (sensor 1A, 1B)
- X112: Axis 2 (sensor 2A, 2B)

Table 4-2 Connector X111, X112; both 15-pin Sub-D connector socket

Pin	X111	X112	Type ¹⁾	Function
1	P24EXT	P24EXT	Q	P24EXT, from X431.5
2	P24EXT	P24EXT	Q	P24EXT, from X431.5
3	–	–	–	Not assigned
4	–	–	–	Not assigned
5	M24EXT	M24EXT	Q	M24EXT, from X431.6
6	–	–	–	Not assigned
7	–	–	–	Not assigned
8	–	–	–	Not assigned
9	M24EXT	M24EXT	Q	M24EXT, from X431.6
10	M24EXT	M24EXT	Q	M24EXT, from X431.6
11	IST1BN	IST2BN	I	Analog actual value signal, reference ground
12	IST1BP	IST2BP	I	Analog actual value signal, max. range 0...10 V
13	M24EXT	M24EXT	Q	M24EXT, from X431.6
14	IST1AN	IST2AN	I	Analog actual value signal, reference ground
15	IST1AP	IST2AP	I	Analog actual value signal, max. range 0...10 V

1) I: Input, Q: Output

The inputs are differential with 40 kΩ input resistance.
The input voltage range is 0...+10 V.

The supply output P24EXT has an electronic short-circuit protection. The supply output is designed for a total current (4 sensors) of 200 mA.

4.1.3 Analog set-point and actual values

- X121: Axis 1
- X122: Axis 2

Table 4-3 Connector X121, X122; both 15-pin Sub-D connector socket

Pin	X121	X122	Type ¹⁾	Function
1	P24RV1	P24RV2	Q	P24EXT switched, from X431.5
2	P24RV1	P24RV2	Q	P24EXT switched, from X431.5
3	P24RV1	P24RV2	Q	P24EXT switched, from X431.5
4	P24RV1	P24RV2	Q	P24EXT switched, from X431.5
5	M	M		Electronic ground
6	USOLL1N	USOLL2N	Q	Analog set-point output, reference ground
7	USOLL1P	USOLL2P	Q	Analog set-point output +/-10 V
8	M	M		Electronic ground
9	M24EXT	M24EXT	Q	M24EXT, from X431.6
10	M24EXT	M24EXT	Q	M24EXT, from X431.6
11	M24EXT	M24EXT	Q	M24EXT, from X431.6
12	–	–		Not assigned
13	M	M		Electronic ground
14	UIST1N	UIST2N	I	Analog actual value input, ref. ground
15	UIST1P	UIST2P	I	Analog actual value input +/-10 V

1) I: Input, Q: Output

The analog actual value inputs are differential with 100 kΩ input resistance.

Load capability for the 24 V outputs:

- at an ambient temperature of 40 °C 2.0 A
- at an ambient temperature of 55 °C 1.5 A

for the mean current value with a load cycle of 10 s duration.

There can be linear interpolation between the temperature vertexes.

The short-term load capacity of the switched P24EXT outputs is 3.0 A (200 ms).

Fuse F1900 or F1901 is destroyed on the ANA module (location see Fig. 4-2) in the event of overloading.

Fuse

Outputs 24 V switched for axis 1 and 2 are protected by means of a miniature fuse F1900 (axis 1) or F1901 (axis 2).

Value: 2.5 AF/250 V; 5x20 mm UL

Manufacturer: Wickmann-Werke GmbH

Annenstraße 113

D-58453 Witten

or

Postfach 2520

D-58415 Witten

Germany

Order no.: 19194

4.1 Overview of interfaces

4.1.4 Terminals

24 V external power supply, enable, BERO inputs

- X431: Axis 1
- X432: Axis 2

Table 4-4 Connector X431; 8-pin Phoenix Combicon connector

Pin	X431	Type ¹⁾	Function	Typ. voltage/ limit values
1	M	I	Electronic ground	
2	PV1	Q	P24EXT switched, axis 1	Max. 2.0 A
3	MV1	Q	M24EXT switched, axis 1	
4	C1	–	Reserved, do not connect	
5	P24	I	Input +24 V external	26.5 V \pm 2 %
6	M24	I	Input 0 V external	
7	663	I	Module-specific enable	21 V...30 V
8	9	Q	Enabling voltage, internal, +24 V	

Table 4-5 Connector X432; 8-pin Phoenix Combicon connector

Pin	X432	Type ¹⁾	Function	Typ. voltage/ limit values
1	M	I	Electronic ground	
2	PV2	Q	P24EXT switched, axis 2	Max. 2.0 A
3	MV2	Q	M24EXT switched, axis 2	
4	C2	–	Reserved, do not connect	
5	B1	I	BERO input axis 1	13 V...30 V
6	19	Q	Enabling voltage, internal, ground T.19	
7	B2	I	BERO input axis, 2	13 V...30 V
8	9	Q	Enabling voltage, internal, +24 V	

Note

It is **not permissible** to have a connection (jumper) between X431.6 and X432.3!

Max. terminal cross section 2.5 mm².

Outputs X431.2 and X432.2 (P24EXT switched, axis 1 and 2) are short-circuit proof. The user must limit the energy absorption when cutting off inductive loads to 1.7 J (see also Chapter 2.4.2). Should reversed polarity occur, then the outputs are not protected against overload. The power supply must be external (via X431.5 and X431.6).

P24EXT=26.5 V \pm 2% according to external supply (Chapter 2.4.2).

1) I = Input; Q = Output

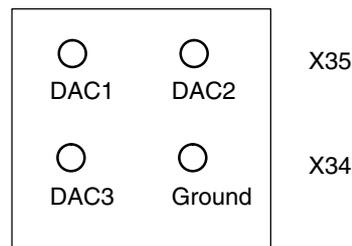
Enable inputs

Module-specific enable takes place via terminal 663. The input is evaluated by means of the optocoupler in the ANA module. The enabling voltage can be picked up from terminal 9.

Terminal 663 is specific to the internal enabling voltage (ground, terminal 19).

4.1.5 Measuring sockets (diagnostics)**Measuring sockets**

Internal signals can be assigned to the ANA module's measuring sockets by means of the Start-up tool or MMC102/103 (in conjunction with SINUMERIK 840D); they are available there as analog values (see also Chapter 3.9).

**4.1.6 Bus interfaces****Drive bus**

(see SIMODRIVE 611A/D)

- X141: Input
- X341: Output

A bus terminator must be connected on the last module.

Device bus

(see SIMODRIVE 611A/D)

- X151: Device bus

4.2 Note

4.2 Note

4.2.1 Climatic and mechanical environmental conditions during operation

Applicable standards IEC 68-2-1, IEC 68-2-2, IEC 68-2-3

Climatic environmental conditions If the operating temperature cannot be kept within the values specified, it is advisable to connect a heat exchanger or air conditioner.

Table 4-6 Climatic environmental conditions

Temperature range	Lower temperature limit	0°C
	Upper temperature limit	+55°C
Dew point temperature td and Relative air humidity U	Mean annual value	U = 75%, td = 17°C
	On 30 days (24 hours) per year (days distributed through the year)	U = 95%, td = 24°C
	On the other days (<24 hours) (keeping to the mean annual values)	U = 85%, td = 20°C
Moisture condensation		Not permissible
Temperature change	Within an hour	10 K
	Within three minutes	1 K
Atmospheric pressure	With operation up to 1500 m above NN. At greater altitudes the upper limit temperature must be reduced by 3.5°C/500m.	86 kPa to 108 kPa

Table 4-7 Mechanical environmental conditions

Vibration stress (acc. to IEC 68-2-6)	Frequency range 10–58 Hz	Constant deflection 0.075 mm Ampl. of acceleration 9.8 m/s ²
	over 58–500 Hz	
Shock during operation (Testing cat. E, testing Ea acc. to IEC 68, Section 2-27)	Acceleration	5 g
	Duration of nominal shock	11 ms for device without drive 30 ms for device with drive

4.2.2 Transport and storage conditions

Note

The following specifications are applicable to the electrical part of the ANA module.

Applicable standards

IEC 68-2-1, IEC 68-2-2, IEC 68-2-3

Modules in original packaging

The following specifications are applicable for modules in original packaging:

Table 4-8 Climatic conditions

Temperature range	Lower temperature limit	−40°C
	Upper temperature limit	+70°C
Dew point temperature td and relative air humidity U	Mean annual value	U = 75%, td = 17°C
	On 30 days (24 hours) per year (days distributed through the year)	U = 95%, td = 24°C
	On 30 days (24 hours) per year (days distributed through the year)	U = 85%, td = 20°C
Moisture condensation	The following cases can apply at the same time for moisture condensation:	Seldom, briefly, slightly
	Max. duration of moisture condensation	3 hours
	Moisture condensation frequency	Mean annual value: 3 / max.: 10
	Shortest sequence of moisture condensation cycles	1 day
Temperature change	Within one hour	20 K
Atmospheric pressure	The specified values correspond to a transport altitude of up to 3265 m above NN	66 kPa to 108 kPa

Table 4-9 Mechanical conditions during transport in original packaging

Oscillation stress (acc. to IEC 68-2-6)	Frequency range 5–9 Hz	Const. deflection 3.5 mm
	over 9–500 Hz	Ampl. of acceleration 10 m/s ²

4.2 Note

4.2.3 Stress through pollutants

Applicable standards

DIN 40046, Part 36 and Part 37

Table 4-10 Gases posing a risk to operation

Sulphur dioxide (SO₂) Testing conditions:	Severity	10 cm ³ /m ³ ± 0.3 cm ³ /m ³
	Temperature	25 °C ± 2 °C
	Relative air humidity	75% ± 5%
	Testing duration	4 days
Hydrogen sulphide (H₂S) Testing conditions:	Severity	1 cm ³ /m ³ ± 0.3 cm ³ /m ³
	Temperature	25 °C ± 2 °C
	Relative air humidity	75% ± 5%
	Testing duration	4 days

Dust posing a risk to operation

If the controller is to be operated in a location where dust contamination could pose a risk, it is advisable to install the controller in a cabinet fitted with a heat exchanger or suitable air inlet.



Diagnostics

5

Alarms

There are no special drive alarms.

NC alarms are described in:

References: /DA/, Diagnostics Guide

For special cases of operation together with an integrated PLC, please refer to the reference manuals for the SIMATIC S7-300 system.



I/Os/Accessories

6.1 Measuring systems

6.1.1 Encoders, linear measuring systems

Note

Pin assignment see Chapter 4.1.1.

Encoder specification

The ANA module is designed for evaluation of

- **Incremental measuring system** with sinusoidal signals (A, B) and a reference signal (R)
- or
- **Absolute measuring system** with sinusoidal signals (A, B) and EnDat interface for absolute position sensing

with the following signal limit data:

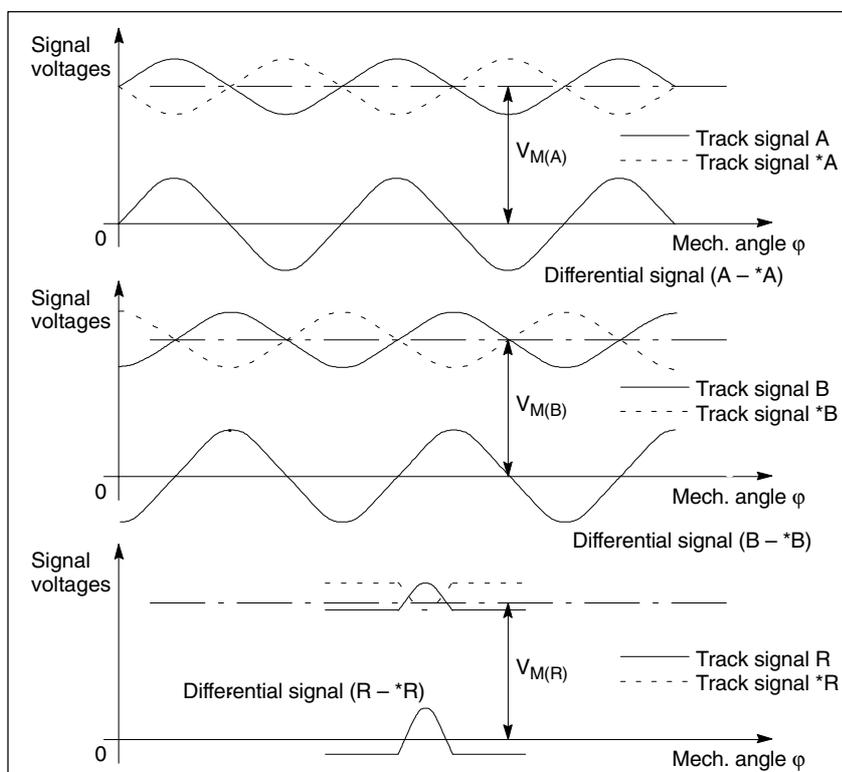


Fig. 6-1 Required signal chart of measuring system for data definition

6.1 Measuring systems

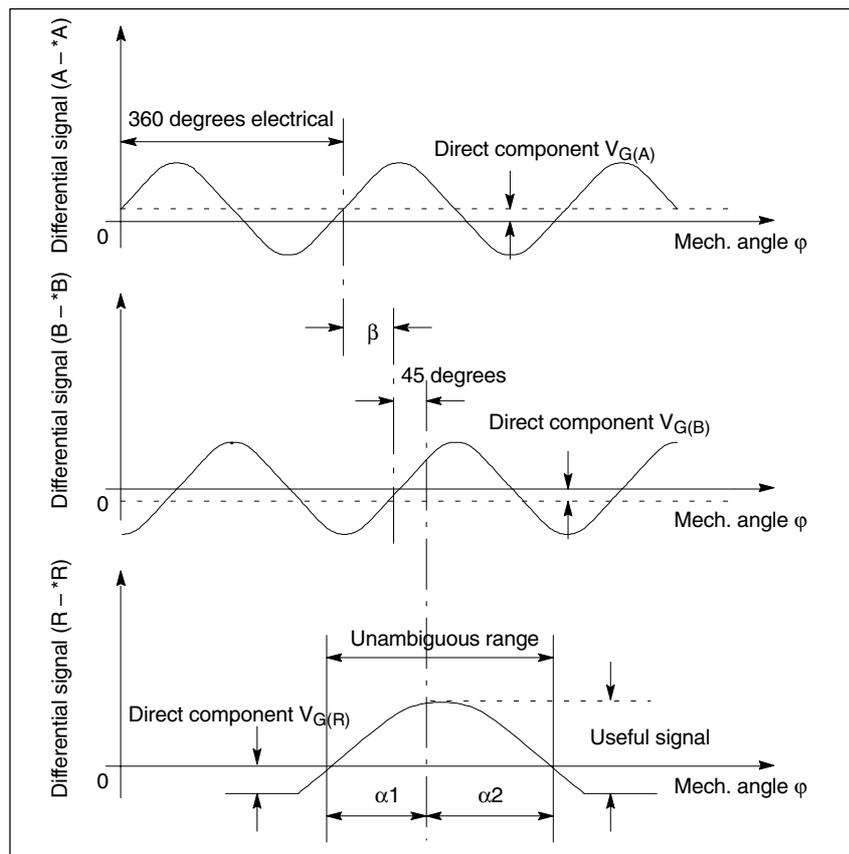


Fig. 6-2 Required signal chart of measuring system (incremental signals and reference signal) after differential amplification for data function

Table 6-1 Measuring system signal key data

Parameter	Designation	Min.	Typ.	Max.	Unit
Mean voltage	$V_{M(A)}; V_{M(B)}; V_{M(R)}$	1.75		3.25	V
Amplitude	$A - *A; B - *B$	350	500	600	mv
Ratio	$(A - *A)/(B - *B)$	0.9	1.0	1.1	-
Dynamic amplitude change	$\Delta(A - *A)/360^\circ \text{ el.}; \Delta(B - *B)/360^\circ \text{ el.}$	-	-	0.3	mV/360° el.
Direct component	$V_{G(A)}/\text{amplitude } (A - *A);$ $V_{G(B)}/\text{amplitude } (B - *B);$	-0.2	0	+0.2	
Dynamic change of direct component	$\Delta V_{G(A)}/360^\circ \text{ el.};$ $\Delta V_{G(B)}/360^\circ \text{ el.}$	-	-	1	mV/360° el.
Signal frequency	fs	-	-	200	kHz
Phase shift	β	85	90	95	Degrees
Harmonic distortion ¹⁾	k	-	-	1	%
Useful signal	$R - *R$	300	-	1500	mV
Direct voltage	$V_{G(R)}$	-150	-	-500	mV
Unambiguous range	$\alpha1; \alpha2$	50	-	270	Degrees

1) Definition for harmonic distortion: $k =$

$$\frac{\sqrt{U_1^2 + U_2^2 + \dots + U_n^2}}{\sqrt{U_0^2 + U_1^2 + \dots + U_n^2}}$$

U₀: Fundamental component
U₁...U_n: Harmonic component

Note

You need to take speed ripple/positioning inaccuracy or other error functions into account for signals that are outside the signal specification.

6.1.2 Interconnection diagrams

Connection possibilities

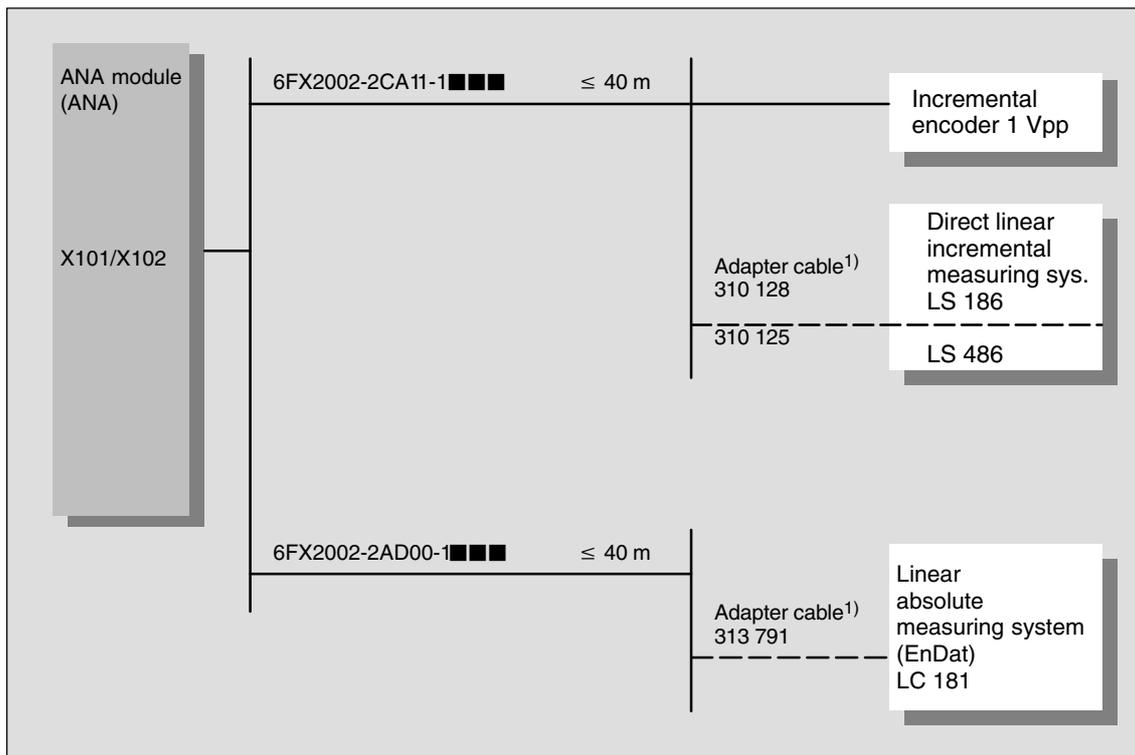


Fig. 6-3 Example connection possibilities for measuring system cable

¹⁾ The cable can be ordered from the manufacturer of the linear scale.

6.1 Measuring systems

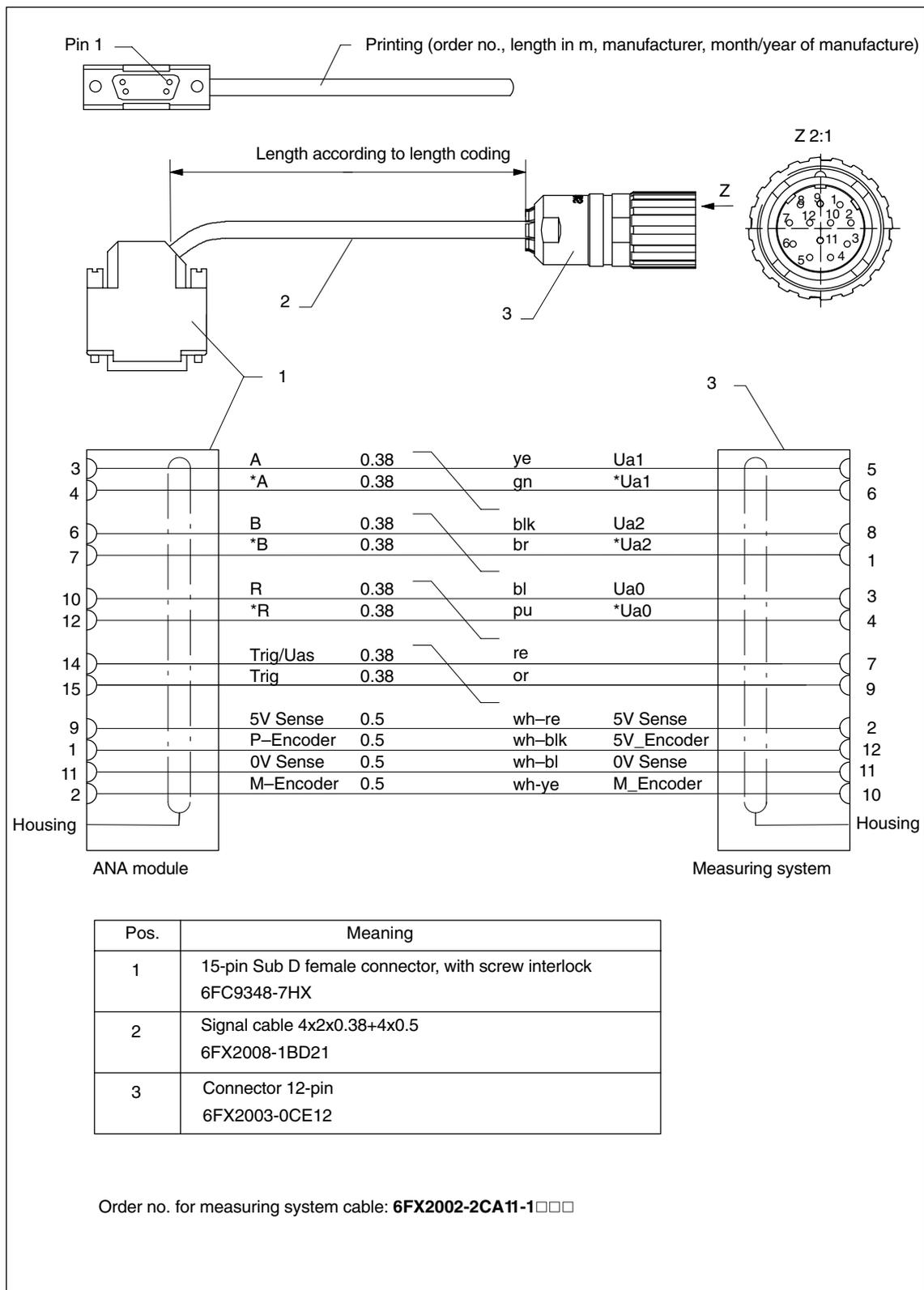


Fig. 6-4 Measuring system for encoder with voltage signals (X101/X102)

6.1 Measuring systems

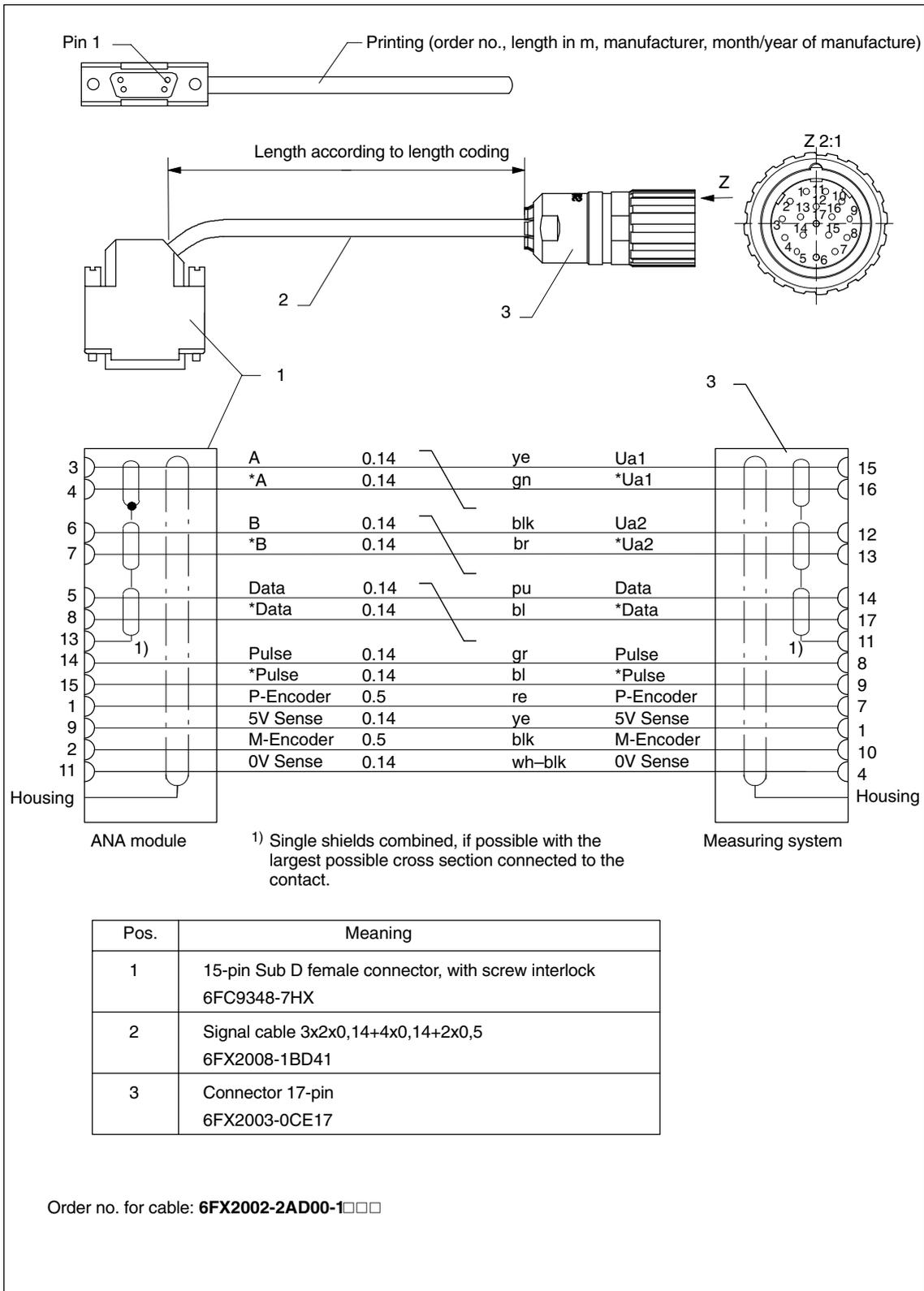


Fig. 6-5 Measuring system for encoder with voltage signals +EnDat (X101/X102)

6.2 BERO (X432)

6.2 BERO (X432)

You can only connect type 3 conductor PNP make contact BEROs.

We recommend e.g.:

SIEMENS BERO M30 3RG 4014-0AG01

BERO M12 3RG 4012-3AG01

Note

The BERO cable must be shielded.

Table 6-2 Pin assignment X432

Terminal marking	Type ¹⁾	Signal designation
B1/B2	I	BERO (external reference signal) axis 1/2
19	Q	Power supply for BERO external ground
9	Q	Power supply for BERO 24 V external

1) I: Input, Q: Output

Service

7

7.1 Hotline

Siemens AG

Hotline

Tel. No.	+49 180 525 8008 (numerical)
Fax	+49 180 525 8009
Tel. No.	+49 9131/98-3471 (FDD) and -3475 (MSD)
Fax	+49 9131/98-1313
Mo–Fr	8:00 am – 5:00 pm

Standby service

Tel. No.	+49 172 840 8776
Mo–Fr	5:00 pm – 10:00 pm
Saturday	8:00 pm – 10:00 pm
12/24	8:00 am – 2:00 pm
12/31.	8:00 am – 2:00 pm
Sunday	None



A

Abbreviations

ANA	Analog drive
ARM (MSD)	Asynchronous rotation motor (main spindle drive)
AS	Automation System
AT	Advanced Technology
BERO	Proximity limit switch
COM	Communication Module
DAC	Digital/analog converter channel
D/A	Digital to Analog
DP	Distributed Peripherals (I/Os)
DRV	Driver Module
DSC	Dynamic Stiffness Control
EMC	Electromagnetic Compatibility
ESD	Modules/components endangered by electrostatic discharge
EUS	End User Interfaces
FDD	Feed Drive
FFT	Fast Fourier Transform
FRM	Enabling voltage internal ground
FRP	Enabling voltage internal +24 V
HD	Hard Disk
HHU	Handheld Unit
HLD	Hydraulic Linear Drive
I/RF	Infeed/Regenerative Feedback Module
IM	Interface Module (SIMATIC S7-300)
IM Address	Interface Module Address
ISA	Industry Standard Architecture
K Bus	Communication Bus
LED	Light Emitting Diode
M24EX	External 0 V input
MCP	Machine Control Panel
MD	Machine Data
MLFB	Machine-readable product designation (Order No.)

MMC	Man Machine Communication
MPI	MultiPoint Interface
MSD	Main Spindle Drive
NC	Numerical Control
NCU	Numeric Control Unit
NE	Mains Infeed (module)
NMI	Non-Maskable Interrupt
OP	Operator Panel
OPI	Operator Panel Interface
P24EXT	External +24 V input
PBL	Parameter Basic List
P Bus	I/O Bus
PCMCIA	Personal Computer Memory Card International Association
PER	I/O Module
PG	Programming Unit
PI	Program Invocation
PID	Controller with Proportional, Integral and Differential components
PLC	Programmable Logic Controller
PS	Power Supply (SIMATIC S7-300)
RK	Control loop
SCI	Serial Communication Control
SLM	Synchronous Linear Motor
SM	Signal Module of SIMATIC S7-300, e.g. I/O modules
SRM (FDD)	Synchronous Rotation Motor (feed drive)
SW	Software
Term.	Terminal
UE	Unregulated incoming supply
ÜW	Monitoring
VGA	Video Graphics Adapter
ZK	Status class

References

General Documentation

- /BU/** SINUMERIK 840D/810D/FM-NC
Ordering Information
Catalog NC 60.1
Order No.: E86060-K4460-A101-A6-7600
- /ST7/** **SIMATIC**
SIMATIC S7 Programmable Logic Controllers
Catalog ST 70
Order No.: E86 060-K4670-A111-A3
- /VS/** SINUMERIK 840D/810D/FM-NC
Technical Information
Catalog NC 60.2
Order No.: E86060-D4460-A201-A4-7600
- /W/** SINUMERIK 840D/810D/FM-NC
Brochure
- /Z/** SINUMERIK, SIROTEC, SIMODRIVE
Accessories and Equipment for Special-Purpose Machines
Catalog NC Z
Order No.: E86060-K4490-A001-A6-7600

Electronic Documentation

- /CD6/** The SINUMERIK System (04.00 Edition)
DOC ON CD
(includes all SINUMERIK 840D/810D/FM-NC and SIMODRIVE 611D
publications)
Order No.: 6FC5 298-5CA00-0BG2

User Documentation

/AUE/	SINUMERIK 840D/810D/FM-NC AutoTurn Graphic Programming System Operator's Guide Part 2: Setup Order No.: 6FC5 298-4AA50-0BP2	(07.99 Edition)
/AUK/	SINUMERIK 840D/810D/FM-NC Short Guide AutoTurn Operation Order No.: 6FC5 298-4AA30-0BP2	(07.99 Edition)
/AUP/	SINUMERIK 840D/810D/FM-NC AutoTurn Graphic Programming System Operator's Guide Part 1: Programming Order No.: 6FC5 298-4AA40-0BP2	(07.99 Edition)
/BA/	SINUMERIK 840D/810D/FM-NC Operator's Guide Order No.: 6FC5 298-5AA00-0BP2	(04.00 Edition)
	<ul style="list-style-type: none"> – Operator's Guide – Operator's Guide Interactive Programming (MMC 102/103) 	
/BAE/	SINUMERIK 840D/810D/ FM-NC Operator's Guide Unit Operator Panel Order No.: 6FC5 298-3AA60-0BP1	(04.96 Edition)
/BAH/	SINUMERIK 840D/810D Operator's Guide HT6 (HPU new) Order No.: 6FC5 298-0AD60-0BP0	(06.00 Edition)
/BAK/	SINUMERIK 840D/810D/FM-NC Short Operation Guide Order No.: 6FC5 298-5AA10-0BP0	(12.98 Edition)
/BAM/	SINUMERIK 840D/810D Operator's Guide ManualTurn Order No.: 6FC5 298-5AD00-0BP0	(02.00 Edition)
/KAM/	SINUMERIK 840D/810D Short Guide ManualTurn Order No.: 6FC5 298-2AD40-0BP0	(11.98 Edition)

/BAS/	SINUMERIK 840D/810D Operator's Guide ShopMill Order No.: 6FC5 298-5AD10-0BP1	(11.99 Edition)
/KAS/	SINUMERIK 840D/810D Short Guide ShopMill Order No.: 6FC5 298-2AD30-0BP0	(01.98 Edition)
/BAP/	SINUMERIK 840D/840Di/810D Operator's Guide Handheld Programming Unit Order No.: 6FC5 298-5AD20-0BP1	(04.00 Edition)
/BNM/	SINUMERIK 840D/840Di/810D/FM-NC User's Guide Measuring Cycles Order No.: 6FC5 298-5AA70-0BP2	(04.00 Edition)
/DA/	SINUMERIK 840D/840Di/810D/FM-NC Diagnostics Guide Order No.: 6FC5 298-5AA20-0BP2	(04.00 Edition)
/PG/	SINUMERIK 840D/840Di/810D/FM-NC Programming Guide Fundamentals Order No.: 6FC5 298-5AB00-0BP2	(04.00 Edition)
/PGA/	SINUMERIK 840D/840Di/810D/FM-NC Programming Guide Advanced Order No.: 6FC5 298-5AB10-0BP2	(04.00 Edition)
/PGK/	SINUMERIK 840D/810D/FM-NC Short Guide Programming Order No.: 6FC5 298-5AB30-0BP0	(12.98 Edition)
/PGZ/	SINUMERIK 840D/840Di/810D/FM-NC Programming Guide Cycles Order No.: 6FC5 298-5AB40-0BP2	(04.00 Edition)
/PI /	PCIN 4.4 Software for Data Transfer to/from MMC Module Order No.: 6FX2 060 4AA00-4XB0 (German, English, French) Order from: WK Fürth	
/SYI /	SINUMERIK 840Di System Overview Order No.: 6FC5 298-5AE40-0BP0	(06.00 Edition)

Manufacturer/Service Documentation

a) Lists

/LIS/	SINUMERIK 840D/840Di/810D/FM-NC SIMODRIVE 611D Lists Order No.: 6FC5 297-5AB70-0BP2	(04.00 Edition)
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b) Hardware

/BH/	SINUMERIK 840D/840Di/810D/FM-NC Operator Components Manual (HW) Order No.: 6FC5 297-5AA50-0BP2	(04.00 Edition)
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/BHA/	SIMODRIVE Sensor Absolute Encoder with Profibus DP User Guide (HW) Order No.: 6SN1197-0AB10-0BP1	(02.99 Edition)
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/EMV/	SINUMERIK, SIROTEC, SIMODRIVE EMC Installation Guide Planning Guide (HW) Order No.: 6FC5 297-0AD30-0BP1	(06.99 Edition)
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/PHC/	SINUMERIK 810D Manual Configuring (HW) Order No.: 6FC5 297-3AD10-0BP2	(04.00 Edition)
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/PHD/	SINUMERIK 840D NCU 561.2-573.2 Configuring Manual (HW) Order No.: 6FC5 297-5AC10-0BP2	(04.00 Edition)
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/PHF/	SINUMERIK FM-NC NCU 570 Configuring Manual (HW) Order No.: 6FC5 297-3AC00-0BP0	(04.96 Edition)
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/PMH/	SIMODRIVE Sensor Measuring System for Main Spindle Drives Configuring/Installation Guide, SIMAG-H (HW) Order No.: 6SN1197-0AB30-0BP0	(05.99 Edition)
--------------	---	-----------------

c) Software

/FB1/	SINUMERIK 840D/840Di/810D/FM-NC Description of Functions, Basic Machine (Part 1) (04.00 Edition) (the various sections are listed below) Order No.: 6FC5 297-5AC20-0BP2
A2	Various Interface Signals
A3	Axis Monitoring, Protection Zones
B1	Continuous Path Mode, Exact Stop and Look Ahead
B2	Acceleration
D1	Diagnostic Tools
D2	Interactive Programming
F1	Travel to Fixed Stop
G2	Velocities, Setpoint/Actual-Value Systems, Closed-Loop Control
H2	Output of Auxiliary Functions to PLC
K1	Mode Group, Channel, Program Operation Mode
K2	Axes, Coordinate Systems, Frames, Actual-Value System for Workpiece, External Zero Offset
K4	Communication
N2	EMERGENCY STOP
P1	Transverse Axes
P3	Basic PLC Program
R1	Reference Point Approach
S1	Spindles
V1	Feeds
W1	Tool Compensation

/FB2/	SINUMERIK 840D/840Di/810D(CCU2)/FM-NC Description of Functions, Extended Functions (Part 2) (04.00 Edition) including FM-NC: Turning, Stepper Motor (the various sections are listed below) Order No.: 6FC5 297-5AC30-0BP2
A4	Digital and Analog NCK I/Os
B3	Several Operator Panels and NCUs
B4	Operation via PG/PC
F3	Remote Diagnostics
H1	Jog with/without Handwheel
K3	Compensations
K5	Mode Groups, Channels, Axis Replacement
L1	FM-NC Local Bus
M1	Kinematic Transformation
M5	Measurement
N3	Software Cams, Position Switching Signals
N4	Punching and Nibbling
P2	Positioning Axes
P5	Oscillation
R2	Rotary Axes
S3	Synchronous Spindles
S5	Synchronized Actions (up to and including SW 3)
S6	Stepper Motor Control
S7	Memory Configuration
T1	Indexing Axes

W3	Tool Change
W4	Grinding

/FB3/

SINUMERIK 840D/840Di/810D(CCU2)/FM-NC
Description of Functions, Special Functions (Part 3) (04.00 Edition)
 (the various sections are listed below)
 Order No.: 6FC5 297-5AC80-0BP2

F2	3-Axis to 5-Axis Transformation
G1	Gantry Axes
G3	Cycle Times
K6	Contour Tunnel Monitoring
M3	Coupled Motion and Leading Value Coupling
S8	Constant Workpiece Speed for Centerless Grinding
T3	Tangential Control
V2	Preprocessing
W5	3D Tool Radius Compensation
TE1	Clearance Control
TE2	Analog Axis
TE3	Master-Slave for Drives
TE4	Transformation Package Handling
TE5	Setpoint Exchange
TE6	MCS Coupling

/FBA/

SIMODRIVE 611D/SINUMERIK 840D/810D
Description of Functions, Drive Functions (04.00 Edition)
 (the various sections are listed below)
 Order No.: 6SN1 197-0AA80-0BP6

DB1	Operational Messages/Alarm Reactions
DD1	Diagnostic Functions
DD2	Speed Control Loop
DE1	Extended Drive Functions
DF1	Enable Commands
DG1	Encoder Parameterization
DM1	Calculation of Motor/Power Section Parameters and Controller Data
DS1	Current Control Loop
DÜ1	Monitors/Limitations

/FBAN/

SINUMERIK 840D/SIMODRIVE 611D Digital
 Description of Functions
ANA-Module (11.99 Edition)
 Order No.: 6SN1 197-0AB80-0BP0

/FBD/

SINUMERIK 840D
 Description of Functions **Digitizing** (07.99 Edition)
 Order No.: 6FC5 297-4AC50-0BP0

DI1	Start-up
DI2	Scanning with Tactile Sensors (scancad scan)
DI3	Scanning with Lasers (scancad laser)
DI4	Milling Program Generation (scancad mill)

/FBDN/	CAM Integration DNC NT-2000 Description of Functions System for NC Data Management and Data Distribution (10.99 Edition) Order No.: 6FC5 297-5AE50-0BP0	
/FBFA/	SINUMERIK 840D/810D Description of Functions ISO Dialects for SINUMERIK Order No.: 6FC5 297-5AE10-0BP1	(04.00 Edition)
/FBHLA/	SINUMERIK 840D/SIMODRIVE 611 digital Description of Functions HLA Module Order No.: 6SN1 197-0AB60-0BP1	(08.99 Edition)
/FBMA/	SINUMERIK 840D/810D Description of Functions ManualTurn Order No.: 6FC5 297-5AD50-0BP0	(02.00 Edition)
/FBO/	SINUMERIK 840D/810D/FM-NC Description of Functions Configuring of Operator Interface OP 030 (the various sections are listed below) Order No.: 6FC5 297-3AC40-0BP0	(03.96 Edition)
	BA Operator's Guide EU Development Environment (Configuring Package) PS Online only: Configuring Syntax (Configuring Package) PSE Introduction to Configuring of Operator Interface IK Screen Kit: Software Update and Configuration	
/FBP/	SINUMERIK 840D Description of Functions C-PLC Programming Order No.: 6FC5 297-3AB60-0BP0	(03.96 Edition)
/FBR/	SINUMERIK 840D/810D Description of Functions SINCOM Computer Link Order No.: 6FC5 297-5AD60-0BP0	(02.00 Edition)
	NFL Host Computer Interface NPL PLC/NCK Interface	
/FBSI/	SINUMERIK 840D/SIMODRIVE Description of Functions SINUMERIK Safety Integrated (05.00 Edition) Order No.: 6FC5 297-5AB80-0BP1	

/FBSP/	SINUMERIK 840D/810D Description of Functions ShopMill Order No.: 6FC5 297-5AD80-0BP1	(05.00 Edition)
/FBST/	SIMATIC FM STEPDRIVE/SIMOSTEP Description of Functions Order No.: 6SN1 197-0AA70-0BP3	(11.98 Edition)
/FBSY/	SINUMERIK 840D/810D Description of Functions Synchronized Actions for Wood, Glass, Ceramics, Presses Order No.: 6FC5 297-5AD40-0BP2	(04.00 Edition)
/FBTD/	SINUMERIK 840D/810D Description of Functions Tool Information SINTDI with Online Help Order No.: 6FC5 297-5AE00-0BP0	(04.99 Edition)
/FBU/	SIMODRIVE 611 universal Description of Functions Closed-Loop Control Component for Speed Control and Positioning Order No.: 6SN1 197-0AB20-0BP2	(10.99 Edition)
/FBW/	SINUMERIK 840D/810D Description of Functions Tool Management Order No.: 6FC5 297-5AC60-0BP2	(04.00 Edition)
/HBI/	SINUMERIK 840Di Manual Order No.: 6FC5 297-5AE50-0BP0	(06.00 Edition)
/IK/	SINUMERIK 840D/810D/FM-NC Screen Kit MMC 100/Unit Operator Panel Description of Functions: Software Update and Configuration Order No.: 6FC5 297-3EA10-0BP1	(06.96 Edition)
/KBU/	SIMODRIVE 611 universal Short Description Closed-Loop Control Component for Speed Control Order No.: 6SN1 197-0AB40-0BP2	(10.99 Edition)

/PJLM/	SIMODRIVE Planning Guide Linear Motors (02.00 Edition) (on request) ALL General Information about Linear Motors 1FN1 1FN1 Three-Phase AC Linear Motor 1FN3 1FN3 Three-Phase AC Linear Motor CON Connections Order No.: 6SN1 197-0AB70-0BP1	
/PJM/	SIMODRIVE Planning Guide Motors (01.98 Edition) Three-Phase AC Motors for Feed and Main Spindle Drives Order No.: 6SN1 197-0AA20-0BP3	
/PJU/	SIMODRIVE 611-A/611-D Planning Guide Inverters (08.98 Edition) Transistor PWM Inverters for AC Feed Drives and AC Main Spindle Drives Order No.: 6SN1 197-0AA00-0BP4	
/POS1/	SIMODRIVE POSMO A User Manual (02.00 Edition) Distributed Positioning Motor on PROFIBUS DP Order No.: 6SN2 197-0AA00-0BP1	
/POS2/	SIMODRIVE POSMO A Installation Instructions (enclosed with POSMO A) (12.98 Edition) Order No.: 462 008 0815 00	
/S7H/	SIMATIC S7-300 (10.98 Edition) – Manual: Assembly, CPU Data (HW) – Reference Manual: Module Data Order No.: 6ES7 398-8AA03-8AA0	
/S7HT/	SIMATIC S7-300 (03.97 Edition) Manual: STEP 7, Basic Information, V. 3.1 Order No.: 6ES7 810-4CA02-8AA0	
/S7HR/	SIMATIC S7-300 (03.97 Edition) Manual STEP 7, Reference Manuals, V. 3.1 Order No.: 6ES7 810-4CA02-8AR0	
/S7S/	SIMATIC S7-300 (04.97 Edition) FM 353 Step Drive Positioning Module Order in conjunction with Configuring Package	

/S7L/	SIMATIC S7-300 FM 354 Servo Drive Positioning Module Order in conjunction with Configuring Package	(04.97 Edition)
/S7M/	SIMATIC S7-300 FM 357 Multi-Axis Module for Servo and Stepper Drives Order in conjunction with Configuring Package	(10.99 Edition)
/SHM/	SIMODRIVE 611 Manual Single-Axis Positioning for MCU 172A Order No.: 6SN 1197-4MA00-0BP0	(01.98 Edition)
/SP/	SIMODRIVE 611-A/611-D, SimoPro 3.1 Program for Configuring Machine-Tool Drives Order No.: 6SC6 111-6PC00-0AA□ Order from: WK Fürth	
d) Installation and start-up		
/IAA/	SIMODRIVE 611A Installation and Start-Up Guide Order No.: 6SN 1197-0AA60-0BP5	(04.00 Edition)
/IAC/	SINUMERIK 810D Installation and Start-Up Guide (incl. description of SIMODRIVE 611D start-up software) Order No.: 6FC5 297-3AD20-0BP2	(04.00 Edition)
/IAD/	SINUMERIK 840D/SIMODRIVE 611D Installation and Start-Up Guide (incl. description of SIMODRIVE 611D start-up software) Order No.: 6FC5 297-5AB10-0BP2	(04.00 Edition)
/IAF/	SINUMERIK FM-NC Installation and Start-Up Guide	(04.96 Edition)
/IAM/	Order No.: 6FC5 297-3AB00-0BP0	
/IAM/	SINUMERIK 840D/810D MMC Installation and Start-Up Guide Order No.: 6FC5 297-5AE20-0BP2	(04.00 Edition)
	IM1 Start-up functions for the MMC 100.2	
	IM3 Start-up functions for the MMC 103	
	IM4 Start-up functions for HMI Advanced (PCU 50)	
	HE1 Editor help	
	BE1 Supplement operator interface	



EC Declaration of Conformity

C

Note

An extract from the EC Declaration of Conformity No. E002 V 25/02/99 is shown below. A complete copy of the EC Declaration of Conformity can be found in the “EMC Installation Guidelines” for the SINUMERIK, SIROTEC and SIMODRIVE controls.

SIEMENS**EG-Konformitätserklärung**
EC Declaration of Conformity

No. E002 V 25/02/99

Hersteller: Siemens AG
 Manufacturer:

Anschrift: Siemens AG A&D MC
 Address: Frauenaauracherstraße 80
 91056 Erlangen

Produkt- bezeichnung: SINUMERIK 805, 805SM-P, 805SM-TW, 810, 810D
 820, 840C, 840CE, 840D, 840DE, FM NC
 Product description: SIMATIC FM 353, FM 354, FM 357
 SIROTEC RCM1D, RCM1P
 SIMODRIVE 610, 611A, 611D, 611U, MCU, FM STEPDRIVE

Das bezeichnete Produkt stimmt in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender Europäischer Richtlinie überein:
The product described above in the form as delivered is in conformity with the provisions of the following European Directives:

89/336/EWG Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit
 (geändert durch 91/263/EWG, 92/31/EWG, 93/68/EWG und 93/97/EWG).

Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility (amended by 91/263/EEC, 92/31/EEC, 93/68/EEC and 93/97/EEC)

Die Einhaltung dieser Richtlinie setzt einen EMV-gerechten Einbau der Produkte gemäß EMV-Aufbauanleitung für SINUMERIK, SIROTEC, SIMODRIVE (Best. Nr. 6FC 5297-0AD30-0AP0) in die Gesamtanlage voraus. Anlagenkonfigurationen, bei der die Einhaltung dieser Richtlinie nachgewiesen wurde, sowie angewandte Normen, siehe:

For keeping the directive, it is required to install the products according to "EMC Mounting regulation for SINUMERIK, SIROTEC, SIMODRIVE" (Order No. 6FC 5297-0AD30-0BP0). For details of the system configurations, which meet the requirements of the directives, as well as for the standards applied see:

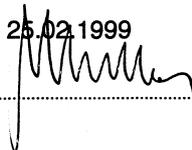
- Anhang A1 - A14 (Anlagenkonfigurationen) - Annex A1 - A14 (system configurations)
- Anhang B1 - B7 (Komponenten) - Annex B1 - B7 (components)
- Anhang C (Normen) - Annex C (standards)

Siemens AG

Erlangen, den 25.02.1999

R. Müller

Entwicklungsleitung

Name, Funktion
Name, function

Unterschrift
signature

K. Krause

Qualitätsmanagement

Name, Funktion
Name, function

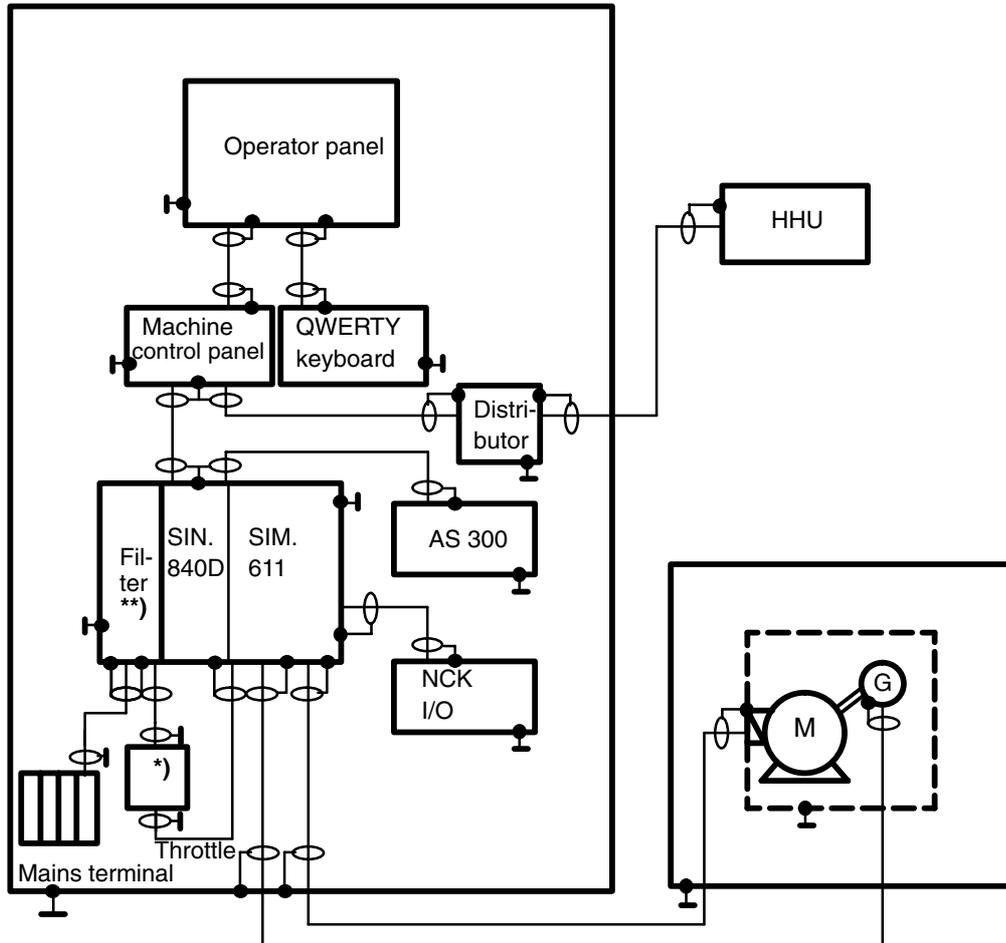
Unterschrift
signature

Diese Erklärung bescheinigt die Übereinstimmung mit der genannten Richtlinie, ist jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety documentation accompanying the product shall be considered in detail.

Appendix A to EC Declaration of Conformity No. E002

A9: Typical plant configuration SINUMERIK 840D/SIMODRIVE 611 with digital set-point interface

Metal cabinet



*) with I/RF module and UE module 28 kW

**) filter in module group or separately

- All components which are designated in the Ordering Information as approved for operation in a combined SINUMERIK 840D / SIMODRIVE 611D installation comply with Directive 89/336/EEC when operated in an installation of this type.
- For compliance with standards, see Appendix C

Note:

The plant configuration sketch illustrates only the basic measures to be implemented in a typical plant configuration to ensure compliance with Directive 89/336/EEC.

In addition, especially in cases where the plant configuration deviates from this typical model, the installation guidelines for EMC plant design in the product documentation and the EMC installation guidelines for SINUMERIK, SIROTEC and SIMODRIVE (order no.: 6FC5297-0AD30-0BP0) must be noted and implemented.

Appendix C to EC Declaration of Conformity No. E002 V 25/02/99

C: The compliance of the products with Council Directive 89/336/EEC has been verified through inspection and testing in accordance with the following product standard, basic technical specifications and the basic standards contained therein. Product categories SINUMERIK, SIROTEC, SIMPDRIVE and SIMATIC are subject to the requirements of different standards.

C1 Product categories SINUMERIK*), SIMATIC, SIROTEC:

Basic specification: EN 50081-2 dated 8/93 1)

<u>Basic standards:</u>	<u>Subject of tests:</u>
EN 55011 2)	Radio interference

Basic specification: EN 50082-2 dated 3/95 3)

<u>Basic standards:</u>	<u>Subject of tests:</u>
EN 61000-4-3 4)	Radiated radio frequency field (amplitude-modulated)
ENV 50204 5)	Radiated radio frequency field (pulse-modulated)
EN 61000-4-6 6)	Conducted disturbances
EN 61000-4-8 7)	Power frequency magnetic fields
EN 61000-4-2 8)	Electrostatic discharge
EN 61000-4-4 9)	Electrical fast transient bursts

*) except for SINUMERIK 810D

C2 Product categories SIMODRIVE, SINUMERIK 810D:

Product standard: EN 61800-3 10)

C3 Other standards complied with:

- | | |
|-----------------------------------|---|
| 1) VDE 0839 Part 81-2 | 6) IEC 801-6,
VDE 0847 Part 4-6
IEV 1000-4-6
ENV 50141 |
| 2) VDE 0875 Part 11 | 7) VDE 0847 Part 4-8
IEC 1000-4-8 |
| 3) VDE 0839 Part 82-2 | 8) VDE 0847 Part 4-2
EN 60801 Part 2
IEC 801-2
VDE 0843 Part 2 |
| 4) VDE 0847 Part 4-3
ENV 50140 | 9) VDE 0843 Part 4
VDE 0847 Part 4-4
IEC 801-4 |
| 5) VDE 0847 Part 204 | 10) VDE 0160 Part 100 |



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	Suggestions
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