Rexroth
Bosch Group

# Rexroth ServoDyn D
# Diagnostics, maintenance

**1070066032**
**Edition 04**

## Maintenance Guidelines

**Title** Rexroth ServoDdyn D
Diagnostics, maintenance

**Type of Documentation** Maintenance Guidelines

**Document Typecode** DOK-SERV*D-DIAGNOSTICS-WA04-EN-P

**Purpose of Documentation** The present manual informs you about the diagnostics options of the ServoDyn D drive series.

**Record of Revisions**

| Description | Release Date | Notes |
|---|---|---|
| DOK-SERV*D-DIAGNOSTICS-WA04-EN-P | 05.2004 | Software releases refer to page 1–10 |
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# Contents

Contents

# 1 Safety Instructions

Please read this manual before commissioning the ServoDyn D drives. Store this manual in a place to which all users have access at any time.

## 1.1 Intended use

This manual contains information required for the intended use of this product.

The described low-voltage motors are intended for use in **commercial or industrial systems**. They comply with the harmonized standards of the VDE 0530/EN 60034 series. Their use in potentially explosive atmospheres is not admissible unless expressly permitted by additional instructions.

Air-cooled designs are rated for ambient temperatures ranging between –20 to +40 °C, and an operating altitude of ≤ 1000 m above sea level. Rating plate specifications deviating from this standard must be strictly observed. Conditions at the operating site must correspond to all specifications stated on the rating plate.

Low-voltage motors comprise **components** intended for integration into machines as contemplated by the EU Declaration of Conformity, as defined by Machinery Directive (98/37/EC, 98/79/EC). Before putting the motors into operation, ensure that the machine the motors are to be installed in meets the stipulations of the Machinery Directive (note also EN 60204-1).

The drive inverters described

- have been developed, manufactured, tested and documented in compliance with the safety standards. These products normally pose no danger to persons or property if they are used in accordance with the handling stipulations and safety notes prescribed for their configuration, mounting, and proper operation.
- comply with the requirements of
  - the EMC Directives (89/336/EEC, 93/68/EEC and 93/44/EEC)
  - the EMC product standard EN 61800-3 + A11
  - the Low-Voltage Directive (73/23/EEC)
  - the harmonized standards EN 50178 (VDE 0160) and EN 60146-1-1 (VDE 0558-11)
- are designed for operation in industrial environments, i.e.
  - no direct connection to public low-voltage power supply,
  - connection to the medium- or high-voltage system via a transformer.

  In residential environments, in trade and commerce as well as small enterprises class A equipment may only be used if the following warning is attached:

☞ **This is a Class A device. In a residential area, this device may cause radio interference. In such case, the user may be required to introduce suitable countermeasures, and to bear the cost of the same.**

Before putting the drive inverters into operation, ensure that the machine which the inverters are to be installed in meets the stipulations of the Machinery Directive (98/37/EC, 98/79/EC) and the EMC Directive (89/336/EEC).

The faultless, safe functioning of the product requires proper transport, storage, erection and installation as well as careful operation.

Safety Instructions

## 1.2 Qualified personnel

The requirements as to qualified personnel depend on the qualification profiles described by ZVEI (central association of the electrical industry) and VDMA (association of German machine and plant builders) in:
**Weiterbildung in der Automatisierungstechnik**
**edited by: ZVEI and VDMA**
**MaschinenbauVerlag**
**Postfach 71 08 64**
**D-60498 Frankfurt**.

The present manual is designed for drive specialists.

Programming, start and operation as well as the modification of program parameters is reserved to properly trained personnel! This personnel must be able to judge potential hazards arising from programming, program changes and in general from the mechanical, electrical, or electronic equipment.

Interventions in the hardware and software of our products, unless described otherwise in this manual, are reserved to specialized Rexroth personnel.

Tampering with the hardware or software, ignoring warning signs attached to the components, or non-compliance with the warning notes given in this manual may result in serious bodily injury or damage to property.

Only electrotechnicians as recognized under IEV 826-09-01 (modified) who are familiar with the contents of this manual may install and service the products described.

Such personnel are

- those who, being well trained and experienced in their field and familiar with the relevant norms, are able to analyze the jobs being carried out and recognize any hazards which may have arisen.
- those who have acquired the same amount of expert knowledge through years of experience that would normally be acquired through formal technical training.

With regard to the foregoing, please note our comprehensive range of training courses. Please visit our website at
http://www.boschrexroth.com
for the latest information concerning training courses, teachware and training systems. Personal information is available from our Didactic Center Erbach,
Telephone: (+49) (0) 60 62 78-600.

## 1.3 Safety markings on products

Warning of dangerous electrical voltage!

Electrostatically sensitive components!

Warning of hazardous light emissions (optical fiber cable emissions)!

Protect against shock and impact!

Lug for connecting PE conductor only!

Connection of shield conductor only

Safety Instructions

## 1.4 Safety instructions in this manual

**DANGEROUS ELECTRICAL VOLTAGE**
This symbol is used to warn of a **dangerous electrical voltage.** The failure to observe the instructions in this manual in whole or in part may result in **personal injury**.

**DANGER**
This symbol is used wherever insufficient or lacking compliance with instructions may result in **personal injury**.

**CAUTION**
This symbol is used wherever insufficient or lacking compliance with instructions may result in **damage to equipment or data files**.

☞ This symbol is used to draw the user's attention to special circumstances.

★ This symbol is used if user activities are required.

Safety Instructions

## 1.5 Safety instructions for the described product

**DANGER**
**Danger of life through inadequate EMERGENCY-STOP devices!**
**EMERGENCY-STOP devices must be active and within reach in all system modes. Releasing an EMERGENCY-STOP device must not result in an uncontrolled restart of the system!**
**First check the EMERGENCY-STOP circuit, then switch the system on!**

**DANGER**
**Danger for persons and equipment!**
**Test every new program before starting up a system!**

**DANGER**
**Retrofits or modifications may adversely affect the safety of the products described!**
**The consequences may include severe injury, damage to equipment, or environmental hazards. Possible retrofits or modifications to the system using third-party equipment therefore have to be approved by Rexroth.**

**DANGER**
**Health hazards through destroyed electrical components!**
**Do not destroy any built-in components. Dispose of destroyed components in a proper manner.**

**DANGER**
**Do not look directly into the LEDs in the optical fiber connection. Due to their high output, this may result in eye injuries.**
**When the inverter is switched on, do not look into the LED or the open end of a short connected lead.**

**DANGER**
**Please note your local, system-specific regulations and requirements as well as the proper use of tools, hoisting and transport equipment as well as the applicable standards, regulations, and accident prevention regulations.**

Safety Instructions

**DANGEROUS ELECTRICAL VOLTAGE**
**Unless described otherwise, maintenance works must be performed on inactive systems! The system must be protected against unauthorized or accidental reclosing.**

**Measuring or test activities on the live system are reserved to qualified electrical personnel!**

**DANGEROUS ELECTRICAL VOLTAGE**
**Lethal voltages of up to 375 V DC against ground on all power connections and DC link connections!**

**The drives must not be switched on unless all covers have been fitted! When the drive has been disconnected from mains, wait for up to 5 minutes until the system is de-energized before removing any covers.**

**The drive must always be examined for safe isolation from supply!**

**DANGER – WARNING OF HOT SURFACE!**
**The surfaces of motors can reach temperatures of up to approx. 100 °C.**
**A touch guard is to be provided where necessary.**

**CAUTION**
**Impacts and shocks applied to the shaft end will damage the rotary encoder and ball bearings!**
**Drive elements such as pulleys, clutch disks, toothed wheels etc. may only be assembled or removed by continuously heating up the drive elements or with a suitable installation or removal tool. Use the thread in the shaft end.**

**CAUTION**
**use only spare parts approved by Rexroth!**

**CAUTION**
**Damages to the module or inverter by removing plug-in connections.**
**All plug-in connections to the encoder may only be inserted or removed while the drive is switched off.**

**CAUTION**
**Observe all precautions for ESD protection when handling modules and components! Avoid electrostatic discharge!**

The following protective measures must be observed for modules and components sensitive to electrostatic discharge (ESD)!

- Personnel responsible for storage, transport, and handling must have training in ESD protection.
- ESD-sensitive components must be stored and transported in the prescribed protective packaging.
- ESD-sensitive components may only be handled at special ESD-workplaces.
- Personnel, working surfaces, as well as all equipment and tools which may come into contact with ESD-sensitive components must have the same potential (e.g. by grounding).
- Wear an approved grounding bracelet. The grounding bracelet must be connected with the working surface through a cable with an integrated 1 MΩ resistor.
- ESD-sensitive components may by no means come into contact with chargeable objects, including most plastic materials.
- When ESD-sensitive components are installed in or removed from equipment, the equipment must be de-energized.

Safety Instructions

## 1.6 Documentation, software release and trademarks

### Documentation

The present manual informs you about the diagnostics options of the ServoDyn D drive series.

| Overview of available documentation | Part no. | | | |
|---|---|---|---|---|
| | German | English | French | Italian |
| Servo motors SF, SR | 1070 066 004 | 1070 066 024 | 1070 066 048 | 1070 066 046 |
| Asynchronous motors DU | 1070 066 007 | 1070 066 027 | – | – |
| Servodyn-D, Configuration<br>- Manual for overview and rating | 1070 066 009 | 1070 066 029 | 1070 066 059 | 1070 066 049 |
| Servodyn-D, Connectivity Manual | 1070 066 010 | 1070 066 030 | 1070 066 060 | 1070 066 050 |
| Servodyn-D,<br>- Connectivity Manual - Stand alone version | 1070 066 016 | 1070 066 036 | 1070 066 066 | 1070 066 056 |
| Servodyn-D, Servodyn-M<br>- Parameter manual (without CANopen) | 1070 066 018 | 1070 066 038 | 1070 066 068 | 1070 066 058 |
| Servodyn-D, Servodyn-M<br>- Parameter manual CANopen | 1070 066 094 | 1070 066 095 | – | – |
| Servodyn-D with SERCOS interface<br>- Parameter and commissioning manual | 1070 066 011 | 1070 066 031 | – | 1070 066 051 |
| Servodyn-D with analog interface<br>- Commissioning manual | 1070 066 014 | 1070 066 034 | – | – |
| Servodyn-D with CANrho interface<br>- Commissioning manual | 1070 066 017 | 1070 066 037 | – | – |
| Servodyn-D with motion control<br>- Commissioning manual | 1070 066 015 | 1070 066 035 | – | – |
| Servodyn-D with PROFIBUS-DP<br>- Commissioning manual | 1070 066 090 | 1070 066 091 | – | – |
| Servodyn-D DM/DS..8001 (ASM)<br>Parameter and commissioning manual | 1070 066 008 | 1070 066 028 | – | 1070 066 053 |
| Diagnostics, maintenance | 1070 066 012 | 1070 066 032 | 1070 066 062 | 1070 066 052 |
| RSU, Redundant safety monitoring | 1070 066 006 | 1070 066 026 | 1070 066 081 | 1070 066 082 |
| EMC manual | 1070 066 072 | 1070 066 074 | 1070 066 075 | 1070 066 076 |
| External load switching module EBX | 1070 066 077 | 1070 066 080 | – | – |

☞ **In this manual the floppy disk drive always uses drive letter A:, and the hard disk drive always uses drive letter C:.**

Special keys or key combinations are shown enclosed in pointed brackets:

- Named keys: e.g., <Enter>, <PgUp>, <Del>
- Key combinations (pressed simultaneously): e.g., <Ctrl> + <PgUp>

Safety Instructions

## Release

☞ **The present manual applies to the following releases:**

| | | |
|---|---|---|
| **DM/DS software:** | **SERCOS interface** | **V0.049 or higher** |
| | **CANopen/rho** | **V0.002 or higher** |
| | **Analog interface** | **V0.17 or higher** |
| | **PROFIBUS-DP** | **V0.004 or higher** |
| | **Motion Control** | **V0.010 or higher** |
| **VM software:** | **V0.045 or higher** | |

- The current software release number can be viewed by selecting parameter S-0-0030 with the DSS-D Commissioning and Service System, or in the ”Software” field of the module configuration display (DIAGNOSTICS ▶ MODULE CONFIGURATION).

- For information concerning the current DSS software release, refer to HELP ▶ ABOUT...

- The current software release of VMA..KR and VMA..B,C,D,F can only be read from the 7-segment display during test operation. For this purpose, turn dip switch ”T” on the VM’s personality module ”on”:

  The following appears in a running, flashing display:
  “**Cxx.ZZ.ddmmyyyy**“

  Where: **xx** = software release number
  **ZZ** = (internal)
  **dd** = software creation day
  **mm** = software creation month
  **yyyy** = software creation year

## Trademarks

All trademarks of software installed on Rexroth products upon delivery are the property of the respective manufacturer.

Upon delivery, all installed software is copyright-protected. The software may only be reproduced with the approval of Rexroth or in accordance with the license agreement of the respective manufacturer.

MS-DOS® and Windows™ are registered trademarks of Microsoft Corporation.

PROFIBUS® is a registered trademark of the PROFIBUS Nutzerorganisation e.V. (user organization).

SERCOS interface™ is a registered trademark of Interessengemeinschaft SERCOS interface e.V. (Joint VDW/ZVEI Working Committee).

# 2 Mains connection at the place of installation

**CAUTION**
**A reversed phase sequence or winding direction of a line reactor will destroy the mains connection module.**
**Please ensure proper wiring.**

## 2.1 Earthing

**CAUTION**
**Inverter modules may only be operated with an earthed neutral system.**
**Systems not directly earthed (IT protective system) must not be used for operation, as air clearances and leakage paths in the module may be overloaded.**
**Operation at asymmetrical mains systems (TT protective system, one mains phase is earthed) is not permissible!**

DIN VDE 0100-300 defines mains systems subject to their type of earth connection.

Accordingly, in an IT protective system, all active parts are separated from earth, or one point is connected to earth via a resistor.

The exposed conductive parts of an electrical system are either

- earthed separately, or
- earthed jointly, or
- jointly connected to the system earth.

☞ **Please note the information on earthing in the ServoDyn D EMC manual, for part no. refer to page 1–9.**

**DANGEROUS ELECTRICAL VOLTAGE**
**The only permissible protective measure in accordance with EN 50 178 is a protective earth connection.**
**The protective conductor must at least have the same area as the mains feeder.**
**Earthing only one end of the DC link when operating by means of an isolating transformer is prohibited!**

Mains connection at the place of installation

Earth connections in the switch cabinet must be designed in the form of a grid mesh.
The module housing and mounting plate of the switch cabinet must be earthed. The connection between the line filter and the supply module should be as short as possible.
The protective earth cross-section must at least correspond to the cross-section of the line feeder of the supply module.

**DANGER**
**Dangerous shock currents through inappropriate protective earth connections!**
**Do not impair protective earth connections by mechanical, chemical or electro-chemical influences. The connection must be firm and lasting.**

Mains connection at the place of installation

## 2.2 Earth-leakage circuit-breaker

Inverters incorporate switched power units which are always associated with capacitive leakage currents against earth. The leakage currents may depend on the number of inverters, the earthing conditions as well as the design and length of motor power cables.

Mains filters and shielded cables used to improve the electromagnetic compatibility (EMC) increase the leakage currents further. For this reason, no earth-leakage circuit-breakers with nominal leakage currents of less than 300 mA may be used.

**DANGEROUS ELECTRICAL VOLTAGE**
**Personnel protection is only guaranteed if earth-leakage circuit-breakers with nominal leakage currents of less than 30 mA are used.**

☞ **Inductors and/or capacitors present in the electric circuit may lead to spurious trips. If radio interference suppression filters are used, spurious trips can only be avoided by installing an isolating transformer.**

**DANGEROUS ELECTRICAL VOLTAGE**
**If a pulse power current sensitive e.l.c.b. type A in accordance with IEC-755 (VDE 0664) is used, its protective function is not guaranteed for inverters with a 3-phase mains connection (B6 circuit).**

The protection of all electrical components connected together with inverters with a 3-phase mains connection to a pulse power current sensitive e.l.c.b. may be adversely affected.
Therefore, you should either install an isolating transformer with a protective device and earthing in the mains feeder, or use a universal current sensitive e.l.c.b. type B which also provides safety disconnection in the event of DC leakage currents.

Mains connection at the place of installation

Notes:

Marks, certifications

# 3 Marks, certifications

## 3.1 CE-marking

### Low-Voltage Directive

The CE marking confirms compliance of drive modules of the ServoDyn D series with the Low-Voltage Directive. The rating and construction satisfy the requirements of EN 50178.

### Machinery Directive

The CE marking confirms compliance of drive modules of the ServoDyn D series with the Machinery Directive. The rating and construction satisfy the requirements of EN 60204-1.

### EMC Directive

Concerning the EMC Directive, the exception stipulated in the German EMC Act, EMVG Art. 6, Subs. (9), is applicable, cf. below.
The following must be noted with respect to the operational system (cf. EMC manual):

- Requirements on EMC noise emission
  - Conducted noise
    Depending on the application (industrial environment or domestic application), a suitable mains filter is to be provided in the power supply line.
    The cubicle construction should be designed so as to ensure the efficiency of the mains filter to the greatest possible extent.
  - Radiated noise
    Depending on the application (industrial environment or domestic application), a suitable switch cabinet with EMC shielding has to be provided.
    For the motor leads, shielded cables should be preferably used which are grounded on both ends of the shield.

- Required interference immunity
  The rating and construction satisfy the requirements of the EMC product standard EN 61800-3 for application in industrial environments.

EMVG 18.09.1998

Art. 6 Exceptions and special determinations

(9) Apparatuses, systems, and components covered by Subs. 3, which are exclusively manufactured and designed as accessories or spare parts for further processing by companies or persons with expert knowledge in the field of electromagnetic compatibility, are exempted from compliance with the protection requirements and the requirements of Art. 4 Subs. 1 Nos. 1 to 3 and 5. The operational unit which contains apparatuses, systems or components defined in the 1st sentence above, shall satisfy the provisions of this law.

Marks, certifications

## 3.2 EU design type certification

The certification covers ServoDyn D with redundant safety monitoring RSU. RSU complies with the requirements concerning:

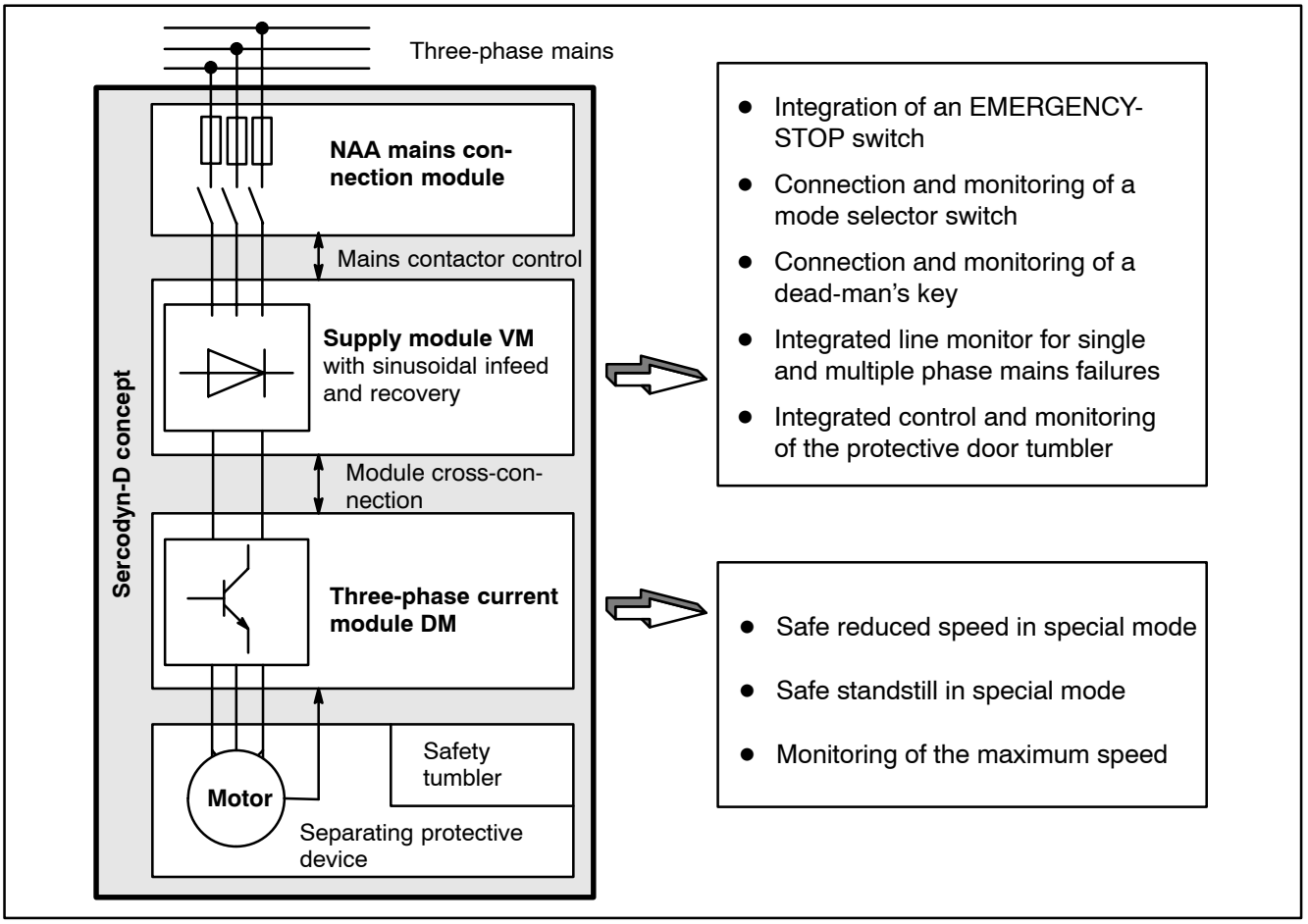
- **Safety-relevant parts of controllers** in accordance with EN 954-1 Category 3, as required by
  - EN 12415 (safety of turning machines)
  - EN 12417 (safety of machining centres)
- **Control functions in the event of a fault** according to EN 60204-1

In the special mode, the integrated 2-channel safety structure monitors all axis and spindle movements. It is available for:

- Three-phase modules with SERCOS interface (firmware release as of V0.040)
- in connection with supply modules with energy recovery capability (firmware release as of V0.040) and
- mains connection module NAA

This concept has been certified, i.e. additional monitoring equipment is not necessary.

☞ **For more information, refer to ServoDyn D with Redundant Safety Monitoring manual, part no. in Section 1.6.**



Marks, certifications

## 3.3 UL/CSA certification


For a number of ServoDyn D modules in compact mechanics, a UL/CSA certification is available for the U.S. and Canada. They are marked by adhesive labels. These modules are listed in the **"Product Identity 23 MB", File No. E214694**.

### Installation in compliance with UL/CSA

In order to obtain a UL/CSA-compliant installation, the following must be noted in addition to the use of the certified components:

- Systems may only be used in environments with pollution severity 2.
- Note tightening torques of the connection terminals as specified in Interface Conditions manual, for part no. refer to page 1–9.
- The insulated copper wires must be specified for 60/75 °C as a minimum.
- Only insulated Class 1 wires or equivalent may be used, e.g. to UL Style 1015 (on motor side, H07: $U_0$/U: 600/1000 V) and UL Style 1007 or 1569 (on supply side, H05: $U_0$/U: 300/500 V)
- Suitable for installation in symmetrical supply networks with a short-circuit current of ≦10 kA with max. 460 V +10 %.

### Operation in compliance with UL/CSA

For UL/CSA-compliant operation, the bimetal function ($I^2t$ monitoring) must be activated in the inverters using parameter P-0-0053 in order to provide motor protection.

- $I_N$ of the motor is automatically retrieved from the electronic rating plate to the $I^2t$ monitoring function.
- P-0-0053 is only used to set the desired time constant:
  Factory setting: 0.0 (disabled)
  Customary setting range: 100...150
  (corresponds to release characteristics of bimetal relay)

Marks, certifications

Notes:

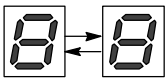
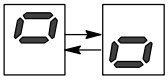
VMA..KB, VMA..KE status, warning and error displays

# 4 Diagnostics displays at the drive

## 4.1 VMA..KB, VMA..KE status, warning and error displays

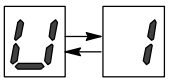
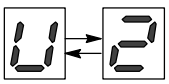
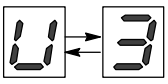
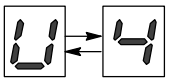
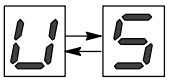
| 7-segment display | Status | Action |
|---|---|---|
|  | **Ready**<br>Standard ready display | – |
|  | **Warning:**<br>● Excessive heat sink temperature<br>● Ballast switch may be overloaded<br>● VM power limit reached | ● Increase air supply, reduce ambient temperature<br>● Reduce module load |
|  | **Undervoltage**<br>DC link voltage < 400 V | ● Switch module on<br>● Check system voltage |
|  | **Overvoltage**<br>DC link voltage > 800 V | ● Reduce braking current<br>● Check system voltage |
|  | **Ballast switch overload** | ● Reduce braking current<br>● Set longer braking times |
|  | **Power supply fault**<br>Internal supply voltage outside permissible tolerance. | ● Check 24 V connection voltage<br>● Replace module |
|  | **Module overtemperature**<br>Heat sink temperature > 75°C | ● Increase air supply<br>● Reduce ambient temperature |
|  | **Ambient overtemperature**<br>Ambient temperature > 55°C | ● Check application conditions<br>● Observe derating |

## 4.2 VMA..KR, VMA..B,C,D,F status displays

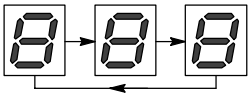
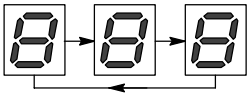
| LED | Status | Action |
|---|---|---|
| ☼ AE | **Drive On**<br>LED lights up at 24 V at X06.7 (AE) | – |
| ☼ FGI | **Enable internal** if<br>• 24 V at X06.7 (AE)<br>• no error | – |
|  | Multi-digit displays flash alternately. | |
|  | **Normal operation (NO)**<br>Standard ready display | – |
|  | **Special operating mode (SO)**<br>Operating mode for open safety door where standstill monitoring of the drives is still active at maximum energy supply. | – |
|  | **Intermediate circuit not yet discharged**<br>Alternate flashing while DC link voltage >50 V | Wait for a discharge time of 5 minutes and then check the DC link at the DC measuring sockets for zero voltage. |

**DANGEROUS ELECTRICAL VOLTAGE**
**Before dismounting the modules, wait for a discharge time of 5 minutes and check the DC link at the DC measuring sockets for zero voltage.**

## 4.3 VMA..KR, VMA..B,C,D,F warning displays

| Displays flash alternately | Warning<br><br>The drive can switch off without delay. | Action |
|---|---|---|
|  | **Overload**<br>Output limit of the VM reached during supply or regeneration:<br>• $P_{max}$ > 140 %, or<br>• $P_N$ > 100 % | In continuous operation: reduce load.<br><br>When regenerating: select longer braking ramp by limiting braking current (P-0-0027) |
|  | **Overtemperature**<br>Heat sink temperature > 75°C | • Check air supply<br>• Check fan |
|  | **Overtemperature**<br>Ambient temperature > 45°C | • Check application conditions<br>• Observe derating |
|  | **Power failure, 1 phase**<br>The VM maintains axis supply, although the output is reduced to 66 %.<br>Overload may result if failure of one phase is long-term. | • Check fuses and line system<br>• Check wiring<br>• Replace power supply module NA |
|  | **Power failure, 2 or 3 phase**<br>$U_{system\ rms}$ <70 % for more than 3 ms.<br>The DC link can be temporarily supported by the axes, which are informed of the power failure via the module cross connection. | • Check fuses and line system<br>• Check wiring<br>• Replace power supply module NA |

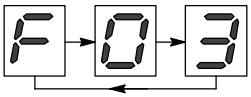
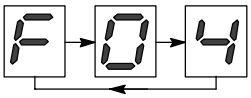
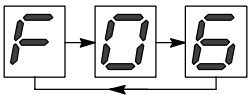
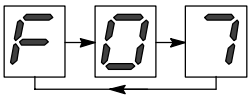
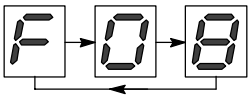
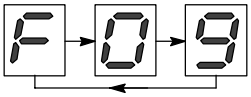
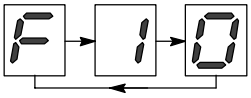
## 4.4 Status displays DM and DS (without frequency inverter)

| LED | Status | Action |
|---|---|---|
| ☼ FG | **Axis enable external** if<br>• 24 V at X06.3 (FG) | – |
| ☼ FGI | **Enable internal** if<br>• 24 V at X06.3 (FG)<br>• Central enable by VM present<br>• no error<br>• Additionally with **SERCOS interface**: ”Drive On” and ”Drive Enable” output | – |
|  | Multi-digit displays flash alternately. | |
|  | **Open bus**<br>(only with SERCOS interface)<br>The preset address value **flashes**:<br>• before phase 0, if no signal has been received<br>• in phase 2 and thereafter if the axis was not addressed in phase 1 | • in phase 0: check bus link<br>• in phase 2 and later: check the setting of the axis address (DIP switch on personality module) |
|  | **Phase 0**<br>Initialization phase.<br>If system remains in phase 0:<br>• Fault in phase run-up | • Check initialization file (*.scs)<br>• Contact controller’s manufacturer |
|  | **Phase 1** (only with SERCOS interface)<br>Initialization phase.<br>If system remains in phase 1:<br>• Fault in phase run-up | • Check initialization file (*.scs)<br>• Contact controller’s manufacturer |
|  | **Phase 2**<br>Initialization phase.<br>If system remains in phase 2:<br>• The parameters loaded into the drive during this phase are not all valid | • Call up list of invalid operating data in phase 2 (S-0-0021)<br>• Check input limits of parameters<br>• Check parameters for completeness |
|  | **Phase 3**<br>Initialization phase.<br>If system remains in phase 3:<br>• The parameters loaded into the drive during this phase are not all valid | • Call up list of invalid operating data in phase 3 (S-0-0022)<br>• Check input limits of parameters<br>• Check parameters for completeness |
|  | **Phase 4**<br>Operating phase.<br>The drive has started up, communication has been established. | – |

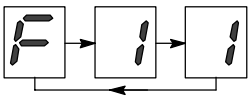
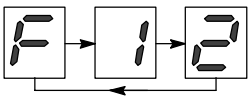
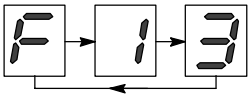
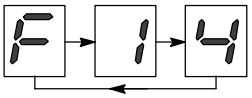
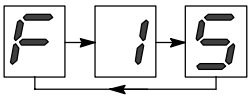
☞ **Phase run-up is performed so fast, especially if no bus interface is used, that the drive immediately displays phase 4 when it has been switched on.**

## 4.5 VMA..KR, VMA..B,C,D,F and DM/DS error displays (without frequency inverter)

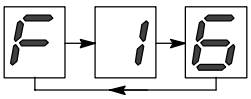
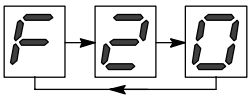
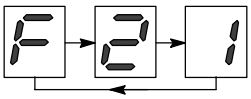
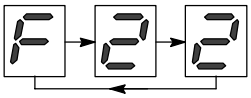
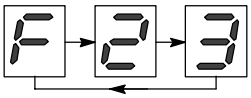
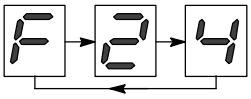
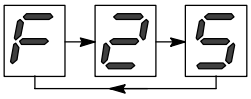
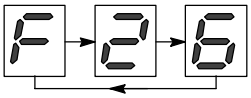
☞ **For a more detailed analysis, please refer to parameter S-0-0095, refer to page 4–14, where you will find a lot of specific information concerning the errors displayed at the drives.**

| **Displays flash alternately.** | **Error**<br>The drive has switched off. | **Action** |
|---|---|---|
|  | **Fault in option module**<br>Option module in drive slot is defective. | • Check option module for firm seat<br>• Replace option module |
|  | **Overcurrent**<br>Admissible peak current exceeded. | • Reduce load<br>• Select longer braking and acceleration ramps<br>• Check controller optimization<br>• Check motor<br>• Check application |
|  | **Real-time error**<br>Error in drive control during commissioning | • Restart module<br>• Reduce computer load by DSS-D (e.g. turn oscilloscope off)<br>• Replace module |
|  | **Module overtemperature**<br>Excessive heat sink temperature | • Check ambient temperature, increase air supply<br>• Check fan<br>• Reduce load |
|  | **Motor overtemperature**<br>Motor winding temperature > 145°C, temperature sensor or sensor cable defective. | • Reduce motor load, use bigger motor<br>• Check cooling<br>• Check encoder cable<br>• Check application conditions |
|  | **Ambient overtemperature**<br>Ambient temperature > 55°C | • Check application conditions<br>• Observe derating |
|  | **Communication error**<br>• **with SERCOS interface**<br>Communication lost, module jumps back to phase 0.<br>• **with CAN bus**<br>No SYNC message | • SERCOS interface:<br>After phase 2 start up, evaluate type of error and communication phase in which the error occurred (S-0-0014). |

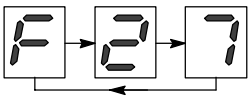
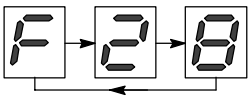
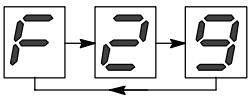
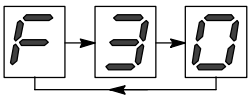
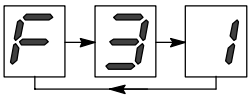
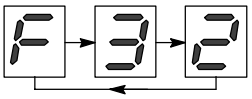
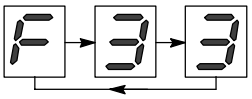
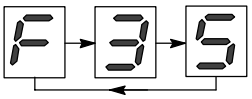
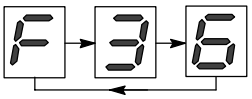
VMA..KR, VMA..B,C,D,F and DM/DS error displays

| **Displays flash alternately.** | **Error**<br>The drive has switched off. | **Action** |
|---|---|---|
|  | **Normal operation:**<br>**Encoder error**<br>Connection error, short circuit or interruption of encoder cable.<br>Encoder, encoder evaluation or electronic rating plate defective.<br>**Special mode (RSU):**<br>**Encoder slip**<br>**Noise limiter overload** (because of excessively long, shielded motor cables) | ☞**For details of the fault, refer to S-0-0095, cf. page 4–14.**<br><br>For motor encoder and/or external encoder:<br>• Check encoder connector<br>• Check encoder cable<br>• Replace motor<br>• Replace module<br>With RSU:<br>• Check if max. 8 modules per VM<br>• Noise limiter overload if P-0-0047 ≈ 20 V |
|  | **Trailing error,**<br>**Standstill monitoring**<br>Axis moves without traversing command | • Check mechanical system |
|  | **Excessive controller deviation**<br>Drive was not able to follow the setpoint inputs.<br>DS modules: Undervoltage in DC link | • Compare max. setpoint input to speed limit (S-0-0091)<br>• Check lag<br>• DS: Check power supply<br>• **SERCOS interface**:<br>Observe current limit for braking/acceleration (P-0-0061, P-0-0062);<br>Increase acceleration limit S-0-0138;<br>In mode “Special operation” adjust the setpoint input of the NC to the setup speed P-0-0012. |
|  | **Position limit exceeded**<br>The setpoint input leads to an axis position outside the traversing range. | • Check position limit parameters S-0-0049 and S-0-0050<br>• Check setting of software limit switches |
|  | **Normal operation:**<br>**Maximum speed exceeded (channel 1)**<br>• The speed limit value S-0-0091 was exceeded.<br><br>**Special operating mode (RSU):**<br>**Deviation from Safe Standstill (channel 1)**<br>• The angle of rotation limit value P-0-0022 was exceeded.<br>**Special mode with acknowledgement (RSU):**<br>**Deviation from Safe Speed (channel 1)**<br>• The speed limit value P-0-0012 was exceeded. | • Observe speed limit<br>• Observe sequence of operations<br>• Check enable signals<br>• Check control circuits<br>• Clear error by “Reset Diagnostics class 1 error”<br><br>☞**Check whether the fan on the bottom side of the module has failed.** |

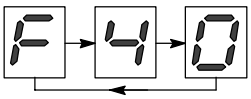
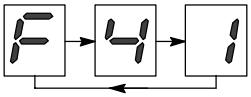
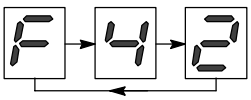
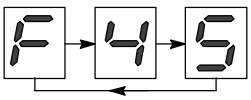
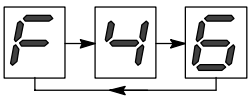
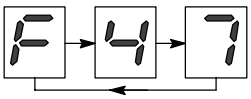
VMA..KR, VMA..B,C,D,F and DM/DS error displays

| Displays flash alternately. | Error<br>The drive has switched off. | Action |
|---|---|---|
|  | **Normal operation:**<br>**Maximum speed exceeded (channel 2)**<br>• The speed limit value S-0-0091 was exceeded.<br><br>**Special operating mode (RSU):**<br>**Deviation from Safe Standstill (channel 2)**<br>• The angle of rotation limit value P-0-0022 was exceeded.<br>**Special mode with acknowledgement (RSU):**<br>**Deviation from Safe Speed (channel 2)**<br>• The speed limit value P-0-0012 was exceeded. | • Observe speed limit<br>• Observe sequence of operations<br>• Check enable signals<br>• Check control circuits<br>• Clear error by a RESET on the DM, re-initialize SERCOS ring.<br>Activate mains contactor with “Drive On”.<br>• Replace VM if DMs and VM display the error simultaneously<br><br>☞**Check whether the fan on the bottom side of the module has failed.** |
|  | **Charging circuit overloaded**<br>Energy loss in the charging resistors too high. Short circuit in DC link. | • Check wiring with “DC link connection terminal” in place<br>• Switch back on after approx. 5 min.<br>• Replace mains connection module<br>• Replace EBX module |
|  | **Line reactor connection**<br>• The line reactor is incorrectly connected.<br>• Possible interaction with F22: Switch back on after 16 seconds | • Check line reactor connection<br>• Observe waiting time for reconnection (> 16 sec) |
|  | **Charging circuit defective**<br>Line contactor K1 in the mains connection module is not energized.<br>The display may change to F21 if switched back on within 16 sec. | • Set rotary switch S1 on VM to values > 0.<br>• Observe waiting time for reconnection (> 16 sec)<br>• Replace mains connection module |
|  | **No DC link controller**<br>DC link cannot be adjusted according to setpoint. | • Replace supply module |
|  | **Main contactor is not energized** | • Replace mains connection module |
|  | **Main contactor released**<br>The main contactor was released during operation. | • Replace mains connection module |
|  | **Main contactor is not released** | • Replace mains connection module |

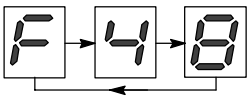
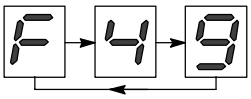
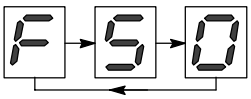
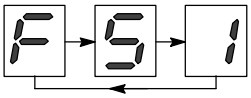
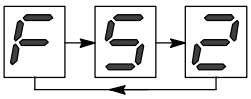
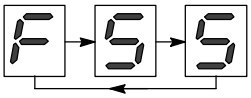
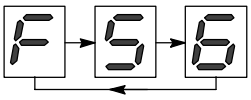
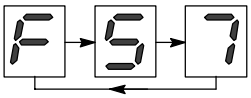
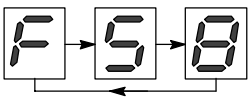
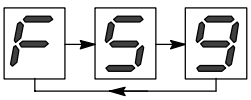
VMA..KR, VMA..B,C,D,F and DM/DS error displays

| **Displays flash alternately.** | **Error**<br>The drive has switched off. | **Action** |
|---|---|---|
|  | **Load contactor is not released** | • Replace mains connection module |
|  | **Synchronization error in VM..B,C,D** | • Check system voltage<br>• Replace supply module |
|  | **Mains frequency**<br>Mains frequency < 48 Hz or > 62 Hz | • Check mains frequency |
|  | **Overvoltage in DC link**<br>DC link voltage > 800 V<br>(before: U1 warning display)<br><br>**Has several meanings on the VMW 180:**<br>• DC link overvoltage<br>Display may also appear if another error has been cleared with “Drive On”.<br>• Overcurrent in output stage<br>• Driver switched off because of overcurrent in output stage<br>• Driver circuit of the output stage defective | • Reduce feedback power (select longer delay time, reduce braking current)<br>• Note error message on VM<br><br>• Error can be cleared with “Drive On”<br><br>• After “Drive On” error can be cleared by module RESET<br>• After “Drive On” and module RESET error can be cleared by toggling 24-V off/on<br>• Error cannot be cleared. Replace module. |
|  | **Undervoltage in DC link**<br>DC link voltage <400 V | • Reduce acceleration power of the axes (warning display U1 shown before on VM)<br>• A 2- or 3-phase mains failure may have been present (previously warning display U5 on the VM) |
|  | **Overvoltage in system**<br>System voltage is too high | • Check system voltage |
|  | **Undervoltage in system**<br>System voltage is too low | • Check system voltage |
|  | **Power supply fault**<br>Internal logic supply voltages not in admissible range | • Replace module |
|  | **Fault in external 24 V DC**<br>24 V module supply not within permitted range | • Check 24 V supply at X30 of the supply module<br>• Check F1 miniature fuse in VM |

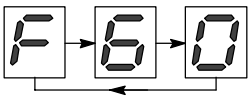
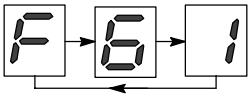
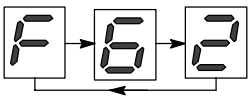
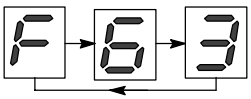
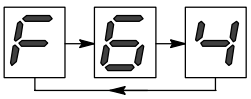
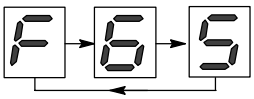
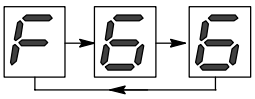
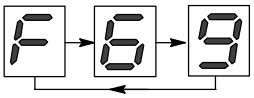
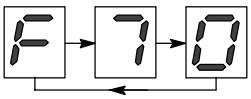
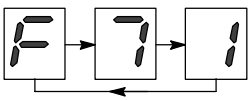
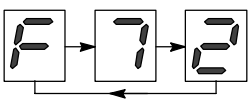
VMA..KR, VMA..B,C,D,F and DM/DS error displays

| Displays flash alternately. | Error<br>The drive has switched off. | Action |
|---|---|---|
|  | **Drives do not stand still**<br>Drives shutdown not completed when time limit has expired | • Check time limit setting in VM<br>• Check enable signals<br>• Clear error with “Drive On” |
|  | **Channel error Emergency-Stop**<br>None of the channels was not switched within 0.5 sec | • Check Emergency-Stop wiring (X312.2, X06.3/4)<br>• Clear error by activating the Emergency Stop channel again, then unlocking Emergency Stop channel, then outputting “Drive On”. |
|  | **Channel error operating mode (RSU)**<br>Operating mode switchover via channels NO and SO does not take place within 2 sec. | • Check control of the VM inputs NO and SO (X312.3/4, X06.6)<br>• Check safety door tumbler control<br>• Clear error with “Drive On” |
|  | **Channel error safety door tumbler (RSU)**<br>The check-back signal “safety door released” was not given within approx. 2 sec. in special mode | • Check safety door tumbler<br>• Check PLC check-back signal (X312.6)<br>• The VM should be replaced if there is a short-circuit in the driver of the safety door release (X312.5)<br>• Clear error with “Drive On” |
|  | **Normal operating mode:**<br>**Output stage cannot be switched off**<br><br>**Special mode (RSU):**<br>**Channel error Acknowledgement**<br>• The two acknowledgement channels have not been activated simultaneously (P-0-0024)<br>• Time limit P-0-0023 for acknowledgement exceeded<br>**Channel error “Safe signal transmission”**<br>Defective signal transmission in X810 starting with module with this error message<br>**Channel error “Safety-oriented data”**<br>The cyclic safety-oriented data on the PM module and in the EEPROM are not identical | ☞**For details of the fault, refer to S-0-0095, cf. page 4–14.**<br><br>• Clear error on the DMs by “Reset Diagnostics class 1 error”, on the VM with “RESET”<br>• Replace module<br><br>• Check wiring (X312.1, X06.5)<br>• Check key for mechanical or electrical bridge<br>• Observe sequence of operations<br><br>• Check X810 signal cross-connection<br>• Replace module<br><br>• Check safety-oriented data<br>• Clear error by “Reset Diagnostics class 1 error” |
|  | **Channel error FGZ (RSU)**<br>Defective transmission of the central enable signal from VM | • Check X810 signal cross-connection<br>• Replace module |

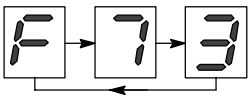
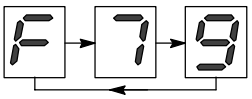
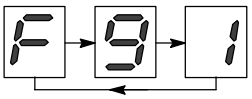
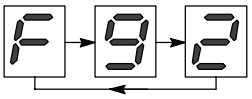
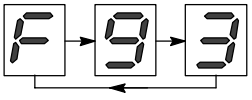
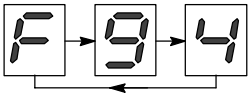
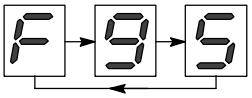
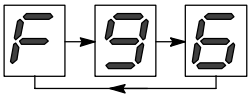
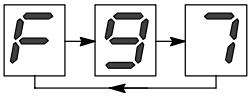
VMA..KR, VMA..B,C,D,F and DM/DS error displays

| **Displays flash alternately.** | **Error**<br>The drive has switched off. | **Action** |
|---|---|---|
|  | **Normal operating mode:**<br>ASTS signal in module cross-connection not cleared properly<br><br>**Special mode (RSU):**<br>**Channel error Drive shutdown**<br>The VM initiates “Drive shutdown”, however, it cannot transmit this status through the module cross-connection.<br>**No 24 V supply**<br>The VM has detected that the 24 V supply is missing in the axis modules. | • Check X810 signal cross-connection<br><br>• Check X810 signal cross-connection<br>• Replace module<br><br>• 24 V connection, check 24 V connection |
|  | **Time delay > (16 sec – S1)**<br>between the shutdown request for an axis and an additional Emergency Stop command of the NC/PLC (S1 = rotary switch on VM, front panel)<br><br>**Emergency Stop timer on VM defective** | • Eliminate time overlap between “Drive shutdown” and “Emergency Stop”<br>• Toggle 24 V off / on or press RESET<br><br>• Replace supply module |
|  | **CPU Test**<br>Microprocessor fault | • Replace module |
|  | **RAM Test**<br>Fault in RAM memory | • Replace module |
|  <br>**to**<br>  | **Checksum error** | • Replace personality module or memory card |
|  | **Update Memory Card**<br>Update of memory card was incorrect. | • Replace memory card |
|  | **Watchdog error** | • Replace module |
|  | **Error in security test** | • Replace module |
|  | **Memory overflow** | • Replace module |

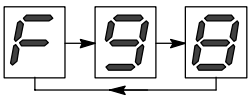
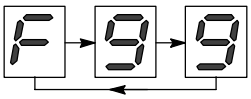
VMA..KR, VMA..B,C,D,F and DM/DS error displays

| Displays flash alternately. | Error<br>The drive has switched off. | Action |
|---|---|---|
|  | **Initialization error $I^2C$-Bus** | • Replace module |
|  | **Initialization error AD converter** | • Check motor cable<br>• Replace module |
|  | **Initialization error PWM3** | • Replace module |
|  | **Initialization error SERCOS tables** | • Replace module |
|  | **Initialization error overcurrent threshold** | • Replace module |
|  | **Initialization error Security (RSU)** | • Check signal cross-connection between modules<br>• Replace module |
|  | **Error in special mode (RSU):**<br>**Channel error "Safety-oriented data"**<br>During initialization, the safety-oriented data on the PM module and in the EE-PROM are not identical | • Check safety-oriented data<br>• Clear error by "Reset Diagnostics class 1 error" |
|  | **Temperature measurement Timeout or wrong temperature sensor fitted to motor** | • Restart module<br>• Reduce computer load by DSS-D (e.g. turn oscilloscope or ADC output channels off)<br>• Replace motor |
|  | **Encoder fault**<br>Incorrect encoder initialization | ☞**For details of the fault, refer to S-0-0095, cf. page 4–14.**<br>• Connect permitted encoder<br>• Check encoder connection<br>• Replace motor/encoder |
|  | **Invalid driver ID** | • Replace module |
|  | **Assignment between module and software**<br>The software does not match the hardware. | • Use suitable software |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

| **Displays flash alternately.** | **Error**<br>The drive has switched off. | **Action** |
|---|---|---|
|  | **Assignment mains connection module – VM**<br>Mains connection module and supply module do not have the same power output stage. | • Combine compatible modules |
|  | **CAN bus only:**<br>**Internal command active**<br>The controller must not enable the drive at this time. | |
|  | **Runtime Personality Module** | • Check stable position of personality module<br>• Replace personality module |
|  | **Runtime $I^2C$-Bus** | • Replace module |
|  | **Stacking error** | • Replace module |
|  | **Inadmissible memory access** | • Replace module |
|  | **Synchronization error I controller**<br>Internal synchronization of the VM firmware disturbed | • Replace module |
|  | **Speed controller plausibility error** | ☞**For details of the fault, refer to S-0-0095, cf. page 4–14.**<br>• Check motor cable<br>• Switch modules off because of **dangerous** electrical voltage!<br>Check DC link connection,<br>check DC link voltage<br>• Motor stalled<br>• Turn off torque reduction<br>• For more details, refer to P-0-0010 |
|  | **VM error**<br>Torque is immediately turned off because of an operating fault (e.g. under-/overvoltage) | • Check error message on VM<br>• Clear error by “Reset Diagnostics class 1 error”<br>☞**Check whether the fan on the bottom side of the module has failed.** |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

| **Displays flash alternately.** | **Error**<br>The drive has switched off. | **Action** |
|---|---|---|
|  | **VM off with active control**<br>Motors are shut down because of a shut-down command<br>**Status message** for DM with analog interface, MC, CAN bus and PROFIBUS-DP if the VM is switched off while the FG enable signal is high. | • Switch VM on<br>• Check EMERGENCY-STOP<br>• Clear error by “Reset Diagnostics class 1 error” |
|  | **Other runtime errors** | • Replace module |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

## 4.5.1 List of error number in parameter P-0-0095

Parameter P-0-0095 contains additional error numbers which provide for a more detailed analysis of various error displays of the modules. The following table is based on the F code display and lists the meaning of the error numbers:

| F code display | Error number | Meaning |
|---|---|---|
| F03 | 0 | Faulty option module in drive slot |
| F04 | 0 | Overcurrent; Permitted peak current exceeded |
| F06 | 0 | Realtime error; Excessive computer load; Defective module (watchdog) |
| | 1 | Realtime error; Watchdog I-controller has responded |
| | 2 | Realtime error; Watchdog N-controller has responded |
| | 4 | Realtime error; Watchdog X-controller has responded |
| F07 | 0 | Heat sink overtemperature; Heat sink temperature > 80°C |
| F08 | 0 | Motor overtemperature; Motor winding > 145°C; Defective temperature probe |
| F10 | 0 | SERCOS interface communication error; Detailed diagnostics at S-0-0014 |
| F11 | 0 | Encoder fault; Detailed fault documentation unavailable at this time |
| | 1 | Motor encoder: Encoder signal voltage amplitude too low |
| | 2 | Motor encoder: Error in captured analog value |
| | 4 | Motor encoder: Two active counting slopes |
| | 8 | Motor encoder: Excessive RPM upon absolute-value capture |
| | 16 | Motor encoder: Short-circuit between encoder signals and GND, or power supply |
| | 96 | Motor encoder: Loose encoder (only in conjunction with RSU software) |
| | 160 | Motor encoder: Loose encoder (only in conjunction with RSU software) |
| | 289 | Motor encoder: Broken encoder coupling; Wrong encoder connected |
| | 16384 | Motor encoder: Wrong marker distance |
| | 32768 | Processing error in RSU software; Function: Redundant encoder monitoring |
| | 50001 | OM3 encoder: Encoder signal voltage amplitude too low |
| | 50004 | OM3 encoder: Two active counting slopes |
| | 50016 | OM3 encoder: Short-circuit between encoder signals and GND, or power supply |
| | 50256 | OM1/2 encoder: Two active counting slopes |
| | 50512 | OM1/2 encoder: Too many pulses per RPM |
| | 51024 | OM1/2 encoder: Too few pulses per RPM |
| | 52048 | OM1/2 encoder: Encoder signals A and AN not inverted |
| | 54096 | OM1/2 encoder: Encoder signals B and BN not inverted |
| | 58192 | OM1/2 encoder: Encoder signals R and RN not inverted |
| | 66384 | External encoder: Wrong marker distance |
| F12 | 0 | Tracking error (zero-speed monitoring); Axis moves without traversing command |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

| F code display | Error number | Meaning |
|---|---|---|
| F13 | 0 | Excessive system deviation; Drive is unable to follow defined nominal value |
| | 1 | Monitoring error dual encoder |
| | 2 | Excessive system deviation spindle |
| F14 | 0 | Positioning threshold exceeded; |
| F15 | 0 | Software speed monitoring: Overspeed in Standard mode |
| | 3 | Software speed monitoring: Overspeed in Setup mode |
| | 5 | Software speed monitoring: Overspeed in zero-speed monitoring |
| F16 | 0 | Hardware speed monitoring: Overspeed in Standard mode |
| | 3 | Hardware speed monitoring: Overspeed in Setup mode |
| | 5 | Hardware speed monitoring: Overspeed in zero-speed monitoring |
| F30 | 0 | Overvoltage in DC link; DC link voltage > 670 V |
| F35 | 0 | Power supply fault |
| F36 | 0 | Faulty external 24 VDC power; 24 V module power outside of permissible range |
| F46 | 0 | RSU channel error – detailed fault documentation unavailable at this time |
| | 16 | RSU: Hardware speed monitoring in Standard mode |
| | 17 | RSU: Hardware speed monitoring in non-standard operation |
| | 32 | RSU: Software speed monitoring in Standard mode |
| | 33 | RSU: Software speed monitoring in non-standard operation |
| | 64 | RSU: Channel error timeout expired in Standard mode |
| | 65 | RSU: Channel error timeout expired in non-standard mode |
| | 128 | RSU: Maximum dead-man interval expired in Standard mode |
| | 129 | RSU: Maximum dead-man interval expired in non-standard mode |
| | 2048 | RSU: Data comparison error in Standard mode |
| | 2049 | RSU: Data comparison error in non-standard mode |
| | 4096 | RSU: Data error, sensor calibration in Standard mode |
| | 4097 | RSU: Error: Data & sensor calibration in non-standard mode |
| | 6144 | RSU: Error: Data & sensor calibration in Standard mode |
| | 6145 | RSU: Data error, sensor calibration in non-standard mode |
| | 8192 | RSU: Error, high-level lockout in Standard mode |
| | 8193 | RSU: Error, high-level lockout in non-standard mode |
| | 8432 | RSU: Error, Program process monitoring in Standard mode |
| | 8433 | RSU: Error, high-level lockout in non-standard mode |
| F60 | 0 | I2C-Initialization error – Detailed fault documentation unavailable at this time |
| F61 | 0 | ADC-Initialization error – Detailed fault documentation unavailable at this time |
| F62 | 0 | PWM – Initialization error; Defective module |
| F63 | 0 | Initialization error – SERCOS tables |
| F64 | 0 | Overcurrent – Initialization error; Defective module |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

| F code display | Error number | Meaning |
|---|---|---|
| F65 | 0 | RSU: Security, Initialization error – Without detailed documentation |
| | 6 | RSU: Security counter CNT0 does not count up |
| | 7 | RSU: Security counter CNT0 does not count down |
| | 8 | RSU: One security bit set prematurely |
| | 9 | RSU: Clockwise max. monitoring does not respond |
| | 10 | RSU: Clockwise setup monitoring does not respond |
| | 11 | RSU: Clockwise zero-speed monitoring does not respond |
| | 12 | RSU: Clockwise setup monitoring does not respond |
| | 13 | RSU: Clockwise zero-speed monitoring does not respond |
| | 14 | RSU: A security bit has responded upon counterclockwise rotation |
| | 15 | RSU: Clockwise max. monitoring does not respond |
| | 16 | RSU: Clockwise setup monitoring does not respond |
| | 17 | RSU: Clockwise zero-speed monitoring does not respond |
| | 18 | RSU: Clockwise setup monitoring does not respond |
| | 19 | RSU: Clockwise zero-speed monitoring does not respond |
| | 20 | RSU: Wrong SECSR error bits and/or info bits |
| | 21 | RSU: CNT1 SECURITY counter not zero |
| | 22 | RSU: Wrong SECSR error bits and/or info bits |
| | 23 | RSU: CNT1 SECURITY counter not zero |
| | 24 | RSU: Wrong SECSR error bits and/or info bits |
| | 25 | RSU: CNT0 SECURITY counter not zero |
| | 26 | RSU: CNT1 SECURITY counter not zero |
| | 27 | RSU: Wrong SECSR error bits and/or info bits |
| | 28 | RSU: Wrong SECSR error bits and/or info bits |
| | 38 | RSU: Incorrect decoding of PSVM non-standard status |
| | 39 | RSU: Error in LSR bits 11–15 (PSVM decoding) |
| | 40 | RSU: PSVM error bit in LSR register not HIGH |
| | 47 | RSU: PSVM test error: Faulty LPMR CTR count |
| F66 | 0 | RSU-Initialization error – detailed fault documentation unavailable at this time |
| | 1 | RSU – Memory read error |
| | 2 | RSU – Memory write error |
| | 4 | RSU – Memory, Error in data record |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

| F code display | Error number | Meaning |
|---|---|---|
| F70 | 0 | Measuring system initialization error – Without detailed fault documentation |
| | 1 | Defective motor rating plate; faulty data transfer |
| | 2 | Missing interface –> Defective cable, loose connection, defective rating plate |
| | 3 | Defective motor rating plate |
| | 4 | Motor rating plate without parameters |
| | 5 | Faulty data transfer; Defective memory location in motor rating plate |
| | 6 | Defective encoder; Faults upon absolute-value data transfer |
| | 7 | Defective encoder; Faulty data transfer (absolute-value parity check) |
| | 8 | Missing hardware trigger on pin NP_2 (zero-marker-storage-error) |
| | 9 | Missing interface; Defective cable; Loose connection; Defective rating plate |
| | 11 | Missing interface; Defective cable; Loose connection; Defective rating plate |
| | 12 | Missing interface; Defective cable; Loose connection; Defective rating plate |
| | 13 | Missing interface; Defective cable; Loose connection; Defective rating plate |
| | 14 | Missing interface; Defective cable; Loose connection; Defective rating plate |
| | 15 | Missing interface; Defective cable; Loose connection; Defective rating plate |
| | 16 | Missing interface –> Software error |
| | 84 | Defective motor rating plate |
| | 85 | Defective motor rating plate |
| | 86 | Faulty data transfer; Defective motor rating plate |
| | 87 | Faulty data transfer; Defective motor rating plate |
| | 88 | Faulty data transfer; Defective motor rating plate |
| | 89 | Faulty data transfer; Defective motor rating plate |
| | 90 | Faulty data transfer; Defective motor rating plate |
| | 91 | Faulty data transfer; Defective motor rating plate |
| | 92 | Faulty data transfer; Defective motor rating plate |
| | 93 | Faulty data transfer; Defective motor rating plate |
| | 94 | Faulty data transfer; Defective memory location in motor rating plate |
| | 95 | Motor rating plate without parameters |
| | 96 | Missing interface; Defective cable;Loose connection;Defective motor rating plate |
| | 97 | Missing interface; Defective cable;Loose connection;Defective motor rating plate |
| | 98 | Faulty data transfer; Defective motor rating plate |
| | 99 | Faulty data transfer (CRC check, motor rating plate) |
| | 100 | Faulty data transfer; Defective motor rating plate |
| | 101 | Faulty data transfer (CRC check, motor rating plate) |
| | 102 | Motor rating plate without parameters |
| | 103 | Faulty data transfer; Defective memory location in motor rating plate |
| | 104 | Faulty data transfer; Defective memory location in motor rating plate |
| | 105 | Faulty data transfer (CRC check, motor rating plate) |
| | 106 | Defective encoder –> Signal amplitude too low; Missing illumination .... |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

| F code display | Error number | Meaning |
|---|---|---|
| F70 | 107 | Defective encoder; Faults upon absolute-value data transfer |
| | 108 | Missing hardware trigger on pin NP_2 (zero-marker-storage-error) |
| | 109 | Internal rating plate without parameters |
| | 110 | Defective memory location in internal rating plate |
| | 111 | Defective memory location in internal rating plate |
| | 113 | Software error (flash memory not addressable/responding) |
| | 114 | Software error (flash memory not addressable/responding) |
| | 115 | Defective SDCL-ASIC on option module 3 |
| | 117 | Error incremental-encoder –>Two active counting slopes;Amplitude too low |
| | 118 | Module with resolver interface <–> Motor without resolver |
| | 119 | Motor with resolver <–> Module without resolver interface |
| | 120 | Reading absolute value not possible with internal rating plate |
| | 121 | Software error –> Reading absolute value without valid interface |
| | 122 | Encoder cable break at EnDat or SSI interface |
| | 123 | Defective encoder;Excessive speed upon initialization (error quadra. correction) |
| | 124 | Defective encoder; Excessive RPM upon initialization (error quadran. correction) |
| | 125 | Defective ext. encoder; Excessive speed upon initializ. (err quadr. correction) |
| | 126 | Defective ext. encoder; Excessive RPM upon initializ. (error quadra. correction) |
| | 127 | Missing interface; Defective cable; Loose fasteners; Defective rating plate |
| | 128 | No binary interrelation between encoder pulses and absolute singleturn value |
| | 129 | Motor rating plate: Parameter set 1 without parameters |
| | 130 | Motor rating plate: Parameter set 1 without parameters |
| | 131 | Flash rating plate: Parameter set 1 without parameters |
| | 132 | Motor rating plate: Parameter set 1 without parameters |
| | 133 | Motor rating plate: Defective memory location, parameter set 1 (checksum error) |
| | 134 | Motor rating plate: Defective memory location, parameter set 1 (checksum error) |
| | 135 | Flash rating plate: Defective memory location, parameter set 1 (checksum error) |
| | 136 | Motor rating plate: Defective memory location, parameter set 1 (checksum error) |
| | 137 | Motor rating plate: Parameter set 2 without parameters |
| | 138 | Motor rating plate: Parameter set 2 without parameters |
| | 139 | Flash rating plate: Parameter set 2 without parameters |
| | 140 | There is no 2nd parameter set for SSI interface |
| | 141 | Motor rating plate: Defective memory location, parameter set 2 (checksum error) |
| | 142 | Motor rating plate: Defective memory location, parameter set 2 (checksum error) |
| | 143 | Flash rating plate: Defective memory location, parameter set 2 (checksum error) |
| | 144 | There is no 2nd parameter set for SSI interface |
| | 300 | Faulty parameter transfer from DSS to drive (checksum error) |
| | 301 | Faulty parameter transfer from DSS to drive (checksum error) |
| | 302 | SSI interface not addressable (defective cable; loose connection ...) |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

| F code display | Error number | Meaning |
|---|---|---|
| F70 | 303 | Faulty data transfer; Defective motor rating plate |
| | 304 | Faulty data transfer; Defective motor rating plate |
| | 305 | I2C bus not addressable (defective cable; loose connection, misc. faults ...) |
| | 306 | Faulty data transfer; Defective motor rating plate |
| | 307 | Faulty data transfer; Defective motor rating plate |
| | 308 | Faulty data transfer; Defective motor rating plate |
| | 309 | Faulty data transfer; Defective motor rating plate |
| | 310 | Faulty data transfer; Defective motor rating plate |
| | 311 | Faulty data transfer; Defective motor rating plate |
| | 312 | Faulty data transfer; Defective motor rating plate |
| | 313 | Faulty data transfer (CRC check, motor rating plate) |
| | 314 | Faulty data transfer; Defective motor rating plate (checksum test) |
| | 315 | Faulty data transfer; Defective motor rating plate (checksum test) |
| | 316 | Faulty data transfer; Defective motor rating plate (checksum test) |
| | 317 | Faulty data transfer; Defective motor rating plate (checksum test) |
| | 318 | Missing motor interface; Defective cable;Loose connection;Defective rating plate |
| | 319 | There is no 2nd parameter set for SSI interface |
| | 320 | Faulty data transfer; Defective motor rating plate |
| | 321 | Faulty data transfer (CRC check, motor rating plate) |
| | 322 | Unable to clear internal flash memory –> Defective memory location |
| | 323 | Unable to write to internal flash memory –> Defective memory location |
| | 324 | Unable to write to internal flash memory –> Defective memory location |
| | 325 | Defective memory location in internal flash module (checksum test) |
| | 326 | Defective memory location in internal flash module (checksum test) |
| | 329 | I2C bus not addressable (defective cable; loose connection, misc. faults ...) |
| | 331 | I2C bus not addressable (defective cable; loose connection, misc. faults ...) |
| | 332 | I2C bus not addressable (defective cable; loose connection, misc. faults ...) |
| | 333 | I2C bus not addressable (defective cable; loose connection, misc. faults ...) |
| | 334 | I2C bus not addressable (defective cable; loose connection, misc. faults ...) |
| | 335 | I2C bus not addressable (defective cable; loose connection, misc. faults ...) |
| | 1201 | Motor rating plate: Parameter set 1: Motor type = 0 |
| | 1202 | Motor rating plate: Parameter set 1: Version number = 0 |
| | 1203 | Motor rating plate: Parameter set 1: Encoder pulses = 0 |
| | 1204 | Motor rating plate: Parameter set 1: Nominal velocity = 0 |
| | 1205 | Motor rating plate: Parameter set 1: Max. velocity = 0 |
| | 1206 | Motor rating plate: Parameter set 1: Nominal current = 0 |
| | 1207 | Motor rating plate: Parameter set 1: Standstill current = 0 |
| | 1208 | Motor rating plate: Parameter set 1: Maximum current = 0 |
| | 1209 | Motor rating plate: Parameter set 1: Rated torque = 0 |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

| F code display | Error number | Meaning |
|---|---|---|
| F70 | 1210 | Motor rating plate: Parameter set 1: Standstill torque = 0 |
| | 1211 | Motor rating plate: Parameter set 1: Max. torque = 0 |
| | 1212 | Motor rating plate: Parameter set 1: Stator resistance = 0 |
| | 1213 | Motor rating plate: Parameter set 1: Rotor inertia = 0 |
| | 1214 | Motor rating plate: Parameter set 1: Pair of poles = 0 |
| | 1215 | Motor rating plate: Parameter set 1: Temp. characteristic, R-reference = 0 |
| | 1216 | Motor rating plate: Parameter set 1: Temp. characteristic, B-value = 0 |
| | 1217 | Motor rating plate: Parameter set 1: Temp. characteristic, T-reference = 0 |
| | 1218 | Motor rating plate: Parameter set 1: Proportional gain 2 = 0 |
| | 1219 | Motor rating plate: Parameter set 1: Proportional gain 1 = 0 |
| | 1220 | Motor rating plate: Parameter set 1: Integral action time 2 = 0 |
| | 1221 | Motor rating plate: Parameter set 1: Integral action time 1 = 0 |
| | 1222 | Motor rating plate: Parameter set 1: Torque constant value 1 = 0 |
| | 1223 | Motor rating plate: Parameter set 1: EMF constant = 0 |
| | 1224 | Motor rating plate: Parameter set 1: Series inductance = 0 |
| | 1225 | Motor rating plate: Parameter set 1: Shunt inductance = 0 |
| | 1226 | Motor rating plate: Parameter set 1: Rated voltage = 0 |
| | 1227 | Motor rating plate: Parameter set 1: Noload current = 0 |
| | 1228 | Motor rating plate: Parameter set 1: Rotor time constant = 0 |
| | 1229 | Motor rating plate: Parameter set 1: LH char. curve: Lh-0 = 0 |
| | 1230 | Motor rating plate: Parameter set 1: LH char. curve: Break point current = 0 |
| | 1231 | Motor rating plate: Parameter set 1: LH char. curve: Lh saturation = 0 |
| | 1232 | Motor rating plate: Parameter set 1: LH char. curve: Saturation current = 0 |
| | 1233 | Motor rating plate: Parameter set 1: Leakage inductance stator = 0 |
| | 1234 | Motor rating plate: Parameter set 1: Leakage inductance rotor = 0 |
| | 1235 | Motor rating plate: Parameter set 1: Rotor resistance = 0 |
| | 1236 | Motor rating plate: Parameter set 1: Temp. coefficient = 0 |
| | 1237 | Motor rating plate: Parameter set 1: Version number < 3 |
| | 1238 | Motor rating plate: Parameter set 1: 2nd winding not possible with Vecon |
| | 1239 | Motor rating plate: Parameter set 1: Encoder line count > 4096 |
| | 1240 | Motor rating plate: Parameter set 1: Encoder line count > 4096 |
| | 1241 | Motor rating plate: Parameter set 1:Software does not support motor/encoder type |
| | 1242 | Motor rating plate: Parameter set 1: Single-turn value = 0 |
| | 1243 | Motor rating plate: Parameter set 1: Single-turn or multi-turn value = 0 |
| | 1244 | Motor rating plate: Parameter set 1: Signal periods between ref. marks = 0 |
| | 1246 | Motor rating plate: Parameter set 1: Invalid motor type |
| | 1250 | Motor rating plate: Parameter set 1: Encoder type = 0 |
| | 1251 | Motor rating plate: Parameter set 1: Pole pitch = 0 |
| | 1252 | Motor rating plate: Parameter set 1: Speed: Nominal = 0 |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

| F code display | Error number | Meaning |
|---|---|---|
| F70 | 1253 | Motor rating plate: Parameter set 1: Speed: Maximum = 0 |
| | 1254 | Motor rating plate: Parameter set 1: Force: Nominal thrust = 0 |
| | 1255 | Motor rating plate: Parameter set 1: Force: Standstill thrust = 0 |
| | 1256 | Motor rating plate: Parameter set 1: Force: Max. thrust = 0 |
| | 1257 | Motor rating plate: Parameter set 1: Primary Resistance = 0 |
| | 1258 | Motor rating plate: Parameter set 1: Transportable load = 0 |
| | 1259 | Motor rating plate: Parameter set 1: Signal periods length = 0 |
| | 1260 | Motor rating plate: Parameter set 1: Distance between reference marks = 0 |
| | 1261 | Motor rating plate: Parameter set 1: Step distance = 0 |
| | 1262 | Motor rating plate: Parameter set 1: Distance between reference marks = 0 |
| | 1263 | Motor rating plate: Parameter set 1: Thrust constant value 1 = 0 |
| | 1264 | Motor rating plate: Parameter set 1: EMF constant = 0 |
| | 1265 | Motor rating plate: Parameter set 1: Series inductance = 0 |
| | 1266 | Motor rating plate: Parameter set 1: Shunt inductance = 0 |
| | 1267 | Motor rating plate: Parameter set 1: Leak inductance primary winding = 0 |
| | 1268 | Motor rating plate: Parameter set 1: Leak inductance secondary winding=0 |
| | 1269 | Motor rating plate: Parameter set 1: Second. resistance = 0 |
| | 1270 | Multiturn value: Different rating plate info & Mfg. specifications; Motor set 1 |
| | 1271 | Singleturn value: Different rating plate info & Mfg. specifications; Motor set 1 |
| | 1272 | Encoder pulses: Different rating plate info & Mfg. specifications; Motor set 1 |
| | 1273 | Singleturn value: Different rating plate info & Mfg. specifications; Motor set 1 |
| | 1274 | Encoder pulses: Different rating plate info & Mfg. specifications; Motor set 1 |
| | 1275 | No. of ref. marker periods:Different rating plate info & Mfg. specif.;Motor set1 |
| | 1276 | Encoder pulses: Different rating plate info & Mfg. specifications; Motor set 1 |
| | 1277 | Encoder pulses: Different rating plate info & Mfg. specifications; Motor set 1 |
| | 1278 | Signal period length:Different rating plate info &Mfg. specifications;Motor set1 |
| | 1279 | Steps distance : Different rating plate info & Mfg. specifications; Motor set 1 |
| | 1280 | Signal period length:Different rating plate info& Mfg. specifications;Motor set1 |
| | 1281 | Signal period length:Different rating plate info&Mfg. specifications;Motor set 1 |
| | 1282 | Ref. marker spacing:Different rating plate info & Mfg. specifications;Motor set1 |
| | 1283 | Signal period length:Different rating plate info &Mfg. specifications;Motor set1 |
| | 1284 | Ref. marker spacing:Different rating plate info & Mfg. specifications;Motor set1 |
| | 1285 | 1st Ref. marker position:Different rating plate info & Mfg. specific.;Motor set1 |
| | 1286 | Encoder pulses: Different rating plate info & Mfg. specifications; Motor set 1 |
| | 1287 | Encoder pulses: Different rating plate info & Mfg. specifications; Motor set 1 |
| | 1301 | Motor rating plate: Parameter set 2: Motor type = 0 |
| | 1302 | Motor rating plate: Parameter set 2: Version number = 0 |
| | 1303 | Motor rating plate: Parameter set 2: Encoder pulses = 0 |
| | 1304 | Motor rating plate: Parameter set 2: Nominal velocity = 0 |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

| F code display | Error number | Meaning |
|---|---|---|
| F70 | 1305 | Motor rating plate: Parameter set 2: Max. velocity = 0 |
| | 1306 | Motor rating plate: Parameter set 2: Nominal current = 0 |
| | 1307 | Motor rating plate: Parameter set 2: Standstill current = 0 |
| | 1308 | Motor rating plate: Parameter set 2: Maximum current = 0 |
| | 1309 | Motor rating plate: Parameter set 2: Rated torque = 0 |
| | 1310 | Motor rating plate: Parameter set 2: Standstill torque = 0 |
| | 1311 | Motor rating plate: Parameter set 2: Max. torque = 0 |
| | 1312 | Motor rating plate: Parameter set 2: Stator resistance = 0 |
| | 1313 | Motor rating plate: Parameter set 2: Rotor inertia = 0 |
| | 1314 | Motor rating plate: Parameter set 2: Pair of poles = 0 |
| | 1315 | Motor rating plate: Parameter set 2: Temp. characteristic, R-reference = 0 |
| | 1316 | Motor rating plate: Parameter set 2: Temp. characteristic, B-value = 0 |
| | 1317 | Motor rating plate: Parameter set 2: Temp. characteristic, T-reference = 0 |
| | 1318 | Motor rating plate: Parameter set 2: Proportional gain 2 = 0 |
| | 1319 | Motor rating plate: Parameter set 2: Proportional gain 1 = 0 |
| | 1320 | Motor rating plate: Parameter set 2: Integral action time 2 = 0 |
| | 1321 | Motor rating plate: Parameter set 2: Integral action time 1 = 0 |
| | 1322 | Motor rating plate: Parameter set 2: Torque constant value 1 = 0 |
| | 1323 | Motor rating plate: Parameter set 2: EMF constant = 0 |
| | 1324 | Motor rating plate: Parameter set 2: Series inductance = 0 |
| | 1325 | Motor rating plate: Parameter set 2: Shunt inductance = 0 |
| | 1326 | Motor rating plate: Parameter set 2: Rated voltage = 0 |
| | 1327 | Motor rating plate: Parameter set 2: Noload current = 0 |
| | 1328 | Motor rating plate: Parameter set 2: Rotor time constant = 0 |
| | 1329 | Motor rating plate: Parameter set 2: LH char. curve: Lh–0 = 0 |
| | 1330 | Motor rating plate: Parameter set 2: LH char. curve: Break point current = 0 |
| | 1331 | Motor rating plate: Parameter set 2: LH char. curve: Lh saturation = 0 |
| | 1332 | Motor rating plate: Parameter set 2: LH char. curve: Saturation current = 0 |
| | 1333 | Motor rating plate: Parameter set 2: Leakage inductance stator = 0 |
| | 1334 | Motor rating plate: Parameter set 2: Leakage inductance rotor = 0 |
| | 1335 | Motor rating plate: Parameter set 2: Rotor resistance = 0 |
| | 1336 | Motor rating plate: Parameter set 2: Temp. coefficient = 0 |
| | 1337 | Motor rating plate: Parameter set 2: Version number < 3 |
| | 1342 | Motor rating plate: Parameter set 2: Single-turn value = 0 |
| | 1343 | Motor rating plate: Parameter set 2: Single-turn or multi-turn value = 0 |
| | 1344 | Motor rating plate: Parameter set 2: Signal periods between ref. Marks = 0 |
| | 1345 | Motor rating plate: Encoder type not the same for parameter set 1 and 2 |
| | 1346 | Motor rating plate: Parameter set 2: Invalid motor type |
| | 1350 | Motor rating plate: Parameter set 2: Encoder type = 0 |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

| F code display | Error number | Meaning |
|---|---|---|
| F70 | 1351 | Motor rating plate: Parameter set 2: Pole pitch = 0 |
| | 1352 | Motor rating plate: Parameter set 2: Speed: Nominal value = 0 |
| | 1353 | Motor rating plate: Parameter set 2: Speed: Maximum = 0 |
| | 1354 | Motor rating plate: Parameter set 2: Force: Nominal thrust = 0 |
| | 1355 | Motor rating plate: Parameter set 2: Force: Standstill thrust = 0 |
| | 1356 | Motor rating plate: Parameter set 2: Force: Max. thrust = 0 |
| | 1357 | Motor rating plate: Parameter set 2: Primary Resistance = 0 |
| | 1358 | Motor rating plate: Parameter set 2: Transportable load = 0 |
| | 1359 | Motor rating plate: Parameter set 2: Signal periods length = 0 |
| | 1360 | Motor rating plate: Parameter set 2: Distance between reference marks = 0 |
| | 1361 | Motor rating plate: Parameter set 2: Step distance = 0 |
| | 1362 | Motor rating plate: Parameter set 2: Distance between reference marks = 0 |
| | 1363 | Motor rating plate: Parameter set 2: Thrust constant value 1 = 0 |
| | 1364 | Motor rating plate: Parameter set 2: EMF constant = 0 |
| | 1365 | Motor rating plate: Parameter set 2: Series inductance = 0 |
| | 1366 | Motor rating plate: Parameter set 2: Shunt inductance = 0 |
| | 1367 | Motor rating plate: Parameter set 2: Leakage inductance primary winding = 0 |
| | 1368 | Motor rating plate: Parameter set 2: Leakage inductance secondary winding = 0 |
| | 1369 | Motor rating plate: Parameter set 2: Second. resistance = 0 |
| | 1370 | Multiturn value: Different rating plate info & Mfg. specifications; Motor set 2 |
| | 1371 | Singleturn value: Different rating plate info & Mfg. specifications; Motor set 2 |
| | 1372 | Encoder pulses: Different rating plate info & Mfg. specifications; Motor set 2 |
| | 1373 | Singleturn value: Different rating plate info & Mfg. specifications; Motor set 2 |
| | 1374 | Encoder pulses: Different rating plate info & Mfg. specifications; Motor set 2 |
| | 1375 | No. of ref. marker periods:Different rating plate info <–> Mfg. specs;Motor set2 |
| | 1376 | Encoder pulses: Different rating plate info & Mfg. specifications; Motor set 2 |
| | 1377 | Encoder pulses: Different rating plate info & Mfg. specifications; Motor set 2 |
| | 1378 | Signal period length:Different rating plate info &Mfg. specifications;Motor set2 |
| | 1379 | Steps distance : Different rating plate info & Mfg. specifications; Motor set 2 |
| | 1380 | Signal period length:Different rating plate info&Mfg. specifications; Motor set2 |
| | 1381 | Signal period length:Different rating plate info&Mfg. specifications;Motor set2 |
| | 1382 | Ref. marker spacing:Different rating plate info & Mfg. specifications;Motor set2 |
| | 1383 | Signal period length:Different rating plate info &Mfg. specifications;Motor set2 |
| | 1384 | Ref. marker spacing:Different rating plate info & Mfg. specifications;Motor set2 |
| | 1385 | 1st Ref. marker position: Different rating plate info & Mfg. specs;Motor set 2 |
| | 1386 | Encoder pulses: Different rating plate info & Mfg. specifications; Motor set 2 |
| | 1387 | Encoder pulses: Different rating plate info & Mfg. specifications; Motor set 2 |
| | 2201 | Flash rating plate: Parameter set 1: Motor type = 0 |
| | 2202 | Flash rating plate: Parameter set 1: Version number = 0 |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

| F code display | Error number | Meaning |
|---|---|---|
| F70 | 2203 | Flash rating plate: Parameter set 1: Encoder pulses = 0 |
| | 2204 | Flash rating plate: Parameter set 1: Nominal velocity = 0 |
| | 2205 | Flash rating plate: Parameter set 1: Max. velocity = 0 |
| | 2206 | Flash rating plate: Parameter set 1: Nominal current = 0 |
| | 2207 | Flash rating plate: Parameter set 1: Standstill current = 0 |
| | 2208 | Flash rating plate: Parameter set 1: Maximum current = 0 |
| | 2209 | Flash rating plate: Parameter set 1: Rated torque = 0 |
| | 2210 | Flash rating plate: Parameter set 1: Standstill torque = 0 |
| | 2211 | Flash rating plate: Parameter set 1: Max. torque = 0 |
| | 2212 | Flash rating plate: Parameter set 1: Stator resistance = 0 |
| | 2213 | Flash rating plate: Parameter set 1: Rotor inertia = 0 |
| | 2214 | Flash rating plate: Parameter set 1: Pair of poles = 0 |
| | 2215 | Flash rating plate: Parameter set 1: Temp. characteristic, R-reference = 0 |
| | 2216 | Flash rating plate: Parameter set 1: Temp. characteristic, B-value = 0 |
| | 2217 | Flash rating plate: Parameter set 1: Temp. characteristic, T-reference = 0 |
| | 2218 | Flash rating plate: Parameter set 1: Proportional gain 2 = 0 |
| | 2219 | Flash rating plate: Parameter set 1: Proportional gain 1 = 0 |
| | 2220 | Flash rating plate: Parameter set 1: Integral action time 2 = 0 |
| | 2221 | Flash rating plate: Parameter set 1: Integral action time 1 = 0 |
| | 2222 | Flash rating plate: Parameter set 1: Torque constant value 1 = 0 |
| | 2223 | Flash rating plate: Parameter set 1: EMF constant = 0 |
| | 2224 | Flash rating plate: Parameter set 1: Series inductance = 0 |
| | 2225 | Flash rating plate: Parameter set 1: Shunt inductance = 0 |
| | 2226 | Flash rating plate: Parameter set 1: Rated voltage = 0 |
| | 2227 | Flash rating plate: Parameter set 1: Noload current = 0 |
| | 2228 | Flash rating plate: Parameter set 1: Rotor time constant = 0 |
| | 2229 | Flash rating plate: Parameter set 1: LH char. curve: Lh–0 = 0 |
| | 2230 | Flash rating plate: Parameter set 1: LH char. curve: Break point current = 0 |
| | 2231 | Flash rating plate: Parameter set 1: LH char. curve: Lh saturation = 0 |
| | 2232 | Flash rating plate: Parameter set 1: LH char. curve: Saturation current = 0 |
| | 2233 | Flash rating plate: Parameter set 1: Leakage inductance stator = 0 |
| | 2234 | Flash rating plate: Parameter set 1: Leakage inductance rotor = 0 |
| | 2235 | Flash rating plate: Parameter set 1: Rotor resistance = 0 |
| | 2236 | Flash rating plate: Parameter set 1: Temp. coefficient = 0 |
| | 2237 | Flash rating plate: Parameter set 1: Version number < 3 |
| | 2238 | Flash rating plate: Parameter set 1: 2nd winding not possible with Vecon |
| | 2239 | Flash rating plate: Parameter set 1: Encoder line count > 4096 |
| | 2240 | Flash rating plate: Parameter set 1: Encoder line count > 4096 |
| | 2241 | Flash rating plate: Parameter set 1:Software does not support motor/encoder type |

VMA..KR, VMA..B,C,D,F and DM/DS error displays

| F code display | Error number | Meaning |
|---|---|---|
| F70 | 2242 | Flash rating plate: Parameter set 1: Single-turn value = 0 |
| | 2243 | Flash rating plate: Parameter set 1: Single-turn or multi-turn value = 0 |
| | 2244 | Flash rating plate: Parameter set 1: Signal periods between ref. marks = 0 |
| | 2246 | Flash rating plate: Parameter set 1: Invalid motor type |
| | 2250 | Flash rating plate: Parameter set 1: Encoder type = 0 |
| | 2251 | Flash rating plate: Parameter set 1: Pole pitch = 0 |
| | 2252 | Flash rating plate: Parameter set 1: Speed: Nominal value = 0 |
| | 2253 | Flash rating plate: Parameter set 1: Speed: Maximum = 0 |
| | 2254 | Flash rating plate: Parameter set 1: Force: Nominal thrust = 0 |
| | 2255 | Flash rating plate: Parameter set 1: Force: Standstill thrust = 0 |
| | 2256 | Flash rating plate: Parameter set 1: Force: Max. thrust = 0 |
| | 2257 | Flash rating plate: Parameter set 1: Primary Resistance = 0 |
| | 2258 | Flash rating plate: Parameter set 1: Transportable load = 0 |
| | 2259 | Flash rating plate: Parameter set 1: Signal periods length = 0 |
| | 2260 | Flash rating plate: Parameter set 1: Distance between reference marks = 0 |
| | 2261 | Flash rating plate: Parameter set 1: Step distance = 0 |
| | 2262 | Flash rating plate: Parameter set 1: Distance between reference marks = 0 |
| | 2263 | Flash rating plate: Parameter set 1: Thrust constant value 1 = 0 |
| | 2264 | Flash rating plate: Parameter set 1: EMK constant = 0 |
| | 2265 | Flash rating plate: Parameter set 1: Series inductance = 0 |
| | 2266 | Flash rating plate: Parameter set 1: Shunt inductance = 0 |
| | 2267 | Flash rating plate: Parameter set 1: Leakage inductance, primary winding=0 |
| | 2268 | Flash rating plate: Parameter set 1: Leakage inductance, secondary winding=0 |
| | 2269 | Flash rating plate: Parameter set 1: Second. resistance = 0 |
| | 2301 | Flash rating plate: Parameter set 2: Motor type = 0 |
| | 2302 | Flash rating plate: Parameter set 2: Version number = 0 |
| | 2303 | Flash rating plate: Parameter set 2: Encoder pulses = 0 |
| | 2304 | Flash rating plate: Parameter set 2: Nominal velocity = 0 |
| | 2305 | Flash rating plate: Parameter set 2: Max. velocity = 0 |
| | 2306 | Flash rating plate: Parameter set 2: Nominal current = 0 |
| | 2307 | Flash rating plate: Parameter set 2: Standstill current = 0 |
| | 2308 | Flash rating plate: Parameter set 2: Maximum current = 0 |
| | 2309 | Flash rating plate: Parameter set 2: Rated torque = 0 |
| | 2310 | Flash rating plate: Parameter set 2: Standstill torque = 0 |
| | 2311 | Flash rating plate: Parameter set 2: Max. torque = 0 |
| | 2312 | Flash rating plate: Parameter set 2: Stator resistance = 0 |
| | 2313 | Flash rating plate: Parameter set 2: Rotor inertia = 0 |
| | 2314 | Flash rating plate: Parameter set 2: Pair of poles = 0 |
| | 2315 | Flash rating plate: Parameter set 2: Temp. characteristic, R-reference = 0 |

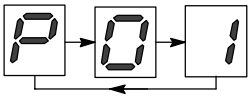
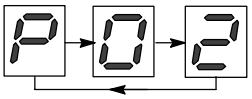
VMA..KR, VMA..B,C,D,F and DM/DS error displays

| F code display | Error number | Meaning |
|---|---|---|
| F70 | 2316 | Flash rating plate: Parameter set 2: Temp. characteristic, B-value = 0 |
| | 2317 | Flash rating plate: Parameter set 2: Temp. characteristic, T-reference = 0 |
| | 2318 | Flash rating plate: Parameter set 2: Proportional gain 2 = 0 |
| | 2319 | Flash rating plate: Parameter set 2: Proportional gain 1 = 0 |
| | 2320 | Flash rating plate: Parameter set 2: Integral action time 2 = 0 |
| | 2321 | Flash rating plate: Parameter set 2: Integral action time 1 = 0 |
| | 2322 | Flash rating plate: Parameter set 2: Torque constant value 1 = 0 |
| | 2323 | Flash rating plate: Parameter set 2: EMF constant = 0 |
| | 2324 | Flash rating plate: Parameter set 2: Series inductance = 0 |
| | 2325 | Flash rating plate: Parameter set 2: Shunt inductance = 0 |
| | 2326 | Flash rating plate: Parameter set 2: Rated voltage = 0 |
| | 2327 | Flash rating plate: Parameter set 2: Noload current = 0 |
| | 2328 | Flash rating plate: Parameter set 2: Rotor time constant = 0 |
| | 2329 | Flash rating plate: Parameter set 2: LH char. curve: Lh–0 = 0 |
| | 2330 | Flash rating plate: Parameter set 2: LH char. curve: Break point current = 0 |
| | 2331 | Flash rating plate: Parameter set 2: LH char. curve: Lh saturation = 0 |
| | 2332 | Flash rating plate: Parameter set 2: LH char. curve: Saturation current = 0 |
| | 2333 | Flash rating plate: Parameter set 2: Leakage inductance stator = 0 |
| | 2334 | Flash rating plate: Parameter set 2: Leakage inductance rotor = 0 |
| | 2335 | Flash rating plate: Parameter set 2: Rotor resistance = 0 |
| | 2336 | Flash rating plate: Parameter set 2: Temp. coefficient = 0 |
| | 2337 | Flash rating plate: Parameter set 2: Version number < 3 |
| | 2342 | Flash rating plate: Parameter set 2: Single-turn value = 0 |
| | 2343 | Flash rating plate: Parameter set 2: Single-turn or multi-turn value = 0 |
| | 2344 | Flash rating plate: Parameter set 2: Signal periods between ref. marks = 0 |
| | 2345 | Flash rating plate: Encoder type not the same for parameter set 1 and 2 |
| | 2346 | Flash rating plate: Parameter set 2: Invalid motor type |
| | 2350 | Flash rating plate: Parameter set 2: Encoder type = 0 |
| | 2351 | Flash rating plate: Parameter set 2: Pole pitch = 0 |
| | 2352 | Flash rating plate: Parameter set 2: Speed: Nominal value = 0 |
| | 2353 | Flash rating plate: Parameter set 2: Speed: Maximum = 0 |
| | 2354 | Flash rating plate: Parameter set 2: Force: Nominal thrust = 0 |
| | 2355 | Flash rating plate: Parameter set 2: Force: Standstill thrust = 0 |
| | 2356 | Flash rating plate: Parameter set 2: Force: Max. thrust = 0 |
| | 2357 | Flash rating plate: Parameter set 2: Primary Resistance = 0 |
| | 2358 | Flash rating plate: Parameter set 2: Transportable load = 0 |
| | 2359 | Flash rating plate: Parameter set 2: Signal periods length = 0 |
| | 2360 | Flash rating plate: Parameter set 2: Distance between reference marks = 0 |
| | 2361 | Flash rating plate: Parameter set 2: Step distance = 0 |

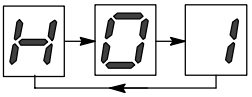
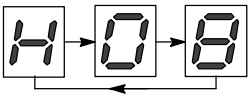
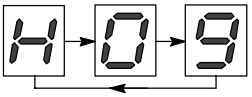
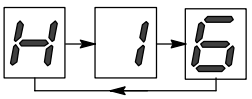
VMA..KR, VMA..B,C,D,F and DM/DS error displays

| F code display | Error number | Meaning |
|---|---|---|
| F70 | 2362 | Flash rating plate: Parameter set 2: Distance between reference marks = 0 |
| | 2363 | Flash rating plate: Parameter set 2: Thrust constant value 1 = 0 |
| | 2364 | Flash rating plate: Parameter set 2: EMF constant = 0 |
| | 2365 | Flash rating plate: Parameter set 2: Series inductance = 0 |
| | 2366 | Flash rating plate: Parameter set 2: Shunt inductance = 0 |
| | 2367 | Flash rating plate: Parameter set 2: Leakage inductance primary winding = 0 |
| | 2368 | Flash rating plate: Parameter set 2: Leakage inductance secondary winding = 0 |
| | 2369 | Flash rating plate: Parameter set 2: Second. resistance = 0 |
| F71 | 0 | Inverter-Initialization error – Detailed fault documentation unavailable at this |
| F72 | 0 | Configuration error; Motor / module combination not functional |
| F91 | 0 | Personality error; Check proper seating of PM; Replace module |
| F92 | 0 | I2C-Bus runtime error; Defective module |
| F95 | 0 | I-controller synchronization error; Defective module |
| F96 | 0 | Speed controller, plausibility error – Detailed fault documentation unavailable |
| | 2 | Drive blocked in negative direction |
| | 3 | Too little current –> Performance interruption |
| | 4 | Motor overspeed –> Reverse acceleration |
| | 5 | Too little current –> Performance interruption |
| | 8 | Timeout torque limitation |
| | 18 | Drive blocked in positive direction |
| | 19 | Too little current –> Performance interruption |
| | 20 | Motor overspeed –> Reverse acceleration |
| | 21 | Too little current –> Performance interruption |
| | 128 | Speed controller synchronization error |
| F97 | 0 | VM shutdown due to FGZ shutdown |
| F98 | 0 | ASTS shutdown |

## 4.6 PROFIBUS-DP errors

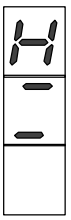
| **Displays flash alternately.** | **Error**<br><br>The drive has switched off. | **Action** |
|---|---|---|
|  | **Initialization error**<br>Incorrect parameterization data | • Check structure of the parameterization data<br>(refer to “ServoDyn with PROFIBUS-DP Interface” manual) |
|  | **Initialization error**<br>Configuration data does not match the desired configuration | • Check whether the drive mode from the parameterization data matches the telegram configuration |

## 4.7 DMA computer errors (without SERCOS interface)

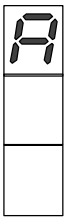
| **Displays flash alternately.** | **Error**<br><br>The drive has switched off. | **Action** |
|---|---|---|
|  <br>**up to**<br>  | **CPU program execution errors**<br><br>H01 dc Power failure (also refer to F 36)<br>H02 stack overflow<br>H03 stack underflow<br>H04 undefined CPU code<br>H05 undefined protected command<br>H06 inadmissible word instruction<br>H07 inadmissible jump<br>H08 inadmissible bus control | • Contact Rexroth technical service<br>• Replace module |
|  <br>up to<br>  | **CPU computing errors**<br><br>H09 integer overflow<br>H10 floating overflow<br>H11 floating underflow<br>H12 division by zero<br>H13 undefined floating number<br>H14 integer/floating conversion error<br>H15 floating point stack overflow<br>H16 floating point stack underflow | • Check last parameter changes made before error occurred<br>• Contact Rexroth technical service |

# 4.8 ServoDyn D frequency inverter displays

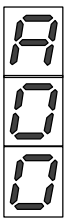
## 4.8.1 Status/warning displays

| LED | Status | Action |
|---|---|---|
| ☼ FG | **Axis enable external** if<br>• 24 V at X06.3/4 (FG) | – |
| ☼ FGI | **Enable internal** if<br>• 24 V at X06.3 (FG)<br>• Central enable by VM present<br>• no error | – |
|  | 3-digit 7-segment display | |
|  <br>computer has been booted<br>TEMP<br>STA | **Operating display:**<br>• STA is present if:<br>– computer has been booted<br>– no errors<br>**Temperature status:**<br>• TEMP is present if:<br>Temperature of the heat sink or the motor (with active bimetal function) is within the permitted range.<br>• TEMP relay is closed | –<br><br><br><br>If no display (temperature exceeded):<br>• Check air supply, fan<br>• Reduce cycle frequency or load<br>• Select motor with higher rating<br>• Verify bimetal setting |

You can read various operating data from the 7-segment display:



- Press <D> key in the basic display.
- Select the 'A' display function with the <↑> or <↓> keys.
- Press key <D>.
- Select the desired operating display with the <↑> or <↓> keys, e.g. A00 (actual output frequency).
- Press key <D>.
- The display shows the current operating data.
- Jump back to the operating data level by simultaneously pressing the <↑> and <↓> keys.
- You may now select the next operating display with the <↑> or <↓> keys, e.g. A08.
- Further procedure as described above.

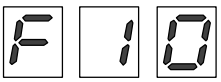


ServoDyn D frequency inverter displays

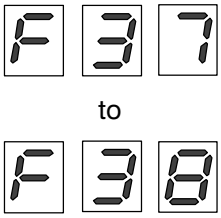
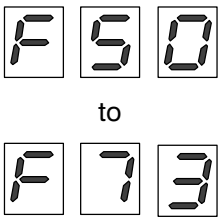
|  | **Read from DSS** | **Unit** | **Description** | | |
|---|---|---|---|---|---|
| A00 | A-0-1000 | Hz | Actual output frequency $f_{act}$ | | Current motor frequency |
| A01 | A-0-1001 | Hz | Commanded output frequency $f_{set}$ | | Specified output frequency |
| A02 | A-0-1002 | A | Total current | | rms value of the total current |
| A03 | A-0-1003 | A | Active current | | rms value of active current |
| A04 | A-0-1004 | A | Reactive current | | rms value of reactive current |
| A05 | A-0-1005 | V | Motor voltage | | rms value of current motor voltage |
| A06 | A-0-1006 | V | DC link voltage | | Current value of DC link voltage<br>(display = 350 V for voltage values ≦ 350 V) |
| A07 | A-0-1007 | kVA | Total power | | Current total power |
| A08 | A-0-1008 | kW | Shaft output | | Current mechanical shaft output of the motor |
| A09 | A-0-1009 | % | Utilization | | Current utilization of the motor,<br>for $f < f_N$ with reference to the motor torque $M_N$<br>for $f > f_N$ with reference to the motor power $P_N$<br>Accuracy: depends on the motor,<br>for $n > 0.1\ n_N$ approx. 5% of the final value |
| A10 | A-0-1010 | °C | Heat sink temperature | | Current heat sink temperature.<br>With increased heat sink temperature: Warning ‘U01’,<br>TEMP relay is opened. |
| A11 | A-0-1011 | A | Present current limit | | The presently effective current limit is set depending on the selected settings and the current heat sink temperature. |
| A12 | A-0-1012 | | TEMP warning | | **Warning message** when TEMP relay has switched off: |
| | | | | **U00** | no warning |
| | | | | **U01** | excessive heat sink temperature |
| | | | | **U02** | Excessive motor temperature.<br>Only if bimetal function is active P43 – P45. |
| | | | | **U03** | Excessive heat sink and motor temperature |
| A13 | A-0-1013 | | Last error after STA shut-off | | After restart, the last error present before STA was deactivated is displayed. |
| A14 | A-0-1014 | | Software version | | Number left of point = software status<br>Number right of point = software scope.<br>Please indicate this data in the event of enquiries. |
| A15 | A-0-1015 | | Software index | | Version index of operating software,<br>always specify in enquiries. |

ServoDyn D frequency inverter displays

## 4.8.2 Error displays

| Displays in vertical arrangement on the module | **Error**<br>The drive has switched off. | **Action** |
|---|---|---|
|  | **Power supply fault**<br>Internal or external 24 V supply voltages not in admissible range | • Check module cross-connection<br>• Replace module |
|  | **Overvoltage** / **Driver fault**<br>Power output stage was switched off because of a fault in the power supply unit | • Check output stage<br>• Replace module |
|  | **Short-circuit or ground fault in the load circuit**<br>Motor or motor cable defective | • Measure motor and motor lead<br>• Check output stage |
|  | **Overcurrent**<br>Admissible module peak current exceeded for > 2 sec | • Reduce load<br>• Select flatter braking and acceleration ramps<br>• Check application |
|  | **Overvoltage in DC link**<br>$U_{DC}$ > 860 V, unless F20 | • Check system voltage<br>• Reduce braking power |
|  | **Motor connection**<br>Motor not properly connected | • Check motor connection |
|  | **Heat sink overtemperature** | • Check air supply<br>• Check fan |
|  | **Motor overtemperature**<br>Electronic bimetal function signals motor overload | • Verify bimetal setting<br>• Check motor rating |
|  | **Motor overtemperature**<br>PTC connection signals motor overload | • Check motor rating |
|  | **Signal cross-connection** (computer driver)<br>Hardware fault | • Replace module |
|  | **Signal cross-connection** (computer driver)<br>Runtime error | • Replace module |

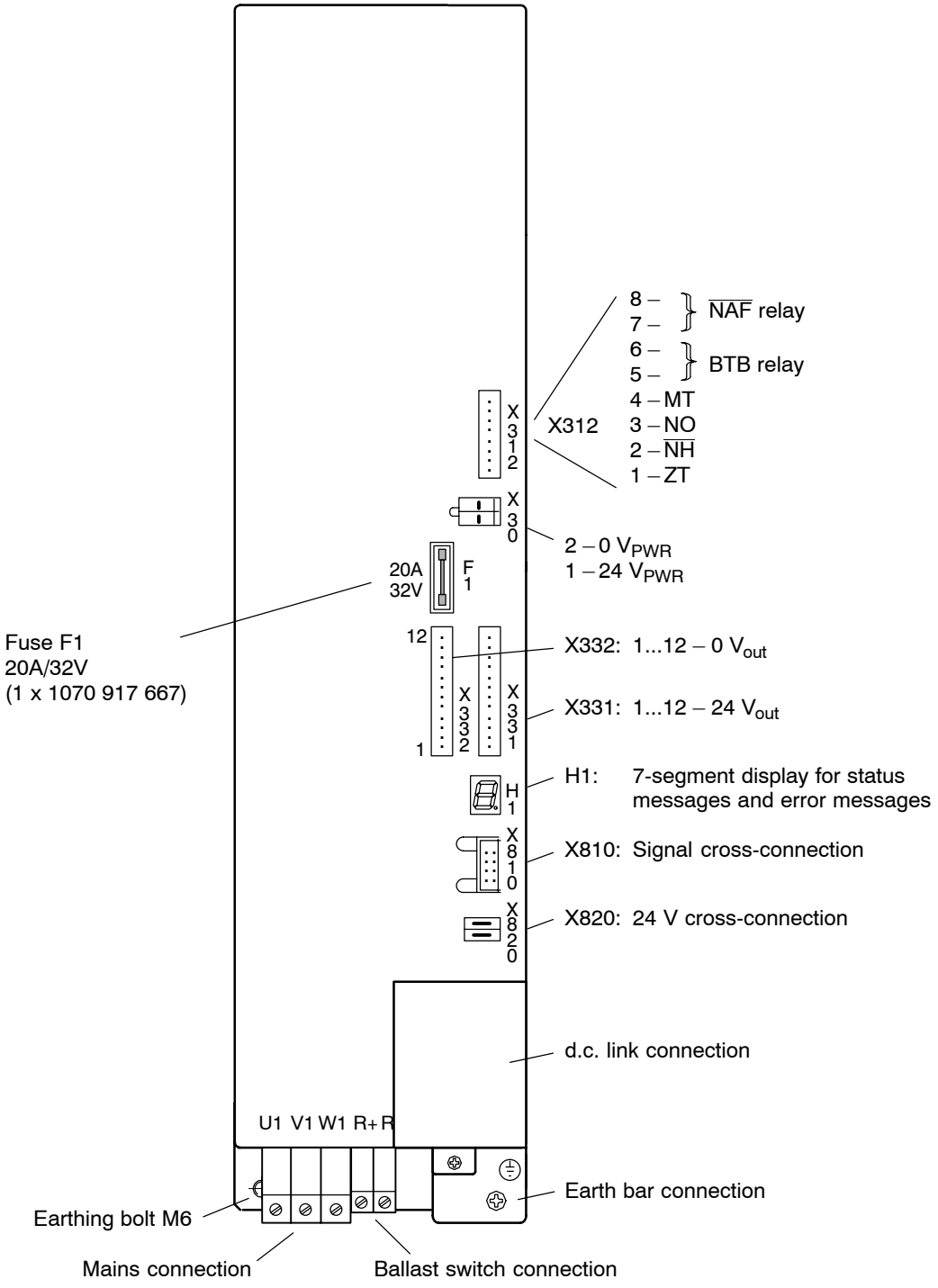
ServoDyn D frequency inverter displays

| Displays in vertical arrangement on the module | **Error**<br>The drive has switched off. | **Action** |
|---|---|---|
|  | **Driver fault**<br>Invalid driver parameter | • Replace module |
|  | **Error in RAM memory** | • Replace module |
|  | **EEPROM error**<br>EEPROM cannot be read/written | • Replace module |
|  | **Real-time error**<br>Processor error | • Restart module<br>• Replace module |

Connection overview

# 5 Connection overview

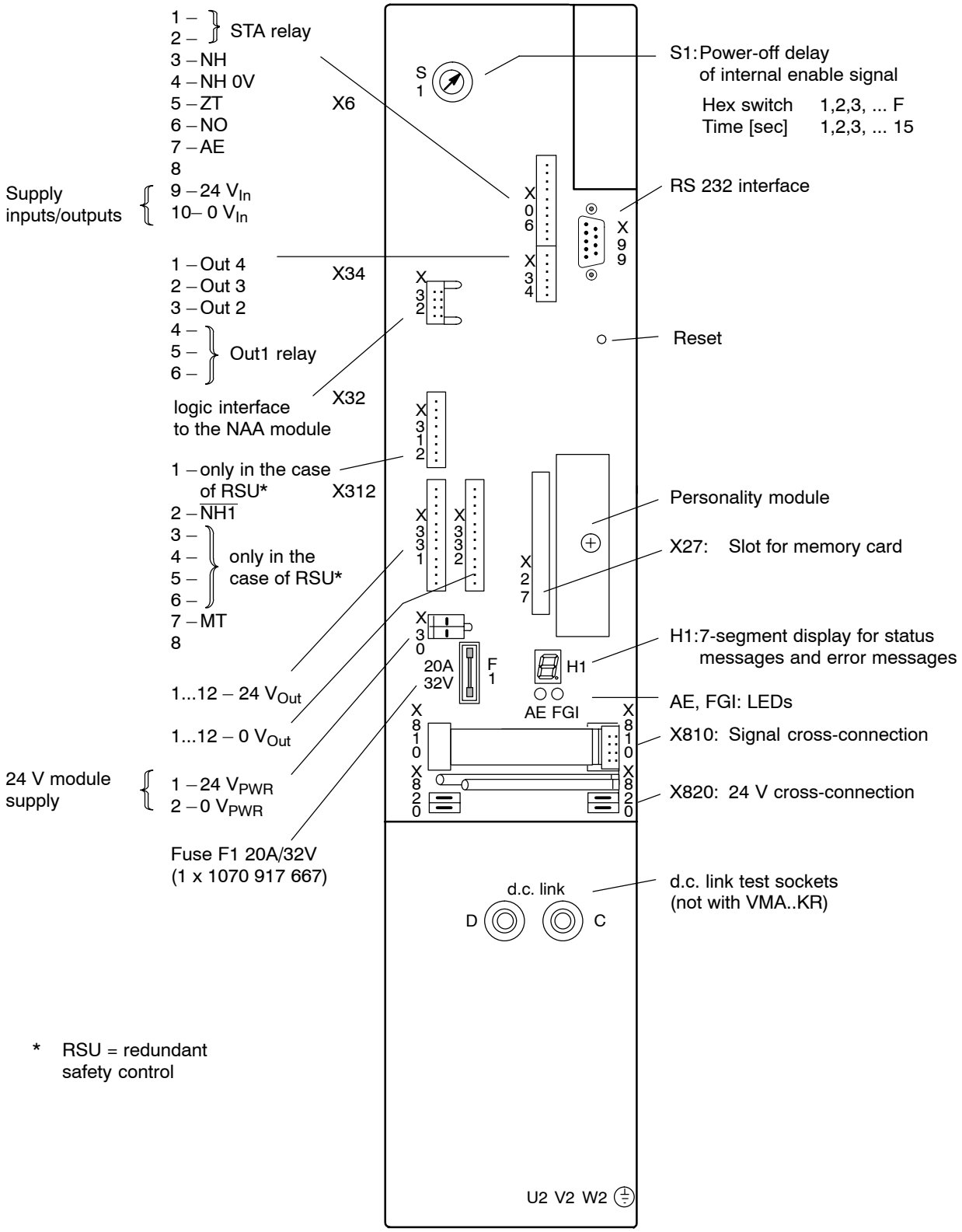
## 5.1 VMA..KB, VMA..KE supply module (with ballast switch)



Connection overview

# 5.2 VMA..KR, VMA..B,C,D,F supply module (with current regeneration)

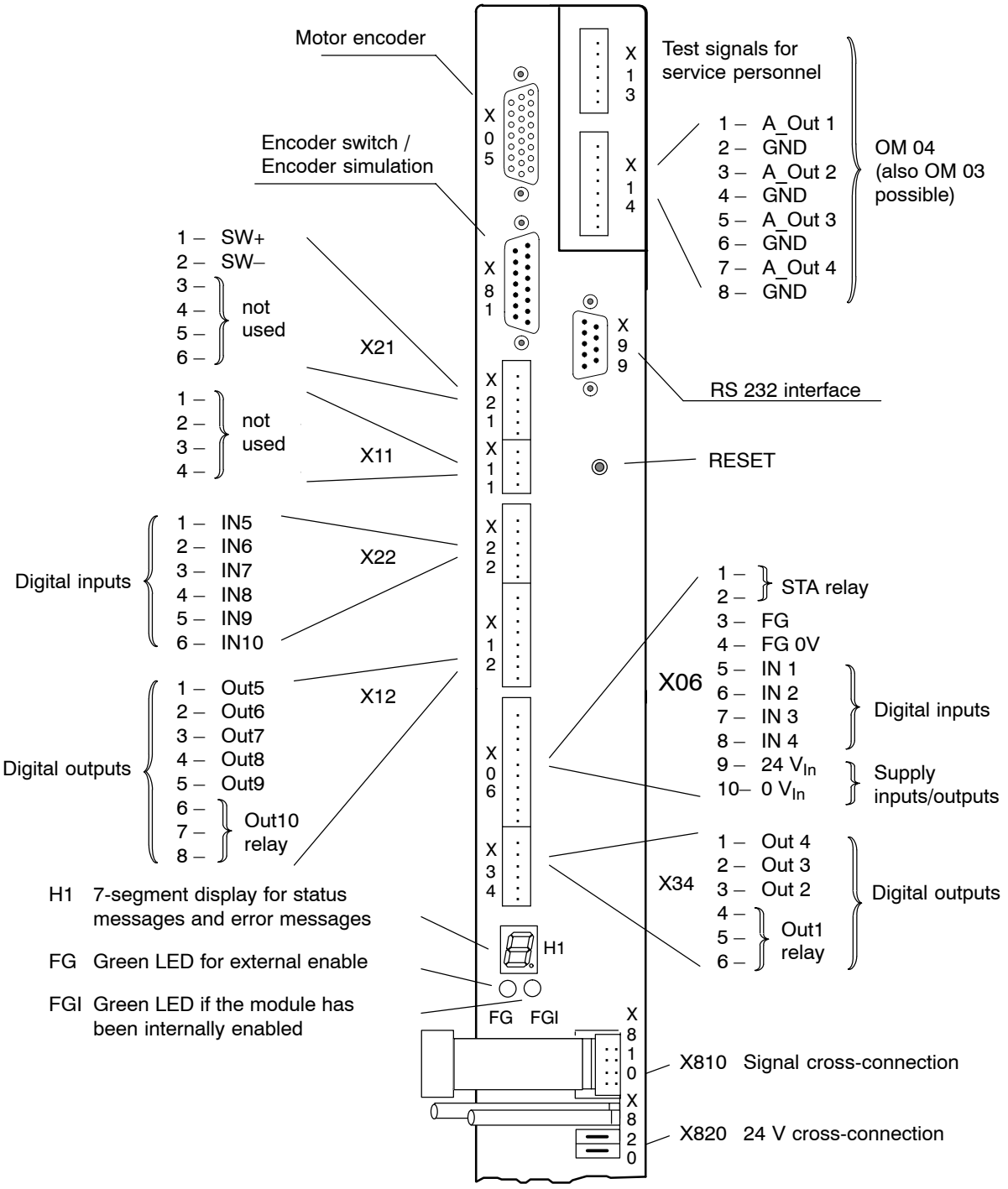
**Figure shows VMA 35B, interface is identical for all modules**




* RSU = redundant safety control

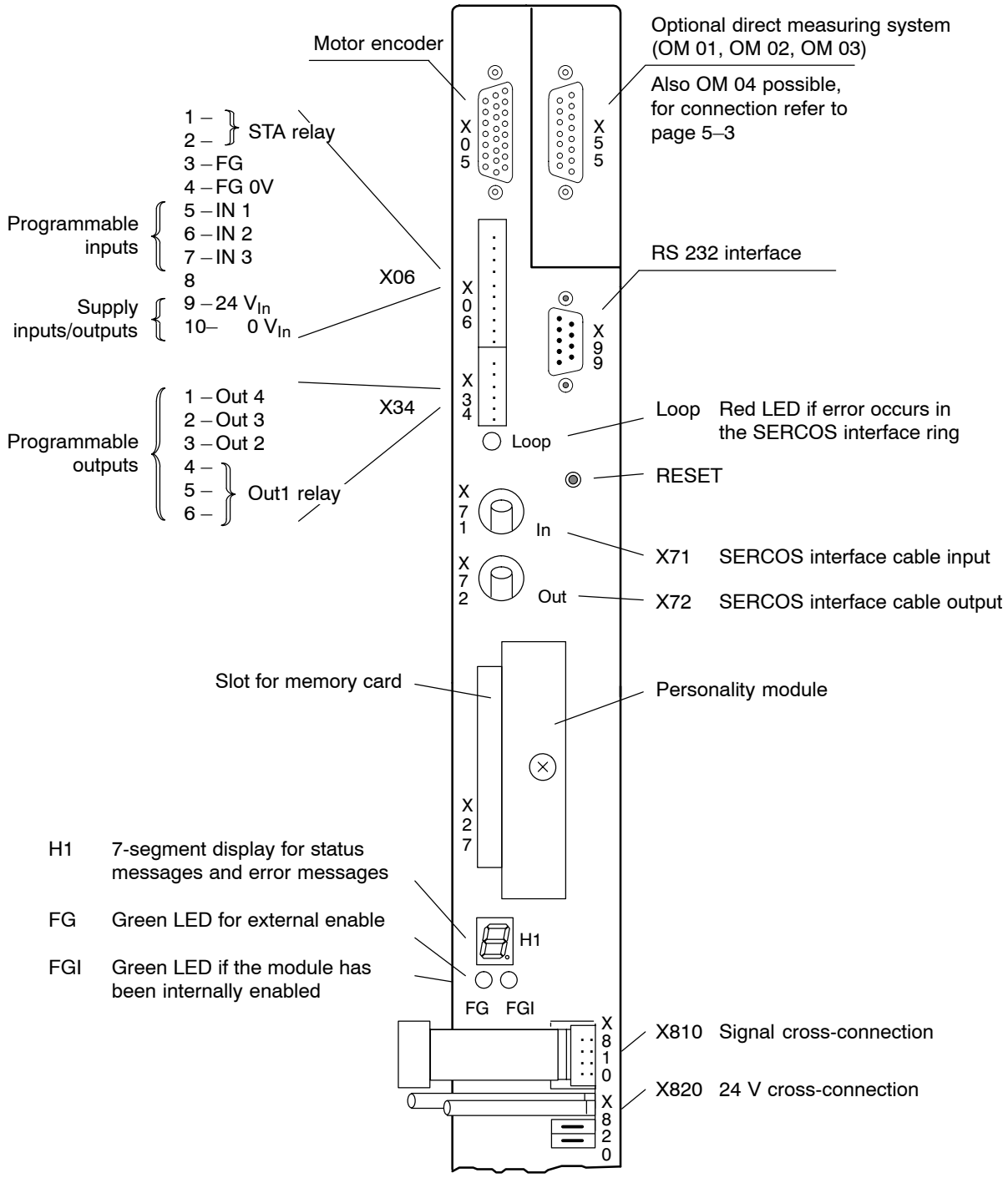
Connection overview

## 5.3 DMA module with analog interface or positioning function (MC)



Connection overview

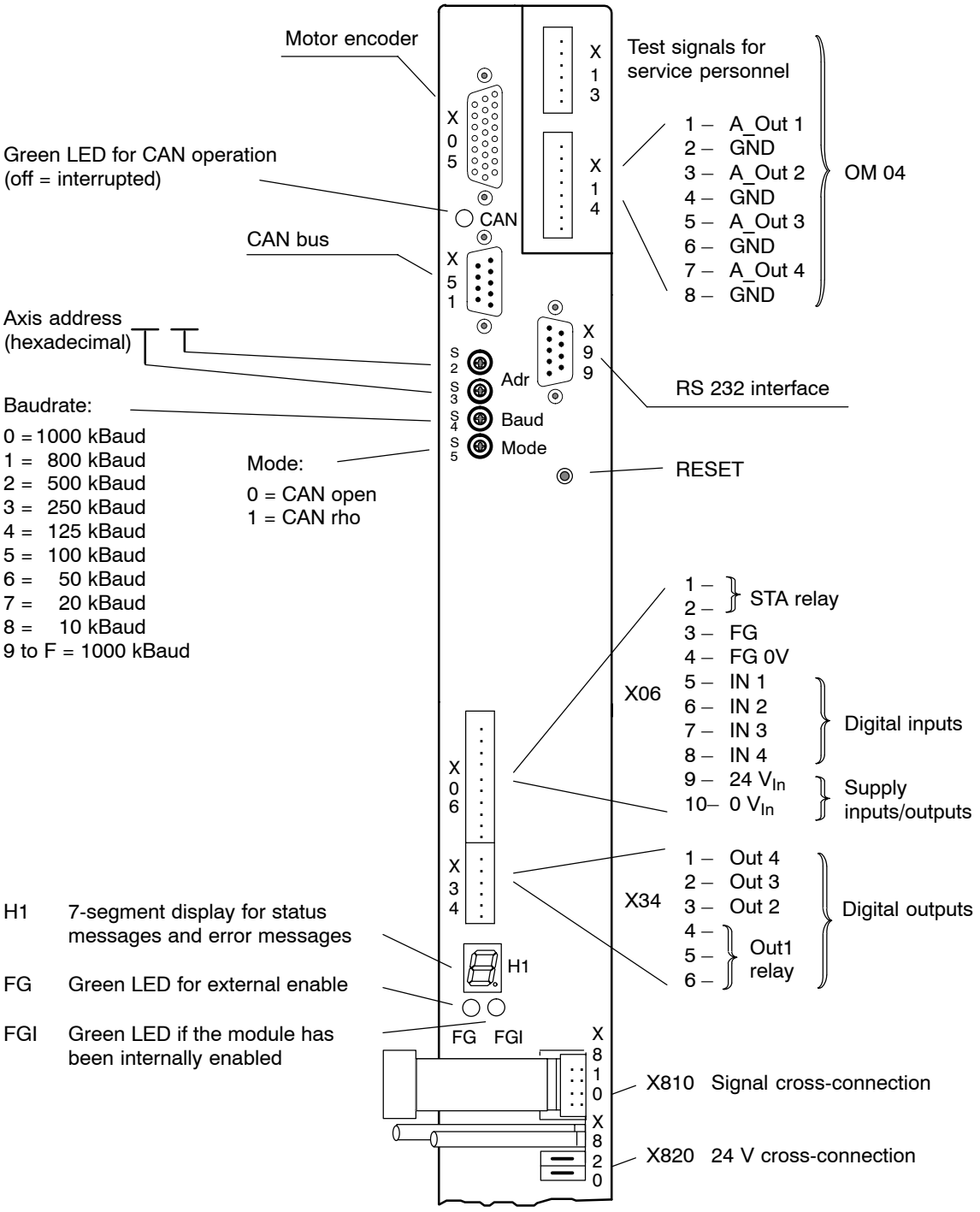
## 5.4 DMA module with SERCOS interface




**DANGER**
**Do not look directly into the LEDs in the optical fiber connection. Due to their high output, this may result in eye injuries.**
**When the inverter is switched on, do not look into the LED or the open end of a short connected lead.**

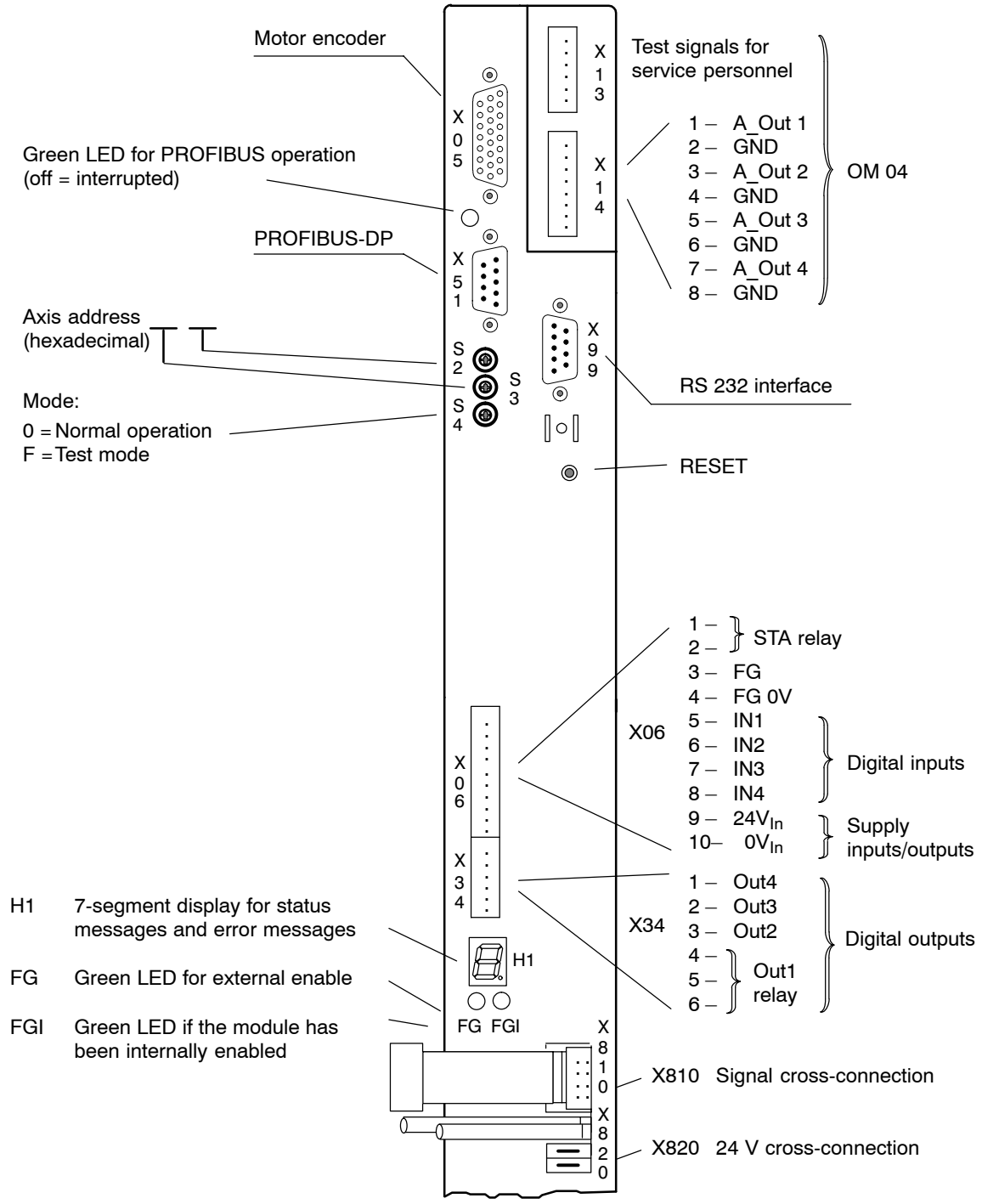
Connection overview

## 5.5 DMA module with CAN bus



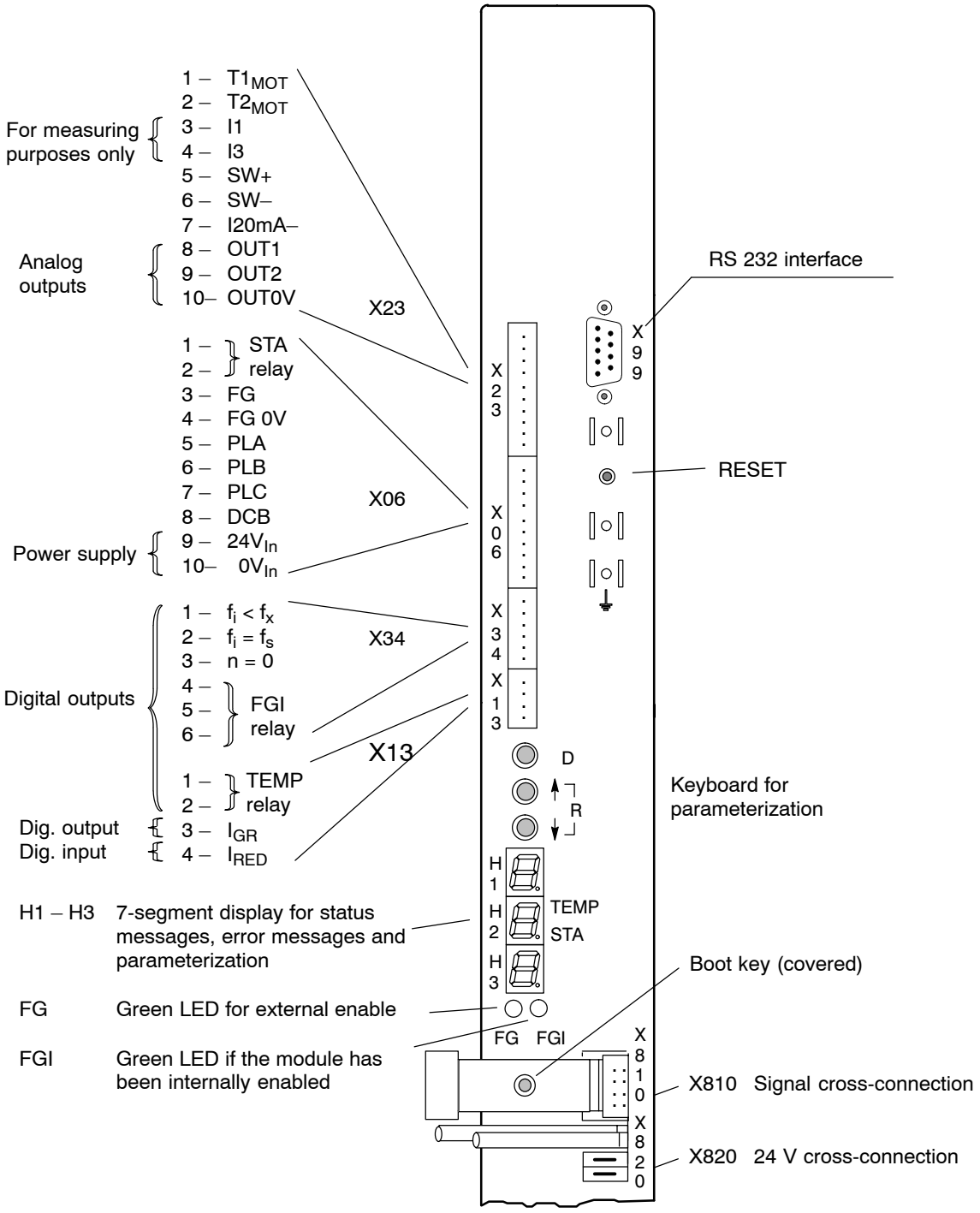
Connection overview

## 5.6 DMA module with PROFIBUS-DP



Connection overview

## 5.7 DM..8001-D frequency inverter with analog interface



Connection overview

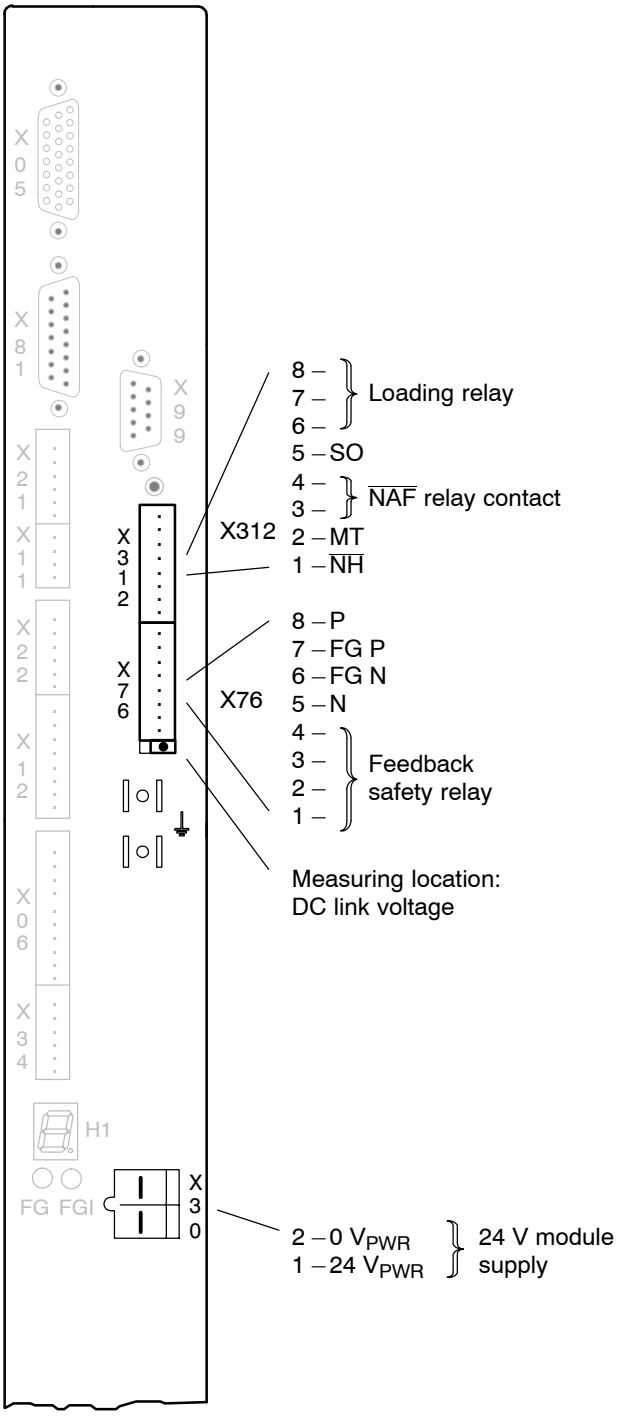
## 5.8 Stand-alone module DS, supply unit

Stand-alone modules are single-axis drives with an integrated supply unit. The interfaces and functions correspond to those of the modules described in sections 5.3 to 5.7. Therefore, the following illustration only shows the additional connectors of the supply unit:

### 5.8.1 Overview of DS..K xxx2-D (in set-up mode)

Other connectors corresponding to the interfaces:

- analog interface, positioning function
- frequency inverter
- CAN bus
- SERCOS interface
- PROFIBUS-DP

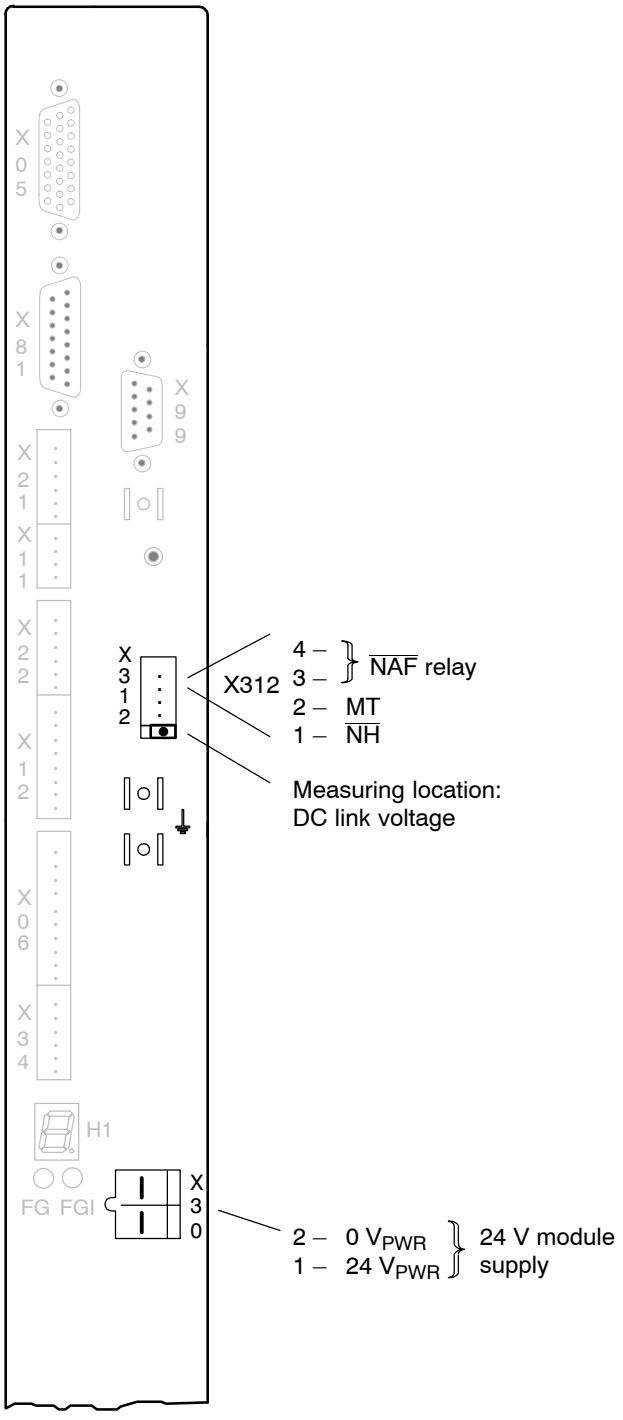


Connection overview

## 5.8.2 Overview of DS..K xxx1-D

Other connectors corresponding to the interfaces:

- analog interface, positioning function
- frequency inverter
- CAN bus
- SERCOS interface
- PROFIBUS-DP



Connection overview

Notes:

# 6 Replacing components

**DANGER**
**Danger caused by unqualified interventions.**
**The maintenance and installation of the components is reserved to qualified personnel who observes the accident prevention regulations (UVV VBG4, VDE 100, VDE 105) and installation standards (EN 60204-Part 1, prEN 50178).**

Please note the safety instructions on the first pages of this manual!

## 6.1 Motors

**DANGER**
**Brakes are subject to wear.**
**The holding brake is no service brake and must only be operated when the axis is at standstill.**
**After approx. 1000 Emergency-Stop braking processes with an extraneous moment of inertia ≦ motor moment of inertia, the holding brake must be checked in the manufacturer's workshop.**

**DANGEROUS ELECTRICAL VOLTAGE**
**All connection and installation work must be performed while the system is de-energized.**
**Due to permanent magnet excitation, a dangerous voltage is present at the power outlet when the rotor is rotating and the motor is not connected electrically!**

**DANGER**
**Danger of injuries by ejected featherkey.**
**Motors with a groove and featherkey may only be operated when installed in place or with featherkey secured.**

**CAUTION**
**Damages to the module or inverter by removing plug-in connections.**
**All plug-in connections to the encoder may only be inserted or removed while the drive is switched off.**

Replacing components

**CAUTION**
**Impacts and shocks applied to the shaft end will damage the rotary encoder and ball bearings!**
**Drive elements such as pulleys, clutch disks, toothed wheels etc. may only be assembled or removed by continuously heating up the drive elements or with a suitable installation or removal tool. Use the thread in the shaft end.**

At least half of motors with an **oil-tight flange on the output side** (oil-running tight, designs 100, 101) must be submerged in oil. Due to the high friction, they must never be started dry.
For dry operation, the rotary shaft seal must be removed, however, it cannot be reinstalled afterwards.

**CAUTION**
**Loss of data!**
**Interventions in the motor may delete the data of the electronic rating plate.**
**Do not dismantle servo motors. Installation work in excess of the adjustment of the outgoing cable direction must be performed in the manufacturer's workshop.**

The outgoing direction of all plug-in systems can be changed by releasing the angle flange box.
Do not turn the angle flange box by more than 180° in order to avoid damaging the connection leads.

**CAUTION**
**Moisture inside the motor.**
**When tightening the angle flange box, please make sure that the O-ring is properly seated in the groove of the angle flange box.**
**Protection standard IP 67 is achieved for the plug-in system only if the admissible external lead diameters are maintained and the mating connectors are screwed down to their stop.**

Replacing components

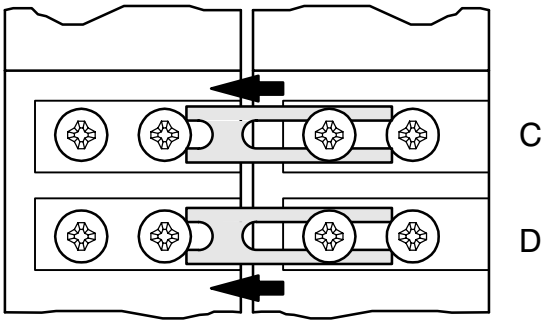
## 6.2 Drive modules

**CAUTION**
**Destruction of power units!**
**Note the tightening torque of 3 Nm for the power connections U, V, W.**

### 6.2.1 VM...K and DM...K

The DC link connection is achieved with conductor bars ”C” and ”D” at the front side of the modules:

1. Release fastening screw below the cover, unhinge and remove cover upward.
2. Release screws of the pre-assembled conductor bars, push bars below the fastening screws of the adjoining left module, and tighten screws again.




**CAUTION**
**Destruction of power units!**
**Please note the tightening torque of 3 Nm for the screwed DC link connections.**

3. Reinstate all covers.

**DANGEROUS ELECTRICAL VOLTAGE**
**Busbars carry lethal voltages during operation.**
**It is absolutely necessary to install the shock-protection covers at both ends of each row of modules.**

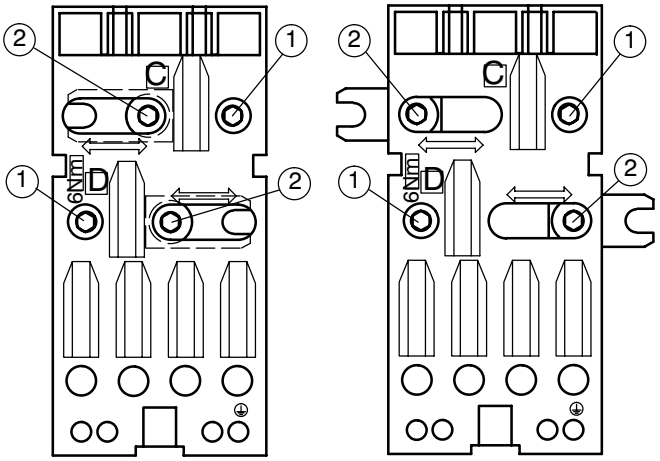
Replacing components

## 6.2.2 DC link connection of VMA..B,C,D and DMA..A,B,D with backplane modules

The conductor bars are captivated in the backplane module terminal blocks.
Mounting using a SW 4 Allen key:

1. Unscrew the terminal screws (1).
2. Unscrew the terminal screws (2), move the conductor bars into the adjoining terminal block and tighten the screws.
3. Fasten the second end of the conductor bar using the terminal screw (1).
4. Cover the right backplane module terminal block of every module row with the terminal block end cover from the VMA module accessory set. There is a second cover in the DC link terminal accessory set which can be used if there are two module rows.

**DANGEROUS ELECTRICAL VOLTAGE**
**Busbars carry lethal voltages during operation.**
**It is absolutely necessary to install the terminal block covers at the right-hand end of each row of modules.**




**CAUTION**
**Destruction of power units!**
**Please note the tightening torque of 5 Nm for the screwed DC link connections.**

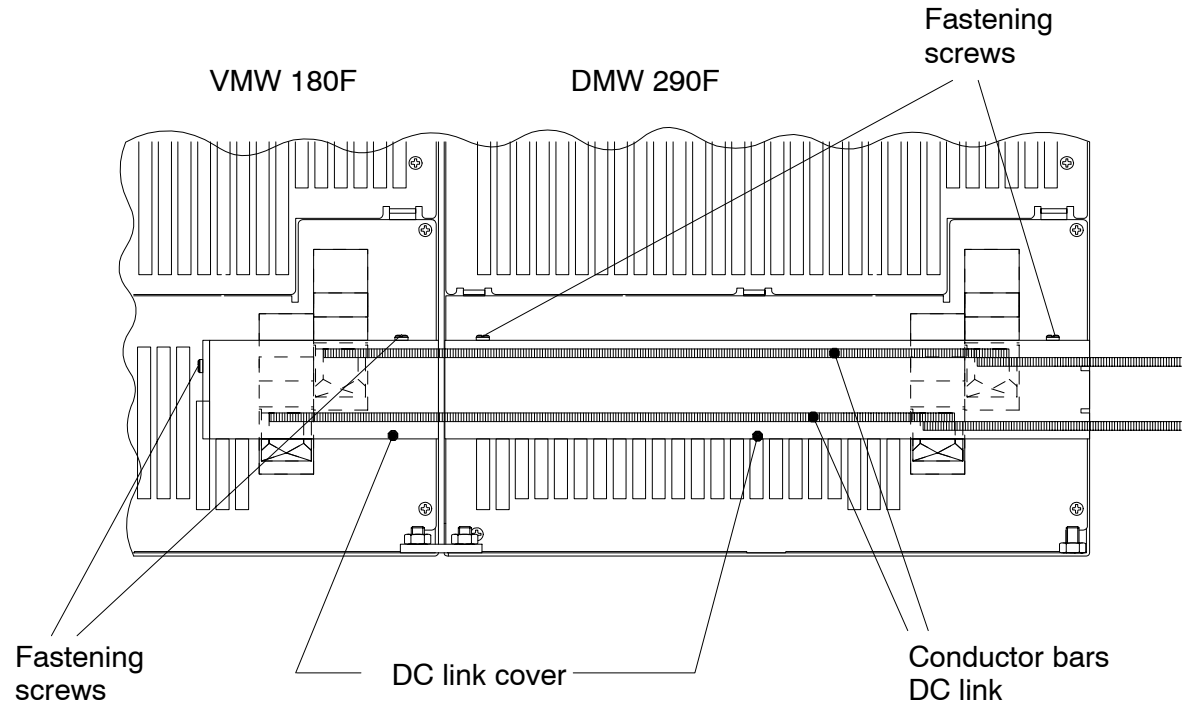
Replacing components

## 6.2.3 DC link connection of VMW..F and DMW..F with water cooling

★ The DC link connection is made at the bottom side of the modules using the conductor bars supplied together with the unit:

1. Push conductor bars into terminals “C” and “D” and tighten them firmly.
2. Pull plastic cover from the accessory kit over the conductor bars and screw them to the metal brackets provided.

View of module bottom:




**CAUTION**
**Tighten DC link screws with 18 Nm to protect the power supply unit.**

Replacing components

Notes:

Annex

# A Annex

## A.1 Index

Rexroth
Bosch Group

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