engineering

mannesmann

Rexroth

DIAX 04

SSE-03VRS

SERCOS interface

HDS   HDD

DIAX04
Drive With Servo Function

Troubleshooting Guide SSE03VRS

SYSTEM200

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Title	DIAX04
	Drive With Servo Function
Type of Documentation	Troubleshooting Guide SSE 03VRS
Document Typecode	DOK-DIAX04-SSE-03VRS**-WA01-EN-P
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Purpose of Documentation? This documentation is designed to assist maintenance personal in identifying errors with the machinery.

- help in understanding error messages
- help in finding the causes of errors
- describe the procedure for trouble shooting
- simplify the process of establishing contact with the Rexroth Indramat Customer service department

Record of Revisions

Description	Release Date	Notes
DOK-DIAX04-SSE-03VRS**-WA01-EN-P	10.99	First edition

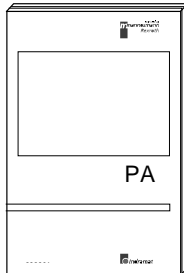**Note** This document has been printed on chlorine-free bleached paper.

Summary of Documentation - Box
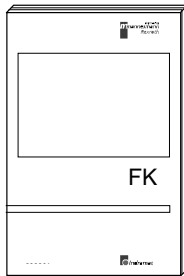
Functional Description:

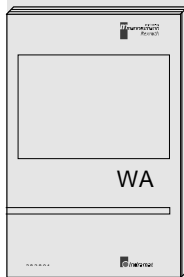Description of all implemented Function
based on SERCOS-Parameters

FK

Order designation:
DOK-DIAX04-SSE-03VRS**-FK01-EN-P

Parameter Description:
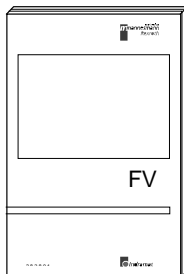
A description of all parameters
used in the firmware

PA

Order designation:
DOK-DIAX04-SSE-03VRS**-PA01-EN-P

Troubleshooting Guide:

-Explanation of the diagnostic states
-How to proceed when eliminating faults

WA

Order designation:
DOK-DIAX04-SSE-03VRS**-WA01-EN-P

Firmware Version Notes:

Description of new and changed functions
in terms of the derivatives:

-FWA-DIAX04-SSE02VRS-MS

FV

Order designation:
DOK-DIAX04-SSE-03VRS**-FV01-EN-P

Order designation
DOK-DIAX04-SSE-03VRS**-6101-EN-P
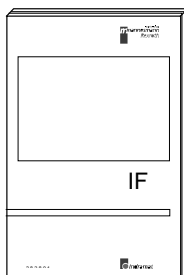
Drive Configuration:
-Determining the motor type
-Choosing the motor – motor feedback combination
-Choosing the desired function of the
 drive control device

IF

Order designation:
DOK-DIAX04-SSE-03VRS**-IF01-EN-P

CD: DRIVEHELP

Collection of Windows help systems which
contain documents on firmware derivatives

Order designation:
DOK-GENERL-DRIVEHELP**-GExx-MS-D0600

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Notes

Contents

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1   Diagnostic Message Descriptions

1.1   Overview of the diagnostic message descriptions

Diagnostic Message Types

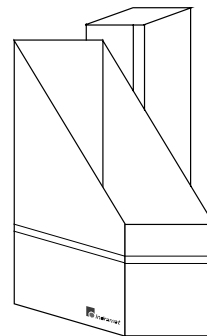Each operational state of the drive will be characterized with a diagnostic message.

Differentiations will be made between:

- **Error diagnostic messages**
- **Warning diagnostic messages**
- **Command diagnostic messages**
- **Drive Mode diagnostic messages**
- **Operation status**

Construction of a diagnostic message

A diagnostic message consists of:

- **A diagnostic number** and a
- **diagnostic text**

F228 Excessive Control Deviation

Diagnostic message
Diagnostic message number
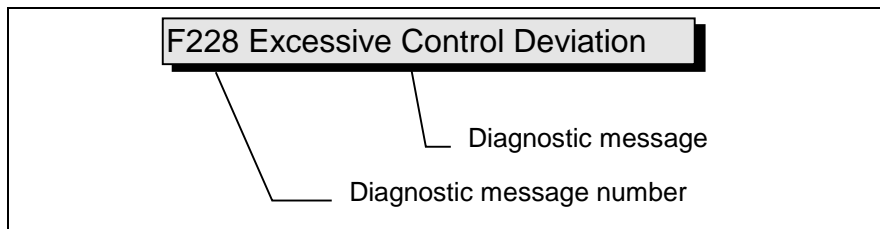
Fig. 1-1:   Diagnostic message with a diagnostic number and text.

For the example in the graphic, "F2" and "28" are shown alternately on the H1-Display.

The control system can read out the diagnostic number in hexadecimal form with the **S-0-0390, Diagnostic message number** parameter.

In addition, the drive allocates to the control system the diagnostic number and diagnostic text as a string **F228 Excessive deviation** with the **S-0-0095, Diagnostic message** parameter.

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Display

The H1-Display serves as an optical display of the diagnostic message on the drive and for two-axis devices (HDD) additionally the H2-Display.

H1-Display

H2-Display

HDD

HDS

FA5012d1.fh7
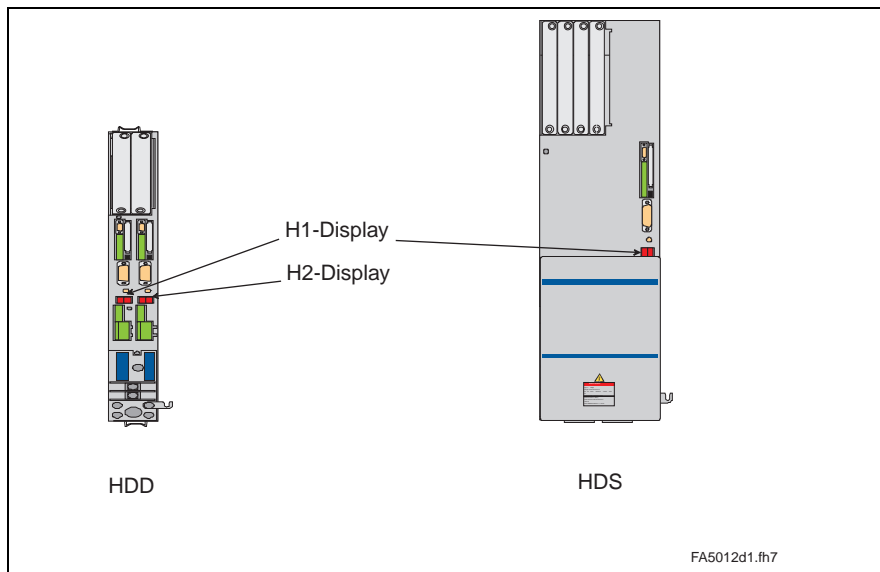
Fig. 1-2:   H1-/H2-Display on HDS- and HDD-Drive

The diagnostic number appears on this two-positional seven-segment display. The image can be seen on the "Diagnostic Message Priority Display".

This display quickly shows the current operation status without the use of a communications interface.

The operating mode cannot be seen from the H1- ... H2 Display. If the drive follows the operating mode and no command was activated, then the symbol "AF" appears on the display.

Diagnostic Message Output Priority

If more than one diagnostic message is waiting, then the message with the highest priority will be displayed.

The following graphic classifies operation status in order of importance.
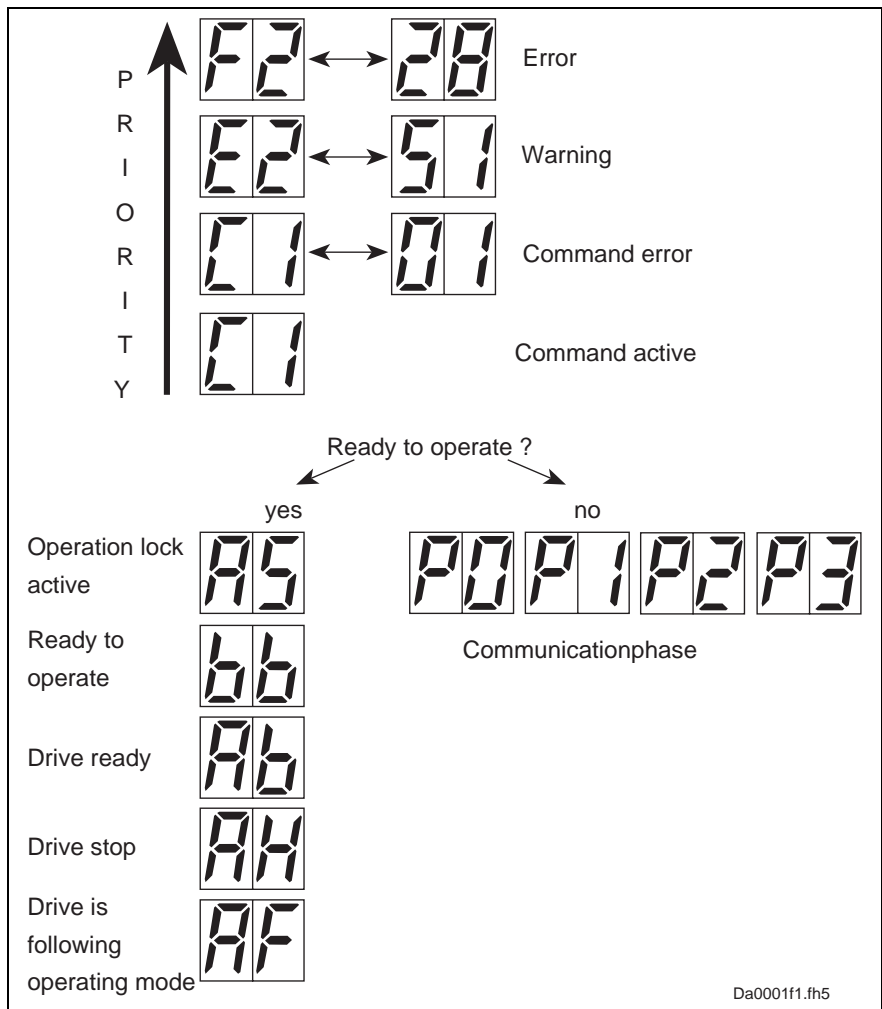
Fig. 1-3:　　Diagnostic message priority diagram

Clear Coded Diagnostic Message

The clear coded diagnostic message contains the diagnostic number followed by the diagnostic text, as shown in the example, "Excessive Output Error" (Fig. 1-1). It can be read out with the **S-0-0095, Diagnostic message** parameter and directly displays the operation status on an operator surface.

The clear coded diagnostic message will be switched to the current language.

Notes

2   Safety Instructions for Electrical Equipment

2.1   Introduction

Read these instructions before the equipment is used and eliminate the risk of personal injury or property damage. Follow these safety instructions at all times.

Do not attempt to install, use or service this equipment without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation of the equipment prior to working with the equipment at any time. If you do not have the user documentation for your equipment contact your local Rexroth Indramat representative to send this documentation immediately to the person or persons responsible for the safe operation of this equipment.

If the product is resold, rented or transferred or passed on to others, then these safety instructions must be delivered with the product.

⚠️ **WARNING**	**Inappropriate use of this equipment, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, may result in product damage, personal injury, severe electrical shock or death !**

2.2   Explanations

The safety warnings in this documentation describe individual classes of danger and hazards:

Warning symbol with signal word in compliance with ANSI	**Danger class in compliance with ANSI** The danger class describes the consequences resulting from non-compliance with the safety guidelines.
⚠️ **DANGER**	Bodily harm or product damage will occur.
⚠️ **WARNING**	Death or severe bodily harm may occur.
⚠️ **CAUTION**	Death or severe bodily harm may occur.

Fig. 2-1: Classes of danger

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2.3   Hazards by inappropriate use

⚠ **DANGER**	**High voltage and high discharge current ! Danger to life, risk of severe electrical shock and risk of injury !**
⚠ **DANGER**	**Dangerous movements ! Danger to life and risk of injury or equipment damage by unintentional motor movements !**
⚠ **WARNING**	**High electrical voltage due to wrong connections ! Danger to life, severe electrical shock and severe bodily injury !**
⚠ **WARNING**	**Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment !**
⚠ **CAUTION**	**Surface of machine housing could be extremely hot ! Danger of injury ! Danger of burns !**
⚠ **CAUTION**	**Risk of injury due to inappropriate handling ! Bodily injury caused by crushing, shearing, cutting and mechanical shock !**
⚠ **CAUTION**	**Risk of injury due to inappropriate handling of batteries !**

2.4   General Information

- Rexroth Indramat GmbH is not liable for damages resulting from failure to observe the warnings given in these documentation.

- Order operating, maintenance and safety instructions in your language before starting up the machine.If you find that due to a translation error you can not completely understand the documentation for your product, please ask your supplier to clarify.

- Proper and correct transport, storage, assembly and installation as well as care in operation and maintenance are prerequisites for optimal and safe operation of this equipment.

- Trained and qualified personnel in electrical equipment :

  Only trained and qualified personnel may work on this equipment or within its proximity. Personnel are qualified if they have sufficient knowledge of the assembly, installation and operation of the product as well as an understanding of all warnings and precautionary measures noted in these instructions.

  Furthermore, they should be trained, instructed and qualified to switch electrical circuits and equipment on and off, to ground them and to mark them according to the requirements of safe work practices and common sense. They must have adequate safety equipment and be trained in first aid.

- Use only genuine spare parts approved by the manufacturer.

- Follow all safety regulations and requirements for the specific application as practiced in the country of use.

- The equipment is designed for installation on commercial machinery.

- Start-up is only permitted once it is sure that the machine, in which the product is installed, complies with the requirements of national safety regulations and safety specifications of the application.

European countries: see directive 89/392/EEC (machine guideline).

- Operation is only permitted if the national EMC regulations for the application are met.

  The instructions for installation in accordance with EMC requirements can be found in the INDRAMAT document "EMC in Drive and Control Systems".

  The machine builder is responsible for compliance with the limiting values as prescribed in the national regulations and specific EMC regulations for the application.

European countries: see Directive 89/336/EEC (EMC Guideline).

U.S.A.: See National Electrical Codes (NEC), National Electrical Manufacturers Association (NEMA), and local building codes. The user of this equipment must consult the above noted items at all times.

- Technical data, connections and operational conditions are specified in the product documentation and must be followed at all times.

2.5   Protection against contact with electrical parts

> **Note :**   This section refers to equipment with voltages above 50 Volts.

Making contact with parts conducting voltages above 50 volts could be dangerous to personnel and cause an electrical shock. When operating electrical equipment, it is unavoidable that some parts of the unit conduct dangerous voltages.

⚠️ **DANGER**

High electrical voltage ! Danger to life, severe electrical shock and severe bodily injury !

⇒ Only those trained and qualified to work with or on electrical equipment are permitted to operate, mainain or repair this equipment.

⇒ Follow general construction and safety regulations when working on electrical installations.

⇒ Before switching on power the ground wire must be permanently connected to all electrical units according to the connection diagram.

⇒ Do not operate electrical equipment at any time if the ground wire is not permanently connected, even for brief measurements or tests.

⇒ Disconnect mains or the voltage source from the equipment before beginning any work. Lock the equipment against being switched on while work is being performed.

⇒ Wait five (5) minutes after switching off power to allow capacitors to discharge before beginning work. Measure the voltage on the capacitors before beginning work to make sure that the equipment is safe to touch.

⇒ Never touch the electrical connection points of a component while power is turned on.

⇒ Install the covers and guards provided with the equipment properly before switching the equipment on. Prevent contact with live parts at any time.

⇒ A residual-current-operated protective device (r.c.d.) must not be used on an AC drive ! Indirect contact must be prevented by other means, for example, by an overcurrent protective device.

⇒ Equipment that is built into machines must be secured against direct contact. Use appropriate housings, for example a control cabinet.

European countries: according to EN 50178/1998, section 5.3.2.3.

U.S.A: See National Electrical Codes (NEC), National Electrical Manufacturers Association (NEMA) and local building codes. The user of this equipment must observe the above noted instructions at all times.

![warning triangle] **DANGER**

High electrical voltage ! High leakage current ! Danger to life, danger of injury and bodily harm from electrical shock !

⇒ Before switching on power for electrical units, all housings and motors must be permanently grounded according to the connection diagram. This applies even for brief tests.

⇒ Leakage current exceeds 3.5 mA. Therefore the electrical equipment and units must always be firmly connected to the supply network.

⇒ Use a copper conductor with at least 10 mm² cross section over its entire course for this protective connection !

⇒ Prior to startups, even for brief tests, always connect the protective conductor or connect with ground wire. High voltage levels can occur on the housing that could lead to severe electrical shock and personal injury.

European countries: EN 50178/1998, section 5.3.2.1.

USA: See National Electrical Codes (NEC), National Electrical Manufacturers Association (NEMA), and local building codes. The user of this equipment must maintain the above noted instructions at all times.

2.6   Protection by protective low voltage (PELV) against electrical shock

All connections and terminals with voltages between 5 and 50 Volts on INDRAMAT products are protective low voltages designed in accordance with the following standards on contact safety :

• International: IEC 364-4-411.1.5

• EU countries: see EN 50178/1998, section 5.2.8.1.

![warning triangle] **WARNING**

High electrical voltage due to wrong connections ! Danger to life, severe electrical shock and severe bodily injury !

⇒ Only equipment, electrical components and cables of the protective low voltage type (PELV = Protective Extra Low Voltage) may be connected to all terminals and clamps with 0 to 50 Volts.

⇒ Only safely isolated voltages and electrical circuits may be connected. Safe isolation is achieved, for example, with an isolating transformer, an optoelectronic coupler or when battery-operated.

2.7 Protection against dangerous movements

Dangerous movements can be caused by faulty control or the connected motors. These causes are be various such as:

- unclean or wrong wiring of cable connections
- inappropriate or wrong operation of equipment
- malfunction of sensors, encoders and monitoring circuits
- defective components
- software errors

Dangerous movements can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation.

The monitors in the drive components make faulty operation almost impossible. Regarding personnel safety, especially the danger of bodily harm and property damage, this alone should not be relied upon to ensure complete safety. Until the built-in monitors become active and effective, it must be assumed in any case that some faulty drive movements will occur. The extent of these faulty drive movements depends upon the type of control and the state of operation.

DANGER

Dangerous movements ! Danger to life and risk of injury or equipment damage !

⇒ Personnel protection must be secured for the above listed reason by means of superordinate monitors or measures.

These are instituted in accordance with the specific situation of the facility and a danger and fault analysis conducted by the manufacturer of the facility. All the safety regulations that apply to this facility are included therein. By switching off, circumventing or if safety devices have simply not been activated, then random machine movements or other types of faults can occur.

Avoiding accidents, injury or property damage :

⇒ Keep free and clear of the machine's range of motion and moving parts. Prevent people from accidentally entering the machine's range of movement:

- use protective fences

- use protective railings

- install protective coverings

- install light curtains or light barriers

⇒ Fences must be strong enough to withstand maximum possible momentum.

⇒ Mount the emergency stop switch (E-stop) in the immediate reach of the operator. Verify that the emergency stop works before startup. Don´t operate the machine if the emergency stop is not working.

⇒ Isolate the drive power connection by means of an emergency stop circuit or use a start-inhibit system to prevent unintentional start-up.

⇒ Make sure that the drives are brought to standstill before accessing or entering the danger zone.

⇒ Disconnect electrical power to the equipment using a master switch and secure the switch against reconnection for :

- maintenance and repair work

- cleaning of equipment

- long periods of discontinued equipment use

⇒ Avoid operating high-frequency, remote control and radio equipment near electronics circuits and supply leads. If use of such equipment cannot be avoided, verify the system and the plant for possible malfunctions at all possible positions of normal use before the first start-up. If necessary, perform a special electromagnetic compatibility (EMC) test on the plant.

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2.8 Protection against magnetic and electromagnetic fields during operations and mounting

Magnetic and electromagnetic fields generated by current-carrying conductors and permanent magnets in motors represent a serious health hazard to persons with heart pacemakers, metal implants and hearing aids.

WARNING

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment !

⇒ Persons with pacemakers, metal implants and hearing aids are not permitted to enter following areas:

- Areas in which electrical equipment and parts are mounted, being operated or started up.

- Areas in which parts of motors with permanent magnets are being stored, operated, repaired or mounted.

⇒ If it is necessary for a person with a pacemaker to enter such an area, then a physician must be consulted prior to doing so. Pacemaker, that are already implanted or will be implanted in the future, have a considerable deviation in their resistance to interferences. Due to the unpredictable behaviour there are no rules with general validity.

⇒ Persons with hearing aids, metal implants or metal pieces must consult a doctor before they enter the areas described above. Otherwise health hazards will occur.

2.9 Protection against contact with hot parts

CAUTION

Housing surfaces could be extremely hot !
Danger of injury ! Danger of burns !

⇒ Do not touch surfaces near the source of heat ! Danger of burns !

⇒ Wait ten (10) minutes before you access any hot unit. Allow the unit to cool down.

⇒ Do not touch hot parts of the equipment, such as housings, heatsinks or resistors. Danger of burns !

2.10 Protection during handling and installation

Under certain conditions unappropriate handling and installation of drive components may cause injuries.

⚠️ **CAUTION**	**Risk of injury through incorrect handling !** **Bodily harm caused by crushing, shearing, cutting and mechanical shock !**

⇒ Observe general instructions and safety regulations during handling installation.

⇒ Use only appropriate lifting or moving equipment.

⇒ Take precautions to avoid pinching and crushing.

⇒ Use only appropriate tools. If specified by the product documentation, special tools must be used.

⇒ Use lifting devices and tools correctly and safely.

⇒ Wear appropriate protective clothing, e.g. safety glasses, safety shoes and safety gloves.

⇒ Never stay under suspended loads.

⇒ Clean up liquids from the floor immediately to prevent personnel from slipping.

2.11 Battery safety

Batteries contain reactive chemicals in a solid housing. Inappropriate handling may result in injuries or equipment damage.

⚠️ **CAUTION**	**Risk of injury through incorrect handling !**

⇒ Construction and design according to the standards

⇒ Do not attempt to reactivate discharged batteries by heating or other methods (danger of explosion and corrosion).

⇒ Never charge batteries (danger from leakage and explosion).

⇒ Never throw batteries into a fire.

⇒ Do not dismantle batteries.

⇒ Handle with care. Incorrect extraction or installation of a battery can damage equipment.

Note: Environmental protection and disposal! The batteries contained in the product should be considered as hazardous material for land, air and sea transport in the sense of the legal requirements (danger of explosion). Dispose batteries separately from other refuse. Observe the legal requirements given in the country of installation.

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Notes

3 Description of diagnostic letters F... and E...

3.1 Error diagnostic messages F...

Many areas are monitored in connection with operating modes and parameter settings. An error message is generated if a condition is discovered which no longer allows proper operation.

Error Classes The errors are separated into four different error classes. The error class is evident from the diagnostic message. They are determined with the drive's error response.

Error class :	Diagnostic Message:	Drive Reaction:
Fatal	F8xx	Torque free switching
Travel range	F6xx	Velocity command value to zero
Communications Interface	F4xx	In accordance with best possible deceleration
Non-fatal	F2xx	In accordance with best possible deceleration

Fig. 3-1:   Error Classes and Drive Reaction

Drive's Error Reaction If an error state is detected in the drive then an automatic operation of the drive's error response will be started as long the drive is in control. The H1 display blinks a Fx / xx.

The drive's reaction can be parameterized by **P-0-0119, Deceleration as best as possible**, with interface and non-fatal errors. At the end of each error reaction the drive is switched off.

Reset the Error Errors will not be automatically deleted but must be:

- Reset from the control through the initialization of the command **S-0-0099, Reset Class 1 Diagnostics**, or
- reset by pressing the **"S1"** button.

If the error state is still present then the error will be immediately detected again.

A positive edge bit on the control enable signal is necessary in order to turn on the drive again.

F207 Switching to uninitialized operation mode

Cause:

0 has been selected in at least one of the four Operating mode parameters **S-0-0032..35**. This mode has been selected by the bits 8 and 9 in the master control word while the drive controller was on.

Remedy:

Enter the desired mode in the activated mode parameter.

Examples for possible modes are:

Meaning:	Bit list of the mode parameters:
Torque control	0000 0000 0000 0001
Velocity control	0000 0000 0000 0010
Position control with act. feedback val. 1	0000 0000 0000 x011
Position control with act. feedback val. 2	0000 0000 0000 x100
Drive-internal interpolation with actual feedback value 1	0000 0000 0001 x011
Drive-internal interpolation with actual feedback value 2	0000 0000 0001 x100
Relative drive-internal interpolation with actual feedback value 1	0000 0010 0001 x011
Relative drive-internal interpolation with actual feedback value 2	0000 0010 0001 x100

Fig. 3-2:   Operation Modes

Which operation modes can be selected in a certain device is written in the description for the operation mode parameters:

Parameter: Primary mode of operation   S-0-0032

Secondary operation mode 1   S-0-0033

Secondary operation mode 2   S-0-0034

Secondary operation mode 3   S-0-0035

Check for input of the permissible interpolation method.

See also the functional description: "Setting the Operating Mode Parameters"

F208 UL The motor type has changed.

This indication happens when you power up for the first time with a new motor.

The regulator settings for the current, velocity and position loops are stored in the feedback on the motor. After powering up, the drive compares the motor type stored in the parameter with the connected motor type. If the two do not match, basic control loop settings must be adapted, too.

With the Basic Load command, the default control loop settings are loaded from the feedback memory into the drive. The previous loop settings are overwritten. By pressing the S1 key, the command Basic Load is started.

Causes:

- The motor has been exchanged.

- A parameter file has been loaded, but the parameter **S-0-0141, Motor type** contained a motor type different from the present one.

Remedy:

Command **C700 Basic Load** or press the S1 button.

See also the functional description: "Automatic Execution of the Load Default Feature".

F209 PL Load parameter default values

After replacing the firmware version, the drive displays "**PL**", if the parameters have been changed in regards to the old product. By pressing the S1 button on the drive controller or by starting the command "load basic parameters", all the parameters will be erased and restored with the default (initial) values.

Cause:

The firmware has been exchanged; the number of parameters in comparison to the old product has changed.

Remedy:

Press S1 button on the drive controller, and all the parameters will be erased and restored with the factory preset default values

⇒ This overwrites all parameters and positioning blocks.

WARNING

See also the functional description: "Basic parameter block".

F218 Amplifier overtemp. shutdown

The temperature of the amplifier's heatsink is monitored. If the heatsink is too hot, the drive will power down in order to protect against damage.

Cause:

1. Ambient temperature is too high. The specified performance data are valid up to an ambient temperature of 45°C.
2. The amplifier's heatsink is dirty.
3. Air flow is prevented by other assembly parts or the control cabinet assembly.
4. Blower defective

Remedy:

For 1. Reduce the ambient temperature, e.g. through cooling of the control cabinet.

For 2. Remove obstructions or dirt from the heatsink.

For 3. Install the device vertically and clear a large enough area for proper heatsink ventilation.

For 4. Exchange drive.

F219 Motor overtemp. shutdown

If the motor temperature exceeds the value in **S-0-0204, Motor shutdown temperature**, the drive will generate this error message. The value in **S-0-0204** is fixed at 150°C for MHD-,MKD- and MKE motors. The appropriate value must be entered from the motor's technical specifications for all other types of motors.

For motors of series: 2AD, 1MB, LAF, LAR, and MBW, the current motor temperature can be called up with parameter **S-0-0383, Motor temperature**.

Cause:

1. The motor became overloaded. The effective torque demand on the motor was above its permissible continuous torque level for too long.
2. Short circuit or disconnection in the connection to motor temperature monitoring.
3. Instability in the velocity control loop.

Remedy:

For 1. Check the layout of the motor. For motors which have been in operation for longer periods of time, check to see if the operating conditions have changed (in regards to cleanliness, friction, moved components, etc.).

For 2. Check the wiring to the motor temperature monitor X6/1 and X6/2 for disconnection or short circuits.

For 3. Check the velocity control loop parameters (see the functional description).

See also the functional description: "Temperature monitoring"

F221 Motor temp. surveillance defective

Cause:

Wire break or interruption in the wires for the motor temperature monitoring.

Remedy:

Check the wiring for the motor temperature monitoring (signals MT(emp)+ and MT(emp)-) for interruption and short circuit.

See also the functional description: "Temperature Monitoring".

F226 Undervoltage in power section

The level of the DC bus voltage is monitored by the drive controller. If the DC bus voltage falls below a minimal threshold, the drive independently shuts down according to the set error reaction.

Cause:

1.   The power source has been interrupted without first switching off the drive enable (RF).

2.   Disturbance in the power supply

Remedy:

For 1. Check the logic regarding the activation of the drive within the connected control.

For 2. Check the power supply.

The error can be cleared by removing the drive enable signal.

See also the functional description: "Drive enable"

F228 Excessive deviation

When the position loop is closed, the drive monitors whether it is able to follow the specified command value. This is done by calculating a model position value in the drive and comparing that value with the actual feedback value. If the difference between theoretical and actual position value permanently exceeds the value of the **S-0-0159, Monitoring window** parameter, the drive obviously cannot follow the given command value. Then this error is generated.

Cause:

1. The drive's **acceleration** capacity has been exceeded.

2. The axis is **blocked**.

3. Incorrect parameter values set in the drive parameters.

4. Incorrect parameter values in **S-0-0159, Monitoring window**.

Remedy:

Ref. 1. Check the **S-0-0092, Bipolar torque/force limit value** parameter and set it to the maximum permissible value of the application. Reduce the specified acceleration value from the controller (see controller Manual).

Ref. 2. Check the mechanical system and eliminate jamming of the axis.

Ref. 3. Check the drive parameters (control loop tuning).

Ref. 4. Set the parameter values of **S-0-0159, Monitoring window**.

See also the functional description " Position Control Loop Monitoring".

F229 Encoder 1 failure: quadrant error

With wrong signals in the encoder evaluation, a hardware error has been discovered in the encoder interface 1 being used.

Cause:

1.   Defective encoder cable

2.   Disruptive electro-magnetic interference on the encoder cable

3.   Defective encoder interface

4.   Defective drive controller

Remedy:

For 1.   Exchange the encoder cable.

For 2.   Keep the encoder cable well away from the power cables.

For 3.   Exchange the encoder interface.

For 4.   Exchange the drive controller.

F230 Max. signal frequency of encoder 1 exceeded

The signal frequency of the encoder 1 (motor encoder) is checked whether the allowed max. frequency of the encoder interface is exceeded.

If the frequency is higher than allowed, the error **F230, Max. signal frequency of encoder 1 exceeded** is generated. The position status of the encoder 1 is cleared to 0.

Cause:

Maximum speed of the feedback device is lower than the maximum motor speed.

Suggestion:

- Don't allow the motor to run faster than the maximum allowed sensor speed by reducing parameter **S-0-0091, Bipolar Speed Limit.**

- Change the sensor for a device with higher speed rating.

F233 External power supply error

Cause:

The DEA plug-in modules have isolated inputs and outputs. Proper operation of those inputs and outputs requires an external 24-Volts to be applied. The drive monitors that voltage as soon as a DEA plug-in module has been installed.

Remedy:

Check the external 24-V power supply.

Name:	**Unit:**	**min.:**	**typ.:**	**max.:**
External operating voltage $+U_L$	V	18	24	32
External current consumption I_L	mA			100

Fig. 3-3:   External power supply

See also the functional description: "Digital I/O Functional Principle"

F236 Excessive position feedback difference

Cause:

In the communication phase 4 transition check command, position feedback value 1 and position feedback value 2 are set to the same value, and the cyclic evaluation of both encoders is started. In cyclic operation (phase 4), the position feedback difference of both encoders is compared with **S-0-0391, Monitoring window feedback 2**. If the amount of the difference exceeds the monitoring window, the error F236 Excessive position feedback difference is diagnosed, the parameter-

selected error response is performed, and the reference bits of both encoders are cleared.

Note:	The monitoring is off, when the parameter S-0-0391, Monitoring window feedback 2 is set to the value 0.

Possible Causes :

1. Incorrect parameter for the encoder 2
    (**S-0-0115, Position feedback 2 type parameter,
    S-0-0117, Resolution of feedback 2**)

2. Incorrect parameter setting of mechanical system between motor shaft and encoder 2:
    (S-0-0121, Input revolutions of load gear,
    S-0-0122, Output revolutions of load gear,
    S-0-0123, Feed constant)

3. The mechanical system between motor shaft and encoder 2 is not rigid (e.g. gear play, slip).

4. Defective encoder cable

5. Maximum input frequency of the encoder interface exceeded

6. Encoder 2 (optional) is not mounted to the driven axis.

7. Incorrect reference measure of an absolute encoder

Remedy:

Ref. 1. Check **S-0-0115, Position feedback 2 type parameter** and **S-0-0117, Resolution of feedback 2**.

Ref. 2. Check **S-0-0121, S-0-0122, Input/Output revolutions of load gear** and **S-0-0123, Feed constant**.

Ref. 3. Increase **S-0-0391, Monitoring window feedback 2;** switch off when using a gearbox with a large amount of slip.

Ref. 4. Replace encoder cable.

Ref. 5. Reduce the velocity.

Ref. 6. Set **S-0-0391, Monitoring window feedback 2** to 0 (de-activate monitoring function).

Ref. 7. Perform **P-0-0012, C300 Command 'Set absolute measurement'**.

See also the functional description "Actual Feedback Value Monitoring".

F237 Excessive position command difference

Cause:

When the drive is operating in position control, incoming position command values are monitored. If the velocity required of the drive by two successive position command values is greater than or equal to the value in **S-0-0091, Bipolar velocity limit value**, position command value monitoring is initiated. The **Excessive position command value** is stored in parameter **P-0-0010**. The **last valid position command value** is stored in parameter **P-0-0011**.

If position data are to be processed in modulo format, then the interpretation of the command is also dependent on the value set in **S-0-0393, Command value mode for modulo format.** The parameter should be set for the "shortest path" (0).

Remedy:

Compare S-0-0091, Bipolar velocity limit value with the velocity in the program and adjust to match it, if necessary.

F242 Encoder 2 failure: signal too small

Cause:

The analog signals of an external measurement system are used for high resolution analysis of that measurement system. These are monitored according to two criteria:

1. The pointer length, which is calculated from the amplified sine and cosine signals, must be at least 1 V.

2. The maximum pointer length resulting from the sine and cosine signals must not exceed 11.8 V.

$$pointerlength = \sqrt{\sin^2 + \cos^2}$$

Fig. 3-4:   Pointer length
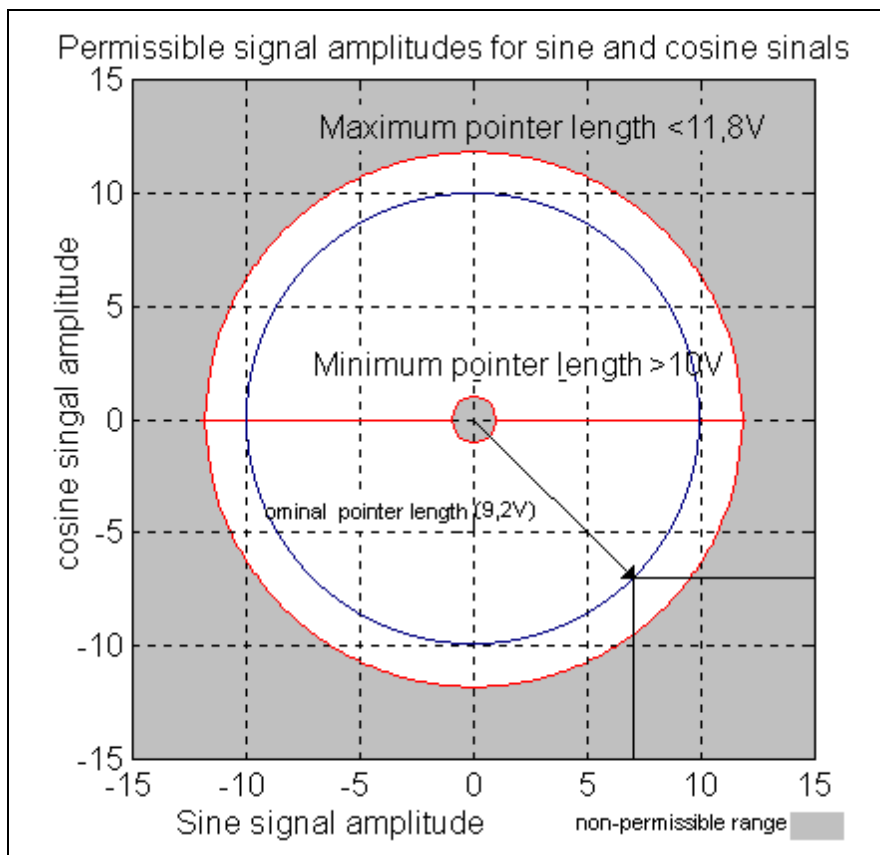
Fig. 3-5:   Correct signal amplitude

Note: When an incremental encoder with squarewave signals is used, the signal is not monitored.

Example:

U_{cos} = -6.5V

U_{sin} = 6.5V

$$\text{pointer length} = \sqrt{(-6.5V)^2 + 6.5V^2} \cong 9.2V$$

Remedy:

1. Check the measurement system cable.

2. Check the measurement system.

F245 Encoder 2 failure: quadrant error

The evaluation of the additional optional encoder (encoder 2) is active. In the evaluation of the sinusoidal input signals of the optional encoder, a plausibility check is performed between these signals and the counter fed by these signals. Doing this, an error has been encountered.

Cause:

1. Defective encoder cable
2. Disruptive electro-magnetic interference on the encoder cable
3. Defective encoder interface

Remedy:

For 1. Exchange the encoder cable.

For 2. Keep the encoder cable well away from power cables.

For 3. Exchange the encoder interface (DIAX) or the drive (Ecodrive).

F246 Max signal frequency of encoder 2 exceeded

The signal frequency of the encoder 2 (optional encoder) is checked whether the allowed max. frequency of the encoder interface is exceeded.

Whether, in the case of an excessive frequency, the error F246, Max signal frequency for encoder 2 exceeded is generated or not, depends on the setting in the parameter **P-0-0185, Function of encoder 2**. If the number 4 for spindle encoder is set there, only the position status of the optional encoder is cleared to 0. In the other case, the warning **F246** is generated and the position status is cleared to 0.

F248 Low battery voltage

Cause:

For motors of series MKD and MKE, the absolute position information is stored by a battery-powered electronic in the motor feedback. The battery is designed for a 10-year life span. If the battery voltage falls below 3,1 V, this message appears. The absolute encoder function will still be preserved for about 2 weeks.

⚠ **CAUTION**	**Malfunction in the control of motors and moving elements** Possible damages: Mechanical injuries ⇒ Replace the battery as soon as possible.

Instructions for Exchanging Batteries

Have the following tools and accessories ready:

*   Torx screwdriver size 10
*   Needle-nose pliers, torque wrench
*   New packaged battery (Part No. 257101)

⚠ **CAUTION**	**Malfunction in the control of motors and moving elements** Possible damages: Mechanical injuries ⇒ Turn off the power supply. Make sure it will not be turned back on. Exchange the battery while the control voltage (24V) is turned on.

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If the control voltage is turned off while the battery is taken out, the absolute **reference** point will be lost. Then, the reference point must be reestablished with the command "**Set absolute measuring**".

Removing the Battery

- Unscrew torx screws with size 10 screwdriver.
- Pull out the resolver feedback (RSF) lid by hand.
- Pull off the battery connector.
- Loosen battery clamp and remove the battery.
- Place the prepared battery in the housing and screw on the clamp. **Attention!** Do not kink or clamp the battery cable.
- Attach the connector of the battery.

Close the resolver feedback lid, screw in 4 torx screws and tighten to 1.8 Nm with the torque wrench.

F267 Erroneous internal hardware synchronization

Cause:

The drive control is synchronized on the bus interface (SERCOS, Profibus, Interbus, ...). The correct function of the synchronization is monitored. If the average value of the deviation exceeds 5 µs, this error is generated.

Remedy:

Replace drive controller.

F268 Brake fault

The drive controller takes control of the brake for motors with an integrated holding brake. The braking current is monitored.

If the braking current is outside of the permissible range between:

> 0.4 -1.6 * **P-0-0511, Break current**

this error message will be generated.

Cause:

1.   The power supply for the brake is not connected properly or is outside of the (24 V +/- 10%) tolerance.
2.   The motor cable is incorrectly connected (wiring error).
3.   Defective brake.
3.   Defective drive controller.

Note: A connection between the 0V brake supply and the 0V of the drive controller is required.

Remedy:

For 1.   Check the power supply.

For 2.   Check the motor cable.

For 3.   Exchange the motor.

For 4.   Exchange the drive controller.

See also the functional description: "Current Limit"

F270 Error power supply home switch

To be able to monitor the home switch in drive-controlled homing, the DSS2.1 plug-in module requires an external 24-V power supply. The drive monitors the external 24-V power supply if homing with home switch has been selected via **S-0-0147, Homing parameter** (bit 5).

Cause:

The external 24-V power supply of the DSS2.1 plug-in module is missing.

Remedy:

1. Set **S-0-0147, Homing parameter** to "Homing without home switch" (bit 5 = 1).

2. Check the 24-V power supply at connector X12 of the DSS2.1 module.

Name:	Unit:	min.:	typ.:	max.:
External operating voltage $+U_L$	V	18	24	32
External current consumption I_L	mA			100

Fig. 3-6: External power supply

See also the functional description: "Configuration of the Home switch"

F271 Error power supply travel limit switch

To be able to monitor the travel limit switches, the DSS2.1 plug-in module requires an external 24-V power supply. The drive monitors the external 24-V power supply if the travel limit switches have been activated via the **P-0-0090, Travel limit parameter**.

Cause:

The external 24-V power supply of the DSS2.1 plug-in module is missing.

Remedy:

1. De-activate **P-0-0090, Travel limit parameter**.

2. Check the 24-V power supply at connector X12 of the DSS2.1 module.

See also the functional description: "Travel Zone Limit Switches - Activation and Polarity"

F272 Error power supply probe input

The probe inputs of the DSS2.1 plug-in module require an external 24-V power supply. The drive monitors the external 24-V power supply if the probes are activated via the **S-0-0170, Probing cycle procedure command**.

Cause:

The external 24-V power supply of the DSS2.1 plug-in module is missing.

Remedy:

Connect the 24-V power supply to the connector X12 of the DSS2.1 module.

See also the functional description: "Connecting the Probe Inputs"

F273 Error power supply E-Stop

The emergency stop input of the DSS2.1 plug-in module requires an external 24-V power supply. The drive monitors the external 24-V power supply if the emergency stop function is activated via the **P-0-0008, Activation E-Stop-Function** parameter.

Cause:

The external 24-V power supply of the DSS2.1 plug-in module is missing.

Remedy:

1.   Connect 24-V power supply to the connector X12 of the DSS2.1 module.

2.   Use the **P-0-0008, Activation E-Stop-function** parameter to de-activate the emergency stop function.

See also the functional description: "Connection of the Emergency-Stop Input"

F276 Absolute encoder out of allowed window

When turning off the drive controller with an absolute encoder, the actual feedback position will be stored. When powered up, the absolute position given by the encoder is compared with the stored position.

Cause:

1.   Turning on for the first time (invalid stored position)

2.   The motor has been moved further than allowed by the parameter in the absolute encoder monitoring window, P-0-0097, while it was turned off.

3.   Incorrect position initialization

Remedy:

For 1.   Press S1 to reset the error and set the absolute position.

For 2.   The motor was moved while turned off and sits outside of its permissible position. Check to see if the displayed position is correct in relation to the machine zero point. Reset subsequent errors.

For 3.

⚠ **WARNING**	**An accident may occur by accidental shaft movement.** Check absolute position information. The feedback is defective if the absolute position information is wrong. The motor should be exchanged and sent to the INDRAMAT Customer Service.

See also Functional Description "Absolute Encoder Monitoring".

F277 Current measurement trim wrong

The current reading in the drive controller is compensated for during operation. The compensation values are stored in parameters P-0-4000 and P-0-4001. These values are queried to ensure they maintain the tolerance of +/- 10 %. Should the values be greater, then this error is generated.

Cause:

1. Hardware defective in the drive controller.

Remedy:

1. Replace hardware.

F316 Softstart fault power supply unit

The DC bus cannot be activated.

Cause:

1. Short-circuit in power supply or drive controller.

2. Too many additional capacitors have been connected.

3. Interrupt in DC bus choke (only applies to HVE)

Remedy:

1. Disconnect drive controllers and turn power back on. If Power Supply is defective, replace it. Otherwise, reconnect the drives, one at a time, until the defective one is found.

2. Number of additional capacitor must be reduced or a separate loading device must be used.

3. DC bus choke and lines must be checked, possibly replaced.

F318 Heatsink overtemp. fault power supply unit

Power switched off due to excessive heatsink temperature.

Cause:

The unit is overloaded or ambient temperature is too high.

Remedy:

Check load and ambient temperature. Temperature pre-warning contact of the unit must be checked.

F320 Bleeder overload

Power shutoff due to high bleeder load.

Cause:

1. In the HVR, too much regenerated drive energy even with power off.

2. In the HVE, continuous regenerated power or drive energy is too high.

3. Unit is defective.

Remedy:

On 1: Reduce drive speed. Delay power off in the case of Power Supply switch off or emergency stop.

On 2: Increase cycle time, reduce the speed of the drive, install additional bleeder.

On 3: Replace unit.

F360 Overcurrent power supply unit

With HVR only!

Cause:

Short-circuit in power supply unit, drive controller, motor or a cable.

Remedy:

Disconnect power supply lines on the drive controller one at a time. Replace a unit if it is defective.

F369 +24V/+-15V/+5V fault power supply unit

Control voltage interference.

Cause:

1.   Maximum permissible load has been exceeded
2.   Short-circuit in wiring if control voltage is used outside of drive system.
3.   Unit is defective.

Remedy

On 1:   Remove control voltage bus connections to drive controllers one after the other.

On 2:   Remove control voltage connections and check for short-circuits.

On 3:   Replace unit.

F380 Short to ground power supply unit

Cause:

Ground short: in power supply unit

in drive controller

in motor or motor cable

Remedy:

Remove connections to motor and power supply unit one at a time. Replace defective drive components.

F381 Mains failure

With HVR only !

Cause:

At least one phase of the 3 phase power supply input is missing.

Remedy:

Check mains fuses and replace, if necessary.

F382 Mains phase loss fault

With HVE only !

Cause:

At least one phase of the 3 phase power supply input is missing.

Remedy:

Check mains fuses and replace, if necessary.

F383 Line voltage fault

With HVR only !

Cause:

Mains voltage exceeds permissible tolerance (3x 380 ... 480V, ± 10 %).

Remedy:

Check mains voltage, use matching transformer, if necessary.

F384 Connection error at power supply unit

With HVR only !

Cause:

Power and control voltage connects are not in phase.

Remedy:

Check connection voltage. Terminals X5/U and X8/1, X5/V and X8/2, X5/W and X8/3 may not conduct voltage to each other.

F385 Line frequency fault

With HVR only !

Cause:

Mains frequency exceeds permissible tolerance (± 2Hz).

F394 Checksum error power supply unit

With HVR only !

Cause:

Unit failure.

Remedy:

Replace unit.

F401 Double MST failure shutdown

The master sync telegram was not received in the drive controller in two successive SERCOS cycles.

Cause:

1.   Disruption in the Fiber Optic transmission line.
2.   Too much attenuation of the light signal.
3.   Malfunction in the SERCOS interface (general).

Remedy:

For 1.   Check all Fiber Optic connections in the SERCOS ring.

For 2.   Measure the attenuation in the Fiber Optic cable.

The maximum attenuation between TX and RX must not fall below 12.5 dB.

For 3.   Exchange the SERCOS interface module in the drive controller.

See also the functional description: "SERCOS interface Error"

F402 Failure of 2 consecutive MDT signals

The drive failed to receive the Master Date Telegram in 2 consecutive SERCOS or fieldbus cycles .

Causes:

1. Fiber optic ring: Distortion in the fiber optic transmission.
2. Fiber optic ring: The attenuation of the optical signal is too high.
3. SERCO: Distortion in the SERCOS interface (general)
4. Fieldbus: The field bus communication was broken/stopped for longer that the watchdog time.
5. The master has stopped sending cyclical telegrams to the drive.

Note: This error can only come if the drive is in Phase 4 (Operating Mode).

Remedy:

1. Check all fiber optic connections in the SERCOS ring.
2. Measure the attenuation in the fiber optic cables. The maximum attenuation between TX and RX is not allowed to exceed 12.5 dB.
3. Exchange the defective SERCOS interface.
4. Check the fieldbus connectors and cable connection.
5. Turn on the master control and start cyclic communications. See the specific controller manual for more details.

See also the functional description: "SERCOS interface Error"

F403 Invalid communication phase shutdown

An invalid communications phase was given by the SERCOS master module (phase > 4).

Cause:

Error in the SERCOS master module of the control system.

Remedy:

Consult the control system manufacturer.

See also the functional description: "SERCOS interface Error"

F404 Error during phase progression

The prescribed order was not maintained during phase progression.

Cause:

Error in the SERCOS master module of the control system.

Remedy:

Consult the control system manufacturer.

See also the functional description: "SERCOS interface Error"

F405 Error during phase regression

Switching back from a communication phase did not switch to phase 0.

Cause:

Malfunction in the SERCOS master module of the controller.

Remedy:

Contact the controller manufacturer.

See also the functional description: "SERCOS interface Error"

F406 Phase switching without ready signal

The SERCOS master attempted a phase switch without waiting for the drive controller's ready signal.

Cause:

Error in the SERCOS master module of the control system.

Remedy:

Consult the control system manufacturer.

See also the functional description: "SERCOS interface Error"

F434 Emergency-Stop

Pressing the emergency stop switch (E-Stop) has caused the drive to perform the emergency stop function that was selected in the **P-0-0119, Best possible deceleration** parameter. Setting bit 15 of **S-0-0011, Class 1 diagnostics** causes an error message to be issued to the controller.

Cause:

The emergency stop switch has been pressed.

Remedy:

Eliminate the malfunction that has caused the emergency switch to be actuated, and clear the error.

See also the functional description: " Emergency stop feature".

F501 Monitoring Safe Halt

The safety function Safe Halt is selected, and the drive interlock is not active, or the control has given the drive enable.

Cause:

1. Error in the actuation of the drive interlock (DIAX: connector X3)
2. Malfunction of the control

Remedy:

For 1. Check the wiring of the drive interlock.

For 2. Contact the manufacturer of the control.

See also the functional description: "Intelligent Safety Technology IST".

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F502 Monitoring Safe operating halt

The monitoring of the Safe operating Halt has been triggered. The monitor is active in the following cases:

- When switching on a safety function, the monitoring of the Safe operating Halt is active for 300 ms.

- The safety function Safe operating Halt is active.

- The safety function Safe reduced Speed 1/2 with safety limited absolute position 1/2 is selected, and the confirmation key is not pressed.

Cause:

1. During active operation mode position control, the control has changed the position command value.

2. During active operation mode velocity control, the control has given a velocity command value different from 0.

3. After switching on the monitor for the Safe operating Halt, the axis has moved by more than the **P-0-0267, Pos. monitoring window for safe stop operation, drive**.

Remedy:

Zu 1. Contact the manufacturer of the control.

Zu 2. Contact the manufacturer of the control.

Zu 3. Inhibit the motion of the axis, or increase the parameter **P-0-0267, Pos. monitoring window for safe stop operation, drive**.

See also the functional description: "Intelligent Safety Technology IST".

F503 Monitoring safe reduced speed 1 + abs. pos. 1

The monitor of the safety function Monitoring safe reduced speed 1 + abs. pos. 1 has triggered. Either the drive has exceeded the **P-0-0253, Max. speed 1 for safety function, drive**, or it has left the position range set by the parameters **P-0-0254, Upper position limit 1 for safety function, drive** and **P-0-0255, Lower position limit 1 for safety function, drive**.

If the parameters P-0-0254 and P-0-0255 are other than zero, the lack of the Safe Reference leads to the same error.

Cause:

1. The abs. value of the actual velocity has become greater than the Max. Velocity 1.

2. During active operation mode position control, the abs. value of the position command difference has become greater than the Max. Velocity 1.

3. During active operation mode velocity control, the abs. value of the velocity command has become greater than the Max. Velocity 1.

4. The execution of the **P-0-0272, C000 Command Check reference** has not been successful.

5. The actual position has left the Absolute Range 1.

6. During active operation mode position control, the position command has left the Absolute Range 1.

Remedy:

For 1., 2., 3.   Reduce the jog velocity or increase the Max. Velocity 1.

For 4.   Home the axis with subsequent command "Check Reference".

For 5, 6.   Move the axis into the permitted range. Check the position limits P-0-0254 and P-0-0255.

See also the functional description: "Intelligent Safety Technology IST".

F504 Monitoring safe reduced speed 2 + abs. pos. 2

The monitor of the safety function Monitoring safe reduced speed 2 + abs. pos. 2 has triggered. Either the drive has exceeded the **P-0-0256, Max. speed 2 for safety function, drive**, or it has left the position range set by the parameters **P-0-0257, Upper position limit 2 for safety function, drive** and **P-0-0258, Lower position limit 2 for safety function, drive**.

If the parameters P-0-0257 and P-0-0258 are other than zero, the lack of the Safe Reference leads to the same error.

Cause:

1. The abs. value of the actual velocity has become greater than the Max. Velocity 2.

2. During active operation mode position control, the abs. value of the position command difference has become greater than the Max. Velocity 2.

3. During active operation mode velocity control, the abs. value of the velocity command has become greater than the Max. Velocity 2.

4. The execution of the **P-0-0272, C000 Command Check reference** has not been successful.

5. The actual position has left the Absolute Range 2.

6. During active operation mode position control, the position command has left the Absolute Range 2.

Remedy:

For 1., 2., 3.   Reduce the jog velocity or increase the Max. Velocity 2.

For 4.   Home the axis with subsequent command "Check Reference".

For 5, 6.   Move the axis into the permitted range. Check the position limits P-0-0257 and P-0-0258.

See also the functional description: "Intelligent Safety Technology IST".

F505 Activation of a safety function wrong

300 ms after switching on a safety function, there is a check whether the acknowledge bits for the input signals in the status words of drive and control (parameters P-0-0252 and P-0-0276) are identical. Furthermore, the difference of the monitored actual positions (parameters P-0-0273 and P-0-0296) must be smaller than the Monitoring Window for the Safe operating Halt (parameter P-0-0267).

Cause:

1. The safety function was activated in only one channel (the drive).

2. The monitored actual position in the control is wrong.

Remedy:

For 1. Check the wiring of the safety I/O modules.

For 2. Contact the manufacturer of the control.

See also the functional description: "Intelligent Safety Technology IST".

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F506 Forced dynamization necessary

The time elapsed since the last forced dynamic monitoring is greater than set in the parameter **P-0-0271, Time interval for forced dynamization, drive**.

After switching on, before activating a safety function, a forced dynamization must always be done.

The error is set only when the power is switched on.

Cause:

1. A safety function has been activated without prior performing a forced dynamization.

2. During active safety function, the time interval for the forced dynamization has elapsed.

Remedy:

For 1. Perform a forced dynamization.

For 2. Perform a forced dynamization. Increase parameter **P-0-0271, Time interval for forced dynamization, drive**.

See also the functional description: "Intelligent Safety Technology IST".

F507 Safety input signals wrong, checksum

The 8 bit CRC checksum transferred to the drive with the safety input signals (P-0-0250) is wrong.

Cause:

1. Error in the assignment of I/O module and drive.

2. Error in the safety I/O module.

Remedy:

For 1. Check the address settings.

For 2. Replace the safety I/O module.

See also the functional description: "Intelligent Safety Technology IST".

F508 Safety input signals wrong, counter

The 8 bit counters, which are incremented in the drive and in the safety I/O module every 100 ms, differ by more than 3.

Cause:

Error in the safety I/O module.

Remedy:

Replace the safety I/O module.

See also the functional description: "Intelligent Safety Technology IST".

F509 Data crosscheck wrong

When comparing parameters from the drive with the respective ones in the control, a discrepancy has been detected.

The error is only set when the power is switched on.

Cause:

1. Static safety parameters are different.

2. The acknowledge bits for the input signals in the status words of drive (P-0-0252) and control (P-0-0276) differ longer than 300 ms.

3. The difference of the monitored actual positions of drive and control (parameters P-0-0273 and P-0-0296) are, 300 ms after standstill has been detected, greater than the position monitoring window for the safe operating halt (P-0-0267).

Remedy:

For 1. The values of the parameters P-0-0248, P-0-0253...P-0-0271 of the drive must be equal to the corresponding ones in the control, P-0-0297, P-0-0277...P-0-0295.

For 2. Check the wiring of the safety I/O modules.

For 3. Check the standstill detection. Standstill is detected, when the actual velocity becomes smaller than the value in the parameter **S-0-0124, Standstill window**. Increase the position monitoring window for the safe operating halt (P-0-0267).

See also the functional description: "Intelligent Safety Technology IST".

F510 Safe reference lost

The signal for the Safe Reference cam is set in the input signals of the drive (bit 21, P-0-0250), although the actual position of the axis is more than 10° or 0.1 m away from the reference position for the Safe Homing (P-0-0268).

The precondition for the position comparison is that the Safe Reference is present and that the axis is at standstill (|act. velocity| < **S-0-0124, Standstill window**).

Cause:

Erroneous activation of the input signal for the Safe Reference Cam.

Remedy:

Check the input signal. Make the cam shorter if required.

See also the functional description: "Intelligent Safety Technology IST".

F511 Monitoring of safe reduced speed during switchover

When switching on a safety function while another is already active, it may be that the new safety function allows only a smaller speed than the previous one. In this case, the active velocity limit is reduced by means of a ramp during the parametrized transition time for the switchover (P-0-0270).

The error is set when the active velocity limit is exceeded.

Cause:

1. The abs. value of the actual velocity has become greater than the active velocity limit.

2. During active operation mode position control, the abs. value of the position command difference velocity has become greater than the active velocity limit.

3. During active operation mode velocity control, the abs. value of the velocity command has become greater than the active velocity limit.

Remedy:

Increase the parameter **P-0-0270, Changeover time for safety function, drive**.

See also the functional description: "Intelligent Safety Technology IST".

F629 Positive travel limit exceeded

The drive has received a command value which has led to an axis position outside the positive travel range. The axis has been brought to a standstill with the error response "Set velocity command value to zero".

Bit 2 of paramater **P-0-0090, Travel limit parameter** is set for "Exceeding travel range is an error", or after exceeding the position limit a drive control command has been started (such as the drive-controlled homing procedure).

Cause:

S-0-0049, Positive position limit value exceeded.

Remedy:

1. Check **S-0-0049, Positive position limit value**

2. Check the software limits of the control system

3. Activate the axis after the error response

Procedure:

- Clear the error.

- If the power supply was turned off, turn it back on.

- Move the axis into the permissible working range.

Note: Only command values which lead back into the allowed working range will be accepted. With other command values, the drive will stop again. - The parameter **S-0-0057, Position window** defines a tolerance for the travel limits.

See also the functional description: "Axis Limit Values ".

F630 Negative travel limit exceeded

The drive has received a command value which has led to an axis position outside the negative travel range. The axis has been brought to a standstill with the error response "Set velocity command value to zero".

Bit 2 of paramater **P-0-0090, Travel limit parameter** is set for "Exceeding travel range is an error", or after exceeding the position limit a drive control command has been started (such as the drive-controlled homing procedure).

Cause:

S-0-0050, Negative travel limit value exceeded.

Remedy:

1.   Check **S-0-0050, Negative travel limit value**.

2.   Check the software limits of the control system.

3.   Activate the axis after the error response.

Procedure:

• Clear the error.

• If the power supply was turned off, turn it back on.

• Move the axis into the permissible working range.

Note: Only command values which lead back into the allowed working range will be accepted. With other command values, the drive will stop again. - The parameter **S-0-0057, Position window** defines a tolerance for the travel limits.

See also the functional description: "Travel Range Limits".

F634 Emergency-Stop

Pressing the emergency stop (E-Stop) switch has caused the drive to stop by setting the velocity command value to zero. An error is reported in the **S-0-0011, Class 1 diagnostics** parameter.

Cause:

The emergency stop switch has been pressed.

Remedy:

Eliminate the malfunction that has caused the emergency switch to be actuated, and clear the error.

See also the functional description: " Emergency stop feature".

F643 Positive travel limit switch detected

The positive travel range limit switch has been activated. The axis was brought to a standstill with error reaction "Velocity command value to zero".

In **P-0-0090, Travel limit parameter** bit 2 has been set as "travel range overrun treated as error" or a drive control command was started after the end switch had been actuated (e.g., drive-controlled homing).

Cause:

The positive travel range limit switch has been activated.

Remedy:

1.   clear error

2.   turn power source back on

3.   move axis into the allowed travel range

Note: The drive will not accept command values which lead out of the permissible travel range. Entering these command values in the drive controller will result in this error.

See also the functional description: "Travel Range Limits".

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F644 Negative travel limit switch detected

The negative travel limit switch has been activated. The axis has been brought to a standstill with the "Set velocity command value to zero" error response.

Bit 2 of parameter **P-0-0090, Travel limit parameter** is set for "Exceeding travel range as error", or a drive control command has been started (such as the drive-controlled homing procedure). with the limit switch already actuated.

Cause:

The negative travel limit switch has been activated.

Remedy:

1.   Reset the error.

2.   Turn the power supply on again.

3.   Move the axis into the permissible travel range.

Note: The drive will not accept command values which lead out of the permissible travel range. Entering these command values in the drive controller will result in this error.

See also the functional description: "Travel Range Limits".

F811 Commutation offset could not be determined

The Automatic Commutation Adjustment has tried to determine the commutation offset. That has failed.

Cause:

The motor could not move freely enough.

Remedy:

Check whether the motor is blocked.

See also the functional description: "Determining commutation offset".

F812 Motion range exceeded during commutation

A range of +/- 1 pole pair distance is defined, within which the axis may move during the Automatic Commutation adjustment. If this range is exceeded, this error message appears.

Cause:

1. The drive enable has been set while the axis was still in motion.

2. The axis has been moved by a mechanical force.

3. Parameters P-0-0560 Commutation adjustment current and P-0-0562 Commutation adjustment cycle time are set too high. Possibly the mechanical properties of the axis, like friction or weight load, have changed.

Remedy:

1. Wait until the axis motion stops and set the drive enable once again.

2. Inhibit the influence of the mechanical force.

3. Reduce the parameter values for P-0-0560 Commutation adjustment current and P-0-0562 Commutation adjustment cycle time. You can also set them to the default values P-0-0560 Commutation adjustment current = 25 % and P-0-0562 Commutation adjustment cycle time = 4 milliseconds. Afterwards, start the command D300 Commutation adjustment to evaluate once again the optimal parameters.

See also the functional description: "Synchronous Motors".

F822 Encoder 1 failure: signal too small

The analog signals of a motor measurement system are used for high resolution analysis of that measurement system. These are monitored according to two criteria:

1.   The pointer length, which is calculated from the amplified sine and cosine signals, must be at least 1 V.

2.   The maximum pointer length resulting from the sine and cosine signals must not exceed 11.8 V.

$$\texttt{pointer length} = \sqrt{\sin^2 + \cos^2}$$

Fig. 3-7:   Pointer length

Fig. 3-8:   Correct signal amplitude

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Example:

U_{cos} = -6,5V

U_{sin} = 6,5V
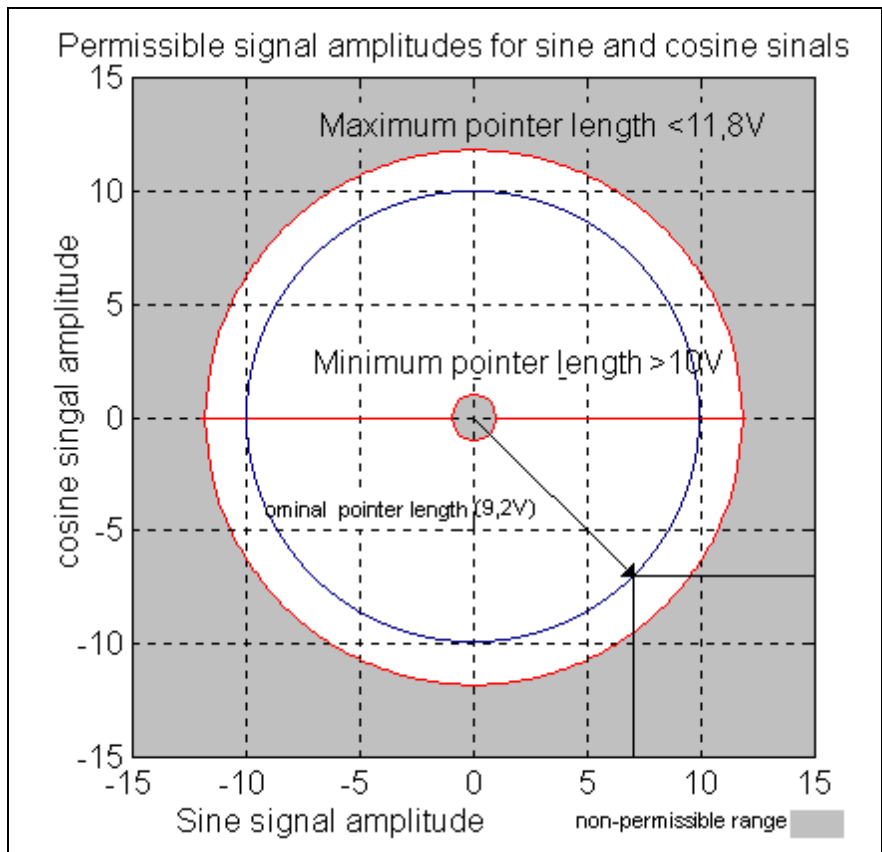
$$\texttt{pointer length} = \sqrt{(-6.5V)^2 + 6.5V^2} \approx 9.2V$$

Note: The error cannot be cleared in communications phase 4. Before clearing the error, switch to communications phase 2.

Note: When an incremental encoder with squarewave signals is used, the signal is not monitored.

Remedy:

- Check the measurement system cable.

- Lay the feedback cable well away from the motor power cable. The cover must be placed over the drive controller (see drive controller project specifications.)

- Check the measurement system and exchange, if necessary.

F827 Drive interlock while drive activated

Cause:

The drive Starting Lockout was activated while controller enable was set. The drive controller switches to torque-free state immediately.

Remedy:

The drive interlock should not be activated when controller enable is set. Check the control system of the drive interlock input.

F860 Overcurrent: short in power stage

The transistor (IGBT) current has exceeded the allowed maximum peak value. The drive is immediately disabled, the motor freewheels to a stop.

Cause:

1. Short circuit in the motor or motor cable.

2. Defective power section of the drive controller

3. The current regulator was parameterized with wrong values.

Remedy:

For 1. Check the motor cable for a short.

For 2. Exchange the drive controller.

For 3. Check that the current controller parameters are as given in the motor data sheet; if they differ, input the correct values.

F861 Overcurrent: short to ground

The phase current sum is monitored. Sum = 0 in normal mode. The ground-fault fuse responds if the current sum exceeds 0.5 x I_N.

Cause:

1.   Defective motor cable.

2.   Ground fault in the motor.

Remedy:

Check motor cable and motor for ground fault; replace if necessary.

F869 +/-15Volt DC error

The drive controller found a malfunction in the ± 15 V power supply.

Cause:

1.   Defective control voltage bus cable.

2.   Defective control voltage supply module.

Remedy:

For 1. Check the control voltage bus cable or plug connection and exchange if necessary.

For 2. Check control voltage supply module (see supply module instructions for use).

F870 +24Volt DC error

The drive controller requires a 24-V control voltage. The drive's torque is released immediately when the maximum permissible tolerance of +-20% is exceeded. If an optional electrically released motor holding brake is present, then it is activated.

Cause:

1. Defective **cable** for the control voltages.

2. 24-V power supply **overload**.

3. Defective power **supply unit**.

4. **Short-circuit** in the emergency stop circuit.

Remedy:

Ref. 1. Check and, if necessary, replace the cable and connections of the control voltages.

Ref. 2. Check the 24-V power at the power supply unit.

Ref. 3. Check the power supply unit.

Ref. 4. Check the emergency stop circuit for a short-circuit.

Note: This error can only be cleared in parameter mode (phase 2). As a result of this error, the encoder emulation is switched off.

F871 +10Volt DC error

The power supply voltage for the current sensors has been disrupted.

Cause:

A defect in the drive controller.

Remedy:

Exchange the drive controller.

F878 Velocity loop error

The velocity loop monitor will appear when the following conditions occur simultaneously:

- The current command value is at the peak current limit.
- The difference between the actual velocity and the command velocity is greater than 2,5 % of the maximum motor velocity.
- actual speed > 1.25 % of maximum speed
- Command and actual acceleration have different qualifying (+/-) signs.

Cause:

1. Motor cable is connected incorrectly.
2. Defective controller section of the drive
3. Defective feedback
4. Velocity loop paramaterized incorrectly
5. Incorrect commutation offset

Remedy:

For 1.   Check the motor cable connection.

For 2.   Exchange the drive controller.

For 3.   Exchange the motor.

For 4.   Check the velocity controller to see whether it is within operational parameters.

For 5.   Exchange the motor.

See also the functional description: "Determining the Velocity Controller Setting".

F879 Velocity limit S-0-0091 exceeded

In torque control, the actual velocity is monitored. This error is generated if the programmed velocity in the **S-0-0091, Bipolar velocity limit value** parameter is exceeded by the 1.125-fold value or a minimum of 100 rpm (rotary motor) or by 100 mm/min (linear motor).

Cause:

The torque command value was for too long a time greater than the load torque. This causes the actual speed to increase up to the maximum possible motor speed.

Remedy:

Assign the correct torque command value for the required task. Reduce the **S-0-0092, Bipolar torque/force limit value** parameter value.

See also the functional description "Limiting to Bipolar Velocity Limit Value".

3.2 Warning Diagnostic Messages

Warnings do not lead to an automatic shutdown

Many areas are monitored in connection with operating modes and parameter settings. As a result, if a state is discovered which is still allowed by the order of operation, but in continuous operation generates an error and thereafter leads to shutdown of the drive, a warning will be generated in the case where this state appears again.

Warning Classes

The warning class is evident from the diagnostic message

Warnings can be separated into 2 classes. They differentiate if the drive will perform an automatic response with the appearance of a warning.

Warning Class:	Diagnostic Message:	Drive Reaction:
with Drive Response	E8xx	Drive Stop
without Drive Response	E2xx	--

Fig. 3-9:   Division of the Warning Classes

Warnings can not be externally deleted.

E219 Warning Drive temp. surveillance defective

Temperature monitoring checks to see if the measured drive controller temperature is within reasonable bounds. If it determines that it is lower than -10°C, then it is assumed the measuring unit is defective. Warning **E219 Warning Drive temp. surveillance defective** will appear for 30 seconds. Afterwards the drive will be brought to a standstill according to the selected error response and message **F220 Bleeder overload shutdown** will be generated.

Cause:

Broken cable in the drive controller, or defective sensor.

Remedy:

Exchange or repair the drive controller.

E221 Warning Motor temp. surveillance defective

Temperature monitoring checks to see if the measured motor temperature is within reasonable bounds. If it determines that it is lower than -10°C, then it is assumed the measuring unit is defective. Warning **E221 Warning Motor temp. surveillance defective** will appear for 30 seconds. Afterwards the drive controller will be brought to a standstill according to the selected error response and message **F221 Error Motor temp. surveillance defective** will be generated.

Cause:

1.   Motor temperature sensor not connected.
2.   Broken cable.
3.   Defective sensor.
4.   Broken cable in drive controller.

Remedy:

For 1.   Connect the sensor to the drive controller and to the motor (see project planning specifications for the motor).

For 2.   Exchange the wiring between the drive controller and the motor.

For 3.   Exchange the motor.

For 4.   Exchange the drive controller.

See also the functional description: "Temperature Monitoring".

E225 Motor overload

The maximum possible motor current is reduced in order to protect the motor from being destroyed.

If a current flows in the that is greater than 2.2 times the motor current at standstill S-0-0111, the maximum possible motor current **(S-0-0109, Motor peak current)** is reduced. With 4-fold motor current at standstill, the reduction starts after 400 ms. With 5-fold current it starts earlier, and with 3-fold current later.

The **E225 Motor overload** warning is issued when the motor peak current is reduced by the limitation.

The reduction also has an effect on the **P-0-4045, Active permanent current**.

See also the functional description: "Current Limit"

E226 Undervoltage in power section

If bit 5 of the **P-0-0118, Power off on error** parameter has been set, an undervoltage condition will be handled as a nonfatal warning. The drive issues this warning if the drive enabling signal is present and the DC bus voltage message disappears.

Cause:

Power supply unit is switched off or mains failure occurs while the drive enabling signal is set.

Remedy:

Switch off the drive enabling signal before you switch off the power supply unit.

E247 Interpolation velocity = 0

The drive-internal position command value interpolator is active if

- the "drive-internal interpolation" mode,
- drive-controlled homing,
- Jog
- drive halt

The E247 warning is issued if the employed velocity specification is 0. Possible velocity specifications are:

- **S-0-0259, Positioning velocity**
- **S-0-0041, Homing velocity**
- **S-0-0091, Bipolar velocity limit value**
- **P-0-4030, Jog velocity**

See also the functional description: "Operating Mode: Drive Internal Interpolation"

E248 Interpolation acceleration = 0

Cause:

The drive internal position command interpolator (profile generator) is active. It has been given the acceleration = 0. Without acceleration, it can never reach a given speed.

Note: Input parameter values are converted into a drive internal format, so an input acceleration word > 0 can, when converted, result in an acceleration = 0. The parameter values which, internaly, result in an acceleration > 0, can be calculated using the formulas found in the chapter entitled "Drive-internal format of position data"

Operation modes with drive internal position command generation:

1. Drive-internal interpolation
2. Drive-controlled homing
3. Drive Halt
4. jog

Remedy:

Input a reasonable value > 0 for the employed acceleration. Possible acceleration specifications, depending from the operation mode, are:

For 1 and 4:   **S-0-0260**, **Positioning acceleration**   **>0**

For 2.:   **S-0-0042, Homing acceleration**   **>0**

For 3.:   **S-0-0138, Bipolar acceleration limit value**   **>0**

See also the functional description: "Operating Mode: Drive Internal Interpolation"

E249 Positioning velocity >= S-0-0091

Cause:

Operating modes with internal interpolation limit the positioning speed to that set in **S-0-0091, Bipolar velocity limit value.**

This applies to the following modes:

1. Drive Internal Interpolation

2. Jogging

Remedy:

S-0-0259, Positioning Velocity or

P-0-4030, Jog velocity

must be reduced

See also the functional description: "Operating Mode: Drive Internal Interpolation".

E250 Drive overtemp. prewarning

The temperature of the heatsink in the drive controller has reached the maximum permissible temperature. The drive controller follows the command value input for a period of 30 seconds. This makes it possible to bring the axis to a standstill with the control system while keeping true to the process (for example, close the operation, leave the collision area, etc.).

After 30 seconds, the response set in parameter **P-0-0119, Best possible deceleration** will be performed by the drive controller.

Cause:

1.   Failure of the drive's internal blower.

2.   Failure of the control cabinet's climate control.

3.   Incorrect control cabinet sizing in regards to heat dissipation.

Remedy:

For 1. If the blower fails, exchange the drive controller.

For 2. Install climate control features in the cabinet.

For 3. Check the sizing of the control cabinet.

See also the functional description "Current Limit"

E251 Motor overtemp. prewarning

The motor is too hot. If the motor temperature, which is displayed in parameter **S-0-0383, Motor temperature**, has exceeded the value in **S-0-0201, Motor warning temperature** Warning E251 is generated. If the temperature increases above the value in **S-0-0204, Motor shutdown temperature**, error **F219 Motor overtemp. shutdown** will be generated.

The values for parameters **S-0-0201, Motor warning temperature** and **S-0-0204, Motor shutdown temperature** are set at 140°C and 150°C , respectively, for MKD and MHD motors.

Cause:

1. The motor became overloaded. The effective torque required of the motor was above the permissible continuous standstill torque for too long.

2. Failure or contamination of motor cooling unit.

Remedy:

1. Check the layout of the motor. For systems which have been in use for a long time, check to see if the drive controller conditions have changed (in regards to pollution, friction, components which have been moved, etc.).

2. Check operation of cooling system, clean air ways.

See also the functional description: "Temperature Monitoring"

E253 Target position out of travel range

In operation modes with drive controlles interpolation, the drive checks **before the move** whether the specified **S-0-0258, Target position**, is within the possible travel range of the drive. This range is defined by the parameters **S-0-0049, Positive position limit value** and **S-0-0050, Negative position limit value**. The position limit check is activated in the parameter **S-0-0055, Position polarities** with bit 4.

Cause:

The target position lies beyond the position limits, and the position limit check is activated.. The motion profile results in a target position greater than the maximum allowed position.

Results:

- This warning message, E253, appears.

- The **drive stops**.

- The drive does not accept the target position.

- In **S-0-0012, Class 2 diagnostic** warning bit 13 is set.

Remedy:

1. For the Drive controlled interpolation mode, input the **S-0-0258, Target position** only within the position limits.

2. Check the **position limit values**. Moreover, the positive position limit value must be greater than the negative position limit value.

3. If you don't need the position limit check, de-activate it, e.g. in modulo mode.

See also the functional description: "Operating Mode: Drive Internal Interpolation".

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E255 Feedrate-override S-0-0108 = 0

With the parameter **S-0-0108, Feedrate override**, the travel velocity of all drive-controlled travel commands can be changed proportionally (in %).

If the value of this parameter is 0, the travel velocity is also 0. With velocity = 0, the motor remains stationary despite having a commanded value.

Causes:

1. The parameter **S-0-0108, Feedrate override** is **0**.

2. For devices with analog inputs: Feedrate override via analog input is activated, and the voltage at the analog input is 0.

3. The **feed potentiometer** of the connected control system is at 0 or is being evaluated incorrectly.

Remedies:

For 1.: Set **Feedrate override > 0**, so that the drive moves. Full speed is attained with 100% .

For 2.: Apply a voltage > 0 proportional to the desired speed,
+10V corresponds to 100 % (full) speed.
Alternative: De-activate Feedrate override.

For 3.: Turn the feed potentiometer cautiously, check the analog signal and the evaluation for it.

See also the functional description: "Sequence control "Drive-Controlled Homing"".

E257 Continuous current limit active

The thermal controller load is monitored. If a rated current profile is demanded of the drive controller which would require too high a power transistor load over time (too much warming of the power output stage), the drive controller will react by dynamically reducing the effective peak current. This warning will be given at the same time. Parameter **P-0-4046, Active peak current** is reduced. Before the peak current is actually limited, the advance warning message **E261 Continuous current limitation prewarning** should have been generated.

Cause:

The drive controller was overloaded.

Remedy:

1.   Check the drive set-up.

2.   Reduce acceleration.

With systems which have been used for longer periods of time, check to see if drive controller conditions have changed in regards to:

- Friction

- Movement of the load.

See also the functional description: "Current Limit"

E259 Command velocity limit active

In the position control and velocity control operating modes, the effective velocity command value is limited to the value in parameter **S-0-0091, Bipolar velocity limit value**. The warning is given if the resulting velocity command value reaches this limit.

Cause:

Parameter **S-0-0091, Bipolar velocity limit value** was set too low.

Remedy:

In normal operating conditions, set parameter **S-0-0091, Bipolar velocity limit value** to a value 10% greater than the NC maximum velocity.

See also the functional description: "Limiting to Bipolar Velocity Limit Value".

E261 Continuous current limit prewarning

Digital drives are monitored by a continually operating temperature model. If the thermal load reaches 100%, the continuous current limit will be activated shortly thereafter and warning E257 Continuous Current Limit Active, is displayed.

Before the torque is reduced, a continuous current limit early warning is given via a switching threshold, which is determined by parameter **P-0-0127, Overload warning**.
To deactivate the warning, enter **P-0-0127** = 100% into the parameter.

Cause:

The drive controller was overloaded.

Remedy:

1. Check the drive layout.

2. Reduce acceleration.

3. Increase the switching threshold in parameter
   P-0-0127, Overload warning

4. With systems which have been used for longer periods of time, check to see if drive controller conditions have changed in regards to:

   - Friction

   - Movement of the load

   - Feed during processing.

See also the functional description: "Current Limit"

E263 Velocity command value > limit S-0-0091

Cause:

The value given to the drive for **S-0-0036, Velocity command value** was greater than permissible.

Remedy:

It is limited to **S-0-0091, Bipolar velocity limit value**.

See also the functional description: "Operating Mode: Velocity Control"

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E264 Target position out of num. range

Cause:

In drive-internal interpolation mode, the previous target position in the internal position format cannot be reached.

Recover:

1. Check the given target position and correct, if necessary.

2. With infinitely turning axes it is necessary that the position data be illustrated in modulo format.

3. The absolute internally illustrable position can be enlarged by enlarging the maximum travel range.

E324 Option module error power supply unit

Cause:

A component that is connected to the HVE or HVR power supply unit reports a malfunction.

Remedy:

Check the option module, and replace it if necessary.

E325 Recovery overload power supply unit

Cause:

The regenerated load of the drives is excessive.

Remedy:

Reduce allowable deceleration. Use a drive controller with a smaller peak current.

E326 Bus power overload

Error will be stored for no more than 500 ms!

Cause:

The input power required by the drives is excessive.

Remedy:

Reduce the allowable acceleration. Use a drive controller with a smaller peak current.

E350 Heat sink overtemp. warning power supply unit

The permissible heatsink temperature has been reached. The temperature pre-warning contact is open. Power will be switched off after 30 s.

Cause:

1. Load too high

2. Ambient temperature too high

3. Cooling air is blocked

4. Blower in unit is defective

Remedy:

1.   Reduce load

2.   reduce control cabinet temperature

3.   check cooling air ducts

4.   replace unit.

E352 Bleeder overload warning power supply unit

Cause:

75% of the permissible bleeder ON time has been reached due to excessive regenerated power.

Remedy:

- allowable acceleration / deceleration must be reduced

- reduce drive speed

- reduce peak current of the drive

E353 Diagnostic message power supply erroneous

The power supply unit HVE or HVR cyclically sends status and error messages via a serial connection to the connected controller. If the controllers do not receive several sequential messages, then this warning is generated.

Cause:

1.   serial interface of power supply unit is defective

2.   break in serial connection lines

3.   serial interface of controller is defective

Remedy:

On 1.   replace power supply unit.

On 2.   check and replace bus cable, if necessary

On 3.   replace controller, if necessary

E387 Control voltage supply fault power supply unit

With HVE only !

Cause:

The power voltage supply in the HVE exceeds permissible tolerance (3x 380 ... 480V, ± 10 %).

Remedy:

Check mains fuse in control cabinet and replace, if necessary.

E408 Invalid addressing of MDT-data container A

This warning indicates an error during the index check in the multiplex channel. During the cyclical data exchange, the index for the access to the list **S-0-0370, Configuration list for MDT data container** is monitored as to whether it points to a non-initialized field in the list. If it does, this warning is generated.

E409 Invalid addressing of AT-data container A

This warning indicates an error during the index check in the multiplex channel. During the cyclical data exchange, the index for the access to the list **S-0-0371, Configuration list for the AT data container** is monitored as to whether it points to a non-initialized field in the list. If it does, this warning is generated.

See also the functional description: "Checking the Indices"

E410 Slave not scanned or address 0

While the SERCOS ring is being initialized in communications phase 1, each slave which is to participate in the additional phase uptake must be addressed by the SERCOS master. Slaves which are not addressed or which have been set to drive address "0" indicate this by generating warning E410. Communication with these slaves in higher communications phases is not possible. They work only in pass through mode (i.e. they do not have an AT of their own, rather they serve only as a "pass through" for the SERCOS communication).

Cause:

The slave was not scanned in phase 1, or address 0 is set.

Remedy:

- Set the correct slave address.
- Check the SERCOS master configuration.

See also the functional description: "Adjustments of the SERCOS Interface"

E825 Overvoltage in power stage

The **DC bus voltage** is too high.

Cause:

1. During **braking** (decelerating): the energy regenerated from the mechanical system via the motor was so high for a moment that it could not be sufficiently dissipated to heat by the bleeder resistor. The regenerated current could not be dissipated and therefore charged the DC bus, so that the voltage has become too high.

2. The **mains voltage** (AC input) is too high.

Result:

In case of overvoltage, the motor is switched to **torque-free** operation. As soon as the DC Bus voltage falls again below the maximum allowable value, the controller will be turned on again.

Remedy:

For 1. Reduce the **acceleration** values.
         Check the drive controller layout, if necessary.
         Install an auxiliary bleeder, if necessary.

For 2. Check the **mains supply voltage** (AC/3phase).

⇒ Danger of high-voltage shock!
Care for protection against accidental touch.

WARNING

E826 Undervoltage in power section

If the bit 3 is set in the parameter **P-0-0118, Power off on error**, the undervoltage is treated as "fatal warning" with shutdown of the drive operation. If the drive enable is on at the same time, and the DC bus voltage indication goes down, the drive displays this warning.

Cause:

Switching off the power supply or a loss of mains while the drive enable is on.

Remedy:

Switch off the drive enable before switching off the supply unit.

E829 Positive position limit exceeded

The drive has received a command value which resulted in an axis position outside the positive travel range. The axis has been brought to a standstill by setting the velocity command to zero. A class 1 diagnostic error is not generated. The drive will automatically follow command values that lead back into the allowed range. "Handle travel range exceeded as warning" is set in bit 2 of parameter **P-0-0090, Command value transmit time (TMTSG)**.

Cause:

S-0-0049, Positive position limit value exceeded.

Remedy:

Enter command values which lead back into the allowed range.

Note: Only such command values will be accepted that lead back into the allowed working range. With other command values, the drive will stop again. - The parameter **S-0-0057, Position window** defines a tolerance for the travel limits.

See also the functional description: "Travel Range Limits".

E830 Negative position limit exceeded

The drive has received a command value which resulted in an axis position outside the negative travel range. The axis has been brought to a standstill by setting the velocity command to zero. A class 1 diagnostic error is not generated. The drive will automatically follow command values which lead into the allowed range. "Handle travel range exceeded as warning" is set in bit 2 of parameter **P-0-0090, Travel limit parameter**.

Cause:

S-0-0050, Negative travel limit value exceeded.

Remedy:

Enter command values which lead back into the allowed range.

Note: Only such command values will be accepted that lead back into the allowed working range. With other command values, the drive will stop again. - The parameter **S-0-0057, Position window** defines a tolerance for the travel limits.

See also the functional description: "Travel Range Limits".

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E834 Emergency-Stop

Pressing the emergency stop switch has caused the drive to perform the error reaction that had been selected via the **P-0-0119, Best possible deceleration** parameter. There is no error message issued to the controller.

Cause:

The emergency stop switch was pressed.

Remedy:

Eliminate the malfunction that led to the activation of the emergency stop switch. The warning will then disappear.

See also the functional description: " Emergency stop feature".

E843 Positive limit switch activated

The drive has received a command value which resulted in an axis position outside the positive travel range. The axis has been brought to a standstill by setting the velocity command to zero. A class 1 diagnostic error is not generated. The drive will automatically follow command values that lead back into the allowed range. Bit 2 of **P-0-0090, Travel limit parameter** is set to "Overtravelling is handled as a warning".

Cause:

The positive limit switch has been activated.

Remedy:

Enter command values that lead back into the allowed range.

See also the functional description: "Travel Zone Limit Switch Monitoring".

E844 Negative limit switch activated

The drive has received a command value which resulted in an axis position outside the negative travel range. The axis has been brought to a standstill by setting the velocity command to zero. A class 1 diagnostic error is not generated. The drive will automatically follow command values that lead back into the allowed range. Bit 2 of **P-0-0090, Travel limit parameter** is set to "Overtravelling is handled as a warning".

Cause:

The negative limit switch has been activated.

Remedy:

Enter command values which lead back into the allowed range.

See also the functional description: "Travel Zone Limit Switch Monitoring".

4 Description of Diagnostic Letters B...,C..., D... and A...

4.1 Command Diagnostic Messages B...,C... and D

The commands are used for control of complex features in the drive.

For example, the features "drive controlled homing procedure" or "Communication Phase 4 Transition Check" are defined as commands.

Commands can start, interrupt or erase a primary control.

A parameter belongs to each command whereby the command can be controlled by the parameter.

During the command operation, the diagnostic message "Cx" appears in the H1 display where the x stands for the number of the command.

It can distinguish between 3 types of commands.

Command Types

- **Drive Commands**
  - Lead to an eventual automatic drive movement
  - Can be started only through an inputted control enable
  - Deactivates the active operating mode during its operation

- **Monitor Commands**
  Activation or deactivation of monitors or features

- **Management Commands**
  - Lead management tasks that are not interruptible

B100 Command Release motor holding brake

The command **P-0-0542, Command Release motor holding brake** has been activated.

See also the functional description: "Motor Holding Brake".

B101 Command not enabled

The command **P-0-0542, Command Release motor holding brake** has been activated without prior enabling via the parameter P-0-0538, Bit 8.

See also the functional description: "Motor Holding Brake".

C000 Command Check reference

Meaning:

The **P-0-0272, C000 Command Check reference** is active. With this command, the drive checks whether the following conditions are met:

- The axis has been homed (S-0-0403, Position status = 1).
- The actual position differs by less than the **P-0-0267, Pos. monitoring window for safe stop operation, drive** from the **P-0-0268, Reference position for safe homing**.
- The signal for the safe reference cam is set.

See also the functional description: "Intelligent Safety Technology IST".

C001 Safe reference not possible

Meaning :

The **P-0-0272, C000 Command Check reference** has been started. This command could not be acknowledged positively, because at least one of the following conditions is not met :

- The axis has been homed (S-0-0403, Position status = 1).
- The actual position differs by less than the **P-0-0267, Pos. monitoring window for safe stop operation, drive** from the **P-0-0268, Reference position for safe homing**.
- The signal for the safe reference cam is set.

See also the functional description: "Intelligent Safety Technology IST".

C100 Communication phase 3 transition check

The command **S-0-0127, C1 Communication phase 3 transition check** has been activated.

See also the functional description: "**S-0-0127, C100 Communication phase 3 transition check**"

C101 Invalid communication parameter (S-0-0021)

Cause:

Communications parameters which are needed to operate the drive in communication phase 3 are invalid.

Remedy:

A list of the invalid parameters can be seen in parameter **S-0-0021, List of invalid op. data for comm. ph. 2**. The invalid parameters must be rewritten so they are correct.

See also the functional description: "S-0-0127, C100 Communication Phase 3 Transition Check".

C104 Config. IDN for MDT not configurable

Cause:

Telegram type 7 was set in parameter **S-0-0015, Telegram type parameter**.

Parameters which are missing in **S-0-0188, List of configurable data in MDT** are kept in **S-0-0024**, **Configuration list for the master data telegram**.

Remedy:

- set preferred telegram (telegram type = 0..6)

- You must either set a priority telegram (Telegram type = 0..6) or provide **S-0-0024, Config. list of master data telegram** with parameters. These parameters are also contained in **S-0-0188, List of configurable data in the MDT**.

See also the functional description: "Configuration of Telegram Contents"

C105 Configurated length > max. length for MDT

Cause:

Telegram type 7 was set in parameter **S-0-0015, Telegram type parameter**.

The length of the configured data in the MDT, which is determined by **S-0-0024, Configurations list of the master data telegram**, exceeds the maximum permissible length **S-0-0186, Length of the configurable data record in the MDT.**

Remedy:

- set preferred telegram (telegram type = 0..6)

- number of configured parameters in MDT (S-0-0024) must be decreased

See also the functional description: "Configuration of Telegram Contents"

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C106 Config. IDN for AT not configurable

Cause:

Telegram type 7 was set in parameter **S-0-0015, Telegram type parameter**.

Parameters which are not contained in **S-0-0187, List of configurable data in AT** can be seen in **S-0-0016, Custom amplifier telegram configuration list.**

Remedy:

- set preferred telegram (telegram type = 0..6)
- **S-0-0016, Configuration list of drive telegrams** must have parameters that are also in **S-0-0187, , List of configurable data in ATListe der konfigurierbaren Daten im AT**.

See also the functional description: "Configuration of telegram contents"

C107 Configurated length > max. length for AT

Cause:

Message frame type 7 has been selected in **S-0-0015, Telegram Type Parameter**.

The length of the configured data record in the AT, that is defined via

S-0-0016, Custom amplifier telegram configuration list,

exceeds the maximum permissible **S-0-0185, Length of the configurable data record in the AT**.

Remedy:

- set preferred telegram (telegram type = 0..6)
- number of configured parameters in the AT (S-0-0016) must be decreased

See also the functional description: "Configuration of telegram contents"

C108 Time slot parameter > Sercos cycle time

Cause:

One of the time slot parameters:

- **S-0-0006, AT transmission starting time (T1)**
- **S-0-0089, MDT transmission starting time (T2)**
- **S-0-0007, Feedback acquisition starting time (T4)**
- **S-0-0008, Command valid time (T3)**

exceeds **S-0-0002, SERCOS Cycle time (Tscyc).**

Remedy:

Correct the appropriate parameter(s). These times are determined by the manufacturer of the control system and are specified by the SERCOS interface.

See also the functional description: "Configuration of the Telegram Send and Receive Times"

C109 Position of data record in MDT (S-0-0009) even

Cause:

Parameter **S-0-0009, Beginning address in master data telegram** contains an even value. This is not permitted.

Remedy:

Parameter **S-0-0009, Beginning address in master data telegram** must be set to an odd value. These parameters are determined by the manufacturer of the control system, and are specified by the SERCOS interface.

See also the functional description: "Configuration of the Telegram Send and Receive Times"

C110 Length of MDT (S-0-0010) odd

Cause:

Parameter **S-0-0010, Length of master data telegram** contains an odd value. This is not permitted.

Remedy:

Parameter **S-0-0010, Length of master data telegram** must be set to an even value. These parameters are determined by the manufacturer of the control system, and are specified by the SERCOS interface.

See also the functional description: "Configuration of the Telegram Send and Receive Times"

C111 ID9 + Record length - 1 > length MDT (S-0-0010)

Cause:

Parameter(s) are set incorrectly for **S-0-0009, Beginning address in master data telegram** and **S-0-0010, Length of master data telegram**. The length of the record in MDT for the drive plus the starting address in MDT is greater than the total length of the MDT.

Remedy:

The parameters for **S-0-0009, Beginning address in master data telegram** and **S-0-0010, Length of master data telegram** must be corrected. Those parameters are determined by the manufacturer of the control system and are specified by the SERCOS interface.

See also the functional description: "Configuration of the Telegram Send and Receive Times"

C112 TNcyc (S-0-0001) or TScyc (S-0-0002) error

Cause:

Only multiples of 1ms are permitted as valid values for **S-0-0001, NC Cycle time (TNcyc)** and **S-0-0002, SERCOS Cycle time (Tscyc)**. Here, this is not the case.

Remedy:

S-0-0001, NC Cycle time (TNcyc) and **S-0-0002, SERCOS Cycle time (Tscyc)** must be corrected. These parameters are determined by the manufacturer of the control system and are specified by the SERCOS interface.

See also the functional description: "Configuration of the Telegram Send and Receive Times"

C113 Relation TNcyc (S-0-0001) to TScyc (S-0-0002) error

Cause:

The value of **S-0-0001, NC Cycle time (TNcyc)** can only be equal to or be a multiple of **S-0-0002, SERCOS Cycle time (Tscyc)**. Here this is not the case.

Remedy:

S-0-0001, NC Cycle time (Tncyc) and **S-0-0002, SERCOS Cycle time (Tscyc)** must be corrected. These parameters are determined by the manufacturer of the control system and are specified by the SERCOS interface.

See also the functional description: "Configuration of the Telegram Send and Receive Times"

C114 T4 > TScyc (S-0-0002) - T4min (S-0-0005)

Cause:

The maximum allowable value for **S-0-0007, Feedback acquisition starting time (T4)** is

S-0-0002, SERCOS Cycle time (Tscyc) -
            S-0-0005, Minimum feedback acquisition time(T4min)

The value for **S-0-0007, Feedback acquisition starting time (T4)** is incorrect.

Remedy:

Correct S-0-0007, Feedback acquisition starting time (T4). These parameters are determined by the manufacturer of the control system and are specified by the SERCOS interface.

See also the functional description: "Configuration of the Telegram Send and Receive Times"

C115 T2 too small

Cause:

The value set for **S-0-0089, MDT Transmit starting time (T2)** is incorrect. The drive cannot work with this value.

Remedy:

Correct S-0-0089, MDT Transmit starting time (T2).

These parameters are determined by the manufacturer of the control system, and are specified by the SERCOS interface.

See also the functional description: "Configuration of the Telegram Send and Receive Times"

C117 Timeout at command execution

A system error has occurred.

Please contact Rexroth Indramat.

C118 Order of MDT configuration wrong

The chronological order of processing the cyclical MDT data in the drive is the same order in which the configured ident numbers (IDN) are placed in the parameter **S-0-0024, Config. list of the master-data-telegram**. For the usage of the multiplex mode in the MDT, there are the parameters

- **S-0-0360, MDT Data container A**
- **S-0-0368, Addressing for data container A**
- **S-0-0362, List index, MDT data container A**

If more than one of these parameters is configured in the MDT, their correct order is checked in the command **S-0-0127, C100 Communication phase 3 transition check**. The following rules must be obeyed:

- **S-0-0368, Addressing for data container A** must be configured as the first of the 3 parameters above.
- **S-0-0360, MDT Data container A** must be configured as the last of the 3 parameters above.

If this is not the case, the drive generates the command error **C118 Order of MDT configuration wrong**.

C200 Communication phase 4 transition check

Meaning:

The command **S-0-0128, C200 Communication phase 4 transition check** has been activated.

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C201 Invalid parameter(s) (->S-0-0022)

Cause:

Parameters which will be necessary to operate the drive in communications phase 4 are invalid. The invalid parameters can be seen in **S-0-0022, IDN list of invalid op. data for comm. ph. 3**.

Remedy:

The parameters of **S-0-0022, IDN list of invalid op. data for comm. ph. 3** must be rewritten so they are correct.

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C202 Parameter limit error (->S-0-0022)

Cause:

Parameters which are necessary to operate the drive in communications phase 4 are outside of their minimum or maximum input values, or the entered value can't be processed (for bit bars). The incorrect parameters are listed in **S-0-0022, IDN list of invalid op. data for comm. ph. 3**.

Remedy:

The parameters of **S-0-0022, IDN list of invalid op. data for comm. ph. 3** must be rewritten with correct values.

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C203 Parameter calculation error (->S-0-0022)

Cause:

Parameters that are required for phase-4 operation (operating mode) cannot be processed in that way. The incorrect parameters are listed in **S-0-0022, IDN List of Invalid Op. Data for Comm. Ph. 3**.

Remedy:

Write correct values to the parameters in **S-0-0022, IDN List of Invalid Op. Data for Comm. Ph. 3**.

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C204 Motor type P-0-4014 incorrect

An MHD-, MKD or MKE motor (value 1 or 5) is entered into parameter **P-0-4014, Motor type**. The appropriate abbreviation "MHD", "MKD", or "MKE" however, was not found in parameter **S-7-0141, Motor type** in the motor feedback data memory.

Cause:

1.   Incorrect parameter set for type of motor.
2.   The motor feedback memory cannot be read.
3   motor feedback - not connected

Remedy:

For 1. Enter the type of motor used in parameter **P-0-4014, Motor type**

For 2 and 3 Check feedback connection.
         If feedback is defective, exchange motor.

See also the functional description: "Automatic Setting of the Motor Type for Motors with Feedback Memory".

C210 Feedback 2 required (->S-0-0022)

Cause:

Values that require an optional encoder have been entered in **S-0-0147, Homing parameter** or in the **S-0-0032...35, Mode of Operation** parameters. However, 0 (not available) has been entered in the **P-0-0075, Interface Feedback 2, optional** parameter.

The ident number of the parameter that requires the optional encoder is entered in **S-0-0022, IDN List of Invalid Op. Data for Comm. Ph. 3**.

Remedy:

Modify **S-0-0147, Homing parameter** or the **S-0-0032...35, Mode of Operation** parameters to utilization of the motor encoder instead of optional encoder or set **P-0-0075, Interface Feedback 2, optional** to a value different from 0 to activate the optional measuring system.

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C211 Invalid feedback data (->S-0-0022)

Invalid data has been encountered when the parameters stored in the motor feedback were read, or an error has occurred when the data was read.

Causes:

1.   Motor feedback cable not connected or defective
2.   Motor feedback defective
3.   Drive controller defective

Remedy:

Ref. 1. Check motor feedback cable; connect both sides

Ref. 2. Replace motor

Ref. 3. Replace amplifier

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check"**".

C212 Invalid amplifier data (->S-0-0022)

During drive initialization, the operating software accesses data from an EEPROM in the drive controller. This error message is generated if the attempt to read the data has failed.

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Causes:

Defective hardware in the drive controller.

Remedy:

Replace drive controller.

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C213 Position data scaling error

Cause:

The scaling parameters for position data permit the position data display format to be selected. The drive-internal position data format depends on the employed motor encoder and the encoder resolution.

The factor used for converting the position data from the drive-internal format into the display format or vice versa is outside the allowable range, because either

- linear motor and rotary position scaling with motor reference, or
- rotary motor and linear position scaling with motor reference, or
- linear motor with modulo scaling has been selected; or
- the determined factor used for converting the position data from the display format to the internal format, and vice versa, cannot be represented.

Remedy:

Checking and correcting the relevant parameters, such as

- **S-0-0076, Position data scaling type**
- **S-0-0077, Linear position data scaling factor**
- **S-0-0078, Linear position data scaling exponent**
- **S-0-0079, Rotational position resolution**
- **S-0-0116, Resolution of motor feedback**
- **S-0-0121, Input revolutions of load gear**
- **S-0-0122, Output revolutions of load gear**
- **S-0-0123, Feed constant**
- **P-0-0074, Interface feedback 1**
- **S-0-0277, Position feedback 1 type parameter**

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C214 Velocity data scaling error

Cause:

The scaling parameters for velocity data permit the velocity data display format to be selected. The drive-internal velocity data format depends on the employed motor encoder and the encoder resolution.

The factor used for converting the velocity data from the drive-internal format into the display format or vice versa is outside the allowable range.

Remedy:

Checking and correcting the relevant parameters, such as

- **S-0-0044, Velocity data scaling type**
- **S-0-0045, Velocity data scaling factor**
- **S-0-0046, Velocity data scaling exponent**
- **S-0-0116, Resolution of motor feedback**
- **S-0-0121, Input revolutions of load gear**
- **S-0-0122, Output revolutions of load gear**
- **S-0-0123, Feed constant**
- **P-0-0074, Interface feedback 1**
- **S-0-0277, Position feedback 1 type parameter**

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check"**".

C215 Acceleration data scaling error

Cause:

The display format of the acceleration data can be set using acceleration scaling parameters. The drive-controlled format of the acceleration data is dependent on what motor encoder and encoder resolution are used. The factor for converting acceleration data from internal drive format to display format (or vice-versa) is outside the allowable range.

Remedy:

Check and set the relevant parameters correctly as follows:

- **S-0-0160, Acceleration data scaling type**
- **S-0-0161, Acceleration data scaling factor**
- **S-0-0162, Acceleration data scaling exponent**
- **S-0-0116, Resolution of motor feedback**
- **S-0-0121, Input revolutions of load gear**
- **S-0-0122, Output revolutions of load gear**
- **S-0-0123, Feed constant**
- **P-0-0074, Interface feedback 1**
- **S-0-0277, Position feedback 1 type parameter**

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C216 Torque/force data scaling error

Cause:

The display format of the torque/force data can be set using torque/force scaling parameters. The factor for converting torque data from drive-controlled format to display format (or vice-versa) is outside the allowable area.

Remedy:

Check and set the relevant parameters correctly as follows:

- **S-0-0086, Torque/force data scaling type**
- **S-0-0093, Torque/force data scaling factor**
- **S-0-0094, Torque/force data scaling exponent**
- **S-0-0110, Amplifier peak current**
- **S-0-0111, Motor current at standstill**

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C217 Feedback1 data reading error

If you have entered these values into **P-0-0074, Interface feedback 1**:

- "1" for standard interface,
- "4" for DFF module, or
- "8" for DAG module (EnDat)

then the attached encoder must have a feedback data memory. The values for the encoder resolution and the feedback type are taken from there. An error was discovered while reading these values.

Cause:

1.   Defective motor feedback cable.

2.   Defective motor feedback.

Remedy:

For 1.   Check the motor feedback cable.

For 2.   Exchange the motor.

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C218 Feedback 2 data reading error

The initialization of the measuring systems is done in the command **S-0-0128, C200 Communication phase 4 transition check**. If the measuring system to initialize has an intrinsic data memory, this memory is read.

The error C218 Feedback 2 data reading error is generated, if an additional optional encoder (encoder 2) is present and being evaluated (**P-0-0075 Feedback 2 type** other than 0) and if an error is discovered while reading the data.

Measuring systems with intrinsic data memory are :

- DSF/HSF/LSF and resolver, as well as
- measuring systems with Endat interface (from Heidenhain)

Cause:

1.   Defective measurement system cable

2.   Defective measurement system

Remedy:

For 1.   Check the measurement system cable.

For 2.   Exchange the measurement system.

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C220 Feedback 1 initializing error

A number of tests are performed when the motor encoder is initialized. An error was detected during this process. This error may be:

- Error while reading the angle rectification data

- Error while copying the angle rectification data

- Interruption of communication with the encoder

- Assembly error with the position of an initialization track

- Error while reading the analog signal of an initialization track

- Error in the pointer length of the analog signal of an initialization track

- Invalid offset between the high and low resolution track

- Error in the measuring system micro-controller

Cause:

1.   Defective motor feedback **cable**

2.   Defective motor **feedback**

3.   Defective measurement system **interface**

Remedy:

For 1.   Check the motor feedback cable.

For 2.   Exchange the motor.

For 3.   Exchange the measuring system interface, if it is a module, or the complete drive controller.

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C221 Feedback 2 initializing error

Several checks are performed during the initialization of an optional encoder. An error has been detected during this process. This error may be:

- Error while reading the angle rectification data

- Error while copying the angle rectification data

- Interruption of communication with the encoder

- Assembly error with the position of an initialization track

- Error while reading the analog signal of an initialization track

- Error in the pointer length of the analog signal of an initialization track

- Invalid offset between the high and low resolution track

- Error in the measuring system micro-controller

- With DAG 1.2: external 24V set for SSI interface

4-14 **Description of Diagnostic Letters B...,C..., D... and A...**   **DIAX04 SSE-03VRS**

Cause:

1.   External encoder cable defective.
2.   Defective feedback.
3.   Defective measurement system interface.

Remedy:

For 1. Check the optional feedback cable.

For 2. Exchange feedback.

For 3. Exchange the measuring system interface (module).

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C223 Input value for max. range too high

Cause:

An internal position resolution has been selected via the **S-0-0278, Maximum travel range** parameter that no longer guarantees a correct commutation of the motor.

Remedy:

Select a smaller value for the **S-0-0278, Maximum travel range** parameter.

See also the functional description **"S-0-0128, C200 Communication Phase 4 Transition Check**".

C225 Coprocessor not ready for initialization

The drive controller has a coprocessor. This coprocessor is initialized during the transfer command. The coprocessor signals that it is ready for initialization. If it is not ready, this error is generated.

Cause:

Coprocessor failed.

Remedy:

Exchange the drive controller.

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C226 Coprocessor acknowledge failed

The drive controller has a coprocessor. This coprocessor is initialized during the transfer command. If the coprocessor does not confirm the initialization by the master processor, this error will be generated.

Cause:

The coprocessor failed.

Remedy:

Exchange the drive controller.

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See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check"**".

C227 Modulo range error

Cause:

The marginal conditions for modulo processing were not maintained.

See functional description: "Modulo Processing-Limiting Conditions".

C228 Controller type S-0-0140 wrong

Several internal software settings are made based on parameter **S-0-0140, Controller type**. If the content of this parameter cannot be used, then this error will be generated.

Cause:

1.   The controller type cannot be processed by this software.
2.   Amplifier EEProm defective.

Remedy:

For 1.   Contact Indramat.

For 2.   Exchange/repair the control device.

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C231 Emulator not loadable

Cause:

The position emulator on the DAE02.1 interface is loaded from a ROM module according to the selection made in P-0-4020. With ELS firmware, the incremental encoder firmware is always loaded; P-0-4020 does not exist in this case. The loading process is monitored; this error message is generated in the event of a malfunction. The cause is a hardware defect on the DAE02.1 interface.

Remedial action:

Replace the DAE02.1 interface.

C232 Encoder 1 interface not present

Cause:

The encoder interface that was selected in the **P-0-0074, Interface feedback 1** parameter has not been installed or cannot be found by the drive, due to a defect.

Remedy:

Install or replace the selected encoder interface.

See also the functional description: "**S-0-0127, C100 Communication Phase 3 Transition Check**"

C233 Encoder 2 interface not present

Cause:

The encoder interface that has been selected in the **P-0-0075, Interface Feedback 2, external** parameter has not been installed or is defective and can therefore not be recognized by the drive.

Remedy:

Install or replace the selected encoder interface.

See also the functional description: "**S-0-0127, C100 Communication Phase 3 Transition Check**"

C234 Encoder combination not possible

Cause:

The encoder interface that has been selected in the **P-0-0075, Interface Feedback 2, optional** parameter cannot be supported by the drive; it has already been allocated to the motor encoder.

Remedy:

Select another **optional** encoder.

See also the functional description: "Determining the Encoder Interface of the Optional Encoder"

C235 Load-side motor encoder with inductance motor only

Cause:

The functionality of the optional encoder can be defined in the **P-0-0185, Function of opt. encoder** parameter. If 'load-side motor encoder' has been selected as the function of the optional encoder, that function will only be supported for asynchronous motors.

Remedy:

Set the **P-0-4014, Motor type** parameter according to the employed motor type.

Check the **P-0-0185, Function of opt. encoder** parameter.

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C236 Feedback 1 required (P-0-0074)

Cause:

A motor encoder is not required (P-0-0074 = 0) if a load-sided motor encoder has been selected via the **P-0-0185, Function of opt. encoder** parameter. However, **S-0-0147, Homing parameter** or the **S-0-0032...35, Mode of Operation** parameters contain values that require a motor encoder.

Remedy:

Change **S-0-0147, Homing parameter** or the **S-0-0032...35, Mode of Operation** parameters such that they are suitable for using an optional encoder.

Enter a value ≠ 0 in the **P-0-0074, Interface feedback 1** parameter to activate the motor encoder.

See also the functional description "**S-0-0128, C200 Communication Phase 4 Transition Check**".

C300 Command Set absolute measuring

Command **P-0-0012, C300 Command 'Set absolute measurement'** was activated by the control system in use.

See also the functional description: " Set Absolute Measuring"

C302 Absolute measuring system not installed

Command **P-0-0012, C300 Command 'Set absolute measurement'** was started without an absolute measuring system being present.

The command cannot be processed because no absolute measuring system is available.

Cause:

1.   The command should not have been activated.

2.   The contacted motor or the external measurement system was not executed as an absolute encoder.

Remedy:

For 1.   Stop execution of the command.

For 2.   Equip the motor or external measurement system with an absolute encoder function.

See also the functional description: "Set Absolute Measuring"

C400 Switching to parameter mode

The command for transition into parameter mode. Before editing parameters that can be edited only in parameter mode, this command must be processed.

See also the functional description: "Parameter Mode - Operation Mode"

C401 Drive active, switching not allowed

Cause:

The command **C400 Command: Switch to parameter mode** has been started, although the drive enable is on.

Remedy:

End the command and turn off the drive enable, then the command can be started again.

See also the functional description: "Parameter Mode - Operation Mode"

C402 Only allowed without master

Cause:

The command **P-0-4023, C400 Communication phase 2 transition** was started even though the command communications interface (SERCOS or fieldbus) is active (P-0-4086 = 00b).

The command can only be executed if the command communications interface (SERCOS or fieldbus) is **inactive** (P-0-4086 = xx1b).

The command communications interface is active if

- signals are pending at the SERCOS interface Signal receiver

Remedy:

Phase progression via SERCOS interface must be executed or SERCOS interface deactivated prior to command start.

C500 Reset class 1 diagnostic, error reset

The command for clearing errors, **S-0-0099, C500 Reset class 1 diagnostic** was activated by the control system in use. All drive internal errors are cleared. But before that happens, the cause of the error must have been cleared.

See also the functional description: "Clearing Errors"

C501 Error delete only in parameter mode

Cause:

An attempt has been made of clearing the error **F822 Motor encoder failure: signal too small** in communication phase 4 (operating mode). This is only possible in communication phases < 4 (parameter setting mode).

Remedy:

1.   Switch back the communication phase.

2.   Activate the command again.

C600 Drive controlled homing procedure command

Command **S-0-0148, C600 Drive controlled homing procedure command** has been activated by the control system in use.

See also the functional description: " Drive-Controlled Homing"

C601 Homing only possible with drive enable

Cause:

The controller enabling signal was not active when the program was started. This is not permitted.

Remedy:

1.   Switch on the controller enable signal.

2.   Start the command again.

See also the functional description: "Functions of the Control During "Drive-Controlled Homing""

C602 Distance home switch - reference mark erroneous

Cause:

The evaluation of the homing switch has been activated. The distance between the positive homing switch edge and the reference mark that shall be interpreted is outside the valid range.

Remedy:

Read the value from the **S-0-0298, Reference cam shift by ...** parameter and enter it in the **S-0-0299, Home switch offset** parameter.

See also the functional description: "Connection of the Home switch"

C604 Homing of absolute encoder not possible

Command **S-0-0148, C600 Drive controlled homing procedure command** was activated. An absolute measuring system was selected using the encoder selection in **S-0-0147, Homing parameter**. This command can only run if command **P-0-0012, C300 Command 'Set absolute measurement'** has been previously activated.

Remedy:

First activate command **P-0-0012, C300 Command 'Set absolute measurement'**, and then start command **S-0-0148, C600 Drive controlled homing procedure command**. This procedure will define the absolute reference point.

See also the functional description: "Possible Error Messages During "Drive-Controlled Homing""

C606 Reference mark not detected

Cause:

If

- a distance-coded or
- an incremental measuring system with zero switch

are referenced, then the maximum travel distance during the referencing procedure is known. If no reference mark is detected over the course of this path, then error message **C606, Reference mark not detected** is generated and referencing is aborted with the generation of an error.

Note: The traversing path of linear non-distance coded measuring system with zero switch evaluation is not known if „0" is entered in parameter **P-0-0153, Optimal distance home switch - reference mark.** This is generally the case if the linear scale has no reference marks at equal and known distances.

Remedy:

- Check the measuring system to be referenced as well as all cabling.
- Check for correct parametrization.
- Check the correction reference mark detection using command **P-0-0014, D500 Command determine marker position**

C700 Basic load

With motors of the MHD, MKD and MKE series, the controller parameters for the connected motor that are stored in the controller are set to their default values by activating the controller parameters that are stored in the motor feedback. The drive controller issues the C7 message to indicate that the **C700 Basic load** command has been activated via the command parameter **S-0-0262, C700 Command basic load**.

Cause:

The command **C700 Basic load** has been activated.

See also the functional description: " Load Default"

C702 Default parameters not available

With motors of the MHD, MKD and MKE series, adapting the control loops to the connected digital drive is done by activating the speed controller parameters that are stored in the motor feedback. The drive controller employs the **C702 Default parameters not available** message to signal that the **S-0-0262, C700 Command basic load** command has been activated, but that there is no data memory at the connected motor.

Remedy:

Order the parameter sheet of the employed motor from the INDRAMAT Service, and enter the parameters.

See also the functional description: "Error Conditions of the Load Default Settings Procedure"

C703 Default parameters invalid

Cause:

The default parameters are read from the motor feedback data memory. At least one of these parameters is invalid.

Remedy:

Check the connection to the motor feedback. Exchange the motor if necessary.

See also the functional description: "Error Conditions of the Load Default Settings Procedure"

C704 Parameters not copyable

Cause:

The default parameters in use are not compatible with this software version.

Remedy:

Please contact Indramat. Explain, which software version, which device and which motor type you have.

See also the functional description: "Error Conditions of the Load Default Settings Procedure"

C800 Default parameter load

How to start the command:

This command can be started in 2 ways:

1. When "PL" is displayed on the drive controller (appears after a change in firmware version), by pressing the S1 button beneath the display.

2. By starting the **P-0-4094, C8 Default parameter load**

What the command does:

All the **parameters are** cleared and preset with their default (initial) value. Process blocks and control loop settings are **overwritten**, too.

Default parameters:

Default values are stored in the drive for all parameters which are listed in **S-0-0192, IDN-list of backup operation data**. They define a **basic state** of the drive that permits the drive to be switched "ready for operation" (display "bb"). Mechanical components like gear and load as well as the control loop settings therefore are <u>not</u> taken into consideration.

See also the functional description: "Basic parameter block".

C801 Parameter default value erroneous (-> S-0-0021)

Cause:

During the execution of **P-0-4094, C800 Command Base-parameter load,** a default value that has been stored in the drive was recognized as incorrect. The related parameter is entered in the **S-0-0021, IDN-list of invalid op. data for comm. Ph. 2**.

See also the functional description: "Basic parameter block"

D300 Command adjust commutation

A correctly adjusted commutation offset is mandatory for the operation of synchronous motors. The "D3" message indicates that the command has been activated, that is used for determining the commutation offset.

Cause:

The commutation setting command has been activated.

See also the functional description: "Determining commutation offset"

D301 Drive not ready for commutation command

Meaning:

The drive must be in torque control mode when the "D3" command is started.

Cause::

Activate torque control and start the command again.

See also the functional description: "Determining commutation offset"

D311 Commutation offset could not be determined.

The Automatic Commutation Adjustment has tried to determine the commutation offset. That has failed.

Cause:

The motor could not move freely enough.

Remedy:

Check whether the motor is blocked.

See also the functional description: "Determining commutation offset"

D312 Motion range exceeded during commutation

A range of +/- 1 pole pair distance is defined, within which the axis may move during the Automatic Commutation adjustment. If this range is exceeded, this error message appears.

Cause:

1. The drive enable has been set while the axis was still in motion.
2. The axis has been moved by a mechanical force.
3. Parameters P-0-0560 Commutation adjustment current and P-0-0562 Commutation adjustment cycle time are set too high. Possibly the mechanical properties of the axis, like friction or weight load, have changed.

Remedy:

1. Wait until the axis stands still and set the drive enable once again.
2. Inhibit the influence of the mechanical force.
3. Reduce the parameter values for P-0-0560 Commutation adjustment current and P-0-0562 Commutation adjustment cycle time. You can also set them to the default values P-0-0560 Commutation adjustment current = 25 % and P-0-0562 Commutation adjustment cycle time = 4 milliseconds. Afterwards, start the command D300 commutation adjustment to evaluate once again the optimal parameters.

See also the functional description: "Asynchronous Motors".

D400 Positive stop drive procedure command

When the positive stop drive procedure command is activated, all controller monitoring which would result in an error message for class 1 diagnostic caused by blocking the drive with a positive stop is turned off.

Cause:

Command **D400 Positive stop drive procedure command** was activated.

See also the functional description: "Positive stop drive procedure"

D401 ZKL1-Error at command start

Cause:

A class 1 diagnostic error was discovered while starting the command "Positive stop drive procedure" As a result, the command could not be executed.

Remedy:

Eliminate the cause of the error, clear the error, and start the command again.

See also the functional description: "Positive stop drive procedure"

D500 Command Get mark position

The **P-0-0014, D500 Command determine marker position** command can be used for checking the correct acquisition and position of the reference marker of an incremental measuring system. The "d5" display shows that the command has been activated.

Cause:

The **Determine marker position** command has been activated.

See also the functional description: "Functional principle of command detect marker position"

D501 Incremental encoder required

Cause:

The command has been started for a measuring system that does not possess real reference markers. These include measuring systems such as DSF, EnDat, SSI or resolver measuring systems.

Remedy:

Check whether the correct encoder has been selected in **S-0-0147, Homing parameter**.

Employ an encoder system with real reference markers.

See also the functional description: "Functional principle of command detect marker position"

D600 Cancel reference point procedure command

Meaning:

The reference of the encoder that has been selected via **S-0-0147, Homing parameter** is canceled.

Cause:

The **D600 Cancel reference point procedure command** has been activated.

See also the functional description: " Drive-Controlled Homing"

D700 Parking axis command

The command permits one or more drives of a drive package to be stopped without error messages being issued to the controller and/or the power supply module. The remaining drives of the package can be handled without any restrictions.

Cause:

The **S-0-0139, D700 Command parking axis** command has been activated.

See also the functional description: "Command Parking Axis"

4.2 Status Diagnostic Messages

A000 Communication phase 0

The communication process is divided into four communication phases: Phases 0 and 1 are used to recognize the participants. Phase 2 is used to prepare the time and data protocols for communication phases 3 and 4.

Initialization is performed in ascending order of the sequence. The defaults of the communication phase are set by the control system. When the switch to communication phase 4 takes place, initialization is completed and input power is enabled.

If the phase switch is interrupted, the status display remains in the communications phase which has already been reached.

If diagnostic message **A000 Communication phase 0** is active, the drive is in phase 0 and is waiting for a phase transfer to 1 by the control system.

See also the functional description: "Parameter Mode - Operation Mode".

A001 Communication phase 1

The communication process is divided into four communication phases: Phases 0 and 1 are used to recognize the participants. Phase 2 is used to prepare the time and data protocols for communication phases 3 and 4.

Initialization is performed in ascending order of the sequence. The defaults of the communications phase are set by the control system. When the switch to communications phase 4 takes place, initialization is completed and input power is enabled.

If the phase switch is interrupted, the status display remains in the communications phase which has already been reached.

If diagnostic message **A001 Communication phase 1** is active, the drive is in phase 1, and transfer from phase 1 to 2 has not yet been initiated by the control system.

See also the functional description: "Parameter Mode - Operation Mode".

A002 Communication phase 2

For field bus and SERCOS devices, the control demands via the master communication "communication phase 2", or the drive has been switched to phase 2 by the command **P-0-4023, C400 Communication phase 2 transition**. Therefore, the drive is in the "parameter mode". In this mode, many parameters are editable, which can not be edited in "communication phase 4" ("operation mode").

In this phase, usually

- for field bus and SERCOS devices, the communication parameters are transferred from the control to the drive and

- the functions Load and Save parameters ("file services") are performed when needed.

Before switching to communication phase 3 is possible, the command **S-0-0127, C100 Communication phase 3 transition check** must be done. In this command, the drive checks the validity of the parameters needed for the communication phase 3.

After successful execution of the command, the control switches the drive to comm. phase 3 (with field bus and SERCOS devices), or the drive switches by itself to phase 3 at the end of the command.

See also the functional description: "Parameter Mode - Operation Mode".

A003 Communication phase 3

For field bus and SERCOS devices, the control selects via the master communication "communication phase 3", or the drive has been switched to phase 3 by the command **S-0-0127, C100 Communication phase 3 transition check**. The drive is in the "restricted parameter mode". In this mode, many parameters are still editable which can not be edited in "communication phase 4" ("operation mode").

Before switching to communication phase 4 is possible, the command **S-0-0128, C200 Communication phase 4 transition check** must be done. In this command, the drive checks. the validity of the parameters needed for the communication phase 4 ("operation mode").

After successful execution of the command, the control switches the drive to comm. phase 4 (with field bus and SERCOS devices), or the drive switches by itself to phase 4 at the end of the command.

See also the functional description: "Parameter Mode - Operation Mode".

A010 Drive HALT

The feature Drive-Halt (= opposite of Drive-Start) is activated by the control via the communication interface through clearing the /Drive-Halt bit (bit 13) in the master control word or by interrupting a drive control command (i.e. drive-controlled homing).

The Drive-Halt feature is for decelerating the axis to standstill at defined **acceleration** and defined **jerk**.

In **Jog mode S-0-0260**, **Positioning Acceleration** is used for accelerationand **S-0-0193**, **Positioning Jerk** is used for jerk .

In **Velocity control** and in Torque control mode, the drive is decelerated to standstill by setting the velocity command to 0 and using the max. torque.

See also the functional description: "The Functional Principle of Drive Halt".

A011 Drive interlock open

Digital drive controllers are equipped with a starting lockout device that prevents an unwanted start of a servo axis. Activating the starting lockout device separates the power stage control electronics from the power stage via a relay contact.

+24 V is applied across the AS+/AS– terminals of the X3 connector.

A012 Control and power sections ready for operation

The drive is supplied with control voltage, and the power is switched on. The drive is ready to deliver power.

A013 Ready for power on

The drive is supplied with a control voltage, and there are no errors in the drive controller.

The drive is ready to be turned on with power.

See also the functional description: "Parameter Mode - Operation Mode".

A100 Drive in TORQUE control

The drive is in the torque control operating mode. It follows the torque command value sequence set by the control system.

See also the functional description: "Operating Mode: Torque Control".

A101 Drive in VELOCITY control

The drive is in the velocity control operating mode. It follows the velocity command value sequence set by the control system. The velocity control loop is closed in the drive.

See also the functional description: "Operating Mode: Velocity Control".

A102 Position mode with encoder 1

The drive is in **position control mode**. The position loop is closed in the drive by a position encoder. The control system only sets the position command value sequence; the drive follows the command value with a systematical **lag** (following error).

Encoder 1 indicates that the position encoder is installed on the motor shaft (indirect measurement of the axis position).

See also the functional description: "Operating Mode: Position Control".

A103 Position mode with encoder 2

The drive is in **position control mode**. The position loop is closed in the drive by a position encoder. The control system only sets the position command value sequence; the drive follows the command value with a systematical **lag** (following error).

Encoder 2 indicates that the position encoder is installed on the machine axis (direct axis position measurement).

See also the functional description: "Operating Mode: Position Control".

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A104 Position mode lagless, encoder 1

The drive is in **position control mode**. The position loop is closed in the drive by a position encoder. The control system only sets the position command value sequence; the drive follows the command value **without following error** (**lagless**).

Encoder 1 indicates that the position encoder is installed on the motor shaft (indirect measurement of axis position).

See also the functional description: "Operating Mode: Position Control".

A105 Position control lagless, feedback 2

The drive is in **position control mode**. The position loop is closed in the drive by a position encoder. The control system only sets the position command value sequence; the drive follows the command value **without following error** (**lagless**).

Encoder 2 indicates that the position encoder is installed on the machine axis (direct axis position measurement).

See also the functional description: "Operating Mode: Position Control".

A106 Drive controlled interpolation, encoder 1

The drive receives a position command value from the control system which is identical to the **target position** of the travel path. Then the drive generates (**interpolates**) an internal position command value sequence, which uses the control system to maintain maximum values for jerk, velocity and acceleration sequences.

The drive moves with a systematical **lag** (following error) to the target position.

Encoder 1 indicates that the position encoder is installed on the motor shaft (indirect measurement of the axis position).

See also the functional description: "Operating Mode: Drive Internal Interpolation".

A107 Drive controlled interpolation, encoder 2

The drive receives a position command value from the control system which is identical to the **target position** of the travel path. Then the drive generates (**interpolates**) an internal position command value sequence, which uses the control system to maintain maximum values for jerk, velocity and acceleration sequences.

The drive moves with a systematical **lag** (following error) to the target position.

Encoder 2 indicates that the position encoder is installed on the machine axis (direct axis position measurement).

See also the functional description: "Operating Mode: Drive Internal Interpolation"

A108 Drive controlled interpolation, lagless, encoder 1

The drive receives a position command value from the control system which is identical to the **target position** of the travel path. Then the drive generates (**interpolates**) an internal position command value sequence, which uses the control system to maintain maximum values for jerk, velocity and acceleration sequences.

The drive moves **without following error (lagless)** to the target position.

Encoder 1 indicates that the position encoder is installed on the motor shaft (indirect measurement of the axis position).

See also the functional description: "Operating Mode: Drive Internal Interpolation".

A109 Drive controlled interpolation, lagless, encoder 2

The drive receives a position command value from the control system which is identical to the **target position** of the travel path. Then the drive generates (**interpolates**) an internal position command value sequence, which uses the control system to maintain maximum values for jerk, velocity and acceleration sequences.

The drive moves **without following error (lagless)** to the target position.

Encoder 2 indicates that the position encoder is installed on the machine axis (direct axis position measurement).

See also the functional description: "Operating Mode: Drive Internal Interpolation".

A800 Unknown operation mode

There is no diagnosis for the activated Operating Mode.

4.3   Diagnostic messages for basic initialization and after fatal System errors

Diagnostic Message Display: -0

Cause:

The data storage for the controller is tested for its functional capability.

If an error is detected, this display will remain.

Remedy:

The drive controller is defective and must be exchanged.

Diagnostic Message Display: -1

Cause:

The data storage for the DSS 2.1 Module is tested for its functional capability.

If an error is detected, this display will remain.

Remedy:

The DSS Module or the connection to the main device is defective.

- If DSS module is defective → exchange
- If drive controller is defective → exchange

Diagnostic Message Display: -2

Cause:

Makeup of the parameter structure.

If the EPROMS are exchanged for another version of the firmware, the parameter memory on the programming module is erased (duration appx. 5 sec.).

Diagnostic Message Display: -3

Cause:

The motor type and the type of the motor feedback are determined by reading their parameter storage areas.

Diagnostic Message Display: -5

During basic initialization, an error was reported by the coprocessor.

Cause:

1.   Control voltage error (+24 V or +/-15 V).
2.   +/-10 V - error.

Remedy:

For 1.   Check the control voltage supply.

For 2.   Replace the drive.

Diagnostic Message Display: -6

Cause:

A fatal processor or program error was encountered.

Remedy:

The error in question is a system error. Please contact the appropriate software development company.

Diagnostic Message Display: Watchdog ◖◗

Cause:

A fatal processor or program error (Watchdog) was encountered.

Remedy:

Replace the drive.

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4.4 Operation Status

Hereafter, the possible states of operation are listed alphabetically. These are shown on the H1 display of the device.

bb

"Ready for operation"

Refer to description **A013 Ready for power on**.

Ab

"Drive is ready"

Refer to description **A012 Control and power sections ready for operation**.

AF

"Drive enable"

According to the operation mode in use, you will find a more exact description of the display "AF" under the respective state diagnosis A101..A800.

AH

"Drive Halt"

Refer to description **A010 Drive HALT**.

AS

"Drive interlock"

Refer to description: **A011 Drive interlock open**

P0

"Phase 0" (only with SERCOS communication)

Refer to description **A000 Communication phase 0**.

P1

"Phase 1"

Refer to description **A001 Communication phase 1**.

P2

"Phase 2"

Refer to description **A002 Communication phase 2**.

P3

"Phase 3"

Refer to description **A003 Communication phase 3**.

PL

"Basic Parameter Load"

See also: **F209 PL Load parameter default values**

UL

"Basic Load"

See also: **F208 UL The motor type has changed**

Notes

5   Exchanging Drive Components

5.1   Identifying the Drive Components

Power Supply Module

- The type plate of the power supply module is on the upper side of the machine at the front edge of the housing.
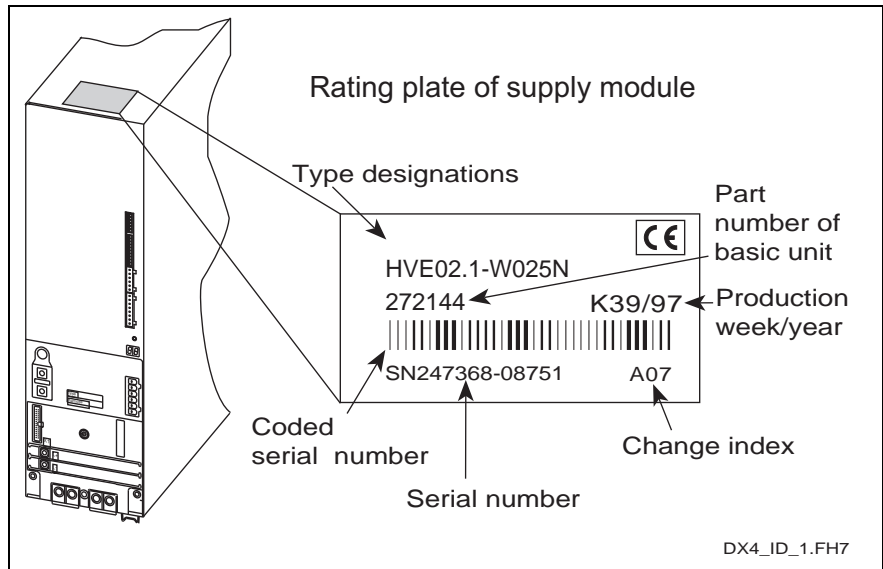
Fig. 5-1:   Type plate on the power supply module (Example)

Servicing   When contacting Customer Service at Indramat, it is important to know

- type designation and
- serial number

of the power supply module.

Procuring a replacement unit   Use the type deisgnations when ordering replacement units from INDRAMAT.

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Drive Controllers

Three type plates are mounted to the unit to identify hardware and firmware.
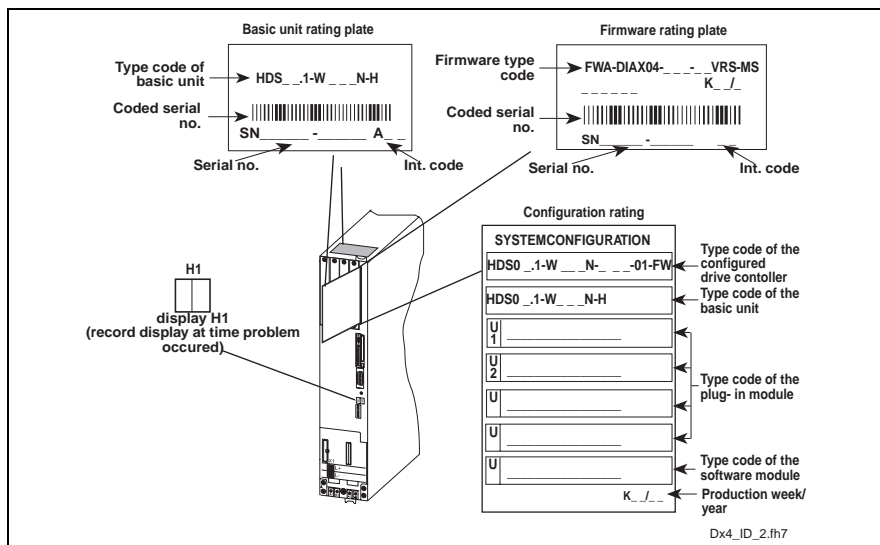
Fig. 5-2:   Type plates for HDS / HDD controllers (Example)

Servicing

When contacting Customer Service at Indramat, it is important to know

- the type designation of the configured drive controller,
- the serial number of the basic unit and
- the firmware type designation.

Procuring a configured replacement unit

Replacement units can be purchased from Indramat in the form of completely configured drive controllers, provided that

- the type designation of the configured drive controller and the
- firmware type designation

are known. The drive controller is then supplied with plug-in modules (U1...U4) and the software module (U5) including firmware.

Putting a replacement unit together

The replacement unit can be put together with a basic unit and the necessary plug-in modules. When orderingor when the customer uses parts from his own stock, it is necessary to know:

- the type designation of the basic unit and the
- type designation of the plug-in module.

If the customer puts the replacement unit together himself, then it is not necessary to order either software or firmware as the software module (including firmware) can be removed from the defective unit and re-used. This means that the replacement unit requires no adjustments in the machine.

Procuring a new software module	It only makes sense to replace a software module if the drive firmware has an error significant to the application or the new functionality of a new firmware release is required.

> **Note:** The software module of the drive controller contains the machine-specific parameters which can be lost when replacing the software module. This means that the module should only be replaced in very specific cases!

When ordering, note the

- type designation of the software module as well as the
- firmware type designation.

The latest firmware is automatically delivered.

Motors

A type plate is mounted to each motor in the vicinity of the junction box or power connector. If this type plate is in any way covered by the contours of the machine, then an additional type plate can be mounted to a more visible spot on the motor or machine. (An additional type plate is supplied with each motor, it is attached over the motor type plate with tape.)

Servicing When contacting Customer Service at Indramat, it is important to know

- the type designation and the
- serial number

of the motor.

Procuring a replacmenet motor Replacement motors must be ordered from INDRAMAT specifying the complete type designation.

Electrical connections

Standard cables
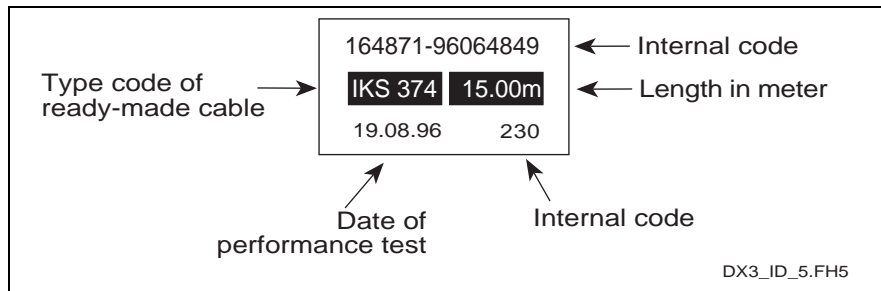
Fig. 5-3:   Type plate of standard INDRAMAT cables (Example)

Servicing   If cables are damaged it is advisable to replace them with standard and tested Indramat cables.

Procuring a standard cable   When ordering, specify

- type designations of the cables and their
- lengths.

The type plate is situated near the end of the cable.

Making a replacement cable   The replacement cable can be made of various parts, i.e., plug-in connectors, ferrules and connector sleeves. The power connectors in particular require special tools to mount the components. When obtaining the components, note

- type designation of the plug-in connector and
- type designation of the cable.

Information about special tools and assembly guidelines can be obtained from INDRAMAT upon request!

5.2   Replacing Drive Components

Power Supply Module

To avoid machine downtime it makes sense to replace defective drive controllers by simply exchanging the unit.

INDRAMAT power supply modules have been designed to ensure a safe, quick and uncomplicated replacement to keep production downtime to an absolute minimum.

Problems in the supply unit are diagnosed, and the steps to take when "Replacing the Power Supply Unit" are outlined in terms of the error diagnoses listed in the relevant document, i.e. DIAX04 - ....; Fault Clearance Guidelines".

Production can be resumed immediately after the unit is replaced because it is not necessary to adjust the drive to the machine.

Exchanging a Unit

Procuring a replacement
- To achieve the greatest functionality, it is recommended to obtain a configured drive controller for the replacement. See section "on page 5-1.

Filling out a fault report
- A fault report form is incorporated into this document in section "Fault Report" on page 5-12, where it can be copied and used. The Fault Report must be completely filled out! This information ensures that the repair will be quickly and efficiently completed and also helps locate the cause of the problem!

Disconnecting the voltage
- Switch the main switch of the machine off and secure it against being switched back on.

- Remove the cover of the power connection of the defective unit and all adjacent units.

	Voltage-conducting bus bars (exceeding 50V), even with supply voltage off!
⚠ **DANGER**	Electrical shock could result if touched! ⇒ Wait discharge time of DC bus (L+/L-) before checking that it has dropped below 50 volts!

- All electrical and mechanical connections (with the exception of the unit mounting) on the front of the unit, top and underside must be released and removed.

Removing the supply module
Release the screws on the underside of the unit. Lift unit up with both hands and remove it.

Mounting the module
- Grip the supply module at the bottom and top and hang it into the mounting bars. Now screw into place!

Connecting the supply module

- Re-connect all electrical connections of the supply module as specified by the machine manufacturer!

- Re-mount the power connection covers!

Starting up the drive package
- Start the machine up as specified by the machine manufacturer.

Drive Controllers

To avoid machine downtimes, it makes sense to replace defective drive controllers by simply replacing them.

INDRAMAT drive controllers have been designed to quickly and simply replace the units and to keep production downtimes low.

Drive system faults are diagnosed by the drive controllers in terms of "Replacing the controller" and as dependent on the fault diagnosis found in the relevant document, "DIAX04 - ....; Fault Clearance Guidelines"

Production can be immediately started up after the unit is replaced as the drive does not have to be adjusted to the machine.

Exchanging a Unit

Procuring a replacment unit
- To achieve the greatest functionality, it is recommended to obtain a configured drive controller for the replacement. See section "on page 5-1".

Filling out a fault report
- A fault report form is incorporated into this document in section "Fault Report" on page 5-12, where it can be copied and used. The Fault Report must be completely filled out! This information ensures that the repair will be quickly and efficiently completed and also helps locate the cause of the problem!

Disconnecting the voltage
- Switch the main switch of machine off and secure against being switched back on.

- Remove the cover of the power connection of the defective unit and all adjacent units.

⚠ **DANGER**	**Voltage-conducting bus bars (exceeding 50V), even with supply voltage off!** Electrical shock could result if touched! ⇒ Wait discharge time of DC bus (L+/L-) before checking that it has dropped below 50 volts!

- All electrical and mechanical connections (with the exception of the unit mounting) on the front of the unit, top and underside must be released and removed.

Removing the drive controller

- Release the screws on the underside of the unit. Lift unit up with both hands and remove it.

- Release the software module (slot U5) by pressing the button, remove it from the defective unit and plug into the replacement unit.

Note:	The software module contains the machine-specific parameters! If the original software module is used, then no adjustments of the drive to the machine need be made!

Mounting a HDDS/HDS
- Grip the controller at the top and bottom and hang into the mounting bars. Tighten the screws!

Connecting the controller
- Reconnect all electrical connections as per the specifications of the machine manufacturer!

- Remount the cover of the power connections!

Starting up the controller
- Start the machine up as specified by the machine manufacturer.

- Check controller functions!

Motors

Procuring a replacement motor   See section. "Identifying the Drive Components" on page 5-1.

Filling Out a Fault Report

- A fault report form is incorporated into this document in section "Fault Report" on page 5-12, where it can be copied and used. The Fault Report must be completely filled out! This information ensures that the repair will be quickly and efficiently completed and also helps locate the cause of the problem!

⚠ **DANGER**	**High voltage at motor lead terminal if not completely powered down and return of drive enable or if motor is still turning!** Electrical shock could result from contact! ⇒ Check to make sure that the supply connections for power and control electronics and DC bus are not conducting voltage! ⇒ Make sure that the motor is standing still!

Removing motor

⚠ **CAUTION**	**Error when handling and mounting** Injuries, damage to machine! ⇒ Note the specs of the machine manufacturer for removing a defective motor! ⇒ Secure hanging machine axes against falling!

- Remove defective motor as specified by machine manufacturer.

Note: Make sure that the open ends of the connectors are not contaminated! Maximum allowable degree of contamination is V2! The operating safety is not guaranteed if contamination exceeds this level!

Contamination level	Immediate ambient conditions
V2	Dirt that is capable of conducting cannot occur during operation (IP65), but non-conductive contamination can occur during installation or during replacement of drive components. Some condense water could also form for short periods.

DX3_AT_2.FH5

Fig. 5-4:   Allowable degree of contamination on plug-in connectors of motor

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Mounting motor • Mount replacement motor as specified by manufacturer.

•

Connecting the motor • Re-connect all electrical and liquid (if motor is liquid cooled) connections as specified by the machine manufacturer!

•

Note: Insert the connectors only if they are dry and clean**!**

Re-starting the machine • Start up the machine as specified by the machine manufacturer. If may be necessary to re-establish the reference dimension if the measuring system of the motor supplies the feedback position for position control.

• Check motor blower function, if necessary. The rotational direction of the blower wheel must agree with that of the direction of the arrow on the blower housing!

• With liquid-cooled motors, check coolant level in tank!

Electrical Connections

Procuring a replacement cable   To ensure the highest degree of safety, it is recommended to use a standard INDRAMAT cable for replacement. See section "Identifying the Drive Components" on page 5-1.

Switching voltage off   • Switch main switch of machine off and secure it against being switched back on.

> ⚠ **DANGER**
>
> **High voltage at power terminals if not completely powered down!**
>
> Electrical shock upon contact!
>
> ⇒ Check to make sure that the supply connections for power and control electronics and DC bus are not conducting current (voltage potential = 0)!

Replacing and mounting   • Remove defective cable. Possibly connect new cable to defective one thus when pulling out one, the new one is simultaneously pulled in.

Note: Make sure that the open ends of the connectors are not contaminated! Maximum allowable degree of contamination is V2! The operating safety is not guaranteed if contamination exceeds this level!

Contamination level	Immediate ambient conditions
V2	Conductive contamination cannot occur during operation of the drive (IP65) but non-conductive dirt contamination can occur during installation or replacement of the drive components. Some condense water could also form.
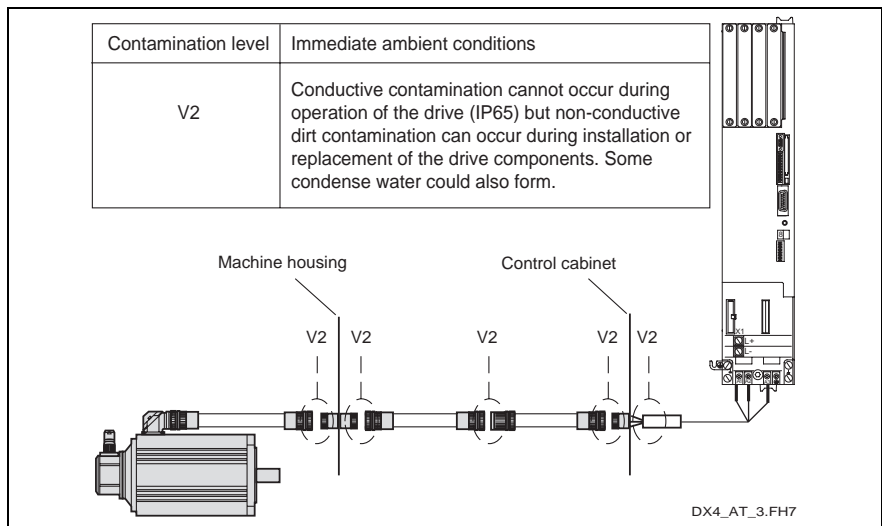
Fig. 5-5:   Permissible degree of contamination of plug-in connectors

Connecting a cable   • In the case of cables without plug-in connectors, connect the individual cores as per the specifications of the machine manufacturer. Ferrules and connectors sleeves must be used! Note correct phases with motor power and motor blower connections.

• Make sure cables with plug-in connectors have clean surfaces!

Note: Plug connectors in only if these are clean and dry**!**

Starting machine up   • Start the machine up as specified by the machine manufacturer. It may be necessary to check the motor blower. The rotational direction of the blower wheel must agree with the direction of the arrow o the blower housing!

Dispose of defective cable properly!

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Plug-in Modules

Procuring a plug-in module See section "Identifying the Drive Components" on page 5-2.

Disconnecting voltage
- Remove the HDD/HDS from the mains. Make sure that the power and control power source are switched off. The displays on the power supply module and controller must not be illuminated.

- All electrical and optical connections on the front plate of the plug-in module must be removed.

Replacing plug-in modules

⚠️ **CAUTION**	**Danger when handling!** Controller and plug-in module could be damaged if plug-in module replaced with power applied! ⇒ Plug-in modules may not be removed or inserted with power on!

- Release screws at top and bottom of defective plug-in module. Pull module out and label it as "defective"!
- Insert new module and tighten screws.
- All electrical and optical connections must be reconnected.

Starting controller up
- Make sure that the cause for the defective plug-in module has been eliminated (e.g., defect in external measuring system, etc.).

- Start machine up as specified by machine manufacturer. The HDD/HDS drive package is started up simultaneously.

Software Module

Procuring a software module

> **Note:** The software module contains all machine-specific parameters. Prior to mounting a new software module, secure the parameters on an external medium and re-load after replacing the module.

See sec. "IIdentifying the Drive Components" on page 5-1.

Disconnecting the voltage

Disconnect drive controller with HDD/HDSS from mains. Make sure that power and control voltage power sources are shut down. The displays on module and controller must not be illuminated.

⚡ **DANGER**	**Voltage-conducting bus bars (exceeding 50V), even with supply voltage off!** Electrical shock could result if touched! ⇒ Wait discharge time of DC bus (L+/L-) before checking that it has dropped below 50 volts!

Replacing the software module
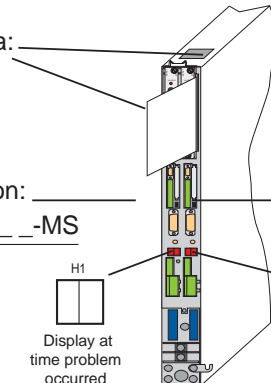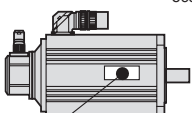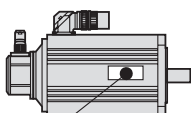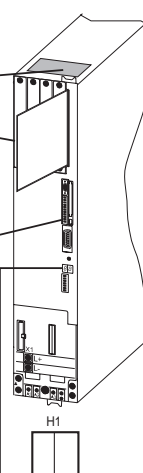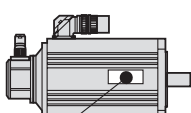
⚠ **CAUTION**	**Danger when handling!** Danger to hardware and firmware if plug-in module replaced with voltage applied! ⇒ Do not remove software module or insert it if voltage is applied!

- Remove software module (slot U5) and label it as defective.
- Insert new software module and click it into place!

Starting up controller
- Software module replacement necessitates a restart of the drive as drive behavior could be altered by error corrections or functional firmware expansion. The data which was previously secured on an external medium can then be reloaded.

5.3 Fault Report

Fault Report
for DIAX04

This fault report supports clarification of problems and their causes. It is absolutely necessary for finding and eliminating even hidden, sporadic or applications-specific problems.

- Always include a fault report when sending in a repair.
- In any other case, send the fault report to the respective INDRAMAT Customer Service office, or send it into
  office with the address found on the back for the INDRAMAT Quality Assurance Department.

INDRAMAT will process the matter quickly and efficiently.

Fault report from:

Co: Loc: Date:

Dept.:   Name: Tele.:

Information on the defective drive:

Rating plate basic unit data:

HDD - _ _ _ _ - _ _

Serial no:

Software module information:
FWC-HSM _._ - _ _ _ - _ _V_ _-MS
S.No.: _ _ _ _ _ _ -

H1

Display at time problem occurred

Motor data:

Motortype:

Serial no:

Software module information:
FWC-HSM _._ - _ _ _ - _ _V_ _-MS
S.No.: _ _ _ _ _ _ -

H1

Display at time problem occurred

Motor data:

Motortype:

Serial no:

Information on the problem:

Rating plate basic unit data:
HDS - _ _ _ _ - _ _
Serial no:

Software module information:
FWC-HSM _._ - _ _ _ - _ _V_ _-MS

S.No.: _ _ _ _ _ _ -

Motor data:

H1

Status display H1
(Record display info at time of problem)

Motortype:

Serial no:

Please look at the back

Pi6003f1.FH7

Rexroth Indramat GmbH • Bgm.-Dr.-Nebel-Straße 2 • D-97816 Lohr • Telefon 09352 / 404-0 • Tx 689 421 • Fax 09352 / 404-885

	Fault report for DIAX04	page 2

Information about HVE or HVR:

Rating plate basic unit data:
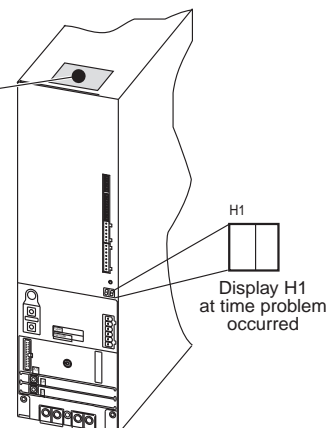
HVE _._ - _ _ _ _ - _

Serial no.: _____

or

HVR _._ - _ _ _ _ - _

Serial no.: _____

H1

Display H1
at time problem
occurred

Information about the machine on which problem occurred:

Manufacturer: _____   Type: _____   Operating hrs.: _____

Machine number: _____   Startup date: _____

Number of drives: _____   Manuf. of and machine controller type: _____

Designation of machine axis at which problem occurred: X ☐   Y ☐   Z ☐   A ☐   C ☐   Q ☐   _ _ -axis

Please explain the problem:

_____
_____
_____
_____
_____
_____

Additional information:

Defective state:	Cause:	Accompanying effects:	
☐ is constantly present	☐ unknown	☐ mechanical problems	Have there been problems with
☐ during startups	☐ connection error	☐ mains section failed	this axis before ?
☐ occurs sporadically	☐ external causes	☐ control failed	
☐ occurs after ☐ hours	☐ mechanical damage	☐ motor failed	How often: _____
☐ occurs with vibrations	☐ loose connetions	☐ cable break	
☐ is temperature-dependent	☐ moisture in unit	☐ defective blower	Do the problems always occur on specific
	☐ extrinsic object in unit	☐ defective feedback	data or at specific times of the day ?

Pi6004f1.fh7

Fig. 5-6:   Fault Report for AC drives with HDD/HDS

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USA ☒ SALES ☒ Service			USA　Service HOTLINE
Mannesmann Rexroth Corporation Rexroth Indramat Division Charlotte Regional Sales Office 14001 South Lakes Drive USA - Charlotte, North Carolina 28273 Telefon:　+1 704/5 83 97 62 　　　　　+1 704/5 83 14 86			**+1-800-860-1055** - 7 days / 24hrs -

Kundenbetreuungsstellen außerhalb Europa / USA

Service agencies outside Europe / USA

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