ECODRIVE03
Drive for Machine Tool Applications
With SERCOS-, Analog- and Parallelinterface

Troubleshooting Guide: SMT-02VRS

SYSTEM200

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DOK-ECODR3-SMT-02VRS**-WA01-EN-P

Title	ECODRIVE03 Drive for Machine Tool Applications With SERCOS-, Analog- and Parallelinterface
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Purpose of Documentation	The following documentation describes the functions of the firmware FWA-ECODR3-SMT-02VRS. This documentation serves: • for error diagnosis and error removal

Record of Revisions

Description	Release Date	Notes
DOK-ECODR3-SMT-02VRS**-WA01-DE-P	12.99	First edition

Validity　　All rights are reserved with respect to the content of this documentation and the availability of the product.

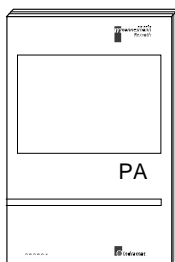**Note**　　This document has been printed on chlorine-free bleached paper..

Summary of Documentation - Box
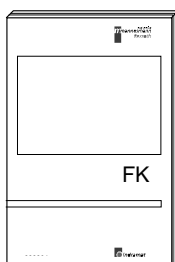
Functional Description:

Description of all implemented Function
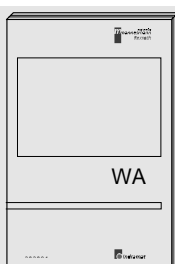based on SERCOS Parameters

FK

Order designation:
DOK-ECODR3-SMT-02VRS**-FK01-EN-P

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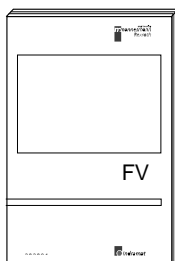
A description of all parameters
used in the firmware

PA

Order designation:
DOK-ECODR3-SMT-02VRS**-PA01-EN-P

Troubleshooting Guide:

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

WA

Order designation:
DOK-ECODR3-SMT-02VRS**-WA01-EN-P

Firmware Version Notes:

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

-FWA-ECODR3-SMT01VRS-MS

FV

Order designation:
DOK-ECODR3-SMT-02VRS**-FV01-EN-P
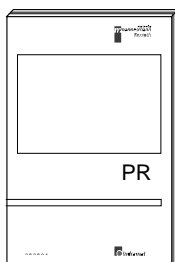
Project Planning Manual:

-Planning control cabinet construction
-Planning the electric layout in the control cabinet

PR

Order designation:
DOK-ECODR3-DKC**.3****-PR01-EN-P

CD: DRIVEHELP

Collection of Windows help systems which
contain documents on firmware derivatives

Order designation:
DOK-GENERL-DRIVEHELP**-GExx-MS-D0600
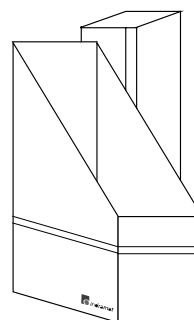
Order designation
DOK-ECODR3-SMT-02VRS**-7101-EN-P

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Notes

1   Diagnostic Message Descriptions

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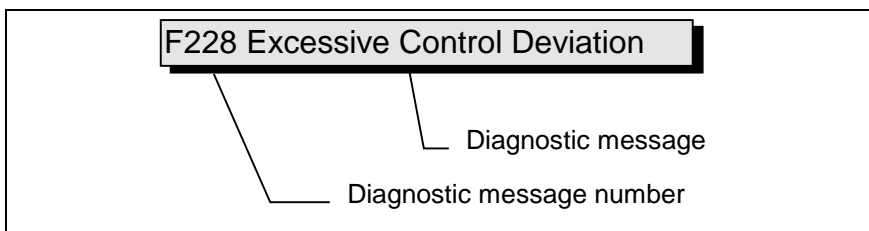
Fig. 1-1:   Diagnostic message with a diagnostic number and text.

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.

H1-Display

The H1-Display serves as an optical display of the diagnostic message on the drive.

H1-Display

DKC

FA5047f1.fh7
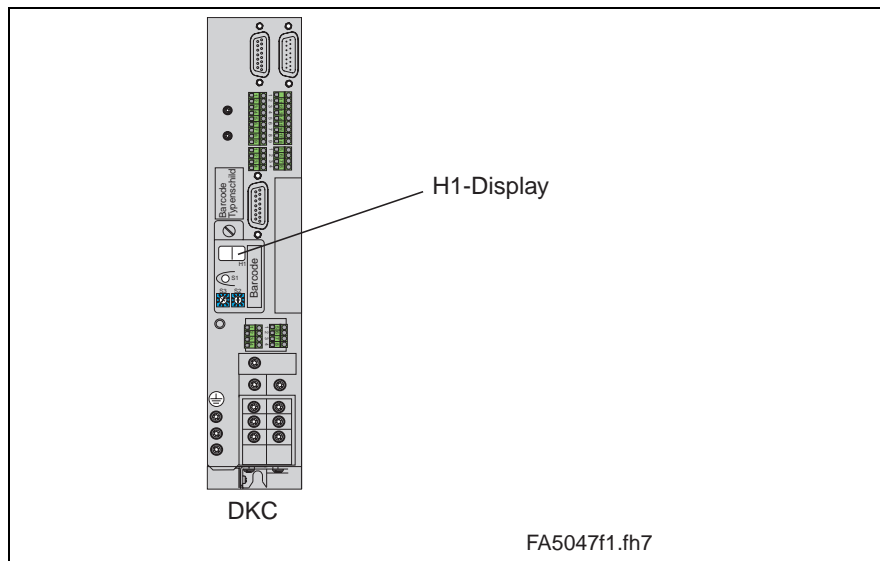
Fig. 1-2:   H1-/Display

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-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.
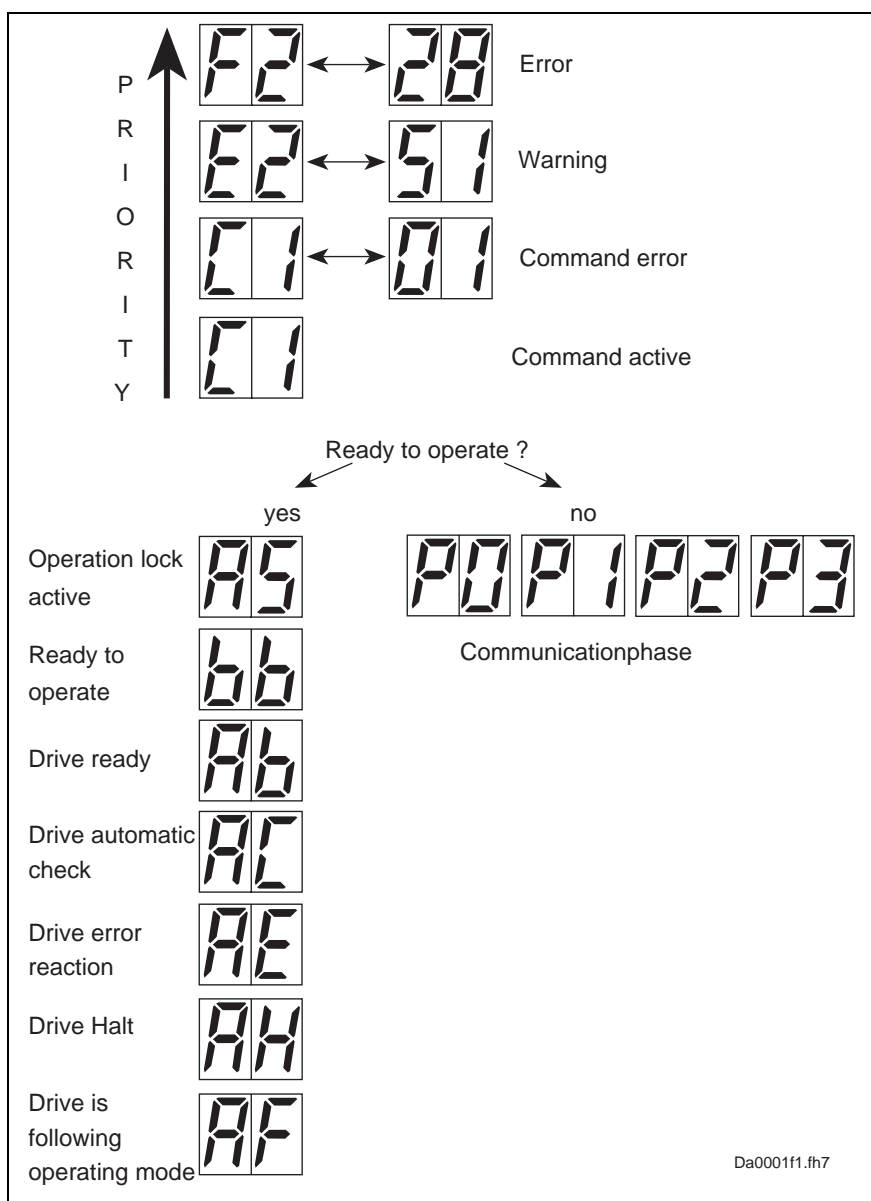
Fig. 1-3:   Diagnostic message priority diagram

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 Electric Servo Drives and Controls

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 degrees of hazard seriousness in compliance with ANSI:

Warning symbol with signal word	Degree of hazard seriousness
	The degree of hazard seriousness 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. 2-4: Classes of danger with ANSI

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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.

- Only use spare parts and accessories 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.

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

- The ambient conditions given in the product documentation must be observed.

- Use only safety features that are clearly and explicitly approved in the Project Planning manual.
  For example, the following areas of use are not allowed: Construction cranes, Elevators used for people or freight, Devices and vehicles to transport people, Medical applications, Refinery plants, the transport of hazardous goods, Radioactive or nuclear applications, Applications sensitive to high frequency, mining, food processing, Control of protection equipment (also in a machine).

- 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.

- 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, maintain 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.

⇒ Before working with electrical parts with voltage potentials higher than 50 V, the equipment must be disconnected from the mains voltage or power supply.

⇒ The following should be observed with electrical drives, power supplies, and filter components:
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 electric 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.

To be observed with electrical drives, power supplies, and filter components:

⚠️ **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**

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 opto-electronic coupler or when battery-operated.

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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 interference. Due to the unpredictable behavior 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 parts and 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 !**

⇒ 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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2.12 Protection against pressurized Systems

Certain Motors (ADS, ADM, 1MB etc.) and drives, corresponding to the information in the Project Planning manual, must be provided with and remain under a forced load such as compressed air, hydraulic oil, cooling fluid or coolant. In these cases, improper handling of the supply of the pressurized systems or connections of the fluid or air under pressure can lead to injuries or accidents.

⚠️ **CAUTION**	**Danger of injury when pressurized systems are handled by untrained personnel!**
	⇒ Do not attempt to disassemble, to open or to cut a pressurized system.
	⇒ Observe the operation restrictions of the respective manufacturer.
	⇒ Before the disassembly of pressurized systems, lower pressure and drain off the fluid or gas.
	⇒ Use suitable protective clothing (for example protective eyewear, safety shoes and gloves)
	⇒ Remove any fluid that has leaked out onto the floor immediately.

Note:	Environmental protection and disposal! The fluids used in the operation of the pressurized system equipment is not environmentally compatible. Fluid that is damaging to the environment must be disposed of separate from normal waste. Observe the national specifications of the country of installation.

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-zero switch
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 mode 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

⚠ **WARNING**
- This overwrites all parameters and positioning blocks.

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

5. E219: Sensor defective appears prior to shutdown of unit

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.

For 5.   Exchange drive.

F219 Motor overtemp. shutdown

The motor temperature has risen to an unacceptable level.

As soon as the **temperature error threshold** of 155°C is exceeded, the drive will immediately be brought to a standstill as set in the error reaction (P-0-0119, best possible standstill).

It applies:

temperature warning threshold < temperature error threshold

See also **E251 Motor overtemperature warning**.

Cause:

1.   The motor is **overloaded**. The effective torque demanded from the motor has been above its allowable continuous torque level for too long.

2.   **Wire break**, short disconnection or circuit in the motor temperature monitor line

3. **Instability** in the velocity loop

Remedy:

For 1. Check the installation of the motor. If the system has been in operation for a long time, check to see if the the operating conditions have changed. (in regards to pollution, friction, moved components, etc.)

For 2. Check wires and cables to the motor temperature monitor for wire breaks, earth short and short circuits.

For 3. Check velocity loop parameters.

See also the functional descripton: "Temperature Monitoring"

F220 Bleeder overload shutdown

1. The regenerated energy from the mechanism of the machine via the motor has exceeded the capability of the braking resistor (bleeder). By exceeding the maximum energy of the resistor, the drive will shutdown according to the set error reaction, thereby protecting the bleeder from temperature damage.

Cause:

The reflected energy from the machine's mechanism over the motor is too great.

Remedy:

With too much power   → reduce the acceleration value.

With too much energy   → reduce the velocity.

Check the drive installation.

May require installation of an additional bleeder module.

2. The bleeder resistor is used as a charging resistor to load the DC bus capacitors.

Cause:

If a power failure has been programmed as a warning, then the softstart of the mains section can be started (controller turned on via the bleeder resistor on the mains). If the control does not bring the installation to a standstill once this warning is issued (the drive continues to receive power from the mains), then the bleeder monitor could be triggered.

Remedy:

- Set both power failure and undervoltage as a fatal warning. Then the drive prevents power input from the mains.

- The control switches the installation/machine off as soon as this warning is generated.

- Parametrize undervoltgage as an error, then the drive switches the machine off with the error reaction which has been set.

See also the functional description: "Current Limit".

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".

F223 Error during initialisation of the parking axis

Cause:

After the start of command **S-0-0139, D700 Command Parking axis** the following is deactivated:

- Measuring system monitoring
- control loop monitoring and
- temperature monitoring

At the end of the command, measuring system initialization is carried out. This means all initializations as with command **S-0-0128, C200 Communication phase 4 transition check** are carried out.

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If an error occurs during these initialization procedures, then error **F223 Error during initialisation of the parking axis** is generated. To specify the error more precisely, it is necessary to activate the transition command phase 3 to 4.

Recovery:

1. bring drive into parametrization mode
2. the switching command phase 3 to 4 must be started
3. and the switching command error must be cleared

See also the functional description: "Command Parking Axis"

F224 Maximum braking time exceeded

Cause:

The decel time of the drive is monitored when the drive enable removed and given an error reaction with velocity-controlled standstill of the drive.

If maximum decel time is exceeded (Parameter **P-0-0126, Maximum braking time**), then the drive is brought to a torque-free standstill and error **F224 Maximum braking time exceeded** is generated.

Remedy:

1. extend **P-0-0126, Maximum braking time**
2. increase brake ramp of error reaction

    P-0-1203, P-0-1201 or P-0-1211 and P-0-1213.
3. reduce external moment of inertia
4. increase torque limit value

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

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.

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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.

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 amplitude wrong

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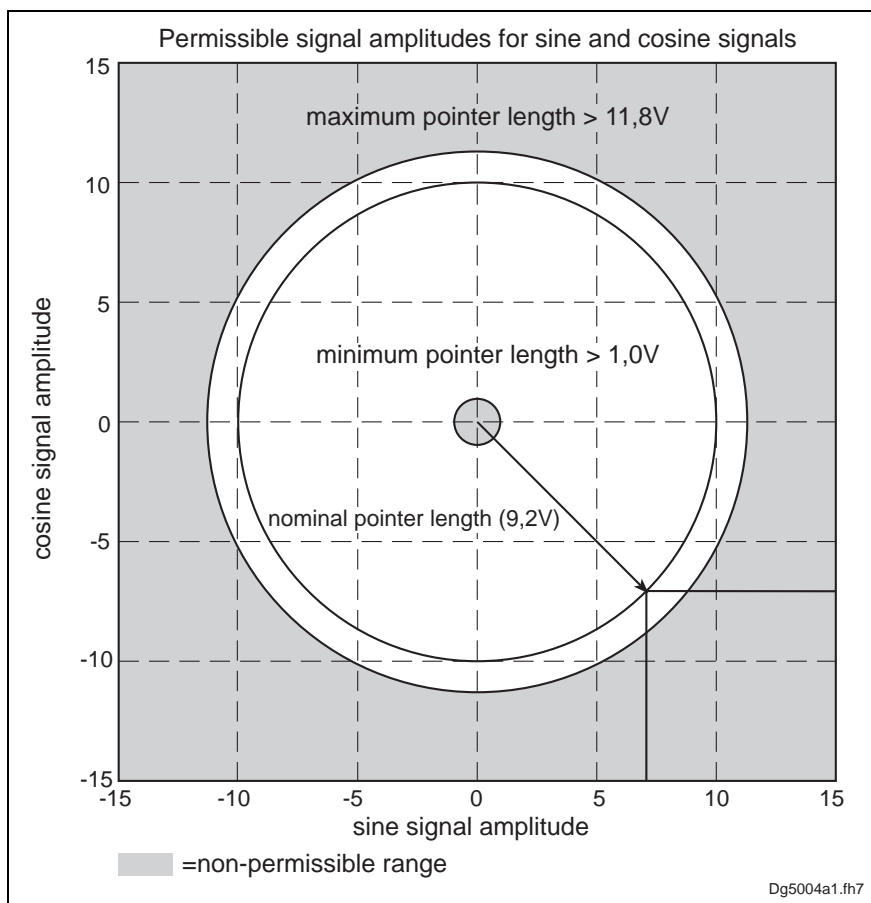
Fig. 3-4:   Correct signal amplitude

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

Example:

Ucos = -6.5V

Usin =   6.5V

$$\text{pointerlength} = \sqrt{(-6.5V)^2 + 6.5V^2} \approx 9.2V$$

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** ⇒ 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** ⇒ 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.

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**".

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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.

F253 Incr. encoder emulator: pulse frequency too high

Cause:

The incremental encoder emulator can process a maximum of 2047 lines per sample period (500µs); this value has been exceeded.

Remedy:

1.   Reduce the **number of lines** of the incremental encoder emulator (P-0-0502).

or

2.   Reduce the travel **velocity**.

See also the functional description: "Encoder Emulation".

F260 Command current limit shutoff

If the current setpoint reaches the peak value, then warning **E260 Command current limit shutoff** is generated. If the limit remains standing for more than 1.5 ms, then the drive is shutdown with error message **F260 Command current limit shutoff**.

Error cause:

1.   Motor power cable has not been connected.
2.   Motor holding brake not released (not connected).
3.   The axis is mechanically jammed.
4.   Accel time exceeds maximum torque greater than 1.5s.

The error message can be switched off in the motor function parameters.

F262 External short at status outputs

Status outputs (ready, warning and UD-message) are monitored for short circuits and thermal overload.

- If output current exceeds 350mA for about 1µs, then this is acknowledged as a short circuit and the pertinent channel is shut off. The output remains off unit the error is cleared.

- With thermal overload, the error is set and the output(s) shut off. After the driver has cooled off, the outputs are switched back on and so on. The error, however, remains until it is cleared. Thermal overload can occur if several outputs are overloaded in excess of 80 mA.

Note: Light bulbs, for example, cannot be controlled as their inrush current causes a short-circuit.

Cause:

1.   Short circuited outputs

2.   One or more outputs are overloaded.

Remedy:

For 1.   Eliminate short circuit or limit switching current (< 350 mA)

For 2.   Drop current, depending on output, to < 80 mA.

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

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.

F269 Error during release of the motor holding brake

After drive enable is set or while running the brake monitor command the motor does not move despite that. The motor torque command is equal to the brake holding torque.

Cause:

1.   Motor brake not connected

2.   Axis mechanically jammed

3.   Frictional torque > brake nominal torque.

Remedy:

on 1.   connect brake

on 2.   check mechanics and eliminate jam

on 3.   switch brake monitor off

See also the functional description: "Motor Holding Brake"

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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 Rexroth Indramat Customer Service.

Note: If a customer password is activated and the drive controller is locked, then error F276 Absolute encoder out of allowed window cannot be reset. The drive controller must be unlocked first.

See also the 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.

F281 Mains fault

Cause:

The power supply voltage was not present during operation for at least 3 power periods. As a result, the drive controller was brought to a standstill according to the set error response.

Remedy:

Check the power supply connection according to the project planning specifications.

F386 No ready signal from supply module

Cause:

Input BbN "mains section ready" on the drive controller is at 24V, i.e., the connected mains section is not issuing a ready to operate signal.

Remedy:

1. Check mains section.

2. Check connection from mains section to BbN input on drive.

3. If the drive does not have a separate power section, then switch the input monitor off.

See also **P-0-4062, Monitoring the Mains section**

See also the functional description: "Current Limit"

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"

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F402 Double MDT failure shutdown

The master data telegram (MDT) has not been received in the drive over the course of two successive SERCOS or fieldbus cycles.

Cause:

1. Fiber optic bus: interference in the fiber optic transmission

2. Fiber optic bus: light signal input power too low

3. SERCOS: problem in SERCOS interface (general)

4. Fieldbus: bus connection terminated/blocked longer than watchdog duration

5. The bus master is no longer sending cyclic telegrams to the drive, although they are expected in phase 4.

Remedy:

On 1. All fiber optic cable connections in SERCOS ring must be checked.

On 2. The fiber optics power read at the receiver (test mode: continuous light) must lie between the range of −20dBm (10µW) and −5dBm (320µW). If it does not, then adjust transmission power or check attenuation of the fiber optic cable (maximum attenuation between TX and RX may not exceed 12.5 dB!)

On 3. SERCOS interface module in drive has to be replaced.

On 4. Check fieldbus connector and cable connections, signal level.

On 5. Switch master on and start up cyclic communications, see Control Manual.

See also Function 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".

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 such 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 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 drivecontroller will result in this error.

Also see the function description: "Travel Range Limits".

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 periodic 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 amplitude wrong

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.

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

Fig. 3-5:   Pointer length
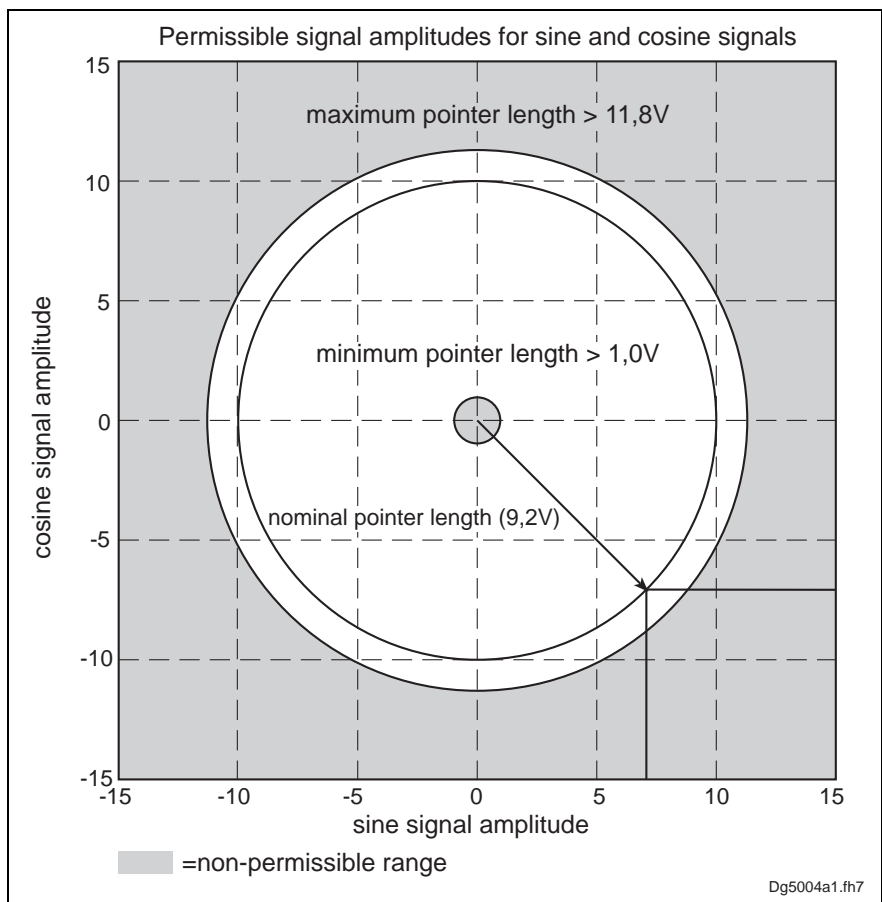
Fig. 3-6:   Correct signal amplitude

Example:

Ucos = -6,5V

Usin =   6,5V

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

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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.

Cause:

1.   Defective encoder cable

2.   Disruptive electro-magnetic interference on the encoder cable

3.   Defective encoder

Remedy:

1.   Check the measurement system cable.

2.   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.)

3.   Check the measurement system and exchange, if necessary.

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.

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.

F873 Power supply driver stages fault

The voltage supply of the driver stage is monitored, and if the voltage is too low, the drive is turned off.

Cause:

The voltage supply of the driver stage is too low.

Remedy:

Exchange 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.

- Command accel and actual velocity have different qualifying signs

- Actual velocity > 20 rpm or 20 mm/min

- Command and actual acceleration have different qualifying (+/-)signs.

Cause:

4. Motor cable is connected incorrectly.

5. Defective controller section of the drive

6. Defective feedback

7. Velocity loop paramatrized incorrectly

8. 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".

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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. 3-7:   Division of the Warning Classes

Warnings can not be externally deleted.

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. Use second sensor in the motor if available.

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
- the "relative drive-internal interpolation" mode
- drive-controlled homing
- Jog
- drive halt
- Process block mode

is active

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**
- **P-0-4007, Process block velocity**

Note:	Warning E247 is suppressed if S-0-0259, Positioning Velocity is cyclically configured.

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. Relative drive-internal interpolation
3. Drive-controlled homing
4. Drive Halt
5. Process block mode
6. jog

Remedy:

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

For 1, 2 and 6:	**S-0-0260**, **Positioning acceleration**	**>0**
For 3.:	**S-0-0042, Homing acceleration**	**>0**
For 4.:	**S-0-0138, Bipolar acceleration limit value**	**>0**
For 5.:	**P-0-4008, Process block Acceleration**	**>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. Relative drive-internal interpolation
3. Positioning Block Mode
4. Jogging

Remedy:

S-0-0259, Positioning Velocity or

P-0-4007, Process block velocity or

P-0-4030, Jog velocity

must be reduced

See also 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 feature in the cabinet.

For 3.   Check the sizing of the control cabinet.

See also the functional description:"Current Limit"

E251 Motor overtemp. prewarning

As soon as the temperature **warning threshold** (145°C) is exceeded, the warning E251 is output, and the drive keeps on following the command value.

This state can last for a long time without powering down. Only when the temperature **error threshold** is exceeded, an immediate powering down will take place.

See also **F219 Motor Overtemperature Shutdown**.

Cause:

The motor is overloaded. The effective torque required from the motor was above the allowable standstill continuous torque for too long.

Remedy:

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

See also the functional description: "Temperature Monitoring".

E252 Bleeder overload prewarning

Cause:

The braking resistance (bleeder) in the amplifier is charged with the reflected energy from the motor by about 90%. The bleeder overtemperature warning shows that an overload of the bleeder is expected if the feedback energy increases on and on.

Remedy:

Reduce the acceleration value or velocity. Check the drive installation.

E253 Target position out of travel range

In operation modes with drive controlled 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 or the process block.

- 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. Don't input moves which are greater than the maximum allowed position minus the current position.

3. In positioning-sequence operating mode always set **S-0-4006, Command Targetposition** smaller than the maximum allowed position.

4. The same holds for Relative Positioning commands, where the sum of the commanded positions + the start position should be less than the maximum allowed position.

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

6. 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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E254 Not homed

If absolute positions are selected while in a positioning operation mode, the control drive must be homed to a reference position. If this is not the case, an absolute position cannot be reached. The drive rejects this positioning command and stops. The warning E254 will be given.

Cause:

Absolute positioning was selected without the drive being referenced.

Remedies:

1. Do the homing (referencing) command with the drive or
2. do only relative positioning.

See also the function description "Drive-Controlled Homing".

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".

E256 Torque limit = 0

Cause:

1. For protection against mechanical overload, the maximum torque can be limited by the **S-0-0092, Bipolar Torque Limit** parameter. If the actual value of this parameter is equal to 0, the motor does not develop torque and does not follow the given command values.

2. Torque reduction is set via an analog channel, and the applied voltage amounts to 10 V.

Remedy:

For 1.   Set the torque limit to a value greater than 0.

For 2.   Establish an analog voltage smaller than 10 V.

See also the functional description:"Current Limit"

E257 Continuous current limit active

The drive controller sets the peak current available for 400 ms. Thereafter, the continuous current limit becomes active and dynamically limits the peak current to the continuous current.

Cause:

More continuous torque was required than was available.

Remedy:

1. Check the drive installation.

2. Check the installation of the motor. For systems which have been in use for a long time, check to see whether the drive conditions have changed in regards to

    - pollution
    - friction
    - moved masses

See also the functional description: "Current Limit".

E258 Selected process block is not programmed.

Cause:

A positioning block was selected for which there is no set target position or positioning velocity, etc.

Remedy:

Select another positioning block or enter the required data.

See also the functional description: "Positioning Block Mode"

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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".

E260 Command Current limit active

The warning shows that the speed controller is entering its limit. This means that the acceleration capacity of the drive has been exceeded. In position control mode this means that there is an ever-increasing deviation between command and actual values (lag error).

Remedy:

- In position control, reduce parametrized accel value or speed value so that the drive can follow the position command value.

- Increase torque limit value, if necessary.

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 error 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

    - Movements 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"

E264 Target position out of num. range

Cause:

In modes:

- drive-internal interpolation,
- relative interpolation and
- positioning block mode

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.

E269 Brake torque too low

When switching the drive enable off or with the brake monitoring command, the motor has moved while checking the brake torque. The motor holding brake thus no longer supplies the nominal torque.

Possible causes for the holding torque that is too low:

1. brake is covered with a layer of oxidization due to storage
2. brake is covered with oil or grease
3. brake is worn down

Remedy:

on 1   if the warning occurs when the drive enable is removed, then start "command brake monitoring".

on 2   if the warning occurs with the removal of the drive enable, start "command brake monitoring". The command brake monitoring re-checks the brake torque. If the torque is too low, then the brake is re-ground. This re-grinding of the brake removes any residues or films. The brake should then bring its full torque.

on 3   if the brake is repeatedly re-ground yet the torque not achieved, then the motor holding brake must be replaced.

See also the functional description: "Motor Holding Brake"

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E281 Mains fault

Cause:

The mains voltage has failed during operation for at least three mains cycles.

In parameter **P-0-0118, Power off on error** mains failure and undervoltage failure have been set as warnings.

The drive does not conduct an error reaction. If the drive continues to operate despite the warning, an **F220 Bleeder overload shutdown** could be generated.

Remedy:

Check the mains connections to ensure that they are as illustrated in the project planning manual.

See Function Description: "Current Limit".

E386 No ready signal from supply module

Cause:

The input BbN "mains section "ready" to operate" on the drive controller is at 24V, i.e., the connected mains section does not issue a ready to operate.

Mains failure and undervoltage errors have been set in parameter **P-0-0118, Power off on error** have been set as warnings.

The drive does not conduct an error reaction. If the drive continues to operate despite the warning, then error **F220 Bleeder overload shutdown** could be generated.

Remedy:

1.) Check mains section.

2.) Check the mains section connection to input ingang BbN on the drive.

3.) If the drive is not supplied by a separate mains section, then the input of the monitor must be switched off.

See **P-0-4062, Power supply monitor**

See the Function Description: "Current Limit".

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, rther 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.

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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".

E831 Position limit reached during jog

If the position limit monitor is activated and the drive is "IN REFERENCE", then it will be positioned on the position limit during movement by jogging. If the drive is positioned on the position limit or beyond the position limit, the drive stops and signals "Position limit value reached during jog".

Remedy:

1.   Move the motor back within the allowed travel area with the jog function   **- or -**

2.   Turn off the position limit monitor.

See also the functional description: "Operating Mode: Jogging".

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".

E881 Mains fault

Cause:

The mains voltage has failed for at least three mains cycles during operation.

Mains errors and undervoltage errors were set as fatal warnings in parameter **P-0-0118, Power off on error**.

The drive switches the motor off.

Recovery:

Checked the mains connections to ensure that they are as specified in the project planning manual.

See function description: "Current Limit".

E886 No ready signal from supply module

Cause:

Input BbN "Mains section readyl" on the drive controller is at 24V, i.e., the mains section connected is not issuing a ready to operate signal.

In parameter **P-0-0118, Power off on error** mains errors and undervoltage errors were set as warnings.

The drive switches the motor off.

Recovery:

1.) Check mains section.

2.) Check connection from mains section to input BbN on drive.

3.) If the drive is not supplied by a separate mains section, then switch the input monitor off.

See **P-0-4062, Power supply monitor.**

See function description: "Current Limit".

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

B000 Pulse wire/Resolver offset detection

Command **P-0-0550, B000 Pulse wire/Resolver offset detection** is conducted.

B001 Motor does not have resolver feedback

If no motor with resolver feedback is connected, then command **P-0-0550, B000 Pulse wire/Resolver offset detection** cannot be conducted.

B002 Drive active at command start

If the drive is in control mode, then it is not possible to conduct command **P-0-0550, B000 Pulse wire/Resolver offset detection**. Drive enable is removed.

B003 Power supply is off

If the power supply is off, then it is not possible to conduct command **P-0-0550, B000 Pulse wire/Resolver offset detection**.

B004 S pulse not found within travel range

S pulse was not found as pulse wire encoder is defective.

B005 Error writing to feedback EEPROM

An error occurred while writing via the IIC interface.

B006 Error in feedback processor, SDAI does not show 1

The feedback processor does not go into a ready state.

B008 Drive must be in operation mode (phase 4)

The drive is not in Phase 4 (bb).

B009 Drive does not control in secondary operation mode 1

The drive does not accept the internal drive enable.

B010 5 pulses found, but min. distance to move not reached

Five pulses if travel path is too short, interference or pulse wire encoder is defective.

B011 SDAI goes immeadiately back to 0, old PIC version

Signal SDAI goes back to "0", old PIC, setting not possible.

B012 Master password required

No master password has been entered.

B013 Shaft does not turn as expected

The shaft does not turned as planned.

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".

B200 Brake check command

The command **P-0-0542, Command to open motor holding brake** was activated.

See also the functional description: "Motor Holding Brake"

B201 Brake check only with drive enable

P-0-0541, B200 command brake monitor was activated and the drive enable was not activated.

See also the functional description: "Motor Holding Brake"

B202 Error during bedding in the brake

The brake monitor command tries to bed in the motor brake. This means that the motor must be moved with closed holding brake. If the torque of the motor is too small to move the motor with closed brake, then the command error is generated.

Cause:

1. Torque of amplifier has been reduced.
2. Axis is mechanically jammed.
3. Weight load plus brake torque is bigger than motor peak torque.

Remedy:

on 1:   remove reduction

on 2:   eliminate jam

on 3:   reduce weight load

See also the functional description: "Motor Holding Brake"

B203 Brake torque too low

The motor moved when checking the brake torque during the command monitor brake. The motor holding brake thus does not supply the nominal torque.

Possible causes for the low holding torque:

4. Brake covered by oxidized layer due to storage
5. Brake covered by oil or lubricant
6. Brake is worn down.

Remedy:

on 1   Re-start "command brake monitor".

on 2   Re-start "command brake monitor". The command brake monitor re-checks the brake torque again. If detected that the torque is too low, then the brake is bedded in. The bedding of the brake removes the oxidized layer or oil film. The brake should now be able to generate sufficient torque.

on 3   If multiple tries result in the brake still not reaching the holding torque, then the motor holding brake has to be replaced.

See also the functional description: "Motor Holding Brake"

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".

C102 Limit error communication parameter (S-0-0021)

Cause:

Communications parameters, which are needed to operate the drive in communication phase 3, are outside their limit values.

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 with values **between** the respective **min. and the max. value** to be 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**.

Note: List parameters only allowed in multiplex channel.

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

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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 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"

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 the AT**.

Note: List parameters only allowed in multiplex channel.

See also the function 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 v maximum permissible **S-0-0185, Length of the configurable data record in the AT**.

Remedy:

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

- number of configurated 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"

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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 500 µs or even 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 permissible 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"

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**.

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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.   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.

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

All MKD und MHD motors have a data memory in the feedback unit. From there, settings for the encoder are read.

Cause:

During reading of the values from the feedback, an error has occurred.

Remedy:

Check feedback cable.

Change 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

Cause:

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

Note: If this warning occurs in combination with an EnDat feedback device then the feedback device is defective.

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".

C227 Modulo range error

Cause:

The marginal conditions for modulo processing were not maintained.

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

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 $\neq 0$ 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".

C238 Wrong function of encoder 2

Cause:

An operating mode needs encoder 2 as control encoder.

Encoder 2 is, however, being used as master axis encoder or measuring wheel encoder.

Recovery:

1. Only operating modes with motor encoder in the operating mode parameter S-0-0032, S-0-0033, S-0-0034, S-0-0035, have been entered.

2. If a mode needs encoder 2 for control, then encoder 2 must be used as control encoder or spindle encoder. (P-0-0185 =0 or 4).

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: "Setting the Absolute Dimension"

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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: "Setting the Absolute Dimension"

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: "Parametrization Mode - Operating 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: "Parametrization Mode - Operating 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 Error"

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

Cause:

If, with absolute encoder, the homing command was called without having done the command **P-0-0012, Set absolute measuring** before, the homing command is cancelled with this error.

If the encoder had been referenced with the "**Set absolute measuring**", then the homing command would give you a possibility to trigger a positioning move to the reference point.

Remedy:

Home the absolute encoder with the command "**Set absolute measuring**".

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"

C802 Locked with password

The parameter **S-0-0267, Password** offers the possibility to set a **write protection** for the drive parameters. The diagnostic message **C705 Locked with password** indicates, that the command **P-0-4094, C800 Command Base-parameter load** has been started, although the drive parameters are protected with the customer password.

See also the functional description: "Basic parameter block"

C900 Position spindle command

The command **S-0-0152, C900 Position spindle command** has been activated via the applied control.

See also the functional descriprion: "Spindle Positioning".

C902 Spindle positioning requires drive enable

Cause:

When starting the **S-0-0152, C900 Position spindle command**, the drive enable was not yet set.

Remedy:

Set the drive enable before starting the command.

C905 Positioning with non-init. absolute encoder impossible

When using an absolute encoder as motor or spindle feedback, the command "set absolute measure" must be performed in order to set the position reference between spindle and measurement system.

Cause:

The absolute encoder used as motor or spindle feedback is not in reference with the spindle. The command S-0-0152 Drive controlled spindle positioning cannot be executed, because the measuring system doesn't have a reference position.

Remedy:

- If an absolute encoder is not desired: switch off the absolute encoder evaluation in parameter **S-0-0277, Position feedback 1 type** or **S-0-0115, Position feedback 2 type**.
- Do the **P-0-0012, C300 Command 'Set absolute measurement'**.

See also the functional description: "Drive-Controlled Homing" and "Setting the Absolute Dimension".

C906 Error during search for zero pulse

Cause:

The homing procedure within the spindle positioning has not been executed successfully. The encoder zero pulse has not been found or could not be assigned properly.

Remedy:

- Check the parametrization of spindle positioning, especially the used combination of encoder and reference (home) switch.
- Check the encoder parametrization.
- Check the distance between zero pulse and reference switch.
- Do the drive controlled homing to check the homing procedure.

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"

D302 Torque/Force too small to move

The command **D3 Command adjust commutation** has been started. To perform this, the motor must move. But it doesn't move.

Cause:

1. The torque is too small to overcome mechanical resistances (friction or weight).

2. The motor is **blocked** mechanically.

3. Motor movement and encoder rotation direction are contradictory to each other.

Remedy:

1. Increase the **S-0-0092, Torque/Force limit** bipolar so that the motor overcomes the mechanical resistances and can turn. Check also P-0-0109, Torque/Force peak limit; this parameter value should be at least as great as S-0-0092.

2. Clear the jamming. Check also the brake.

3. At the motor connection, switch 2 phases or turn rotational direction of encoder (Parameter S-0-0277, position encoder type parameter 1).

Note: For devices with analog inputs, the torque can be limited via an analog torque reduction.

See also the functional description: "Determining commutation offset"

D303 Drive in control at start of command

If the drive controller is in control, then it is not possible to execute command **P-0-0524, D300 Commutation adjustment command**.

D306 Power is off

If the power is off, then it is not possible to execute command **P-0-0524, D300 Commutation adjustment command**.

D307 Drive does not move

Command **P-0-0524, D300 Commutation adjustment command** was terminated with an error.

D308 No adjustment with asynchronous motor

Commutation offset determination is not possible with an asynchronous motor.

D309 Proceed to phase 4

If the drive controller is not in phase 4 (bb), then it is not possible to executed command **P-0-0524, D300 Commutation adjustment command**.

D310 Input master password

No master password was input.

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: "Synchronous 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"

D701 Parking axis only while drive is disabled

The start of command "Command Parking Axis" is only permitted without drive enable applied.

If the command is activated with an applied drive enable, then the drive generates command error **D701 Parking axis only while drive is disabled**.

See also the functional description: "Command Parking Axis"

D900 Command automatic loop tuning

Description:

The start of this command means that an automatic control loop setting is executed in the drive if the drive is in the loop at command start, i.e., the drive enable signal is applied.

See also Function description "Automatic Control Loop Settings"

The start of this command can trigger a movement if drive enable and drive start are at the drive.

The drive conducts autonomous movements within the range defined by both limits.

The E-stop sequence function and the travel range limit switch must be guaranteed and checked.

WARNING

See also Function description:
"Safety Instructions for Electric Servo Drives and Controls"

During command D9, the drive autonomously conducts motions, i.e., without external command value.

D901 Start requires drive enable

Description:

To ensure that the drive is in the loop when starting the command **P-0-0162, D9 automatic control loop setting,** such is queried at command start.

Cause:

Drive enable not set at command start (NO-RF)

Remedy:

Set drive enable and restart command.

See also the functional description: "Automatic Control Loop Settings"

D902 Motor feedback data not valid

Description:

At the start of the automatic control loop setting (**P-0-0162),** the motor parameters

- torque constant
- rated current of unit are read out of the feedback.

Cause:

- One of the above feedback data has a value smaller than or equal to zero (<=0). This means that the controller parameter is incorrectly calculated.
- Motor without feedback data storage.

Remedy:

If known, write the correct values back into the parameter or contact Indramat Customer Service to obtain the feedback data valid for your motor.

In the worst case, it may be necessary to replace the motor.

See also the functional description: "Automatic Control Loop Settings"

D903 Inertia detection failed

Description:

At the start of the automatic control loop setting, the load moment of inertia is determined with an "oscillation attempt".

This means that the speed change and the motor current must exceed a minimum value during acceleration or deceleration to guarantee a sensible and sufficiently precise calculation of the moment of inertia.

Cause:

- drive acceleration too low
- number of measured value too small for automatic control loop setting
- motor speed too low
- load moment of inertia too big

Remedy:

- increase bipolar torque/force value **S-0-0092**
- increase pos. accel S-0-0260
- increase pos. speed S-0-0259
- increase feedrate override S-0-0108

See also Function description: "Prerequisites for starting the automatic control loop settings"

D904 Gain adjustment failed

Description:

In exceptional cases, difficulties in the automatic control loop setting may arise. This means that an automatic setting is not possible. Standard or default values must therefore be loaded into the drive.

Cause:

- oscillating mechanical systems (resonance)
- high level of interference in the encoder signal

Remedy:

Satisfactory results can sometimes be achieved by starting the command **P-0-0162, D9 automatic control loop setting** with a large **P-0-0163, damping factor for automatic control loop setting**, i.e., low dynamics.

This value can be reduced until the control loop behaves as needed.

If even then control loop settings remain unsuccessful, then the setting must be manual.

See also the functional description:"Automatic Control Loop Settings**"**

D905 Travel range invalid, P-0-0166 & P-0-0167

Description:

Before starting an automatic control loop setting, both travel range limits, i.e., upper and lower, must be defined.

When starting command **P-0-0162, D9 automatic control loop setting** the number values are automatically checked for validity. It is checked if the traversing path is large enough and if sensible values have been entered.

Cause:

- **P-0-0167, upper traversing range** smaller than **P-0-0166, lower traversing range**
- Maximum traversing path (**P-0-0169, Travel distance for autom. control loop adjust**) is less than 6 motor rotations and thus too small to start the automatic control loop setting.

Remedy:

- clear command error by ending the command
- a) input new limits whereby:upper > lower limits
  b) redefine limits to define a larger traversing range
- restart command with sensible traversing range

See also Function description: "Prerequisites for starting the automatic control loop settings""

D906 Travel range exceeded

Description:

During automatic control loop setting, there is a constant monitoring of the valid traversing range **P-0-0166** and **P-0-0167**.

Cause:

If only one of these limits is exceeded, then command error **D906** is generated and the drive brought to standstill speed controlled.

Possible causes:

- actual position outside of defined traversing range
- limits redefined after command start

Remedy:

- clear command error and end command
- redefine limits so that the actual position is within defined traversing range
- retart command using sensible traversing range

See also Function description: "Prerequisites for starting the automatic control loop settings"

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: "Parametrization Mode - Operating 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 delayed 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: "Parametrization Mode - Operating 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 no more 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 e.g. 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: "Parametrization Mode - Operating Mode".

A003 Communication phase 3

For field bus and SERCOS devices, the control demands 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, still many parameters are editable too, which can no more 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 e.g. 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: "Parametrization Mode - Operating Mode".

A010 Drive HALT

The feature Drive-Halt (= contrary of Drive-Start) is activated by the applied control via the used 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 **acceleration** and **S-0-0193**, **Positioning Jerk** is used.

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".

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: "Parametrization Mode - Operating 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".

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".

A146 Relative drive controlled interpolation, encoder 1

In the **S-0-0282, Travel distance** parameter, the drive receives a distance specification from the controller. When bit 0 of the **S-0-0346, Setup flag for relative command values** parameter is toggled, this distance is summed up to the value in **S-0-0258, Target position**. In order to get from the current position to the new target position, the drive now generates (interpolates) an internal position command value curve. This is done taking the limit values of velocity, acceleration, and jerk in the parameters

- **S-0-0259, Positioning velocity**
- **S-0-0260**, **Positioning acceleration**
- **S-0-0193, Positioning jerk**

into account.

The drive approaches the target position with a position lag that is proportional to the velocity.

Encoder 1 means that the position encoder is attached to the motor shaft (indirect measurement of the axis position).

See also the functional description: "Mode: Relative drive-internal interpolation".

A147 Relative drive controlled interpolation, encoder 2

In the **S-0-0282, Travel distance** parameter, the drive receives a distance specification from the controller. When bit 0 of the **S-0-0346, Setup flag for relative command values** parameter is toggled, this distance is summed up to the value in **S-0-0258, Target position**. In order to get from the current position to the new target position, the drive now generates (interpolates) an internal position command value curve. This is done taking the limit values of velocity, acceleration, and jerk in the parameters

- **S-0-0259, Positioning velocity**
- **S-0-0260**, **Positioning acceleration**
- **S-0-0193, Positioning jerk**

into account.

The drive approaches the target position with a position lag that is proportional to the velocity.

Encoder 2 means that the position encoder that is attached to the load is used for closing the position control loop (direct axis position measurement).

See also the functional description: "Mode: Relative drive-internal interpolation".

A148 Relative drive contr. interpolation, enc. 1, lagless

In the **S-0-0282, Travel distance** parameter, the drive receives a distance specification from the controller. When bit 0 of the **S-0-0346, Setup flag for relative command values** parameter is toggled, this distance is summed up to the value in **S-0-0258, Target position**. In order to get from the current position to the new target position, the drive now generates (interpolates) an internal position command value curve. This is done taking the limit values of velocity, acceleration, and jerk in the parameters

- **S-0-0259, Positioning velocity**
- **S-0-0260**, **Positioning acceleration**
- **S-0-0193, Positioning jerk**

into account.

The drive approaches the target position of the travel path without a position lag.

Encoder 1 means that the position encoder is attached to the motor shaft (indirect measurement of the axis position).

See also the functional description: "Mode: Relative drive-internal interpolation".

A149 Relative drive contr. interpolation, enc. 2, lagless

In the **S-0-0282, Travel distance** parameter, the drive receives a distance specification from the controller. When bit 0 of the **S-0-0346, Setup flag for relative command values** parameter is toggled, this distance is summed up to the value in **S-0-0258, Target position**. In order to get from the current position to the new target position, the drive now generates (interpolates) an internal position command value curve. This is done taking the limit values of velocity, acceleration, and jerk in the parameters

- **S-0-0259, Positioning velocity**
- **S-0-0260**, **Positioning acceleration**
- **S-0-0193, Positioning jerk**

into account.

The drive approaches the target position of the travel path without a position lag.

Encoder 2 means that the position encoder that is attached to the load is used for closing the position control loop (direct axis position measurement).

See also the functional description: "Mode: Relative drive-internal interpolation".

A203 Stepper position mode

Description:

The drive is functioning in position control with Stepper interface. The device follows the position command which will be developed out of the stepper motor signals.

See also the functional description: "Operating Mode: Stepper Motor Operations"

A204 Stepper position mode, lagless

Description:

The drive is functioning in position regulation without lag/Stepper Drive interface. The device follows the position command which will be developed out of the stepper motor signals.

A206 Process block mode, encoder 1

The drive performs a closed loop position control with systematical lag. The actual value comes from the encoder 1 (motor encoder). The command value profile is generated in the drive.

Target position, velocity, acceleration and jerk are determined by a pre-programmed process block. Depending on **P-0-4019, Process block mode**, the target position is interpreted as an absolute value or as a relative distance to move.

See also the functional description: "Positioning Block Mode"

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A207 Process block mode lagless, encoder 1

The drive performs a closed loop position control without lag. The actual value comes from the encoder 1 (motor encoder). The command value profile is generated in the drive.

Target position, velocity, acceleration and jerk are determined by a pre-programmed process block. Depending on **P-0-4019, Process block mode**, the target position is interpreted as an absolute value or as a relative distance to move.

See also the functional description: "Positioning Block Mode"

A208 JOG mode positive

The drive moves with a jogging velocity (P-0-4030) in the positive direction. The motor is turning clockwise, when viewing the motor shaft.

See also the functional description:"Operating Mode: Jogging"

A210 Process block mode, encoder 2

The drive performs a closed loop position control with systematical lag. The actual value comes from the encoder 2 (ext. encoder). The command value profile is generated in the drive.

Target position, velocity, acceleration and jerk are determined by a pre-programmed process block. Depending on **P-0-4019, Process block mode**, the target position is interpreted as an absolute value or as a relative distance to move.

See also the functional description: "Positioning Block Mode"

A211 Process block mode lagless, encoder 2

The drive performs a closed loop position control without lag. The actual value comes from the encoder 2 (ext. encoder). The command value profile is generated in the drive.

Target position, velocity, acceleration and jerk are determined by a pre-programmed process block. Depending on **P-0-4019, Process block mode**, the target position is interpreted as an absolute value or as a relative distance to move.

See also the functional description: "Positioning Block Mode"

A218 JOG mode negative

The drive moves with a jogging velocity (P-0-4030) in the negative direction. The motor is turning counter clockwise, when viewing the motor shaft.

See also the functional description:"Operating Mode: Jogging"

A400 Automatic drive check and adjustment

Diagnosis A400 is a group diagnosis for various system states. It is used in drive checks and adjustments. A through diagnosis is automatically run when the drive enable is switched on and off.

Drive checks and adjustments include systems states that are run through independent on parametrization.

- sequence of holding brake delay time (see **P-0-0526, Brake control delay**)

- structure of air gap field (is asynchronous motor)

- automatic determination of commutation offset (if synchronous motor with incremental measuring system)

Depending on parametrization, the following system status is checked.

- Automatic brake monitor (see **P-0-0538, Motor function parameter 1**)

A401 Drive deceleration to standstill

The drive

- is brought to standstill as defined in parameter **P-0-0119, Best possible deceleration** or

- carries out "velocity command value equals zero" after a travel range error has occurred.

(see also functional description "General Instructions for Installation/ Definition of Terms, Introduction / Error".)

A800 Unknown operation mode

There is no diagnosis for the activated operation mode.

4.3 Diagnostic messages for basic initialization and after fatal System errors

Diagnostic Message Display: -0

The writable **data storage** of the drive controller is tested for its functional capability.

If an error is detected, E2 is displayed.

Diagnostic Message Display: -1

The hardware of the amplifier is beig initialized.

Diagnostic Message Display: -2

Cause:

The control **supply voltage of the encoder** is missing.

Remedy:

Exchange the hardware.

Diagnostic Message Display: -3

Initializing the parameters from the non volatile memory and calculating the respective data depending from the parameter contents.

Diagnostic Message Display: -4

Initializing and checking the **command communication**.

Diagnostic Message Display: -5

Initializing the system control.

Diagnostic Message Display: -6

Starting the system.

Diagnostic Message Display: ◖◗ (2 dots)

Causes:

1. Programming mode
2. The prozessor does not run at all because of hardware fault.

Remedies:

For 1. Reload firmware program by Indramat customer service.

For 2. Exchange the hardware.

Diagnostic Message Display: E1

Cause:

Processor fault, caused by static discharge, program error or hardware fault. More information is available via a terminal connected to the RS-232 interface.

Remedy:

Switch the amplifier off and on again; if the fault is still present, exchange the hardware. In any case inform the customer service.

Diagnostic Message Display: E2

Cause:

Test of the **RAM** on the programming module has shown an error. RAM defective or not plugged properly.

Remedy:

Switch off, check the plug connection and switch on again; if the error happens agains, exchange the firmware module.

Diagnostic Message Display: E3

Cause:

Caused by a hardware fault or by a static discharge, the 1st **watchdog** of the amplifier has triggered.

Remedy:

Switch the amplifier off and on again; if E3 appears again, exchange the amplifier. In any case inform the customer service. Please explain the exact circumstances under which the error occurred.

Diagnostic Message Display: E4

Cause:

Caused by a hardware fault or by a static discharge, the 2nd **watchdog** of the amplifier has triggered.

Remedy:

Switch the amplifier off and on again; if E4 appears again, exchange the amplifier. In any case inform the customer service.

Diagnostic Message Display: E5

Cause:

Test of the **dual-port-RAM** for command communication failed. Maybe the hardware for command communication is not plugged on properly.

Remedy:

Check the plug connection; if OK, exchange the amplifier.

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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"

See also: **A013 Ready for power on**.

Ab

"Drive is ready"

See also: **A012 Control and power sections ready for operation**.

AC

"Drive Automatic Check"

See also: **A400 Automatic drive check and adjustment**

AE

"Drive Error Reaction"

See also: **A401 Drive deceleration to standstill**

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"

See also: **A010 Drive HALT**.

Jb

"Jog backward"

See also: **A218 Jog negative**

JF

"Jog Forward"

See also: **A208 Jog positive**

P0

"**Phase 0**" (only with SERCOS communication)

See also: **A000 Communication phase 0**.

P1

"**Phase 1**"

See also: **A001 Communication phase 1**.

P2

"**Phase 2**"

See also: **A002 Communication phase 2**.

P3

"**Phase 3**"

See also: **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 Replacing or Exchanging Drive Components

The diagnostic display of ECODRIVE enables an aimed and effective problem search in order to:

- avoid production downtimes due to extensive searches in individual units and repairs of units on the machine
- assume operations without extensive assembly and adjustments
- to quickly eliminate the problem, and replace the defective component

When returning a defective unit to Rexroth Indramat Customer Service, please complete the Fault Report in its entirety. This fault report is at the end of this section and may be copied for your convenience.

Note:	The new drive components must have the same type designations as the old! To ensure this, register the entire type designation when requesting a replacement part.

Position of the type plates:

The type plate of the DKC controller is on the front of the housing. It lists all significant data.

The type plate of the MKD motors on the right side of the motor (when looking onto the drive shaft, terminal box of the motor cable on top).

Standard cables are labelled (cable mark). It bears the order number an the length of the cable.

Specifications for model label

DKC _._ - _ _ _ _ - _

S.No .: _ _ _ _ _ _

Pre- formed engine performance cable

INDRAMAT - cable
IKS _ _ _
No.:
length: m

Pre- formed engine feedback cable

INDRAMAT - cable
IKG _ _ _
No.:
length: m

_ _ _ _ _ _ - _ _ _ - _ _ _ _ _ _ / _ _ _ _

Hardware-
serialnumber

H1

S1

S3   S2

Software-
serialnumber

FWA-ECODR3 _-_ _-_ _VRS-MS

1. Pre- formed cables made by INDRAMAT (with connector) are identified with a model label. The label provides the ordering information (IKS 103 for the Feedback cable, for instance).

2. If cables are ordered without the connector, refer to the stamp on the cable sheathing (Engine Feedback Cable IN 488, for instance).

AP5143F1.fh7

Fig. 5-1: Type designations of the drive components

5.1   Procedure on Replacing the Unit

Note: Note the safety instructions in section 2 when exchanging any parts!

Replacing the DKC:

- Switch main switch off.
- Secure against being switched back on.

⚠   ⇒ Prior to touching bear connecting cables and terminals, wait for the capacitor to discharge! Only then work on the cables!

- Remove contact protection and separate connecting line from DKC.
- Release screws on top and bottom of housing. Remove the DKC from the drive package.
- Insert programming module from defective DKC into new one. This eliminates the reloading of parameter files. If the programming module is defective, see section "Replacing Firmware".
- Hand new DKC into place and tighten screws.
- Connect DKC as specified in the machine terminal diagrams.
- Start up installation.

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Replacing the Motor:

- Switch main switch off.
- Secure against being switched back on.

Note: When replacing the motor, cap open connector ends particularly if there might be the change that coolant or grease could be sprayed or splashed in their vicinity (allowable level of dirt contamination is V2).

- To mechanically replace the AC servo motor, note the instructions of the machine manufacturer.

⚠️ **ATTENTION** ⇒ Danger of unwanted movements. Servo axes with an indirect path measuring systems via a motor encoder will loose the reference dimension if the motor is replaced! This reference to machine coordinate system must therefore be reestablished.

- Servo axes with absolute motor encoder necessitate reestablishing the absolute reference.

Replacing cables:

- Switch main switch off.
- Secure against being switched back on.

⚠️ **ATTENTION** ⇒ Danger from high-voltage levels. Power connector of the cables may only be inserted or separated if power in the installation has been shutdown!

Note: When replacing the motor, cap open connector ends particularly if there might be the change that coolant or grease could be sprayed or splashed in their vicinity (allowable level of dirt contamination is V2).

	Immediate environment requirements
V2	Conductive contamination cannot occur when operating the control drive (at least not with the IP 65); when installing or exchanging drive components, non- conductive contamination or light condensation may momentarily occur.

AP5144F1.Fh7
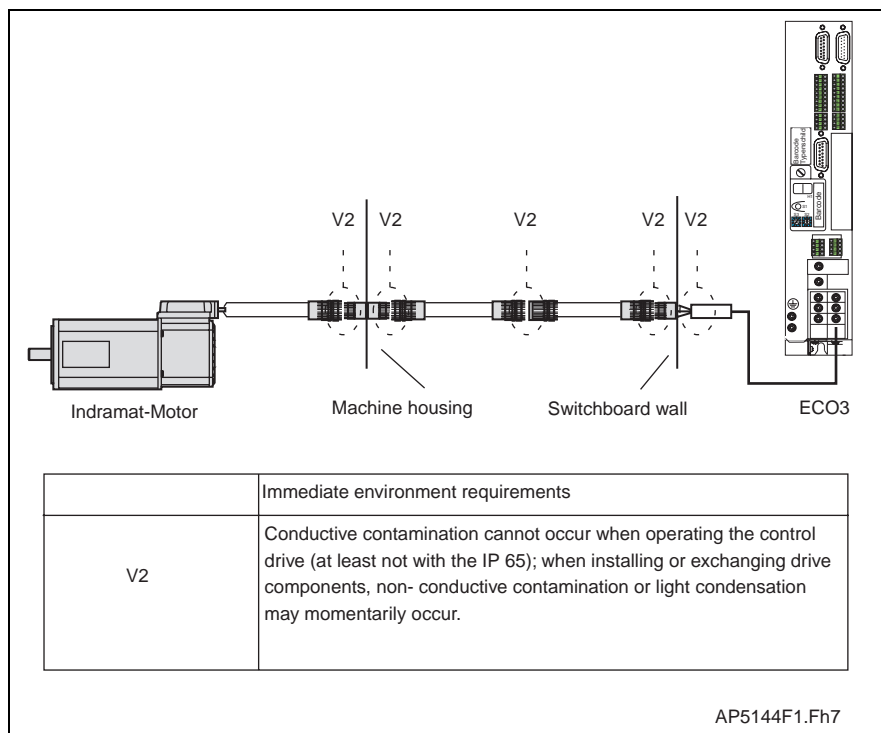
Fig. 5-2: Dirt contamination per DIN VDE 0160

zum Austausch von Kabeln, Angaben des Maschinenherstellers

- When replacing cables, note the instructions of the machine manufacturer.

⚠ **ATTENTION** ⇒ Connect power connections only when they are dry and clean.

Note: If a standard cable from Rexroth Indramat is not used, then check to ensure that the cable agrees with the terminal diagram of the machine manufacturer!

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	Fault Report	*engineering* **m** mannesmann
	for digital AC Servo Drives DKC	*Rexroth*

This fault report is intended to clarify problems and their causes. It is absolutely necessary for finding and eliminating hidden, sporadic or application-related problems.

- Always include a Fault report with any parts returned for repair.

- Otherwise, send Fault Reports to your Rexroth Indramat representative or to the address of the Quality Department printed on the reverse side of this page.

Fault Report dated:	Co.:	Loc.:	Date:
	Dept.:	Name:	Tel.:

Information about the drive:

Data on rating plate

DKC _._ - _ _ _ _ - _ _____

S.N.: _ _ _ _ _ _ - _____

Enter display data at time problem occurred

H1

Hardware- S.N._ _ _ _ _ _ - _ _ _ _ _

FWA-ECODR3_-_ _ _-_ _ VRS

Software- S.N._ _ _ _ _ _ - _ _ _ _ _

Info about motor:

Motor type: _____

S. No.: _____

X5 Zwischenkreisanaschluß
Netzanschluß :
einphasig
dreiphasig

Information about machine at which problem occurred:

Machine manuf. _____ Type:_____ Oper. hours: _____

Machine number: _____ Comm. date: _____

Manufacturer and type of machine control: _____

Designation of the machine axis in which fault occurredt: _____

Describe the problem:

_____
_____
_____

Additional data:

Problem:	Causes:	Auxiliary problems:	
☐ always present	☐ unknown	☐ problem with mechanics	Is there an air conditioner in the cabinet ? Y / N
☐ at startup	☐ connection error	☐ mains sec. failure (24 $V_{ext.}$)	
☐ occurs sporadically	☐ external causes	☐ control failure	Have there been previous problems at this machine ?
☐ occurs after ☐ hrs.	☐ mechanical damage	☐ motor failure	
☐ with vibrations	☐ loose leads/cables	☐ cable break	How often:_____
☐ temperature dependent	☐ moisture in unit	☐ blower defective	
	☐ foreign object in unit	☐ Feedback defective	Did the problems occur on the same day or the same time of the day ?

☐ Additional data: _____

_____

_____

Rexroth Indramat GmbH
Bgm.-Dr.- Nebel- Straße 2
Abt. QSP

D-97816 Lohr am Main

Rexroth Indramat

Pi0001d1.fh7

Rexroth Indramat GmbH • Bgm.-Dr.-Nebel-Straße 2 • D-97816 Lohr • Telefon 09352 / 404-0 • Tx 689 421 • Fax 09352 / 404-885

Fig. 5-3: Fault report

6   Replacing Firmware

6.1   Replacing the Parameter Module

- Secure parameters (DriveTop)
- Switch unit off
- Remove programming module
- Open the lock on the back

Push locking plate
inside to open

Ap5145f1.fh7
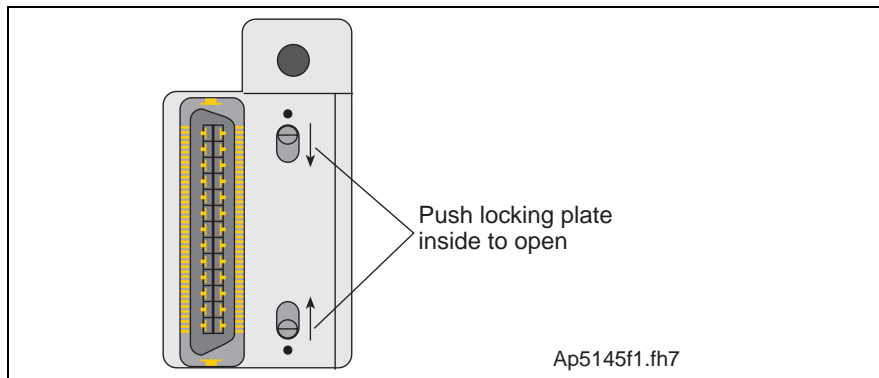
Fig. 6-1:   Locking the programming module

- Open the programming module

Programming module

Parameter module   Firmware module

Ap5146f1.fh7
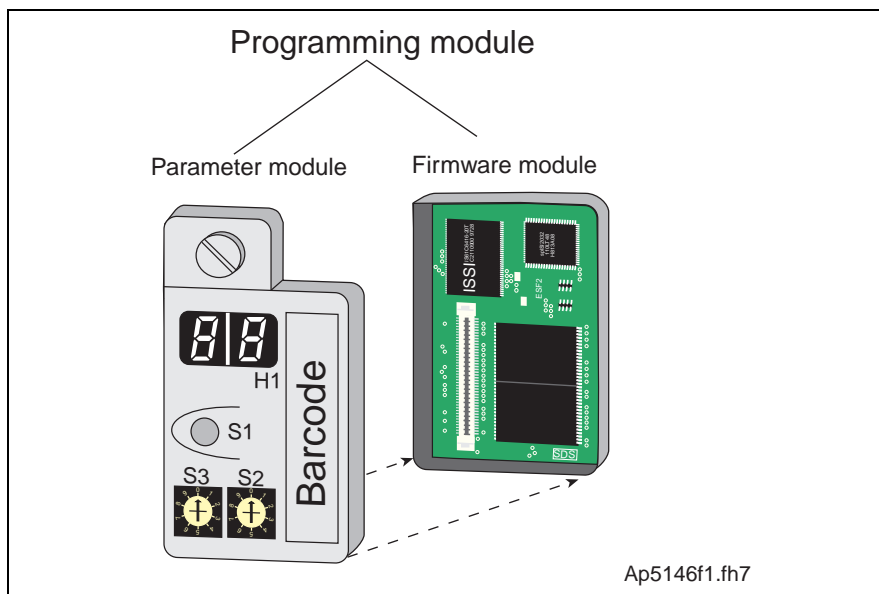
Fig. 6-2:Programming module

- Connect new parameter module and old firmware module
- Close lock (switch outward)
- Insert programming module
- Switch unit on

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6.2   Replacing the Firmware Module

- Switch unit off
- Pull programming module out
- Open the lock on the back of the programming module
- Open the programming module
- Insert old parameter module into new firmware module
- Close lock (lock must be pushed outward)
- Insert programming module
- Switch unit on

6.3   Replacing the Programming Module (complete module)

- Secure parameters (DriveTop)
- Switch unit off
- Pull programming module out
- Insert new programming module
- Switch unit on
- Load parameters

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Notes

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			Rexroth Automation Co., Ltd. Rexroth Indramat Division 1F, I.R. Building Nakamachidai 4-26-44, Tsuzuki-ku YOKOHAMA 224-0041, Japan
			
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		Telefon: +82 (0)2/7 80 82 08
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			TECTRA Automation (Pty) Ltd. 28 Banfield Road,Industria North RSA - Maraisburg 1700
			
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Rexroth Indramat

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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 -

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