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ECODRIVE03

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

Trouble Shooting Guide: SMT 01VRS

DOK-ECODR3-SMT-01VRS**-WAR1-EN-P

279088

Indramat

Titel

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

Type of documentation

Trouble Shooting Guide

Doku-Type

DOK-ECODR3-SMT-01VRS**-WAR1-EN-P

Internal File Mark

- Mappe 71-01V-EN/ Register 10
- Basis: SMT 01V
- 209-0088-4314-01

What is the purpose of this documentation?

This document is designed to assist maintenance personnel in identifying errors with the machinery

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

Course of Modifications

Document identification of previous and present output	Release Date	Remarks
DOK-ECODR3-SMT-01VRS**-WAR1-EN-P	04.98	First edition

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Published by

INDRAMAT GmbH • Bgm.-Dr.-Nebel-Str. 2 • D-97816 Lohr a. Main

Telefon 09352/40-0 • Tx 689421 • Fax 09352/40-4885

Dep. ECD1 (WR/JR)

Note

This document is printed on chlorine-free bleached paper.

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Customer Service Locations

1 Diagnostic Message Descriptions

1.1 Overview of the diagnostic message descriptions

Diagnostic Message Types

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

Differentiations will be made between:

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

Construction of a diagnostic message

A diagnostic message consists of:

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

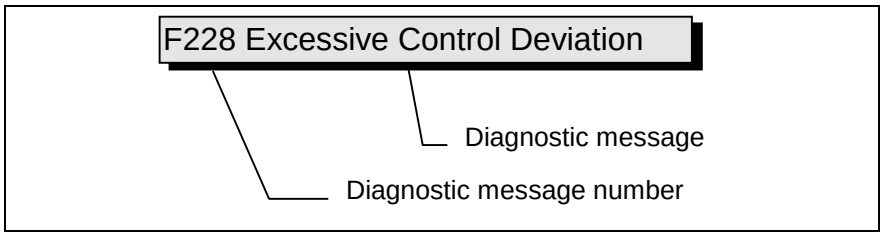


Fig. 1-1: Diagnostic message with a diagnostic number and text.

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.

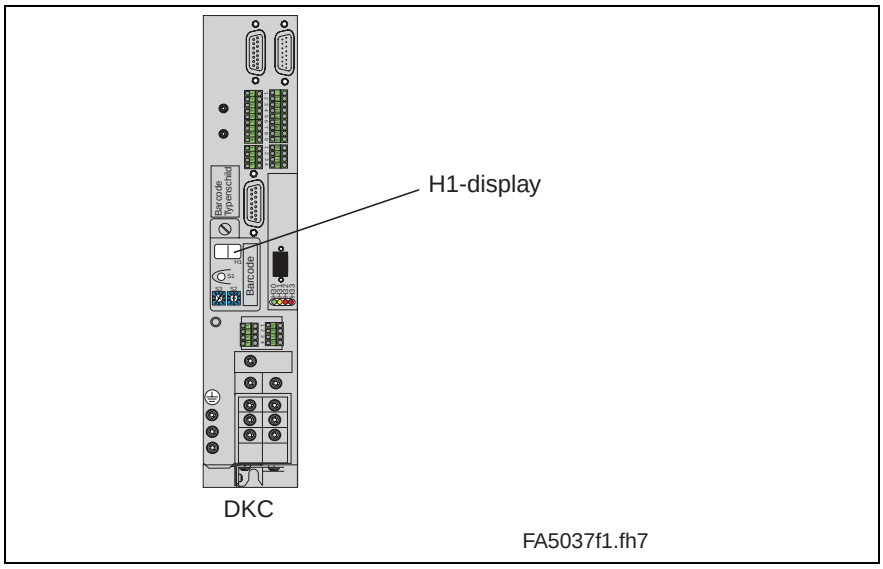


Fig. 1-2: H1-/Display

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.

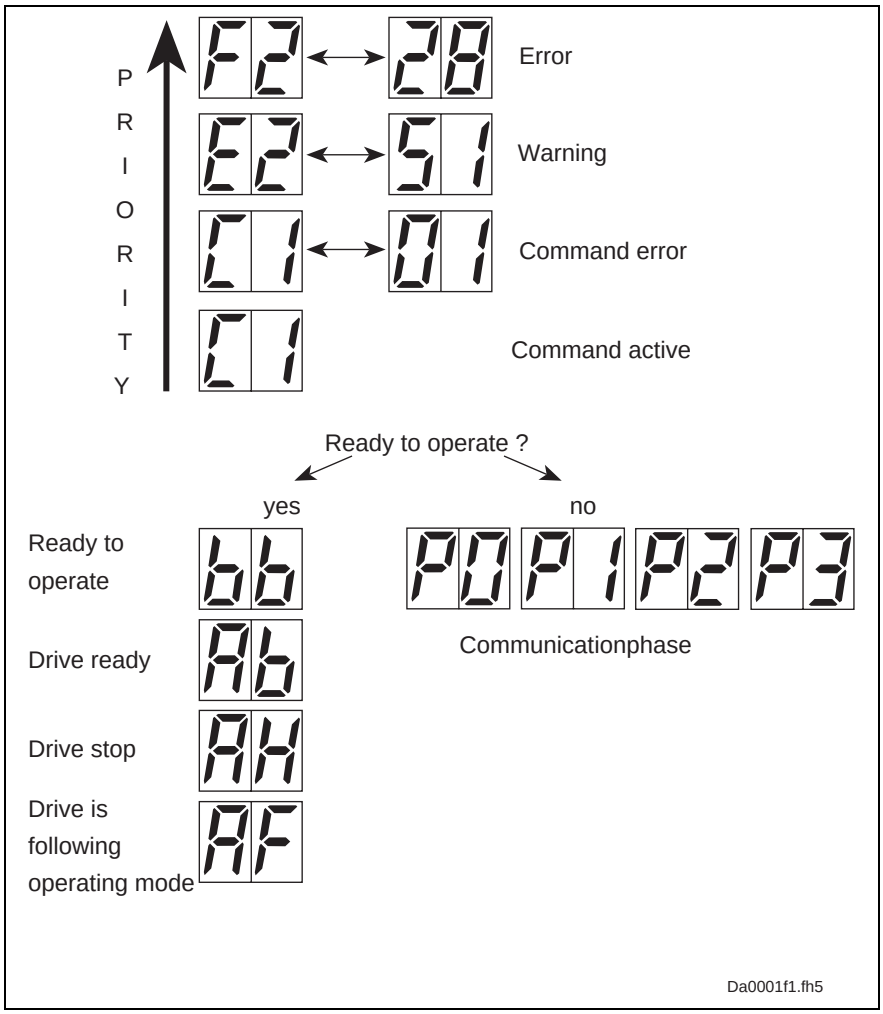


Fig. 1-3: Diagnostic message priority diagram

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 Electrical Drives

2.1 Introduction

These instructions must be read and understood before the equipment is used to minimize the risk of personal injury and /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. Please read and understand these safety instructions, and all user documentation for the equipment, prior to working with the equipment at any time. You must contact your local Indramat representative if you cannot locate the user documentation for your equipment. A listing of Indramat offices is supplied in the back of this manual. Request that your representative send this documentation immediately to the person or persons responsible for the safe operation of this equipment.

If the product is resold, rented and/or otherwise transferred or passed on to others, these safety instructions must accompany it.



WARNING

Improper use of this equipment, failure to follow the attached safety instructions, or tampering with the product, including disabling of safety device, may result in personal injury, severe electrical shock, death, or property damage!

2.2 Hazards by improper 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 unintential movements of the motors!



WARNING

High electrical voltages due to incorrect connections!

Danger to life and limb, severe electrical shock and serious 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 incorrect handling!

Bodily injury caused by crushing, shearing, cutting, and thrusting movements!



CAUTION

Risk of injury due to incorrect handling of batteries!

2.3 General

- INDRAMAT GmbH is not liable for damages resulting from failure to observe the warnings given in these instructions.
- Operating, maintenance and safety instruction in the english language must be ordered and received before initial start-up, if the instructions in the language provided are not understood perfectly.
- 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 in its vicinity. Personnel are qualified if they have sufficient knowledge of the assembly, installation, and operation of the product as well as of all warnings and precautionary measures noted in these instructions.

  Furthermore, they should be trained, instructed, and qualified to switch electrical circuits and equipment on and off, to ground them, and to mark them according to the requirements of safe work practices and common sense. They must have adequate safety equipment and be trained in first aid.
- Use only spare parts approved by the manufacturer.
- All safety regulations and requirements for the specific application must be followed as practiced in the country of use
- The equipment is designed for installation on commercial machinery.
- Start-up is only permitted once it is sure that the machine in which the products are installed complies with the requirements of national safety regulations and safety specifications of the application.

  European countries: see Directive 89/392/EEC (Machine Guideline);
- Operation is only permitted if the national EMC regulations for the application are met.

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

  The machine builder is responsible for the adherence of the limiting values as prescribed in the national regulations and specific regulations for the application concerning EMC.

  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.

2.4 Protection against contact with electrical parts and not grounded enclosures

Note: This section pertains to equipment and drive components with voltages over 50 Volts.

Touching live parts with potentials of 50 Volts and higher applied to them or touching not grounded enclosures can be dangerous and cause severe electrical shock. In order for electrical equipment to be operated, certain parts must have dangerous voltages applied to them.



DANGER

High Voltage!
Danger to life, severe electrical shock and risk of injury!

⇒ Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain and/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.

⇒ At no time may electrical equipment be operated if the ground wire is not permanently connected, even for brief measurements or tests.

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

⇒ Wait 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.

⇒ Before switching the equipment on covers and guards provided with the equipment must be installed to prevent contact with live parts. Before operating cover and guard live parts properly so they cannot be touched.

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

European countries: according to EN 50178/ 1994;

⇒ Electrical components with exposed live parts must be installed in a control cabinet to prevent direct contact.

European countries: according to EN 50178/ 1994;

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.



DANGER

High housing voltage! High leakage current!
Danger to life and limb, danger of injury from electric shock!

⇒ Prior to powering up, connect the electrical equipment, the housing of all electrical units and motors to the protective conductor at the grounding points or ground them. This applies even to brief tests.

⇒ The protective conductor of the electrical equipment and units must always be connected to the supply network. Leakage current exceeds 3.5 mA.

⇒ Use at least a 10 mm^2 copper conductor cross section for this protective connection over its entire course!

⇒ 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 / 1994, section 5.3.2.3.

USA: 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.

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

All connections and terminals with voltages ranging 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
- European countries within the EU: see EN 50178/1994, section 5.2.8.1.



WARNING

High electrical voltages due to incorrect connections!
Danger to life and limb, severe electrical shock and/or serious bodily injury!

⇒ Only that equipment or those electrical components and cables may be connected to all terminals and clamps with 0 to 50 volts if these are of the protective low voltage type (PELV = Protective Extra Low Voltage).

⇒ Only connect those voltages and electrical circuits that are safely isolated. Safe isolation is achieved, for example, with an isolating transformer, an optoelectronic coupler or when battery-operated.

2.6 Protection against dangerous movements

Dangerous movements can be caused when units have bad interfaces or motors are connected incorrectly.

There are various causes of dangerous movements:

- Improper or incorrect wiring or cable connections
- equipment is operated incorrectly
- probe parameters or encoder parameters are set incorrectly
- broken components
- errors in software or firmware

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

Although the monitoring circuits in the drive components make improper operation almost impossible, personnel safety requires that proper safety precautions be taken to minimize the risk of personal injury and/or property damage. This means that unexpected motion must be anticipated since safety monitoring built into the equipment might be defeated by incorrect wiring or other faults.



DANGER

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

⇒ In the drive component monitoring units, every effort is made to avoid the possibility of faulty operation in connected drives. Unintended machine motion or other malfunction is possible if monitoring units are disabled, bypassed or not activated.

⇒ Safe requirements of each individual drive application must be considered on a case-by-case basis by users and machine builders.

Avoiding accidents, personal injury and/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

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

⇒ Mount the Emergency Stop (E-Stop) switch in the immediate reach of the operator. Verify that the Emergency Stop works before startup. Do not use if not working.

⇒ Isolate the drive power connection by means of an Emergency Stop circuit or use a safe lock-out 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 lock-out and secure 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 equipment electronics 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.

2.7 Protection against magnetic and electromagnetic fields during operations and mounting

Magnetic and electromagnetic fields in the vicinity of current-carrying conductors and permanent motor magnets 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 and metal implants are not permitted to have access to the following areas:

- Areas in which electrical equipment and parts are mounted, operating or are being commissioned.
- Areas in which parts of motors with permanent magnets are being stored, repaired or mounted.

⇒ If it is necessary for a person wearing a heart pacemaker to enter into such an area then a physician must be consulted prior to doing so.

⇒ Persons with metal implants or hearing aids must take care prior to entering into areas described above. It is assumed that metal implants or hearing aids will be affected by such areas and a physician must be consulted prior to doing so.

2.8 Protection against contact with hot parts



CAUTION

Surface of machine housing could be extremely hot! Danger of injury! Danger of burns!

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

⇒ Prior to accessing a unit, wait 10 minutes to allow the unit to cool off.

⇒ If hot parts of the equipment such as unit housing in which heatsink and resistor are located, then this can cause burns.

2.9 Protection during handling and installation

All INDRAMAT products should be handled and assembled according to the instructions in the documentation.



CAUTION

Risk of injury due to incorrect handling!
Bodily injury caused by crushing, shearing, cutting, and thrusting movements!

⇒ Observe installation instructions and safety regulations before handling and working on the product.

⇒ Use suitable installation in using lifting or moving equipment. Refer to the user manual for the product.

⇒ Take precautions to avoid pinching and crushing.

⇒ Only use suitable tools specified in the user manuals and use them according the instructions.

⇒ Use lifting devices and tools correctly and safely.

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

⇒ Never stand under suspended loads.

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

2.10 Battery safety

Batteries contain reactive chemicals. Incorrect handling can result in injury or equipment damage.



CAUTION

Risk of injury due to incorrect handling!

⇒ Do not attempt to reactivate dead 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 take batteries apart.

⇒ Handle carefully. 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 of batteries separately from other refuse. Observe the legal requirements in 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 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.

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 **P-0-4036, Contacted motor type** contained a motor type different from the present one.

Remedy:

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

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.

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

Remedy:

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

For 2. Remove obstructions or dirt from the heatsink.

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

For 4. Exchange drive.

F219 Motor overtemp. shutdown

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**, ground short or short 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.

F220 Bleeder overload shutdown

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.

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.

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.

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 oviously 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**.

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.

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.

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).
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**.

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'**.

F237 Excessive position command difference

Cause:

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

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

Remedy:

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

F242 Encoder 2 failure: signal too small

Cause:

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

1. The pointer length, which is calculated from the 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. 3-3: Pointer length

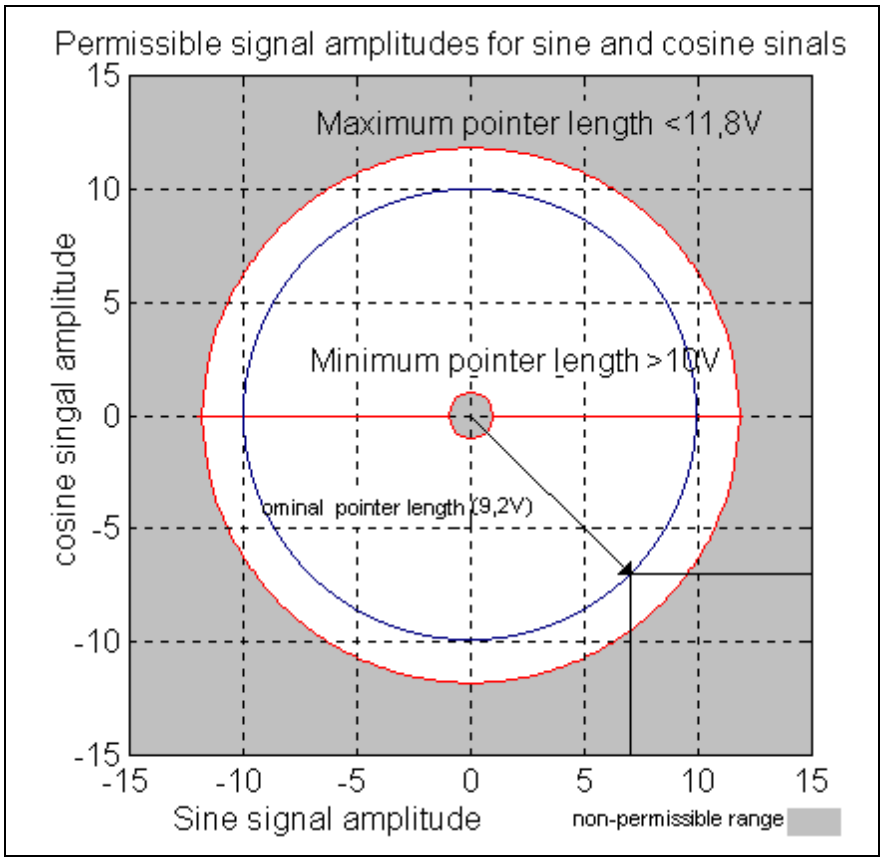


Fig. 3-4: Correct signal amplitude

Example:

Ucos = -6.5V

Usin = 6.5V

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

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 device (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 2.8 V, this message appears. The absolute encoder function will still be preserved for about 2 weeks.



CAUTION

Malfunction in the control of motors and moving elements

Possible damages: Mechanical injuries

⇒ Replace the battery as soon as possible.

Instructions for Exchanging Batteries

Have the following tools and accessories ready:

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



CAUTION

Malfunction in the control of motors and moving elements

Possible damages: Mechanical injuries

⇒ Turn off the power supply. Make sure it will not be turned back on. Exchange the battery while the control voltage (24V) is turned on.

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

Removing the Battery

- Unscrew torx screws (1) with size 10 screwdriver.
- Pull out the resolver feedback (RSF) lid by hand.
- Pull off the battery connector (2).
- Loosen battery clamp (3) 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 (2) of the battery.

Close the resolver feedback lid, screw in 4 torx screws (1) 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 1023 lines per sample period (250 µs); this value has been exceeded.

Remedial action:

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

or

2. Reduce the travel **velocity**.

F262 External short at status outputs

Status outputs 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 unti 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 (X2/6, X2/7, X2/8, X2/9, X2/10, X2/20, X2/21, X2/22)
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.

F267 Erroneous internal hardware synchronization

Cause:

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

Remedy:

Replace drive controller.

F276 Absolute encoder out of allowed window

When turning off the drive controller with an absolute encoder (multiturn), the actual feedback position will be stored. When powered up, the absolute position given by the encoder is compared with the stored position. If the deviation is greater than the paramaterized **P-0-0097, Absolute Encoder Monitoring Window**, the error **F276** will appear and be given to the control system.

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

F277 Current measurement trim wrong

This error can only happen during the test of the drive controller at the INDRAMAT factory.

The current measurement in the drive controller is calibrated precisely with a test current in the INDRAMAT test department. During this test, correction values outside the projected tolerances have come out.

Cause:

1. Hardware defective in the drive controller
2. The correct current for the calibraton does not flow.

Remedy:

1. Repair the control board.
2. Check the calibration current.

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:

The input BbN "operation readiness from supply unit“ at the drive controller is at 24V, that means the connected mains supply unit does not report ready for operation.

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 LWL transmission line.
2. Too much attenuation in the light signal.
3. Malfunction in the SERCOS interface (general).

Remedy:

For 1. Check all LWL connections in the SERCOS ring.

For 2. Measure the attenuation in the LWL 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.

F402 Double MDT failure shutdown

The Master Data Telegram (MDT) has not been received in two successive SERCOS or field bus cycles of the drive.

Cause:

1. Optic fibre-bus: Optical link corrupted.
2. Optic fibre bus: Too high damping of the light signals
3. SERCOS: Error in the SERCOS Interface (general)
4. Field bus: Bus connection interrupted/locked up for longer than watchdog time.
5. The bus-master does not send cyclical telegrams any more to the drive. However, these are mandatory in phase 4.

Remedy:

For 1. Check all the fibre optic connections in the SERCOS ring.

For 2. Measure the damping/absorption of the optical cables.

The max. loss between TX and RX may not exceed 12,5 dB!

For 3. Replace the SERCOS Interface module in the drive.

For 4. Check the field bus connectors and wiring, signal levels.

For 5. Switch on the master and get the cyclical communication going, see manual for your control.

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.

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.

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.

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.

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.

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 such command values will be accepted which 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 hysteresis for the travel limits.

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 will be accepted which 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 hysteresis for the travel 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.

F643 Positive travel limit switch detected

The positive travel limit switch has been encountered. 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 positive travel limit switch is detected.

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.

F644 Negative travel limit switch detected

The negative travel limit switch has been encountered. 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 is detected.

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.

F822 Encoder 1 failure: signal too small

For the high resolution evaluation of a position encoder, the analog signals of the transducer are used. These are monitored for 2 criteria:

1. The pointer length resulting from sine and cosine signal must be **> 1 V**.
2. The max. pointer length from sine and cosine signal must not exceed 11.8 V.

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

Fig. 3-5: Pointer length

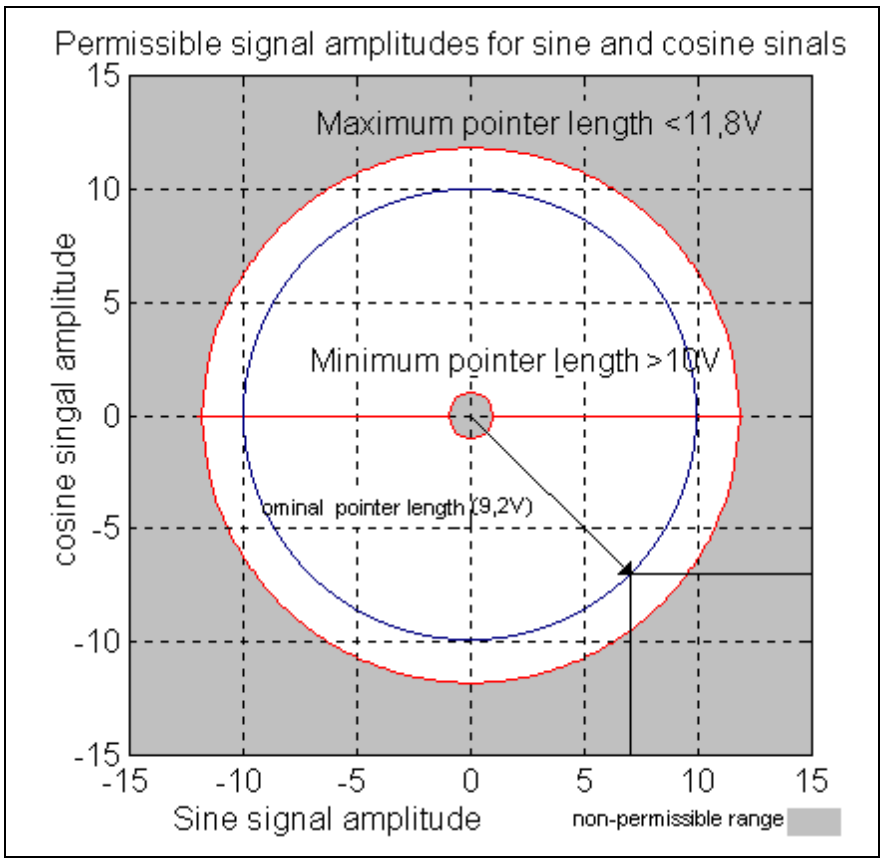


Fig. 3-6: Correct signal amplitude

Example:

Ucos = -6,5V

Usin = 6,5V

$$Pointerlength = \sqrt{(-6{,}5V)^2 + (6{,}5V)^2} = 9{,}2V$$

Note: The error cannot be cleared in communication phase 4 (operating mode). Before clearing the error, you are obliged to switch to communication phase 2 (parameter mode).

Causes:

1. Feedback **Cable** defective
2. Transmission of the feedback signals **disturbed**
3. **Feedback** defective

Remedies:

1. Check the cable to the measuring system
2. Place the cable apart from the motor power cable. The screen must be connected to the housing of the drive controller.
3. Check the measuring system; replace it, if necessary.

F860 Overcurrent: short in power stage

The current in the power transistor bridge has exceeded twice the peak current of the drive. As a result, the drive will immediately switched to a torque-free state. An optional brake is immediately activated.

Cause:

1. Short circuit in the 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. The current regulator parameters should not deviate from the default values of the feedback.

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. An optional blocking brake 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 parametrization 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.
- The difference between the actual velocity and the command velocity is greater than 10 % of the maximum motor velocity.
- actual speed > 1.25 % of maximum speed
- Command and actual acceleration have different qualifying signs.

Cause:

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

Remedy:

For 1. Check the motor cable connection.

For 2. Exchange the drive controller.

For 3. Exchange the motor.

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

For 5. Exchange the motor.

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.

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.

For 4. Exchange the drive controller.

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 (motor peak current S-0-0109) 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 active permanent current P-0-4045.

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.

E231 No jogging direction selected

During jog operation to the position limit, this warning is generated, when no unambiguous direction for jogging is selected. This happens, when the parameter P-0-4056 Jog inputs contains the value 00b or 11b.

Remedy:

Select an unambiguous jogging direction, either positive or negative, in P-0-4056 or, with parallel interface, via the hardware inputs.

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,
- drive halt

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**

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.

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

Remedy:

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

For 1. and 2.:	**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**

E249 Positioning velocity S-0-0259 > S-0-0091

Cause:

In the operation modes "Drive-internal interpolation" and "Relative drive-internal interpolation", the velocity specified in the **S-0-0259, Positioning velocity** parameter is used for positioning. In the "process block“ operation mode, this velocity is taken for positioning with limited speed.

If velocity specified there is greater than value in **S-0-0091, Bipolar velocity limit value**, the message E249 is generated. Then, bit 5 is set in **S-0-0012, Class 2 diagnostics**.

Note: The warning E249 is only generated when the parameter S-0-0259 is transferred cyclically via the command communication (SERCOS, Profibus-DP, Interbus, ...).

Remedy:

Reduce **S-0-0259, Positioning speed** or, for process block mode, **S-0-4007, Process block Velocity**.

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 dimensioning in regards to heat dissipation.

Remedy:

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

For 2. Install climatization feature in the cabinet.

For 3. Check the dimensions of the control cabinet.

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).

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 ontrolled 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.

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. For the Relative drive controlled interpolation mode, do the same, outgoing from the actual position.
3. For the Process block mode, input the **S-0-4006 Process block target position** only within the position limits.
4. For relative process blocks, do the same, outgoing from the actual 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.

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.

E255 Feedrate-override S-0-0108 = 0

With the parameter **S-0-0108, Feedrate override**, the travel velocity of all in 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, however, the drive can never go anywhere. It cannot follow the applied command values.

Causes:

1. The parameter **S-0-0108, Feedrate override** is **0**.
2. **S-0-0259, Positioning Velocity** is **0**.
3. The **P-0-4007, Process block velocity** is **0** with the selected process block.
4. For devices with analog inputs: Feedrate override via analog input is activated, and the voltage there is 0.
5. The **feed potentiometer** of the connected control system is at 0 or is being evaluated incorrectly. Like 4.

Remedies:

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

For 2.: Set **S-0-0259** to the suitable value > 0 for your application.

For 3.: Set **P-0-4007** to the suitable value > 0 for your application.

For 4.: Apply a voltage > 0 proportional to the desired speed,
+10V corresponds to 100 % (full) speed.
Alternative: De-activate Feedrate override.

For 5.: Turn the feed potentiometer cautiously, check the analog signal and the evaluation for it.

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.

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

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.

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 effective velocity.

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.
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
   - Components which have been moved
   - Feed during processing.

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**.

E264 Target position out of num. range

Cause:

When using the operating mode "position control with process blocks", the target position of the selected additive process block will be verified to see whether it lies within the numerical range. This was not the case.

Remedy:

1. Check the target position and correct if necessary.
2. Select the position data display in modulo format.

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** is surveyed, whether it points to a non-initialised 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** is surveyed, whether it points to a non-initialised field in the list. If it does, this warning is generated.

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 the repeater mode.

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.

E825 Overvoltage in power stage

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

Cause:

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



WARNING

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

E826 Undervoltage in power section

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

Cause:

Switching off the power supply or mains failure 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 hysteresis for the travel 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 hysteresis for the travel 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.

E834 Emergency-Stop

Pressing the emergency stop switch has caused the drive to perform the emergency stop function 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.

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 actuated.

Remedy:

Enter command values that lead back into the allowed range.

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 actuated.

Remedy:

Enter command values which lead back into the allowed range.

Notes

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

4.1 Command Diagnostic Messages 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 interruptable

C100 Communication phase 3 transition check

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

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.

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.

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:

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**.

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 record 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:

You must either set a priority telegram in **S-0-0015, Telegram type parameter** (telegram type = 0..6) or reduce the number of configurable parameters in MDT.

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:

You must either set a priority telegram in parameter **S-0-0015, Telegram type parameter** (telegram type = 0..6) or you must provide **S-0-0016, Custom amplifier telegram configuration list** with parameters that are contained in **S-0-0187, List of configurable data in the AT.**

C107 Configurated length > max. length for AT

Cause:

Message frame type 7 has been selected in **S-0-0015, Telegram Type Parameter**. The length of the configured data record in the AT, that is defined via **S-0-0016, Custom amplifier telegram configuration list**, exceeds the maximum permissible **S-0-0185, Length of the configurable data record in the AT**.

Remedy:

Either select the priority message frame via **S-0-0015, Telegram Type Parameter** (message frame type = 0...6) or reduce the number of configured parameters in the AT (**S-0-0016**).

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.

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.

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.

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.

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

Cause:

Only 500 us 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.

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.

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.

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.

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 configurated ident numbers (IDN) are placed in the parameter **S-0-0024, Config. list of the master-data-telegram**.

If both parameters **S-0-0360, MDT Data container A** and **S-0-0368, Addressing for data container A** as well are configured in the MDT, then the processing of the MDT data container is only correct if the addressing has been processed before. To maintain the correct order for the configuration of the MDT, the drive checks in the command S-0-0127, C100 Communication phase 3 transition check, whether the **IDN S-0-0368** is configured **before S-0-0360**.

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

C200 Communication phase 4 transition check

Meaning:

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

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.

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.

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**.

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-0-0141, 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.

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.

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.

Set **P-0-0075, Interface Feedback 2, optional** to a value different from 0 to activate the optional measuring system.

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

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

During drive initialization, the operating software fetches data from an EEPROM in the drive controller. This error message is generated after that access has failed.

Causes:

Defective hardware in the drive controller.

Remedy:

Replace drive controller.

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 processable 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**

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 processable 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**

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 workable 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**

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 workable 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**

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.

C218 Feedback 2 data reading error

The initializatin 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.

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.

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.

Remedy:

For 1. Check the optional feedback cable.

For 2. Exchange feedback.

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

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.

C227 Modulo range error

Cause:

The selected modulo value is greater than half the numerical position range of the drive.

Remedy:

Decrease the modulo value.

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.

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.

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.

C300 Set absolute measuring

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

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.

C400 Command: switch 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.

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.

C402 Only allowed without master

Cause:

The command **P-0-4023, C400 Communication phase 2 transition** was started via the serial interface. The command is not executed and terminated with this error message because the active SERCOS interface is of a higher priority and would be disturbed.

The command can only be done if the SERCOS interface is inactive (i.e. there are no signals applied to the receiver of the SERCOS interface).

Remedy:

Perform phase selection via SERCOS interface or de-activate SERCOS interface before the command is started.

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, the cause of the error must have been cleared.

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.

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.

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.

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**".

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.

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 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.

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.

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.

C705 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 **C700 Basic Load** has been started, although the drive parameters are protected with the customer password.

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 figure in the list **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 not taken into consideration.

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**.

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.

C900 Position spindle command

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

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'**.

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.

D301 Drive not ready for commutation command

Cause with linear motor:

There must not be a controller enable signal when the command is started. However, it must be in communication phase 4 ("bb“ or "Ab“ displayed).

Cause with rotary synchronous motor:

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

This error message is generated if those conditions are not satisfied.

Remedial action with linear motor:

Depending on the motor type, switch off the controller enable signal and start the command again.

Remedial action with rotary synchronous motor:

Activate torque control and start the command again.

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.

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.

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

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 while blocking the drive with a positive stop is turned off.

Cause:

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

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.

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.

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.

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.

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.

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.



WARNING

⇒ 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.

See also Function description:
"Safety Instructions"

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

Note: Under some circumstances, errors can also occur while the command is being executed. These are then signalled with pertinent messages.
D901 start only with RF
D902 motor feedback not valid
D903 inertia detection failed
D904 gain adjustment failed
D905 wrong position range
D906 position range exceeded

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.

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.

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.

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

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.

Note: A manual setting should only be necessary in exceptional cases!

D905 Position 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.

Possible fault causes:

- **P-0-0167, upper traversing range** smaller than **P-0-0166, lower traversing range**
- Maximum traversing path (= upper - lower limits) 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

D906 Position 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

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

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.

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 in the communications phase which has already been reached freezes.

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.

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.

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.

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 **process block mode**, the acceleration and the jerk value of the previous process block are active.

In **Jog mode** and in stepper position mode,
for **acceleration, S-0-0260**, Positioning acceleration is taken, and
for **jerk, S-0-0193**, Positioning jerk is taken.

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

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.

A100 Drive in TORQUE control

The drive is in the torque control operating mode. It follows the torque command value sequence which was set by the control system.

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.

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).

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).

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 (lag) error**.

Encoder 1 indicates that the position encoder is installed on the motor shaft (indirect measurement of axis position).

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 (lag) error**.

Encoder 2 indicates that the position encoder is installed on the machine axis (direct axis position measurement).

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).

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).

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** to the target position.

Encoder 1 indicates that the position encoder is installed on the motor shaft (indirect measurement of the axis position).

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** to the target position.

Encoder 2 indicates that the position encoder is installed on the machine axis (direct axis position measurement).

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).

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).

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).

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).

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.

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.

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.

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.

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.

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.

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.

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, this display will remain.

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 NovRam and calculating the respective data depending from the parameter contents.

Diagnostic Message Display: -5

Initializing and checking the **command communication**.

Diagnostic Message Display: -5

Initializing the system control.

Diagnostic Message Display: -6

Starting the system control.

Diagnostic Message Display: ∘∘ (2 dots)

Cause:

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

Remedy:

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.

4.4 Operation Status

Hereafter, the possible states of operation are listed alphabetically. These are shown with the display H1 on the device.

bb

"Ready for operation"

Refer to description **A013 Ready for power on**.

Ab

"Drive is ready"

Refer to description **A012 Control and power sections ready for operation**.

AF

"Drive enable"

According to the operation mode in use, you will find a more exact description of the display "AF" under the respective state diagnosis A101..A800.

AH

"Drive Halt"

Refer to description **A010 Drive HALT**.

Jb

"Jog backward"

Refer to description **A218 Jog negative**.

JF

"Jog Forward"

Refer to description **A208 Jog positive**.

P0

"Phase 0" (only with SERCOS communication)

Refer to description **A000 Communication phase 0**.

P1

"Phase 1"

Refer to description **A001 Communication phase 1**.

P2

"Phase 2"

Refer to description **A002 Communication phase 2**.

P3

"Phase 3"

Refer to description **A003 Communication phase 3**.

PL

"Basic Parameter Load"

See also: **F209 PL Load parameter default values**.

UL

"Basic Load"

See also: **F208 UL The motor type has changed.**

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 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.

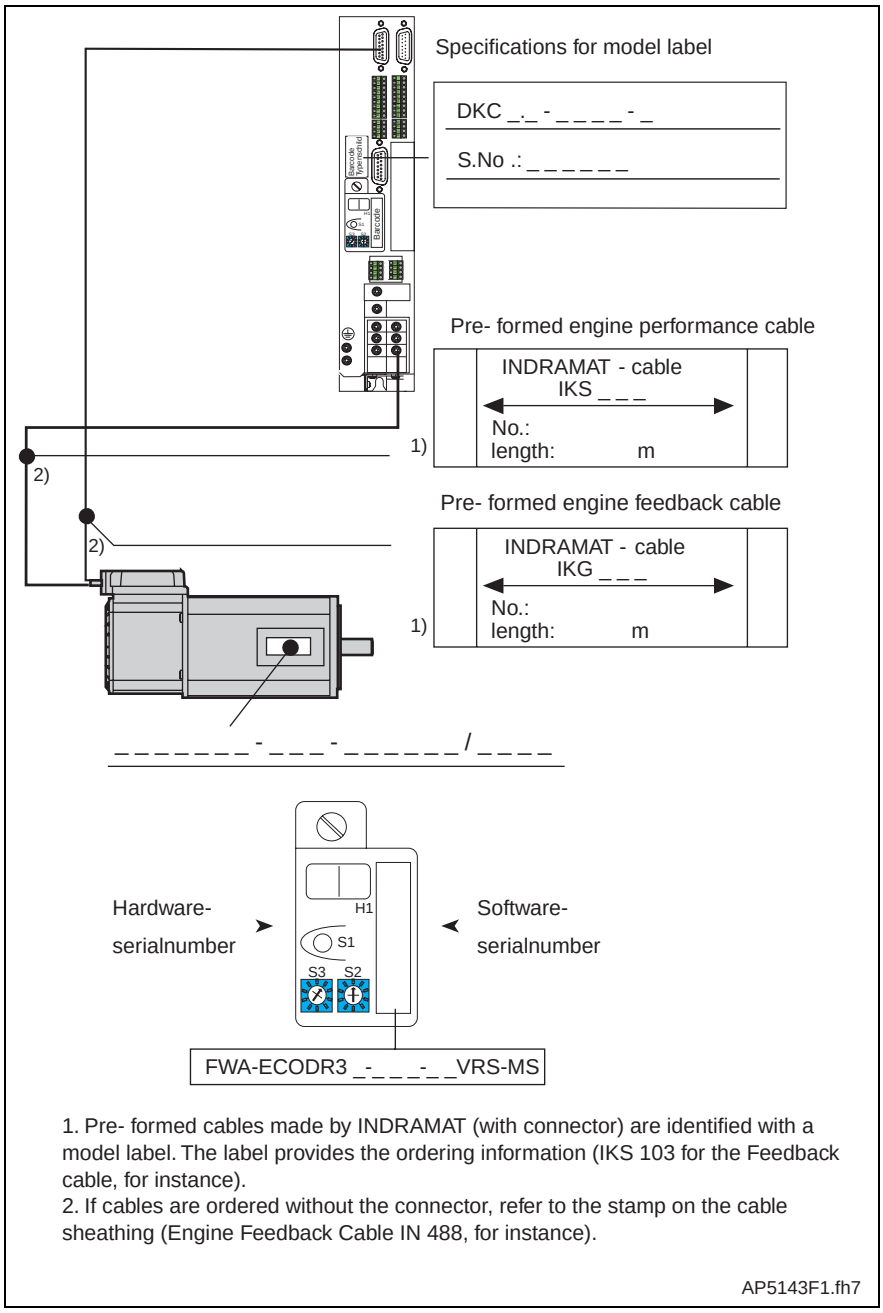
Note: The new drive components must have the same type designations as the old! To ensure this, register the entire type designation when requesting a replacement part.

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.



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.

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:

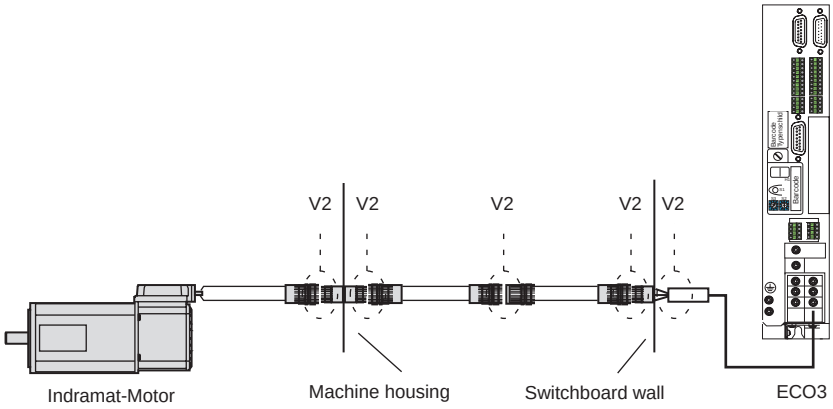
- Switch main switch off.
- Secure against being switched back on.



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

Fif. 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 INDRAMAT is not used, then check to ensure that the cable agrees with the terminal diagram of the machine manufacturer!

Indramat

Fault Report

for digital AC Servo Drives DKC

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 INDRAMAT representative or to the address of the Quality Department printed on the reverse side of this page.

INDRAMAT appreciates your efforts and will respond quickly.

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

FWA-ECODR3_-_ _ _-_ _ VRS

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

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

X5 Zwischenkreisanaschluß

Netzanschluß :

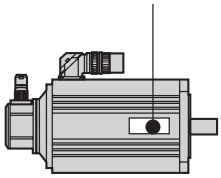
einphasig ☐

dreiphasig ☐

Info about motor:

Motor type: _____

S. No.: _____



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
☐ at startup	☐ connection error	☐ mains sec. failure (24 $V_{ext.}$)
☐ occurs sporadically	☐ external causes	☐ control failure
☐ occurs after ☐ hrs.	☐ mechanical damage	☐ motor failure
☐ with vibrations	☐ loose leads/cables	☐ cable break
☐ temperature dependent	☐ moisture in unit	☐ blower defective
	☐ foreign object in unit	☐ Feedback defective

Is there an air conditioner in the cabinet ? Y / N ☐

Have there been previous problems at this machine ?

How often: _____

Did the problems occur on the same day or the same time of the day ?

_____

_____

☐ Additional data: _____

_____

_____

INDRAMAT GmbH
Bgm.-Dr.- Nebel- Straße 2
Abt. QSP

D-97816 Lohr am Main

Pi0001d1.fh7

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

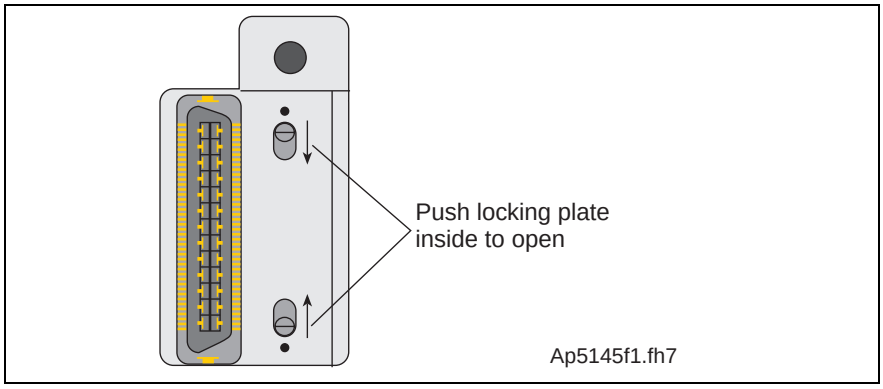


Fig. 6-4: Locking the programming module

- Open the programming module

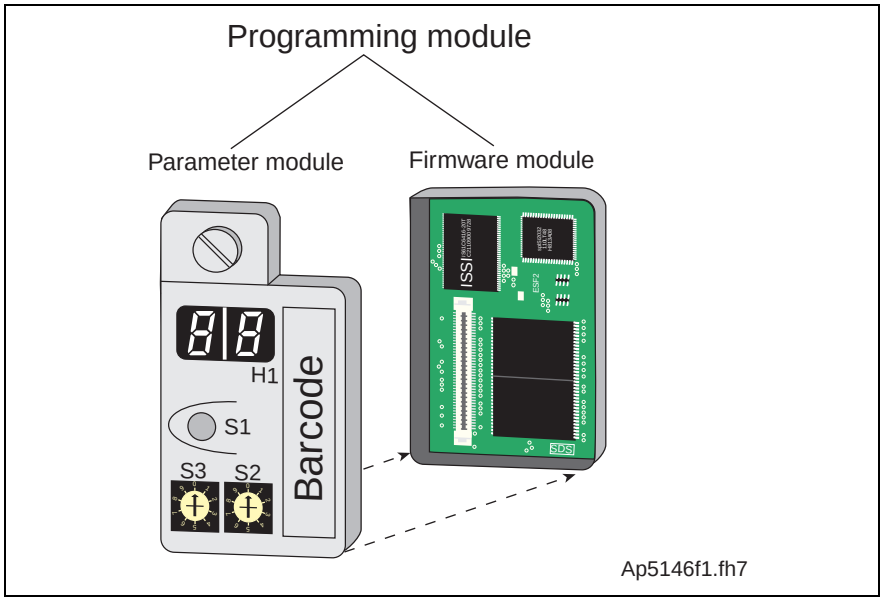


Fig. 6-5:Programming module

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

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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Kundenbetreuungsstellen - Sales & Service Facilities

Deutschland - Germany

Vertriebsgebiet Mitte Germany Centre ☒V/S ☒ Service	Vertriebsgebiet Ost Germany East ☒V/S ☒ Service	Vertriebsgebiet West Germany West ☒V/S ☒ Service	Vertriebsgebiet Nord Germany North ☒V/S ☐ Service
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Kundenbetreuungsstellen in Deutschland - Service agencies in Germany

Europa - Europe

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Europäische Kundenbetreuungsstellen (ohne Deutschland)
European Service agencies (without Germany)

Außerhalb Europa - outside Europe

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China ☒V/S ☐ Service Mannesmann Rexroth (China) Ldt. 15/F China World Trade Center 1, Jianguomenwai Avenue PRC - Beijing 100004 Telefon: +86 10/65 05 03 80 Telefax: +86 10/65 05 03 79	China ☒V/S ☐ Service Mannesmann Rexroth (China) Ldt. A-5F., 123 Lian Shan Street Sha He Kou District PRC - Dalian 116 023 Telefon: +86 411/46 78 930 Telefax: +86 411/46 78 932	Hongkong ☒V/S ☒ Service Rexroth (China) Ldt. 19 Cheung Shun Street 1st Floor, Cheung Sha Wan, Kowloon, Hongkong Telefon: +852 27/41 13 51/-54 oder/or +852 27/41 14 30 Telefax: +852 27/86 07 33	India ☒V/S ☒ Service Mannesmann Rexroth (India) Ltd. INDRAMAT Division Plot. 96, Phase III Peenya Industrial Area IND - Bangalore - 560058 Telefon: +91 (0)80/8 39 21 01 Telefax: +91 (0)80/8 39 43 45
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Kundenbetreuungsstellen außerhalb Europa - Service agencies outside Europe

Außerhalb Europa / USA - outside Europe / USA

USA ☒V/S ☒ Service	USA ☒V/S ☒ Service	USA ☒V/S ☒ Service	USA ☒V/S ☒ Service
Mannesmann Rexroth Corporation INDRAMAT Division 5150 Prairie Stone Parkway USA -Hoffman Estates, IL 60192-3707 Telefon: +1 847/6 45 36 00 Telefax: +1 847/6 45 62 01	Mannesmann Rexroth Corporation INDRAMAT Division Central Region Technical Center USA - Auburn Hills, MI 48326 Telefon: +1 248/3 93 33 30 Telefax: +1 248/3 93 29 06	Mannesmann Rexroth Corporation INDRAMAT Division Southeastern Technical Center 3625 Swiftwater Park Drive USA - Suwanee Georgia 30174 Telefon: +1 770/9 32 32 00 +1 770/9 32 19 03	Mannesmann Rexroth Corporation INDRAMAT Division Northeastern Technical Center 99 Rainbow Road USA - East Granby, Connecticut 06026 Telefon: +1 860/8 44 83 77 +1 860/8 44 85 95
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