

DIAX04

Drive With Servo Function

Trouble Shooting Guide: SSE 01VRS

DOK-DIAX04-SSE-01VRS**-WAR1-EN-P

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What is the purpose of this documentation? The following documentation describes the functions of the firmware FWA-DIAX04-SSE-01VRS.
 This documentation serves trained maintenance personnel:

- as a working guide for installation of the digital AC servo drive via a SERCOS-compatible control system
- for parameterization of the drive controller
- for data security of the drive parameter
- for error diagnosis and error removal

Course of modifications

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1 Diagnostic Message Descriptions

1.1 Overview of the diagnostic message descriptions

Diagnostic Message Types

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

Differentiations will be made between:

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

Construction of a diagnostic message

A diagnostic message consists of:

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

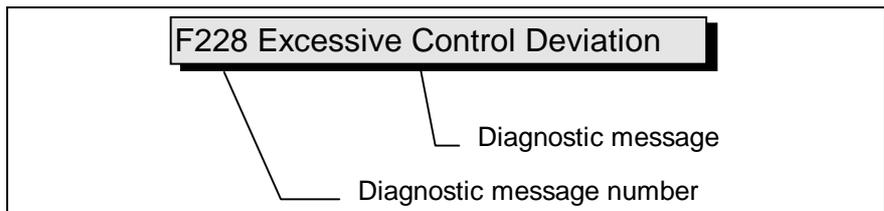


Fig. 1-1: Diagnostic message with a diagnostic number and text.

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 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.

Display

The H1 display is the visual representation the diagnosis of the drive controller. H2 serves two-axis units (HDD) as an addition display.

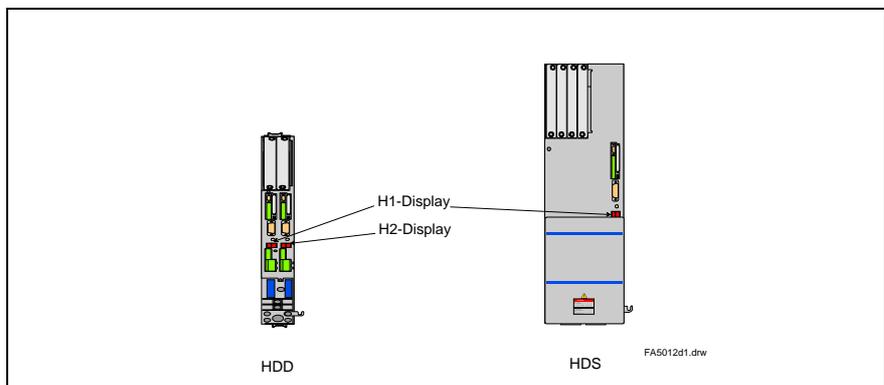


Fig. 1-2: H1 and H2 displays on the HDS and HDD controllers

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 or H2 display. If the drive follows the operating mode and no command was activated, then the symbol "AF" appears on the display.

Diagnostic Message Output Priority

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

The following graphic classifies operation status in order of importance.

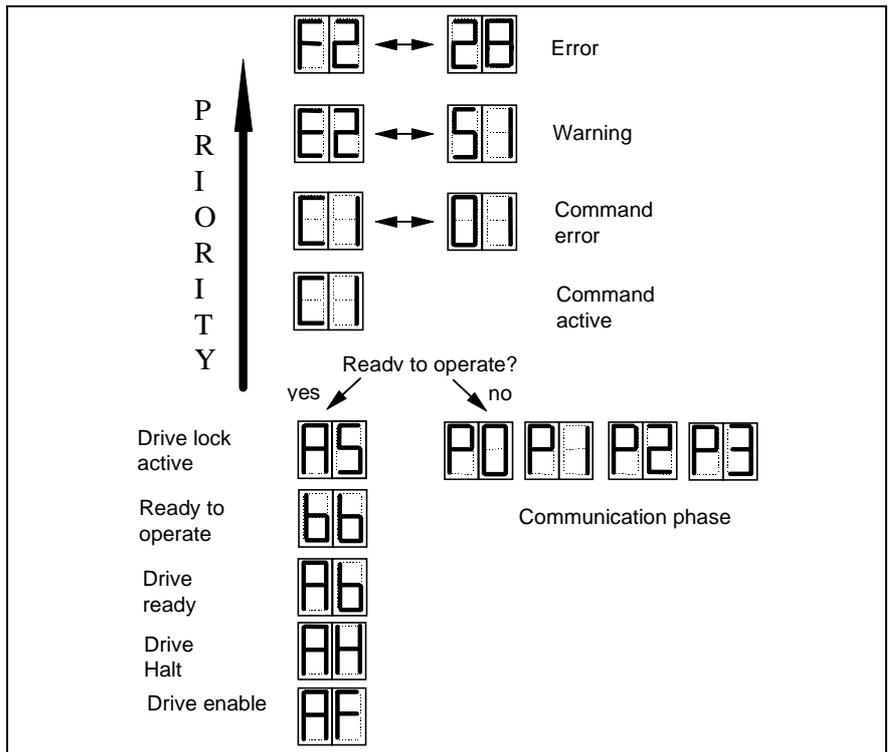


Fig. 1-3: Diagnostic message priority diagram

Clear Coded Diagnostic Message

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

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

2 Description of Diagnostic Letters F... and E...

2.1 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

Table 2-1: 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 operating mode

Cause:

At least one of the 4 operating mode parameters **S-0-0032..35** is set to "0". When the drive controller is activated, this operating mode can be selected via bits 8 and 9 in the master control word.

Remedy:

Enter the desired operating mode in the activated operating mode parameter.

Permissible operating modes:

Meaning:	Bit list of the operating mode parameters:
Torque control	0000 0000 0000 0001
Velocity control	0000 0000 0000 0010
Position control with actual feedback value 1	0000 0000 0000 x011
Position control with actual position value 2	0000 0000 0000 x100
Drive-controlled interpolation with actual feedback value 1	0000 0000 0001 x011
Drive-controlled interpolation with actual feedback value 2	0000 0000 0001 x100

Fig. 2-2: Operating modes

Parameters:	Main operating mode	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 these parameters for input of permissible interpolation type.

F208 Motor Type Has Changed

See also the functional description: "Automatic execution of the load default feature."

F219 Motor Overtemperature Shutdown

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

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

Cause:

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

Remedy:

- For 1. Check the layout of the motor. For motors which have been in operation for longer periods of time, check to see if the operating conditions have changed (in regards to cleanliness, friction, moved components, etc.).
- For 2. Check the wiring to the motor temperature monitor X6/1 and X6/2 for grounds and short circuits.
- For 3. Check the velocity control loop parameters (see the functional description).

F221 Error Motor Temperature Control

Cause:

Short-circuit in the wiring to the motor temperature monitoring.

Remedy:

Check the wiring to the motor temperature monitoring X6/1 and X6/2 for short-circuits.

F222 Error Drive Overtemperature Watch Defekt

Temperature monitoring checks to see if the measured drive controller temperature is within reasonable bounds.

If it determines that it is lower than -10°C, then it is assumed the measuring unit is defective.

The error message is generated after the accompanying E219 warning has been given for 30 seconds.

Cause:

- 1. Sensor not connected to the DRP3 circuit board.
- 2. Broken cable in the drive controller, or defective sensor.

Remedy:

Exchange or repair the drive controller.

F226 Undervoltage Error

The DC bus voltage is monitored in the power supply module. The drive controller is told via the control voltage bus whether the DC bus voltage is above the minimum permissible value of +200 V for HDS and +250 V for HDD. Going below this threshold stops the drive according to the error response which has been selected.

Requirement: The NCB bridge is not installed on the supply module.

Cause:

- 1. The power source has been interrupted without switching off the drive with the controller enable signal (RF).
- 2. Activation of the drive via the control enable (RF) without prior activation of the power supply.
- 3. Supply module malfunction.

Remedy:

- 1. Check the logic for activating the drive controller within the contacted control system.
- 2. If there is a supply module malfunction, eliminate it. See the explanation in the supply module user manual.

F228 Excessive Deviation

If the position loop is closed, the drive will monitor whether the command value that was set can be followed. In doing this, the drive will calculate a model feedback value and compare it to the actual feedback value. This error is generated if the difference between the theoretical and actual feedback values exceeds the value in parameter **S-0-0159, Monitoring window** on a continuous basis.

Cause:

1. The acceleration capacity of the drive was exceeded.
2. The axis was blocked.
3. Parameter error in the drive parameters.
4. **Parameters set incorrectly for S-0-0159, Monitoring window**
5. The power supply was turned off with control enable present. Possible cause: an error in an AC servo drive at the common supply module.

Remedy:

- For 1. Check parameter **S-0-0092, Bipolar torque limit** and set it equal to the maximum permissible value for the operation.
Reduce the acceleration setting of the control system (see control system handbook).
- For 2. Check the mechanical system and eliminate any jamming of the motor axis.
- For 3. Check the drive controller parameters.
- For 4. **Set parameters for S-0-0159, Monitoring window.**
- For 5. Check the AC servo drive for an error message other than "28".

F229 Motor Encoder Failure: Quadrant Error

A hardware error was discovered in the motor encoder interface being used.

Cause:

1. Defective encoder cable.
2. Disruptive electro-magnetic interference on the encoder cable.
3. Defective motor 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 motor encoder interface.
- For 4. Exchange the drive controller.

F233 External Power Supply Error

Cause:

Various optional connector modules have metallically separated input and output. To use these inputs and outputs properly, you must install an external power supply. If this supply lies outside the permissible range, the error message explained here will be generated.

The following functions require an external power supply:

1. Homing switch for module DSS2, activated by parameter **S-0-0147, Homing parameter**, bit 5.
2. Travel range limit switch for module DSS, activated by parameter **P-0-0090, Travel range limit switch parameter**, bit 1.
3. Sensor inputs activated by **S-0-0170, Command sensor cycle**
4. Emergency stop input for module DSS2, activated by parameter **P-0-0008, Activation E-Stop function**, bit 0.
5. Use of a DEA module.
6. Evaluating a measurement system with a DAG module.

Remedy:

Check external power supply.

Description:	Unit:	min.:	typ.:	max.:
External operating voltage +UL	V	18	24	32
External current consumption IL	mA			100

Fig. 2-3: External power supply voltage

F234 Emergency Stop

Cause:

The emergency stop function (E-Stop) was activated by turning off the +24V current at the X12/6 input. The drive was brought to a standstill by the error response which had previously been set.

Remedy:

1. Eliminate the condition which caused the +24V current at the X12/6 input to be turned off.
2. Activate the "Reset class 1 diagnostic" command with the control system (see control system handbook).

F236 Excessive Position Feedback Difference

Cause:

Actual feedback value 1 and actual feedback value 2 are both set to the same value in the command for the transition check for communications phase 4, and cyclical evaluation of both encoders is started. In cyclical operation (phase 4), the actual feedback value difference of both encoders is then compared with **S-0-0391, External encoder monitoring window**. If the difference is greater than the monitoring window, error F236 "Excessive position feedback difference" is generated, and the error response previously set by parameter is executed.

1. Incorrect parameter for the external encoder.
(**S-0-0115, Position feedback 2 type parameter, S-0-0117, Resolution of rotational feedback 2**).
2. Incorrect parameters have been set for the mechanical system between the motor axis and the external encoder.
(**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 the motor shaft and the external encoder is not rigid (for example there is play in the transmission).
4. Defective encoder cable.
5. The module (DLF or DEF) for evaluating the external measuring system is defective.
6. The maximum input frequency of the encoder interface has been exceeded.
7. External encoder not attached to the axis which is being controlled.

Remedy:

- For 1. **Check S-0-0115, Position feedback 2 type parameter and S-0-0117, Resolution of rotational feedback 2.**
- For 2. **Check S-0-0121, S-0-0122, Load gear input and output revolutions and S-0-0123, Feed constant**
- For 3. **Enlarge S-0-0391, External encoder monitoring window.**
- For 4. Exchange the encoder cable.
- For 5. Exchange the module for evaluating the external measurement system.
- For 6. Reduce velocity.
- For 7. **Set S-0-0391, External encoder monitoring window to 0** (turn off monitoring).

F237 Excessive Position Command Value Difference**Cause:**

When the drive is operating in position control, position command values which come via the SERCOS interface 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**, 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 values is also dependent on the value set in **S-0-0393, command value in 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 External Encoder Failure: Signals 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. 2-1 Pointer length

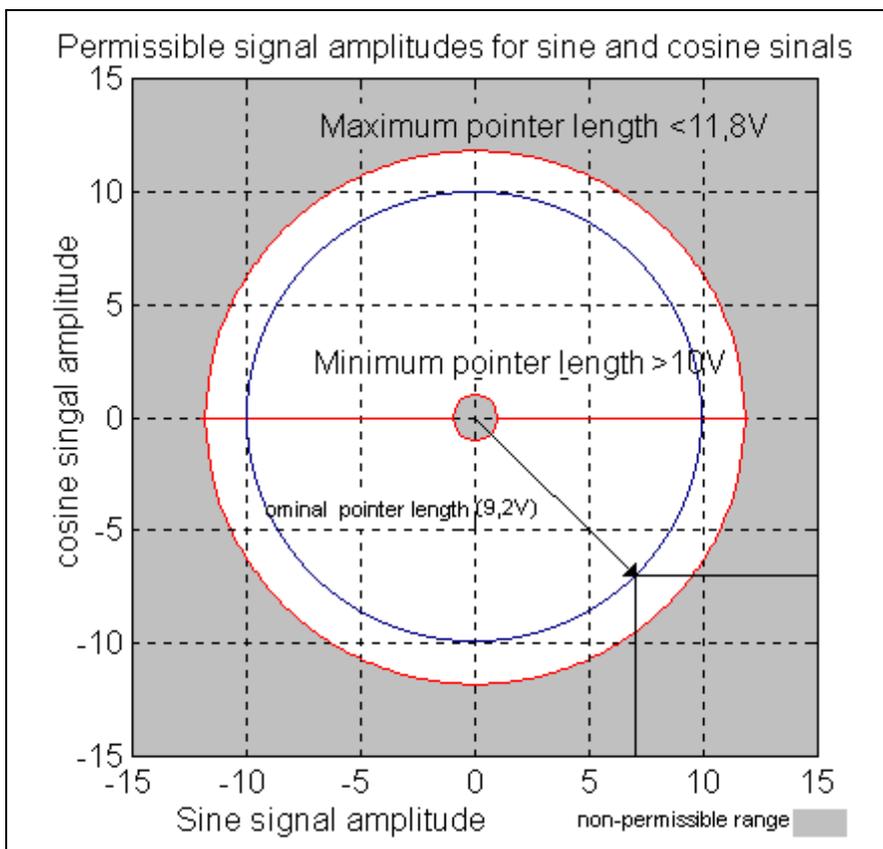


Fig. 2-2: Correct signal amplitude

Example:

$$U_{\cos} = -6.5\text{V}$$

$$U_{\sin} = 6.5\text{V}$$

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

Remedy:

1. Check the measurement system cable.
2. Check the measurement system.

F245 External Encoder Failure: Quadrant Error

A hardware error was discovered in the high resolution position interface for "DLF" sine signals of the external measurement system.

Cause:

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

Remedy:

For 1. Exchange the encoder cable.

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

For 3. Exchange the DLF module.

F248 Low Battery Voltage

Cause:

For motors of series MKD and MKE, the absolute position information is stored by a battery-powered buffer 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

Source of danger: Malfunction in the control of motors and moving elements

Possible damages: Mechanical injuries

Precautionary measures: 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

Source of danger: A malfunction in the control of motors and moving elements

Possible damages: Mechanical injuries

Precautionary measures: Turn off the power supply.
Make sure it will not be turned back on.
Exchange the battery while the control voltage is turned on.

If the control voltage is turned off while the battery is taken out, the absolute reference point will be lost.

The reference point must then be reestablished.

Removing the Battery

- Unscrew torx screw with a size 10 screwdriver.
- Pull out the resolver feedback (RSF) lid by hand.
- Pull off the battery connection.
- Loosen battery clamp and remove the battery.
- Place the factory-made battery (Part No.: 257101) in the housing and screw on the clamp. **WARNING!** Do not kink the battery cable.
- Attach connection to the battery.

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

F267 Incorrect Internal Hardware Synchronization

Cause:

The drive control of all drives in a SERCOS ring is synchronized by a phase control loop. Proper functioning of the synchronization is monitored. This error is generated if the average deviation is greater than 5 usec.

Remedy:

- Exchange DSS module.
- Exchange the drive controller.

F268 Brake Error

The drive controller takes control of the brake for motors with an integrated holding brake. The braking current is monitored. If the braking current is outside of the permissible range between:

$$0.4 - 1.6 * P-0-0511, \text{ Break current}$$

this error message will be generated.

Cause:

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

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

Remedy:

- For 1. Check the power supply.
For 2. Check the motor cable.
For 3. Exchange the motor.
For 4. Exchange the drive controller.

F276 Absolute Encoder Error, Deviation > P-0-0097

When a drive controller with an absolute encoder motor (multiturn) is switched off, the actual feedback position is saved. When it is turned back on, the position determined by the absolute encoder evaluation is compared with this stored position. This error is given if the deviation is greater than the value set by parameter in **P-0-0097, Absolute encoder control window**.

Cause:

1. Turning on for the first time (invalid stored position).
2. The axis was moved further in switched-off state than allowed by parameter **P-0-0097, Absolute encoder control window**.
3. Incorrect position initialization.

Remedy:

For 1. Clear the error and set the reference point.

For 2. The axis was moved while turned off and is located outside of its permissible position.
Check to see if a new travel command would cause damage.
Then clear errors.

For 3. **Danger of Accident through Unwanted Axis Motion**

Check reference point. If the reference point is incorrect, there is a problem with the feedback. The feedback should be exchanged (with MHD-, MKD- or MKE absolute motor encoders, exchange the whole motor).

F280 Earth connection

Cause:

Ground short in the DC bus or in the motor.

This error is reported only in compact devices.

Remedy:

- Isolation test of the motor and motor power supply cable.
- Disconnect the power supply cable from the motor to the drive and turn on the drive and the power. If the error recurs, the drive should be exchanged.

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.

F282 Phase Fault

The power supply voltage is checked each time the control voltage is switched on and each time the controller enable is switched off. A phase error was found during this check.

Cause:

A power supply phase has failed or is outside of the permissible tolerance.

Remedy:

Check the power supply connection according to the project planning specifications of the drive controller being used.

F283 Net Overvoltage

Cause:

The power supply voltage is above the permissible value $> 460V+15\%$

Remedy:

Make sure the power supply is connected properly according to the project planning specifications of the drive controller being used.

F284 Main Contactor nc - Low Voltage

Cause:

When the main contactor was turned off, the DC bus voltage went below 400 V while controller enable was set.

Remedy:

Switch off the controller enable before switching off the main contactor.

F316 Power supply module softstart error

The DC bus cannot be loaded.

Cause:

1. Short-circuit in power supply or drive controller.
2. Too many additional capacitors have been connected.
3. Interrupt in DC bus choke (only applies to HVE)

Recovery:

- 1: Release connection to drive controllers and turn power back on. If unit is defective, replace it.
- 2: Number of additional capacitor must be reduced or a separate loading device must be used.
- 3: DC bus choke and lines must be checked, possibly replaced.

F318 Power supply module heatsink overtemperature

Power switched off due to excessive heatsink temperature.

Cause:

The unit is overloaded over ambient temperature is too high.

Recovery:

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

F320 Bleeder overload

Power off due to high bleeder load.

Cause:

1. In the HVR, too much regenerated drive energy even with power off.
2. In the HVE, continuous regenerated power or rotary drive energy is too high.
3. Unit is defective.

Recovery:

On 1: Reduce drive speed. Delay power off in the case of OFF or and emergency stop.

On 3: Replace unit.

F324 Power supply unit additional component error

Cause:

An error has been detected in an additional component, e.g., additional bleeder, control voltage power supply unit or a separate loading device.

Recovery

Check the additional components.

F360 Power supply unit over voltage

With HVR only!

Cause:

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

Recovery:

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

F369 +24V / ±15V / +5V Power supply unit error

Control voltage interference.

Cause:

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

Recovery

On 1: Release bus connections to drive controller one after the other.

On 2: Release control voltage taps and check for short-circuits.

On 3: Replace unit.

F380 Power supply unit ground short

Cause:

Ground short: in power supply unit
in drive controller
in motor or motor cable

Recovery:

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

F381 Power failure

With HVR only !

Cause:

At least one phase of the power supply is missing.

Recovery:

Check mains fuses and replace, if necessary.

F382 Phase error

With HVE only !

Cause:

At least one phase of the power supply is missing

Recovery:

Check mains fuses and replace, if necessary.

F383 Mains voltage error

With HVR only !

Cause:

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

Recovery:

Check mains voltage, use matching transformer, if necessary.

F384 Power supply unit connection error

With HVR only !

Cause:

Power and control voltage connects are not phase coincident.

Recovery:

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

F385 Mains frequency error

With HVR only !

Cause:

Mains frequency exceeds permissible tolerance ($\pm 2\text{Hz}$).

F394 Checksum error - power supply unit

With HVR only !

Cause:

Unit failure.

Recovery:

Replace unit.

F401 Double MST Error 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 Error Shutdown

The master data telegram (MDT) 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.

F403 Invalid Communications 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

Phase 0 was not switched to while switching back from a communications phase.

Cause :

Error in the SERCOS master module of the control system.

Remedy:

Consult the control system 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.

F629 Positive Travel Limit Value Is Exceeded

The drive received a command value which resulted in an axis position outside the positive travel range. The axis was brought to a standstill with the "Set velocity command value to zero" error response. Bit 2 of parameter **P-0-0090, Travel range limit switch** is set for "Exceeding travel range as an error," or exceeding the position limit began a drive control command (such as the drive-controlled homing procedure).

Cause:

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

Remedy:

1. **Check S-0-0049, Positive position limit value.**
2. Check the software limits of the control system.
3. Activate the axis after the error response.

Procedure:

- Clear the error.
- If the power supply was turned off, turn it back on.
- Move the axis into the permissible working range.

Note: Only command values which lead to the permissible working area will be accepted. All other command values will result in bringing the drive controller to a standstill again.

F630 Negative Travel Limit Value Is Exceeded

The drive received a command value which resulted in an axis position outside the negative travel range. The axis was brought to a standstill with the "Set velocity command value to zero" error response. Bit 2 of parameter **P-0-0090, Travel range limit switch** is set for "Exceeding travel range as an error," or exceeding the position limit began a drive control command (such as the drive-controlled homing procedure).

Cause:

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

Remedy:

1. **Check S-0-0050, Negative travel limit value.**
2. Check the software limits of the control system.
3. Activate the axis after the error response.

Procedure:

- Clear the error.
- If the power supply was turned off, turn it back on.
- Move the axis into the permissible working range.

Note: Only command values which lead to the permissible working area will be accepted. All other command values will result in bringing the drive controller to a standstill again.

F643 Positive Travel Limit Switch Detected

The positive travel limit switch was encountered. The axis was brought to a standstill with the "Set velocity command value to zero" error response. Bit 2 of parameter **P-0-0090, Travel range limit switch** is set for "Exceeding travel range as error," or exceeding the position limit began a drive control command (such as the drive-controlled homing procedure).

Cause:

The positive range limit switch is detected.

Remedy:

1. Reset the error.
2. Turn the power supply on again.
3. Move the axis into the permissible travel region.

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 was encountered. The axis was brought to a standstill with the "Set velocity command value to zero" error response. Bit 2 of parameter **P-0-0090, Travel range limit switch** is set for "Exceeding travel range as error," or exceeding the position limit began a drive control command (such as the drive-controlled homing procedure).

Cause:

The negative travel limit switch was detected.

Remedy:

1. Reset the error.
2. Turn the power supply on again.
3. Move the axis into the permissible travel region.

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.

F818 Drive Overtemperature Shutdown

A temperature level which was too high was reached in the power stage of the drive controller. In response, the drive controller has issued the warning: "E250 Drive overtemperature warning" for 30 seconds. The drive controller is then brought to a standstill according to the error response which has been selected and gives this error message.

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 has failed, exchange the drive controller.
 For 2. Install climatization feature in the cabinet.
 For 3. Check the dimensions of the control cabinet.

F819 Drive Overtemperature Watch Defect

Cause:

An NTC resistor is used to measure the drive temperature. If the resistor is defective or is not connected, the previously mentioned error message is generated.

Remedy:

Exchange or connect the NTC resistor.

F820 Bleeder Overload

Cause:

The energy of a braking motor cannot be converted quickly enough by the bleeder resistors.

The energy converted by the internal bleeder is analyzed. When the maximum energy capacity of the bleeder is exceeded, it is shut off. The bleeder overload error is generated.

Remedy:

The braking slope should have a flatter parameter, or the bleeder capacity can be increased by adding an additional bleeder.
 The drive can be used again after the bleeder has cooled down.

F822 Motor Encoder Failure: Signals Too Small

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 equal 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. 2-3: Pointer length

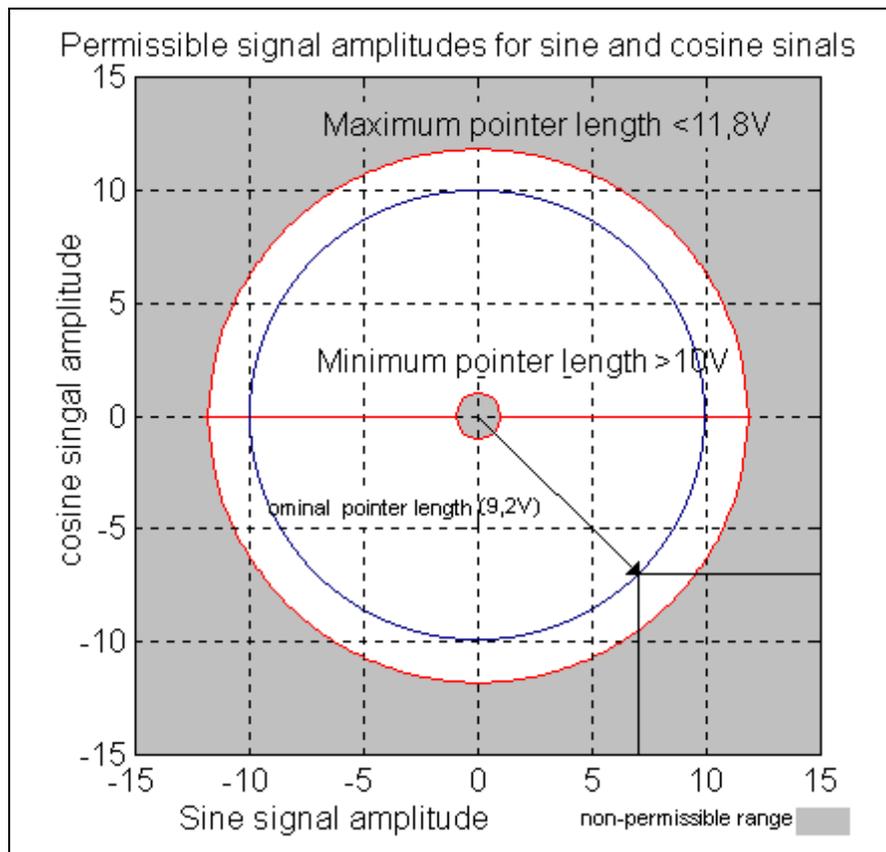


Fig. 2-4: Correct signal amplitude

Example:

Ucos = -6,5V

Usin = 6,5V

$$\text{pointer length} = \sqrt{(-6,5V)^2 + 6,5V} \approx 9,2V$$

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

Remedy:

- Check the measurement system cable.
- Lay the feedback cable well away from the motor power cable. The cover must be placed over the drive controller (see drive controller project specifications.)
- Check the measurement system and exchange, if necessary.

F827 Drive Interlock While Drive Activated

Cause:

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

Remedy:

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

F860 Overcurrent: Short in Powerstage

The current in the power transistor bridge has exceeded the value of the peak current of the drive by a factor of two. As a result, the drive will be switched immediately to torque-free operation. An optional holding brake is activated immediately.

Cause:

1. Short-circuit in the motor cable.
2. Defective power section in the drive controller.

Remedy:

- For 1. Check the motor cable for a short-circuit.
For 2. Exchange the drive controller.

F861 Overcurrent: Short to Ground

The sum of the phase currents is monitored. During normal operation, the sum = 0. If the sum of the current is greater than $0.5 \times I_N$, the short-circuit to ground fuse is activated.

Cause:

1. Defective motor cable.
2. Short-circuit to ground in the motor.

Remedy:

Check the motor cable and motor for a short-circuit to ground and exchange if necessary.

F869 +/- 15 Volt Error

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

Cause:

1. Defective control voltage bus cable.
2. Defective supply module.

Remedy:

- For 1. Check the control voltage bus cable or plug connection and exchange if necessary.
For 2. Check supply module (see supply module instructions for use).

F870 + 24 Volt Error

The drive controller found a malfunction in the + 24 V power supply.

Cause:

1. Defective control voltage bus cable.
2. The 24 V power supply is overloaded.
3. Defective supply module.
4. Short-circuit in the emergency circuit.

Remedy:

- For 1. Check the control bus cable or plug connection and exchange if necessary.
For 2. Check the wiring and/or replace the power supply module.
For 3. Check supply module (see supply module instructions for use).
For 4. Check the emergency circuit for shorts.

F871 + 10 Volt Error

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

Cause:

A defect in the drive controller.

Remedy:

Exchange the drive controller.

F878 Velocity Control Loop Error

If the difference between velocity command value and feedback value is greater than 10% of the maximum motor velocity while the velocity control loop is active, then the feedback velocity value must move in the direction of the command value. This error is generated if the feedback value does not come closer to the command value within 20 ms and the effective torque/force command value is at the limit (=P-0-4046, **Aktiv peak current**).

Cause:

1. Motor cable is connected incorrectly.
2. Defective power section of the drive.
3. Defective feedback.
4. Parameters set incorrectly for velocity controller.
5. Parameters for acceleration or brake slope are too steep.
6. Effective peak current is too low.

Remedy:

For 1. Check motor cable connection.

For 2. Exchange the drive controller.

For 3. Exchange the motor.

For 4. Check the velocity controller according to the user instructions (see the velocity controller chapter).

For 5. Decrease the maximum acceleration in the control system or **decrease P-0-1201, Acceleration slope 1**.

F879 Crossing Velocity Limit (S-0-0091) Value

The feedback velocity is monitored in torque control mode. This error is generated if the programmed velocity in parameter **S-0-0091, Bipolar velocity limit value** is exceeded by 1.125 times or min. 100 rpms (rotary motors) or 100 mm/min (linear motors).

Cause:

The load torque was less than the torque command value. This leads to an increase in the feedback velocity up to the maximum possible motor velocity.

Remedy:

Assign the proper torque command value for the desired task. Reduce parameter **S-0-0092, Bipolar torque limit**.

F889 Regenerating Overcurrent

Cause:

The feedback current of the drive is greater than 1.2 times the type current (with HDD only).

Remedy:

Replace the drive.

F890 Regenerating Electronic Watchdog

Cause:

The RSK processor on the plug-in storage card is not working.

Remedy:

Exchange drive controller or the plug-in storage card.

F891 Power Supply Fault

The DC bus voltage is not established after the main contactor has been switched on.

Cause:

If there is a short-circuit in the DC bus, voltage cannot build up after the drive has been switched on. This error is generated if the voltage remains under 100 V for approx. 200ms.

Remedy:

Exchange the drive controller.

F892 Wrong Code of the Current Measuring Unit

A faulty current measuring unit was discovered after the control voltage was turned on.

Cause:

The current measuring unit has an incorrect code. The coding does not work with the RSK circuit board.

Remedy:

Exchange the current measuring unit.

F893 No Regenerating Current to Net

This error message is generated if the feedback current command value is at its maximum and no current is flowing for approx. 50ms.

Cause:

1. Power supply not properly connected.
2. Defective feedback.

Remedy:

For 1. Check the power supply connection according to the project planning specifications.

For 2. Exchange the drive controller.

F894 Checksum Error

Cause:

The checksum is stored in the EPROM during the initial programming. Each time the drive is turned on, the processor checks to see if the checksum which was created from the processor corresponds to the one which has been stored. This error is generated if this is not the case.

Remedy:

Exchange the RSK circuit board EPROM.

2.2 Warning Diagnostic Messages

E201 No Mains

Cause:

After the control voltage has been switched on, the drive checks to see if the mains connection of the power supply has also been switched on. This warning is given if this has not happened correctly.

Remedy:

Check power connections (external relay, fuse, etc.).

E202 Not Ready for Power On

Cause:

As usually happens, the main contactor K1 was turned off when the controller enable was not set. Because of the drive controller capacities, the DC bus voltage must not decrease suddenly after the main contactor is turned off. This message is generated as long as the DC bus voltage > 250V and prevents the main contactor from being turned on. This serves to protect discharging resistors.

Remedy:

The warning is automatically recalled by the drive controller when the DC bus voltage falls below 250V.

E219 Warning Drive Temperature Watch Defekt

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

Cause:

1. Sensor not connected to the DRP3 circuit board.
2. Broken cable in the drive controller, or defective sensor.

Remedy:

Exchange or repair the drive controller.

E221 Warning Motor Temperature Control

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 temperature control" will appear for 30 seconds. Afterwards the drive controller will be brought to a standstill according to the selected error response and message F221 "Motor temperature control error" 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.

E249 Positioning Velocity (S-0259) Greater S-0-0091

Cause:

In "Drive-controlled interpolation" operating mode, a velocity is given in parameter **S-0-0259, Positioning velocity** at which the given target position is to be approached.

Message E249 is generated if this is greater than the permissible maximum value **S-0-0091, Bipolar velocity limit value**. Message bit 4 is set in **S-0-0013, Class 3 diagnostic** simultaneously.

Remedy:

Reduce S-0-0259, Positioning velocity.

E250 Drive Overtemperature Warning

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, Deceleration as best as possible** 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 Overtemperature Warning

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

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

Set MHD, MKD and MKE motors to 145°C or 155°C.

Cause:

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

Remedy:

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

E253 Target Position Out of Range

Cause:

In "Drive-controlled interpolation" operating mode, a check is performed to see whether the specified **S-0-0258, Target position**, is within the possible travel region of the drive.

This is defined by parameters **S-0-0049, Positive position limit value** and **S-0-0050, Negative position limit value**.

Message E253 is generated if the target position lies outside of the travel range. Additionally, warning bit 13 is set in **S-0-0012, Class 2 diagnostic**.

Remedy:

Check the specified **S-0-0258, Target position** and correct it, if necessary.

E255 Feedrate Override (S-0-0108) = 0

The travel velocity used in drive-controlled travel commands can be changed with parameter **S-0-00108, Feedrate override**.

This warning is given if the value of this parameter is 0, since the drive cannot then follow command values.

Cause:

1. The control system's feed potentiometer is set to zero or is being evaluated incorrectly.
2. The parameter was set to an incorrect value.

Remedy:

For 1. Check the feed potentiometer.

For 2. Set the parameter to the correct value for the application.

E257 Continuous Current Limiting Active

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

Cause:

The drive controller was overloaded.

Remedy:

1. Check the drive layout.
2. Reduce acceleration.

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

- Friction
- Components which have been moved.

E259 Command Velocity Limitation 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 Limiting 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 S-0-0036 Greater Than Bipolar Limit

Cause:

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

Remedy:

It is limited to **S-0-001, Bipolar velocity limit value**.

E325 Power supply unit regeneration overload

Cause:

The regenerated load of the drives is excessive.

Recovery

Reduce permitted delays. Use a drive controller with smaller peak currents.

E326 Power supply module feed overload

Error will be stored for no more than 500 ms!

Cause:

The input power required by the drives is excessive.

Recovery:

Reduce the permissible acceleration. Use drive controller with smaller peak current.

E350 Power supply unit warning - heatsink overtemperature

The permissible heatsink temperature has been reached. Temperature prewarning contact open. Power off after 30 seconds.

Cause:

Load too high, ambient temperature too high.

Cooling air is blocked, blower in unit is defective.

Recovery:

Reduce load, reduce control cabinet temperature, check cooling air ducts, replace unit.

E352 Power supply module bleeder overload warning

Cause:

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

Recovery:

- permissible acceleration (delay) must be reduced
- reduce drive speed
- reduce peak current of the drive

E353 Power supply unit diagnosis faulty

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

Cause:

1. serial interface of power supply unit is defective
2. break in serial connection lines
3. serial interface of controller is defective

Recovery:

- On 1. replace power supply unit.
On 2. check and replace bus cable, if necessary
On 3. replace controller, if necessary

E387 Power supply unit control voltage failure

With HVE only !

Cause:

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

Recovery:

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

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 "0" address is set.

Remedy:

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

E825 Overvoltage Error

The DC bus voltage has reached impermissibly high values. ($U_d > 475$ V). The drive controller was switched to torque-free operation so as not to endanger the drive's power amplifier.

Cause:

The energy regenerated by a braking drive controller (a main-spindle drive, for example) cannot be converted by the bleeder resistors quickly enough.

Remedy:

The braking slope should have a flatter parameter, or the bleeder capacity can be increased by adding an additional bleeder.

E829 Positive Position Limit Value Exceeded

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

Cause:

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

Remedy:

Enter command values which lead back into the allowable range.

E830 Negative Position Limit Value Exceeded

The drive received a command value which resulted in an axis position outside the negative travel range. The axis was brought to a standstill by setting the velocity command value to zero. A class 1 diagnostic error is not generated. The drive will automatically follow command values which lead into the allowable range after they are entered. "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 allowable range.

E843 Positive Travel Zone Limit Switch Activated

The drive received a command value which resulted in an axis position outside the positive travel range. The axis was brought to a standstill by setting the velocity command value to zero. A class 1 diagnostic error is not generated. The drive will automatically follow command values which lead to the allowable range after they are entered. "**Handle travel range limit exceeded as warning**" is set in bit 2 of parameter **S-0-0090, Travel limit parameter**.

Cause:

Positive travel range limit switch detected.

Remedy:

Enter command values which lead back into the allowable range.

E844 Negative Travel Zone Limit Switch Activated

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

Cause:

Negative travel range limit switch detected.

Remedy:

Enter command values which lead back into the allowable range.

3 Description of Diagnostic Letters C... and A...

3.1 Command Diagnostic Messages C...

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 Communications Phase 3 Transition Check

Cause:

Command **S-0-0127, C1 Communications phase 3 transition check**, is activated.

C101 Invalid Communications 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.

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 else provide **S-0-0024, Configuration list for MDT** with parameters. These parameters are also contained in **S-0-0188, List of configurable data**.

C105 Configured 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 record in MDT**.

Remedy:

You must either set a priority telegram in **S-0-0015, Telegram type parameter** (telegram type = 0..6) or else 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, List of configurable data for the AT** .

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, List of configurable data for the AT** with parameters that are contained in **S-0-0187, List of configurable parameters**

C107 Configured Length > Max. Length for AT

Cause:

Telegram type 7 was set in **S-0-0015, Telegram type parameter**. The length of the configurable record in AT, which is determined by **S-0-0016, Configuration drive telegram** exceeds the maximum permissible length **S-0-0187, Length of the configurable record in AT**.

Remedy:

Either set a priority telegram with **S-0-0015, Telegram type parameter** (telegram type = 0..6), or reduce the number of configurable 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**.

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, Starting address in MDT** contains an even value. This is not permitted.

Remedy:

Parameter **S-0-0009, Starting address in MDT** 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 of 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** and **S-0-0002, SERCOS cycle time**. Here, this is not the case.

Remedy:

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

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

Cause:

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

Remedy:

S-0-0001, NC cycle time and **S-0-0002, SERCOS cycle time** 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, Measurement time feedback value T4** is:

S-0-0002, SERCOS cycle time - S-0-0005, minimum time feedback value determination T4min.

The value for **S-0-0007, Feedback values 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.

C200 Communications Phase 4 Transition Check

Meaning:

Command **S-0-0128, C2 Communications phase 4 transition check** is activated.

C201 Invalid Parameter (-> 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 Limit Error Parameter (-> S-0-0022)

Cause:

Parameters which are necessary to operate the drive in communications phase 4 are either 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 so they are correct.

C203 Parameter Calculation Error (-> S-0-0022)

Cause:

Parameters which are necessary to operate in phase 4 cannot be processed. The incorrect parameters are listed in **S-0-0022, IDN list of invalid op. data for comm. ph. 3**. For example, in parameter **P-0-0075, External feedback interface**, the value for the DLF module has been entered, but it is actually not available.

Remedy:

Correct values must be written 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, Type of motor**

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

C210 External Feedback Required (-> S-0-0022)

Cause:

Values are entered in parameters **S-0-0147, Homing parameter** or **S-0-0032..35 Operating type parameters** which require the use of an external encoder. However, only "0" (i.e., no setting) is entered in parameter **P-0-0075, External encoder interface**.

Remedy:

S-0-0147, Homing parameter or **Operating mode parameters S-0-0032..35** need to be changed for use with the motor encoder instead of external encoder.

Activate an external measurement system by entering a non-zero value for **P-0-0075, External feedback interface**.

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

If you are using an MHD, MKD or MKE motor, a data storage area is available in the motor feedback. An attempt has been made to read parameters stored there. An error occurred during this process.

Causes:

1. Defective motor feedback cable.
2. Defective motor feedback.
3. Defective drive controller.

Remedy:

- For 1. Check the motor feedback cable.
- For 2. Exchange the motor.
- For 3. Exchange the amplifier.

C212 Invalid Amplifier Data (-> S-0-0022)

During drive initialization, the operating software retrieves data from an EEPROM in the drive controller. If this access was unsuccessful, an error message will be generated.

Cause:

Defective hardware in the drive controller.

Remedy:

Exchange the drive controller.

C213 Position Data Scaling Error**Cause:**

The display format of the position data can be set with the position data scaling parameter. The internal drive controller format of the position data is dependent on the motor encoder being used and the resolution of the controller. The factor for converting the position data from the internal drive format into display format or vice-versa is outside of the workable area because either:

- The motor is linear and positional scaling of the motor is rotary or
- the motor is rotary and positional scaling (in reference to motor) is linear or
- Linear motor and module scaling is set or
- The calculated factor for converting the position data from display format to internal format (or vice-versa) cannot be represented.

Remedy:

Check and set the relevant parameters correctly as follows:

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

C214 Velocity Data Scaling Error

Cause:

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

Remedy:

Check and set the relevant parameters correctly as follows:

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

C215 Acceleration Data Scaling Error

Cause:

The display format of the acceleration data can be set for the acceleration data using 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, Rotational encoder resolution 1**
- **S-0-0121, Input revolutions of load gear**
- **S-0-0122, Output revolutions of load gear**
- **S-0-0123, Feed constant**
- **P-0-0074, Motor encoder interface**
- **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 for the torque/force data using 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 Motor Feedback Data Reading Error

If you have entered these values into **P-0-0074, Motor feedback interface**:

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

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

Cause:

1. Defective motor feedback cable.
2. Defective motor feedback.

Remedy:

- For 1. Check the motor feedback cable.
For 2. Exchange the motor.

C218 External Feedback Data Reading Error

If **P-0-0075, External encoder interface** is set at

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

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

Cause:

1. Defective measurement system cable.
2. Defective measurement system.

Remedy:

- For 1. Check the measurement system cable.
For 2. Exchange the measurement system

C220 Mot. Feedback Initialization 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 (module).

C221 Ext. Feedback Initialization Error

Several checks are performed during the initialization of an external encoder. 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
- External 24V set for SSI interface with DAG 1.2

Cause:

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

Remedy:

For 1. Check the external feedback cable.

For 2. Exchange feedback.

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

C225 Coprocessor Not Ready For Initialization

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

Cause:

Coprocessor failed.

Remedy:

Exchange the drive controller.

C226 Coprocessor Acknowledge Failed

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

Cause:

The coprocessor failed.

Remedy:

Exchange the drive controller.

C227 Module Range Error

See the feature description: "Modulo processing limiting conditions."

C228 Controller Type (S-0-0140) Incorrect

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

Cause:

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

Remedy:

For 1. Contact Indramat.

For 2. Exchange/repair the control device.

C300 Set Absolute Measuring

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

C302 Absolute Measuring System Not Installed

Command **P-0-0012, '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.

C500 Reset Class 1 Diagnostic (Error Reset)

The command for clearing errors, "**S-0-0099, Reset class 1 diagnostic**" was activated by the control system in use.

C501 Error Delet Only in Parameter Mode

Cause:

An attempt was made to delete error F8/22, Motor encoder error, signals too small, in communications phase 4. This is only possible in communications phases < 4.

Remedy:

1. Set communications phase back.
2. Retry command.

C600 Drive-Controlled Homing Procedure Command

Command **S-0-0148, Drive-controlled homing procedure** was activated by the control system in use.

C601 Homing Not Possible if Drive is Not Enabled

Cause:

The command was started without control enable being turned on. This is not permissible.

Remedy:

1. Turn the controller enable on.
2. Start the command again.

C602 Distance Homing Switch - Reference Mark Erroneous

Cause:

Evaluation of the zero-switch is turned on. The distance between the positive off switch transition and the reference mark to be evaluated is outside the permissible range.

Remedy:

Transfer the value in parameter **S-0-0298, Shift reference cam by...** to parameter **S-0-0299, Home switch offset**.

C604 Homing of Absolute Encoder Not Possible

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

Remedy:

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

C700 Basic load

For motors of series MHD, MKD or MKE the machine mechanics are adjusted to the digital drive by activating the velocity controller parameters stored in the motor feedback. The drive controller signals with message C700 that command C700, Basic load, was activated by command **S-0-0262, Command basic load**.

Cause:

Command C700, Basic load, was activated.

C701 Basic Load Not Possible If Drive Is Enabled

Cause:

Command **S-0-0262, Command basic load** cannot be run if the controller enable is set.

Remedy:

1. Disable controller enable.
2. Start the command again.

C702 Default Parameters Not Available

For motors of series MHD, MKD or MKE, the machine mechanics are adjusted to the digital drive by activating the velocity controller parameters stored in the motor feedback. The drive controller signals with message C702 that command **S-0-0262, Command basic load**, was activated, but no data memory is available in the contacted motor.

Remedy:

Order the parameter information sheet from Indramat customer 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 motor if necessary.

C704 Parameters Not Copyable

Cause:

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

Remedy:

Contact Indramat.

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.

3.2 Status Diagnostic Messages

A000 Communication Phase 0

The communication process is divided into four communications phases: Phases 0 and 1 are used to recognize the participants. Phase 2 is used to provide the time and data protocols for communications 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 **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 Communications Phase 1

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

The communication process is divided into four communications phases: Phases 0 and 1 are used to recognize the participants. Phase 2 is used to provide the time and data protocols for communications 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 **A002 Communication phase 2** is active, the drive is in phase 2. Before the control system transfers to communications phase 3, command **S-0-0127, C1 Communications phase 3 transition check** must be started. If the command is acknowledged negatively, transfer to communications phase 3 is not possible. The problems that were diagnosed by the drive must be solved first.

Note: The parameters are not checked to see if they are correct.

A003 Communications Phase 3

The communication connection is divided into four communication phases: Phases 0 and 1 are used to recognize the participants. Phase 2 is used to provide the time and data protocols for communications 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 **A002 Communication phase 3** is active, the drive is in phase 3.

Before the control system transfers to communications phase 4 (operating mode), command **S-0-0128, C2 communication phase 4 transition check** must be started. If the command is acknowledged negatively, transfer to communications phase 4 is not possible. The problems that were diagnosed by the drive must be solved first.

Note: The parameters are not checked to see if they are correct.

A010 Halt Drive

The feature "Halt drive" was activated. The halt drive feature serves to stop the motor at a defined deceleration and a defined jerk.

This feature can either be activated by deleting the drive halt bits (BIT 13) in the master control word or by interrupting a drive control command (i.e., in drive-controlled homing).

A011 Drive Interlock Open

Digital drive controllers are equipped with a drive interlock. It prevents undesired starting of a servo axis. When drive interlock is activated, the control electronics of the power output stage are disconnected from the power output stage by a relay contact. To terminals AS+; AS- of connector plug X3: +24V of power has been applied.

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 for power delivery.

A013 Ready for Power ON

The drive is supplied with a control voltage; there are no errors in the drive controller. The drive is ready to be turned on.

A100 Drive in Torque Mode

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 Mode

The drive is in the velocity control operating mode. It follows the velocity command value sequence set by the control system. The RPM control loop is closed in the drive.

A102 Position Mode 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 following (lag) error.

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

A103 Position Mode 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 following (lag) error.

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

A104 Position Mode Encoder 1/Lagless Positioning

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 Mode Encoder 2/Lagless Positioning

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 following (lag) error to the target position of the travel path.

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 following (lag) error to the target position of the travel path.

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

A108 Drive-Controlled Interpolation/Encoder 1 Lagless Positioning

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 of the travel path.

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

A109 Drive-Controlled Interpolation/Encoder 2 Lagless Positioning

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 of the travel path.

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

3.3 Diagnostic Messages for Basic Initialization and After Fatal System Errors

Diagnostic Message Display: -0

Cause:

The data storage for the controller is tested for its functional capability. If an error is detected, this display will remain.

Remedy:

The drive controller is defective (DRP3) and must be exchanged.

Diagnostic Message Display: -1

Cause:

The data storage for the DSS 2.1 Module is tested for its functional capability.

If an error is detected, this display will remain.

Remedy:

The DSS Module or the connection to the main device is defective.

- If DSS module is defective > exchange
- If drive controller is defective > exchange

Diagnostic Message Display: -2

Cause:

Makeup of the parameter structure.

If the EPROMS are exchanged for another version of the firmware, the parameter memory on the programming module is erased (duration appx. 5 sec.).

Diagnostic Message Display: -3

Cause:

The motor type and the type of the motor feedback are determined by reading their parameter storage areas.

Diagnostic Message Display: -5

During basic initialization, an error was reported by the coprocessor.

Cause:

1. Control voltage error (+24 V or +/-15 V).
2. +/-10 V - error.

Remedy:

For 1. Check the control voltage supply.

For 2. Replace the drive.

Diagnostic Message Display: -6

Cause:

A fatal processor or program error was encountered.

Remedy:

The error in question is a system error. Please contact the appropriate software development company.

Diagnostic Message Display: Watchdog **

Cause:

A fatal processor or program error (Watchdog) was encountered.

Remedy:

Replace the drive.

Notes

4 Exchanging Drive Components

– in preparation –

Notes

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Customer service locations outside Europe

