

DIAX04 Main Spindle Drives

Fault Clearance Guidelines

DOK-DIAX04-SHS-02VRS**-WAR1-EN-P

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The purpose of this document	<p>This documentation is intended for use by maintenance personnel when locating and clearing faults in the machine.</p> <p>Its purpose is:</p> <ul style="list-style-type: none"> • to help understand the error messages • to locate the cause of a fault • to specify fault clearance procedures • to assist in assuming contact with INDRAMAT Customer Service
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1 Diagnostics Options

1.1 Overview of Options

Diagnostic Modes

Each operational state of the drive controller has been assigned a diagnosis.

A difference is made between

- **error diagnoses**
- **warning diagnoses**
- **command diagnoses**
- **status diagnoses**
- **operating states**

The Structure of a Diagnosis

A diagnosis is made up of:

- a **diagnosis number** and a
- **diagnosis text**.

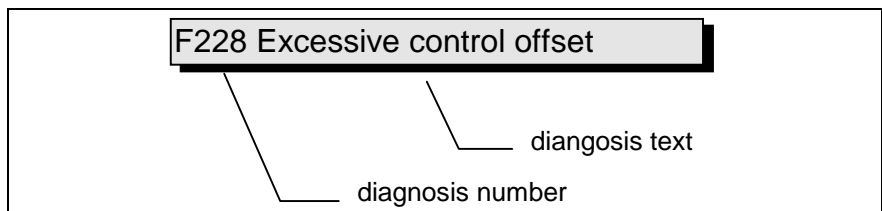


Fig. 1-1: The structure of a diagnosis made up of a diagnosis number and text

The example shown above alternately appears in the H1 display as either "F2" or "28".

The control can read the diagnosis number in hexadecimal format in parameter **P-0-0001, Diagnosis Number**.

The drive also makes available to the control both diagnosis number and text in the form of a string **F228, Excessive control offset** in parameter **S-0-0095, Diagnosis**.

H1 Display

The H1 display is the optical display of diagnoses in the drive controller.

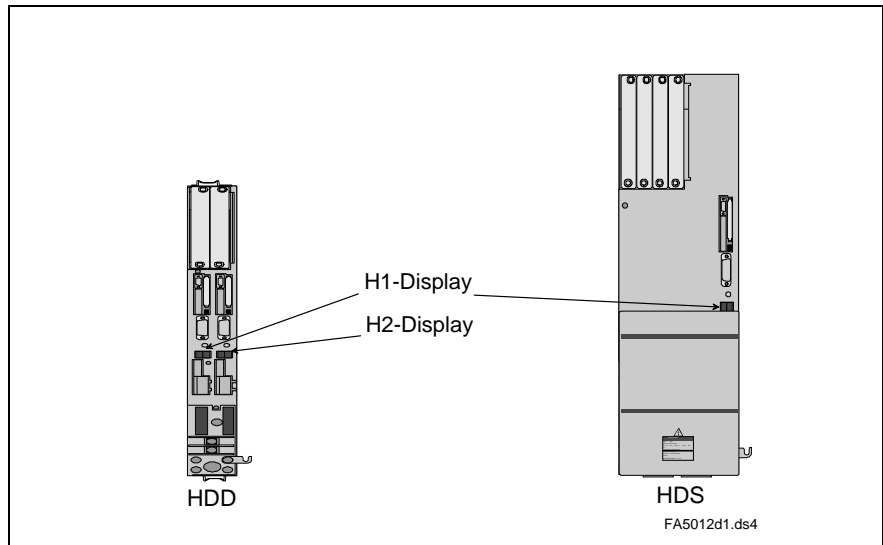


Fig. 1-2: H1 and H2 displays on HDD and HDS controllers

The symbol of this diagnosis number appears on this 2-place, 7-segment display. The form of illustration is shown in "priority-dependent diagnostics illustrations".

With the help of this display it becomes possible to quickly, and without the use of a communications interface, to view the current operating state.

The H1 display does not give any indication as to operating state. If the drive follows operating mode, and no command is activated, then "AF" appears in the display.

Diagnostic output priority

If several diagnoses are pending simultaneously, then the highest priority message is shown.

The following illustrates the breakdown of the operating states in terms of their importance.

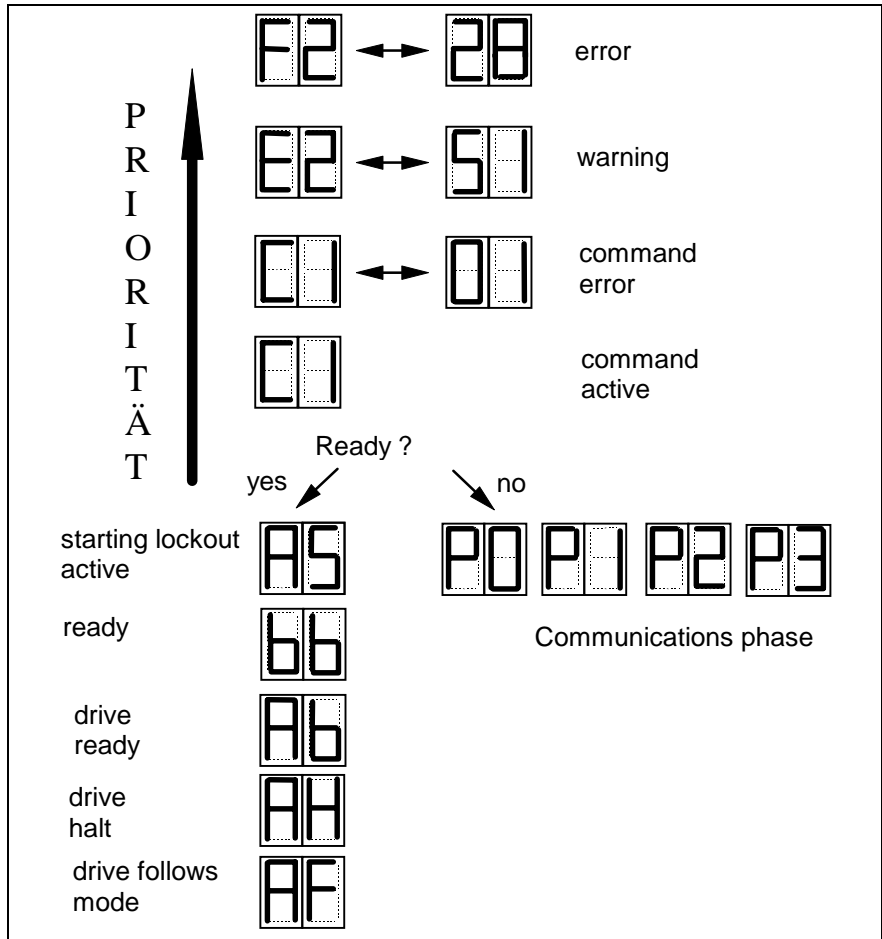


Fig. 1-3: Priority-dependent diagnostics displays

Clear-Text Diagnosis

This contains the diagnosis number followed by the diagnosis text, as seen in example "Excessive control offset" (Fig. 1-1).

It can be read at parameter **S-0-0095, Diagnosis**. It supports the direct display on an operator interface of drive states.

The clear text diagnosis can be switched to the language required.

2 Definition of Display F... and E ...

2.1 Error Diagnosis F...

Depending on operating states and parameter settings, a number of monitoring functions are executed. If during the course of such a function an error state is depicted, that no longer permits operation, then an error message is generated.

Error classes

Errors can be broken down into four different classes. The diagnosis indicates the error class. It decides the drive error reaction.

Error class:	Diagnosis	Drive reaction:
fatal	F8xx	torque to zero
traverse range	F6xx	speed command to zero
interface	F4xx	as per best possible decel set
non-fatal	F2xx	as per best possible decel set

Tab. 2-1: Error classes and drive reactions

Drive error reactions

If an error state is detected in a drive, then a drive error reaction is automatically started if the drive is in control. The H1 display flashes Fx / xx.

The drive reaction with interface and non-fatal error can be parametrized with **P-0-0119, Best possible decel**. The drive goes torque free at the end of every error reaction.

Error reset

Errors do not clear themselves but must be cleared externally

- by the control by generating command **S-0-0099, Reset-class 1 diagnostics (C1D)** or
- by pressing key "**S1**".

If the error state persists, then it will be immediately detected.

A positive edge on the drive enable signal is needed to switch the drive back on.

F207 Switching to a Non-Initialized Mode

Cause:

"0" is parametrized in at least one of the four operating modes in parameters **S-0-0032..35**. This mode is selected in the master control word by bits 8 and 9 with activated drive control.

Recovery:

The desired mode must be entered in an activated operating mode parameter.

Permissible operating modes are:

Definition:	Bit list of operating mode parameters
torque control	0000 0000 0000 0001
velocity control	0000 0000 0000 0010
position control with act. pos. value 1	0000 0000 0000 x011
position control with act. pos. value 2	0000 0000 0000 x100
drive-internal interpolation with actual position value 1	0000 0000 0001 x011
drive-internal interpolation with actual position value 2	0000 0000 0001 x100

Tab. 2-2: Operating modes

Parameter:	main operating mode	S-0-0032
	auxiliary mode 1	S-0-0033
	auxiliary mode 2	S-0-0034
	auxiliary mode 3	S-0-0035

Check for correct entry of permissible interpolation mode.

F208 Motor type has changed

Cause:

If a motor with data storage in the feedback is operated by a controller, then the controller will automatically recognize and store the type designation of the motor.

This occurs with each powering up. If the motor is changed to a different type at some later date, then error message F208 will be generated.

Recovery:

- Use correct motor type.
- If a new MDD or MKD motor is connected, then the new motor type is assumed once the error is cleared.
- If a 2AD, ADF or 1MB motor is connected, then all motor-specific parameters must be checked and, if necessary, the correct ones entered.

F219 Motor Switchoff Temperature

If the motor temperature exceeds the value set in **S-0-0204, Motor switchoff temperature**, then the drive generates this error message. With MDD and MKD motors, the value is set permanently to 155°C. The temperature must be set with all other motor types. The value is listed in the data sheet of the motor.

In motors 2AD, 1MB, LAF, LAR and MBW the current motor temperature can be viewed in parameter **S-0-0383, Motor Temperature**.

Cause:

1. The motor was overloaded. The rms torque requested by the motor exceeded permissible continuous torque for too long a period of time.
2. Break in line or short-circuit to motor temperature monitor.
3. Speed control loop unstable.

Recovery:

- On 1. Check motor layout. In plants that have been operational for extended periods, check conditions for any changes (e.g., dirt, friction, moving masses, and so on).
- On 2. Check line to motor temperature monitors X6/1 and X6/2 for breaks in line or short circuits.
- On 3. Velocity control loop parameter must be checked (see Function Description).

F221 Error Motor Temperature Monitor Defective

Cause:

Break in line to motor temperature monitor.

Recovery:

Check line to motor temperature monitor X6/1 and X6/2 for breaks.

F222 Error Amplifier Temperature Monitor Defective

The temperature monitor checks whether the measured drive controller temperature is acceptable.

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

Once the relevant warning E219 is generated for 30 seconds, then the error message is generated.

Cause:

1. Sensor not connected to PCB DRP3.
2. Cable break in drive controller or sensor defective.

Recovery:

Replace or repair drive controller.

F226 Undervoltage Error

DC bus voltage is monitored in the supply unit. The control voltage bus informs the drive controller as to whether the DC bus voltage exceeds the minimum allowable value of +200 V with a DDS and +250 V with a DKR. Exceeding this threshold causes a deceleration of the drive in terms of the error reaction which has been set.

Precondition: NCB bridge at supply module is not in use.

Cause:

1. Power off without prior deactivation of drive via the drive enable signal (RF).
2. Activation of the drive via the driver enable signal (RF) without prior activation of power section.
3. Supply module not functioning correctly.
4. Short circuit / short to ground of motor.

Recovery:

1. Check logic which activates drive in mounted control unit.
2. If the supply unit is not working properly, then repair it. See Application Description of Supply Module.

F228 Excessive Control Offset

If the control loop is closed, then the drive monitors whether the set command value can be complied with or not. A model position actual value is calculated in the drive and compared to the actual position value. If the difference continuously exceeds the theoretical and actual position value as set in parameter **S-0-0159, Monitor Window**, then this error is generated.

Cause:

1. The acceleration capability of the drive was exceeded.
2. The axis was blocked.
3. Faulty parametrization in the drive parameters.
4. **S-0-0159, Monitor Window** incorrectly parametrized.
5. The power supply was switched off with drive enable signal applied. Possible cause: errors in an AC servo drive in a shared supply module.

Recovery:

- On 1. Parameter **S-0-0092, Bipolar Torque Limit Value** must be checked and set to the maximum allowable value for the application.
Acceleration value of control must be reduced (see Control Manual)
- On 2. Check mechanics and eliminate axis jamming.
- On 3. Check drive parameters.
- On 4. Parametrize **S-0-0159, Monitoring window**.
- On 5. AC servo drive with an error message other than "28" must be checked.

F229 Motor Encoder Error: Quadrant Error

A hardware error was detected by the motor encoder interface.

Cause:

1. encoder cable defective
2. encoder cable receiving interference
3. motor encoder interface defective
4. drive controller defective

Recovery:

- On 1. replace encoder cable
- On 2. route encoder cable separate of power-conductive cables
- On 3. motor encoder interface must be replaced
- On 4. replace drive controller

F233 Error External Voltage Supply

Cause:

Various optional plugin modules have galvanically isolated inputs and outputs. To operate these properly, an external power source must be applied. If this voltage exceeds permissible range, then this error message is generated.

The following functions require an external voltage source:

1. Reference switch on module DSS2, activated via parameter **P-0-0300, Spindle positioning parameter 2**, bit 0.
2. Measuring probe input activated with **S-0-0170, Command measuring probe cycle**.
3. Emergency stop input of DSS2 module activated via parameter **P-0-0008, Activate emergency-stop function**, bit 0.
4. Use a DEA module.
5. Evaluate linear scale via a DAG module.

Recovery:

Check external voltage supply.

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

Tab. 2-3: External supply voltage

F234 Emergency Stop Activated

Cause:

The emergency stop function was tripped by switching off the +24V at input X12/6. The drive was decelerated with the error reaction set.

Recovery:

1. Cause for removal of +24V at input X12/6 must be cleared.
2. Via control, activate command "Reset tatus class 1" (see control handbook).

See function description "Emergency-Stop Function" also.

F236 Excessive Actual Position Difference

Cause:

In the transition check to communications phase 4 command, actual position values 1 and 2 are set to the same value and the cyclical evaluation of both encoders is started. In cyclical mode (phase 4) the actual position difference of both encoders is compared with **S-0-0391, Monitoring window, external encoder**. If the difference exceeds that set in the monitor window, then error F236 "Excessive actual position difference" is diagnosed and the parametrized error reaction executed.

1. Parameter of external encoder is wrong (**S-0-0115, Position encoder type parameter 2** **S-0-0117, External encoder resolution**).
2. Mechanics between motor shaft and external encoder wrongly parametrized (**S-0-0121, Input revolutions of load gear, S-0-0122, Output revolutions of load gear.**)
3. Mechanics between motor shaft and external encoder not rigid (e.g., play in gears).
4. Encoder cable defective.
5. Module (DLF or DEF) for the evaluation of external measuring system defective.
6. Maximum input frequency of encoder interface exceeded.
7. External encoder not mounted to drive axis.

Recovery:

- On 1. **S-0-0115, Position feedback type 2** parameter and **S-0-0117, External encoder resolution** must be checked.
- On 2. **S-0-0121, S-0-0122, Input and output revolutions of load gear** and **S-0-0123, feed constant** must be checked.
- On 3. Increase **S-0-0391, Monitor window external encoder**.
- On 4. Replace encoder cable.
- On 5. Replace module for evaluation of external measuring system.
- On 6. Reduce velocity.
- On 7. Set **S-0-0391, External encoder monitor window** to 0 (switch monitor off).

F237 Excessive Position Command Difference

Cause:

While the drive is working in position control, the position command values coming over SERCOS Interface are monitored. If the speed requested by two sequential position command values exceeds or is equal to the value set in **S-•-0091, Bipolar speed limit value**, then the position command value monitor is activated. The **excessive position command value** is stored in parameter **P-0-0010**. The **final valid position** command value is stored in parameter **P-0-0011**.

Recovery:

S-•-0091, Bipolar speed limit value is compared with the programmed speeds and, if necessary, adjusted.

F242 Error of Ext. Encoder: Signal Amplitude Faulty

Cause:

A high-resolution evaluation of an external linear scale uses the analog signals of such. These are monitored in terms of two criteria:

1. The index point resulting from sine and cosine signals must equal at least $> 1 \text{ V}$.
2. The maximum index point resulting from sine and cosine signals may not exceed 11.8 V .

$$\text{Index point} = \sqrt{\sin^2 + \cos^2}$$

Fig. 2-1: Index point

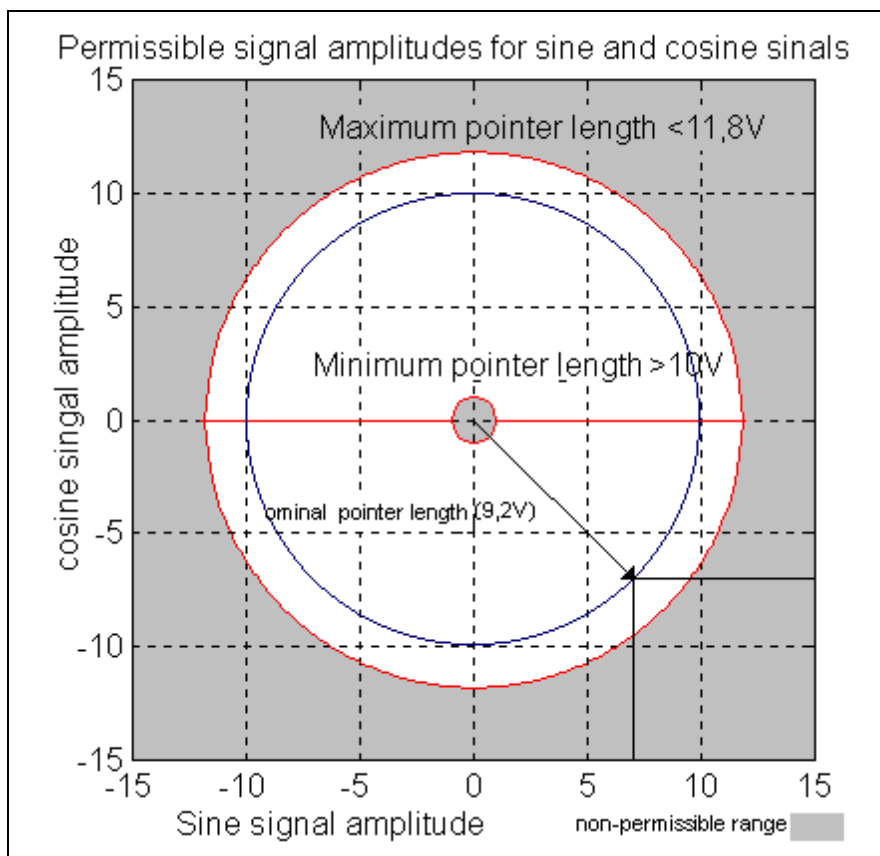


Fig. 2-2: Correct signal amplitudes

Example:

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

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

$$\text{index point} = \sqrt{(-6.5 \text{ V})^2 + 6.5 \text{ V}} \approx 9,2 \text{ V}$$

Recovery:

1. Check cable to measuring system.
2. Check measuring system.

Error of Ext. Encoder: Quadrant Error

A hardware error has been detected on the high-resolution position interface for sine signal "DLF" of the external measuring system.

Cause:

1. Encoder cable defective.
2. Encoder cable receiving interference.
3. DLF module is defective.

Recovery:

- On 1. Replace encoder cable.
- On 2. Route encoder cable separately of power-conductive cables.
- On 3. Replace DLF module.

F248 Low Battery Voltage

Cause:

The absolute position information in MKD motors is stored in the battery-backed electronics in the motor feedback. The battery generally has a lifespan of ten years. This message is generated if the voltage of the battery drops below 2.8 volts. The absolute encoder function is then guaranteed for only two more weeks.

Caution

Source of danger: Error in the control of motor and moving parts.
Possible damage: Mechanical damage.
Measures: Replace battery as soon as possible.

How to change the battery

Have tools and aids as follows ready:

- Torx screwdriver, size 10
- wrench and torque keys
- new standard battery (part no.: 257101)

Caution

Source of danger: Error in the control of motor and moving parts.
Possible damage: Mechanical damage.
Measures: Switch power off. Secure against being switched back on.
Replace battery with control voltage on.

If the control voltage is switched off while the battery is removed, then the absolute dimension will be lost.

The absolute dimension must be re-established again.

Removing the battery

- remove Torx screws with size 10 screwdriver
- manually pull out lid of resolver feedback RSF
- pull out battery connector
- clamping device of battery released and battery removed
- standard battery (part no.: 257101) inserted into housing and clamping device screwed on. **Note! Do not pinch battery cable.**
- insert battery connector

Close the lid of the resolver feedback, tighten Torx screws and tighten with a torque key with 1.8 Nm!

Erroneous Internal Hardware Synchronization

Cause:

The drive control of all drives on a SERCOS ring are synchronized via one phase control loop. The synchronization function is monitored. If the mean value of the deviation exceeds 5 µsec, then this error is generated.

Recovery:

- replace DDS module
- replace drive controller

F268 Brake Fault

The drive controller regulates the brakes in mortors with an integral holding brake. Brake current is monitored. If the brake current exceeds the allowable range of

$$0.4 - 1.6 * \mathbf{P-0-0511, Holding\ brake\ current}$$

then this error message is generated.

Cause:

1. The supply voltage for the holding brake is not correctly connected or exceeds tolerance (24 V +/- 10 %).
2. The motor cable is either not completely or incorrectly connected (poles reversed).
3. Holding brake defective.
4. Drive controller defective.

Note: Galvanic connection between 0V brake power source and 0V of the drive controller.

Recovery:

- On 1. Check supply voltage.
On 2. Check motor cable.
On 3. Replace motor.
On 4. Replace drive controller.

F276 Absolute Encoder Out of Allowed Window > P-0-0097

When a drive controller with absolute encoder motor (multiturn) is switched off, the current actual position is stored. When powering back up, an evaluation of the absolute encoder determines the position using this stored one by comparing them. If the deviation exceeds the parametrized **P-0-0097, Absolute encoder monitor window**, then this error is generated.

Cause:

1. Initial switching on (the stored position is invalid).
2. The axis was moved while the machine was off by a distance greater than that parametrized in **P-0-0097, Absolute encoder monitor window**.
3. Faulty positioning initialization.

Recovery:

- On 1. Clear error (establish absolute dimension).
- On 2. The axis was moved while machine was shutdown and now stands outside of the allowable position.
Check whether a renewed travel command can cause damage.
Then clear errors.
- On 3. **Danger of accidents caused by unwanted axis motions.**
Check absolute dimension. If it is incorrect, then there is a feedback defect. Replace the feedback (with absolute motor encoder with MDD or MKD motor the complete motor).

Softstart Fault Power Supply Unit

The DC bus cannot be loaded.

Cause:

1. Short-circuit in supply or drive controller.
2. Too many additional capacitors are connected.
3. DC bus choke interrupted (only applie to HVE).

Recovery:

- On 1: Loosen connections to the drive controllers and switch power back on. Replace a defective unit, if necessary.
- On 2: Reduce the number of auxiliary capacitors or use a separate charging set.
- On 3: Check DC bus choke and lines and replace, if necessary.

F318 Heatsink Overtemperature Fault in Power Supply Unit

Power shutdown due to excessive heatsink temperature.

Cause:

The unit is loaded or the ambient temperature is too high.

Recovery:

Check load and ambient temperature. Check temperature prewarning contact of the unit.

F320 Bleeder Overload

Power shutdown because of excessive bleeder load.

Cause:

1. The regenerated drive energy of the HVR is too big when the power is shut off.
2. The continuous regenerated power of the HVE and/or the rotatory drive energy is too big.
3. The unit is defective.

Recovery:

- On 1: Reduce drive speed. Switch power with OFF or an Emergency stop off with lag.
- On 2: Increase cycle time, reduce drive speed, install auxiliary bleeder.
- On 3: Replace unit.

F324 Option Module Error Power Supply Unit

Cause:

A fault was detected in an auxiliary component such as auxiliary bleeder, control voltage mains section or a separate charging set.

Recovery

Check auxiliary components

F360 Overcurrent Power Supply Unit

Only applies to HVR!

Cause:

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

Recovery:

Power connections to the drive controller must be disconnected step by step. Replace defective unit.

F369 +24V / ±15V / +5V Fault Power Supply Unit

Problem in the control voltages.

Cause:

1. Maximum allowable load exceeded.
2. Short-circuit in wiring if control voltage exceeds drive system used.
3. Unit is defective.

Recovery

On 1: Disconnect bus connections to drive controller step by step.

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

On 3: Replace unit.

F380 Short to Ground Power Supply Unit

Cause:

Short to ground in power supply unit
in drive controller
in motor or motor cable.

Recovery:

Losen connections to motor and power supply step by step. Replace defective drive components.

F381 Mains Failure

Only applies to HVR!

Cause:

At least one phase of the mains supply is missing.

Recovery:

Check mains fuses and replace, if necessary.

F382 Mains Phase Loss Fault

Only applies to HVE !

Cause:

At least one phase of the mains supply is missing.

Recovery:

Check mains fuses and replace, if necessary.

F383 Line Voltage Fault

Only applies to HVR !

Cause:

The mains voltage exceeds allowable tolerance (3x 380 to 480V, $\pm 10\%$).

Recovery:

Check mains voltage and use a matching transformer, if necessary.

F384 Connection Error at Power Supply Unit

Only applies to HVR !

Cause:

Power and control voltages 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 Line Frequency Fault

Only applies to HVR !

Cause:

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

F394 Checksum Error Power Supply Unit

Only applies to HVR !

Cause:

Unit error.

Recovery:

Replace unit.

F401 Double MST Error Shutdown

The master sync telegram has not been received by the drive over the course of two sequential SERCOS cycles.

Cause:

1. a fault in the fiber optic cable (LWL) transmission path
2. excessively high attenuation of light signals
3. fault in SERCOS interface (general)

Recovery:

On 1. All LWL connections in the SERCOS ring must be checked.

On 2. Measure attenuation of LWL cables.

Maximum attenuation between TX and RX may not exceed 12.5 dB! Possible transmission power of SERCOS Interface plugin module must be increased with switch position of S5! (see section 4).

On 3. Replace SERCOS interface module in drive.

Also see Function Description: "SERCOS Interface Error".

F402 Double MDT Failure Shutdown

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

Cause:

1. problem in LWL transmission path
2. excessively high attenuation of light signals
3. fault in SERCOS interface (general)

Recovery:

On 1. All LWL connections in SERCOS ring must be checked.

On 2. Measure attenuation of LWL cables.

Maximum attenuation between TX and RX may not exceed 12.5 dB! Possible transmission power of SERCOS Interface plugin module must be increased with switch position of S5! (see section 4).

On 3. Replace SERCOS interface module in drive.

Also see Function Description: "SERCOS Interface Error".

F403 Invalid Communications Phase Shutdown

The SERCOS master module set an invalid communications phase (phase > 4)

Cause:

Error in SERCOS master module of control.

Recovery:

Consult control manufacturer.

See Function Description: "SERCOS Interface Error".

F404 Error During Phase Progression

The prescribed order was not maintained during phase progression.

Cause:

Error in SERCOS master module of control.

Recovery:

Consult control manufacturer.

F405 Error During Phase Regression

Phase regression did not switch to phase 0.

Cause :

Error in SERCOS master module in control.

Recovery:

Consult control manufacturer.

F406 Phase Switching Without Ready Signal

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

Cause:

Error in SERCOS master module in control.

Recovery:

Consult control manufacturer.

F818 Drive Overtemperature Shutdown

Excessively high temperature has been detected in the power stage of the drive controller. For 30 seconds, the drive controller generated the warning : "E250 Drive Overtemperature Warning". The drive then brings itself to the standstill depending on the error reaction set and generates this error message.

Cause:

1. Unit-internal blower has failed.
2. Control cabinet air conditioning has failed.
3. Control cabinet dimensions for heat dissipation are wrong.

Recovery:

- On 1. Replace the drive controller if blower fails.
On 2. Make the control cabinet air conditioner work.
On 3. Check control cabinet dimensions.

F819 Drive Temperature Monitor Defective

Cause:

Use an NTC resistor to measure drive temperature. If it is defective or not connected, then the above message is generated.

Recovery:

NTC resistor must be connected or replaced.

F820 Bleeder Overload (Only applies to DKR)

Cause:

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

The energy converted by the internal bleeder is calculated. If maximum amount of energy that the bleeder can store is exceeded, then it is shutdown. Bleeder overload error is generated.

Recovery:

Brake ramps must be parametrized flatter or bleeder power increased. Once the bleeder has cooled down, the unit is again operational.

F822 Motor Encoder Failure: Signal Too Small

During a high-resolution evaluation of an external linear scale, the analog signals of this system are used. These are monitored in terms of two criteria:

1. The index length calculated from sine and cosine signals must equal at least 1 V.
2. Maximum index length calculated from sine and cosine signals may not exceed 11.8 V.

Note:

Errors cannot be reset in communications phase 4. Go to phase 2 to do so.

Recovery:

- Check cable to measuring system.
- Route cable separate of motor power cable. The shield must be applied to drive controller (see Project Planning document of the drive controller).
- Check measuring system, replace if necessary.

F827 Drive Interlock While Drive Activated

Cause:

The starting lockout was actuated while the control enable was set. The drive immediately goes torque free.

Recovery:

The starting lockout should not be triggered when drive enable is set. check the control for the starting lockout input.

F860 Overcurrent: Short in Power Stage

The current in the power transistor bridge has exceeded twice the value of the peak current of the machine. The drive is immediately switched torque free. The holding brake, if present, is immediately applied.

Cause:

1. Short circuit in motor cable.
2. Power section of the drive controller is defective.

Recovery:

- On 1. Check motor cable for short circuit.
- On 2. Replace drive controller.

F861 Overcurrent: Short to Ground

The sum of the phase currents is monitored. Generally, the sum = 0. If the sum exceeds $0.5 \times I_N$, then the ground monitor fuse is tripped.

Cause:

1. Motor cable defective.
2. Ground fault in motor.

Recovery:

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

F862 No Acknowledge of Gearstage

During gear changes, the auxiliary contactors are controlled directly by the controller and the successful change is signalled to the controller using signal voltages.

Cause:

The gear switch was not conducted within ten (10) seconds after the progression procedure was started.

Recovery:

- Check the electrical wiring layout as per section 8.6.3.
- Check the mechanics of gear motor and index mechanism.

F863 No Acknowledge of Windings Interconnection

During gear changes, the auxiliary contactors are controlled directly by the controller and the successful change is signalled to the controller using signal voltages.

Cause:

The winding change was not conducted within two (2) seconds after the change process was actuated.

Recovery:

- Check the electrical wiring layout as per section 8.7.3
- Check the mechanics of the mains switch.

F869 +/- 15 Volt DC Error

The drive controller has detected an error in the ± 15 V DC supply.

Cause:

1. Control voltage bus cable defective.
2. Supply module defective.

Recovery:

- On 1. Check control voltage bus cable or connection and replace if necessary.
- On 2. Check supply unit (see Application Description/Supply Unit).

F870 + 24 Volt DC Error

The drive controller has detected an error in the + 24 V DC supply.

Cause:

1. Control voltage bus cable defective.
2. 24 V supply voltage overload.
3. Supply unit defective.
4. Short circuit in emergency stop loop.

Recovery:

- On 1. Control bus cable or connection must be checked and replaced if necessary.
- On 2. 24 V supply voltage at supply unit must be checked.
- On 3. Check supply unit (see Application Description/Supply Unit).
- On 4. Check emergency stop loop for short.

F871 + 10 Volt DC Error

The supply voltage to the current sensors is interrupted.

Cause:

Defect in drive controller.

Recovery:

Replace drive controller.

F878 Velocity Loop Error

If the velocity control loop is active and the difference between speed/command and actual values exceeds 10% of the maximum motor speed, then the actual speed value must move in the direction of the command value. If for 20 ms there is no moving of the actual value towards the command value and the rms torque/force command value is within the limit (=P-0-4046, rms peak current), then this error is generated.

Cause:

1. Motor cable not correctly connected.
2. Power section of the drive controller is defective.
3. Feedback defective.
4. Speed control parametrization is incorrect.
5. Accel or decel ramp parametrized too steeply.
6. Motor encoder/external encoder have wrong parameter values.

Recovery:

- On 1. Check motor cable connection.
- On 2. Replace drive controller.
- On 3. Replace motor.
- On 4. Speed control must be checked as per Application Description (see section on speed controller).
- On 5. Maximum acceleration in control must be reduced or **P-0-1201, velocity ramp 1** must be reduced.
- On 6. Check parameter values of motor encoder/ext. encoder!

See Function Description: "Determining Speed Controller Settings".

F879 S-0-0092, Velocity Limit Exceeded

The actual speed is monitored in torque control. This error is generated if the speed set in parameter **S-0-0091, Bipolar speed limit value** is exceeded by 1.125 times or a minimum of 100 rpm (rotatory motors) or 100 mm/min (linear motors).

Cause:

The load torque was lower than the torque command value. This increases the actual speed up to maximum motor speed.

Recovery:

Allocate correct torque command value to the task. Reduce parameter **S-0-0092, bipolar torque limit value**.

Also see Function Description: "Bipolar speed limit value".

2.2 Warning Diagnoses

E219 Warning Drive Temperature Surveillance Defective

The temperature monitor checks whether the drive controller temperature measured is realistic or not. If it is detected as being less than -10°C , then it is assumed that the measuring unit is defective. Warning E219 "Warning Drive Temperature Surveillance Defective" appears for 30 seconds. The drive is braked with the set reaction and the message F220 "Error Drive Temperature Surveillance Defective" is generated.

Cause:

1. Sensor not connected to PCB DRP3.
2. Cable break in drive controller or sensor defective.

Recovery:

Replace/repair drive controller.

E221 Warning Motor Temperature Surveillance Defective

The temperature monitor checks whether the drive controller temperature measured is realistic or not. If it is detected as being less than -10°C , then it is assumed that the measuring unit is defective. Warning E221 "Warning Motor Temperature Surveillance Defective" appears for 30 seconds. The drive is braked with the set reaction and the message F221 "Motor Overtemperature Surveillance Defective" is generated.

Cause:

1. Motor temperature sensor not connected.
2. Break in cable.
3. Sensor defective.
4. Cable break in drive controller.

Recovery:

- On 1. Connect sensor to drive controller and motor (see Project Planning document of motor).
- On 2. Replace cable between controller and motor.
- On 3. Replace motor.
- On 4. Replace drive controller.

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

Cause:

For mode "Drive internal interpolation" a speed is set in parameter **S-0-0259, Positioning velocity** with which the set target position is approached.

If it is greater than the permissible maximum **S-0-0091, bipolar speed limit value**, then message E249 is generated. Simultaneously, **S-0-0013, class 3 diagnostics** is set in message bit 4.

Recovery:

Decrease **S-0-0259, Positioning speed**.

See also Function Description: "Drive-Internal Interpolation".

E250 Drive Overtemperature Prewarning

The heatsink temperature in the drive has reached maximum temperature. For a period of 30 seconds, the drive follows the command value. It is thus possible to bring the axis via the control to a standstill which complies with the process (e.g., conclude processing and leave collision area, etc.)

After 30 seconds, the reaction set in parameter **P-0-0119, Best possible decel** is conducted by the drive.

Cause:

1. Internal blower has failed.
2. Control cabinet air conditioning has failed.
3. Control cabinet incorrectly dimensioned in terms of heat.
4. Air channels jammed.

Recovery:

- On 1. If the blower has failed, then replace the drive controller.
- On 2. Repair the air conditioning unit.
- On 3. Check control cabinet dimensions.
- On 4. Clean air channels!

E251 Motor Overtemp. Warning

The motor has overheated. For a period of 30 seconds, the drive complies with the command value. This means it is possible to brake the axis via the control in a way that complies with the process (e.g., complete processing, leave collision area, etc.). After 30 seconds, the reaction set in parameter **P-0-0119, Best possible standstill** is conducted by the drive.

Cause:

The motor was overloaded. The torque demanded by motor exceeded for too long the allowable continuous torque at standstill.

Recovery:

Check motor layout. In machines that have been operated for longer periods, check whether the drive conditions have changed in terms of dirt, friction, moved masses and so on.

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

Using parameter **S-0-0108, Feedrate Override** the traversing speed in drive-controlled travel commands can be changed. If the value of this parameter is 0, then this warning is generated as the drive cannot comply with the command value.

Cause:

1. Feed potentiometer of connected control is at zero or has been incorrectly evaluated.
2. Parameter set at wrong values.

Recovery:

- On 1. Check feed potentiometer.
On 2. Parameter must be set to proper value for application.

E257 Continuous Current Limit Active

The controller load is thermally monitored. If a command current profile is demanded of the controller which could eventually lead to an excessive load of the power transistors (excessive heating of the power end stage), then the drive will respond with the dynamic reduction of the effective peak current. This warning is thus generated. Parameter **P-0-4046, rms peak current** is reduced. Before this peak current limit actually occurs, however, the prewarning **E261 continuous current limit prewarning** is generated.

Cause:

The drive controller was overloaded.

Recovery:

1. Check drive layout.
2. Reduce acceleration.

In machines that have been operated for longer periods, check whether the drive conditions have changed in terms of dirt, friction, moved masses and so on.

E259 Command Velocity Limit Active

In position control and speed control modes, the rms speed command value is limited to the value set in parameter **S-•-0091, bipolar speed limit value**. If the resulting speed command value reaches this limit, then this warning is generated.

Cause:

Parameter **S-•-0091, bipolar speed limit value** has been parametrized too low.

Recovery:

Generally, parameter **S-•-0091, bipolar speed limit value** must be set 10% higher than the NC usable speed.

E261 Continuous Current Limit Prewarning

Digital drives are constantly monitored. If the thermal load reaches 100%, then the continuous current limit is soon activated.

Prior to torque reduction, the continuous current limit prewarning is generated via a switch threshold which is fixed with parameter **P-0-0127 Overload warning**. By entering into parameter **P-0-0127 = 100%** this warning is deactivated.

Cause:

The drive controller was overloaded.

Recovery:

1. Check drive layout.
2. Reduce acceleration.
3. Switch threshold in parameter **P-0-0127, Overload warning** must be increased.
4. In machines that have been operated for longer periods, check whether the drive conditions have changed in terms of dirt, friction, moved masses and so on.

E263 Velocity Command Value Limit > S-0-0036

Cause:

S-0-0036, speed command value was set higher than permitted for the drive.

Recovery:

Limit it to **S-0-0091, bipolar speed limit value**.

E325 Recovery Overload Power Supply Unit

Cause:

The regenerated power of the drive is too big.

Recovery

Reduce unacceptable delays. Drive controller with a smaller peak current must be used.

E326 Bus Power Overload

Error stored for only 500ms!

Cause:

The power demanded by drives is too big.

Recovery:

Reduce acceleration. Use drive controller with smaller peak currents.

Heatsink Overtemp. Warning of Supply Unit

The allowable heatsink temperature is reached. The temperature warning contact has opened. Power off in 30 seconds.

Cause:

Load too high. Ambient temperature too high. Heatsink air is blocked. Blower in unit is defective.

Recovery:

Reduce load, reduce control cabinet temperature, ensure air, replace unit.

E352 Bleeder Overload Warning Power Supply Unit

Cause:

75% of the allowable bleeder ON time has been achieved due to high regenerated power.

Recovery:

- reduce permissible acceleration (delay)
- reduce drive speed
- reduce peak current of drive

Diagnosis of Power Supply Unit Faulty

The power supply units HVE and HVR send status and error messages over a serial connection on a cyclical basis to connected controllers. If the controllers receive no message over several cycles, then this warning is generated.

Cause:

1. Serial interface of supply unit defective.
2. Serial connection cable breakdown.
3. Serial interface of controller defective.

Recovery:

On 1. Replace supply unit.

On 2. Bus connection cable must be checked and replaced, if necessary.

On 3. Replace controller.

E387 Control Voltage Failure - Power Supply Unit Feed

Only applies to HVE !

Cause:

The control voltage supply of HVE exceeds allowable tolerance (3x 380 ... 480V, $\pm 10\%$).

Recovery:

Check mains fuse in cabinet and replace, if necessary.

E410 Slave Not Scanned or Address 0

During initialization of SERCOS ring in communications phase 1, every slave to participant in further progressions must be addressed by the SERCOS master. Slaves not addressed or with an address of "0", diagnose this with warning E410. Communications with these slaves in higher communication phases is not possible. They only work in repeater mode.

Cause:

Slave was not scanned in phase 1 or address „0“ is set.

Recovery:

- Set correct slave address.
- Sercos master configuration must be checked.

E825 Overvoltage Error

The DC bus voltage is assumed unallowably high values ($U_d > 870 \text{ V}$). So as not to endanger the power stage of the controller, the drive was switched torque free.

Cause:

The regenerated energy of a braking drive (e.g., main spindle drive) cannot be quickly enough converted by the bleeder resistors used.

Recovery:

Parametrize brake ramps flatter or increase bleeder power with an additional bleeder.

3 Definition of Display C... and A ...

3.1 Command Diagnoses C...

Commands support the control of complex functions in the drive.

This means, e.g., that the functions "Drive-guided referencing" or "communications phase 4 transition check" have been defined as a command.

A higher-ranking control can start, terminate or clear commands.

There is a parameter for each command with which the command can be controlled.

While the command is executed, the diagnosis "Cx" appears in the H1 display. The "x" represents the number of the command.

There are three types of commands.

Command types

- **Drive-controlled commands**
 - can initiate an autonomous drive motion
 - can only be started if the drive enable signal is applied
 - can deactivate the active modes while they are being executed
- **Monitor commands**
 - Activate or deactivate monitoring or other functions.
- **Administrative commands**
 - Perform administrative tasks and cannot be terminated.

C100 Communications phase 2 to 3 transition check

Cause:

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

See Function Description: "S-0-0127, C1 Communications Phase 3 transition check" is activated.

C101 Communications Parameter Incomplete (S-0-0021)

Cause:

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

Recovery:

The invalid parameters are stored in parameter **S-0-0021, List of invalid operating data - phase 3**.

Make the invalid parameters valid by write accessing them.

C102 Communications Parameter Limit Value Error (S-0-0021)

Cause:

Parameters needed to operate the drive in communications phase 3 exceed their minimum or maximum input value or the value entered cannot be processed.

Recovery:

The faulty parameters are listed in **S-0-0021, IDN list of invalid operating data phase 2**.

Write valid values into parameters in **S-0-0021**.

C104 Configured ident numbers for MDT not configurable

Cause:

Telegram type 7 has been set in parameter **S-0-0015, Telegram type parameter**. In **S-0-0024, Configuration list for master data telegram** those parameters have been entered in **S-0-0188, List of configurable data in the MDT**.

Recovery:

Either a preferred telegram must be set (telegram type = 0..6) or parameters must be entered in **S-0-0024, Configuration list of the master data telegram** which are also in **S-0-0188, List of configurable data**.

C105 Maximum MDT length exceeded

Cause:

Telegram type 7 was set in parameter **S-0-0015, Telegram type parameter**. The length of the configured data block in the MDT set via **S-0-0024, Configuration list of the master data telegram** exceeds maximum permissible **S-0-0186, Length of configurable data block in the MDT**.

Recovery:

Either set a preferred telegram in **S-0-0015, Telegram type parameter** (telegram type = 0..6) or the number of configured parameters in the MDT must be reduced.

C106 Configurable ident number for AT not configurable

Cause:

Telegram type 7 was set in parameter **S-0-0015, Telegram type parameter**. In **S-0-0016, List of configurable data for the AT** parameters have been set that are not in **S-0-0187, List of configurable data in the AT**.

Recovery:

Either set a preferred telegram in parameter **S-0-0015, Telegram type parameter** (telegram type = 0..6) or parameter must be set in **S-0-0016, List of configurable data for the AT** that are not in **S-0-0187, List of configurable parameters**.

C107 Maximum length of AT exceeded

Cause:

Telegram type 7 was set in parameter **S-0-0015, Telegram type parameter**. The length of the configurable data block in the AT set via **S-0-0016, Configuration drive telegram** exceeds maximum permissible **S-0-0187, Length of configurable data in the AT**.

Recovery:

Either set a preferred telegram in **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**.

Recovery:

Correct the relevant parameter(s). Determining the times is the responsibility of the control manufacturer and these 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 MDT** an even-numbered integer. This is not allowed.

Recovery:

Parameter **S-0-0009, Beginning address in MDT** must be parametrized with an uneven number. This parameter must be determined by the control manufacturer and is 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 even integer. This is not allowed.

Recovery:

Parameter **S-0-0010, Length of master data telegram** must be parametrized with an even integer. This parameter is set by the control manufacturer and is specified by the SERCOS interface.

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

Cause:

Parameters **S-0-0009, Beginning address in MDT** and **S-0-0010, Length of master data telegram** are incorrectly parametrized. The length of the data record in the MDT for the drive plus the beginning address in the MDT exceed the entire length of the MDT.

Recovery:

Correct parametrization of **S-0-0009, Beginning address in MDT** and **S-0-0010, Length of master data telegram**. This parameter is set by the control manufacturer and is specified by the SERCOS interface.

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

Cause:

The valid value for **S-0-0001, NC cycle time** and **S-0-0002, SERCOS cycle time** is either 500 µs or a multiple of 1ms. This is not the case.

Recovery:

S-0-0001, NC cycle time and **S-0-0002, SERCOS cycle time** must be corrected. This parameter is set by the control manufacturer and is specified by the SERCOS interface.

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

Cause:

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

Recovery:

S-0-0001, NC cycle time and **S-0-0002, SERCOS cycle time** must be corrected. This parameter is set by the control manufacturer and is specified by the SERCOS interface.

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

Cause:

The maximum allowable value for **S-0-0007, Feedback acquisition starting time T4** equals:

S-0-0002, SERCOS cycle time - S-0-0005, Minimum acquisition starting time T4min.

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

Recovery:

Correct **S-0-0007, Feedback acquisition starting time T4**. This parameter is set by the control manufacturer and is specified by the SERCOS interface.

C115 T2 too small

Cause:

The value set for **S-0-0089, T2 MDT transmit starting time** is faulty. The drive cannot work with this value.

Recovery:

Correct **S-0-0089, T2 MDT transmit starting time**.

This parameter is set by the control manufacturer and is specified by the SERCOS interface.

C200 Communications phase 3 to 4

Definition:

Command **S-0-0128, C2 Communications phase transition check phase 3 to 4** has been activated.

C201 Parameter block incomplete (-> S-0-0022)

Cause:

Parameters needed to operate the drive in communications phase 4 are invalid. The invalid parameters are stored in **S-0-0022, IDN list of invalid operating data phase 3**.

Recovery:

Write access the parameters in **S-0-0022, IDN list of invalid operating data phase 3**, thereby setting them valid.

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

Cause:

Parameters needed to operate the drive in communications phase 4 exceed either minimum or maximum input values or the values cannot be processed (in terms of bit strips). The faulty parameters are listed in **S-0-0022, IDN list of invalid operating data phase 3**.

Recovery:

Write access the parameters in **S-0-0022, IDN list of invalid operating data phase 3**, thereby setting them valid.

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

Cause:

Parameters needed for operation in phase 4 cannot be processed as they are. The faulty parameters are listed in **S-0-0022, IDN list of invalid operating data phase 3**. For example, parameter **P-0-0075, External encoder interface**. The value of the DLF module has not been entered although it should be there.

Recovery:

Faultless values must be written into parameter in **S-0-0022, IDN list of invalid operating data phase 3**.

C204 Motor type (P-0-4014) incorrect

In parameter **P-0-4014, Motor type** an MDD or MKD motor has been input (value 1 or 5), but in the memory of the motor feedback parameter **S-0-0141, Motor type** the abbreviation "MDD" or "MKD" was not found.

Cause:

1. motor type incorrectly parametrized
2. the motor feedback data memory cannot be read

Recovery:

- On 1. Enter motor type used in parameter **P-0-4014, Motor type**.
On 2. Check feedback line.
Feedback defective - replace motor.

C210 External feedback required (-> S-0-0022)

Cause:

Values were entered in parameters **S-0-0154, Spindle positioning parameter** or in **Operating mode parameters S-0-0032..35** that require an external encoder. However, in parameter **P-0-0075, External encoder interface** "0" (for not present) has been entered.

Recovery:

S-0-0154, Spindle positioning parameter or **Operating mode parameter S-0-0032..35** must be altered to rad that a motor encoder is being used.

External measuring systems must be activated by entering a value for **P-0-0075, External encoder interface** not equal to "0".

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

An MDD or MKD motor has a motor feedback with data memory. The attempt was made to read the parameters stored there. An error occurred during this attempt.

Causen:

1. Motor feedback cable is defective
2. Motor feedback defective
3. Drive controller defective

Recovery:

- On 1. check motor feedback cable
On 2. replace motor
On 3. replace amplifier

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

During initialization, the operating software retrieves data out of the EEPROM in the drive controller. If this accessing fails, then this error message is generated.

Cause:

Drive controller hardware defective.

Recovery:

Replace drive controller.

C213 Position data scaling error

Cause:

The display format of position data can be set with the help of the scaling parameters for position data. The drive-internal format of the position data depends on the motor encoder used and its resolution. The conversion factor of the position data from drive-internal format to display format or vice versa exceeds the processible range as either:

- the linear motor and rotary position scaling with motor reference or
- rotary motor and linear position scaling with motor reference or
- linear motor and modulo scaling have been set or
- the determined conversion factor of the position data of display format to internal format or vice versa cannot be displayed

Recovery:

Check and correct the relevant parameters, namely:

- **S-0-0076, position data scaling mode**
- **S-0-0077, position data scaling factor**
- **S-0-0078, position data scaling exponent**
- **S-0-0079, rotary position resolution**
- **S-0-0116, motor encoder resolution**
- **S-•-0121, load gear input rotations**
- **S-•-0122, load gear output rotations**
- **S-0-0123, feed constant**
- **P-0-0074, motor encoder interface**
- **S-0-0277, position encoder type parameter 1**

C214 Velocity data scaling error

Cause:

The display format of the speed data can be set with the help of the scaling parameters. The drive-internal format of the speed data depends on the motor encoder used and its resolution. The factor for the conversion of speed data from drive-internal format to display format or vice versa exceeds processible range.

Recovery:

Check and correct 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 1**
- **S--0121, input revolutions of load gear**
- **S--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 accel data can be set with the help of the scaling parameter of the accel data. The drive-internal format of the accel data depends on the motor encoder used and encoder resolution. The conversion factor of accel data from drive-internal format into display format or vice versa exceeds processible range.

Recovery:

Check and correct the relevant parameters such as

- **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--0121, input revolutions of load gear**
- **S--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 with the help of the scaling parameter of the torque/force data. The factor for the conversion of the torque/force data from drive-internal format to display format or vice versa exceeds processible range.

Recovery:

Check and correct the relevant parameters such as

- **S-0-0086, torque/force data scaling type**
- **S-0-0093, torque/force data scaling factor**
- **S-0-0094, torque/force data exponent**
- **S-0-0110, amplifier peak current**
- **S-0-0111, motor current at standstill**

C217 Motor feedback data reading error

If **P-0-0074, Motor encoder interface** is parametrized

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

then the connected encoder must have available to it an encoder with feedback memory. The values for encoder resolution and feedback type are read from it. An error occurred while reading these values.

Cause:

1. Motor feedback cable defective
2. Motor feedback defective

Recovery:

- On 1. Check motor feedback cable
On 2. Replace motor

C218 External feedback data reading error

If **P-0-0075, External encoder interface** is parametrized

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

then the connected encoder must have available to it an encoder with feedback memory. The values for encoder resolution and feedback type are read from it. An error occurred while reading these values.

Cause:

1. Measuring system cable defective
2. Measuring system defective

Recovery:

- On 1. Check measuring system cable
On 2. Replace measuring system

C220 Motor feedback initializing error

Several checks are run when initializing the motor encoder. An error was detected during this procedure. This error can be:

- an error while reading the angle correction data
- an error while copying the angle correction data
- a communication problem with encoder
- an error when compiling the position of an initialization track
- an error when reading the analog signal of an initialization track
- the faulty index length of the analog signals of an initialization track
- an invalid offset between high and low resolution of the track
- an error in the microprocessor of the measuring system

Cause:

1. Motor feedback cable defective
2. Motor feedback defective
3. Measuring system interface defective

Recovery:

- On 1. Check motor feedback cable
On 2. Replace motor
On 3. Replace measuring system interface (module)

C221 External feedback initializing error

Several checks are run when initializing the motor encoder. An error was detected during this procedure. This error can be:

- an error while reading the angle correction data
- an error while coping the angle correction data
- a communication problem with the encoder
- an error when compiling the position of an initialization track
- an error when reading the analog signal of an initialization track
- the faulty index length of the analog signals of an initialization track
- an invalid offset between high and low resolution of the track
- an error in the microprocessor of the measuring system
- an error in the ext. 24V in DAG 1.2 set to SSI interface

Cause:

1. External feedback cable defective
2. Feedback defective
3. Measuring system interface defective

Recovery:

- On 1. Check external feedback cable
- On 2. Replace feedback
- On 3. Replace measuring system interface (module)

C225 Coprocessor not ready for initialization

The drive controller is equipped with a coprocessor. It is initialized with the progression command. The coprocessor signals its readiness to initialize. If it does not, then this error is generated.

Cause:

Coprocessor failure.

Recovery:

Replace the controller.

C226 Coprocessor acknowledge failed

The drive controller is equipped with a coprocessor. It is initialized during the progression command. If the coprocessor does not acknowledge initialization via the master processor, then this error is generated.

Cause:

Coprocessor failed.

Recovery:

Replace drive controller.

C227 Modulo range error

An error occurred while the modulo value was being calculated. The calculated value exceeds range.

Recovery:

Check parameters used for the modulo function.

(See documentation DOK-DIAX03-SHS-02VRS**-FKB1-..., „Modulo Processing Marginal Conditions“.)

C228 Controller type (S-0-0140) wrong

Using parameter **S-0-0140, controller type** various internal settings in the software are performed. If the contents of the parameter cannot be evaluated then this error is generated.

Cause:

1. This controller type cannot be processed with this software.
2. Amplifier EEPROM defective.

Recovery:

On 1. Contact Indramat.

On 2. Replace/repair controller.

C229 DEA4 missing for gearbox or windings changeover

During gear or winding changeovers, auxiliary contactors are directly affected by the controller. The success of a changeover is signalled to the controller with voltage signals.

Cause:

Plug-in module DEA4.2 not mounted in controller.

Recovery:

Mount plug-in module DEA4.2 (see section 4)!

C230 Preselection of gearstages / Y-D connection incomplete

If gear or winding changeover is used, then each of the four changeable parameter blocks must be assigned a gearstage or a windings switch type (Y or Δ).

Note: Gear changeover cannot take place simultaneously with the Y- Δ - switch!

Cause:

Allocation of winding switch incomplete.

Recovery:

Winding switch must be set for each changeable parameter block!

C300 Set absolute measuring

The control activated command **P-0-0012, set absolute dimension**.

C302 Absolute measuring system not installed

The command **P-0-0012, command absolute dimension** was started without an absolute measuring system.

The command cannot be executed if there is no absolute measuring system.

Cause:

1. The command was wrongly activated.
2. The connected motor or the external measuring system are not absolute encoders.

Recovery:

- On 1. The command trigger has been terminated.
- On 2. Motor or external measuring system must be equipped with absolute encoder function.

C500 Reset Class 1 Diagnostics

The command to clear an error **S-0-0099, Reset class 1 diagnostics** was activated via the control.

See Function Description: "Clear error".

C501 Error delete only in parameter mode

Cause:

The attempt was made to clear error F8/22 motor encoder error, signal too small, in communications phase 4. This is only possible in communications phases < 4.

Recovery:

1. Reset communications phase.
2. Reactivate command.

C600 Drive-controller homing procedure command

Command **S-0-0148, drive-guided referencing** was activated via the control.

C601 Homing only possible with drive enable

Cause:

The command was started without the drive enable signal applied. This is not permitted.

Recovery:

1. Apply drive enable.
2. Restart command.

C602 Distance homing switch reference mark erroneous

Cause:

The distance homing switch is activated. The distance between the positive zero circuit edge and the evaluation of the reference marker exceeds permissible range.

Recovery:

The value in parameter **S-0-0298, Reference cam shift by ..** in parameter **S-0-0299, reference switch offset** can be assumed.

C604 Homing of absolute encoder not possible

The command **S-0-0148, drive-guided referencing** was started. The encoder selection in **S-0-0154, Spindle positioning parameter** selected

an absolute measuring system. The command can only be executed if the command **P-0-0012, set absolute dimension** was activated.

Recovery:

First activate command **P-0-0012, set absolute dimension** and then start command **S-0-0148, drive-guided referencing**. This establishes the absolute reference dimension.

C700 Basic load

The mechanics of the machine is adjusted to the digital drive using MDD and MKD motors and by activating the speed control parameters stored in the motor feedback. Via message C7, the drive controller signals that command C700 basic load was activated via command **S-0-0262, Command basic load**.

Cause:

The command C700 basic load has been activated.

C701 Base load not possible with drive enable applied

Cause:

The command **S-0-0262, Command basic load** cannot be conducted with drive enable applied.

Recovery:

1. Remove drive enable.
2. Restart command.

C702 Default parameters not available

The mechanics of the machine is adjusted to the digital drive using MDD and MKD motors and by activating the speed control parameters stored in the motor feedback. Using C702 the drive signals that the command **S-0-0262, Command basic load** was activated but that the mounted motor has no data storage capabilities.

Recovery:

Request parameter sheet of motor from INDRAMAT Customer Service and enter the parameter.

C703 Default parameters invalid

Cause:

The default parameters are read out of the motor feedback data memory. At least one of these parameters is not valid.

Recovery:

The connection to the motor feedback must be checked. It is possible that the motor may have to be replaced.

See Function Description: "Executing function basic load as a command".

C704 Parameters cannot be copied

Cause:

The existing parameters are not compatible with this software version.

Recovery:

Contact Indramat.

C902 Spindle positioning requires drive enable

Cause:

Drive enable was not set when command **S-0-0152 Spindle positioning** was started.

Recovery:

Set drive enable prior to command start.

C904 No external encoder

An external encoder must be mounted to the spindle if the drive is affected by slip during spindle positioning.

Cause:

The direct measuring system (spindle feedback) needed according to **Spindle positioning parameter (S-0-0154)** is not there or not correctly mounted.

Recovery:

Check spindle feedback (external encoder) for correct connection.

C905 Positioning with non-init. absolute encoder impossible

If an absolute encoder is used as motor or spindle feedback, then, prior to drive-guided spindle positioning, it is necessary to execute the command "set absolute dimension" to establish a reference position between spindle and measuring system.

Cause:

The absolute encoder used as motor or spindle feedback is not in reference with the spindle. The command **Drive-guided spindle positioning (S-0-0152)** cannot be executed as the measuring system has no reference position.

Recovery:

- First check whether parameters **S-0-0277, position encoder type parameter 1** and **S-0-0115, position encoder type parameter 2** are set to "absolute encoder resolution".
- Execute command **C3 Set absolute dimension (P-0-0012)** (see section 7.3).

D101 Parameter changeover only in Phase 4

Cause:

The command **d1 parameter block changeover (S-0-0216)** was activated previously in phase 2, but it can only be executed in phase 4. Only after the drive goes into phase 4 can a parameter block other than „0“ be activated.

Recovery:

Activate command **d1 parameter block changeover** in phase 4 only!

D102 Pendel offset speed cannot be achieved

Cause:

The spindle turns once the gear changeover has been actuated by the command **d1 parameter block changeover (S-0-0216)** with **oscillating offset speed S-0-0214**, but does not reach the internal acknowledgement of the oscillating offset speeds as the value in parameter **speed window, S-•-0157**, is zero!

Recovery:

Enter a value in parameter **speed window S-•-0157**, greater than zero!

If the spindle does not turn with **S-0-0214, oscillating offset speed** then check whether the gear stage is blocked!

D201 Oscillating without drive enable not possible

Cause:

At the start of the command **d2 drive-guided oscillating (S-0-0190)** the drive enable was not set.

Recovery:

Set drive enable prior to command start.

D202 Oscillating offset speed not reached

Cause:

The spindle turns with **oscillating offset speed S-0-0214** but does not reach internal acknowledgement of oscillating offset speed as the value in parameter **speed window S-•-0157**, is zero!

Recovery:

Set value in parameter **Speed window, S-•-0157**, greater than zero!

3.2 Class A Diagnostics

A000 Communications phase 0

The communications structure breaks down into four phases. Phase 0 and 1 support recognition of participants. In phase 2, time and data structure of protocols are prepared for communications phase 3 and 4. Initialization takes place in rising order. The control determines the communications phase. Switching into communications phase 4 concludes initialization. Powering down is also possible here. If phase progressions are interrupted, then this is visible when the status display remains in an already reached communications phase. If diagnosis **A000 Communications phase 0** is active, then the drive is in phase 0 and is waiting for phase progression from the control for phase 0 to 1.

A001 Communications phase 1

The communications structure breaks down into four phases. Phase 0 and 1 support recognition of participants. In phase 2, time and data structure of protocols are prepared for communications phase 3 and 4. Initialization takes place in rising order. The control determines the communications phase. Switching into communications phase 4 concludes initialization. Powering down is also possible here. If phase progressions are interrupted, then this is visible when the status display remains in an already reached communications phase. If diagnosis **A001 Communications phase 1** is active, then the drive is in phase 1, a progression from phase 1 to 2 has not yet been triggered by the control.

A002 Communications phase 2

The communications structure breaks down into four phases. Phase 0 and 1 support recognition of participants. In phase 2, time and data structure of protocols are prepared for communications phase 3 and 4. Initialization takes place in rising order. The control determines the communications phase. Switching into communications phase 4 concludes initialization. Powering down is also possible here. If phase progressions are interrupted, then this is visible when the status display remains in an already reached communications phase. If diagnosis **A002 Communications phase 2** is active, then the drive is in phase 2. Before the control switches into communications phase 3, the command **S-0-0127, C1 Communications transition check to phase 3** is started. If the command is negatively acknowledged, then it is not possible to go to communications phase 3. The problems diagnosed by the drive must first be cleared.

Note: The parameters are not checked for accuracy.

A003 Communications phase 3

The communications structure breaks down into four communications phases whereby phases 0 and 1 support the recognition of the participant. Phase 2 prepares time and data structure of protocols for communications phases 3 and 4. Initialization is performed in rising order. The controls set the phase.

Switching to phase 4 completes initialization and now power can be turned on. If phase progression is interrupted, then the display remains in the already reached communications phase. If **A003 Communications phase 3** is active, then the drive is in phase 3.

Before the control goes to communications phase 4 (operating mode), command **S-0-0128, C2 Communications transition check to phase 4** must be started. If the command is negatively acknowledged, then progression to phase 4 is not possible. The problems diagnosed by the drive must first be cleared.

Note: The parameters are not checked for accuracy.

A010 Drive halt

The drive halt function has been activated. This function supports the deceleration of an axis with a defined rate of acceleration and jerk. The function is activated either by clearing the drive halt bits (bit 13) in the master control word or terminating a drive control command, e.g., drive-guided referencing.

A011 Starting lockout active

Digital drive controllers are outfitted with starting lockouts. These prevent the unwanted starting up of a servo axis. By activating the starting lockout, the control electronics of the power end stage separated via a relay contact from the power end stage.

At terminals AS+; AS– of connector X3 +24V were applied.

A012 Control and power section ready

The drive is receiving control voltage. Power is on. The drive is ready to output power.

A013 Ready to receive power

The drive is receiving control voltage. There is no error in the drive. The drive is ready to output power.

A100 Drive in torque control

The drive is in torque control. It is complying with the torque command specified by the control. The speed control loop is closed in the drive.

A101 Drive in velocity control

The drive is in velocity control. It is complying with the speed command specified by the control. The speed control loop is closed in the drive.

A102 Position control/Encoder 1

The drive is in **Position control**. The position control loop is closed in the drive via a position encoder. The control is only setting the command value, the drive is complying with the command but with lag error.

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

A103 Position control/Encoder 2

The drive is in **Position control**. The position control loop is closed in the drive via a position encoder. The control is only setting the command value, the drive is complying with the command but with lag error.

Encoder 2 means that the position encoder is mounted to the machine axis (direct measurement of the axis position).

A104 Position control/Encoder 1 lagless

The drive is in **Position control**. The position control loop is closed in the drive via a position encoder. The control is only setting the command value, the drive follows **without lag error**.

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

A105 Position control/Encoder 2 without lag error

The drive is in **Position control**. The position control loop is closed in the drive via a position encoder. The control is only setting the command value, the drive follows **without lag error**.

Encoder 2 means that the position encoder is mounted to the machine axis (direct measurement of the axis position).

A106 Drive-internal interpolation, Encoder 1

The control supplies a position command value to the drive, which is identical to the target position of the traversing path. The drive generates (interpolates) an internal position command path which contains maximum values fixed by the control for jerk, accel and speed paths. The drive runs with lag errors to the target position of the traversing path.

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

A107 Drive-internal interpolation, Encoder 2

The control supplies a position command value to the drive, which is identical to the target position of the traversing path. The drive generates (interpolates) an internal position command path which contains maximum values fixed by the control for jerk, accel and speed paths. The drive runs with lag errors to the target position of the traversing path.

Encoder 2 means that the position encoder is mounted to the machine axis (direct measurement of the axis position).

A108 Drive-internal interpolation, Encoder 1, lagless

The control supplies a position command value to the drive, which is identical to the target position of the traversing path. The drive generates (interpolates) an internal position command path which contains maximum values fixed by the control for jerk, accel and speed paths. The drive runs without lag errors to the target position of the traversing path.

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

A109 Drive-internal interpolation, Encoder 2, lagless

The control supplies a position command value to the drive, which is identical to the target position of the traversing path. The drive generates (interpolates) an internal position command path which contains maximum values fixed by the control for jerk, accel and speed paths. The drive runs without lag errors to the target position of the traversing path.

Encoder 2 means that the position encoder is mounted to the machine axis (direct measurement of the axis position).

3.3 Operating States

bb

"ready to operate"

the drive is ready to receive power.

Diagnostics text:

Ready to receive power

Ab

"drive ready"

The control and power sections of the drive are ready to operate

Diagnostics text:

Control and power sections ready (drive ready)

AF

"drive enable"

The drive enable was generated and effects the activation of the drive. It follows the command value.

Diagnostics text:

Depends on operating mode selected.

AS

"Starting lockout"

The power end stage was locked. This signal ensures that the torque of the drive goes to zero regardless of the applied operating stage of the drive package.

Diagnostics text:

Starting lockout

AH

"drive halt"

The drive is braked while maintaining accel parameter (S-0-0136) and remains in control.

P0

Phase 0

The drive is in phase 0 and is waiting for transition from phase 0 to 1.

Diagnostics text:

Phase 0

P1

Phase 1

The transition from phase 1 to 2 has not been initiated by control.

Recovery:

See control manual.

P2

Phase 2

Before the control switches to phase 3, the drive checks the input parameters to ensure that the input limits are maintained and if they are complete. If while doing so it discovers invalid parameter values, then the drive controller prevents any phase progression.

Note: The parameters are not checked for accuracy.

Recovery:

In parameter "**ID no. list of invalid operating data comm. phase 2**" ID. no. **S-0-0021** the parameters are stored that were detected as invalid prior to transition to phase 3. Processing these parameters is a prerequisite for switching into communications phase 3.

P3

Phase 3

Before the control switches to phase 3, the drive checks the input parameters to ensure that the input limits are maintained as well as if they are complete. If while doing so it discovers invalid parameter values, then the drive controller prevents any phase progression.

Note: The parameters are not checked for accuracy.

Recovery:

In parameter "**ID no. list of invalid operating data comm. phase 3**" ID. no. **S-0-0022** the parameters are stored that were detected as invalid prior to transition to phase 4. Processing these parameters is a prerequisite for switching into communications phase 4.

3.4 Diagnoses for Basic Initialization and Fatal System Errors

Diagnostic display: -0

Cause:

The controller data memory is checked whether it is operational or not. If an error is detected, then the display remains on.

Recovery:

The controller is defective (DRP3) and must be replaced.

Diagnostic display: -1

Cause:

The data memory of the DSS 2.1 module is checked. If an error is detected, then the display remains on.

Recovery:

The DDS module or the connection to the basic unit is defective.

- replace defective DSS module
- replace defective controller

Diagnostic display: -2

Cause:

Parameter structure.

When replacing EPROMS to a different firmware version, the parameter memory on the programming module is deleted (duration about five (5) seconds).

Diagnostic display: -3

Cause:

Motor type and motor feedback type are determined by reading the parameter memory.

Diagnostic display: -5

During basic initialization, the coprocessor signalled an error.

Cause:

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

Recovery:

- On 1. check control voltage supply
On 2. replace unit

Diagnostic display: -6

Cause:

Fatal processor or program error has occurred.

Recovery:

It is a system error. Contact software developer.

Diagnostic display: Watchdog ●●

Cause:

Fatal processor or program error has occurred (Watchdog).

Recovery:

Replace unit.

4 Replacing the Unit

4.1 Identifying the Drive Components

Power Supply Module

- The type plate of the power supply module is located at the top of the unit at the front edge of the housing.

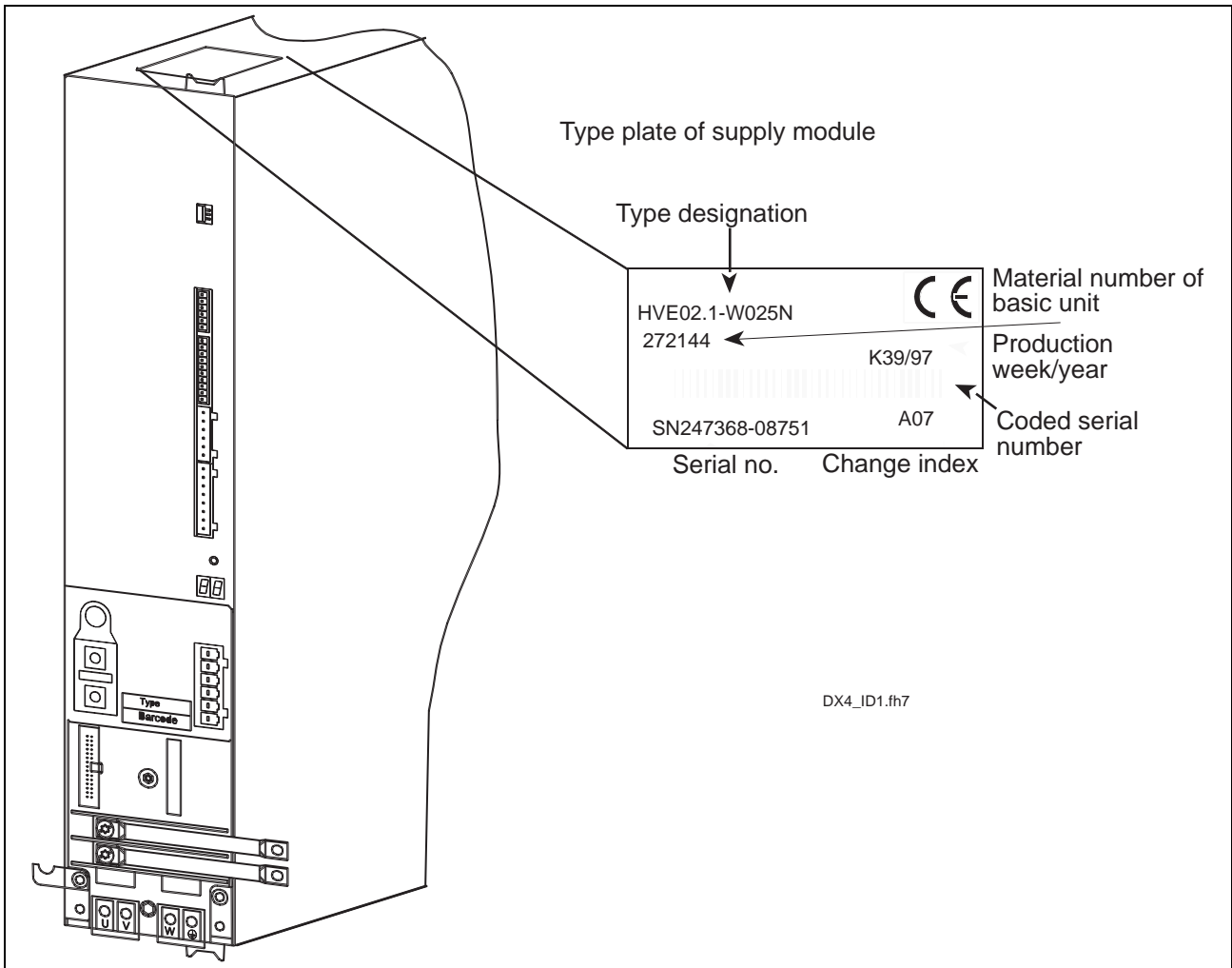


Fig. 4-1: Type plate on the power supply module (example)

Servicing

When contacting customer service at INDRAMAT it is important to know

- type designation and
- serial number

of the power supply module.

Obtaining a replacement unit

Replacement units are obtained from INDRAMAT. Type designations must be specified.

Drive Controllers

There are three type plates on the drive controller which identify hardware and firmware.

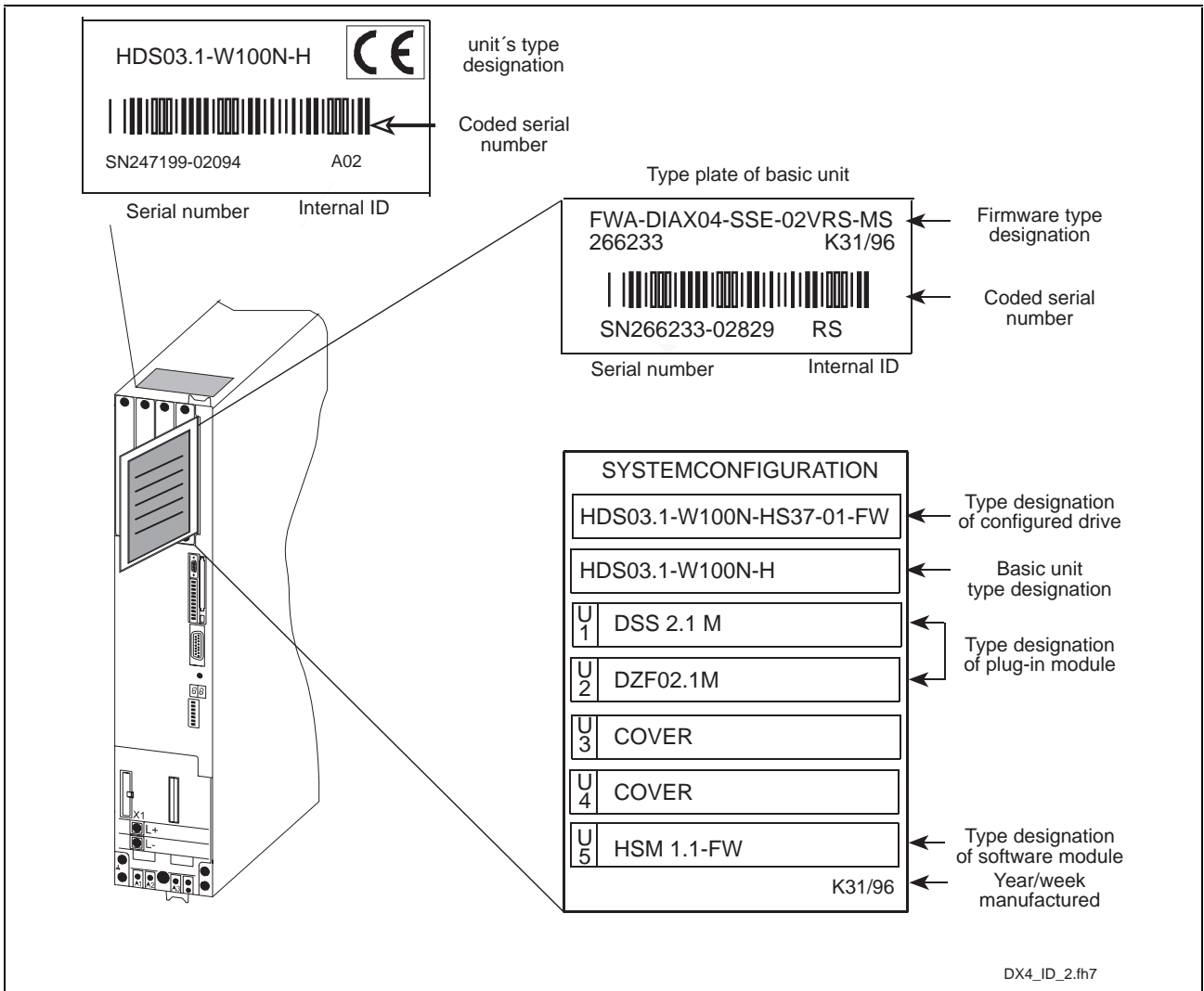


Fig. 4-2: Type plate of controllers HDS / HDD (example)

Servicing

When contacting customer serve at INDRAMAT it is important to know

- type designation of the configured drive controller
- the serial number of the basic unit and
- the firmware type designations.

Obtaining a configured replacement units

Replacement units are available from Indramat as completely configured drive controllers. When ordering note both the

- type designation of the configured drive controller and the
- firmware type designation.

The drive controller is then delivered with plugin modules (U1...U4) and the software module (U5) including firmware.

Putting a replacement unit together

A replacement unit can also be made up of a basic unit and the required plugin modules. When ordering the parts (or when obtaining the parts from the customer's own warehouse), note

- type designation of the basic unit and the
- type designation of the plug-in module

There is no need to order the software module and firmware when ordering parts for the replacement unit as the module (including firmware) can be removed from the defective unit and inserted into the new unit. This eliminates any need to adapt the replacement unit to the demands of the machine and application.

Obtaining a new software module

The replacement of a software module only makes sense if the drive firmware contains a significant error or the firmware is to be expanded by new functions, i.e., a new firmware status is required.

Note: The software module of the drive controller contains the machine-specific parameters. When replacing the software module parameters can be lost. This is why we recommend software modules only if absolute necessary!

When ordering, have handy

- type designation of the software module and
- the firmware type designations.

The most current firmware version is automatically delivered.

Motors

A type plate is mounted to each motor close to the terminal box or the power connector. If this type plate is covered by the machine, then an additional type plate can be mounted to a more visible spot on the motor or machine. (An additional type plate is supplied with each motor. It is taped over the motor type plate with double-sided tape).

Servicing

When contacting customer service at INDRAMAT, it is important to have ready

- type designation and
 - serial number
- of the motor.

Obtaining a replacement motor

Replacement motors can be ordered from Indramat by entering the correct type designation.

Electrical Connections

Standard cables

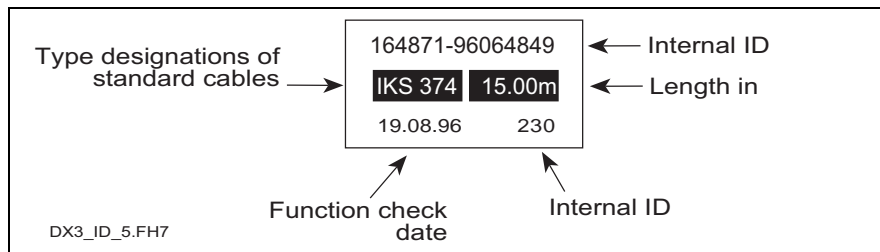


Fig. 4.3: Type plates of standard INDRAMAT cables (example)

Servicing

It is advisable with cable damage to replace them with standard tested cables from INDRAMAT.

Obtaining standard cables

When ordering, have ready

- type designation of the standard cable and the
- length of the cable.

The type plate is situated near the end of the cable.

Make the cable yourself

The replacement cable can also be put together with components (plug-in connectors, lines, ferrules or ring terminals). With the power plug-in connectors, however, special tools are generally necessary for mounting the components. To obtain the components, you need

- type designation of the plug-in connector and the
- type designation of the line.

Data about special tools and mounting guidelines can be obtained from INDRAMAT upon request!

4.2 Replacing Drive Components

Power Supply Modules

To avoid production downtime it makes sense to replace defective drive controllers entirely with a replacement unit.

INDRAMAT power supply modules have been designed to safely and quickly replace a unit without complications to avoid extensive downtimes.

Faults in the power supply module are diagnosed, the steps to handle such an exchange are described in „Replacing Power Supply Modules“ and are depending on the error diagnosis described in the relevant documentation DIAX04 -; Notes on Fault Clearance“.

Production can resume directly after the unit is replaced as new adjustments need to be made to the machine.

Replacing the unit

Obtaining a replacement unit

- To achieve the highest level of safety, it is recommended to obtain a configured drive controller for replacement. See section, "Identifying the drive components" on page 4-1.

Fill out fault report

- The fault report in the section "Fault Report" on page 4-12 must be carefully and completely filled out. This report enables a quick completion of the repair and helps locate application specific faults!

Powering down

- Switch main switch of machine off and secure against being switched back on.
- The transparent viewing plate on the defective unit and the adjacent units must be removed.



DANGER

Voltage conducting current rails (greater than 50V), even with mains voltage off!

Electrical shock upon contact!

⇒ Wait DC bus discharge time (L+/L-) and prior to contact, check for less than 50V!

Dismantling the power supply unit

- All electrical and mechanical connections (except the mounting bolts of the machine) must be removed on the front, top and bottom side of the unit.

Release the clamping screws on the underside of the unit. Pick up unit with both hands and lift it out.

Mounting power supply module

- Grab supply module at top and bottom and hang into the mounting rails. Clamp by releasing the clamping screws!

Connecting the power supply module

- All electrical connections of the power module must be reconnected as specified in the plans of the machine manufacturer.
- Cover the power connections again!

Restarting drive package

- Commission machine as per the instructions of the machine manufacturer.

Drive Controllers

To avoid machine downtimes it makes sense to replace defective drive controllers by replacing the entire unit.

To avoid production downtime it makes sense to replace defective drive controllers entirely with a replacement unit.

INDRAMAT power supply modules have been designed to safely and quickly replace a unit without complications to avoid extensive downtimes.

Faults in the power supply module are diagnosed, the steps to handle such an exchange are described in „Replacing Power Supply Modules“ and are depending on the error diagnosis described in the relevant documentation DIAX04 -; Notes on Fault Clearance“.

Production can resume directly after the unit is replaced as new adjustments need to be made to the machine.

Unit replacement

Obtaining a replacement unit

- To achieve the highest level of functional safety it is recommended to use a configured drive controller for replacement. See section „Identifying the drive components“ on page 4-1.

Fill out a fault report

- A copy of the Fault Report is in section “Fault Report“ on page 4-12. It can be copied. Completely fill it out. This report makes it possible to expedite any repairs and helps located and identify application-technical problems! The main switch of the machine must be switched off and secured against being switched back on.
- Remove the power connection covers of the defective unit and the adjacent units.



DANGER

Voltage conducting current rails (greater than 50V), even with mains voltage off!

Electrical shock upon contact!

⇒ Wait DC bus discharge time (L+/L-) and prior to contact, check for less than 50V!

Dismantling the unit

- All electrical and mechanical connections (except for unit mounting) on the front, top and under side of the unit must be released and removed from unit.
- Release clamp on underside of unit by tightening the clamping screw. Lift unit out with both hands.
- Software module (slot U5) must be released, pulled out of the defective unit and inserted in the replacement unit.

Note: The machine-specific parameters are in the software! If the old software module is used, then no adjustments in the drive to the machine are needed!

Mounting HDDS/HDS

- Grab controller at top and bottom and hang into the mounting rails. Clamp by releasing the clamping screws!

Mounting controller

- All electrical connections of the controller must be reconnected as per the plans of the machine manufacturer!
- Remount the power connection covers!

Restarting the controller

- Restart the machine as per the instructions of the machine manufacturer.
- Check the controller functions!

Motors

Obtaining a replacement motor

Fill out a fault report

See section. „Identifying the Drive Components“ starting with page 4-1.

- A fault report can be copied from the "Fault Report" in sec. "Fault Report" on page 4-12. It can be copied. Completely fill it out. This report makes it possible to expedite any repairs and helps located and identify application-technical problems! The main switch of the machine must be switched off and secured against being switched back on.



DANGER

Danger of high voltage at terminals if power not completely off or if motor still turning!

Electrical shock upon contact!

⇒ Check mains terminals of power and control electronics and DC bus to make sure they are not conducting power!

⇒ Make sure the motor is standing still!

Dismantling motor



Caution

Error when handling and mounting

Injury, damage to machine

⇒ Note instructions of machine manufacturer when dismantling defective motor!

⇒ Secure hanging machine axes against falling!

- Dismantle motor as specified in machine manufacturer's instructions.

Note: Avoid dirtying the sockets of connectors! Maximum contamination level is V2! More dirt than this will make operation dangerous!

DX3_AT_2.FH3

Contamination level	Ambient conditions
V2	Conductive contamination may not occur during operations (IP 65). When installing or replacing drive components, however, non-conductive dirt or light condensation can occur for a brief time.

Fig. 4.4: Allowable dirt contamination level of plugin connectors on motors

- | | |
|-------------------------|---|
| Mounting motor | <ul style="list-style-type: none">• Mount replacement motor as specified by machine manufacturer. |
| Connecting motor | <ul style="list-style-type: none">• All electrical and liquid (with liquid cooling) connections must be connected as specified by the machine manufacturer! |

Note: Insert plug-in connectors only if dry and clean!

- | | |
|------------------------|---|
| Restart machine | <ul style="list-style-type: none">• Restart machine as specified by machine manufacturer. Homing may be necessary if the measuring system of motor supplies the actual position value for position control.• Check the motor blower function. The rotational direction of the blower wheel must agree with the arrow direction on the blower housing!• In the case of liquid-cooled motors, check tank level after restart. |
|------------------------|---|

Electrical Connections

Obtaining a replacement cable

To maintain the highest degree of functioning safety, use standard INDRAMAT cables for replacement. See section „Identifying the Drive Components“ starting with page 4-1.

Powering down

- Switch main switch of machine off and secure against being switched back on.



DANGER

High voltage at terminals if not totally powered down!

Electrical shock upon contact!

⇒ Check mains terminals of power and control electronics and DC bus to make sure they are not conducting power!

Mounting and removing cables

- Remove defective cable and attach new cable to defective one. This way when pulling old one out, the new cable is simultaneously pulled in with it.

Note: Avoid dirtying the sockets of connectors! Maximum contamination level is V2! More dirt than this is dangerous!

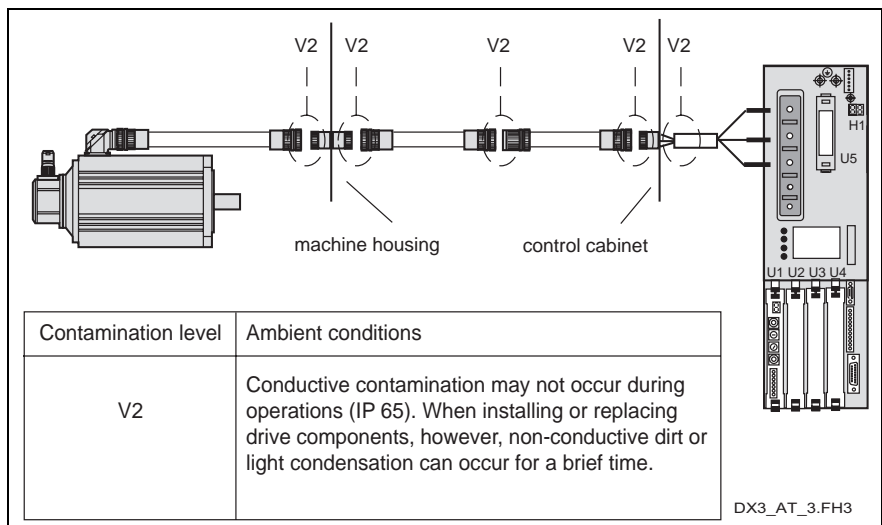


Fig. 4.5: Allowable contamination levels of plugin connectors

Connecting cables

- Cables without plugin connectors have individual cores. Connect these as specified by machine manufacturer. Use ring terminals or ferrules! Note correct phases in motor power and motor power connections!
- Make sure that cables have clean contact surfaces!

Note: Insert plug-in connectors only if dry and clean!

Restarting machine

- Restart machine as specified by machine manufacturer. It may be necessary to check the motor blower function. The rotational direction of the blower wheel must agree with the arrow on the blower!

Dispose of defective cable properly!

Plugin Modules

Obtaining a plug-in module

See section „Identifying the Drive Components“ starting with page 4-1.

Spannungsfrei schalten

- The drive package with HDD/HDS must be separated from mains. Make sure that both power and control voltages are securely switched off. Both the status displays on the power supply module and the controller may not be illuminated.
- All electrical and optical connections must be removed from the front panel of the plugin module

Replacing the plugin module



CAUTION

Error when handling!

Hardware and firmware could be damaged when inserting the plugin module with power on!

⇒ Do not pull or insert module with voltage on!

Restarting the controller

- Release mounting screws at top and bottom of defective plugin module. Pull it out and then label it "defective"!
- Insert new plug-in module and tighten mounting screws.
- Reconnect all electrical or optical connections of the module.
- Make sure that the cause of the defect has been eliminated (e.g., external measuring system defective, etc.).
- Restart machine as specified by machine manufacturer. The drive package with HDD/HDS is simultaneously restarted.

Software Module

Obtaining a software module

Note: The software module contains all machine-specific parameters. Prior to mounting a new software module, secure the parameters on an external data carrier. Then copy them onto the new software module after replacement!

Powering down

See section „Identifying the Drive Components“ starting with page 4-1.

- Separate drive package with HDD/HDS from the mains. Make sure that both power and control voltage sources are absolutely off. The LEDs of the supply module and the H1 display must be dark, may not be illuminated.



DANGER

Bus rails conductive voltage even with mains voltage off (greater than 50V)!

Electrical shock upon contact!

⇒ Wait discharge time of DC bus (L+/L-) check before touching that it is under 50 V!

Replacing software module



CAUTION

Error when handling!

Hardware and firmware could be damaged when inserting the plugin module with power on!

⇒ Do not pull or insert module with voltage on!

Restarting controller

- Software module (slot U5) must be released with button, pull out of defective unit, label if necessary.
- Insert new software module and click it into place!
- The replacement of the software module necessitates a recommissioning of the drive as error corrections or functional operations of the firmware may have altered drive behavior. The data, stored externally at the start, can be reloaded after powering back up.

4.3 Fault Report


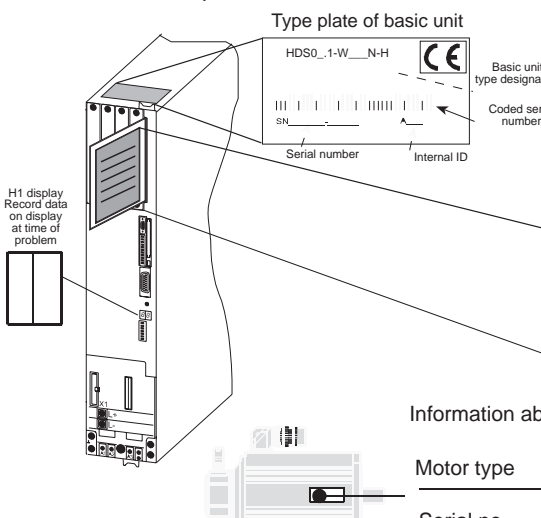
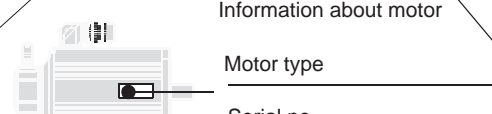
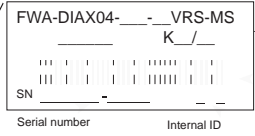
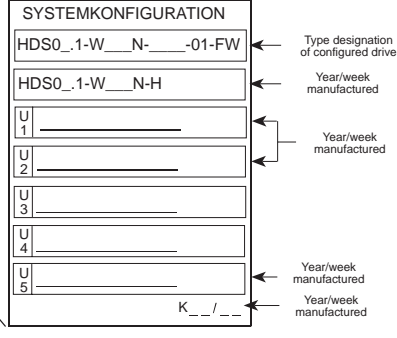
	<h2 style="margin:0;">Fault Report</h2> <h3 style="margin:0;">for Digital AC Drives HDD / HDS</h3>																		
<p>This fault report should be used to clarify faults and their causes. It is needed to find and eliminate hidden, sporadic and application-related problems.</p> <p>- Always include a Fault Report when sending in a repair. - Otherwise, mail fault reports to your local Indramat office.</p> <p>Indramat would like to express its appreciation by quickly and thoroughly assisting.</p>																			
Fault report dated:	Company: _____ Department: _____	Location: _____ Name: _____	Date: _____ Telephone: _____																
<p>Data about the problem drive:</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>Type plate of basic unit</p> <p>HDS0_1-W__N-H</p> <p>Serial number: _____ Internal ID: _____</p> <p>Basic unit type designation</p> <p>Coded serial number</p> <p>H1 display Record data on display at time of problem</p> </div> <div style="width: 45%;">  <p>Information about motor</p> <p>Motor type: _____</p> <p>Serial no.: _____</p> </div> </div> <div style="margin-top: 20px;">  <p>FWA-DIAX04-__-__VRS-MS</p> <p>Basic unit type designation: K_/_/___</p> <p>Coded serial number: SN: _____</p> <p>Serial number: _____ Internal ID: _____</p> </div> <div style="margin-top: 20px;">  <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">SYSTEMKONFIGURATION</th> </tr> </thead> <tbody> <tr> <td>HDS0_1-W__N-__-01-FW</td> <td>Type designation of configured drive</td> </tr> <tr> <td>HDS0_1-W__N-H</td> <td>Year/week manufactured</td> </tr> <tr> <td>U 1 _____</td> <td rowspan="2">Year/week manufactured</td> </tr> <tr> <td>U 2 _____</td> </tr> <tr> <td>U 3 _____</td> <td rowspan="2">Year/week manufactured</td> </tr> <tr> <td>U 4 _____</td> </tr> <tr> <td>U 5 _____</td> <td>Year/week manufactured</td> </tr> <tr> <td>K_/_/___</td> <td>Year/week manufactured</td> </tr> </tbody> </table> </div>				SYSTEMKONFIGURATION		HDS0_1-W__N-__-01-FW	Type designation of configured drive	HDS0_1-W__N-H	Year/week manufactured	U 1 _____	Year/week manufactured	U 2 _____	U 3 _____	Year/week manufactured	U 4 _____	U 5 _____	Year/week manufactured	K_/_/___	Year/week manufactured
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U 5 _____	Year/week manufactured																		
K_/_/___	Year/week manufactured																		
<p>Data on machine with problem:</p> <p>Machine manufacturer _____ Type _____ Operating hours _____</p> <p>Machine no. _____ Commissioning date _____</p> <p>Manufacturer and type of machine control _____</p> <p>Specific machine axis on which the fault occurred: _____</p> <p>Specify the problem: _____</p> <p>_____</p> <p>_____</p>																			
<p>Additional information:</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:25%;">Problem</th> <th style="width:25%;">Causes</th> <th style="width:25%;">Side effects</th> <th style="width:25%;"></th> </tr> </thead> <tbody> <tr> <td> <input type="checkbox"/> is always present <input type="checkbox"/> at startup <input type="checkbox"/> occurs sporadically <input type="checkbox"/> occurs after ___ hrs. <input type="checkbox"/> occurs with vibrations <input type="checkbox"/> depends on temperature </td> <td> <input type="checkbox"/> unknown <input type="checkbox"/> connection fault <input type="checkbox"/> external causes <input type="checkbox"/> mechanical damage <input type="checkbox"/> loose line connection <input type="checkbox"/> moisture in unit <input type="checkbox"/> extrinsic object in unit </td> <td> <input type="checkbox"/> mechanical problem <input type="checkbox"/> mains section failure <input type="checkbox"/> control failure <input type="checkbox"/> motor failure <input type="checkbox"/> cable brake <input type="checkbox"/> blower defective <input type="checkbox"/> feedback defective </td> <td> Is air conditioner in control cabinet? Y / N <input type="checkbox"/> </td> </tr> <tr> <td colspan="3"> <input type="checkbox"/> _____ _____ _____ </td> <td> Have there been problems with this axis before? How often? _____ Did problems occur on same day or certain times of the day? _____ _____ </td> </tr> </tbody> </table>				Problem	Causes	Side effects		<input type="checkbox"/> is always present <input type="checkbox"/> at startup <input type="checkbox"/> occurs sporadically <input type="checkbox"/> occurs after ___ hrs. <input type="checkbox"/> occurs with vibrations <input type="checkbox"/> depends on temperature	<input type="checkbox"/> unknown <input type="checkbox"/> connection fault <input type="checkbox"/> external causes <input type="checkbox"/> mechanical damage <input type="checkbox"/> loose line connection <input type="checkbox"/> moisture in unit <input type="checkbox"/> extrinsic object in unit	<input type="checkbox"/> mechanical problem <input type="checkbox"/> mains section failure <input type="checkbox"/> control failure <input type="checkbox"/> motor failure <input type="checkbox"/> cable brake <input type="checkbox"/> blower defective <input type="checkbox"/> feedback defective	Is air conditioner in control cabinet? Y / N <input type="checkbox"/>	<input type="checkbox"/> _____ _____ _____			Have there been problems with this axis before? How often? _____ Did problems occur on same day or certain times of the day? _____ _____				
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DX4_at_4.fh7																			

Fig. 4.6: Fault Report for AC drives with HDD/HDS

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<p><u>Sales region south</u></p> <p>INDRAMAT GmbH D-80339 München Ridlerstraße 75 Telefon: 089/540138-30 Telefax: 089/540138-10</p>	<p><u>Sales region southwest</u></p> <p>INDRAMAT GmbH D-71229 Leonberg Böblinger Straße 25 Telefon: 07152/972-6 Telefax: 07152/972-727</p>		<p><u>INDRAMAT Service-Hotline</u></p> <p>INDRAMAT GmbH Telefon: D-0172/660 040 6 -or- Telefon: D-0171/333 882 6</p>

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<p><u>Canada</u></p> <p>Basic Technologies Corporation Burlington Division 3426 Mainway Drive Burlington, Ontario Canada L7M 1A8 Telefon: 905/335-55 11 Telefax: 905/335-41 84</p>	<p><u>China</u></p> <p>Rexroth (China) Ltd. Shanghai Office Room 206 Shanghai Intern. Trade Centre 2200 Yanan Xi Lu Shanghai 200335 P.R. China Telefon: 021/627 55 333 Telefax: 021/627 55 666</p>	<p><u>China</u></p> <p>Rexroth (China) Ltd. Shanghai Parts & Service Centre 199 Wu Cao Road, Hua Cao Minhang District Shanghai 201 103 P.R. China Telefon: 021/622 00 058 Telefax: 021/622 00 068</p>	<p><u>China</u></p> <p>Rexroth (China) Ltd. 1430 China World Trade Centre 1, Jianguomenwai Avenue Beijing 100004 P.R. China Telefon: 010/50 50 380 Telefax: 010/50 50 379</p>
<p><u>China</u></p> <p>Rexroth (China) Ltd. A-5F., 123 Lian Shan Street Sha He Kou District Dalian 116 023 P.R. China Telefon: 0411/46 78 930 Telefax: 0411/46 78 932</p>	<p><u>Honkong</u></p> <p>Rexroth (China) Ltd. 19 Cheung Shun Street 1st Floor, Cheung Sha Wan, Kowloon, Honkong Telefon: 741 13 51/-54 und 741 14 30 Telex: 3346 17 GL REX HX Telefax: 786 40 19 786 07 33</p>	<p><u>India</u></p> <p>Mannesmann Rexroth (India) Ltd. INDRAMAT Division Plot. 96, Phase III Peenya Industrial Area Bangalore - 560058 Telefon: 80/839 21 01 80/839 73 74 Telex: 845 5028 RexB Telefax: 80/839 43 45</p>	<p><u>Japan</u></p> <p>Rexroth Co., Ltd. INDRAMAT Division I.R. Building Nakamachidai 4-26-44 Tsuzuki-ku, Yokohama 226 Japan Telefon: 045/942-72 10 Telefax: 045/942-03 41</p>
<p><u>Korea</u></p> <p>Rexroth-Seki Co Ltd. 1500-12 Da-Dae-Dong Saha-Gu, Pusan, 604-050 Telefon: 051/264 90 01 Telefax: 051/264 90 10</p>	<p><u>Korea</u></p> <p>Seo Chang Corporation Ltd. Room 903, Jeail Building 44-35 Yoido-Dong Youngdeungpo-Ku Seoul, Korea Telefon: 02/780-82 07 -9 Telefax: 02/784-54 08</p>	<p><u>Mexico</u></p> <p>Motorización y Diseño de Controles, S.A. de C.V. Av. Dr. Gustavo Baz No. 288 Col. Parque Industrial la loma Apartado Postal No. 318 54060 Tlalnepantla Estado de Mexico Telefon: 5/397 86 44 Telefax: 5/398 98 88</p>	
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Customer Service Locations outside of Europe

Notes

