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.General information

The devices are equipped with different monitoring functions to ensure safe operation. When detecting a problem, a non-fatal or a fatal warning or a non-fatal or fatal error is reported in the diagnostic system (see "Coded diagnostics of the drive" and "Diagnostic classes, status displays, control parameters"), depending on the severity (error class).

To protect the device, the device is set to a safe state (error response) in case of fatal warnings or errors.

If the drive controller or the supply unit is in control (drive enable was set) and an error occurs, the drive controller automatically starts a drive error response.

This error response depends on:

- The error class of the error occurred and
- the presetting.

The following error responses are possible:

- ↘ "Best possible deceleration "
- ↘ "NC reaction on error "
- ↘ "Power off on error"

.Relevance for the user

The chapter describes the basics of the error classes and the error response.

.Application-related information for project planning

For the project planning of a machine, the drive behavior in the case of error has to be taken into consideration. The drive provides different types of the error response, resulting in different machine requirements (e.g. braking behavior of the motor after the error occurred).

.Commissioning

Commissioning of the individual error response functions is described in the following sub-chapters.

To test the response behavior of the drive or the machine, the drive provides options to trigger test errors, see also ↘ "Generating test errors". The following dialog is available for this purpose in ctrlX DRIVE Engineering:

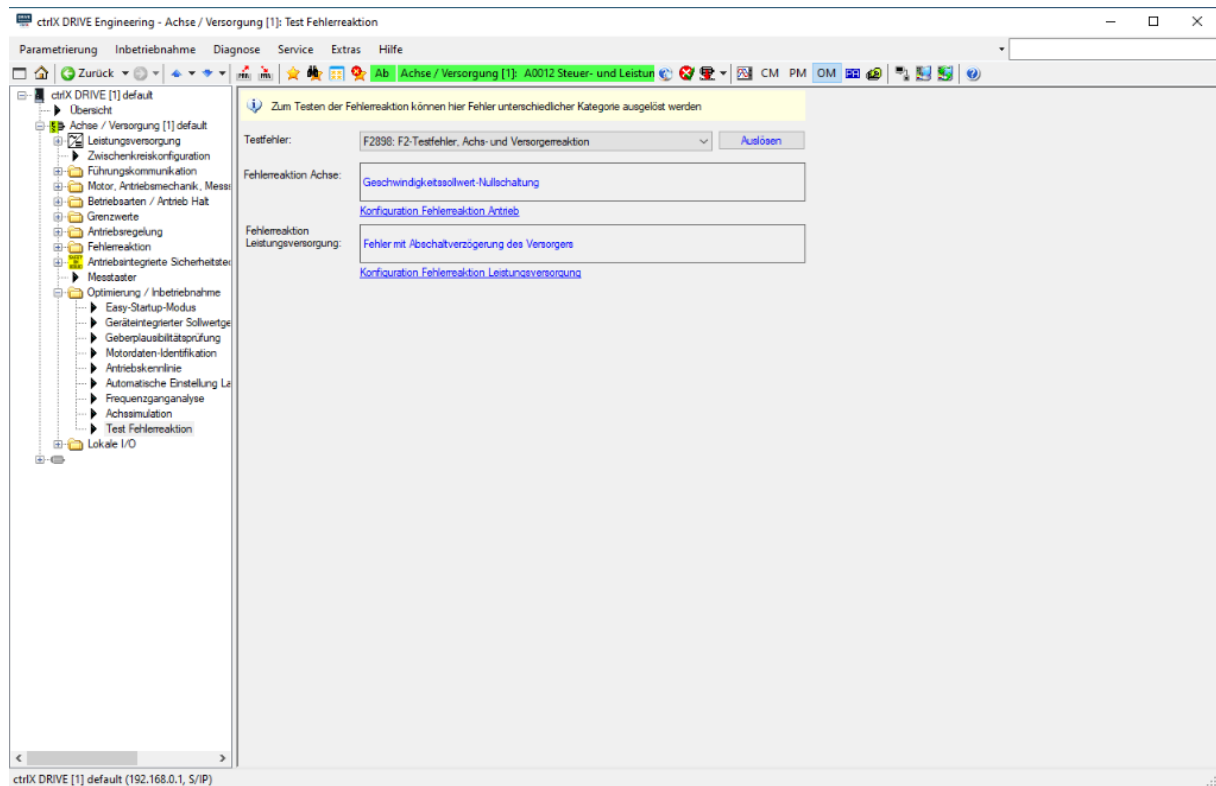


Fig. 332: Parameterizing the deceleration responses of the drive

For further information about the commissioning process please follow this link:

First setup and execute initial movements with ctrlX DRIVE, Chapter 5 "Adjust drive halt and error response settings".



The active safety technology has generally to be taken into account with regard to the error response, see "ctrlX SAFETY, Safety Function "SafeMotion" in ctrlX DRIVEplus, Application Manual" (DOK-XDRV**-SI-MX*****-APRS-EN-P; mat. no. R911404905) and "ctrlX SAFETY, Safety Function "Safe Torque Off" in ctrlX DRIVE, Application Manual" (DOK-XDRV**-SI-TX*****-APRS-EN-P; mat. no. R911383774).

.Additional information and details

Warnings and errors are classified into warning or error classes, see also ↘ "Coded diagnostic messages of the drive".

.Warning classes and warning responses

The potential warning classes and warning responses are listed in the following table.

.Warning classes and warning response

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Number	Warning class	Warning response
E2xxx	Non-fatal warning	Only pre-warning, no response, unrestricted operation is possible
E3xxx	Non-fatal safety technology warning	
E4xxx	Warning of the master communication	
E8xxx	Fatal warning	Only restricted operation is possible. The response of the drive to this warning class is described in the respective warning.
E83xx	Fatal safety technology warning	The axis reacts according to "P-0-0119, Best possible deceleration ", Bits 0..3. NC response is executed if this has been configured

.Error classes and error response

The potential error classes and error responses are listed in the following table.

.Error classes

There are different error classes with increasing priority:

.Error classes and response of the drive

Number of diagnostic	Error class	Error response		
		Control (NC)	Axis	Power supply
F2xxx (not F28xx)	Non-fatal error	possible if P-0-0117, bit 0 = 1 and error response by the drive is delayed via P-0-0117.x.1	according to P-0-0119, bits 0...3	shutdown according to P-0-0118, bit 7
F3xxx	non-fatal safety technology error*)			

Number of diagnostic	Error class	Error response		
		Control (NC)	Axis	Power supply
F28xx	non-fatal error with supply unit response	depending on the error, possible as an option if P-0-0117, bit 0 = 1 and error response by the drive is delayed via P-0-0117.0.1	depending on the error, possible as an option according to P-0-0119, bits 0...3	shutdown is executed, delayed as the case may be via S-0-1720.0.3 (no delay can be set in XMS and XMD)
F4xxx	Master communication error	possible if P-0-0117, bit 2 = 1 and error response by the drive is delayed via P-0-0117.0.2	according to P-0-0119, bits 0...3	Shutdown is executed, delayed as the case may be via S-0-1720.0.3. The subsequent automatic DC bus discharge (ZKS) can be configured using P-0-0860, bit 20.
F6xxx (not F68xx)	"Emergency stop" error	possible if P-0-0117, bit 3 = 1 and error response by the drive is delayed via P-0-0117.0.2	according to P-0-0119, bits 4...7	shutdown according to P-0-0118, bit 7
F68xx	"Emergency stop" error with supply unit response			shutdown is executed, delayed as the case may be via S-0-1720.0.3 (no delay can be set in XMS and XMD)
F7xxx	"Emergency stop" error of the safety technology*)			shutdown according to P-0-0118, bit 7
F8xxx (not F88xx)	fatal error	not possible	immediate activation of the holding brake Torque disable or Motor phase short circuit depending on P-0-0119, bit 8 or controlled deceleration of the axis	shutdown according to P-0-0118, bit 7

Number of diagnostic	Error class	Error response	
		Control (NC)	Power supply
F88xx	fatal error with supply unit response		immediate shutdown
F83xx	fatal safety technology error*)		shutdown according to P-0-0118, bit 7

depending on P-0-0119, bit 12, if possible

Legend:

*: See also *ctrlX SAFETY, Safety Function 'SafeMotion' in ctrlX DRIVEplus, Application Manual (DOK-XDRV**-SI-MX*****-APRS-EN-P; mat. no. R911404905), chapter Error response*

** : The active safety technology has generally to be taken into account with regard to the error response, see "*ctrlX SAFETY, Safety Function 'SafeMotion' in ctrlX DRIVEplus*", Application Manual (DOK-XDRV**-SI-MX*****-APRS-EN-P; mat. no. R911404905).

P-0-0117: Activating response of control in case of error

P-0-0117.0.1: NC response time F2/F3

P-0-0117.0.2: NC response time F4/F6/F7

P-0-0118: Power supply, configuration

P-0-0119: Best possible deceleration

P-0-0860: Converter configuration

S-0-1720.0.3: Power off delay



The higher the number of the diagnostic (F2xxx ... F8xxx), the higher the priority of the error! The response depends on the error with the highest priority. If necessary, ongoing error responses can be interrupted/terminated by errors of higher priority.

.F8 error with specific response

In case of errors not listed below, the response set in "P-0-0119, Best possible deceleration" bit 12-8 will take effect on

the axis.



In case of error F81xx, the possible error response is irrelevant as it is a boot error, i.e., the axis was not in operation.

.F8 error with restricted response of the axis (torque disable)

In case of the errors listed below, the response of the axis will always be torque disable, irrespective of the setting in "P-0-0119, Best possible deceleration ". A motor phase short circuit or controlled deceleration is not possible.

.F8 error with restricted response (torque disable)

Diagnostic number	Diagnostic name
F8018	Shutdown due to overtemperature of machine
F8027	STO while drive enabled
F8035	Communication error, encoder interface modules
F8036	Communication error, onboard encoder modules
F8060	Overcurrent in power section
F8300	Incorrect dynamization of pulse width
F8301	Error when checking selection signals
F8303	STO system error
F8833	Ground fault current grid feed-in
F8834	Ground fault current inverter
F8836	DC bus balancing monitor
F8844	Device-internal module communication disturbed
F8855	Incorrect processing of diagnostic
F8860	Overcurrent in power section (does not decay)
F8891	Power section defective

Diagnostic number	Diagnostic name
F8892	Defective power section device carrier
F8893	DA option defective
F8899	F8 test error, response of axis and supply unit

.F8 error with extended response options (controlled deceleration)

For these errors listed below, it is possible to enable a controlled deceleration in "P-0-0119, Best possible deceleration ", bit 12. If this is not enabled, the regularly set F8 response will be executed.

.F8 error with extended response options (controlled deceleration)

Diagnostic number	Diagnostic name
F8022	Encoder 1: Encoder signals incorrect
F8098	F8 test error, F8022 error response

.Response/behavior in case of a processor crash/exceptional error

In the event of a processor crash of the drive (so-called exception), a coordinated/adjustable error response as well as the generation of a diagnostics is no longer possible. In such a case, the response of the equipment is as follows:

- all analog and digital outputs are set to 0V
- blocking the output stage, i.e. motor is set torque-free
- The supply voltage of the encoder is switched on, reference is lost
- Opening of the bb contact for possible disconnection of the power supply
- the cyclic data of the master communication are no longer served, communication is no longer possible

After rebooting the device, **F8100** is immediately output as a diagnostic message.

.Generating test errors

To test the error response of the relevant category, the response can be triggered by setting the corresponding bits in parameter "P-0-0257, Error triggering for testing". One bit is defined for each category. Then, an error message "Fxy99/Fxy98 Test triggering of error" will be output, whereas x stands for 2, 4, 6, 8 (error class) and y stands for 0 or 8 (supply unit error with power off).

.Error triggering for testing

.Error triggering for testing

Number	Value in P-0-0257
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Number	Value in P-0-0257
F2099	0x1
F2898	0x101
F2899	0x100
F4099	0x210
F6099	0x2
F6899	0x102
F8098 ¹	0x8
F8099	0x4
F8899 ²	0x404

Legend:

1: See also ↘ “F8 error with extended response options (controlled deceleration)”

2: See also ↘ “Additional information and details”, ↘ Table 129: “Error classes and response of the drive”, ↘ Table 130: “F8 error with restricted response (torque disable)”

.Parameters and diagnostics involved

.Parameters involved

- S-0-1720.0.3, Power-off delay
- P-0-0117, Activating response of control in case of error
- P-0-0117.0.1, NC response time F2/F3
- P-0-0117.0.2, NC response time F4/F6/F7
- P-0-0118, Power supply, configuration
- P-0-0257, Error triggering for testing
- P-0-0119, Best possible deceleration
- P-0-0257, Error triggering for testing

.Diagnostics involved

- F2099 F2 test error, response of axis

- F2898 F2 test error, response of axis and supply unit
- F2899 F2 test error, response of supply unit
- F4099 F4 test error, response of axis and supply unit
- F6099 F6 test error, response of axis
- F6899 F6 test error, response of axis and supply unit
- F8098 F8 test error, F8022 error response
- F8099 F8 test error, response of axis
- F8899 F8 test error, response of axis and supply unit