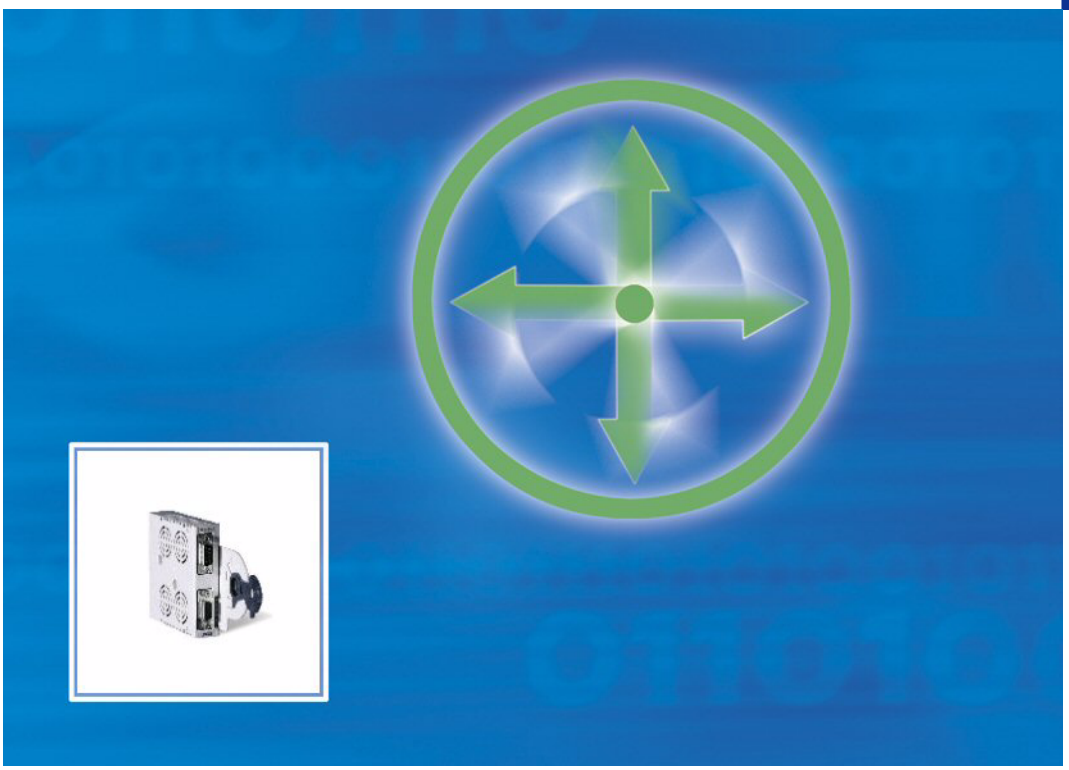
EDS94AYFLF
13279709

L-force *Drives*

Software Manual

9400



Digital frequency extension module (E94AYFLF)

Parameter setting & configuration

Lenze

Overview of the technical documentation for Servo Drives 9400

Project planning, selecting & ordering	
☐ 9400 Hardware Manual	
🖹 Catalogue / electronic catalogue (DSC - Drive Solution Catalogue)	

Mounting & wiring	
🖹 MA 9400 HighLine/ServoPLC	
🖹 MA for communication module	
🖹 MA for extension module	
🖹 MA for safety module	
🖹 MA for accessories	
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Parameter setting	
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☐ SW for Lenze »Engineer« software	
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☐ SW for regenerative power supply module	
☐ KHB for communication module	
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☐ SW for Lenze technology application	
☐ SW 9400 function library	

Configuring	
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☐ SW for Lenze technology application	
☐ SW 9400 function library	

Commissioning of the drive	
🖹 Commissioning guide	
☐ SW for controller (9400 HighLine/ServoPLC)	
☐ Remote Maintenance Manual	

Networking	
☐ KHB for communication medium used	

Legend:
- 🖹 Printed documentation
- ☐ Online documentation (PDF/Engineer online help)

Abbreviations used:

BA	Operating Instructions
KHB	Communication Manual
MA	Mounting Instructions
SW	Software Manual

Contents

1 About this documentation

This documentation contains information on how to parameterise & configure the digital frequency extension module with the L-force »Engineer« and keypad.

Note!

This documentation completes the Mounting Instructions supplied with the extension module. It is valid only in conjunction with the respective Operating Instructions for the standard devices permitted for use.

The Mounting Instructions contain safety instructions which must be observed!

The information given in this documentation applies to:

Extension module	Type designation	From hardware version	From software version
Digital frequency	E94AYFLF	VA	-

This extension module can be used in conjunction with the following standard devices:

Product series	Type designation	From hardware version	From software version
9400 Servo Drives	E94AxxExxxx	VA	01.37

1.1 Conventions used

This documentation uses the following conventions to distinguish between different types of information:

Type of information	Writing	Examples/notes
Numbers		
Decimal separator	Point	The decimal point is always used. Example: 1234.56
Text		
Program name	» «	The Lenze PC software »Engineer«...
Window pane	*Italics*	The *Message window*... / The *Options* dialog box...
Control element	**Bold**	The **OK** button... / The **Copy** command... / The **Properties** tab... / The **Name** input field...
Sequence of menu commands		If the execution of a function requires several commands, the individual commands are separated by an arrow: Select **File→Open** to...
Keyboard command	**<Bold>**	Use **<F1>** to open the Online Help.
		If a command requires a combination of keys, a "+" is placed between the key symbols: Use **<Shift>+<ESC>** to...

Program listings	`Courier`	`IF var1 < var2 THEN`
		`  a = a + 1`
		`  END IF`

Keyword	**`Courier bold`**	
Hyperlink	Underlined	Optically highlighted reference to another topic. It is activated with a mouse click in this online documentation.
Symbols		
Page reference	(📖 6)	Optically highlighted reference to another page. It is activated with a mouse click in this online documentation.
Step-by-step instructions		Step-by-step instructions are indicated by a pictograph.

1.2 Terminology used

Term	Meaning
»Engineer«	Lenze software which supports you throughout the whole machine life cycle - from planning to maintenance.
Code	"Container" for one or several parameters used for controller parameter setting or monitoring.
Subcode	If a code contains several parameters, the individual parameters are stored under "subcodes". This Manual uses a slash "/" as a separator between code and subcode (e.g. "C00118/3").
Function block	A function block (FB) can be compared with an integrated circuit that contains a certain control logic and delivers one or several values when being executed. • An instance (reproduction, copy) of the function block is always inserted in the circuit. • It is also possible to insert several instances of a function block in a circuit. • Each instance has a unique identifier (the instance name) and a processing number which defines the position at which the function block is calculated during the task cycle.
System block	System blocks provide interfaces to basic functions and hardware of the controller in the function block editor of the »Engineer« (e.g. to the digital inputs). • System blocks cannot be instanced in contrast to function blocks.

1.3 Definition of notes used

The following signal words and symbols are used in this documentation to indicate dangers and important information:

Safety instructions

Layout of the safety instructions:

Danger!

(characterises the type and severity of danger)

Note

(describes the danger and gives information about how to prevent dangerous situations)

Pictograph	Signal word	Meaning
	**Danger!**	**Danger of personal injury through dangerous electrical voltage** Indicates an impending danger that may lead to death or severe personal injury if the corresponding measures are not taken.
	**Danger!**	**Danger of personal injury through a general source of danger** Indicates an impending danger that may lead to death or severe personal injury if the corresponding measures are not taken.
	**Stop!**	**Danger of material damage** Indicates a potential danger that may lead to material damage if the corresponding measures are not taken.

Application notes

Pictograph	Signal word	Meaning
	**Note!**	Important note for trouble-free operation
	**Tip!**	Useful tip for easy handling
		Reference to another document

2 Digital frequency input

The optionally available digital frequency extension module serves to extend the L-force 9400 Servo Drive by a digital frequency input and a digital frequency output.

- The digital frequency input X9 reads encoder signals with TTL level (0 ... 500 kHz) and converts these to scaled speed and position values for the application.

2.1 Terminal assignment X9

Pin	Signal
1	B
2	$\overline{A}$
3	A
4	+5 V encoder voltage (controlled)
5	GND
6	$\overline{Z}$
7	Z
8	Sense / Lamp control / Enable
9	$\overline{B}$

Stop!

If an encoder is connected to X9 and supplied by the digital frequency extension module "in a controlled way", the pin 8 of the digital frequency input X9 serves to control and monitor the +5 V encoder voltage. Monitoring

In this case, no digital signal ("Lamp control" or "Enable") may be supplied to PIN 8!

Please also observe the documentation for the encoder used.

2.2 Parameter setting

Note!

Depending on the module receptacle the digital frequency extension module is plugged in, different code ranges are assigned to the parameters!

- Module receptacle MXI1: Parameters are in the C130xx range
- Module receptacle MXI2: Parameters are in the C140xx range

Short overview of the parameters for the digital frequency input:

Parameter		Info	Lenze setting	
[A]	[B]		Value	Unit
C13010	C14010	Encoder type DFIN	Digital frequency output DFOUT	
C13011	C14011	No. of increments DFIN	2048	
C13012	C14012	Signal form DFIN	4x evaluation (A, B)	
C13013	C14013	Initialisation time DFIN	3000	ms
C13014	C14014	Track monitoring DFIN	Active after initialisation time	
C13021	C14021	TP delay time DFIN	0	µs
C13030	C14030	Speed at DFIN	-	Incr./ms
C13031	C14031	Frequency at DFIN	-	Hz
C13032	C14032	Position at DFIN	-	Increments
C13040	C14040	Resp. to track monitoring DFIN	Warning	
C13041	C14041	No resp. to DFIN enable signal	Warning	
C13042	C14042	Resp. to Vcc error DFIN	Warning	

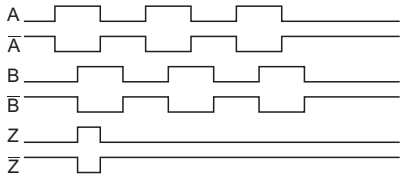
[A] Digital frequency extension module in module receptacle MXI1
[B] Digital frequency extension module in module receptacle MXI2
Greyed out = display parameter

2.2.1 Signal form configuration

In order that the input signals are interpreted correctly from the digital frequency extension module, the setting in C13012 / C14012 must correspond to the signal form of the input signals applied:

4x evaluation (A, B)

Setting C13012 / C14012 = "0"

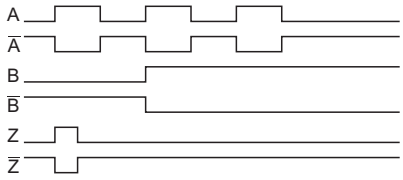


Phase-displaced signal sequence (CW rotation)

	CW rotation	CCW rotation
Track A	leads track B by 90°	lags track B by 90°
Track B	-	-

A:Increments B:Sign

Setting C13012 / C14012 = "1"

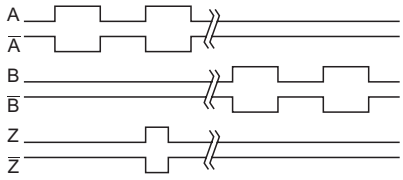


Control of the direction of rotation via track B

	CW rotation	CCW rotation
Track A	transmits the speed	transmits the speed
Track B	= FALSE	= TRUE

Increments A:pos. B:neg.

Setting C13012 / C14012 = "2"



Control of speed and direction of rotation via track A or track B

	CW rotation	CCW rotation
Track A	transmits speed and direction of rotation	= FALSE
Track B	= FALSE	transmits speed and direction of rotation

2.2.2 Encoder signal detection

From the encoder signals applied to digital frequency input X9 and the number of increments set in C13011 / C14011 the speed is created in [rpm] and provided to the application via the output *DFIN_nActualSpeed_s* of the system block **LS_DigitalFrequencyInput**.

At the same time the detected speed is integrated to a 32-bit absolute position and provided to the application via the output *DFIN_dnActualPos_p* of the system block **LS_DigitalFrequencyInput**.

See also: ▸ Problem description - speed variations (📖 17)

2.2.3 Position setting

The 32-bit absolute position output by the system block **LS_DigitalFrequencyInput** at the output *DFIN_dnActualPos_p* can be set as follows to a certain position value:

1. Define the desired absolute position at the input *DFIN_dnReferencePos_p* in [increments].
2. Set the input *DFIN_bLoadReferencePos* from FALSE to TRUE to accept the defined position for the digital frequency input in the next cycle.

Note!

The speed is not affected by setting the position.

If the speed is integrated in the application, the integrator and the position assume different values, i.e. they diverge. In case of further position changes, the difference between the values remains the same.

2.2.4 Use of machine parameters for scaling

This function extension is available from software version V3.0 onwards!

The input *DFIN_AxisData* can be used to transfer the machine parameters of the own motor/drive or of a higher-level drive to the system block **LS_DigitalFrequencyInput**.

- If valid machine parameters are applied to the input *DFIN_AxisData*, then the outputs for the actual position and the actual speed are evaluated on the basis of the transferred machine parameters (gearbox factors, encoder resolution).
  - The position is scaled to the set measuring system/traversing range.
  - The encoder mounting position can be parameterised under C13015 / C14015.
- If the input *DFIN_AxisData* remains unused, the system block continues to operate as before. In this case the units are scaled to revolutions.

Tip!

With this function extension, the system block **LS_DigitalFrequencyInput** can be coupled directly to a master value measuring system. The system block then uses the units of this measuring system for processing.

Short overview of the parameters for this function extension:

Parameter		Info	Lenze setting	
A	B		Value	Unit
C13015	C14015	Encoder mounting position DFIN	Clockwise rotation	
C13035/1	C14035/1	Position unit DFIN	-	
C13035/2	C14035/2	Speed unit DFIN	-	
C13036	C14036	Actual position DFIN	-	Unit
C13037	C14037	Actual speed DFIN	-	Unit/t

A Digital frequency extension module in module receptacle MXI1
B Digital frequency extension module in module receptacle MXI2
Greyed out = display parameter

2.2.5 Voltage control - TTL encoder

If a TTL encoder is connected as the signal source and C13010 / C14010 is set to TTL encoder, the encoder can be supplied with a controlled +5 V voltage via pin 4, which serves to compensate the voltage drop on the encoder cable.

Stop!

If an encoder is connected to X9 and supplied by the digital frequency extension module "in a controlled way", the pin 8 of the digital frequency input X9 serves to control and monitor the +5 V encoder voltage. ▸ Monitoring

In this case, no digital signal ("Lamp control" or "Enable") may be supplied to PIN 8!

Please also observe the documentation for the encoder used.

2.2.6 Monitoring

Initialisation time

In C13013 / C14013 an initialisation time can be set, which must elapse after starting the system before the monitoring modes are switched active.

- Thanks to this "delay" other system parts which serve as signal sources, can initialise themselves first without monitoring being triggered due to missing signals.
- In the "0" setting the initialisation time is set to infinity so that monitoring is deactivated permanently.
- If the setting is changed from "0" to another value, the initialisation time is restarted.
  - A higher-level control can, for instance, switch monitoring active by a corresponding parameter setting of C13013 / C14013 even if the device has been switched on for a long time.

Monitoring of the +5 V voltage for the encoder

If an encoder is connected to X9 and supplied by the digital frequency extension module "in a controlled way", the pin 8 of the digital frequency input X9 serves to control and monitor the +5 V encoder voltage.

- If the voltage control is not able to compensate the voltage drop, a fault message is created and the response set in C13042 / C14042 is executed.
  - At the same time the output *DFIN_bVccCtrlLimited* of the system block **LS_DigitalFrequencyInput** is set to TRUE.

Monitoring of the "Enable" or "Lamp control" signal

If the +5 V encoder voltage is not controlled by the digital frequency extension module, a digital signal can be read in and monitored via pin 8 of the digital frequency input X9, e.g. the "Lamp control" signal of an encoder or the "Enable" signal of an upstream digital frequency module.

- If pin 8 of the digital frequency input X9 is not set to HIGH level (+5V) after the initialisation time has elapsed, a fault message is generated and the response set in C13041 / C14041 is executed.
- The binary status of pin 8 is also displayed at the output *DFIN_bSense* of the system block **LS_DigitalFrequencyInput** .

Track monitoring (open circuit detection)

The signal tracks A, B, and Z are monitored with regard to their differential voltage value.

- For the activation of track monitoring, two modes are available in C13014 / C14014:

C13014 / C14014 = "1"	C13014 / C14014 = "2"
The track monitoring modes are activated after the initialisation time has elapsed. • The initialisation time is set in C13013 / C14013.	The track monitoring modes only become active if pin 8 of the digital frequency input X9 is set to HIGH level (+5 V). • They may be activated e.g. by an encoder (status "Lamp control") or an upstream digital frequency module (status "Enable"). • When this mode is selected, monitoring can be switched active by a signal source if the levels on the tracks have valid values.

- Monitoring is both done at standstill and while the encoder is rotating.
- If track monitoring responds, a fault message is generated and the response set in C13040 / C14040 is executed.
  - At the same time the corresponding output *DFIN_bTrackAError*, *DFIN_bTrackBError* or *DFIN_bTrackZError* of the system block **LS_DigitalFrequencyInput** is set to TRUE.

2.2.7 Touch probe

When the zero pulse occurs on track Z - $\overline{Z}$, a touch probe is triggered.

- The corresponding signals to execute touch probe processing are available via the system block **LS_TouchProbeDFIN**.
- In C13021 / C14021 a delay time can be set for the touch probe.
- If a touch probe has been triggered, the output *DFIN_bTouchProbeReceived* is set to TRUE for one cycle.

Tip!

Detailed information on touch probe processing can be found in the online documentation for the controller in chapter "I/O terminals→Touch probe detection".

2.3 Problem description - speed variations

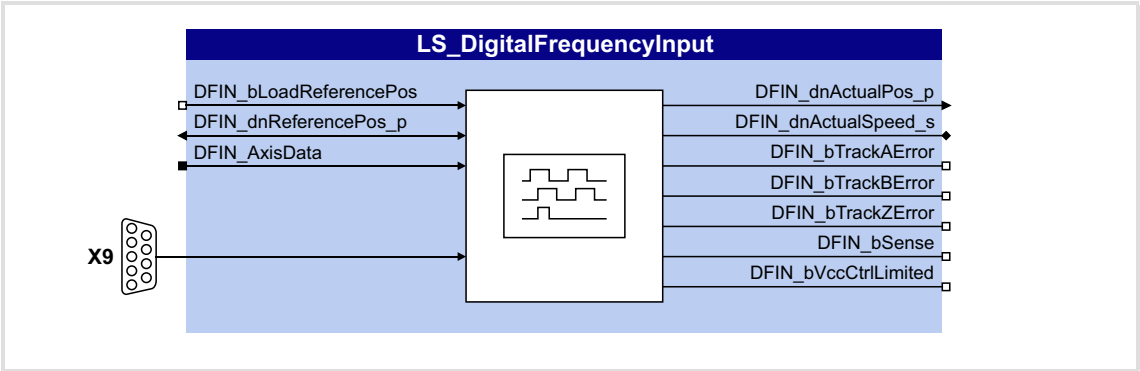
In the digital frequency extension module rectangular encoder signals are processed. The speed is determined by counting the edges occurring within a defined time interval (1 ms). Due to this defined time interval of 1 ms and a finite number of encoder increments per revolution, the calculated speed signal can only assume discrete values. This gives the impression that the signal is very unsteady and inexact. This effect increases with lower numbers of increments.

An example for calculating the expected speed variation can be found in chapter "Digital frequency output". ▸ Problem description - speed variations (📖 28)

2.4 System block "LS_DigitalFrequencyInput"

The system block **LS_DigitalFrequencyInput** displays the optional digital frequency extension module in the FB editor of the »Engineer«.

▶ The system block must be called cyclically since only then speed and position will be calculated accurately to increments.



Inputs

Input Data type	Info/possible settings
DFIN_bLoadReferencePos BOOL	Position setting ▸ Position setting (📖 12)
	FALSE↗TRUE: Sets the 32-bit absolute position output at the output *DFIN_dnActualPos_p* to the value which is applied to input *DFIN_dnReferencePos_p*.
DFIN_dnReferencePos_p DINT	Absolute position in [increments], to which the output *DFIN_dnActualPos_p* is set by a FALSE-TRUE edge at input *DFIN_bLoadReferencePos*. ▸ Position setting (📖 12)
DFIN_AxisData V3.0 or higher	Machine parameters • To transfer the machine parameters of the drive/motor, connect this input to the output *DI_AxisData* of SB **LS_DriveInterface**. • The machine parameters of a higher-level drive can be transferred via the FB **L_SdSetAxisData**. For this purpose, you have to connect the FB's *AxisData* output to this input. • If the input remains unused, the system block continues to operate as before. In this case the units are scaled to revolutions. ▸ Use of machine parameters for scaling (📖 13)

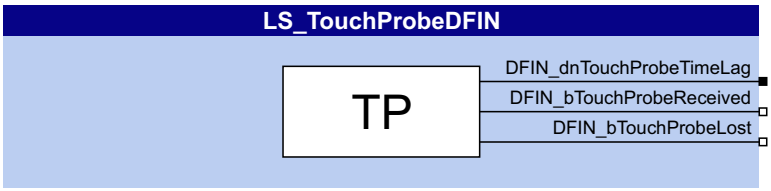
Outputs

Output Data type	Value/meaning
DFIN_dnActualPos_p DINT	Current position in [increments] • Output as signed 32-bit value (positive value ≡ CW rotation). For software versions prior to V3.0: • A virtual revolution is resolved to 16 bits. For software version V3.0 or higher: • If valid machine parameters are applied to the input *DFIN_AxisData*, a virtual revolution is resolved with the encoder resolution specified in the machine parameters. • If the input *DFIN_AxisData* remains unused, a virtual revolution is resolved with the setting under C00100 (Lenze setting: 16 bits).
DFIN_dnActualSpeed_s DINT	Current speed in [rpm] ▸ Problem description - speed variations (📖 17)
DFIN_bTrackAError BOOL	Status signal "Differential signal of track A - $\overline{A}$ invalid" ▸ Monitoring (📖 14) TRUE: The differential signal of track A - $\overline{A}$ is outside the valid voltage range (open circuit).
DFIN_bTrackBError BOOL	Status signal "Differential signal of track B - $\overline{B}$ invalid" ▸ Monitoring (📖 14) TRUE: The differential signal of track B - $\overline{B}$ is outside the valid voltage range (open circuit).
DFIN_bTrackZError BOOL	Status signal "Differential signal of track Z - $\overline{Z}$ invalid" ▸ Monitoring (📖 14) TRUE: The differential signal of track Z - $\overline{Z}$ is outside the valid voltage range (open circuit).
DFIN_bSense BOOL	Status signal "Enable/Lamp control signal is set" ▸ Monitoring (📖 14) TRUE: An upstream digital frequency output has set the "Enable signal" (HIGH signal at X9, pin 8).
DFIN_bVccCtrlLimited BOOL	Status signal "Voltage control for TTL encoder is at the limit" ▸ Voltage control - TTL encoder (📖 14) TRUE: The voltage control for a connected TTL encoder has reached the limit value.

2.5 System block "LS_TouchProbeDFIN"

The system block **LS_TouchProbeDFIN** provides the touch probe signals of the digital frequency input of the optional digital frequency extension module in the FB editor of the »Engineer«.

- The touch probe is triggered when a zero pulse occurs on track Z - $\overline{Z}$.
- In C13021 / C14021 a delay time can be set for the touch probe.
- When a touch probe has been triggered, the output *DFIN_bTouchProbeReceived* is set to TRUE for one cycle of the task in which the SB is being processed.



Outputs

Output Data type	Value/meaning	
DFIN_dnTouchProbeTimeLag DINT	Scaled time stamp for further processing of the touch probe event with the FB **L_SdTouchProbe**.	
DFIN_bTouchProbeReceived BOOL	Status signal "Touch probe detected" • Status is only pending for one cycle of the task in which the SB is being processed.	
	TRUE	Touch probe event has been triggered.
DFIN_bTouchProbeLost BOOL	Status signal "Touch probe(s) lost" • Status is only pending for one cycle of the task in which the SB is being processed.	
	TRUE	More than one touch probe event has been triggered within the task runtime and could therefore not be registered anymore.

Tip!

Detailed information on touch probe processing can be found in the online documentation for the controller in chapter "I/O terminals→Touch probe detection".

3 Digital frequency output

The optionally available digital frequency extension module serves to extend the L-force 9400 Servo Drive by a digital frequency input and a digital frequency output.

- The digital frequency output X10 serves to output encoder signals with TTL level (0 ... 500 kHz).

3.1 Terminal assignment X10

Pin	Signal
1	B
2	$\overline{A}$
3	A
4	+5 V (±6 %)
5	GND
6	$\overline{Z}$
7	Z
8	Enable
9	$\overline{B}$

3.2 Parameter setting

Note!

Depending on the module receptacle the digital frequency extension module is plugged in, different code ranges are assigned to the parameters!

- Module receptacle MXI1: Parameters are in the C130xx range
- Module receptacle MXI2: Parameters are in the C140xx range

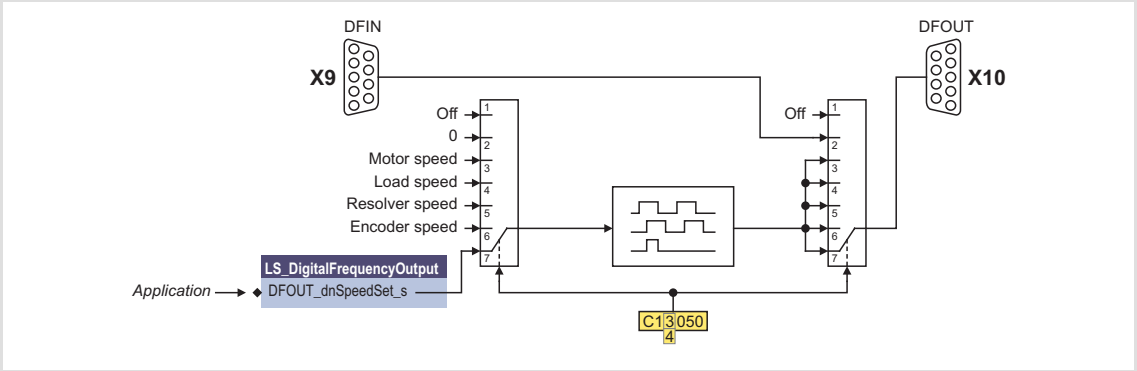
Short overview of the parameters for the digital frequency output:

Parameter		Info	Lenze setting	
[A]	[B]		Value	Unit
C13050	C14050	Signal source DFOUT	Application	
C13051	C14051	No. of increments DFOUT	2048	
C13052	C14052	Zero pulse offset DFOUT	0	Increments
C13053	C14053	Frequency limitation DFOUT	500	kHz
C13061	C14061	TP delay time DFOUT	0	µs
C13070	C14070	Speed at DFOUT	-	Incr./ms
C13071	C14071	Frequency at DFOUT	-	Hz
C13072	C14072	Position at DFOUT	-	Increments
C13080	C14080	Resp. to frequency limit. DFOUT	Warning	

[A] Digital frequency extension module in module receptacle MXI1
[B] Digital frequency extension module in module receptacle MXI2
Greyed out = display parameter

3.2.1 Signal source selection

The signal source for the digital frequency output is selected in C13050 / C14050:



[3-1] Selection of the signal source for X10

Selection	Info
1	Digital frequency output is inactive • "0" frequency is output a the digital frequency output. • All tracks remain on the level output last. • After the controller is switched on, the tracks A, B, and Z are set to HIGH level.
2	The digital frequency input X9 is directly connected to the digital frequency output. **Note:** Due to the direct connection between input and output, sensors are no longer required. • The zero pulse offset (C13052 / C14052) is without function. • The frequency limitation (C13053 / C14053) is without function. • The zero track is only output if connected to X9. • The display parameters for the actual values (speed, frequency, position) are not updated (remedy: use display parameters of the digital frequency input). • The outputs *DFOUT_dnActualPos_p* and *DFOUT_dnActualSpeed_s* of the system block **LS_DigitalFrequencyOutput** are not updated.
3	Output of the motor encoder • The angle of rotation in [increments] derived from the motor encoder is output as a frequency signal after being evaluated with the set number of increments (C13051 / C14051). • The output signal is integrated to a position value via a counter and made available to the application via the output *DFOUT_dnActualPos_p* of the system block **LS_DigitalFrequencyOutput**.
4	Output of the load encoder • The angle of rotation in [increments] derived from the load encoder is output as a frequency signal after being evaluated with the set number of increments (C13051 / C14051). • The output signal is integrated to a position value via a counter and made available to the application via the output *DFOUT_dnActualPos_p* of the system block **LS_DigitalFrequencyOutput**.
5	Output of the resolver angle • The angle of rotation in [increments] derived from the resolver input is output as a frequency signal after being evaluated with the set number of increments (C13051 / C14051). • The output signal is integrated to a position value via a counter and made available to the application via the output *DFOUT_dnActualPos_p* of the system block **LS_DigitalFrequencyOutput**. • It is irrelevant for the output whether the resolver input is used as a load encoder, motor encoder, or not used at all for the motor control.

Selection	Info
6	Output of the encoder angle • The angle of rotation in [increments] derived from the encoder input is output as a frequency signal after being evaluated with the set number of increments (C13051 / C14051). • The output signal is integrated to a position value via a counter and made available to the application via the output *DFOUT_dnActualPos_p* of the system block **LS_DigitalFrequencyOutput**. • It is irrelevant for the output whether the encoder input is used as a load encoder, motor encoder, or not used at all for the motor control.
7	Output of a speed signal of the application • The speed signal in [rpm] defined via the input *DFOUT_dnSpeedSet_s* of the system block **LS_DigitalFrequencyOutput** is integrated and output as a frequency signal after being evaluated with the set number of increments (C13051 / C14051). • The output signal is integrated to a position value via a counter and made available to the application via the output *DFOUT_dnActualPos_p* of the system block **LS_DigitalFrequencyOutput**.

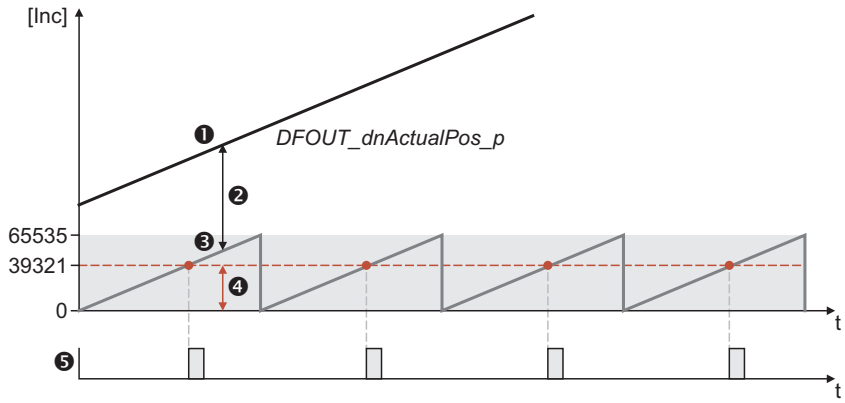
3.2.2 Number of increments and zero pulse offset

The number of increments set in C13051 / C14051 defines e.g. the number of increment to be output before a zero pulse is created.

- ▶ Each zero pulse defines a covered "revolution" of the rotary transducer simulated by the digital frequency output.
- ▶ Within such a "revolution" (in the value range 0 ... 65535 increments) the zero pulse can be shifted by setting a zero pulse offset in C13052 / C14052.

A connection between absolute position and "revolution" is defined by setting the position, as described in the following chapter "Position setting". The position of a zero pulse within a "revolution" remains unchanged.

Example - signal characteristic:



❶ Absolute position (*DFOUT_dnActualPos_p*, also takes into account each overflow of the encoder position)
❷ Position difference (is determined by Position setting)
❸ Encoder position (in the value range 0 ... 65535 increments)
❹ Zero pulse offset (adjustable in C13052 / C14052)
❺ Zero pulses

[3-2] Example: Signal characteristic with the zero pulse offset set to 39321 increments

3.2.3 Position setting

The digital frequency output provides a 32-bit absolute position for the application via the output *DFOUT_dnActualPos_p*. This absolute position is created by integrating the frequency signal to be output.

This position can be set as follows via the system block **LS_DigitalFrequencyOutput** :

1. Define the desired absolute position at the input *DFOUT_dnReferencePos_p* in [increments].
2. Set the input *DFOUT_bLoadReferencePos* from FALSE to TRUE to accept the defined position for the digital frequency output in the next cycle.

Note!

The speed is not affected by setting the position.

If the speed is integrated in the application, the integrator and the position assume different values, i.e. they diverge. In case of further position changes, the difference between the values remains the same.

3.2.4 Use of machine parameters for scaling

This function extension is available from software version V3.0 onwards!

The input *DFOUT_AxisData* can be used to transfer the machine parameters of the own motor/drive or of a higher-level drive to the system block **LS_DigitalFrequencyOutput**.

- If valid machine parameters are applied to the input *DFOUT_AxisData*, then the outputs for the actual position and the actual speed are evaluated on the basis of the transferred machine parameters (gearbox factors, encoder resolution) and the position is scaled to the set measuring system/traversing range.
- If the input *DFOUT_AxisData* remains unused, the system block continues to operate as before. In this case the units are scaled to revolutions.

Tip!

With this function extension, the system block **LS_DigitalFrequencyOutput** can be coupled directly to a master value measuring system. The system block then uses the units of this measuring system for processing.

Short overview of the parameters for this function extension:

Parameter		Info	Lenze setting	
A	B		Value	Unit
C13075/1	C14075/1	Position unit DFOUT	-	
C13075/2	C14075/2	Speed unit DFOUT	-	
C13076	C14076	Actual position DFOUT	-	Unit
C13077	C14077	Actual speed DFOUT	-	Unit/t

A Digital frequency extension module in module receptacle MXI1
B Digital frequency extension module in module receptacle MXI2
Greyed out = display parameter

3.2.5 Frequency limitation

In C13053 / C14053 a frequency limitation can be set for the digital frequency output.

- If the frequency is limited, a fault message is generated and the response set in C13080 / C14080 is executed.
  - At the same time the output *DFOUT_bOutputFreqLimited* of the system block **LS_DigitalFrequencyOutput** is set to TRUE.
- The hardware limits the digital frequency output to 500 kHz.

Note!

- Due to the remainder processing implemented in the 4 kHz control cycle, only settings ≥ 4 kHz are reasonable for frequency limitation!
- If the digital frequency input is directly connected to the digital frequency output, the set frequency limitation is without function!

3.2.6 Touch probe

When the zero pulse occurs on track Z - $\overline{Z}$, a touch probe is triggered.

- The corresponding signals to execute touch probe processing are available via the system block **LS_TouchProbeDFOUT**.
- In C13061 / C14061 a delay time can be set for the touch probe.
- If a touch probe has been triggered, the output *DFOUT_bTouchProbeReceived* is set to TRUE for one cycle.

Tip!

Detailed information on touch probe processing can be found in the online documentation for the controller in chapter "I/O terminals→Touch probe detection".

3.3 Problem description - speed variations

In the digital frequency extension module rectangular encoder signals are processed. The speed is determined by counting the edges occurring within a defined time interval (1 ms). Due to this defined time interval of 1 ms and a finite number of encoder increments per revolution, the calculated speed signal can only assume discrete values. This gives the impression that the signal is very unsteady and inexact. This effect increases with lower numbers of increments.

Example for the digital frequency output

An encoder with 2048 increments at a speed of 60 rpm is to be simulated.

- Setpoint speed $n\_set_{DFOUT} = 60\ rpm = 1\ Hz_{mech.}$
- Simulated encoder: 2048 increments
  (by fourfold evaluation 4 * 2048 = 8192 edges are counted per revolution)
- Output frequency = n_set_{DFOUT} * $number\ of\ increments_{DFOUT} = 1\ Hz_{mech.}$ * 2048 = 2048 Hz

If the measurement lasts 1 ms, 8.192 edges occur per ms. Since the count can only be an integer, 8 or 9 increments are counted. Thus, the speed is calculated as follows:

$$n_{measure\_1} = 60\ rpm \cdot \frac{8}{8.192} = 58.59\ rpm$$

or

$$n_{measure\_2} = 60\ rpm \cdot \frac{9}{8.192} = 65.91\ rpm$$

The speed variation which is detected during this process amounts to:

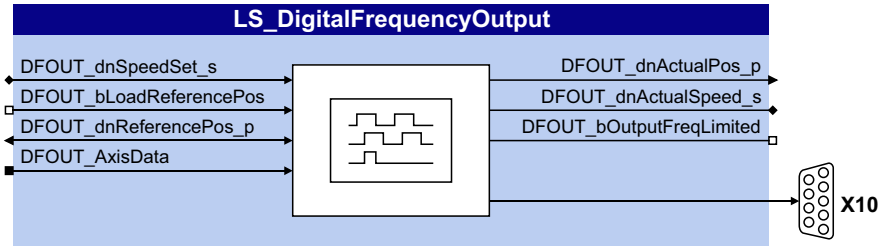
$$\Delta n_{measure} = n_{measure\_2} - n_{measure\_1} = 7.32\ rpm$$

General formula for calculating the expected speed variation

$$\Delta n_{measure} = \frac{15000}{number\ of\ increments} rpm$$

3.4 System block "LS_DigitalFrequencyOutput"

The system block **LS_DigitalFrequencyOutput** displays the digital frequency output of the optional extension module in the FB editor of the »Engineer«:



Inputs

Input Data type	Info/possible settings
DFOUT_dnSpeedSet_s DINT	Speed in [rpm], which is to be output via the digital frequency output as encoder signals with TTL level. • To select this signal source, C13050 / C14050 = "7" must be set. ▸ Signal source selection (📖 23)
DFOUT_bLoadReferencePos BOOL	Position setting ▸ Position setting (📖 25)
	FALSE↗TRUE: Sets the 32-bit absolute position output at the output *DFOUT_dnActualPos_p* to the value which is applied to input *DFOUT_dnReferencePos_p*.
DFOUT_dnReferencePos_p DINT	Absolute position in [increments], to which the output *DFOUT_dnActualPos_p* is set by a FALSE-TRUE edge at input *DFOUT_bLoadReferencePos*. ▸ Position setting (📖 25)
DFOUT_AxisData V3.0 or higher	Machine parameters • To transfer the machine parameters of the drive/motor, connect this input to the output *DI_AxisData* of SB **LS_DriveInterface**. • The machine parameters of a higher-level drive can be transferred via the FB **L_SdSetAxisData**. For this purpose, you have to connect the FB's *AxisData* output to this input. • If the input remains unused, the system block continues to operate as before. In this case the units are scaled to revolutions. ▸ Use of machine parameters for scaling (📖 26)

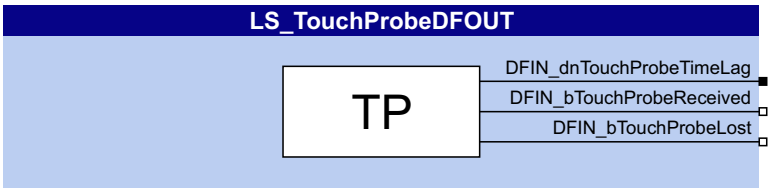
Outputs

Output Data type	Value/meaning
DFOUT_dnActualPos_p DINT	Current position as signed 32-bit value in [increments] For software versions prior to V3.0: • A virtual revolution is resolved to 16 bits. For software version V3.0 or higher: • If valid machine parameters are applied to the input *DFOUT_AxisData*, a virtual revolution is resolved with the encoder resolution specified in the machine parameters. • If the input *DFOUT_AxisData* remains unused, a virtual revolution is resolved with the setting under C00100 (Lenze setting: 16 bits).
DFOUT_dnActualSpeed_s DINT	Current speed in [rpm] ▸ Problem description - speed variations (📖 28)
DFOUT_bOutputFreqLimited BOOL	Status signal "Frequency to be output is limited" ▸ Frequency limitation (📖 27)
	TRUE: The frequency to be output is limited by the value set in C13053 / C14053.

3.5 System block "LS_TouchProbeDFOUT"

The system block **LS_TouchProbeDFOUT** provides the touch probe signals of the digital frequency output of the optional digital frequency extension module in the FB editor of the »Engineer«.

- The touch probe is triggered when a zero pulse occurs on track Z - $\overline{Z}$.
- In C13061 / C14061 a delay time can be set for the touch probe.
- When a touch probe has been triggered, the output *DFOUT_bTouchProbeReceived* is set to TRUE for one cycle of the task in which the SB is being processed.



Outputs

Output Data type	Value/meaning	
DFIN_dnTouchProbeTimeLag DINT	Scaled time stamp for further processing of the touch probe event with the FB **L_SdTouchProbe**.	
DFOUT_ bTouchProbeReceived BOOL	Status signal "Touch probe detected" • Status is only pending for one cycle of the task in which the SB is being processed.	
	TRUE	Touch probe event has been triggered.
DFOUT_bTouchProbeLost BOOL	Status signal "Touch probe(s) lost" • Status is only pending for one cycle of the task in which the SB is being processed.	
	TRUE	More than one touch probe event has been triggered within the task runtime and could therefore not be registered anymore.

Tip!

Detailed information on touch probe processing can be found in the online documentation for the controller in chapter "I/O terminals→Touch probe detection".

4 Parameter reference

Note!

This chapter completes the parameter list and attribute table in the online documentation for the controller by parameters of the digital frequency extension module.

Tip!

General information on parameters can be found in the online documentation for the controller.

4.1 Parameter list

This chapter contains all parameters of the digital frequency extension module in numerically ascending order.

Abbreviated units

Abbreviation	Meaning
Incr.	Increments

C13010

Parameter | Name:
C13010 | Encoder type DFIN

Data type: UNSIGNED_8
Index: $11565_d = 2D2D_h$

Digital frequency extension module in module receptacle MXI1:
Selection of the encoder type for digital frequency input X9

Selection list (Lenze setting in bold)

1	**Digital frequency output DFOUT**
2	TTL encoder

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13011

Parameter | Name:
C13011 | No. of increments DFIN

Data type: UNSIGNED_32
Index: $11564_d = 2D2C_h$

Digital frequency extension module in module receptacle MXI1:
Number of increments for digital frequency input X9
- Definition of the number of pulses for one "mechanical" revolution.

Setting range (min. value | unit | max. value)			Lenze setting
1		16384	**2048**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13012

Parameter | Name:
C13012 | Signal format DFIN

Data type: UNSIGNED_8
Index: $11563_d = 2D2B_h$

Digital frequency extension module in module receptacle MXI1:
Signal form for digital frequency input X9
- Selection of how to interpret the input signal.

Selection list (Lenze setting in bold)

0	**4x evaluation (A, B)**
1	A:Increments B:Sign
2	Increments A:pos. B:neg.

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13013

Parameter | Name:
C13013 | Initialisation time DFIN

Data type: UNSIGNED_16
Index: $11562_d = 2D2A_h$

Digital frequency extension module in module receptacle MXI1:
Initialisation time for digital frequency input X9
- Waiting time after which the "Enable" signal is evaluated and the track monitoring modes are switched active.

Setting range (min. value | unit | max. value)			Lenze setting
0	ms	65535	**3000 ms**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13014

Parameter | Name:
C13014 | Track monitoring DFIN

Data type: UNSIGNED_8
Index: $11561_d = 2D29_h$

Digital frequency extension module in module receptacle MXI1:
Monitoring configuration for digital frequency input X9
- Selection when track monitoring modes (open circuit detection) are active.

Selection list (Lenze setting in bold)

1	**Active after initialisation time**
2	Active after enable signal

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13015

Parameter | Name:
C13015 | Encoder mounting dir. (DFIN)

Data type: UNSIGNED_32
Index: $11560_d = 2D28_h$

Selection list (Lenze setting in bold)		Info
0	**Clockwise direction of rotation**	
1	Counter-clockwise direction of rotation	

☑ Read access ☑ Write access ☑ CINH ☐ PLC-STOP ☐ No transfer

C13021

Parameter | Name:
C13021 | TP delay time DFIN

Data type: UNSIGNED_32
Index: $11554_d = 2D22_h$

Digital frequency extension module in module receptacle MXI1:
Touch probe delay for digital frequency input X9

- The delay time set is considered when the position at the instant of touch probe is determined (instant of zero pulse) and serves to compensate dead times, if existent.

Setting range (min. value | unit | max. value)			Lenze setting
0	µs	7000	**0 µs**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13030

Parameter | Name:
C13030 | Speed at DFIN

Data type: INTEGER_32
Index: $11545_d = 2D19_h$

Digital frequency extension module in module receptacle MXI1:
Display of the current speed at digital frequency input X9

Display range (min. value | unit | max. value)		
-2147483648	Incr./ms	2147483647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13031

Parameter | Name:
C13031 | Frequency at DFIN

Data type: INTEGER_32
Index: $11544_d = 2D18_h$

Digital frequency extension module in module receptacle MXI1:
Display of the current frequency at digital frequency input X9

Display range (min. value | unit | max. value)		
-2147483648	Hz	2147483647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13032

Parameter | Name:
C13032 | Position at DFIN

Data type: INTEGER_32
Index: $11543_d = 2D17_h$

Digital frequency extension module in module receptacle MXI1:
Display of the current position at digital frequency input X9

Display range (min. value | unit | max. value)		
-2147483648	Incr.	2147483647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13035

Parameter | Name:
C13035 | Unit

Data type: VISIBLE_STRING
Index: $11540_d = 2D14_h$

Subcodes	Info
C13035/1	Unit for the position
C13035/2	Unit for the speed

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13036

Parameter | Name:
C13036 | Actual position DFIN

Data type: INTEGER_32
Index: $11539_d = 2D13_h$

Display range (min. value | unit | max. value)		
-214748.3647	Unit	214748.3647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer Scaling factor: 10000

C13037

Parameter | Name:
C13037 | Actual speed DFIN

Data type: INTEGER_32
Index: $11538_d = 2D12_h$

Display range (min. value | unit | max. value)		
-214748.3647	Unit/s	214748.3647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer Scaling factor: 10000

C13040

Parameter | Name:
C13040 | Resp. to track monitoring DFIN

Data type: UNSIGNED_8
Index: $11535_d = 2D0F_h$

Digital frequency extension module in module receptacle MXI1:
Response when track monitoring is triggered for digital frequency input X9
- Track monitoring is triggered if a signal cable (A, B, or Z) is interrupted.

Selection list (Lenze setting in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
5	**Warning**
4	Warning locked
6	Information
0	No response

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13041

Parameter | Name:
C13041 | Resp. to DFIN enable sig. miss.

Data type: UNSIGNED_8
Index: $11534_d = 2D0E_h$

Digital frequency extension module in module receptacle MXI1:
Response when "Enable" signal at digital frequency input X9 fails

Selection list (Lenze setting in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
5	**Warning**
4	Warning locked
6	Information
0	No response

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13042

Parameter | Name:
C13042 | Resp. to Vcc error DFIN

Data type: UNSIGNED_8
Index: $11533_d = 2D0D_h$

Digital frequency extension module in module receptacle MXI1:
Response when monitoring for encoder voltage supply at digital frequency input X9 is triggered
- Monitoring is triggered if the encoder voltage controlled by the digital frequency input reaches the voltage limit.

Selection list (Lenze setting in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
5	**Warning**
4	Warning locked
6	Information
0	No response

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13050

Parameter | Name:
C13050 | Signal source DFOUT

Data type: UNSIGNED_8
Index: $11525_d = 2D05_h$

Digital frequency extension module in module receptacle MXI1:
Selection of the signal source for digital frequency output X10

Selection list (Lenze setting in bold)	
1	None
2	Digital frequency input DFIN
3	Motor feedback system
4	Load feedback system
5	Resolver
6	Encoder
7	**Application [Incr./ms]**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13051

Parameter | Name:
C13051 | No. of increments DFOUT

Data type: UNSIGNED_32
Index: $11524_d = 2D04_h$

Digital frequency extension module in module receptacle MXI1:
Number of increments for digital frequency output X10
- Definition of the number of pulses for one "mechanical" revolution.

Setting range (min. value | unit | max. value)			Lenze setting
1		16384	**2048**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13052

Parameter | Name:
C13052 | Zero pulse offset DFOUT

Data type: UNSIGNED_16
Index: $11523_d = 2D03_h$

Digital frequency extension module in module receptacle MXI1:
Zero pulse offset for digital frequency output X10
- Offset for displacing the zero pulse to be output.

Setting range (min. value | unit | max. value)			Lenze setting
0	Incr.	65535	**0 increments**

☑ Read access ☑ Write access ☑ CINH ☐ PLC-STOP ☐ No transfer

C13053

Parameter | Name:
C13053 | Frequency limitation DFOUT

Data type: UNSIGNED_16
Index: $11522_d = 2D02_h$

Digital frequency extension module in module receptacle MXI1:
Limit frequency for digital frequency output X10

- Frequency to which the digital frequency output is limited by the software.
- If the limit value is reached, the response set in C13080 is executed.
- In terms of the hardware, the digital frequency output is limited to 500 kHz.
- If the digital frequency input is directly connected to the digital frequency output, the set frequency limitation is functionless!

Note: Du to the remainder processing implemented in the 4 kHz control cycle, only settings ≥ 4 kHz are reasonable for frequency limitation!

▸ Frequency limitation

Setting range (min. value | unit | max. value)			Lenze setting
1	kHz	500	**500 kHz**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13061

Parameter | Name:
C13061 | TP delay time DFOUT

Data type: UNSIGNED_32
Index: $11514_d = 2CFA_h$

Digital frequency extension module in module receptacle MXI1:
Touch probe delay for digital frequency output X10

- The delay time set is considered when the position at the instant of touch probe is determined (instant of zero pulse) and serves to compensate dead times, if existent.

Setting range (min. value | unit | max. value)			Lenze setting
0	µs	7000	**0 µs**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13070

Parameter | Name:
C13070 | Speed at DFOUT

Data type: INTEGER_32
Index: $11505_d = 2CF1_h$

Digital frequency extension module in module receptacle MXI1:
Display of the current speed at digital frequency output X10

Display range (min. value | unit | max. value)		
-2147483648	Incr./ms	2147483647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13071

Parameter | Name:
C13071 | Frequency at DFOUT

Data type: INTEGER_32
Index: $11504_d = 2CF0_h$

Digital frequency extension module in module receptacle MXI1:
Display of the current frequency at digital frequency output X10

Display range (min. value | unit | max. value)		
-2147483648	Hz	2147483647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13072

Parameter | Name:
C13072 | Position at DFOUT

Data type: INTEGER_32
Index: $11503_d = 2CEF_h$

Digital frequency extension module in module receptacle MXI1:
Display of the current position at digital frequency output X10

Display range (min. value | unit | max. value)		
-2147483648	Incr.	2147483647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13075

Parameter | Name: **C13075 | Unit**	Data type: VISIBLE_STRING Index: 11500_d = $2CEC_h$

Subcodes	Info
C13075/1	Unit for the position
C13075/2	Unit for the speed

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C13076

Parameter | Name: **C13076 | Actual position DFOUT**	Data type: INTEGER_32 Index: 11499_d = $2CEB_h$

Display range (min. value | unit | max. value)		
-214748.3647	Unit	214748.3647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer Scaling factor: 10000

C13077

Parameter | Name: **C13077 | Actual speed DFOUT**	Data type: INTEGER_32 Index: 11498_d = $2CEA_h$

Display range (min. value | unit | max. value)		
-214748.3647	Unit/s	214748.3647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer Scaling factor: 10000

C13080

Parameter | Name: **C13080 | Resp. to freq. limit. DFOUT**	Data type: UNSIGNED_8 Index: 11495_d = $2CE7_h$

Digital frequency extension module in module receptacle MXI1:
Response when limit frequency for digital frequency output X10 is reached.
- Is executed if the digital frequency reaches the limit value set in C13053.

Selection list (Lenze setting in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
5	**Warning**
4	Warning locked
6	Information
0	No response

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14010

Parameter | Name:
C14010 | Encoder type DFIN

Data type: UNSIGNED_8
Index: $10565_d = 2945_h$

Digital frequency extension module in module receptacle MXI2:
Selection of the encoder type for digital frequency input X9

Selection list (Lenze setting in bold)	
1	**Digital frequency output DFOUT**
2	TTL encoder

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14011

Parameter | Name:
C14011 | No. of increments DFIN

Data type: UNSIGNED_32
Index: $10564_d = 2944_h$

Digital frequency extension module in module receptacle MXI2:
Number of increments for digital frequency input X9
- Definition of the number of pulses for one "mechanical" revolution.

Setting range (min. value | unit | max. value)			Lenze setting
1		16384	**2048**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14012

Parameter | Name:
C14012 | Signal format DFIN

Data type: UNSIGNED_8
Index: $10563_d = 2943_h$

Digital frequency extension module in module receptacle MXI2:
Signal form for digital frequency input X9
- Selection of how to interpret the input signal.

Selection list (Lenze setting in bold)	
0	**4x evaluation (A, B)**
1	A:Increments B:Sign
2	Increments A:pos. B:neg.

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14013

Parameter | Name:
C14013 | Initialisation time DFIN

Data type: UNSIGNED_16
Index: $10562_d = 2942_h$

Digital frequency extension module in module receptacle MXI2:
Initialisation time for digital frequency input X9
- Waiting time after which the "Enable" signal is evaluated and the track monitoring modes are switched active.

Setting range (min. value | unit | max. value)			Lenze setting
0	ms	65535	**3000 ms**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14014

Parameter | Name:
C14014 | Track monitoring DFIN

Data type: UNSIGNED_8
Index: $10561_d = 2941_h$

Digital frequency extension module in module receptacle MXI2:
Monitoring configuration for digital frequency input X9
- Selection when track monitoring modes (open circuit detection) are active.

Selection list (Lenze setting in bold)	
1	**Active after initialisation time**
2	Active after enable signal

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14015

Parameter | Name:
C14015 | Encoder mounting dir. (DFIN)

Data type: UNSIGNED_32
Index: $10560_d = 2940_h$

Selection list (Lenze setting in bold)		Info
0	**Clockwise direction of rotation**	
1	Counter-clockwise direction of rotation	

☑ Read access ☑ Write access ☑ CINH ☐ PLC-STOP ☐ No transfer

C14021

Parameter | Name:
C14021 | TP delay time DFIN

Data type: UNSIGNED_32
Index: $10554_d = 293A_h$

Digital frequency extension module in module receptacle MXI2:
Touch probe delay for digital frequency input X9

- The delay time set is considered when the position at the instant of touch probe is determined (instant of zero pulse) and serves to compensate dead times, if existent.

Setting range (min. value | unit | max. value)			Lenze setting
0	µs	7000	**0 µs**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14030

Parameter | Name:
C14030 | Speed at DFIN

Data type: INTEGER_32
Index: $10545_d = 2931_h$

Digital frequency extension module in module receptacle MXI2:
Display of the current speed at digital frequency input X9

Display range (min. value | unit | max. value)			
-2147483648	Incr./ms	2147483647	

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14031

Parameter | Name:
C14031 | Frequency at DFIN

Data type: INTEGER_32
Index: $10544_d = 2930_h$

Digital frequency extension module in module receptacle MXI2:
Display of the current frequency at digital frequency input X9

Display range (min. value | unit | max. value)			
-2147483648	Hz	2147483647	

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14032

Parameter | Name:
C14032 | Position at DFIN

Data type: INTEGER_32
Index: $10543_d = 292F_h$

Digital frequency extension module in module receptacle MXI2:
Display of the current position at digital frequency input X9

Display range (min. value | unit | max. value)			
-2147483648	Incr.	2147483647	

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14035

Parameter | Name:
C14035 | Unit

Data type: VISIBLE_STRING
Index: $10540_d = 292C_h$

Subcodes	Info
C14035/1	Unit for the position
C14035/2	Unit for the speed

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14036

Parameter | Name:
C14036 | Actual position DFIN

Data type: INTEGER_32
Index: $10539_d = 292B_h$

Display range (min. value | unit | max. value)		
-214748.3647	Unit	214748.3647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer Scaling factor: 10000

C14037

Parameter | Name:
C14037 | Actual speed DFIN

Data type: INTEGER_32
Index: $10538_d = 292A_h$

Display range (min. value | unit | max. value)		
-214748.3647	Unit/s	214748.3647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer Scaling factor: 10000

C14040

Parameter | Name:
C14040 | Resp. to track monitoring DFIN

Data type: UNSIGNED_8
Index: $10535_d = 2927_h$

Digital frequency extension module in module receptacle MXI2:
Response when track monitoring is triggered for digital frequency input X9
- Track monitoring is triggered if a signal cable (A, B, or Z) is interrupted.

Selection list (Lenze setting in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
5	**Warning**
4	Warning locked
6	Information
0	No response

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14041

Parameter | Name:
C14041 | Resp. to DFIN enable sig. miss.

Data type: UNSIGNED_8
Index: $10534_d = 2926_h$

Digital frequency extension module in module receptacle MXI2:
Response when "Enable" signal at digital frequency input X9 fails

Selection list (Lenze setting in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
5	**Warning**
4	Warning locked
6	Information
0	No response

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14042

Parameter | Name:
C14042 | Resp. to Vcc error DFIN

Data type: UNSIGNED_8
Index: $10533_d = 2925_h$

Digital frequency extension module in module receptacle MXI2:
Response when monitoring for encoder voltage supply at digital frequency input X9 is triggered
- Monitoring is triggered if the encoder voltage controlled by the digital frequency input reaches the voltage limit.

Selection list (Lenze setting in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
5	**Warning**
4	Warning locked
6	Information
0	No response

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14050

Parameter | Name:
C14050 | Signal source DFOUT

Data type: UNSIGNED_8
Index: $10525_d = 291D_h$

Digital frequency extension module in module receptacle MXI2:
Selection of the signal source for digital frequency output X10

Selection list (Lenze setting in bold)	
1	None
2	Digital frequency input DFIN
3	Motor feedback system
4	Load feedback system
5	Resolver
6	Encoder
7	**Application [Incr./ms]**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14051

Parameter | Name:
C14051 | No. of increments DFOUT

Data type: UNSIGNED_32
Index: $10524_d = 291C_h$

Digital frequency extension module in module receptacle MXI2:
Number of increments for digital frequency output X10
- Definition of the number of pulses for one "mechanical" revolution.

Setting range (min. value | unit | max. value)			Lenze setting
1		16384	**2048**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14052

Parameter | Name:
C14052 | Zero pulse offset DFOUT

Data type: UNSIGNED_16
Index: $10523_d = 291B_h$

Digital frequency extension module in module receptacle MXI2:
Zero pulse offset for digital frequency output X10
- Offset for displacing the zero pulse to be output.

Setting range (min. value | unit | max. value)			Lenze setting
0	Incr.	65535	**0 increments**

☑ Read access ☑ Write access ☑ CINH ☐ PLC-STOP ☐ No transfer

C14053

Parameter | Name:
C14053 | Frequency limitation DFOUT

Data type: UNSIGNED_16
Index: $10522_d = 291A_h$

Digital frequency extension module in module receptacle MXI2:
Limit frequency for digital frequency output X10

- Frequency to which the digital frequency output is limited by the software.
- If the limit value is reached, the response set in C14080 is executed.
- In terms of the hardware, the digital frequency output is limited to 500 kHz.
- If the digital frequency input is directly connected to the digital frequency output, the set frequency limitation is functionless!

Note: Du to the remainder processing implemented in the 4 kHz control cycle, only settings ≥ 4 kHz are reasonable for frequency limitation!

▸ Frequency limitation

Setting range (min. value | unit | max. value)			Lenze setting
1	kHz	500	**500 kHz**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14061

Parameter | Name:
C14061 | TP delay time DFOUT

Data type: UNSIGNED_32
Index: $10514_d = 2912_h$

Digital frequency extension module in module receptacle MXI2:
Touch probe delay for digital frequency output X10

- The delay time set is considered when the position at the instant of touch probe is determined (instant of zero pulse) and serves to compensate dead times, if existent.

Setting range (min. value | unit | max. value)			Lenze setting
0	µs	7000	**0 µs**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14070

Parameter | Name:
C14070 | Speed at DFOUT

Data type: INTEGER_32
Index: $10505_d = 2909_h$

Digital frequency extension module in module receptacle MXI2:
Display of the current speed at digital frequency output X10

Display range (min. value | unit | max. value)		
-2147483648	Incr./ms	2147483647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14071

Parameter | Name:
C14071 | Frequency at DFOUT

Data type: INTEGER_32
Index: $10504_d = 2908_h$

Digital frequency extension module in module receptacle MXI2:
Display of the current frequency at digital frequency output X10

Display range (min. value | unit | max. value)		
-2147483648	Hz	2147483647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14072

Parameter | Name:
C14072 | Position at DFOUT

Data type: INTEGER_32
Index: $10503_d = 2907_h$

Digital frequency extension module in module receptacle MXI2:
Display of the current position at digital frequency output X10

Display range (min. value | unit | max. value)		
-2147483648	Incr.	2147483647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14075

Parameter | Name: **C14075 | Unit**	Data type: VISIBLE_STRING Index: $10500_d = 2904_h$

Subcodes	Info
C14075/1	Unit for the position
C14075/2	Unit for the speed

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

C14076

Parameter | Name: **C14076 | Actual position DFOUT**	Data type: INTEGER_32 Index: $10499_d = 2903_h$

Display range (min. value | unit | max. value)		
-214748.3647	Unit	214748.3647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer Scaling factor: 10000

C14077

Parameter | Name: **C14077 | Actual speed DFOUT**	Data type: INTEGER_32 Index: $10498_d = 2902_h$

Display range (min. value | unit | max. value)		
-214748.3647	Unit/s	214748.3647

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer Scaling factor: 10000

C14080

Parameter | Name: **C14080 | Resp. to freq. limit. DFOUT**	Data type: UNSIGNED_8 Index: $10495_d = 28FF_h$

Digital frequency extension module in module receptacle MXI2:
Response when limit frequency for digital frequency output X10 is reached.
- Is executed if the digital frequency reaches the limit value set in C14053.

Selection list (Lenze setting in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
5	**Warning**
4	Warning locked
6	Information
0	No response

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer

4.2 Table of attributes

The table of attributes contains information required for communicating with the controller via parameters.

How to read the table of attributes:

Column		Meaning	Entry	
Code		Parameter designation	Cxxxxx	
Name		Short parameter text (display text)	*Text*	
Index	dec	Index under which the parameter is addressed. The subindex of array variables corresponds to the Lenze subcode number.	24575 - Lenze code number	Only required for access via bus system.
	hex		$5FFF_h$ - Lenze code number	
Data	DS	Data structure	E	Single variable (only one parameter element)
			A	Array variable (several parameter elements)
	DA	Number of array elements (subcodes)	*Number*	
	DT	Data type	BITFIELD_8	1 byte bit-coded
			BITFIELD_16	2 bytes bit-coded
			BITFIELD_32	4 bytes bit-coded
			INTEGER_8	1 byte with sign
			INTEGER_16	2 bytes with sign
			INTEGER_32	4 bytes with sign
			UNSIGNED_8	1 byte without sign
			UNSIGNED_16	2 bytes without sign
			UNSIGNED_32	4 bytes without sign
			VISIBLE_STRING	ASCII string
	Factor	Factor for data transmission via bus system, depending on the number of decimal positions.	*Factor*	1 ≡ no decimal positions 10 ≡ 1 decimal position 100 ≡ 2 decimal positions 1000 ≡ 3 decimal positions
Access	R	Read access	☑ Reading allowed	
	W	Write access	☑ Writing allowed	
	CINH	Controller inhibit required	☑ Writing only possible when controller is inhibited	

Table of attributes

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	DT	Factor	R	W	CINH
C13010	Encoder type DFIN	11565	2D2D	E	1	UNSIGNED_8	1	☑	☑	
C13011	No. of increments DFIN	11564	2D2C	E	1	UNSIGNED_32	1	☑	☑	
C13012	Signal format DFIN	11563	2D2B	E	1	UNSIGNED_8	1	☑	☑	
C13013	Initialisation time DFIN	11562	2D2A	E	1	UNSIGNED_16	1	☑	☑	
C13014	Track monitoring DFIN	11561	2D29	E	1	UNSIGNED_8	1	☑	☑	
C13015	Encoder mounting dir. (DFIN)	11560	2D28	E	1	UNSIGNED_32	1	☑	☑	☑
C13021	TP delay time DFIN	11554	2D22	E	1	UNSIGNED_32	1	☑	☑	
C13030	Speed at DFIN	11545	2D19	E	1	INTEGER_32	1	☑		
C13031	Frequency at DFIN	11544	2D18	E	1	INTEGER_32	1	☑		
C13032	Position at DFIN	11543	2D17	E	1	INTEGER_32	1	☑		
C13035	Unit	11540	2D14	A	2	VISIBLE_STRING		☑		
C13036	Actual position DFIN	11539	2D13	E	1	INTEGER_32	10000	☑		
C13037	Actual speed DFIN	11538	2D12	E	1	INTEGER_32	10000	☑		
C13040	Resp. to track monitoring DFIN	11535	2D0F	E	1	UNSIGNED_8	1	☑	☑	
C13041	Resp. to DFIN enable sig. miss.	11534	2D0E	E	1	UNSIGNED_8	1	☑	☑	
C13042	Resp. to Vcc error DFIN	11533	2D0D	E	1	UNSIGNED_8	1	☑	☑	
C13050	Signal source DFOUT	11525	2D05	E	1	UNSIGNED_8	1	☑	☑	
C13051	No. of increments DFOUT	11524	2D04	E	1	UNSIGNED_32	1	☑	☑	
C13052	Zero pulse offset DFOUT	11523	2D03	E	1	UNSIGNED_16	1	☑	☑	☑
C13053	Frequency limitation DFOUT	11522	2D02	E	1	UNSIGNED_16	1	☑	☑	
C13061	TP delay time DFOUT	11514	2CFA	E	1	UNSIGNED_32	1	☑	☑	
C13070	Speed at DFOUT	11505	2CF1	E	1	INTEGER_32	1	☑		
C13071	Frequency at DFOUT	11504	2CF0	E	1	INTEGER_32	1	☑		
C13072	Position at DFOUT	11503	2CEF	E	1	INTEGER_32	1	☑		
C13075	Unit	11500	2CEC	A	2	VISIBLE_STRING		☑		
C13076	Actual position DFOUT	11499	2CEB	E	1	INTEGER_32	10000	☑		
C13077	Actual speed DFOUT	11498	2CEA	E	1	INTEGER_32	10000	☑		
C13080	Resp. to freq. limit. DFOUT	11495	2CE7	E	1	UNSIGNED_8	1	☑	☑	
C14010	Encoder type DFIN	10565	2945	E	1	UNSIGNED_8	1	☑	☑	
C14011	No. of increments DFIN	10564	2944	E	1	UNSIGNED_32	1	☑	☑	
C14012	Signal format DFIN	10563	2943	E	1	UNSIGNED_8	1	☑	☑	
C14013	Initialisation time DFIN	10562	2942	E	1	UNSIGNED_16	1	☑	☑	
C14014	Track monitoring DFIN	10561	2941	E	1	UNSIGNED_8	1	☑	☑	
C14015	Encoder mounting dir. (DFIN)	10560	2940	E	1	UNSIGNED_32	1	☑	☑	☑
C14021	TP delay time DFIN	10554	293A	E	1	UNSIGNED_32	1	☑	☑	
C14030	Speed at DFIN	10545	2931	E	1	INTEGER_32	1	☑		
C14031	Frequency at DFIN	10544	2930	E	1	INTEGER_32	1	☑		
C14032	Position at DFIN	10543	292F	E	1	INTEGER_32	1	☑		
C14035	Unit	10540	292C	A	2	VISIBLE_STRING		☑		
C14036	Actual position DFIN	10539	292B	E	1	INTEGER_32	10000	☑		
C14037	Actual speed DFIN	10538	292A	E	1	INTEGER_32	10000	☑		
C14040	Resp. to track monitoring DFIN	10535	2927	E	1	UNSIGNED_8	1	☑	☑	
C14041	Resp. to DFIN enable sig. miss.	10534	2926	E	1	UNSIGNED_8	1	☑	☑	
C14042	Resp. to Vcc error DFIN	10533	2925	E	1	UNSIGNED_8	1	☑	☑	
C14050	Signal source DFOUT	10525	291D	E	1	UNSIGNED_8	1	☑	☑	
C14051	No. of increments DFOUT	10524	291C	E	1	UNSIGNED_32	1	☑	☑	
C14052	Zero pulse offset DFOUT	10523	291B	E	1	UNSIGNED_16	1	☑	☑	☑
C14053	Frequency limitation DFOUT	10522	291A	E	1	UNSIGNED_16	1	☑	☑	
C14061	TP delay time DFOUT	10514	2912	E	1	UNSIGNED_32	1	☑	☑	

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	DT	Factor	R	W	CINH
C14070	Speed at DFOUT	10505	2909	E	1	INTEGER_32	1	☑		
C14071	Frequency at DFOUT	10504	2908	E	1	INTEGER_32	1	☑		
C14072	Position at DFOUT	10503	2907	E	1	INTEGER_32	1	☑		
C14075	Unit	10500	2904	A	2	VISIBLE_STRING		☑		
C14076	Actual position DFOUT	10499	2903	E	1	INTEGER_32	10000	☑		
C14077	Actual speed DFOUT	10498	2902	E	1	INTEGER_32	10000	☑		
C14080	Resp. to freq. limit. DFOUT	10495	28FF	E	1	UNSIGNED_8	1	☑	☑	

5 Fault messages

Note!

This chapter completes the fault list in the online documentation for the controller by fault messages concerning the digital frequency extension module.

Tip!

General information on diagnostics & fault analysis and fault messages can be found in the online documentation for the controller.

DFIN (MXI1): Track error A-/A [0x00990000]

Response (Lenze setting in bold)	**Setting:** C13040 (☑ Adjustable response)
☑ No ☐ System fault ☒ **Fault** ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
Digital frequency extension module in MXI1: Interruption (open circuit) of signal cable for track A.	• Check signal cable for track A. • Check encoder.

DFIN (MXI1): Track error B-/B [0x00990001]

Response (Lenze setting in bold)	**Setting:** C13040 (☑ Adjustable response)
☑ No ☐ System fault ☒ **Fault** ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
Digital frequency extension module in MXI1: Interruption (open circuit) of signal cable for track B.	• Check signal cable for track B. • Check encoder.

DFIN (MXI1): Track error Z-/Z [0x00990002]

Response (Lenze setting in bold)	**Setting:** C13040 (☑ Adjustable response)
☑ No ☐ System fault ☒ **Fault** ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
Digital frequency extension module in MXI1: Interruption (open circuit) of signal cable for track Z.	• Check signal cable for track Z. • Check encoder.

DFIN (MXI1): Signal error enable/lamp control [0x00990003]

Response (Lenze setting in bold)	**Setting:** C13041 (☑ Adjustable response)
☑ No ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☒ **Warning** ☑ Information	

Cause	Remedy
Digital frequency extension module in MXI1: Interruption (open circuit) of signal cable for "Enable" signal or no "Enable" signal available.	• Check signal cable for "Enable" signal. • Check encoder.

DFIN (MXI1): Supply cannot be corrected anymore [0x00990004]

Response (Lenze setting in bold)	**Setting:** C13042 (☑ Adjustable response)
☑ No ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☒ **Warning** ☑ Information	

Cause	Remedy
Digital frequency extension module in MXI1: The encoder voltage controlled by the digital frequency input has reached the voltage limit.	Check encoder.

DFOUT (MXI1): Maximum frequency reached [0x00990005]

Response (Lenze setting in bold)	**Setting:** C13080 (☑ Adjustable response)
☑ No ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☒ **Warning** ☑ Information	

Cause	Remedy
Digital frequency extension module in MXI1: Limit frequency at the digital frequency output reached. • The digital frequency has reached the limit value set in C013053.	Check set limit value.

DFIN (MXI2): Track error A-/A [0x00aa0000]

Response (Lenze setting in bold)	**Setting:** C14040 (☑ Adjustable response)
☑ No ☐ System fault ☒ **Fault** ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
Digital frequency extension module in MXI2: Interruption (open circuit) of signal cable for track A.	• Check signal cable for track A. • Check encoder.

DFIN (MXI2): Track error B-/B [0x00aa0001]

Response (Lenze setting in bold)	**Setting:** C14040 (☑ Adjustable response)
☑ No ☐ System fault ☒ **Fault** ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
Digital frequency extension module in MXI2: Interruption (open circuit) of signal cable for track B.	• Check signal cable for track B. • Check encoder.

DFIN (MXI2): Track error Z-/Z [0x00aa0002]

Response (Lenze setting in bold)	**Setting:** C14040 (☑ Adjustable response)
☑ No ☐ System fault ☒ **Fault** ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
Digital frequency extension module in MXI2: Interruption (open circuit) of signal cable for track Z.	• Check signal cable for track Z. • Check encoder.

DFIN (MXI2): Signal error enable/lamp control [0x00aa0003]

Response (Lenze setting in bold)	**Setting:** C14041 (☑ Adjustable response)
☑ No ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☒ **Warning** ☑ Information	

Cause	Remedy
Digital frequency extension module in MXI2: Interruption (open circuit) of signal cable for "Enable" signal or no "Enable" signal available.	• Check signal cable for "Enable" signal. • Check encoder.

DFIN (MXI2): Supply cannot be corrected anymore [0x00aa0004]

Response (Lenze setting in bold)	**Setting:** C14042 (☑ Adjustable response)
☑ No ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☒ **Warning** ☑ Information	

Cause	Remedy
Digital frequency extension module in MXI2: The encoder voltage controlled by the digital frequency input has reached the voltage limit.	Check encoder.

DFOUT (MXI2): Maximum frequency reached [0x00aa0005]

Response (Lenze setting in bold)	**Setting:** C14080 (☑ Adjustable response)
☑ No ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☒ **Warning** ☑ Information	

Cause	Remedy
Digital frequency extension module in MXI2: Limit frequency at the digital frequency output reached. • The digital frequency has reached the limit value set in C014053.	Check set limit value.

6 Index

FEEDBACK

Your opinion is important to us

These instructions were created to the best of our knowledge and belief to give you the best possible support for handling our product.

If you have suggestions for improvement, please e-mail us to:

feedback-docu@Lenze.de

Thank you for your support.

Your Lenze documentation team

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