Encoder Parameterization

This document describes the encoders that can be used with

- SIMOTION D4x5
- SIMOTION C2xx
- SIMOTION P350
- ADI4 / IM174

in conjunction with

- SINAMICS S120
- SIMOVERT MASTERDRIVES MC
- SIMODRIVE 611 Universal

The following encoder types are supported:

Encoder type - SINAMICS/SIMODRIVE 611U	Encoder type - ADI4 / IM174
SSI linear scale	SSI-singleturn-encoder
Endat linear scale	SSI Multiturn encoder
Incremental scale	TTL-encode
SSI single-turn encoder	
SSI multiturn encoder	
TTL encoder	
PROFIBUS absolute value encoder	
PROFIBUS singleturn absolute value encoder	
PROFIBUS multiturn absolute value encoder	
PROFINET Singleturn absolute value encoder	
PROFINET Multiturn absolute value encoder	
Endat motor encoder	
Incremental sin/cos motor encoder	
Resolver	
Linear analog sensor using SM335 module (P-bus)	

Notes for the following encoder table:

- The columns contain the appropriate parameterization or an appropriate comment for the associated encoder.
- The SIMOTION column describes the settings for onboard encoders (C2xx), PROFIBUS encoder or for encoders using ADI4 / IM174.
- The columns for the drive systems describe the settings for the direct connection of the encoder to the drive.

Note for the SIMOTION parameters:

Encoder parameters in SIMOTION are specified using parameters in the axis configuration windows or using the configuration data in the expert list as "TypeOfAxis.NumberOfEncoders.Encoder_1.xxx". The following assignments apply to the axis configuration windows:

Parameters	Meaning
Encoder type	TypeOfAxis.NumberOfEncoders.Encoder_1.encoderType
Encoder mode	TypeOfAxis.NumberOfEncoders.Encoder_1.encoderMode
Encoder pulses per revolution (Resolution)	TypeOfAxis.NumberOfEncoders.Encoder_1.IncEncoder.IncResolution
	TypeOfAxis.NumberOfEncoders.Encoder_1.AbsEncoder.AbsResolution
Data width of absolute value without fine resolution (Number of data bits)	TypeOfAxis.NumberOfEncoders.Encoder_1.AbsEncoder.AbsDataLength
Fine resolution (Multiplication factor of the cyclical encoder actual value)	TypeOfAxis.NumberOfEncoders.Encoder_1.IncEncoder.IncResolutionMultiplierCyclic For incremental encoders, a fine resolution of 0 (default value) in the IncResolutionMultipliercyclic parameter means a fine resolution of 2^{11} = 2048
	TypeOfAxis.NumberOfEncoders.Encoder_1.AbsEncoder.AbsResolutionMultiplierCyclic For absolut encoders, a cyclic fine resolution of 0 (default value) in the AbsResolutionMultipliercyclic parameter means a fine resolution of 2^{11} = 2048.
Fine resolution of absolute value in Gn_XIST2 (Multiplication factor of the absolute encoder actual value)	TypeOfAxis.NumberOfEncoders.Encoder_1.AbsEncoder.AbsResolutionMultiplierAbsolute For absolut encoders, a absolut fine resolution of 0 (default value) in the AbsResolutionMultiplierabsolute parameter means a fine resolution of 2^{9} = 512

Note for the transfer of the SINAMICS parameters (as of SIMOTION V4.0):

The "Data transfer from the drive" function is possible after SINAMICS download with subsequent upload to the PG and save data in the project.
This means no separate parameter input is required in SIMOTION.

Note for the transfer of the SINAMICS parameters (as of SIMOTION V4.2):

The adaptation of relevant drive data is activated automatically as of SIMOTION V4.2 in conjunction with SINAMICS S120 as of V2.6.2. The encoder parameters are adapted automatically.

Notes for the SIMOVERT MASTERDRIVES MC parameters:

Parameters	Meaning
U922 index 1 (encoder actual values)	The actual position value is connected to the encoder interface via U922.i001. With an absolute encoder, the absolute value from the encoder is specified as the actual position value. Please note that it takes a moment to read this value after initialization of the Motion Control system. If a resolver or encoder is used, connector KK120 (actual position value) must be set in U922.i001 (actual position value encoder interface). If, however, a multiturn encoder is used, the connector KK100 (absolute position) must be set in U922.i001 (actual position value encoder interface).
P183 index 1 (position measurement configuration)	The position detection configuration is entered in this parameter. **The last digit enables the position measuring.** **xxx1 = enable resolver/encoder** **xxx2 = enable multiturn encoder (x means not relevant)**
P171 (position resolution)	In MASTERDRIVES, the position resolution, including a fine resolution (multiplication factor), is specified . The resolution is specified as a power of two. **The position resolution must be set as follows:** **2^{P171} = number of increments * multiplication factor of the cyclical encoder actual value** i.e. for incremental encoder: IncResolution * IncResolutionMultiplierCyclic i.e. for absolute value encoder: AbsResolution * AbsResolutionMultiplierCyclic

Note to EnDat encoder
SIMOTION and SINAMICS supports encoders with EnDat 2.1 (not EnDat 2.2).

Information for the operation with dynamic servo control (DSC)

With the function Dynamic Servo Control (DSC), the active dynamic part of the position controller is realized in the drive, in the frequency of the speed circuit. This makes it possible to set a considerably higher proportional gain Kv of the position controller in a ratio to the sampling times. This increases the dynamic for the sequence of the command variable and the control of the disturbance variables for highly dynamic drives.
In the PROFIdrive telegram, the position difference (XERR) and the gain factor are transferred to the position controller in the drive, in addition to the pre-control value for the speed. The drive does not require any additional information on the actual value system (zero points and reference points). DSC is supported by MASTERDRIVES (standard telegram 5 and 6 after PROFIdrive) as well as by SIMODRIVE 611U and SINAMICS S120 (additional SIEMENS telegram 105 and 106).
As a support for the start-up with MASTERDRIVES, there is a SCRIPT available.
To activate the function DSC, the position controller has to be set as PV-controller (P-controller with pre-control). Furthermore, the encoder at the axis has to be configured, on the increments of which the position difference (XERR) has been standardized in the drive. The number of this encoder has to be set in the configuration data typeOfAxis.NumberOfEncoders.DSCEncoderNumber.
With SINAMICS, SIMODRIVE 611U and MASTERDRIVES, the motor measuring system is applied to standardize the position difference.

Table of the encoder types and settings

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
SSI linear scale	Temposonics RH-M-1025M-D70-1-S1G1100 0.002 mm / 25-bit Gray / SSI Grd: 2801.04 m/s Fno: 0305 0257	C2xx Encodersystem:=linear_system Encodertype:=sensor_absolute AbsEncoder. AbsDataLength:=25 Absmessagelength:=25 Absmessageformat:=right_margin Resolution.distance:=0.002 AbsState:= Gray_Code Use on D4x5/P350 with ADI4 / IM174 possible, refer to ADI4	In conjunction with SIMOTION, not used on SINAMICS S120	In conjunction with SIMOTION, not used on 611 U	In conjunction with SIMOTION, not used on MASTERDRIVES MC
SSI linear scale	Temposonics RH-M-0170M-P02-1-S1G1100 0.005 mm / 25-bit Gray / SSI Grd: 2801.04 m/s Fno: 0117 0420	C2xx Encodersystem:=linear_system Encodertype:=sensor_absolute AbsEncoder. AbsDataLength:=25 Absmessagelength:=25 Absmessageformat:=right_margin Resolution.distance:=0.005 AbsState:= Gray_Code Use on D4x5/P350 with ADI4 / IM174 possible, refer to ADI4	In conjunction with SIMOTION, not used on SINAMICS S120	In conjunction with SIMOTION, not used on 611 U	In conjunction with SIMOTION, not used on MASTERDRIVES MC
SSI linear scale	BALLUFF BTL5-S172B-M0250-P-S32 0.005mm / 25Bit Gray steigend/ SSI	C2xx Encodersystem:=linear_system Encodertype:=sensor_absolute AbsEncoder. AbsDataLength:=25 Resolution.distance:=0.005 AbsResolutionMultiplierCyclic:=4 AbsResolutionMultiplierAbsolute:=4 Use on D4x5/P350 with ADI4 / IM174 possible, refer to ADI4	Connection to D4x5 via SMC30 SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* Encodersystem:=linear_system Encodertype:=sensor_absolute AbsEncoder. encoderMode=SSI_Mode. AbsDataLength:=25 Resolution.distance:=0.005 AbsResolutionMultiplierCyclic:=4 AbsResolutionMultiplierAbsolute:=4	In conjunction with SIMOTION, not used on 611 U	In conjunction with SIMOTION, not used on MASTERDRIVES MC

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
SSI linear scale	BALLUFF BTL5-S172B-M1200-P-KA05 0.005mm / 25Bit Gray steigend/ SSI	C2xx Encodersystem:=linear_system Encodertype:=sensor_absolute AbsEncoder. AbsDataLength:=25 Resolution.distance:=0.005 AbsResolutionMultiplierCyclic:=2048 AbsResolutionMultiplierAbsolute: =2048 Use on D4x5/P350 with ADI4 / IM174 possible, refer to ADI4	Connection to D4x5 via SMC30 SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* Encodersystem:=linear_system Encodertype:=sensor_absolute AbsEncoder. encoderMode=SSI_Mode. AbsDataLength:=25 Resolution.distance:=0.005 AbsResolutionMultiplierCyclic: =2048 AbsResolutionMultiplierAbsolute: =2048	In conjunction with SIMOTION, not used on 611 U	In conjunction with SIMOTION, not used on MASTERDRIVES MC
Endat linear scale	Heidenhein LC181 (on 1FN3150-3WC00-0AA1) Measurement length 540 mm	For C2xx and P350, only used with MASTERDRIVES MC as machine encoder.	In conjunction with SIMOTION, not used on SINAMICS S120	In conjunction with SIMOTION, not used on 611 U	MASTERDRIVES MC: P145.2:= 5 P135.0:= 4 P146.2:= 0 P147.2:= 0 P148.3:= 23 P148.4:= 0 P148.6:= 160 P149.7:= 1101 P149.8:= 0023 P154.0:= 6 P166.1:= 1001 P181.1:= 5 P181.2:= 8 SIMOTION: encoder type:=absolute value encoder encoder mode:= ENDAT measurement system:=linear encoder system (linear scale) grid pitch:=1 e-004 number of data bits:=23 multiplication factor of the absolute actual value (Gn_XIST2):=1 multiplication factor of the cyclical actual value (Gn_XIST1):=1

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
Endat linear scale	Heidenhein LC181 Measurement length 1440 mm	Used as motor encoder for D4x5 on Sinamics_Integrated	SINAMICS: encoder type: linear measurement system: absolutEnDat log SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* encoder type:=absolute value encoder encoder mode:= ENDAT measurement system:=linear encoder system (linear scale) grid pitch:= 1.6e-002 number of data bits:=24 multiplication factor of the absolute actual value (Gn_XIST2):=0 multiplication factor of the cyclical actual value (Gn_XIST1):=0	In conjunction with SIMOTION, not used on 611 U	In conjunction with SIMOTION, not used on MASTERDRIVES MC
Endat linear scale	Heidenhein LC182	Connection to D4x5 via SMC20	Connection to D4x5 via SMC20 SINAMICS: encoder type: linear measurement system: absolutEnDat log ☑ Encoder identification SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* Encodersystem := linear_system Encodertype := sensor_absolut EncoderMode := ENDAT Resolution.distance:=0.02 AbsEncoder.Absdatalength := 24 AbsResolutionMultipliercyclic:= 0 (2048) AbsResolutionMultiplierabsolute:= 0 (512)	In conjunction with SIMOTION, not used on 611 U	In conjunction with SIMOTION, not used on MASTERDRIVES MC

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
Incremental scale	Heidenheim LS486 (20um)	Used as motor encoder for D4x5 on Sinamics_Integrated	SINAMICS: encoder type: linear measurement system: incremental sine/cosine grid pitch: 20000 nm coarse synchronization: rotor position identification fine synchronization: zero mark Zero marks: one zero mark SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* encoder type:=incremental encoder encoder mode:=sine measurement system:=linear encoder system (linear scale) grid pitch:= 2.e-002 multiplication factor of the cyclical actual value (Gn_XIST1):=0	In conjunction with SIMOTION, not used on 611 U	In conjunction with SIMOTION, not used on MASTERDRIVES MC
SSI singleturn encoder	SIEMENS 6FX2001-5HS12	C2xx Encodersystem:= rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute AbsEncoder. AbsResolution:=8192 AbsDataLength:=13 AbsMessageLength:=length_13 AbsMessageformat:=pinetree AbsResolutionMultiplierCyclic:=0 AbsResolutionMultiplierAbsolute:=0 AbsState:=gray_code Use on D4x5/P350 with ADI4 / IM174 possible, refer to ADI4	Connection to D4x5 via SMC30 SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* Encodersystem:=rotatory_system Encodertype:=sensor_absolute AbsEncoder. encoderMode=SSI_Mode. absResolution:=8192 AbsDataLength:=13 AbsMessageLength:=length_25 AbsMessageformat:=pinetree AbsResolutionMultiplierCyclic:=2048 AbsResolutionMultiplierAbsolute:= 512 AbsState:=gray_code	In conjunction with SIMOTION, not used on 611 U	For the relevant applications, used only on C2xx or via ADI4

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
SSI multiturn encoder	SIEMENS 6FX2001-5HS24	C2xx Encodersystem:= rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute AbsEncoder. AbsResolution:=8192 AbsDataLength:=25 AbsMessagelength:=length_25 AbsMessageformat:=pinetree AbsResolutionMultiplierCyclic:=0 AbsResolutionMultiplierAbsolute:=0 AbsState:=gray_code Use on D4x5/P350 with ADI4 / IM174 possible, refer to ADI4	Connection to D4x5 via SMC30 SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* Encodersystem:=rotatory_system Encodertype:=sensor_absolute AbsEncoder. encoderMode=SSI_Mode. absResolution:=8192 AbsDataLength:=25 AbsMessagelength:=length_25 AbsMessageformat:=pinetree AbsResolutionMultiplierCyclic:=2048 AbsResolutionMultiplierAbsolute:=512 AbsState:=gray_code	In conjunction with SIMOTION, not used on 611 U	Use as external encoder on Masterdrives MC: P135:=4 P145.2:=15 P147.2:=3 P148.3:=12 P148.4:=12 P149.7:=0 P149.8:=0 P149.9:=0010 P166.1:=1 U950.18:=U950.17:=3 SIMOTION: Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute EncoderMode=SSI AbsEncoder. Absresolution:=4096 Absdatalength:=24 AbsResolutionMultipliercyclic:=1 AbsResolutionMultiplierabsolute:=1
TTL encoder	SIEMENS AG 6FX2001-2GB02	Encodersystem:=rotatory_system Encodertype:=sensor_incremental EncoderMode=RECTANGLE_TTL IncEncoder. IncResolution:=1024 IncResolutionMultipliercyclic:=0 Use on D4x5/P350 with ADI4 / IM174 possible, refer to ADI4	Connection to D4x5 via SMC30 SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* Encodersystem:=rotatory_system Encodertype:=sensor_incremental EncoderMode=RECTANGLE_TTL IncEncoder. IncResolution:=1024 IncResolutionMultipliercyclic:=0	In conjunction with SIMOTION, not used on 611 U	In conjunction with SIMOTION, not used on MASTERDRIVES MC

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
PROFIBUS absolute value encoder	FRABA AWC 5812-4096-FBB1DP03PG-T 24 bit	Encoder on PROFIBUS DP **SIMOTION → HW-Config:** measuring steps per revolution:= 4096 value range (high):=256 value range (low):=0 scaling: switched off **SIMOTION → axis:** Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute AbsEncoder. AbsResolution:=4096 AbsDataLength:=24 AbsResolutionMultipliercyclic:=256 AbsResolutionMultiplierabsolute:=1	Encoder on PROFIBUS DP	Encoder on PROFIBUS DP	Encoder on PROFIBUS DP
PROFIBUS singleturn absolute value encoder	SIEMENS 6FX2001-5QP12 13 bit **Version <16**	Encoder on PROFIBUS DP **SIMOTION →HW-Config:** Measuring steps per revolution:= 8192 Value range (high):=0 Value range (low):=8192 **SIMOTION → axis:** Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute AbsEncoder. AbsResolution:=8192 AbsDataLength:=13 AbsResolutionMultipliercyclic:= 524288 AbsResolutionMultiplierabsolute:=1	Encoder on PROFIBUS DP	Encoder on PROFIBUS DP	Encoder on PROFIBUS DP

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
PROFIBUS singleturn absolute value encoder	SIEMENS 6FX2001-5FP12 13 bit Version **16** Note: If GSD SIEM80F9 is used, you have to use the SIMOTION settings of version < A16 (see above)	Encoder on PROFIBUS DP **SIMOTION →HW-Config:** Measuring steps per revolution:= 8192 Value range:= 8192 scaling: switched off **SIMOTION → axis:** Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute AbsEncoder. AbsResolution:=8192 AbsDataLength:=13 AbsResolutionMultiplierCyclic:=1 AbsResolutionMultiplierAbsolute:=1	Encoder on PROFIBUS DP	Encoder on PROFIBUS DP	Encoder on PROFIBUS DP
PROFIBUS multiturn absolute value encoder	SIEMENS 6FX2001-5QP24 25 (13/12) bit Version 8 Note: resolution per revolution 13 bit, corresponds to 8192 incr./rev. Revolution counter 12 bit, corresponds to 4096 rev.	Encoder on PROFIBUS DP **SIMOTION →HW-Config:** Measuring steps per revolution:= 8192 value range (high):=512 value range (low):=0 scaling: switched off **SIMOTION → axis:** Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute AbsEncoder. AbsResolution:=8192 AbsDataLength:=25 AbsResolutionMultipliercyclic:=128 AbsResolutionMultiplierabsolute:=1	Encoder on PROFIBUS DP	Encoder on PROFIBUS DP	Encoder on PROFIBUS DP

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
PROFIBUS multiturn absolute value encoder	SIEMENS 6FX2001-5QP24 13+14 bit Version 10 Note: resolution per revolution 13 bit, corresponds to 8192 incr./rev. Revolution counter 14 bit, corresponds to 16384 rev.	Encoder on PROFIBUS DP **SIMOTION → HW-Config:** Measuring steps per revolution:= 8192 value range (high):=512 value range (low):=0 scaling: switched off **SIMOTION → axis:** Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute AbsEncoder. AbsResolution:=8192 AbsDataLength:=25 AbsResolutionMultipliercyclic:=128 AbsResolutionMultiplierabsolute:=1	Encoder on PROFIBUS DP	Encoder on PROFIBUS DP	Encoder on PROFIBUS DP
PROFIBUS - multiturn absolute value encoder	SIEMENS 6FX2001-5FP24 13+14 bit **Version 16** Note: If GSD SIEM80F9 is used, you have to use the SIMOTION settings of version < A16 (see above)	Encoder on PROFIBUS DP **SIMOTION HW-Konfig**: Measuring steps per revolution:= 8192 value range:=134217728 scaling: switched off **SIMOTION → axis**: Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute AbsEncoder. AbsResolution:=8192 AbsDataLength:=27 AbsResolutionMultiplierCyclic:=1 AbsResolutionMultiplierAbsolute:=1	Encoder on PROFIBUS DP	Encoder on PROFIBUS DP	Encoder on PROFIBUS DP

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
PROFINET - singleturn absolute value encoder	SIEMENS 6FX2001-5FN13 13 bit Version A1	Encoder on PROFINET PN **SIMOTION HW-Konfig**: Measuring steps per revolution:= 8192 value range:= 8192 scaling: switched off rotation scaling:= N2/N4 **SIMOTION → axis**: Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute encoderMode=2 (SSI-Mode) AbsEncoder. AbsResolution:=8192 AbsDataLength:=13 AbsResolutionMultiplierCyclic:=1 AbsResolutionMultiplierAbsolute:=1	Encoder on PROFINET	Encoder on PROFINET	Encoder on PROFINET
PROFINET - multiturn absolute value encoder	SIEMENS 6FX2001-5FN25 13+14 bit Version A1	Encoder on PROFINET PN **SIMOTION HW-Konfig**: Measuring steps per revolution:= 8192 value range:= 134217728 scaling: switched off rotation scaling:= N2/N4 **SIMOTION → axis**: Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute encoderMode=2 (SSI-Mode) AbsEncoder. AbsResolution:=8192 AbsDataLength:=27 AbsResolutionMultiplierCyclic:=1 AbsResolutionMultiplierAbsolute:=1	Encoder on PROFINET	Encoder on PROFINET	Encoder on PROFINET

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
Endat motor encoder	Endat 2048 S/R 1Fxxxxx-xxxxx-xExx Encoder system for motors with DRIVE-CliQ interface: 1Fxxxxx-xxxxx-xFxx	Use possible with drive	Connection via SMC20/SMI20 SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute encoderMode=ENDAT AbsEncoder. AbsResolution:=2048 AbsDataLength:=23 AbsResolutionMultipliercyclic: = 0 (2048) AbsResolutionMultiplierabsolute: = 0 (512)	611U parameters: Encoder lines (1005): 2048 Encoder fine resolution (1042):=11 Encoder fine resolution absolute (1043):=9 SIMOTION: Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute encoderMode=ENDAT AbsEncoder. AbsResolution:=2048 AbsDataLength:=23 AbsResolutionMultipliercyclic: = 0 (2048) AbsResolutionMultiplierabsolute:= 0 (512)	Masterdrives MC parameters: U922.1:= 100 P171:= 22 P183.1:= xxx2 SIMOTION: Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute encoderMode=ENDAT AbsEncoder. AbsResolution:=2048 AbsDataLength:=23 AbsResolutionMultipliercyclic: = 0 (2048) AbsResolutionMultiplierabsolute:=4
Endat motor encoder	Endat 512 S/R 1Fxxxxx-xxxxx-xHxx Encoder system for motors with DRIVE-CliQ interface: 1Fxxxxx-xxxxx-xLxx	Use possible with drive	Connection via SMC20/SMI20 SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute encoderMode=ENDAT AbsEncoder. AbsResolution:=512 AbsDataLength:=21 AbsResolutionMultipliercyclic: = 0 (2048) AbsResolutionMultiplierabsolute: = 0 (512)	611U parameters: Encoder lines (1005): 512 Encoder fine resolution (1042):=11 Encoder fine resolution absolute (1043):=9 SIMOTION: Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute encoderMode=ENDAT AbsEncoder. AbsResolution:=512 AbsDataLength:=21 AbsResolutionMultipliercyclic: = 0 (2048) AbsResolutionMultiplierabsolute: = 0 (512)	Masterdrives MC parameters: U922.1:= 100 P171:= 20 P183.1:= xxx2 P148.1:= 9 SIMOTION: Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute encoderMode=ENDAT AbsEncoder. AbsResolution:=512 AbsDataLength:=21 AbsResolutionMultipliercyclic: = 0 (2048) AbsResolutionMultiplierabsolute:=4

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
Endat motor encoder	Endat 32 S/R 1Fxxxxx-xxxxx-xGxx	Use possible with drive	Connection via SMC20 SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute encoderMode=ENDAT AbsEncoder. AbsResolution:=32 AbsDataLength:=17 AbsResolutionMultipliercyclic: = 0 (2048) AbsResolutionMultiplierabsolute: = 0 (512)	611U parameters: Encoder lines (1005): 32 Encoder fine resolution (1042):=11 Encoder fine resolution absolute (1043):=9 SIMOTION: Encodersystem:= rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute encoderMode=ENDAT AbsEncoder. AbsResolution:=32 AbsDataLength:=17 AbsResolutionMultipliercyclic: = 0 (2048) AbsResolutionMultiplierabsolute: = 0 (512)	Masterdrives MC parameters: U922.1:= 100 P171:= 12 P183.1:= xxx2 SIMOTION: Encodersystem:=rotatory_system Encodertype:= sensor_absolute / sensor_cyclic_absolute encoderMode=ENDAT AbsEncoder. AbsResolution:=32 AbsDataLength:=17 AbsResolutionMultipliercyclic:=128 AbsResolutionMultiplierabsolute:=4
Endat absolut encoder	SIEMENS 6FX2001-5HE25 EnDat 25 Bit	Use possible with drive	Connection to D4x5 via SME25 SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* EncoderSystem:=rotatory_system EncoderType:= sensor_absolute / sensor_cyclic_absolute EncoderMode= ENDAT AbsEncoder. AbsResolution := 512 AbsDataLength := 21 AbsResolutionMultipliercyclic: = 0 (2048) AbsResolutionMultiplierabsolute: = 0 (512)	In conjunction with SIMOTION, not used on 611 U	In conjunction with SIMOTION, not used on MASTERDRIVES MC

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
Incremental sin/cos motor encoder	Optical incremental encoder sin/cos 1 Vpp 2048 S/R ERN1381 / 1387 1Fxxxxx-xxxxx-xAxx Encoder system for motors with DRIVE-CliQ interface: 1Fxxxxx-xxxxx-xDxx	Use possible with drive	Connection via SMC20/SMI20 SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* Encodersystem:=rotatory_system Encodertype:= sensor_incremental encoderMode= sinus_vpp IncResolution:=2048 IncResolutionMultipliercyclic: = 0 (2048)	611U parameters: Encoder lines (1005): 2048 Encoder fine resolution (1042):=11 Encoder fine resolution absolute (1043):=9 SIMOTION: Encodersystem:= rotatory_system Encodertype:= sensor_incremental encoderMode=sinus_vpp IncEncoder. IncResolution:=2048 IncResolutionMultipliercyclic: = 0 (2048)	Masterdrives MC parameters: U922.1:= 120 P171:= 22 P183.1:= xxx1 SIMOTION: Encodersystem:=rotatory_system Encodertype:= sensor_incremental encoderMode= sinus_vpp IncEncoder. IncResolution:=2048 IncResolutionMultipliercyclic: = 0 (2048)
Incremental sin/cos-encoder	SIEMENS 6FX2001-3EC50 sin/cos 1 Vpp 2500 S/R	Use possible with drive	Connection to D4x5 via SME20 SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* EncoderSystem:=rotatory_system EncoderType:= sensor_incremental EncoderMode=sinus_1vpp IncEncoder. IncResolution:=2500 IncResolutionMultipliercyclic: = 0 (2048)	In conjunction with SIMOTION, not used on 611 U	In conjunction with SIMOTION, not used on MASTERDRIVES MC

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
Resolver	2-pin: 1Fxxxxx-xxxxx-xTxx multi-pole: 1Fxxxxx-4xxxx-xSxx Encoder system for motors with DRIVE-CliQ interface: 2-pin: 1Fxxxxx-xxxxx-xPxx multi-pole: 1Fxxxxx-4xxxx-xUxx	Use possible with drive	Connection via SMC10/SMI10 Only 2-, 4- , 6- and 8-pin resolvers are possible (Resolver pin-pair count:=1,2,3 or 4) SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* Encodersystem:=rotatory_system Encodertype:=sensor_incremental encoderMode= RESOLVER IncEncoder.IncResolution:= 1 (2-pin) 2 (4-pin) 3 (6-pin) 4 (8-pin) (corresponds to the number of pin pairs) IncResolutionMultipliercyclic: = 0 (2048) SINAMICS: P418 :=11	611U parameters: Resolver pin-pair count:=1,2,3 or 4 SIMOTION: Encodersystem:= rotatory_system Encodertype:= sensor_incremental encoderMode= RESOLVER IncEncoder.Incresolution:= *) IncResolutionMultipliercyclic:= 2048(0) *) Depending on the P1011.2 611U parameter, the following setting applies P1011.2=0: IncResolution:=1024 (2-pin) =2048 (4-pin) =3072 (6-pin) =4096 (8-pin) P1011.2=1: IncResolution:=4096 (2-pin) =8192 (4-pin) =12288 (6-pin) =16384 (8-pin)	Masterdrives MC parameters: U922.1:= 120 P183.1:= xxx1 P171:= 11 (2-pin) 12(4-pin) 13(6-pin) 13(8-pin) Note for P171: The value is calculated using the formula: P171 = 11 + x; where x = log2 (n/2) with - x must be rounded up to the next integer - log2 is logarithm to base 2 - n is the pin count of the resolver SIMOTION: Encodersystem:=rotatory_system Encodertype:= sensor_incremental encoderMode=RESOLVER IncEncoder.IncResolution:= 1 (2-pin) 2 (4-pin) 4 (6-pin) 4 (8-pin) Note for IncEncoder.IncResolution: This value is calculated from P171 using the formula: IncResolution = $2^{(P171 - 11)}$

Encoder type	Manufacturer	SIMOTION onboard relevant settings	SINAMICS S120-relevant settings	Simodrive 611U-relevant settings	Masterdrives MC-relevant settings
Resolver as absolut encoder	2-polig: 1Fxxxxx-xxxxx-xTxx	Use possible with drive	Connection via SMC10 Only 2-pin resolvers are possible (Resolver pin-pair count:=1) SIMOTION: *(see Note for the transfer of the SINAMICS parameters)* Encodersystem:=rotatory_system Encodertype:= sensor_cyclic_absolute encoderMode= RESOLVER AbsEncoder.AbsResolution:= 1 (2-pin) AbsEncoder.AbsResolutionMultiplierCyclic:= 0 (2048) AbsEncoder.AbsResolutionMultiplierAbsolute:= 0 (512) AbsEncoder.absDataLength:= 0 SINAMICS: P418 :=11 P419:=9	In conjunction with SIMOTION, not used on 611 U	In conjunction with SIMOTION, not used on MASTERDRIVES MC
AnalogSensor -Linear via an analog component e.g. SM335, TM31	BALLUF BTL6-A_10-M____-A1-S1150-10V	C2xx: EncoderSystem:=LINEAR Encodertype:=Sensor_Absolute EncoderMode=Analog_sensor EncoderIdentification:=DIRECT EncoderValueType:=POSITION DriverInfo.logAddress:=258 DriverInfo.resolution:=15 DriverInfo.format:=Value_Left_Margin DriverInfo.minValue:=-32512 DriverInfo.maxValue:=32511 DriverInfo.errorTolerance:=0.1 (An isochronous analog module is used for the position control)	For the relevant applications, used only on C2xx or distributed via ET200M	For the relevant applications, used only on C2xx or distributed via ET200M	For the relevant applications, used only on C2xx or distributed via ET200M

Encoder type	Manufacturer	SIMOTION onboard relevant settings	ADI4 / IM174 -relevant settings		
SSI-singleturn-encoder	SIEMENS 6FX2001-5HS12	Use possible with ADI4 / IM174	**ADI4 / IM174:** Encodertype: SSI Resolution: 8192 MsgLänge: 13 Encoding: Gray Baudrate: 750 kBit/s Bits reserved for fine resolution: 11 **SIMOTION:** Encodersystem:=rotatory_system Encodertype:= sensor_absolute_cyclic encoderMode=SSI AbsEncoder. AbsResolution:=8192 AbsDataLength:=13 AbsMessageformat:=pinetree AbsMultipliercyclic:=2048 AbsMultiplierabsolute:=1		
SSI Multiturn encoder	SIEMENS 6FX2001-5HS24	Use possible with ADI4 / IM174	**ADI4 / IM174:** Encodertype: SSI Resolution: 8192 MsgLength: 25 Encoding: Gray Baudrate: 750 kBit/s Bits reserved for fine resolution: 11 **SIMOTION:** Encodersystem:=rotatory_system Encodertype:= sensor_absolute_cyclic encoderMode=SSI AbsEncoder. AbsResolution:=8192 AbsDataLength:=25 AbsMessageFormat:=pinetree AbsMultiplierCyclic:=2048 AbsMultiplierAbsolute:=1		

TTL-encoder	SIEMENS AG 6FX2001-2GB02	Use possible with ADI4 / IM174	**ADI4 / IM174:** Encodertype: TTL Resolution: 1024 Bits reserved for fine resolution: 11 **SIMOTION:** Encodersystem:=rotatory_system Encodertype:= sensor_incremental EncoderMode=RECTANGLE_TTL IncEncoder. IncResolution:=1024 IncResolutionMultipliercyclic:=2048		