New functionalities for LXM05

AC Servo drive
Extension to product manual

V1.00, 08.2008

Telemecanique

Schneider Electric

Important information

The new functionalities described in this manual are additions to the device functions described in the product manual. Always read the product manual carefully prior to commissioning.

The chapter "Safety" in the product manual contains additional important information.

Not all product variants are available in all countries.
Please consult the current catalog for information on the availability of product variants.

We reserve the right to make changes during the course of technical developments.

All details provided are technical data and not warranted quality.

In general, product names must be considered to be trademarks of the respective owners, even if not specifically identified as such.

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1   LXM05A

These new functionalities are available from software version 1.501. The leading document is the product manual for the device.

Source product manuals   The current product manuals are available for download from the Internet.
http://www.schneider-electric.com

1.1   "Quick Stop" with deceleration ramp

So far   The "Quick Stop" function decelerates the motor very quickly when a Class 1 or Class 2 error or a software stop occur. Until now, the motor was always decelerated with a torque ramp.

New   When the "Quick Stop" function is triggered, the motor can also be decelerated with a deceleration ramp in the Profile Position, Profile Velocity and Motion Sequence operating modes.

Prerequisite   • Software version from 1.501

• can only be performed in fieldbus control mode and only via fieldbus

• Available for operating modes with profile generator only (profile position, profile velocity and motion sequence). In all other operating modes, deceleration is only possible with a torque ramp.

Function principle   The motor may be decelerated via a deceleration ramp or a torque ramp. Set the type of deceleration with the LIM_QStopReact parameter.

▶ Use the LIM_QStopReact parameter to define the required type of deceleration.

▶ Use the RAMPquickstop parameter to define a required deceleration ramp or the LIM_I_maxQSTP parameter to set a required maximum current for the torque ramp.

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
LIM_QStopReact - -	Type of deceleration for Quick Stop **6 / Deceleration ramp**: Deceleration ramp **7 / Torque ramp**: Torque ramp Setting of deceleration ramp with parameter RAMPquickstop. Setting of torque ramp with parameter LIM_I_maxQSTP. The deceleration ramp is only available for operating modes with profile generator. The torque ramp is always used in the operating modes without profile generator.	- 6 7 7	INT16 INT16 R/W per. -	CANopen 605A:0$_h$ Modbus 1584
RAMPquickstop - -	Deceleration ramp for Quick Stop Deceleration of the drive when a software stop is triggered or if an error of error class 1 has occurred.	(1/min)/s 200 6000 3000000	UINT32 UINT32 R/W per. -	CANopen 3006:12$_h$ Modbus 1572
LIM_I_maxQSTP SET- - LiQS 5Et - - L, 95	Current limitation for Quick Stop Max. current during braking via torque ramp due to an error of error classes 1 or 2 and when a software stop is triggered. Maximum and default settings depend on the motor and the power amplifier (settings M_I_max and PA_I_max) In increments of 0.01Apk	A$_{pk}$ - - -	UINT16 UINT16 R/W per. -	CANopen 3011:5$_h$ Modbus 4362

1.2   "Halt" with deceleration ramp

So far   The "Halt" function temporarily interrupts the running operation and stops the motor. Until now, the motor was always stopped with a torque ramp.

New   When the "Halt" function is triggered, the motor may also be decelerated with a deceleration ramp in the Profile Position, Profile Velocity and Motion Sequence operating modes.

Prerequisite   • Software version from 1.501

• can only be performed in fieldbus control mode and only via fieldbus

• Available for operating modes with profile generator only (profile position, profile velocity and motion sequence). In all other operating modes, deceleration is only possible with a torque ramp.

Function principle   The motor may be decelerated via a deceleration ramp or a torque ramp. Set the type of deceleration with the LIM_HaltReaction parameter.

▶ Use the LIM_HaltReaction parameter to define the required type of deceleration.

▶ Use the RAMPdecel parameter to define a required deceleration ramp or the LIM_I_maxHalt parameter to set a required maximum current for the torque ramp.

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
LIM_HaltReaction - -	Type of deceleration for halt **1 / Deceleration ramp**: Deceleration ramp **3 / Torque ramp**: Torque ramp Setting of deceleration ramp with parameter RAMPdecel. Setting of torque ramp with parameter LIM_I_maxHalt. The deceleration ramp is only available for operating modes with profile generator. The torque ramp is always used in the operating modes without profile generator.	- 1 3 3	INT16 INT16 R/W per. -	CANopen 605D:0$_h$ Modbus 1582
RAMPdecel - -	Deceleration of profile generator	(1/min)/s 750 750 3000000	UINT32 UINT32 R/W per. -	CANopen 6084:0$_h$ Modbus 1558
LIM_I_maxHalt SET- - LihA 5EE - - L, hR	Current limitation for Halt Max. current during braking after Halt or when an operating mode is terminated. Maximum and default settings depend on the motor and the power amplifier (settings M_I_max and PA_I_max) In increments of 0.01Apk	A$_{pk}$ - - -	UINT16 UINT16 R/W per. -	CANopen 3011:6$_h$ Modbus 4364

1.3   Saving the preferred method of reference movement

So far Homing establishes an absolute dimension reference of the motor position to a defined axis position. There are various methods of homing which can be selected via the HMmethod parameter. The preferred method of reference movement could not yet be stored.

New The preferred method of reference movement can be specified in the SaveHomeMethod parameter.

Prerequisite • Software version from 1.501

• can only be performed in fieldbus control mode and only via fieldbus

Function principle The SaveHomeMethod parameter is used to save the preferred method of reference movement persistently in the EEPROM. When the preferred method was defined in this parameter, the method will be performed during homing even after the device has been switched off and on. The value to be entered corresponds to the value in the HMmethod parameter.

If the SaveHomeMethod parameter is not modified, the default reference movement is to the positive limit switch (LIMP).

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
SaveHomeMethod - -	Default homing method	- 1 18 35	INT16 INT16 R/W per. -	CANopen 301B:1C$_h$ Modbus 6968
HMmethod - -	Homing method 1: LIMN with index pulse 2: LIMP with index pulse 7: REF+ with index pulse, inv., outside 8: REF+ with index pulse, inv., inside 9: REF+ with index pulse, not inv., inside 10: REF+ with index pulse, not inv., outside 11: REF- with index pulse, inv., outside 12: REF- with index pulse, inv., inside 13: REF- with index pulse, not inv., inside 14: REF- with index pulse, not inv., outside 17: LIMN 18: LIMP 23: REF+, inv., outside 24: REF+, inv., inside 25: REF+, not inv., inside 26: REF+, not inv., outside 27: REF-, inv., outside 28: REF-, inv., inside 29: REF-, not inv., inside 30: REF-, not inv., outside 33: Index pulse neg. direction 34: Index pulse pos. direction 35: Position setting Abbreviations: REF+: Search movement in pos. direction REF-: Search movement in pos. direction inv.: Invert direction in switch not inv.: Direction not inverted in switch outside: Index pulse / distance outside switch inside: Index pulse / distance inside switch	- 1 18 35	INT8 INT16 R/W - -	CANopen 6098:0$_h$ Modbus 6936

1.4 Threshold values and windows

- The "current threshold reached" and "speed threshold reached" thresholds can be assigned to configurable outputs in all operating modes

- Threshold values and windows ("current threshold reached", "speed threshold reached", "in position window", "in speed window") can be output in the DS402 status word, Bit11

1.4.1 Threshold values ("current threshold reached", "speed threshold reached")

So far The "current threshold reached" and "speed threshold reached" functions could only be assigned to configurable outputs in some operating modes.

New The "current threshold reached" und "speed threshold reached" functions can now be assigned to the configurable outputs in all operating modes

Prerequisite • Software version from 1.501

Function principle The "current threshold reached" and "speed threshold reached" functions are available in all operating modes and can be assigned to the configurable outputs. (See "Configurable inputs and outputs" in the product manual).

Function	Jog	Electronic gear	Speed control	Current control	Motion sequence	CANopen / Modbus
Speed threshold reached	•	•	•	•	•	•
Current threshold reached	•	•	•	•	•	•

1.4.2 Thresholds ("current threshold reached", "speed threshold reached") and windows ("in position window", "in speed window")

So far The status of the "current threshold reached", "speed threshold reached", "in position window" and "in speed window" was not mapped in any parameter.

New The previously unused Bit 11 in the `DCOMstatus` parameter can now indicate the status of the "current threshold reached", "speed threshold reached", "in position window" or "in speed window" functions. The value to be indicated can be set via the `SelectIntLim` parameter.

Prerequisite • Software version from 1.501

Function principle Bit 11 in the `DCOMstatus` parameter signals whether a defined current value or speed is exceeded or if a speed range or position deviation is kept. The value to be indicated can be defined in the `SelectIntLim` parameter.

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
SelectIntLim - -	Selection of internal limit for statusword (DS402) **0 / not used (reserved)**: Bit 11 of statusword (DS402) not used (reserved) **1 / Current threshold reached**: Bit 11 of statusword (DS402): Current threshold reached **2 / Speed threshold reached**: Bit 11 of statusword (DS402): Speed threshold reached **3 / In Position Window**: Bit 11 of statusword (DS402): In Position Window **4 / In Speed Window**: Bit 11 of statusword (DS402): In Speed Window	- 0 0 4	UINT16 UINT16 R/W - -	CANopen 301B:1B$_h$ Modbus 6966
DCOMstatus - -	Drivecom status word Refer to chapter Operation, State Machine for bit coding information. Bit0-3,5,6: Status bits Bit4: Voltage enabled Bit7: Warning Bit8: HALT request active Bit9: Remote Bit10: Target reached Bit11: Internal limit active Bit12: Op. mode-specific Bit13: x_err Bit14: x_end Bit15: ref_ok	- - 0 -	UINT16 UINT16 R/- - -	CANopen 6041:0$_h$ Modbus 6916

1.5 Working range with multiturn encoder

So far   When a motor with multiturn encoder is moved counter-clockwise from the absolute position 0, the multiturn encoder encounters an underrun of its absolute position. In contrast, the internal actual position counts mathematically forward and delivers a negative position value. After switching off and on, the internal actual position no longer corresponds with the negative position value but the absolute position of the encoder (e.g. a position of -10 rotations before switching off becomes an absolute position of 4086 revolutions after switching on again).

New   The ShiftEncWorkRang parameter is used to define whether the working range is 0...4096 rotations as it was until now or whether the working range is -2048...+2048 rotations.

Prerequisite   • Software version from 1.501

Function principle   ShiftEncWorkRang = 0: The working range is defined from 0 ... 4096 rotations. Function as described in the product manual.
ShiftEncWorkRang = 1: The working range is defined from -2048 ... 2048 revolutions. With a typical application (positive and negative direction of rotation), the working range of the motor is in the constant range of the encoder.
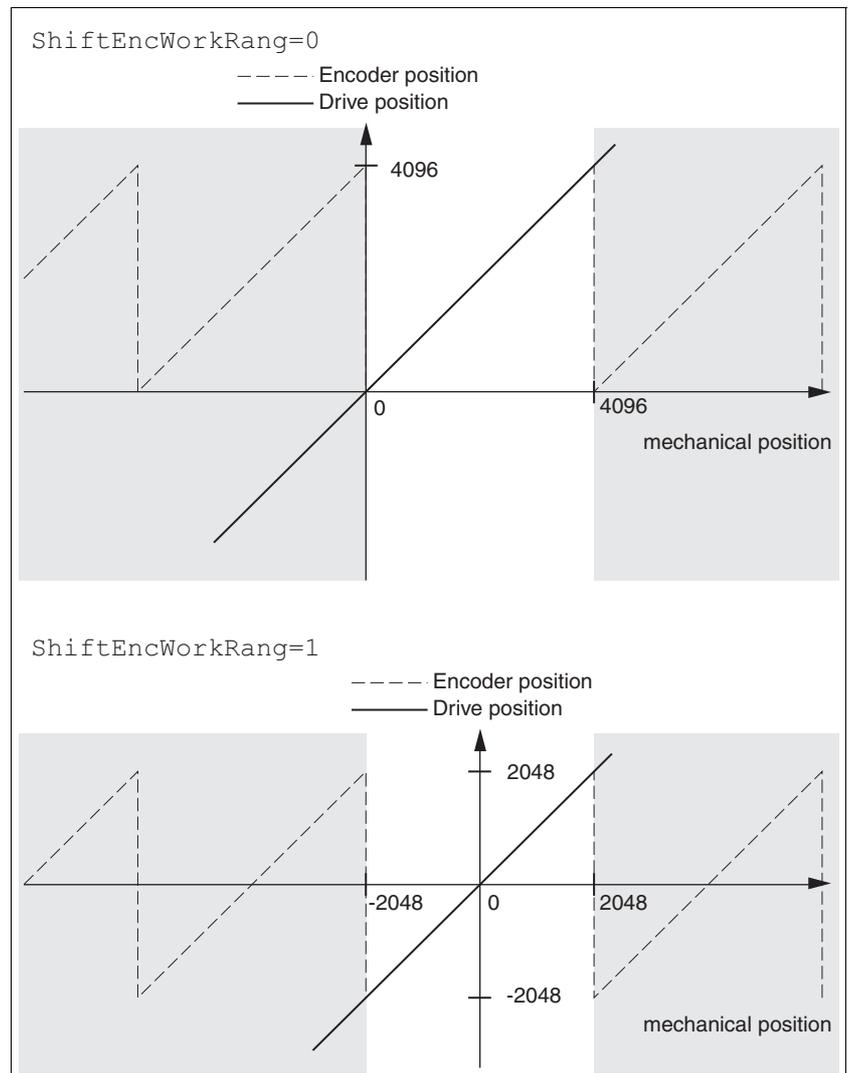
Figure 1.1   Position values of multiturn encoder

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
ShiftEncWorkRang - -	Shifting the encoder working range **0 / not shifted**: Working range: 0 to maximum number of encoder revolutions **1 / shifted**: Working range: negative half of maximum number of encoder revolutions to positive half of maximum number of encoder revolutions Available in software version V1.501 and higher.	- 0 0 1	UINT16 UINT16 R/W per. -	CANopen 3005:20$_h$ Modbus 1344

2   LXM05B

These new functionalities are available from software version 1.501. The leading document is the product manual for the device.

Source product manuals   The current product manuals are available for download from the Internet.
http://www.schneider-electric.com

2.1   "Quick Stop" with deceleration ramp

So far   The "Quick Stop" function decelerates the motor very quickly when a Class 1 or Class 2 error or a software stop occur. Until now, the motor was always decelerated with a torque ramp.

New   When the "Quick Stop" function is triggered, the motor can also be decelerated with a deceleration ramp in the Profile Position, Profile Velocity and Motion Sequence operating modes.

Prerequisite   • Software version from 1.501

• can only be performed in fieldbus control mode and only via fieldbus

• Available for operating modes with profile generator only (profile position, profile velocity and motion sequence). In all other operating modes, deceleration is only possible with a torque ramp.

Function principle   The motor may be decelerated via a deceleration ramp or a torque ramp. Set the type of deceleration with the LIM_QStopReact parameter.

▶ Use the LIM_QStopReact parameter to define the required type of deceleration.

▶ Use the RAMPquickstop parameter to define a required deceleration ramp or the LIM_I_maxQSTP parameter to set a required maximum current for the torque ramp.

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
LIM_QStopReact - -	Type of deceleration for Quick Stop **6 / Deceleration ramp**: Deceleration ramp **7 / Torque ramp**: Torque ramp Setting of deceleration ramp with parameter RAMPquickstop. Setting of torque ramp with parameter LIM_I_maxQSTP. The deceleration ramp is only available for operating modes with profile generator. The torque ramp is always used in the operating modes without profile generator.	- 6 7 7	INT16 INT16 R/W per. -	Modbus 1584 Profibus 1584
RAMPquickstop - -	Deceleration ramp for Quick Stop Deceleration of the drive when a software stop is triggered or if an error of error class 1 has occurred.	(1/min)/s 200 6000 3000000	UINT32 UINT32 R/W per. -	Modbus 1572 Profibus 1572
LIM_I_maxQSTP SET- - LiQS 5Et - - L, 95	Current limitation for Quick Stop Max. current during braking via torque ramp due to an error of error classes 1 or 2 and when a software stop is triggered. Maximum and default settings depend on the motor and the power amplifier (settings M_I_max and PA_I_max) In increments of 0.01Apk	A_{pk} - - -	UINT16 UINT16 R/W per. -	Modbus 4362 Profibus 4362

2.2 "Halt" with deceleration ramp

So far The "Halt" function temporarily interrupts the running operation and stops the motor. Until now, the motor was always stopped with a torque ramp.

New When the "Halt" function is triggered, the motor may also be decelerated with a deceleration ramp in the Profile Position, Profile Velocity and Motion Sequence operating modes.

Prerequisite • Software version from 1.501

• can only be performed in fieldbus control mode and only via fieldbus

• Available for operating modes with profile generator only (profile position, profile velocity and motion sequence). In all other operating modes, deceleration is only possible with a torque ramp.

Function principle The motor may be decelerated via a deceleration ramp or a torque ramp. Set the type of deceleration with the LIM_HaltReaction parameter.

▶ Use the LIM_HaltReaction parameter to define the required type of deceleration.

▶ Use the RAMPdecel parameter to define a required deceleration ramp or the LIM_I_maxHalt parameter to set a required maximum current for the torque ramp.

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
LIM_HaltReaction - -	Type of deceleration for halt **1 / Deceleration ramp**: Deceleration ramp **3 / Torque ramp**: Torque ramp Setting of deceleration ramp with parameter RAMPdecel. Setting of torque ramp with parameter LIM_I_maxHalt. The deceleration ramp is only available for operating modes with profile generator. The torque ramp is always used in the operating modes without profile generator.	- 1 3 3	INT16 INT16 R/W per. -	Modbus 1582 Profibus 1582
RAMPdecel - -	Deceleration of profile generator	(1/min)/s 750 750 3000000	UINT32 UINT32 R/W per. -	Modbus 1558 Profibus 1558
LIM_I_maxHalt SET- - LihA SEt - - Lı hR	Current limitation for Halt Max. current during braking after Halt or when an operating mode is terminated. Maximum and default settings depend on the motor and the power amplifier (settings M_I_max and PA_I_max) In increments of 0.01Apk	A_{pk} - - -	UINT16 UINT16 R/W per. -	Modbus 4364 Profibus 4364

2.3   Saving the preferred method of reference movement

So far   Homing establishes an absolute dimension reference of the motor position to a defined axis position. There are various methods of homing which can be selected via the HMmethod parameter. The preferred method of reference movement could not yet be stored.

New   The preferred method of reference movement can be defined in the SaveHomeMethod parameter.

Prerequisite   • Software version from 1.501

• can only be performed in fieldbus control mode and only via fieldbus

Function principle   The SaveHomeMethod parameter is used to save the preferred method of reference movement persistently in the EEPROM. When the preferred method was defined in this parameter, the method will be performed during homing even after the device has been switched off and on. The value to be entered corresponds to the value in the HMmethod parameter.

If the SaveHomeMethod parameter is not modified, the default reference movement is to the positive limit switch (LIMP).

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
SaveHomeMethod - -	Default homing method	- 1 18 35	INT16 INT16 R/W per. -	Modbus 6968 Profibus 6968
HMmethod - -	Reference movement type **0 / deactivate**: Deactivated **1 / LIMN indexpuls**: LIMN with index pulse **2 / LIMP indexpuls**: LIMP with index pulse **7 / REFpos indexpuls**: REF+ with index pulse, inv., outside **8 / REFneg indexpuls**: REF+ with index pulse, inv., inside **9**: REF+ with index pulse, not inv., inside **10**: REF+ with index pulse, not inv., outside **11**: REF- with index pulse, inv., outside **12**: REF- with index pulse, inv., inside **13**: REF- with index pulse, not inv., inside **14**: REF- with index pulse, not inv., outside **17 / LIMN**: LIMN **18 / LIMP**: LIMP **23 / REFpos**: REF+, inv., outside **24**: REF+, inv., inside **25**: REF+, not inv., inside **26**: REF+, not inv., outside **27 / REFneg**: REF-, inv., outside **28**: REF-, inv., inside **29**: REF-, not inv., inside **30**: REF-, not inv., outside **33**: Index pulse neg. direction **34**: Index pulse pos. Direction Abbreviations: REF+: Search movement in pos. direction REF-: Search movement in pos. direction inv.: Invert direction in switch not inv.: Direction not inverted in switch outside: Index pulse / distance outside switch inside: Index pulse / distance inside switch	- 0 - 35	UINT16 UINT16 R/W - -	Modbus 10242 Profibus 10242

2.4   External encoder

Availability   The function is available from software version 1.501.

Function principle   The "External Encoder" function can be used to transmit positioning values to the position controller using a digital incremental encoder (e.g. a linear glass scale), independently of the motor encoder.
This external encoder can be used to carry out direct position measurement in the installation (actual position).
The external encoder has no influence on the speed and current controllers. The motor encoder always has affects the speed of rotation and current controller.
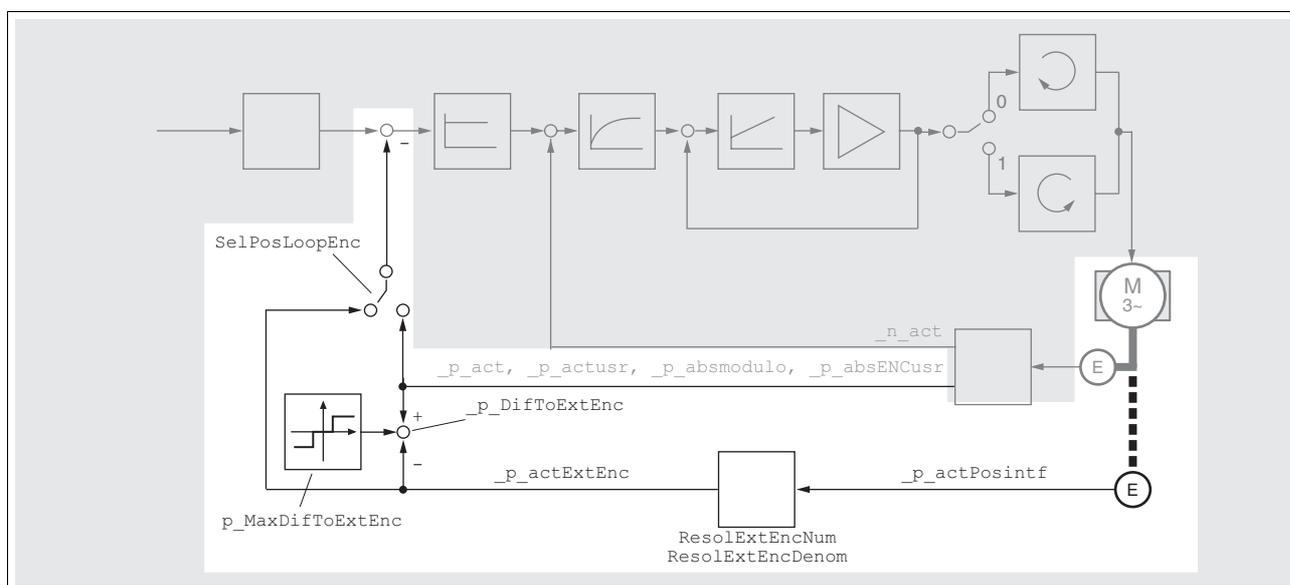

Figure 2.1   Controller structure with external encoder

Connection external encoder   The external encoder is connected to input CN5, see also chapter "Connecting sensor signals A,B" in the product manual. The following must be taken into consideration:

- The external encoder occupies the connection CN5. Neither "Electronic Gear" operating mode nor the ESIM function is possible.

- Only A/B signals are evaluated.

- The external A/B encoder must not exceed a maximum frequency of 1.6MHz or 400kHz for each A/B signal (quadruple evaluation).

- The external encoder must have a separate power supply.

- The `IOposInterfac` parameter must be set to "0 / ABinput".

Changing the motion dynamics   The motion dynamics of the system change, especially with a soft coupling. The position controller receives the position information with a time delay caused by the chain of mechanical couplings. Slip between the motor shaft, mechanical components and the external encoder must be avoided

Influence on the positioning accuracy

The positioning accuracy can also change, depending upon the resolution of the external encoder. If the encoder resolution is lower, the running of the motor will be rougher and the noise from the motor will increase.

For example, a Hiperface motor encoder has a resolution of 1024 increments per revolution and acts on a 12bit analog-digital converter. Internal calculations are then based on 8388608 increments per revolution. With an external digital encoder having a resolution of 1024 increments per revolution, internal calculations are based on 4096 increments. The accuracy of the external encoder is thus less by a factor of 2048. A mechanical gearbox between the motor shaft and the external encoder impairs this result again, depending upon the gear ratio.

An absolute position is not possible

The signals of the external encoder are only counted incrementally. The counter starts at 0 every time you switch on. There is no absolute position.

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
IOposInterfac DRC- - ioPi *drC- -ı oPı*	Signal selection position interface **0 / ABinput / Rb**: Input ENC_A, ENC_B, ENC_I (index pulse) quadruple evaluation **1 / PDinput / Pd**: Input PULSE, DIR **2 / ESIMoutput / ESı П**: Output ESIM_A, ESIM_B, ESIM_I RS422 I/O interface (Pos) IMPORTANT: Changed settings do not become active until the unit is switched on the next time.	- 0 0 2	UINT16 UINT16 R/W per. -	Modbus 1284 Profibus 1284

Setting the resolution

The values of the external encoder must be set using the `ResolExtEncNum` and `ResolExtEncDenom` parameters.
Example:
The motor is mounted on a linear axis with gearbox.
Gear ratio i=3:1
Linear axis: 1 revolution of the shaft corresponds to 100mm
Linear measuring system: Signal period 20 μm
Permanently set evaluation: quadruple

`ResolExtEncNum`= 100mm(travel/revolution) * 1(gear ratio)
`ResolExtEncDenom` =(20μm/4(evaluation)) * 3 (gear ratio)
`ResolExtEncNum` / `ResolExtEncDenom`=100/0.015= 20000/3

Three motor revolutions thus create 20000 encoder increments. The value 20000 must be entered in the `ResolExtEncNum` parameter and the value 3 must be entered in the `ResolExtEncDenom` parameter.

If the calculation produces a decimal value with decimal places, the value must be rounded.

Improved resolution is achieved if the values are multiplied.

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Example: The calculation produces 7853.98 encoder increments per revolution. Therefore, the rounded value 7854 must be entered for `ResolExtEncDenom`. If you do not refer to one revolution, but to 50 revolutions, for example, (`ResolExtEncNum` =50) a value of 392699 is produced for `ResolExtEncDenom` (which is thus 1 increment more accurate than the rounded value 392700).

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
ResolExtEncNum - -	Resolution of external encoder, numerator Specification of the encoder increments the external encoder returns for one or several revolutions of the motor shaft. The value is indicated with a numerator and a denominator so that it is possible, for example, to consider the gear ratio of a mechanical gearing. In the case of opposing directions of rotations of motor encoder and external encoder, a negative numerator value must be entered. Note: The value may not be set to 0. The resolution factor is not applied until this numerator value is specified. Example: One motor revolution causes 1/3 encoder revolution at an encoder resolution of 16384 EncInc/revolution. $$\frac{ResolExtEncNum}{ResolExtEncDenom} = \frac{16384\ EncInc}{3\ revolutions}$$ Available in software version V1.501 and higher.	EncInc - 10000 -	INT32 INT32 R/W per. -	Modbus 1338 Profibus 1338
ResolExtEncDenom - -	Resolution of external encoder, denominator Refer to ResolExtEncNum Denominator as positive 32 bit number, maximum value 1 million. Available in software version V1.501 and higher.	revolution 1 1 1000000	INT32 INT32 R/W per. -	Modbus 1336 Profibus 1336

Position deviation   The maximum permissible difference between the internal and the external encoder must be calculated. One motor revolution corresponds to 131072 increments. The calculated value must be entered in the `p_MaxDifToExtEnc` parameter. During operation, the actual position difference can be read in the `_p_DifToExtEnc` parameter. The `_p_DifToExtEnc` parameter corresponds to the difference between `_p_act` and `_p_act_ExtEnc`

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
p_MaxDifToExtEnc - -	Max. permissible deviation of encoder positions The max. permissible position deviation between the encoder positions is cyclically monitored. If the limit is exceeded, an error is generated. The current position deviation is available via the parameter '_p_DifToExtEnc'. The default value corresponds to 1/2 motor revolution. The maximum value corresponds to one motor revolution (should not be greater for safety reasons). Available in software version V1.501 and higher.	Inc 1 65536 131072	INT32 INT32 R/W per. -	Modbus 1340 Profibus 1340
_p_DifToExtEnc - -	Current deviation of encoder positions Available in software version V1.501 and higher.	Inc - 0 -	INT32 INT32 R/- - -	Modbus 7728 Profibus 7728
_p_act - -	Actual position of motor in internal units IMPORTANT: The actual motor position is not valid until the absolute motor position has been determined. In the case of invalid absolute motor position: _WarnLatched _WarnActive Bit 13=1: Absolute motor position not yet captured	Inc - 0 -	INT32 INT32 R/- - -	Modbus 7700 Profibus 7700
_p_actExtEnc - -	Actual position of external encoder in internal units Available in software version V1.501 and higher.	Inc - 0 -	INT32 INT32 R/- - -	Modbus 7730 Profibus 7730

Checking direction of rotation Before switching on check that the direction of rotation is set correctly. The actual value of the motor encoder (_p_act parameter) and the external encoder (_p_act_ExtEnc or _p_act_ExtEncUsr) must be read. After you have rotated the motor shaft manually (e.g. moving the carriage), both parameters must be read out again. If the counting directions are different, the sign must be changed in the ResolExtEncNum parameter.
An incorrect sign accelerates the motor in an uncontrolled manner (limited by p_MaxDifToExtEnc, position deviation).

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
_p_act - -	Actual position of motor in internal units IMPORTANT: The actual motor position is not valid until the absolute motor position has been determined. In the case of invalid absolute motor position: _WarnLatched _WarnActive Bit 13=1: Absolute motor position not yet captured	Inc - 0 -	INT32 INT32 R/- - -	Modbus 7700 Profibus 7700
_p_actExtEnc - -	Actual position of external encoder in internal units Available in software version V1.501 and higher.	Inc - 0 -	INT32 INT32 R/- - -	Modbus 7730 Profibus 7730
_p_actExtEncUsr - -	Actual position of external encoder in user units Available in software version V1.501 and higher.	usr - 0 -	INT32 INT32 R/- - -	Modbus 7732 Profibus 7732
ResolExtEncNum - -	Resolution of external encoder, numerator Specification of the encoder increments the external encoder returns for one or several revolutions of the motor shaft. The value is indicated with a numerator and a denominator so that it is possible, for example, to consider the gear ratio of a mechanical gearing. In the case of opposing directions of rotations of motor encoder and external encoder, a negative numerator value must be entered. Note: The value may not be set to 0. The resolution factor is not applied until this numerator value is specified. Example: One motor revolution causes 1/3 encoder revolution at an encoder resolution of 16384 EncInc/revolution. $$\frac{\text{ResolExtEncNum}}{\text{ResolExtEncDenom}} = \frac{16384 \text{ EncInc}}{3 \text{ revolutions}}$$ Available in software version V1.501 and higher.	EncInc - 10000 -	INT32 INT32 R/W per. -	Modbus 1338 Profibus 1338

Activating the external encoder   The `SelPosLoopEnc` parameter acts like a switch which provides the position controller with either the position of the motor encoder or the signals from the external encoder. In order to write the parameters, the device must be in the state "Disable". The drive does not have to be restarted for the change in the parameter to become effective.

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
SelPosLoopEnc - -	Selection of encoder **0 / MotorEncoder**: Motor encoder **1 / ExtEncoder**: External encoder Available in software version V1.501 and higher.	- 0 0 1	UINT16 UINT16 R/W per. -	Modbus 1334 Profibus 1334

Adapting the control loop parameters for the external encoder

During initial commissioning the control loop parameters are set without activated external encoder in order to set the functionality of the entire system (Autotuning). With activated external encoder, these control loop parameters must be adapted (repeated Autotuning).

Reference movement with external encoder

If the external encoder is active, the reference movement must be carried out with the position values of the external encoder. If the external encoder is active, a reference movement to index pulse is not possible. Since the encoder only operates incrementally, a reference movement must always be carried out.

2.5   Working range with multiturn encoder

So far

When a motor with multiturn encoder is moved counter-clockwise from the absolute position 0, the multiturn encoder encounters an underrun of its absolute position. In contrast, the internal actual position counts mathematically forward and delivers a negative position value. After switching off and on, the internal actual position no longer corresponds with the negative position value but the absolute position of the encoder (e.g. a position of -10 rotations before switching off becomes an absolute position of 4086 rotations after switching on again).

New

The ShiftEncWorkRang parameter is used to define whether the working range is 0...4096 rotations as it was until now or whether the working range is -2048...+2048 rotations.

Prerequisite

• Software version from 1.501

Function principle

ShiftEncWorkRang = 0: The working range is defined from 0 ... 4096 rotations.Function as described in the product manual.
ShiftEncWorkRang = 1: The working range is defined from -2048 ... 2048 revolutions. With a typical application (positive and negative direction of rotation), the working range of the motor is in the constant range of the encoder.
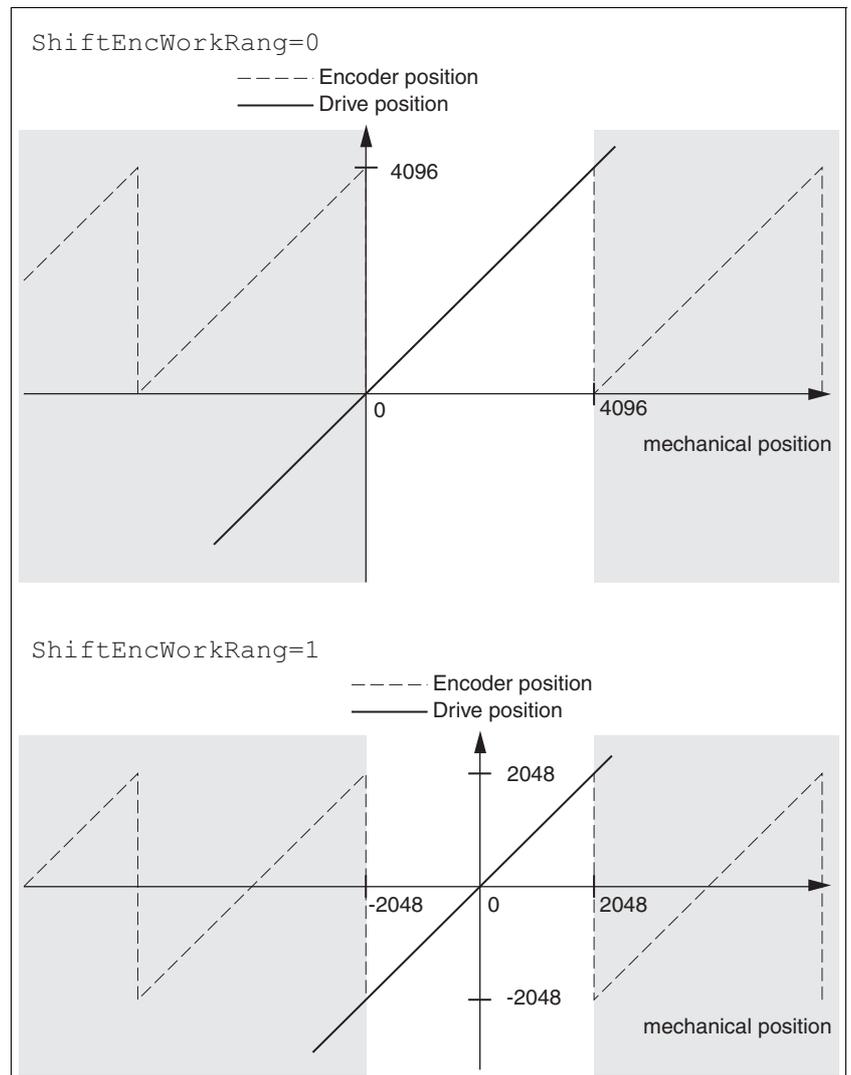
Figure 2.2   Position values of multiturn encoder

Parameter Name HMI menu	Description	Unit Minimum value Default value Maximum value	Data type R/W persistent Expert	Parameter address via fieldbus
ShiftEncWorkRang - -	Shifting the encoder working range **0 / not shifted**: Working range: 0 to maximum number of encoder revolutions **1 / shifted**: Working range: negative half of maximum number of encoder revolutions to positive half of maximum number of encoder revolutions Available in software version V1.501 and higher.	- 0 0 1	UINT16 UINT16 R/W per. -	Modbus 1344 Profibus 1344

AC Servo drive

3 LXM05C

Functionality	Page
3.1 "Threshold values ("current threshold reached", "speed threshold reached")"	25

These new functionalities are available from software version 1.501. The leading document is the product manual for the device.

Source product manuals   The current product manuals are available for download from the Internet.
http://www.schneider-electric.com

3.1 Threshold values ("current threshold reached", "speed threshold reached")

So far   The "current threshold reached" and "speed threshold reached" functions could only be assigned to configurable outputs in some operating modes.

New   • The "current threshold reached" und "speed threshold reached" functions can now be assigned to the configurable outputs in all operating modes

Prerequisite   • Software version from 1.501

Function principle   The "current threshold reached" and "speed threshold reached" functions are available in all operating modes and can be assigned to the configurable outputs. (See "Configurable inputs and outputs" in the product manual).

Function	Jog	Electronic gear	Speed control	Current control
Speed threshold reached	•	•	•	•
Current threshold reached	•	•	•	•