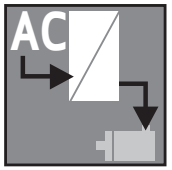
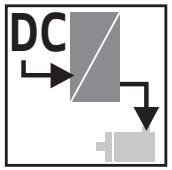
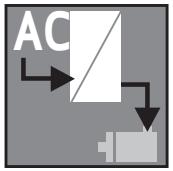


4 to 450 A



4 to 210 A



Compact

MSD Servo Drive

Specification

Option 2 - Technology

TTL encoder with commutation signals

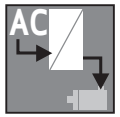
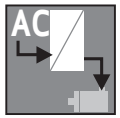
Specification Option 2 - Technology

TTL encoder with commutation signals

ID no: CB32162-001, Rev. 1.0

Date: 08/2011

This documentation applies to:

Series	Model	Hardware version	Firmware version
MSD Servo Drive Single axis system  4 to 450 A	G392-xxx-x5x-xxx G395-xxx-x5x-xxx	from Rev. C	all
MSD Servo Drive Multi axis system  4 to 210 A	G393-xxx-x5x-xxx G397-xxx-x5x-xxx	from Rev. C	all
MSD Servo Drive Compact  Compact	G394-xxx-x5x-xxx	from Rev. A	from V1.10

NOTE: This document does not replace the Operation Manuals.
Please be sure to observe the information contained in the "For your safety", "Intended use" and "Responsibility" sections of the Operation Manuals.
For information on installation, setup and commissioning, and details of the warranted technical characteristics of the Servo Drives, refer to the additional documentation (Operation Manual, User Manual, etc.).

Table of Contents

1. TTL encoder with commutation signals

1.1 Operation modes:

– Evaluation of a TTL encoder

– Processing of three differentially executed autocommutation signals, to determine the rotor position. The rotor position is resolved into six segments per pole pair and is updated during operation by way of the commutation signals.

1.2 Technical data

TTL encoder

Specification	TTL encoder		
Interface	• Wave terminating resistor built-in to device: 120 Ω • Max. cable length: 10 m • Connector: 15-pin D-SUB, High-Density, female		
	min.	max.	
Input frequency	0 Hz	500 kHz	
Input voltage: Track A, B, R	**Differential input EIA-422-compatible; pay attention to voltage range.**		
Differential switching level "High"	+ 0.1 V		
Differential switching level "Low"		-0.1 V	
Signal level reffered to ground	0	+ 5 V	
Input voltage: Track U, V, W	**EIA-422 compliant**		
Differential switching level "High"	+0.2 V		
Differential switching level "Low"		- 0,2 V	
Signal level reffered to ground	- 7 V	+ 12 V	

Table 1.1 Electrical specification of the TTL encoder input on X8

Voltage supply for external encoders

	min	max	type
• Output voltage • Output current	+ 4.75 V	+ 5.25 V 250 mA	+ 5 V

Table 1.2 Electrical specification of voltage supply for external encoder on X8

ATTENTION: No provision is made for connection of sensor cables to compensate for the voltage drop. So the chosen supply cable cross-section should take account of the voltage drop.

NOTE: The encoder supply on X8/3 is short-circuit-proof.

1.2.1 Cable type and layout

The cable type should be chosen as specified by the motor/encoder manufacturer.

Recommended:

- TTL encoder: 6 x 2 x 0.14 mm² und 1 x 2 x 0.5 mm²

The following conditions must be met:

- Use only shielded cables.
- Shield on both sides.
- Interconnect the differential track signals A, B, R and U, V, W by twisted-pair cables.
- Do not separate the encoder cable, for example to route the signals via terminals in the switch cabinet.

1.3 Pin assignment

The assignment of the 15-pin D-Sub female connector on slot X8 is set out in the following table.

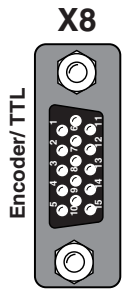
Connection	TTL encoder		
	Pin	Signal	Comments
	1	A–	Track A–
	2	A+	Track A+
	3	+5V	Encoder supply
	4	U +	Track U +
	5	U -	Track U -
	6	B–	Track B–
	7	W +	Track W +
	8	GND	+ 5 V reference potential
	9	R–	Zero pulse –
	10	R+	Zero pulse +
	11	B+	Track B+
	12	W -	Track W -
	13		
	14	V +	Track V +
	15	V -	Track V -

Table 1.3 Pin assignment of TTL encoder with commutation signals on X8.

1.4 Configuration

1.4.1 Configuration of TTL encoder channel X8

By way of TTL encoder channel X8 the following signal sources can be connected:

- TTL encoder with zero pulse
- TTL encoder with zero pulse and U, V, W commutation signals

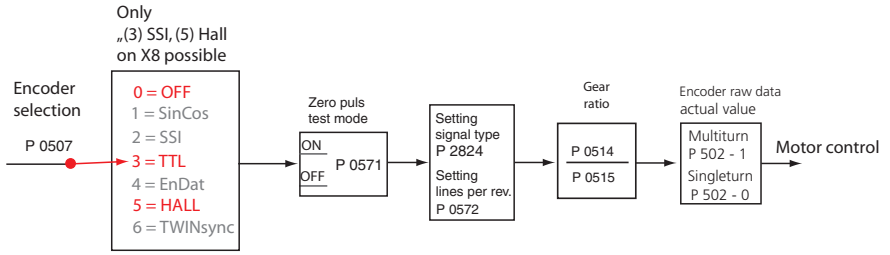


Figure 1.1 Configuration selector

Parameter no.	Setting	Designation in MDA 5	Function
P 0502		ENC_CH3_ActVal	Actual value parameter: Raw data of single-turn and multi-turn information to test encoder evaluation..
(0)	00...00hex	Singleturn	The raw data are displayed after the electronic gearing and before the scaling. Unit: Increments (see figure 1.1).
(1)	00...00hex	Multiturn	

Table 1.4 Basic settings of encoder channel

Parameter no.	Setting	Designation in MDA 5	Function
P 0507		ENC_CH3_ Sel	Selection of encoder
(0)	OFF	No function	No function
(1)	SinCos encoder	SinCos	**Function not supported**
(2)	SSI encoder	SSI	
(3)	TTL encoder	TTL	TTL encoder with zero pulse
(4)	EnDat 2.1/2.2	ENDAT	**Function not supported**
(5)	TTL encoder with commutation signals	HALL	TTL encoder with commutation signals
(6)	TWINsync	TWINsync	**Function not supported**
P 0514	-(2^{31})...+(2^{31}-1)	ENC_CH3_Num	Numerator of encoder gearing
P 0515	1...(2^{31}-1)	ENC_CH3_Denom	Denominator of encoder gearing
P 0571		ENC_CH3_NpTest	Zero pulse wiring test (more details following)
(0)	OFF	No function	No function
(1)	ON	ENABLE_ISR	Zero pulse test mode active
P 0572	Input of number of lines per revolution 1...65536	ENC_CH3_Lines	Setting of number of lines (max. 65536) of TTL encoder per motor revolution
P 2624		EncActPos	Current counter reading, for encoder simulation and encoder input
P 2824		ENC_CH3_TTL_SignalType	TTL signal type

Table 1.4 Basic settings of encoder channel

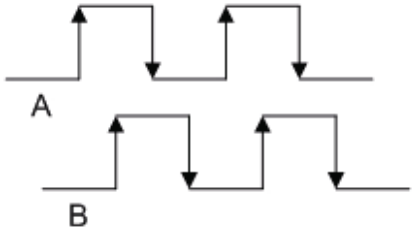
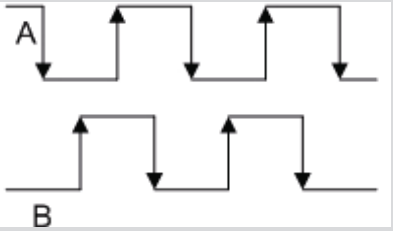
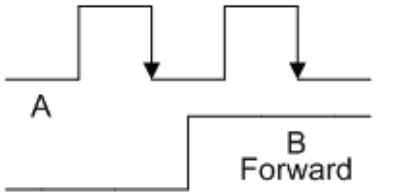
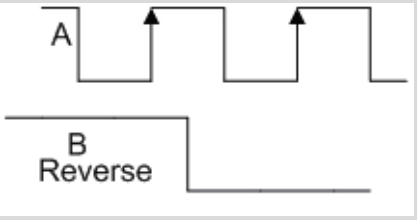
Setting	Function	Example
AF_B (0)	• TTL signals (track A, track B) • Direction of rotation of "slave axis" equal to "master axis"	
AR_B (1)	• TTL signals (track A, track B) • Direction of rotation of "slave axis" in inverse proportion to "master axis"	
ABDFN (2)	• Pulse-direction signals (track A: puls; track B: direction) • With a rising edge of track B positive direction • Only falling edges of track A are evaluated.	
ABDRP (3)	• Pulse-direction signals (track A: puls; track B: direction) • With a falling edge of track B negative direction • Only rising edges of track A are evaluated.	

Table 1.5 Function description – parameter ***P 2824*** *(SignalType)*

1.4.2 Zero pulse wiring test

To enable evaluation for the wiring test parameter **P 0571 = ON (1)** is set. On the oscilloscope it can then be depicted with the measurement variables CH3-Np.
To make the zero pulse clearly visible, the measurement variable remains at High level until the next zero pulse appears. Conversely, the measurement variable remains at Low level until another zero pulse appears. In this, the pulse width of the scope signal does not match the pulse width of the actual zero pulse.

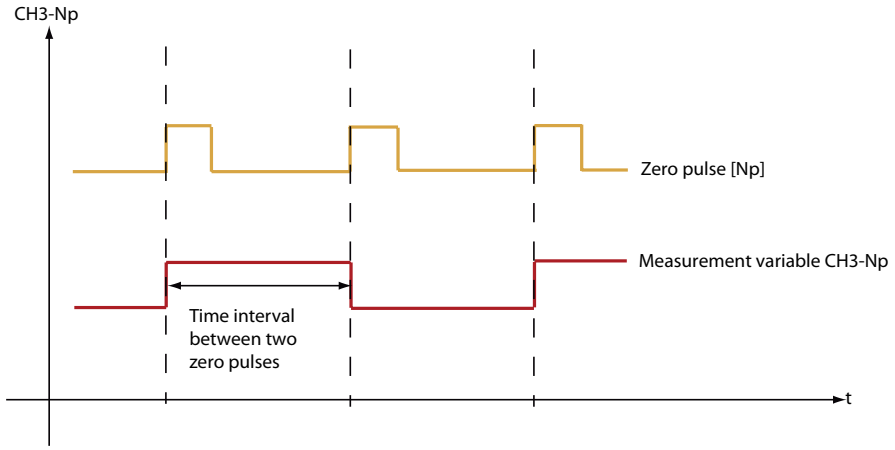


Figure 1.2 Zero pulse recording via measurement variable CH3-NP

NOTE: In zero pulse test mode zero pulse evaluation of homing runs is disabled.

1.4.3 Interface configuration of encoder for loop control

By way of **P 0520, P 0521, P 0522** the physical encoder interface is adapted to the current, speed or position controller (see figure 1.3).

Parameter no.	Setting	Designation in MDA 5	Function
P 0520		ENC_MCon: Encoder: Channel Select for Motor Commutation and Current control	Selection of encoder channel for commutation angle and current control. Feedback signal for field-oriented regulation.
P 0521		ENC_SCon: Encoder: Channel select for Speed Control	Selection of encoder channel for speed configuration. Feedback signal for speed controller
P 0522		ENC_PCon: Encoder: Channel select for Position Control	Selection of encoder channel for position information. Feedback signal for position controller
Parameter settings apply to P 0520, P 0521, P 0522			
(0)	OFF		No encoder selected
(1)	CH1		Channel 1: SinCos on X7
(2)	CH2		Channel 2: Resolver on X6
(3)	CH3		Channel 3: Option on X8

Table 1.6 Encoder configuration

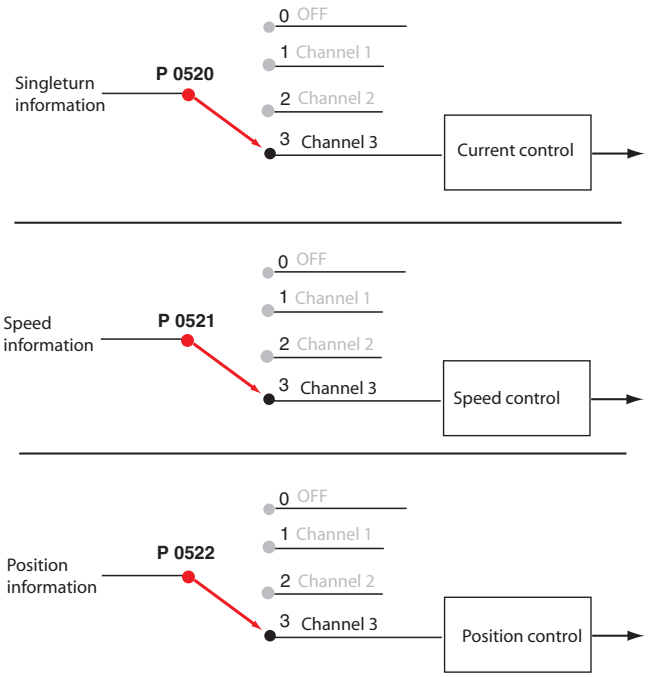


Figure 1.3 Display of encoder configuration for encoder channel X8

ATTENTION: A parameter can only be written or read with the appropriate access rights (e.g. "Local administrator"). A changed parameter must always be saved on the device.
When editable online, a parameter executes a reaction on the device immediately, so inputs must always be carefully checked.

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