

Specification

AC Servo Controller YukonDrive®

TTL-Encoder with commutation
signals



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Note:

This document does not replace the YukonDrive® Operating Manual. Please be sure to observe the information contained in the "For your safety", "Intended use" and "Responsibility" sections of the Operating Manual (ID no.: 1003370). For information on installation, setup and commissioning, and details of the warranted technical characteristics of the YukonDrive®, refer to the additional documentation (Operating Manual, User Manual, etc.).

We reserve the right to make technical changes.

The content of our specification was compiled with the greatest care and attention, and based on the latest information available to us. We should nevertheless point out that this document cannot always be updated in line with ongoing technical developments in our products. Information and specifications may be subject to change at any time. Please visit www.harmonicdrive.de for details of the latest versions.

1. TTL encoder with commutation signals

The technology module „TTL encoder with commutation tracks“ is in particular intended to connect the motor feedback systems D200 as of the FHA-C-Mini series as well as the D2048 as of the CHA-A series servo actuators.

1.1 TTL encoder operation modes

- Evaluation of a TTL encoder
- Processing of three differentially executed commutation 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

1.2.1 TTL encoder

Table 4.1 Electrical specification of the TTL encoder input on X8

Interface	• 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 RS422-compatible; pay attention to voltage range.	
Differential switching level "High"	+ 0.1 V	
Differential switching level "Low"		-0.1 V
Signal level referred to ground	0	+ 5 V
Input voltage: Track U, V, W	RS 422-compliant	
Differential switching level "High"	+0.2 V	
Differential switching level "Low"		- 0.2 V
Signal level referred to ground	- 7 V	+ 12 V

1.2.2 Voltage supply for external encoders

Table 4.2 Electrical specification of voltage supply for external encoder on X8

	min	max	typ.
Output voltage	+ 4.75 V	+ 5.25 V	+ 5 V
Output current		250 mA	



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.

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

1.2.3 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 and 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.

Table 5.1 Pin assignment of TTL encoder with commutation signals on X8

Connection	TTL encoder		
	Pin	Signal	Comments
	1	A-	Track A-
	2	A+	Track A+
	3	+5 V	Encoder supply
	4	U +	Track U +
	5	U-	Track U-
	6	B-	Track B-
	7	W +	Track W +
	8	GND	Encoder supply reference
	9	R-	Zero pulse -
	10	R+	Zero pulse +
	11	B+	Track B+
	12	W-	Track W-
	13	n.c.	not connected
	14	V+	Track V +
	15	V-	Track V-

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 signal

Note: Configuration already done when using a YukonDrive® which has been delivered for a designated actuator.

Do not change settings.

Illustration 6.1

Configuration selector

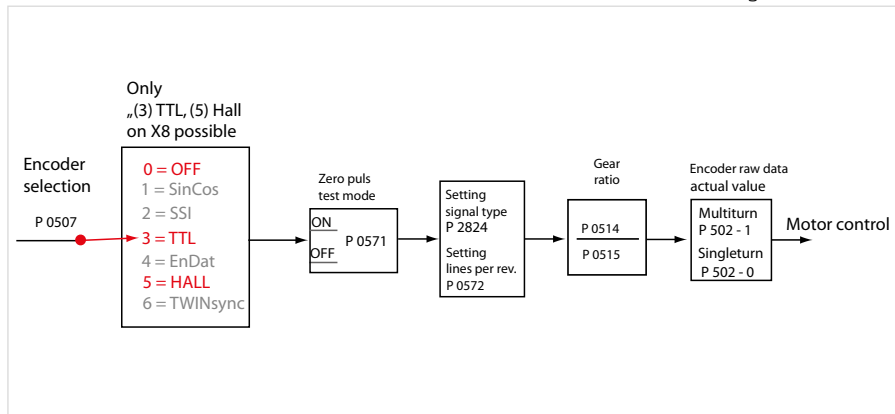


Table 6.2

Basic setting of encoder channel

Parameter no.	Setting	Designation in DMS	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	Single-turn	The raw data are displayed after the electronic gearing and before the scaling. Unit: Increments (see illustration 6.1).
(1)	00...00hex	Multi-turn	

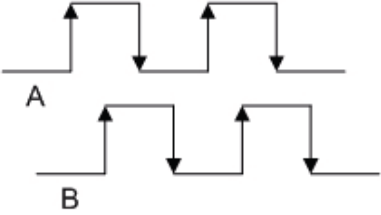
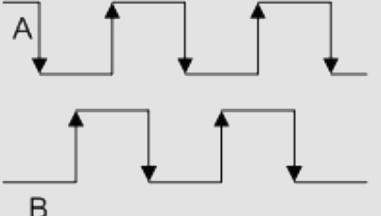
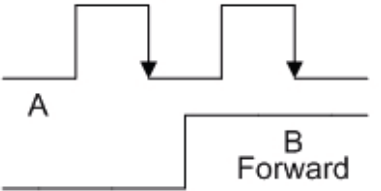
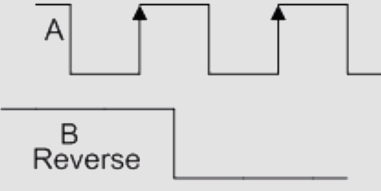
Table 7.1

Basic setting of encoder channel

Parameter no.	Setting	Designation in DM5	Function
P 0507		ENC_CH3_Sel	Selection of encoder
(0)	OFF	No function	No function
(1)	SinCos-Geber	SinCos	Function not supported
(2)	SSI-Geber	SSI	Function not supported
(3)	TTL-Geber	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. Default setting for FHA-C-Mini with D200 and CHA-A with D2048 motor feedback.
(6)	TWINSync	TWINSync	Function not supported
P 0514	$-(2^{15}) \dots + (2^{15}-1)$	ENC_CH3_Num	Numerator of encoder gearing
P 0515	$1 \dots (2^{31}-1)$	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 1...65536	ENC_CH3_Lines	Setting of number of lines (max. 65536) of TTL encoder per motor revolution. For FHA-C-Mini with D200 = 2000, for CHA-A with D2048 = 2048
P2624		EncActPos	Current counter reading, for encoder simulation and encoder input
P2824		ENC_CH3_TTL_Signal Type	TTL signal type

Table 8.1

Function description - parameter P 2824 (SignalType)

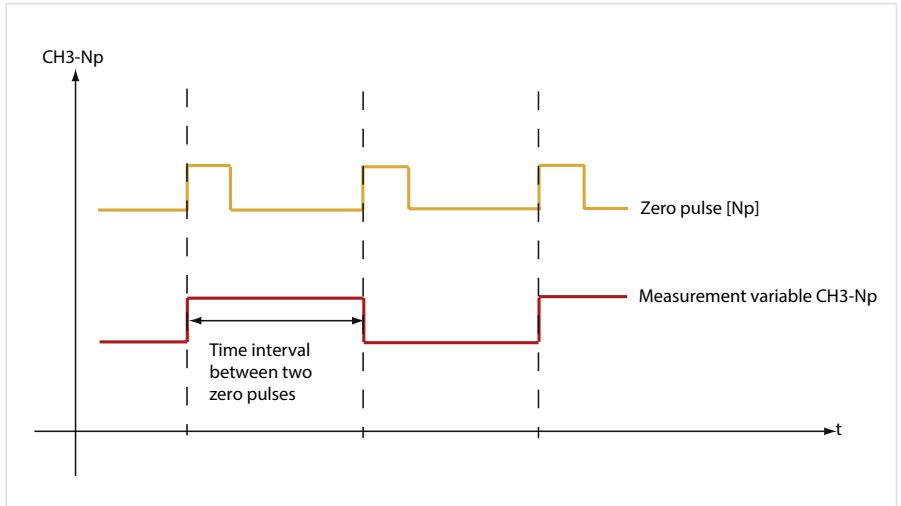
Setting	Function	Example
AF_B (0)	TTL signals (track A, track B) Direction of rotation of „slave axis“ equal to „master axis“	
AR_B (1)	TTL signals (track A, track B) Direction of rotation of „slave axis“ in inverse proportion to „master axis“	
ABDFN (2)	Pulse-direction signals (track A: puls; track 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.	

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.

Illustration 9.1

Zero pulse recording via measurement variable CH3-NP



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

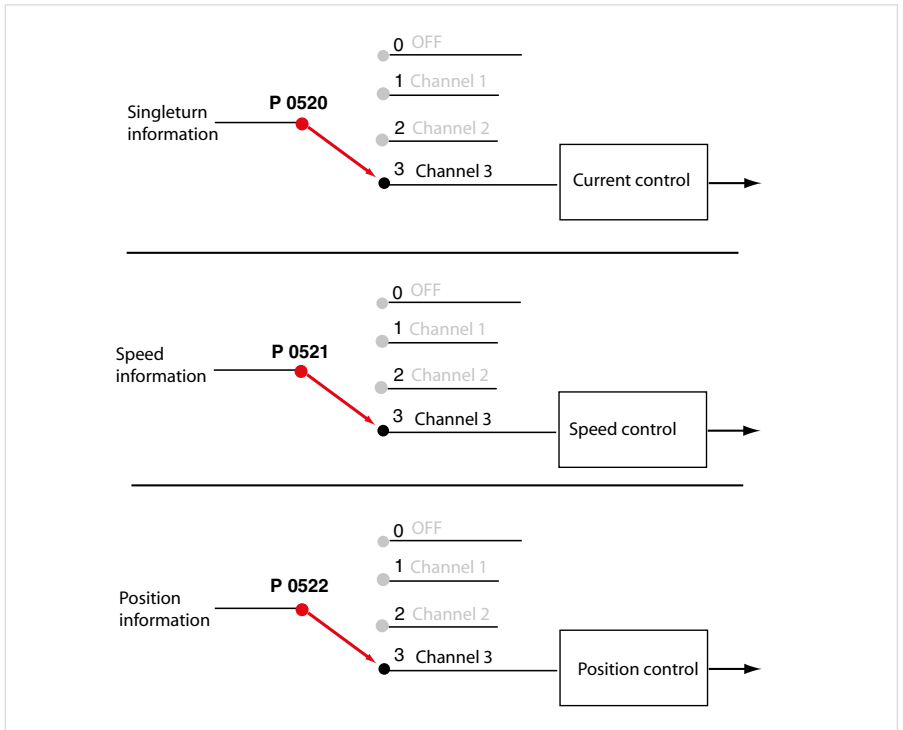
1.4.3 Interface configuration of encoder for closed loop control

By way of P 0520, P 0521, P 0522 the physical encoder interface is adapted to the current, speed or position controller (see illustration 11.1). This, for example, enables the use of an additional output side encoder for the position control loop and the motor feedback system for commutation and speed control loop.

Table 10.1

Encoder configuration

Parameter no.	Setting	Bezeichnung im DMS	Funktion
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



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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Subject to technical changes.