

Diagnostic and testing equipment

HEIDENHAIN encoders are provided with all information necessary for commissioning, monitoring and diagnostics. The type of available information depends on whether the encoder is incremental or absolute and which interface is used.

Incremental encoders mainly have 1 V_{PP} TTL or HTL interfaces. TTL and HTL encoders monitor their signal amplitudes internally and generate a simple fault detection signal. With 1 V_{PP} signals, the analysis of output signals is possible only in external test devices or through computation in the subsequent electronics (**analog diagnostics interface**).

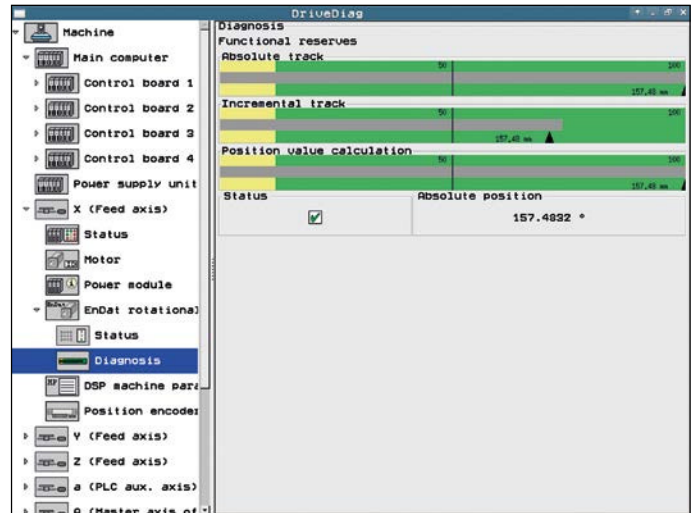
Absolute encoders operate with serial data transfer. Depending on the interface, additional 1 V_{PP} incremental signals can be output. The signals are monitored comprehensively within the encoder. The monitoring result (especially with valuation numbers) can be transferred along with the position value through the serial interface to the subsequent electronics (**digital diagnostics interface**). The following information is available:

- Error message: Position value not reliable
- Warning: An internal functional limit of the encoder has been reached
- Valuation numbers:
 - Detailed information on the encoder's functional reserve
 - Identical scaling for all HEIDENHAIN encoders
 - Cyclic output is possible

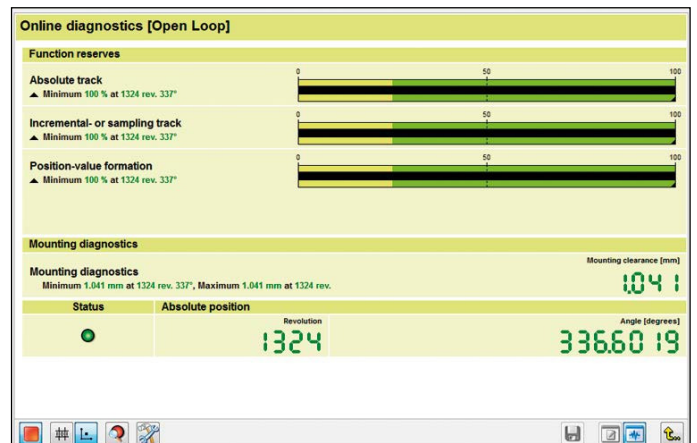
This enables the subsequent electronics to evaluate the current status of the encoder at little cost even in closed-loop mode.

HEIDENHAIN offers the appropriate PWM inspection devices and PWT test devices for encoder analysis. There are two types of diagnostics, depending on how they are integrated:

- Encoder diagnostics: The encoder is connected directly to the test or inspection device. This makes a comprehensive analysis of encoder functions possible.
- Diagnostics in the control loop: The PWM phase meter is looped into the closed control loop (e.g. through a suitable testing adapter). This makes a real-time diagnosis of the machine or system possible during operation. The functions depend on the interface.



Diagnostics in the control loop on HEIDENHAIN controls with display of the valuation number or the analog encoder signals



Diagnostics using PWM 20 and ATS software



Commissioning using PWM 20 and ATS software

Overview		HEIDENHAIN testing equipment		
Interface	Output signals	PWM 20	PWM 9	PWT 1x ¹⁾
EnDat	Position value Incremental signals	Yes Yes	No Yes	No No
Fanuc	Position value	Yes	No	No
Mitsubishi	Position value	Yes	No	No
DRIVE-CLiQ	Position value	Yes	No	No
Yaskawa	Position value	Yes	No	No
SSI	Position value Incremental signals	Yes Yes	No Yes	No No
1 V _{PP}	Incremental signals	Yes	Yes	PWT 18
11 μA _{PP}	Incremental signals	Yes	Yes	PWT 10
TTL	Incremental signals	Yes	Yes	PWT 17
HTL	Incremental signals	Yes ²⁾	Yes	No
Commutation	Block commutation Sinusoidal commutation	Being planned Yes	Yes Yes	No No

¹⁾ The PWT is an aid for setting and adjustment

²⁾ Over signal adapter

The **PWM 9** is a universal measuring device for checking and adjusting HEIDENHAIN incremental encoders. Expansion modules are available for checking the various types of encoder signals. The values can be read on an LCD monitor. Soft keys provide ease of operation.



PWM 9	
Inputs	Expansion modules (interface boards) for 11 μA _{PP} ; 1 V _{PP} ; TTL; HTL; EnDat*/SSI*/commutation signals *No display of position values or parameters
Functions	<ul style="list-style-type: none"> • Measures signal amplitudes, current consumption, operating voltage, output frequency • Graphically displays incremental signals (amplitudes, phase angle and on-off ratio) and the reference-mark signal (width and position) • Displays symbols for the reference mark, fault-detection signal, counting direction • Universal counter, interpolation selectable from single to 1024-fold • Adjustment support for exposed linear encoders
Outputs	<ul style="list-style-type: none"> • Inputs are connected through to the subsequent electronics • BNC sockets for connection to an oscilloscope
Voltage supply	10 V to 30 V DC, max. 15 W
Dimensions	150 mm × 205 mm × 96 mm

The **PWT** is a simple adjusting aid for HEIDENHAIN incremental encoders. In a small LCD window, the signals are shown as bar charts with reference to their tolerance limits.



	PWT 10	PWT 17	PWT 18
Encoder input	~ 11 μ App	□TTL	~ 1 V _{PP}
Functions	Measurement of signal amplitude Wave-form tolerance Amplitude and position of the reference mark signal		
Voltage supply	Via power supply unit (included)		
Dimensions	114 mm x 64 mm x 29 mm		

PWM 20

The PWM 20 phase angle measuring unit serves together with the provided ATS adjusting and testing software for diagnosis and adjustment of HEIDENHAIN encoders.



	PWM 20
Encoder input	<ul style="list-style-type: none"> • EnDat 2.1 or EnDat 2.2 (absolute value with/without incremental signals) • DRIVE-CLiQ • Fanuc Serial Interface • Mitsubishi high speed interface • Yaskawa Serial Interface • SSI • 1 V_{PP}/TTL/11 μApp
Interface	USB 2.0
Voltage supply	100 V to 240 V AC or 24 V DC
Dimensions	258 mm x 154 mm x 55 mm

	ATS
Languages	Choice between English and German
Functions	<ul style="list-style-type: none"> • Position display • Connection dialog • Diagnostics • Mounting wizard for EBI/ECI/EQI, LIP 200, LIC 4000 and others • Additional functions (if supported by the encoder) • Memory contents
System requirements and recommendations	PC (dual-core processor, > 2 GHz) RAM > 2 GB Windows operating systems XP, Vista, 7 (32-bit/64-bit), 8 200 MB free space on hard disk

DRIVE-CLiQ is a registered trademark of Siemens Aktiengesellschaft

The **APS 27** encoder diagnostic kit is necessary for assessing the mounting tolerances of the LIDA 27x with TTL interface. To examine them, the LIDA 27x is either connected to the subsequent electronics via the PS 27 test connector, or is operated directly on the PG 27 test unit.

Green LEDs for the incremental signals and reference pulse, respectively, indicate correct mounting. If they shine red, then the mounting must be checked again.



	APS 27
Encoder	LIDA 277/LIDA 279
Function	Good/bad detection of the TTL signals (incremental signals and reference pulse)
Voltage supply	Via subsequent electronics or power supply unit (included in delivery)
Items supplied	PS 27 test connector PG 27 test unit Power supply unit for PG 27 (110 V to 240 V, including adapter plug) Shading films

The **SA 27** adapter connector serves for tapping the sinusoidal scanning signals of the LIP 372 off the APE. Exposed pins permit connection to an oscilloscope through standard measuring cables.

	SA 27
Encoder	LIP 372
Function	Measuring points for the connection of an oscilloscope
Voltage supply	Via encoder
Dimensions	≈ 30 mm x 30 mm