

# Приборы для проверки и тестирования PWM 21

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Adjusting and testing package

HEIDENHAIN offers an adjusting and testing package for the diagnosis and adjustment of HEIDENHAIN encoders with absolute and incremental interfaces. This package is made up of the following components:

- **PWM 21:** inspection device with USB connectivity to a PC
- **ATS software:** adjusting and testing software with integrated local encoder database for automatic encoder identification

We recommend sending the PWM 21 to the HEIDENHAIN calibration service in Traunreut, Germany, every two years to ensure traceable and accurate testing performance.

For servicing purposes, an encoder diagnostics set can be ordered through the HEIDENHAIN Service department. This set contains the following extra components:

- A sturdy case
- Cables for connecting various encoders or for monitoring mode

For more information, please contact the HEIDENHAIN Service department.  
Or visit: [www.heidenhain.com/service](http://www.heidenhain.com/service).

**Inspection and testing devices from HEIDENHAIN**  
HEIDENHAIN encoders provide all the information needed for initial setup, monitoring and diagnostics. For the analysis of these encoders, HEIDENHAIN offers

| Encoders                                                                                                | Mounting and the mounting wizard                                                                                            |
|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| LIC 21xx, LIC 31xx, LIF 4xx, LIF 1xx, LIDA 4xx, LIDA 2xx and ERM 2xxx                                   | PWT 101 or PWM 21 with ATS software                                                                                         |
| LIC 41xx, LIP 3xx, LB 3xx, LC 2xx, PP 281, ECA 4xxx, ECM 24xx, ERA 4xxx, ERA 7xxx, ERA 8xxx and ERP 880 | Possible with the PWT 101 to a limited extent:<br>For optimal mounting quality, please use the PWM 21 with the ATS software |
| LIP 2xx, LIP 6xxx, ERP 1xxx, ERO 2xxx, PP 6xxx and MKV 1xxx                                             | PWM 21 with ATS software required                                                                                           |



**Range of functions**  
The ATS software guides the user through the encoder inspection process. After the encoder is connected, various functions are available depending on the encoder interface or the operating mode. A mounting wizard provides support for encoder-mounting functions or for testing functional safety. Based on the measurement function, there are various possibilities for recording the results. In certain cases, a signal adapter may be needed as well.

**Software options**  
The ATS software permits the user to expand the standard performance range of the software by entering a product key. The product key is subject to a charge and is valid only for the serial number of the PWM 21.

**Mounting wizard**  
For mounting exposed or multi-section linear encoders, or modular angle encoders, we recommend using the PWM 21 in conjunction with the ATS software. The PWT 101 can be used as well if it supports the encoder interface. but with limitations. Please note the information in the encoder documentation regarding mounting and the availability of a mounting wizard.

**Overview of important new functions with ATS software V3.8:**

- Support for SA2380
  - EnDat 3 monitoring mode
  - EnDat 3 support for the PWM 20
- Software options with a limited validity period are available
- Support for AMO encoders with the SSI interface
- Adapted layout of the measurement functions for incremental interfaces
- Extended mounting wizard for new encoders
- Report function adapted to display inspection limits

PWM 21 inspection device

| Inspection device                             | PWM 21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Area of application                           | <ul style="list-style-type: none"><li>• Functional testing of absolute and incremental HEIDENHAIN encoders</li><li>• Mounting wizard for HEIDENHAIN encoders</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Encoder input<br>only for HEIDENHAIN encoders | <ul style="list-style-type: none"><li>• EnDat 3 (ordering designations: E30-R2, E30-R4, E30-RB and E30- RM) *</li><li>• EnDat 2.2 (EnDat 2.1/EnDat 2.2 without incremental signals; ordering designations: EnDat22, EnDat21)</li><li>• EnDat 2.1 (EnDat 2.1/EnDat 2.2 with incremental signals; ordering designations: EnDat0x, EnDatHx, EnDatTx)</li><li>• DRIVE-CLiQ</li><li>• Fanuc Serial Interface</li><li>• Mitsubishi high speed interface</li><li>• Panasonic Serial Interface</li><li>• Yaskawa Serial Interface</li><li>• SSI</li><li>• 1 V<sub>PP</sub> (3 V<sub>PP</sub> for servicing purposes only)</li><li>• 1 V<sub>PP</sub> with Z1 track</li><li>• 11 μA<sub>PP</sub> (25 μA<sub>PP</sub> for servicing purposes only)</li><li>• TTL</li><li>• HTL (via signal adapter, for servicing purposes only)</li></ul> |
| Encoder output                                | Monitoring mode for certain interfaces (see <i>Diagnostics</i> under <i>Range of functions</i> ); a signal adapter is required for galvanic isolation and EnDat 3 (see <i>Operating modes and signal adapters</i> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Interface                                     | USB 2.0 (High Speed)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Supply voltage                                | AC 100 V to 240 V (±10%), 50 Hz to 60 Hz (±2 Hz)<br>Supply voltage: DC 24 V (±2.4 V)<br>Power consumption ≈ 20 W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Operating temperature                         | 0 °C to 45 °C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Protection                                    | EN 60529<br>IP20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Dimensions                                    | 258 mm × 154 mm × 55 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

\* Depending on the ordering designation, an SA 23xx or SA 1210 signal converter may be needed

ATS software

|                                         | ATS software V3.8                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Download                                | The ATS software is not included in delivery and can be downloaded from the HEIDENHAIN software filebase at <a href="http://www.heidenhain.com/service/downloads/software">www.heidenhain.com/service/downloads/software</a> . For notifications about new ATS software versions, sign up for our newsletter at <a href="http://www.heidenhain.com/newsletter-signup">www.heidenhain.com/newsletter-signup</a> . |
| System requirements and recommendations | <ul style="list-style-type: none"><li>• PC with dual-core processor &gt; 2 GHz</li><li>• Main memory &gt; 2 GB</li><li>• ≈ 500 MB of free memory space</li><li>• Screen resolution ≥ 1024 x 768</li><li>• Operating system: Windows 7, 8, 10 (32-bit or 64-bit), Windows 11</li></ul>                                                                                                                            |
| Software options                        | Management of product keys for optional functions                                                                                                                                                                                                                                                                                                                                                                |
| Languages*                              | German, English, French, Italian, Spanish, Korean, Chinese (simplified), Chinese (traditional)                                                                                                                                                                                                                                                                                                                   |

\* Full availability of the languages depends on the specific version of the ATS V3.8 software

Range of functions

The table on the following page shows a detailed overview of the ATS software functions. For more information about the functions, refer to the User's Manual: [www.heidenhain.com/service/downloads/documentation](http://www.heidenhain.com/service/downloads/documentation)

Connection dialog

For establishing a connection with the encoder, the following information is needed:

- Supply voltage
- Interface
- Information about mounting
- Information about position resolution

Via the integrated encoder database, all of this information is available upon entry of the ID number. In the case of manual entry, only part of the information is available. As a result, some functions cannot be enabled, or their availability is limited.

Operating mode

The range of functions depends on the operating mode. The table shows the range of encoder diagnostics. In monitoring mode, the range of functions is limited.

Signal adapter

For certain interfaces and, depending on whether a PWM 20 or PWM 21 is used, a signal adapter may be needed. For monitoring mode, a signal adapter is recommended.

| Product key | Unlimited period of time | Limited period time | Test version |
|-------------|--------------------------|---------------------|--------------|
| ATS14       | 1277664-14               | 1428272-14          | 1428286-14   |
| ATS20       | 1277664-20               | 1428272-20          | 1428286-20   |
| ATS24       | 1277664-24               | 1428272-24          | 1428286-24   |
| ATS29       | 1277664-29               | 1428272-29          | 1428286-29   |

Additional functions integrated into **ATS14** for encoders with the DRIVE-CLiQ interface:

- Expanded parameter display
- Temperature display: additional display of the temperature within the encoder\*
- Datum shift\*

The signal limit values can be changed with **ATS20**. The inspection and settings limits for signal monitoring are preset to the (standard) values documented in the *Interfaces of HEIDENHAIN Encoders* brochure (ID 1078628-xx). Customized or high-accuracy encoders may have different signal tolerances, such as tighter tolerances for the output signal amplitudes, on-to-off ratios or phase angles. The "Customizing" function allows for manual editing (adapting), saving and loading of signal limit values.

Additional function integrated into **ATS24** for encoders with the Fanuc, Mitsubishi, Panasonic and Yaskawa interfaces:

- Datum shift\*

Additional function integrated into **ATS29** for encoders with an EnDat interface

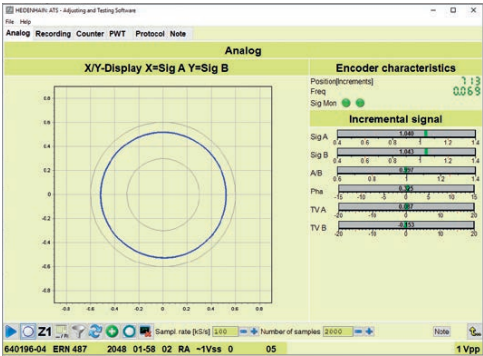
- Datum shift\*

\* If supported by the encoder. For more information, please contact HEIDENHAIN.

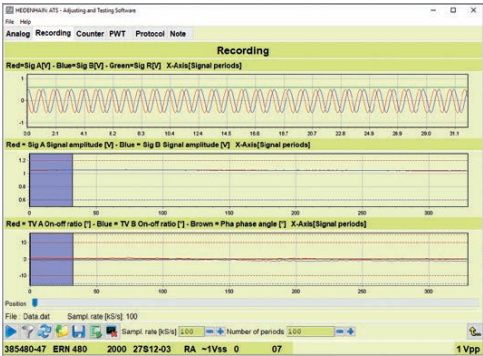
| Range of functions of the PWM 21 and ATS software V3.8                                                                                                                                                                                                                                                                                                                                                                                        | EnDat 3                                                                    | EnDat 2.2 | EnDat 2.1 | Fanuc    | Mitsubishi | SSI      | DRIVE-CLiQ | Yaskawa  | Panasonic | 1Vpp <sup>2)</sup> 11 µApp <sup>2)</sup> | TTL | HTL <sup>3)</sup> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------|-----------|----------|------------|----------|------------|----------|-----------|------------------------------------------|-----|-------------------|
| <b>Connection dialog; encoder connection via:</b> <ul style="list-style-type: none"><li>• Encoder ID number</li><li>• Entry of interface and supply voltage</li><li>• ID number of HEIDENHAIN motor</li></ul>                                                                                                                                                                                                                                 | ✓                                                                          | ✓         | ✓         | ✓        | ✓          | ✓        | ✓          | ✓        | ✓         | ✓                                        | ✓   | ✓                 |
| <b>Position display</b><br>Display of absolute positions<br>Support for daisy-chain bus<br>Display of the incremental position (if available)<br>Display and resetting of error messages<br>Display and resetting of warnings<br>Display of the transmission status<br>PWT display of incremental signals                                                                                                                                     | ✓                                                                          | ✓         | ✓         | ✓        | ✓          | ✓        | ✓          | ✓        | ✓         | —                                        | —   | —                 |
| <b>Diagnostics</b><br>Display of online diagnostics<br>Display of online diagnostics in the control loop <sup>1)</sup><br>Monitoring mode permitted with the PWM 21<br>Display of operating status data<br>Display of encoder information<br>Circular diagram of incremental signals<br>Evaluation of the reference signal<br>Incremental counter<br>Display of supply voltage and supply current<br>Homing/limit display<br>Signal recording | ✓                                                                          | ✓         | —         | ✓        | ✓          | —        | ✓          | ✓        | ✓         | —                                        | —   | —                 |
| <b>Mounting wizards/inspection wizards</b><br>Mounting wizards<br>Inspection wizard for encoders with functional safety<br>Assistant for tensioning the scale tape                                                                                                                                                                                                                                                                            | See "Mounting wizard"; for more information, see the encoder documentation | ✓         | ✓         | —        | —          | —        | ✓          | —        | —         | —                                        | —   | —                 |
| <b>Miscellaneous functions</b><br>Comparison of absolute position with incremental position<br>Datum shift ("electric zeroing"), including information display <sup>4)</sup><br>Configuration wizard (addresses, characteristic curves of sensors, etc.)<br>Display of temperatures<br>Display of additional position values<br>Display of additional sensors<br>Display of limit position signals<br>Expanded status display                 | —<br>(✓)                                                                   | —<br>(✓)  | ✓<br>(✓)  | —<br>(✓) | —<br>(✓)   | ✓<br>(✓) | —<br>(✓)   | —<br>(✓) | —<br>(✓)  | —                                        | —   | —                 |
| <b>Memory contents</b><br>Display of memory contents<br>Modification of memory contents<br>Storing of memory assignments<br>Comparison of current memory contents with saved memory contents<br>Backing up the encoder memory                                                                                                                                                                                                                 | ✓                                                                          | ✓         | ✓         | —        | —          | —        | ✓          | —        | —         | —                                        | —   | —                 |

1) In feed-through mode; preferably in conjunction with a signal adapter (see *Operating modes and signal adapters*)  
2) 25 µApp/3 Vpp for servicing purposes  
3) Via signal adapter, for servicing purposes  
4) Software option required and is available only for certain encoders  
5) Including conversion for PT 1000 sensors when EnDat memory parameters are appropriately set (✓) See the *ATS Software* Operating Instructions

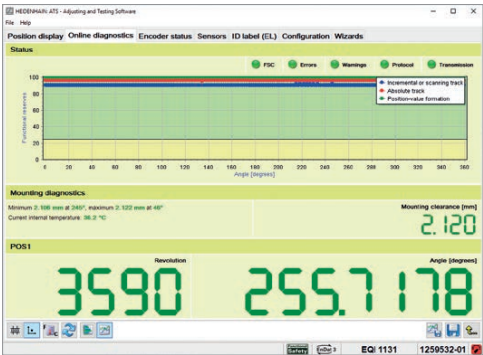
# Operating modes and signal adapter



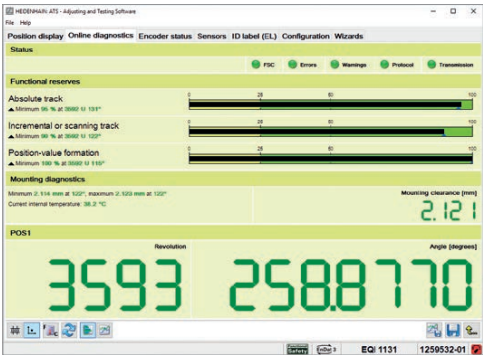
Incremental signal function: analog view



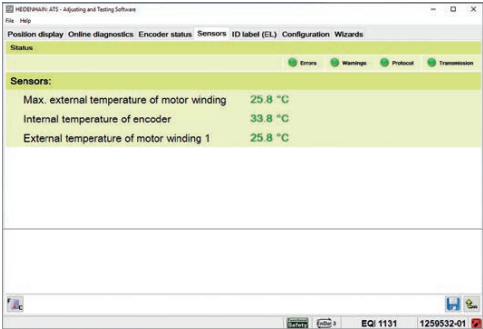
Recorded data loaded from a file



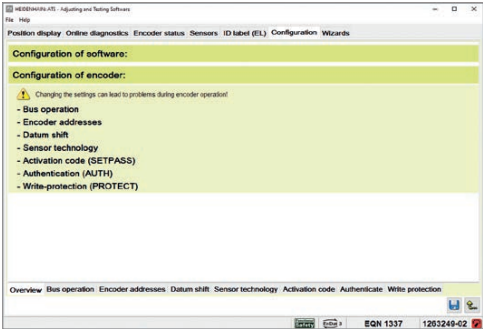
Result of the online diagnostics in the X/Y display



Result of the online diagnostics in a bar graph



Sensors view



Configuration view

## Encoder diagnostics

The encoder is connected directly to the testing or inspection device. This makes a comprehensive analysis of encoder functions possible.

## Monitoring mode

The PWM inspection device is inserted within the closed control loop (via suitable testing adapters as needed). This enables real-time diagnosis of the machine or equipment during operation. The available functions depend on the interface.

| Overview                                   |                                             | PWM 21                   |                                      |
|--------------------------------------------|---------------------------------------------|--------------------------|--------------------------------------|
| Interface                                  | Output signals (selection)                  | Encoder diagnostics      | Monitoring mode                      |
| EnDat 3                                    | Position value<br>Valuation numbers         | Yes<br>Yes               | Yes<br>Yes                           |
| EnDat 2.1<br>(with incremental signals)    | Position value<br>Incremental signals       | Yes<br>Yes               | No<br>Yes                            |
| EnDat 2.2<br>(without incremental signals) | Position value<br>Valuation numbers         | Yes<br>Yes               | Yes<br>Yes <sup>1)</sup>             |
| DRIVE-CLiQ                                 | Position value<br>Valuation numbers         | Yes<br>Yes               | No<br>No                             |
| Fanuc                                      | Position value<br>Valuation numbers         | Yes<br>Yes               | Yes<br>Yes                           |
| Mitsubishi                                 | Position value<br>Valuation numbers         | Yes<br>Yes <sup>2)</sup> | Yes<br>Yes <sup>1) 2)</sup>          |
| Panasonic                                  | Position value<br>Valuation numbers         | Yes<br>Yes               | Yes<br>Yes <sup>1)</sup>             |
| Yaskawa                                    | Position value<br>Valuation numbers         | Yes<br>Yes <sup>3)</sup> | No <sup>4)</sup><br>No <sup>4)</sup> |
| SSI                                        | Position value<br>Incremental signals       | Yes<br>Yes               | No<br>Yes                            |
| 1 Vpp                                      | Incremental signals                         | Yes                      | Yes                                  |
| 11 µApp                                    | Incremental signals                         | Yes                      | Yes                                  |
| TTL                                        | Incremental signals<br>Scanning Signals     | Yes<br>Yes <sup>5)</sup> | Yes<br>No                            |
| HTL                                        | Incremental signals                         | Yes <sup>6)</sup>        | No                                   |
| Commutation                                | Block commutation<br>Sinusoidal commutation | Yes <sup>6)</sup><br>Yes | No<br>Yes                            |

<sup>1)</sup> Information must be requested by the control and transmitted  
<sup>2)</sup> Not available for encoders with the ordering designation Mitsu01  
<sup>3)</sup> Not available for the EIB 3391Y  
<sup>4)</sup> This function is currently not available  
<sup>5)</sup> If supported by the encoder (PWT function)  
<sup>6)</sup> Via corresponding signal adapter

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