HEIDENHAIN

Product Information

PWM 21
ATS Software

Adjusting and testing package

PWM 21

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 connectability 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.*

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 the appropriate PWM inspection devices and PWT testing units. The PWM inspection devices, which are universally deployable, feature low measuring tolerances and can be calibrated. Testing devices such as the PWT 101 provide fewer functions, have wider tolerances, and cannot be calibrated.

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

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.

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: 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

PWM 21 inspection device

Inspection device	PWM 21
Area of application	• Functional testing of absolute and incremental HEIDENHAIN encoders • Mounting wizard for HEIDENHAIN encoders
Encoder input only for HEIDENHAIN encoders	• EnDat 3 (ordering designations: E30-R2, E30-R4, E30-RB and E30- RM)* • EnDat 2.2 (EnDat 2.1/EnDat 2.2 without incremental signals; ordering designations: EnDat22, EnDat21) • EnDat 2.1 (EnDat 2.1/EnDat 2.2 with incremental signals; ordering designations: EnDat0x, EnDatHx, EnDatTx) • DRIVE-CLiQ • Fanuc Serial Interface • Mitsubishi high speed interface • Panasonic Serial Interface • Yaskawa Serial Interface • SSI • 1 V_{PP} (3 V_{PP} for servicing purposes only) • 1 V_{PP} with Z1 track • 11 μA_{PP} (25 μA_{PP} for servicing purposes only) • TTL • HTL (via signal adapter, for servicing purposes only)
Encoder output	Monitoring mode for certain interfaces (see *Diagnostics* under *Range of functions*); a signal adapter is required for galvanic isolation and EnDat 3 (see *Operating modes and signal adapters*)
Interface	USB 2.0 (High Speed)
Supply voltage	AC 100 V to 240 V (±10%), 50 Hz to 60 Hz (±2 Hz) Supply voltage: DC 24 V (±2.4 V) Power consumption ≈ 20 W
Operating temperature	0 °C to 45 °C
Protection EN 60529	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 *www.heidenhain.com/service/downloads/software.* For notifications about new ATS software versions, sign up for our newsletter at *www.heidenhain.com/newsletter-signup.*
System requirements and recommendations	• PC with dual-core processor > 2 GHz • Main memory > 2 GB • ≈ 500 MB of free memory space • Screen resolution ≥ 1024 x 768 • Operating system: Windows 7, 8, 10 (32-bit or 64-bit), Windows 11
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

DRIVE-CLiQ is a registered trademark of Siemens AG

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*

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	1 V$_{PP}$ [2] / 11 µA$_{PP}$ [2]	TTL	HTL [3]
Connection dialog; encoder connection via:												
• Encoder ID number	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
• Entry of interface and supply voltage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
• ID number of HEIDENHAIN motor	✓	✓	✓	–	–	–	–	–	–	✓	✓	–
Position display												
Display of absolution positions	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–
Support for daisy-chain bus	✓	–	–	–	–	–	–	–	–	–	–	–
Display of the incremental position (if available)	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓
Display and resetting of error messages	✓	✓	✓	✓	✓	–	✓	✓	✓	–	–	–
Display and resetting of warnings	✓	✓	✓	✓	✓	–	✓	✓	✓	–	–	–
Display of the transmission status	✓	✓	✓	✓	✓	(✓)	✓	✓	✓	–	–	–
PWT display of incremental signals	–	–	–	–	–	–	–	–	–	✓	(✓)	–
Diagnostics												
Display of online diagnostics	✓	✓	–	✓	✓	–	✓	✓	✓	–	–	–
Display of online diagnostics in the control loop[1]	✓	✓	–	✓	✓	–	✓	✓	✓	–	–	–
Monitoring mode permitted with the PWM 21	✓	✓	✓	✓	✓	–	–	✓	✓	✓	✓	✓
Display of operating status data	✓	✓	–	–	–	–	–	–	–	–	–	–
Display of encoder information	✓	✓	✓	✓	✓	–	✓	–	–	–	✓	✓
Circular diagram of incremental signals	–	–	✓	–	–	✓	–	✓	✓	✓	✓	✓
Evaluation of the reference signal	–	–	–	–	–	–	–	–	–	✓	✓	✓
Incremental counter	–	–	✓	–	–	–	–	✓	✓	✓	✓	✓
Display of supply voltage and supply current	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Homing/limit display	–	–	–	–	–	–	–	✓	✓	✓	✓	–
Signal recording	–	–	–	–	–	–	–	–	–	✓	–	–
Mounting wizards/inspection wizards												
Mounting wizards	See *"Mounting wizard"*; for more information, see the encoder documentation											
Inspection wizard for encoders with functional safety	✓	✓	✓	–	–	–	✓	–	–	–	–	–
Assistant for tensioning the scale tape	–	✓	✓	✓	✓	–	–	–	✓	✓	–	–
Miscellaneous functions												
Comparison of absolute position with incremental position	–	–	✓	–	–	✓	–	–	(✓)	–	–	–
Datum shift ("electric zeroing"), including information display[4]	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	–	–	–
Configuration wizard (addresses, characteristic curves of sensors, etc.)	✓	–	–	–	–	–	–	–	–	–	–	–
Display of temperatures	✓	✓ [5]	–	✓	–	–	✓	–	–	–	–	–
Display of additional position values	✓	✓	–	–	–	–	✓	–	–	–	–	–
Display of additional sensors	✓	✓	–	–	–	–	–	–	–	–	–	–
Display of limit position signals	✓	✓	–	–	–	–	–	–	–	–	–	–
Expanded status display	✓	✓	–	–	–	–	–	–	–	–	–	–
Memory contents												
Display of memory contents	✓	✓	✓	–	–	–	✓	–	–	–	–	–
Modification of memory contents	✓	✓	✓	–	–	–	✓	–	–	–	–	–
Storing of memory assignments	✓	✓	✓	–	–	–	✓	–	–	–	–	–
Comparison of current memory contents with saved memory contents	✓	✓	✓	–	–	–	✓	–	–	–	–	–
Backing up the encoder memory	✓	✓	✓	✓	✓	–	✓	✓	✓	–	–	–

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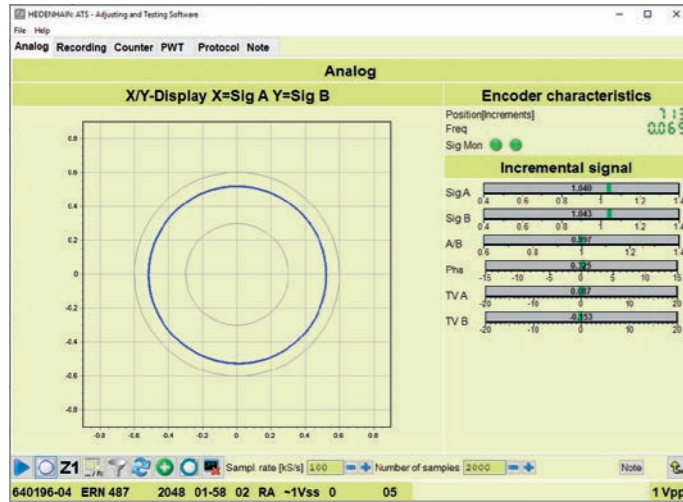[2] 25 µA$_{PP}$/3 V$_{PP}$ for servicing purposes
[3] Via signal adapter, for servicing purposes
[4] Software option required and is available only for certain encoders
[5] Including conversion for PT 1000 sensors when EnDat memory parameters are appropriately set
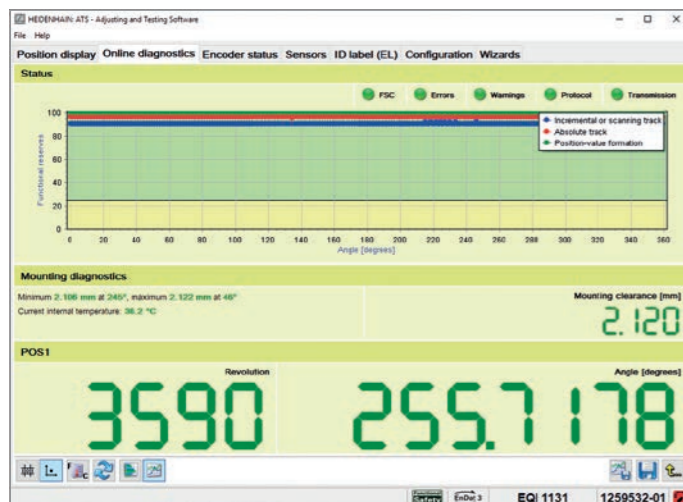(✓) See the *ATS Software* Operating Instructions

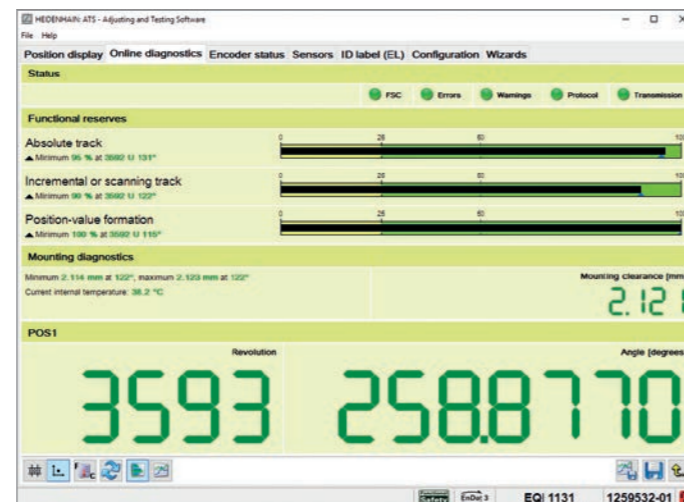DRIVE-CLiQ is a registered trademark of Siemens AG

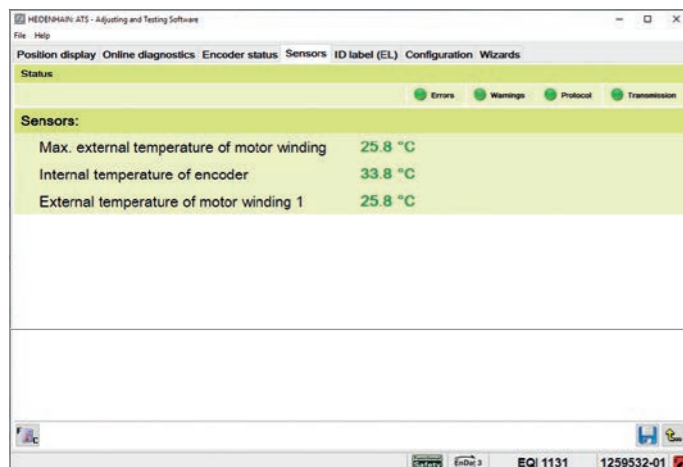Incremental signal function: analog view

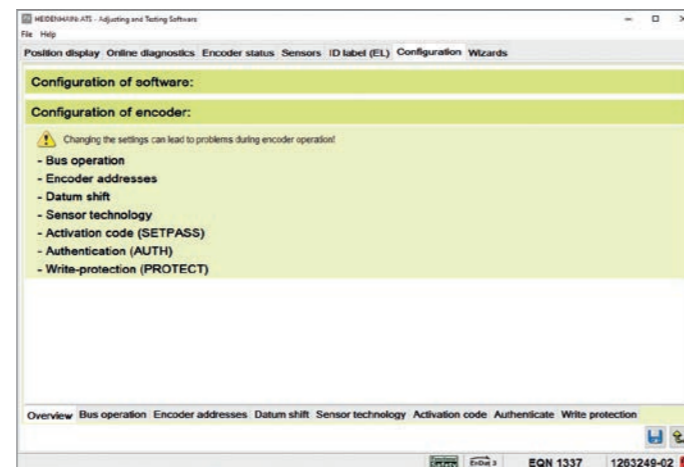Recorded data loaded from a file

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 Valuation numbers	Yes Yes	Yes Yes
EnDat 2.1 (with incremental signals)	Position value Incremental signals	Yes Yes	No Yes
EnDat 2.2 (without incremental signals)	Position value Valuation numbers	Yes Yes	Yes Yes [1]
DRIVE-CLiQ	Position value Valuation numbers	Yes Yes	No No
Fanuc	Position value Valuation numbers	Yes Yes	Yes Yes
Mitsubishi	Position value Valuation numbers	Yes Yes [2]	Yes Yes [1] [2]
Panasonic	Position value Valuation numbers	Yes Yes	Yes Yes [1]
Yaskawa	Position value Valuation numbers	Yes Yes [3]	No [4] No [4]
SSI	Position value Incremental signals	Yes Yes	No Yes
1 V$_{PP}$	Incremental signals	Yes	Yes
11 µA$_{PP}$	Incremental signals	Yes	Yes
TTL	Incremental signals Scanning Signals	Yes Yes [5]	Yes No
HTL	Incremental signals	Yes [6]	No
Commutation	Block commutation Sinusoidal commutation	Yes [6] Yes	No Yes

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

Signal adapters are available for the PWM 21 in order to expand the range of functions:

HTL signal adapter
Connection of encoders with HTL interface for servicing purposes.

SA 1210
Connection of encoders with the E30-R2 ordering designation (the SA 1210 cannot be used in conjunction with the PWM 20).
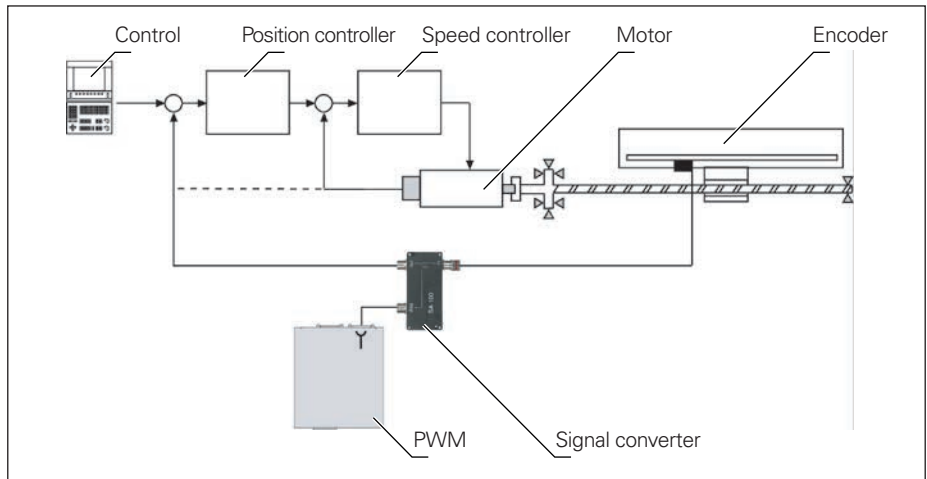
SA 2380
- The SA 2380 replaces the SA 100 and SA 110
- The SA 100 and SA 110 signal adapters are designed for a maximum supply voltage of 5.5 V and are therefore unsuitable for the inspection of EnDat 3 encoders
- Recommended for monitoring mode due to galvanic isolation of the RS-485 and 1 V_{PP} signals
- Connectability of an external power supply, specifically if multiple encoders are connected in bus mode and the power cannot be made available via the PWM 21
- For the connectability of EnDat 3 encoders, see the following table
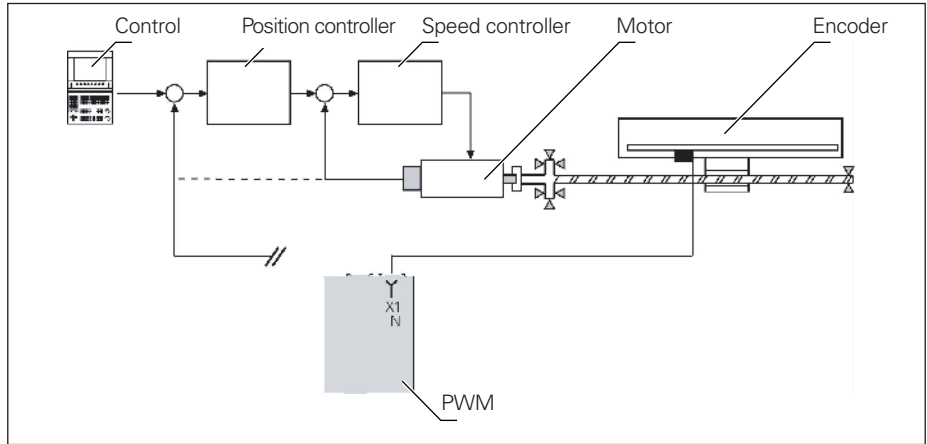
Encoder diagnostics

Monitoring mode with signal converter (potential segregation)

Ordering designation	PWM 20	PWM 21
E30-R2	SA 2380 needed	SA 2380 or SA 1210 needed
E30-R4	SA 2380 needed	✓
E30-RB	SA 2380 needed	✓ (SA 2380 needed only if the PWM 21 cannot provide the maximum power)
E30-RM	SA 2380 needed	✓

HEIDENHAIN

📖 **Further information:**

Information on correct and intended operation is provided in the following documents:
- Brochure: *Interfaces of HEIDENHAIN Encoders* 1078628-xx
- Brochure: *Cables and Connectors* 1206103-xx