



HEIDENHAIN



Product Information

PWM 3000 with ATS Software

Adjusting and testing package



PWM 3000

HEIDENHAIN offers an adjusting and testing package for the diagnosis and adjustment of HEIDENHAIN encoders with absolute and incremental interfaces. It consists of the following components:

- **PWM 3000:** inspection device with Ethernet connectivity to a PC
- **ATS software:** adjusting and testing software with integrated local encoder database for automatic encoder identification

We recommend sending the PWM 3000 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 PWT testing units

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

PWM 3000

The PWM 3000 is the functionally compatible successor model to the PWM 21 (which in turn replaced the PWM 20). Compared to the PWM 21, the PWM 3000 offers the following advantages:

- Greater flexibility and bandwidth at the measuring input
- Higher computing power

The specifications of the PWM 3000, with its heightened performance, make it possible to integrate future new functions through the ATS software.

Mounting wizard

For mounting exposed or multi-section linear encoders, or modular angle encoders, we recommend using the PWM 3000 with the ATS software. If supported by the encoder interface, the PWT 101 can be used as well, 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 of the ATS software, V4.2:

The most important function in ATS V4.2 is the added support for the PWM 3000. Other functional additions:

- Enhanced mounting wizard for new encoders
- Support of EnDat 3 features (display of online diagnostics)

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 and 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. This key is available for a fee, and is valid only for the PWM with the serial number indicated when purchasing the key. This means the key cannot be used with another PWM 3000. The software options offered for the PWM 3000, PWM 21, and PWM 20 have the same ordering number regardless of device.

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 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 with the ATS software
LIP 2xx, LIP 6xxx, ERP 1xxx, ERO 2xxx, PP 6xxx, and MKV 1xxx	PWM with ATS software required

PWM 3000 inspection device with ATS software

Inspection device	PWM 3000
Area of application	<ul style="list-style-type: none"> Functional testing of absolute and incremental HEIDENHAIN encoders Mounting wizard for HEIDENHAIN encoders
Encoder input only for HEIDENHAIN encoders	<ul style="list-style-type: none"> 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 <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	Ethernet as per IEEE 802.3 (10/100/1000 Mbit/s); network address is assigned either automatically via DHCP or through manual configuration
Supply voltage	AC 100 V to 240 V (±10%), 50 Hz to 60 Hz (±2 Hz) Power consumption: max. 60 W
Operating temperature	0 °C to 45 °C
Protection rating EN 60529	IP20
Dimensions	226 mm × 172 mm × 55 mm

* Depending on the ordering designation, an SA 23xx or SA 1210 signal adapter might be required

	ATS software V4.2
Download	<p>The ATS software is part of the uniform adjusting and testing package. The software is not delivered together with the PWM 3000; instead, it can be downloaded from the HEIDENHAIN software filebase at www.heidenhain.com/service/downloads/software. New versions will be released at irregular intervals. Updating to each new version is recommended.</p> <p>For notifications about new ATS software versions, sign up for our newsletter at www.heidenhain.com/newsletter-signup.</p>
System requirements and recommendations	<ul style="list-style-type: none"> 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 available for a fee	<ul style="list-style-type: none"> Add or delete product keys Display the status and validity of product keys
Languages*	German, English, French, Italian, Spanish, Korean, Chinese (simplified), Chinese (traditional)

* Full availability of the languages depends on the specific version of the ATS V4.2 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 *ATS User's Manual*.

ATS software

Starting with version 4.2, the ATS software supports the PWM 3000, PWM 21, and PWM 20 inspection devices. In general, future functions of the ATS software will be prepared for all inspection devices. However, due to the greater scope of functionality of the PWM 3000, some functions will be offered only for this device.

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 which PWM is being used, a signal adapter may be needed. For monitoring mode, a signal adapter is recommended.

Software options

Product key	Unlimited period of time	Limited period of 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 and high-precision encoders may have different signal tolerances (e.g., tighter tolerances for the amplitudes of the output signals, on/off ratios, 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 a Fanuc, Mitsubishi, Panasonic, Yaskawa, or SSI interface

- 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 3000 and ATS software V4.2 (depending on the respective encoder)	EnDat 3	EnDat 2.2	EnDat 2.1	Fanuc	Mitsubishi	SSI	DRIVE-CLiQ	Yaskawa	Panasonic	1V _{PP} ²⁾ 11 μApp 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 absolute 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	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓	-
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	See <i>"Mounting wizard"</i> ; for more information, see the encoder documentation											
Mounting wizards	✓	✓	✓	-	-	-	✓	-	-	-	-	-
Inspection wizard for encoders with functional safety	✓	✓	✓	✓	✓	-	-	-	-	✓	-	-
Wizard 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)	✓	-	-	-	-	-	-	-	-	-	-	-
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*)

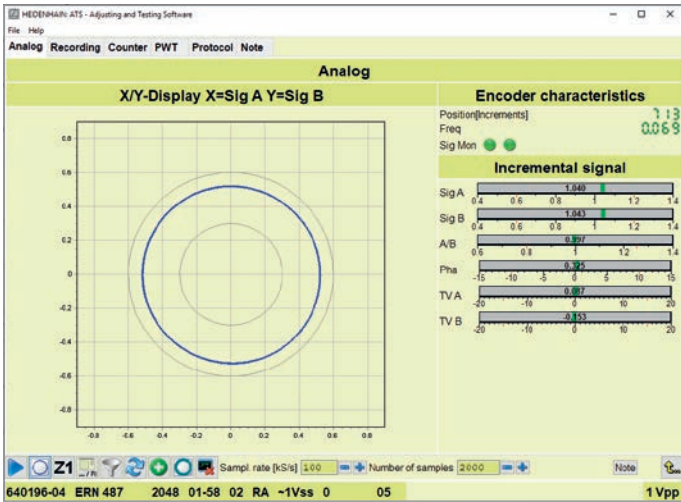
²⁾ 25 μApp/3 V_{PP} for servicing purposes

³⁾ Via signal adapter, for servicing purposes

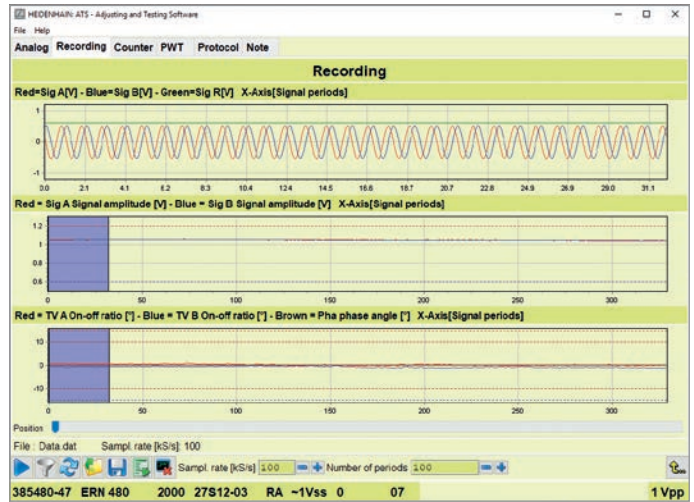
⁴⁾ Software option required and is available only for certain encoders

⁵⁾ Including conversion for PT 1000 sensors when EnDat memory parameters are appropriately set

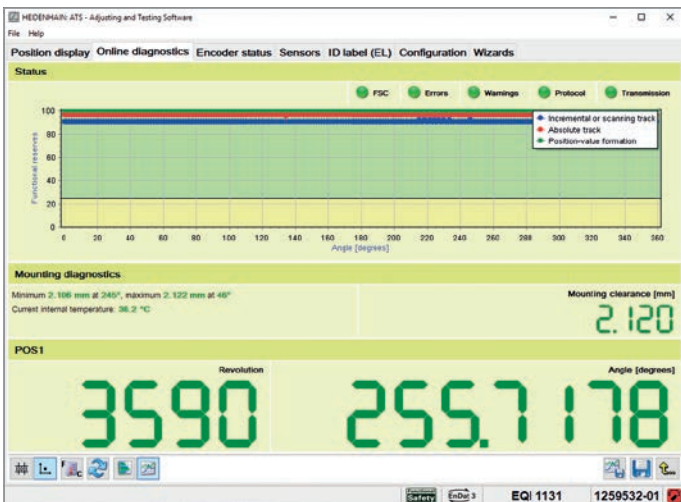
(✓) See the *PWM 3000* Operating Instructions



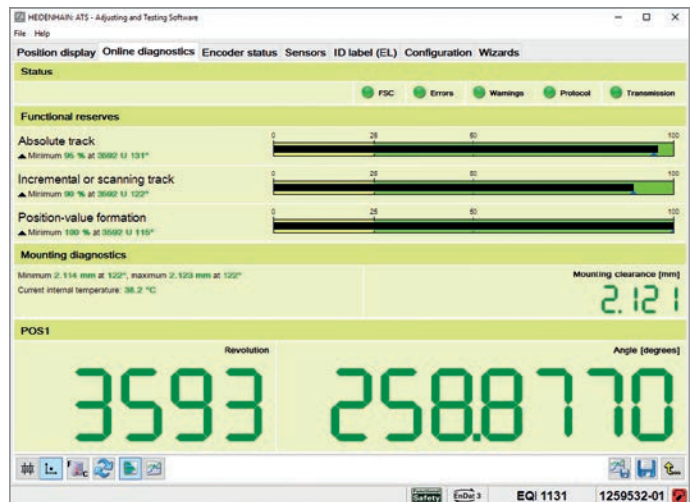
Incremental signal function: analog view



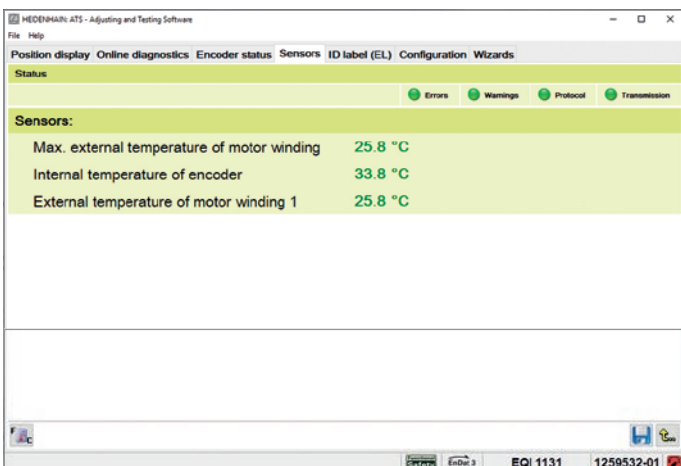
Recorded data loaded from a file



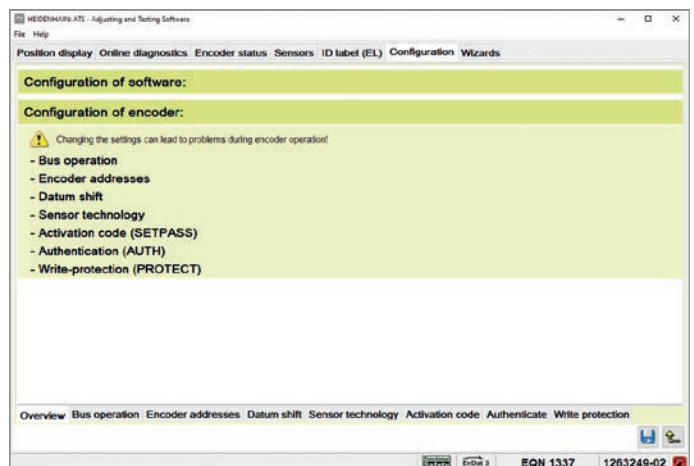
Result of the online diagnostics in the XY display



Result of the online diagnostics in a bar graph



Sensors view



Configuration view

Operating modes and signal adapters

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, particularly for EnDat 3 and HTL). This enables real-time diagnosis of the machine or equipment during operation. The available functions depend on the interface. Use of an SA 2380 signal adapter is recommended because of being able to galvanically isolate the signals.

Overview		PWM 3000	
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⁾ The control must request and transmit the information

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 inspection devices in order to expand the range of functions:

HTL signal adapter

Connection of encoders with HTL interface for servicing purposes.

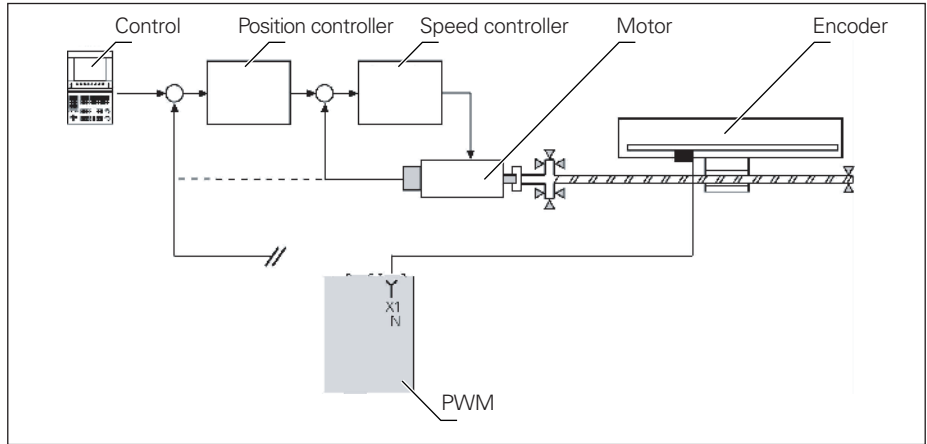
SA 1210

Connection of encoders with the E30-R2 ordering designation to the PWM 21 (the SA 1210 cannot be used in conjunction with the PWM 20).

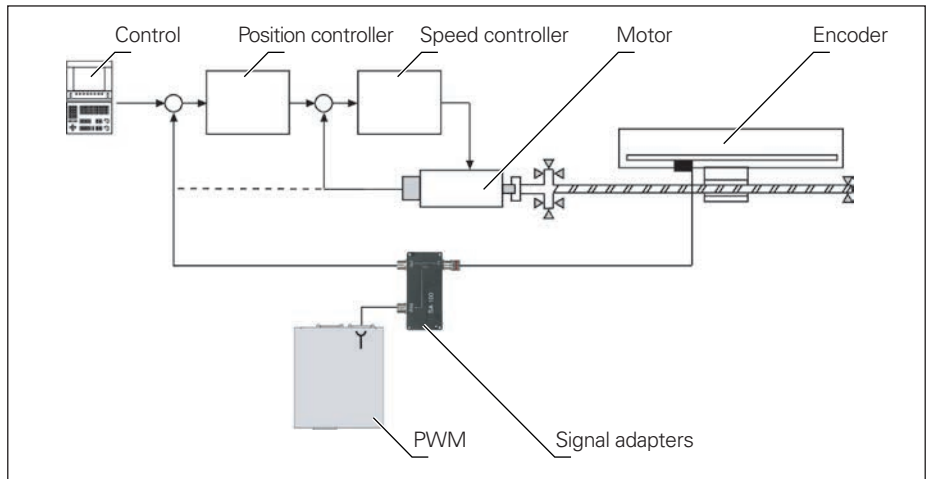


SA 2380

- 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 not suitable 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 EnDat 3 bus mode and power cannot be made available via the PWM
- For the connectability of EnDat 3 encoders and the related ordering designation, see the following table



Encoder diagnostics



Monitoring mode with signal adapter (segregation of potential)

EnDat 3	PWM 20	PWM 21	PWM 3000
Encoder diagnostics	SA 2380 needed	E30-R2: SA 1210 or SA 2380 required	–
Monitoring mode	SA 2380 needed	E30-R2: SA 2380 required, otherwise recommended (see the information on bus mode under SA 2380)	SA 2380 recommended (see the information on bus mode under SA 2380)

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This Product Information document supersedes all previous editions, which thereby become invalid. The basis for ordering from HEIDENHAIN is always the Product Information document edition valid when the order is placed.

More information:

To ensure proper and intended use, comply with the specifications in the following documents:

- Brochure: *Interfaces of HEIDENHAIN Encoders*
- Operating Instructions: *PWM 3000*
- User's Manual: *ATS*

[1078628-xx](#)

[1448758-xx](#)

[543734-xx](#)