

## MINIMAT-ED Digital Electric Screwdriver, stationary

Straight handle design: torque ranges between 0.24 - 4.8 Nm

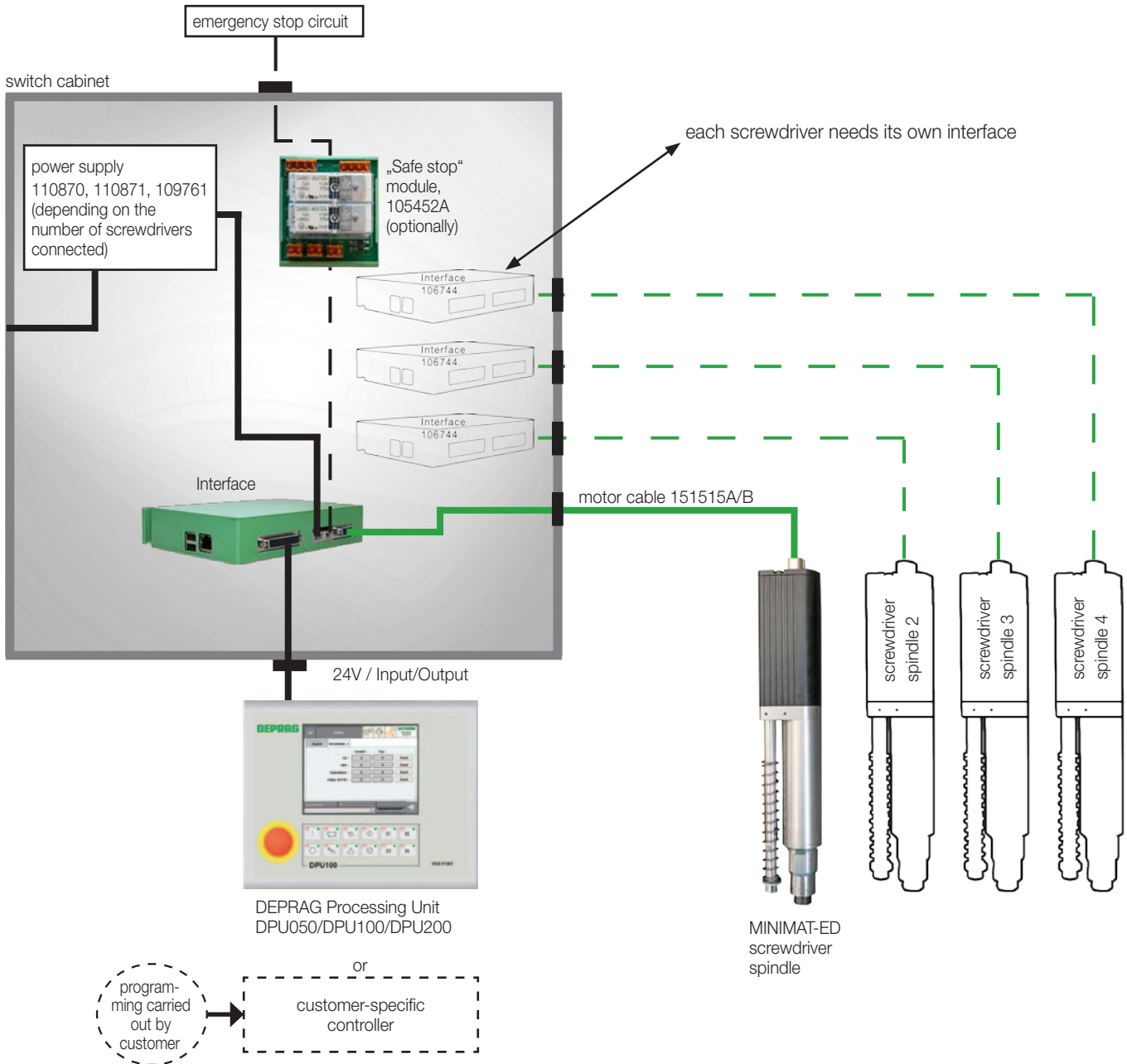
- process reliable
- flexible
- functional variety
- documentation capable
- economical
- simple integration

The new MINIMAT-ED is available in four versions for torques between 0.24 to 4.8 Nm at speeds of 1500 rpm. The rates can be individually adjusted up to the maximum speed for each screwdriver type. The screwdriver spindles also benefit from a particularly slim design and are comfortably lightweight.

Use the interface 330E to connect to and communicate with a system controller when operating the stationary MINIMAT-ED screwdriver. We recommend integrating all required hardware components into a control cabinet.



## SYSTEM SET UP AND COMPONENTS



### Plug & Play!

Simple integration with sample applications for the DEPRAG Processing Unit DPU series.

The hardware components required for the adjustment, control and power supply of the screwdriver are intended for integration into a control cabinet.

The screwdriver is connected to the interface 330E using a motor cable. The additional connection to the PLC uses a network cable (Ethernet) or the input/output interface. A power supply is also required and possibly the „safe stop“ module (optional components).

The necessary circuit diagrams for the electrical engineers are of course available from DEPRAG to enable integration of the components. The pre-assembled motor cable is connected directly to the plug on the interface 330E.

Alternatively, we can deliver a complete system including an already integrated and wired-up control cabinet.

Please contact us; we will be happy to provide you with a quotation.

## ADVANTAGES

The **MINIMAT-ED screwdrivers** allow free programming of the screw tightening process. Within the power range of the selected tool, the torque value, speed, stand-by and direction of rotation can be adjusted individually to the assembly requirements.

The brushless electric motors provide low maintenance operation. They are ideally suited for the tightening of screws due to their outstanding dynamics and achievement of high peak torque values. The integrated torque control - based upon precise measurement of the motor current along with the evaluation of other dynamic factors - as well as angle measurement, allows accurate control of multistage screw-driving processes and documentation of the resulting values.

MINIMAT-ED screwdrivers enable a torque accuracy of < 2% standard deviation under suitable process conditions\*, even after millions of cycles.

Thus, a Cmk value of  $\geq 1.67$  with a tolerance requirement of  $\pm 10\%$  in reference to 6 Sigma is reached. A Cmk value of 1.67 means that the error rate is less than 0.6 per one million screw assemblies.

The **Interface 330E for signal and data exchange** between system controller (PLC) and **screwdriver control electronic** now enables the DEPRAG DPU series controllers and customer specific controllers to control MINIMAT-ED screwdrivers.

An I/O interface is already integrated in the Interface 330E (from software version 1.3 onwards) as a 25-pole SUB-D bushing to simplify control. Systems with older software versions can be upgraded to add the new functions with a software update.

The screwdriver is controlled via 24V inputs and outputs.

### Description of functions

#### Screwdriving functions with Interface 106744B - Software 330 OS BASIC

There are five screwdriving programs (PG1 to PG5) available on the screwdriver for implementing individual screwdriving procedures; the process consists of a search run, torque, and angle screw assembly. There are also five loosening programs available (PG6 to PG10).

Enhanced functionality is always available by activating software 330 OS ADVANCED.

#### Enhanced functionality with Interface 106744C - Software 330 OS ADVANCED

**MINIMAT-ED spindle screwdriver in combination with the software 330 OS ADVANCED – the cost-effective alternative** for EC screwdriving system with AST sequence controller. Cost-effective and a wide range of features, e.g.,

- 15 different screwdriving programs can be stored
- Screwdriving programs can be freely compiled using the following screwdriving templates and commands:
  - assembly to torque
  - extended assembly to torque
  - assembly to angle
  - loosening to angle
  - friction value screwdriving (optional)
  - search run
  - save values
  - statistics
  - waiting time
- Speed reduction setting
- Extended end values
- Additional torque units

#### Control and parameter adjustment via I/O – for fast, simple integration

- Parameter setting and configuration via the web server integrated into the Interface 330E using a separate PC or notebook
- Screwdriver control via 24V inputs and outputs
- There are 4 inputs for program selection available: a start signal, additional signals, and status messages (OK/NOT OK/Ready)

#### Documentation

- Status messages: OK, NOT OK, READY
- No transfer of screwdriving curves
- Record screwdriver results from the last screw assembly

\*) When using the screwdriver in the torque range <50% of the maximum torque, standard deviations of up to 3% may occur.

## ADVANTAGES

### Integration into customer-specific control systems (PLC)

- Using features on the input/output interface application specific implementation of the control and visualisation can be carried out
- For a customer specific controller, the communication protocol is in the operating manual
- Request to the PLC: integrated PC functionality (when using the 24V inputs/outputs)

### User-friendly

- Up to 10 users can gain access to the Interface 330E.

### User interface web server

The screenshot shows the 'Program 1' setup page in the DEPRAG web interface. It features a navigation bar with 'System', 'Screwdriving Sequence', 'Process Data', and 'Tools' tabs, and the DEPRAG logo. The main content area is titled 'Program 1' and includes a 'Print View' button. Below this, there are three sections: 'Find', 'Fasten to torque', and 'Fasten to angle'. Each section contains input fields for speed and shut-off torque/angle. The 'Find' section has speed at 50% and shut-off angle at 0. The 'Fasten to torque' section has speed at 20% and shut-off torque at 0.00 N m. The 'Fasten to angle' section has a direction dropdown set to 'Fasten', speed at 20%, and shut-off angle at 200. To the right of these sections are 'Submit' and 'Submit As' buttons with a dropdown menu set to '1'. At the bottom, there are buttons for 'Create Backup of all Programs', 'Load Backup', and a file selection field showing 'Datei auswählen' and 'Keine ausgewählt'.

Program set-up - OS BASIC

Program set-up - OS ADVANCED

The screenshot shows the 'Program 1' setup page in the DEPRAG web interface, displaying advanced options. It features the same navigation bar and DEPRAG logo as the basic view. The main content area is titled 'Program 1' and includes 'Print View' and 'Remove' buttons. On the left, there is a 'Strategies and Commands' list with buttons for 'Fasten to torque', 'Extended fasten to torque', 'Fasten to angle', 'Loosen to angle', 'Find', 'Save values', 'Statistics', 'Waiting time', and 'Hold position'. Below this list are 'Insert Before', 'Insert After', 'Submit', and 'Submit As' buttons with a dropdown menu set to '1'. The main content area is divided into two sections: '01. Fasten to torque' and '02. Save values'. The '01. Fasten to torque' section includes a 'Remove' button and several input fields: 'Supervision time' (2000 ms), 'Shut-off torque' (90.00 N cm), 'Torque lower limit' (72.00 N cm), 'Torque upper limit' (108.00 N cm), 'Speed' (825 rpm), 'Torque hold time' (0 ms), and 'Angle supervision' (inactive). The '02. Save values' section includes a 'Remove' button. At the bottom, there are buttons for 'Create Backup of all Programs', 'Load Backup', and a file selection field showing 'Datei auswählen' and 'Keine ausgewählt', along with a 'Remove all Programs' button.

# COMPARISON OF DEPRAG STATIONARY SCREWDRIVING SYSTEMS

One essential cornerstone for the development of top quality, error-free production is the **selection of the right screwdriving spindle for integration into your assembly system**. Play it safe!

Our specialists are happy to advise you in your search for the most suitable tool and the configuration of your complete system.

**DEPRAG screwdriving solutions are available for any application.**

	MINIMAT-E	NEW		MINIMAT-EC
	screwdriving system – the stationary electric screwdriver with mechanical shut-off clutch	MINIMAT-ED the electronic screwdriving system with no external screwdriving sequence controller		the flexible EC screwdriving system meeting the highest requirements with sequence controller ASTxx
	The MINIMAT-E with mechanical shut-off clutch for the realization of screwdriving solutions without an air supply; this is an alternative to stationary pneumatic screwdrivers.	The DEPRAG DPU series controllers can be used to control the MINIMAT-ED screwdriver in combination with the Interface 330E for signal and data exchange between the system controller (PLC) and the control electronics of the screwdriver.  In combination with a DPU, single and multi-channel EC screwdriving solutions can be integrated into the controller concept of complete systems at low cost.		The integrated torque measurement based on power consumption as well as an angle measurement enables accurate control and regulation of screw tightening, as well as documentation of essential processing parameters and guarantees utmost precision; thereby allowing the realization of several different tightening parameters within one assembly cycle.
Characteristics		in combination with Interface 330E and standard software 330 OS BASIC	in combination with Interface 330E and software 330 OS ADVANCED	
Tightening and shut-off via torque	✓	✓	✓	✓
Tightening and shut-off via torque with angle control	✗	✗	✓	✓
Tightening and shut-off via angle	✗	✓	✓	✓
Tightening and shut-off via angle with torque control	✗	✗	✓	✓
Loosening and shut-off via angle	✗ *	✓	✓	✓
Extended screwdriving strategies, e.g., friction dependent screw assembly	✗	✗	✓	✓
Parameter adjustment of screwdriving sequences	✗	✓	✓	✓
Creation of screwdriving sequences	✗	✗	✓	✓
Graphic recording	✗	✗	✗	✓
Communication interfaces	✗ **	✓	✓	✓
Storage / documentation / analysis	✗	✓	✓	✓

\* Option for loosening with shut-off via signal

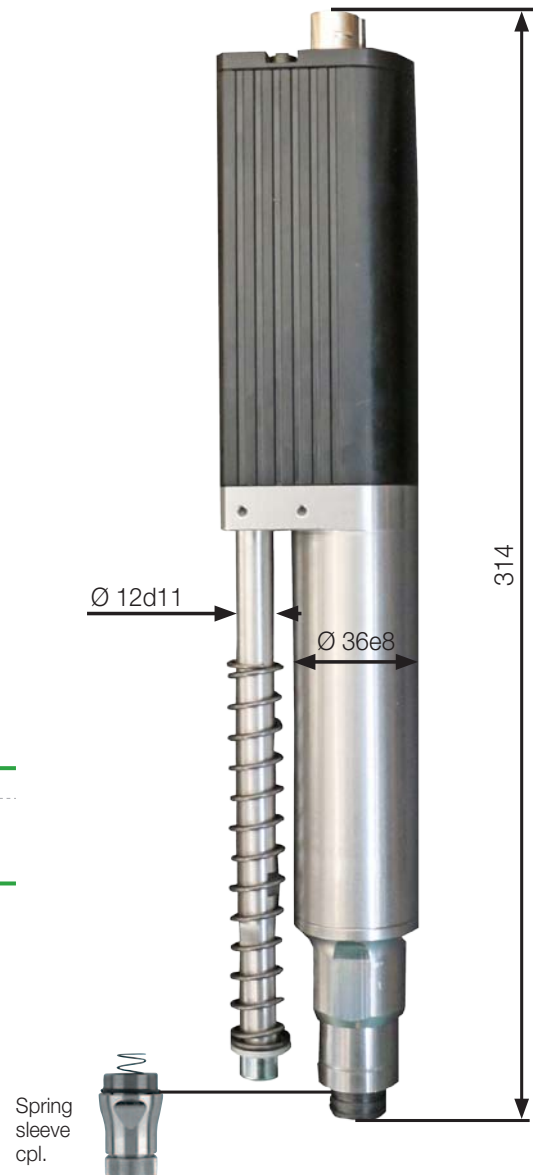
\*\* I/O interface available for PLC

**MINIMAT-ED SCREWDRIVER SPINDLE, Straight handle design, size 36**

Screwdriver spindle	Type	330E36-0012	330E36-0018	330E36-0032	330E36-0048
	Part no.	450000A	450000B	450000E	450000C
Torque min.	Nm/in.lbs	0.24 / 2.1	0.36/3.2	0.64/5.66	1.0/8.85
Torque max.	Nm/in.lbs	1.2/10.6	1.8/15.9	3.2/28.3	4.8/42.5
Speed min.	rpm	150	150	120	90
Speed max.	rpm	1500	1500	1200	900
Diameter	mm/in.	36/1.4	36/1.4	36/1.4	36/1.4
Length	mm/in.	314/12.25	314/12.25	314/12.25	314/12.25
Weight	kg /lbs.	1.2/2.6	1.2/2.6	1.2/2.6	1.2/2.6
Line voltage (DC)	V	48	48	48	48
Internal hex drive DIN ISO 1173		F6.3 (1/4")	F6.3 (1/4")	F6.3 (1/4")	F6.3 (1/4")
Suitable inserting tools and connection parts with inserting end DIN ISO 1173		E6.3 (1/4")	E6.3 (1/4")	E6.3 (1/4")	E6.3 (1/4")

**Optional accessories for the screwdriver spindles**

Spring sleeve cpl.	Part no.	364672A
Spring sleeve cpl., with vacuum connection (in connection with finder, see brochure: Inserting tools D3320E)	Part no.	364672C




## Required components for the installation into a switch cabinet

<b>Motor cable</b> length 2 m	<b>Type</b> Part no.	<b>KS4-2M</b> 151515A	To connect the screwdriver with the interface 330E.
alternative <b>Motor cable</b> length 5 m	<b>Type</b> Part no.	<b>KS4-5M</b> 151515B	
<b>Power supply</b> single 240W-48V	Part no.	110870	Selection depends on the number of screwdrivers used. The different power supply options can be combined with one another.
2-fold 480W-48V	Part no.	110871	
4-fold 960W-48V	Part no.	109761	
<b>Interface with standard software 330 OS BASIC</b>	<b>Type</b> Part no.	<b>330E</b> 106744B	The interface 330E allows simple adjustment of screwdriving programs, recording of result values via the integrated WEB server as well as control of the MINIMAT-ED spindle screwdriver. It has an Ethernet connection and an input/output interface. All settings can be carried out comfortably on the web interface (e.g., DPU, PC, notebook ..). The following languages are available: German, English, French, Swedish, Portuguese, Spanish, Slovenian, Polish, Finnish, Czech, Italian and Romanian. <b>Each screwdriver requires its own interface 330E</b> and is reached via its own individual IP address.
<b>Interface with software 330 OS ADVANCED</b>	<b>Type</b> Part no.	<b>330E</b> 106744C	
<b>Activation key for software 330 OS ADVANCED</b>	Part no.	117244	Upgrade for Interface with standard software 330 OS BASIC on software 330 OS ADVANCED.

## Optional additional software suitable for 330 OS ADVANCED

suitable for interface with software 330 OS ADVANCED			
<b>Software Friction value screwdriving</b> (activation key)	Part no.	201820	With the friction-value process, it is possible to measure and compensate varying friction-values (e.g., on self-forming screw-joints). Additionally, this procedure monitors the predetermined friction values at verification processes.

## Optional component for the installation into a switch cabinet

<b>„Safe stop“ module</b> 	Part no.	105452A	The “safe stop” module disconnects the power supply to the screwdriver. The power supply to the interface 330E remains connected. Disconnection is carried out on two channels with monitoring contacts, so that Performance Level e in accordance with EN ISO 13849-1 is fulfilled (functional safety). Each “safe stop” module can be used to protect up to three screwdrivers. After triggering the safety-cut off around 10s is needed for the screwdriver to return to operational readiness.
Patch cable	Part no.	831901	Connection Interface 330E - PC

 Our software solutions undergo continuous improvements. We recommend that you regularly update your software. In this way you will always receive the most up-to-date security updates, upgraded features and drivers. With the most current version of the software you can be sure that your device is optimally prepared for Industry 4.0.

# DEPRAG

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