

MINIMAT-ED Digital Electric Screwdriver, stationary

Straight handle design: torque ranges between 0.24 - 4.8 N·m

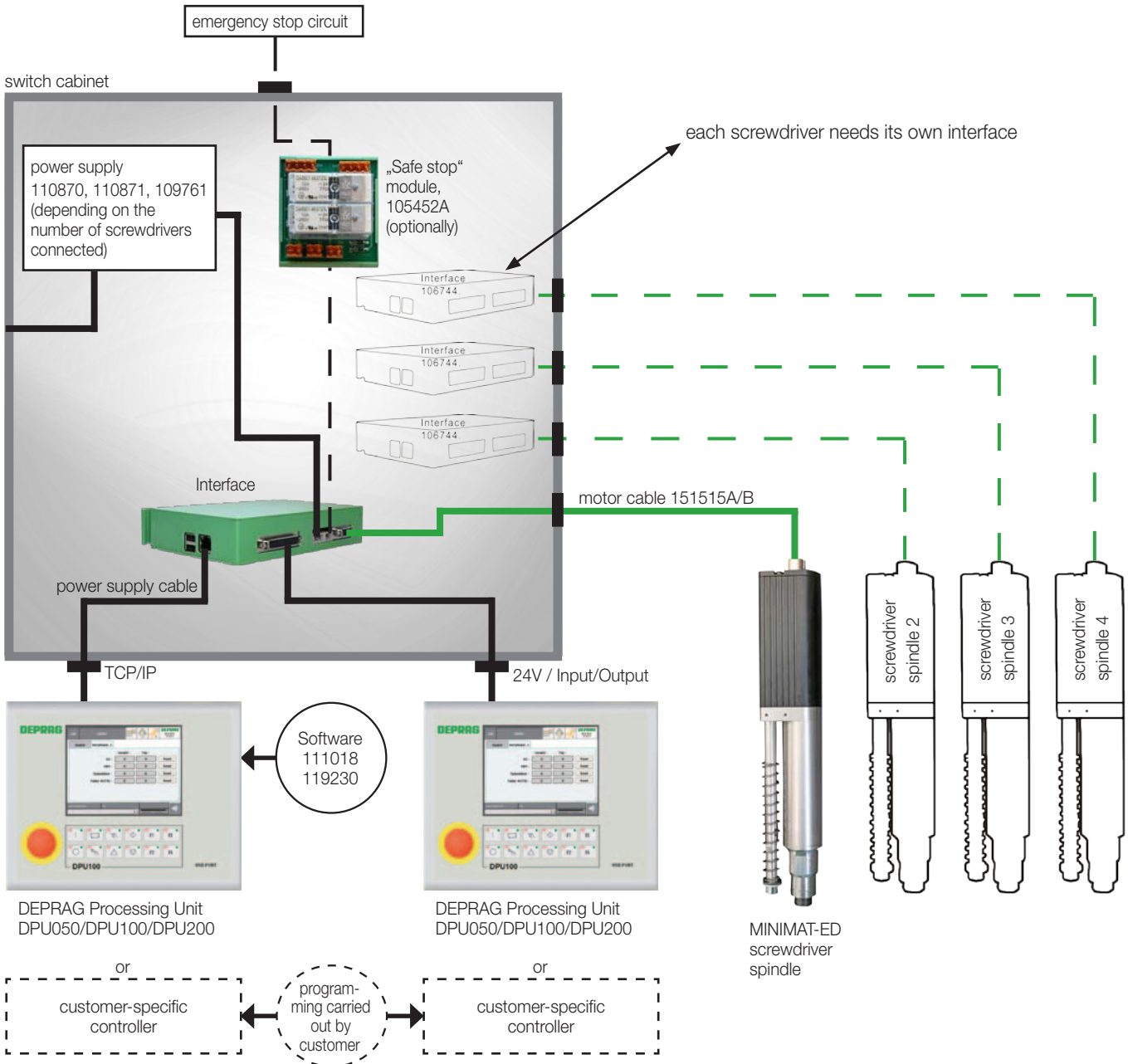
- process reliable
- flexible
- functional variety
- documentation capable
- economical
- simple integration

The new MINIMAT-ED is available in four versions for torques between 0.24 to 4.8 N·m 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 ≥ 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. In combination with the software modules installed on the DPU, via a TCP/IP connection, single and multi-channel EC screwdriving solutions can be integrated into the controller concept of complete systems at low cost.

Alternatively, there is an I/O interface available for simplified control. When using the DEPRAG controller, the software module (119230 or 111018) enables communication between the screwdriver and DPU.

Depending on customer requirements, adjustment of parameters and screwdriver guidance, as well as the inclusion of screwdriver results in the system visualisation can be implemented. Alternatively, the communication interface defined in the documentation can be used for customized software generation.

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.,

- 120 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 measurement (requires activation)
 - assembly to difference torque (requires activation)
 - friction-dependent assembly (requires activation)
 - search run
 - save values
 - waiting time
- Statistics
- Speed reduction setting
- Extended end values

Control and adjustment via TCP/IP

- The integrated web server is used for adjustment and configuration (e.g., for adaptations to screwdriving programs); to display the web interface when using the DPU50 and DPU100 a separate PC/notebook is required
- Control of the screwdriver is carried out via TCP/IP (e.g., program selection and start) when using DPU specific driver software
- Alternatively: Control via customer-specific software using utilizing the communication interface defined in the documentation

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 (TCP/IP or input/output)
- Screwdriving results: result values via TCP/IP interface
- No transfer of screwdriving curves
- Record screwdriver results from the last 7 production days

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

ADVANTAGES

Visualisation

- Sample programs for the fast implementation of a visualisation for the DEPRAG DPU series controllers are in the software modules 119230 and 111018
- The user can create customer specific visualisation

Integration into customer-specific control systems (PLC)

- Using features on the TCP/IP or 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 TCP/IP interface, alternatively 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 screen in the DEPRAG software. It features a navigation bar with 'System', 'Screwdriving Sequence', 'Process Data', and 'Tools' tabs. The main area is divided into sections for 'Find', 'Fasten to torque', and 'Fasten to angle', each with input fields for speed and shut-off torque/angle. A 'Print View' button is located at the top right. Below the main settings, there are buttons for 'Submit' and 'Submit As' with a dropdown menu. At the bottom, there are options for 'Create Backup of all Programs' and 'Load Backup'.

Program set-up - OS BASIC

Program set-up - OS ADVANCED

The screenshot shows the 'Program 1' setup screen in the DEPRAG software, displaying advanced configuration options. The navigation bar is the same as in the basic view. The 'Strategies and Commands' section on the left lists various actions like 'Fasten to torque', 'Extended fasten to torque', etc., with 'Insert Before' and 'Insert After' buttons. The 'General Parameters' section includes 'Program title' (Standard 1) and 'Direction change' (inactive). The '01. Fasten to torque' section has detailed parameters: 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 is also visible. At the bottom, there are buttons for 'Create Backup of all Programs' and 'Remove all Programs'.

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.

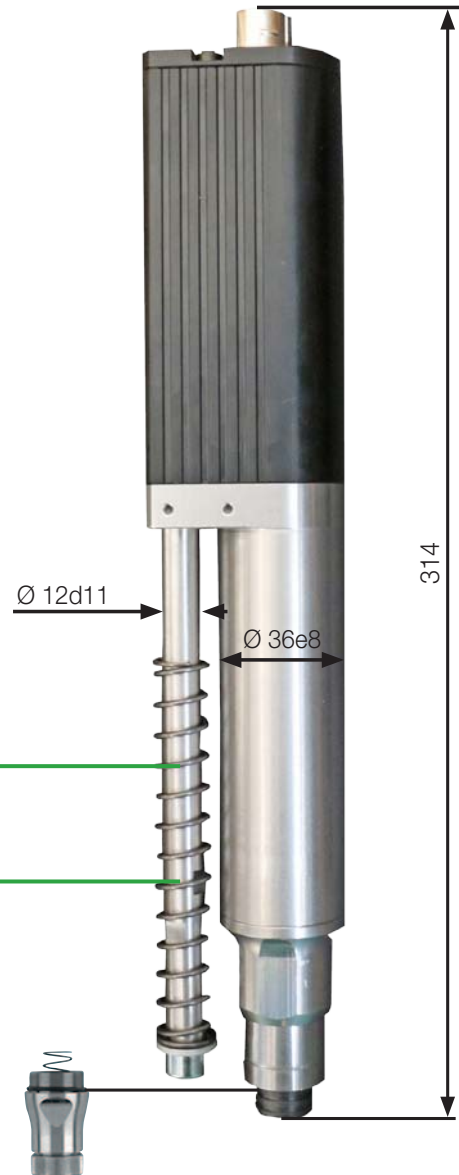
	MINIMAT-E	NEW		MINIMAT-EC
	screwdriving system – the stationary electric screwdriver with mechanical shut-off clutch	MINIMAT-ED the electronic screwdriving system with no external screwdriving sequence controller		the flexible EC screwdriving system meeting the highest requirements with sequence controller 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 the software modules to be installed on the DPU, single and multi-channel EC screwdriving solutions can be integrated into the controller concept of complete systems at low cost. As well as being used for parameter adjustment and control of the screwdriver for existing controller solutions, an additional advantage is the option for the inclusion of screwdriving results in the real system visualisation, e.g., for the display of results relating to screw position.		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.	N·m/in.lbs	0.24 / 2.1	0.36/3.2	0.64/5.66	1.0/8.85
Torque max.	N·m/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


Motor cable length 2 m	Type Part no.	KS4-2M 151515A	To connect the screwdriver with the interface 330E.
alternative Motor cable length 5 m	Type Part no.	KS4-5M 151515B	
Power supply 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	
Interface with standard software 330 OS BASIC	Type Part no.	330E 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. Each screwdriver requires its own interface 330E and is reached via its own individual IP address.
Interface with software 330 OS ADVANCED	Type Part no.	330E 106744C	
Release code for software 330 OS ADVANCED	Part no.	117244	Upgrade for Interface with standard software 330 OS BASIC on software 330 OS ADVANCED.
Software (driver software for DPU050/100)	Type Part no.	330E-DPU-CE 119230	The software module is activated on the DPU and is required for communication and data exchange between the DPU050/DPU100 and the screwdriving system 330E. The software includes a description of the functional features including examples for the implementation of visualisation.
Software (driver software for DPU200)	Type Part no.	330E-DPU200 111018	The software module is activated on the DPU and is required for communication and data exchange between the DPU200 and the screwdriving system 330E. The software includes a description of the functional features including examples for the implementation of visualisation.

Optionale additional software suitable for 330 OS ADVANCED

suitable for interface with software 330 OS ADVANCED

Software Friction value screwdriving (release code)	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.
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Optional component for the installation into a switch cabinet

„Safe stop“ module 	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



At DEPRAG, we are committed to constantly improving our software solutions. To harness these benefits, we recommend regularly updating to the latest edition. For more information, please contact our service department at service@deprag.de.

DEPRAG

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