

## Screwdriver Spindles electric



**NANOMAT-EC** torque ranges between 0.02 - 0.12 Nm

**MICROMAT-EC** torque ranges between 0.03 - 0.8 Nm

**MINIMAT-EC** torque ranges between 0.15 - 25 Nm

## Screwdriver Spindles

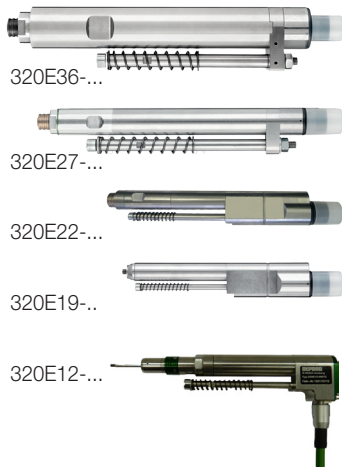
**The flexible EC screwdriver for the highest standards**

- flexible
- documentation features
- high precision

The EC screwdriver spindle with brushless drive technology combined with the AST6 or AST11 screwdriver controller offers maximum flexibility and process control. The integrated torque and angle measurement system enables precise control of the screw assembly process and guarantees the highest accuracy and reliable documentation of important process parameters. Through the combination of different screwdriving strategies with flexible tightening parameters, multi step screw run-down sequences can be realised in one assembly cycle.

## ADVANTAGES

### DEPRAG EC SCREWDRIVER - the flexible EC screwdriver for the highest demands



The DEPRAG EC 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 requirement.

Outstanding features of stationary EC screwdrivers are their high torque precision and the large range of control functions – perfect conditions for process security and control on highest level.

The brushless electric motors provide low maintenance operation. They are ideally suited for the tightening of screws due to their outstanding dynamics and an 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 precise control of multistage screw-driving processes and documentation of the resulting values.

Torque accuracies of < 2% standard deviation and thus Cmk values of  $\geq 1.67$  with a tolerance of  $\pm 10\%$  can be reached \* with NANOMAT-EC/MICROMAT-EC/MINIMAT-EC stationary screwdrivers. Statistically speaking, the error rate is less than 0.6 per one million screw assemblies.

\*) under suitable process conditions

### DEPRAG SEQUENCE CONTROLLER AST6 – compact size for torque ranges up to 2 Nm



AST6-1

- highest precision for lowest torque ranges
- small size for confined spaces
- colour touch screen with 4.3" TFT display
- torque control/angle monitoring
- angle control/torque monitoring
- tightening procedure using friction values
- 100 user-tagable sequence programs
- for stationary applications
- available communication ports: field bus, input/output



ASTi6-1 for the installation into a switch cabinet

The DEPRAG sequence controller AST6 is the ideal controller for stationary screw assemblies in combination with the tried and tested DEPRAG EC screwdrivers of the NANOMAT-EC, MICROMAT-EC and MINIMAT-EC (size 22) series within a torque range of 0.02 Nm – 0.2 Nm. When choosing the option ASTi6-1 for integration into the switch cabinet, the software panel DAST is required for operation and visualisation of the controller. In that case the system controller additionally provides the range of functions available on the AST6-1 display.

**Operator friendly:** The sequence controller already includes standard screwdriving programs for tightening to torque and loosening to angle. Parameters can be directly altered to suit screwdriving tasks using the touch screen. The AST6 allows free programming of your screwdriving sequences. When needed these can be made available from the integrated web server user interface, and efficiently and comfortably created and parameterized.

**High number of programs:** Use the colour TFT touch screen for fast access to the 100 programmable standard programs. Individual application profiles are free selectable using the program number or a user defined program name (tag).

**Based on web browser:** Use an established web browser or the touch screen to set parameters and access controller functions. Additional software is not required.

**Small size:** Due to its small size the controller is particularly suitable for stationary applications where there are confined spaces.

**Storage, documentation and evaluation:** The AST6 records the screwdriving results for the last 7 production days. Additional features include the graphic display of screwdriving graphs, integrated PLC functions, comprehensive analysis options and the option of combination with an automatic screw feeding machine.

A software update service is optionally available. Also available are comprehensive software packages for screw joint analysis, documentation and process data collection.

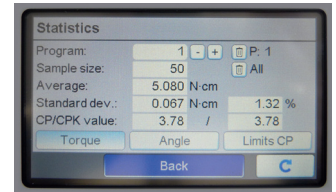
## Examples of the functions display on the AST6



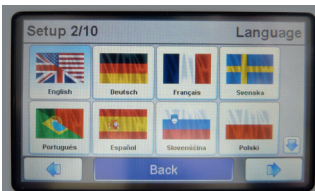
Main menu



Graphic display of screwdriving graphs



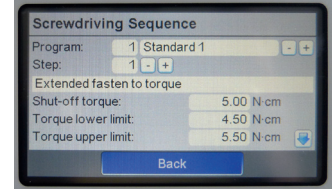
Statistics display



Language selection



Program selection



Program set-up

## DEPRAG SEQUENCE CONTROLLER AST11 – flexible EC technology for the highest standards

- highest precision over the entire torque range
- torque control/angle monitoring
- angle control/torque monitoring
- friction-torque testing and friction-controlled fastening to torque
- 16 freely programmable sequence programs
- comprehensive analysis functions
- communication port: Ethernet - for parameterisation of the web server
- PLC: inputs/outputs
- integrated RS232 port with varied options:
  - 4 fieldbuses available: Profibus, Profinet, EtherCat, EthernetIP
  - direct connection of a barcode scanner
  - connection of a serial printer
- integrated functions for process control
- can be used in combination with DEPRAG feeders
- for manual and stationary applications



The DEPRAG controller AST11 is the ideal sequence controller for manual and stationary screw assemblies together with the tried and tested DEPRAG EC screwdrivers MICROMAT-EC and MINIMAT-EC.

**Operator friendly:** The sequence controller already includes standard screwdriving programs for tightening to torque and loosening to angle. Parameters can be directly altered to suit screwdriving tasks using the controller's keypad. The AST10 allows free programming of your screwdriving sequences for hand-held or stationary screwdriving tools. If required, further screwdriving programs can quickly and easily be set-up using the already existing basic program.

**Freely programmable:** Fast access to the 16 programmable screwdriving programs is enabled by the integrated display- and operating unit.

**Based on web server:** To set parameters and access additional control functions, simply use any common web browser or the integrated key pad. Additional software is not required.

**Various communication options:** Several communication options, especially for stationary use, via PLC and optionally RS232, Profinet, Profibus, EtherCat, Ethernet IP.

**Saving, documentation and evaluation:** The AST10 displays the screwdriving results of the last 7 production days. Additional software modules offer graphic display of screwdriving graphs, integrated PLC functions, comprehensive analysis options via a PC. Combination with an automated DEPRAG screw feeder is also possible. A software update service is optionally available.

## SYSTEM COMPONENTS

Screwdriver spindle, Straight handle design		NANOMAT-EC, size 12		MICROMAT-EC, size 19			
Screwdriver	Type	320E12-00012 1)		320E19-0002	320E19-0005	320E19-0008	
	Part no.	420400B		405024A	405024C	405024B	
Torque min.	Nm / in.lbs	0.02 / 0.18		0.03 / 0.27	0.08 / 0.7	0.15 / 1.3	
Torque max. *)	Nm / in.lbs	0.12 / 1.06		0.2 / 1.8	0.5 / 4.4	0.8 / 7.1	
Speed min.	rpm	120		150	60	100	
Speed max. *)	rpm	1500		1500	1200	1000	
Diameter	mm / in.	17.5 / 0.68		19 / ¾	19 / ¾	19 / ¾	
Length	mm / in.	150 / 5.85		190 / 7 <sup>31</sup> / <sub>64</sub>	190 / 7 <sup>31</sup> / <sub>64</sub>	190 / 7 <sup>31</sup> / <sub>64</sub>	
Weight	kg / lbs	0.2 / 0.44		0.25 / 0.55	0.25 / 0.55	0.27 / 0.59	
Noise level	dB (A)	56		60	60	60	
Line voltage (DC)	V	24		48	48	48	
Internal hex. drive DIN ISO 1173		B3 (3 mm)		B3 (3 mm)	B3 (3 mm)	B3 (3mm)	
Suitable inserting tools and connection parts with inserting end DIN ISO 1173		A3 (3 mm)		A3 (3 mm)	A3 (3 mm)	A3 (3mm)	
Screwdriver spindle, Straight handle design		MINIMAT-EC, size 22		MINIMAT-EC, size 27			
Screwdriver	Type	320E22-00120	320E22-00200	320E27-0010-D	320E27-0018-D	320E27-0024-D	320E27-0042-D
	Part no.	420988D	420988E	416500B	416500H	416500C	416500D
Torque min.	Nm / in.lbs	0.18 / 1.59	0.4 / 3.54	0.15 / 1.3	0.4 / 3.5	0.4 / 3.5	0.7 / 6.2
Torque max. *)	Nm / in.lbs	1.2 / 10.62	2.0 / 17.7	1.0 / 8.85	1.8 / 15.9	2.4 / 21.2	4.2 / 37.2
Speed min.	rpm	50	30	50	100	50	40
Speed max. *)	rpm	900	550	1000	1000	700	400
Diameter	mm / in.	22 / 7/8	22 / 7/8	27 / 1 <sup>1</sup> / <sub>16</sub>	27 / 1 <sup>1</sup> / <sub>16</sub>	27 / 1 <sup>1</sup> / <sub>16</sub>	27 / 1 <sup>1</sup> / <sub>16</sub>
Length	mm / in.	202 / 7 <sup>61</sup> / <sub>64</sub>	202 / 7 <sup>61</sup> / <sub>64</sub>	254 / 9.9	251 / 9.8	251 / 9.8	263 / 10.3
Weight	kg / lbs	0.55 / 1.21	0.55 / 1.21	0.75 / 1.65	0.75 / 1.65	0.75 / 1.65	0.75 / 1.65
Noise level	dB (A)	60	60	60	60	60	60
Line voltage (DC)	V	24	24	48	48	48	48
Internal hex. drive DIN ISO 1173		F6.3 (1/4")	F6.3 (1/4")	B3 (3 mm)	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")	A3 (3 mm)	E6.3 (1/4")	E6.3 (1/4")	E6.3 (1/4")
Screwdriver spindle, Straight handle design		MINIMAT-EC, size 36					
Screwdriver	Type	320E36-0040-D	320E36-0060-D	320E36-0090-D	320E36-0120-D	320E36-0180-D	320E36-0250-D
	Part no.	416600E	416600A	416600F	416600B	416600C	416600G
Torque min.	Nm / in.lbs	0.8 / 7.1	1 / 8.85	2 / 17.7	2 / 17.7	3 / 26.6	5 / 44.25
Torque max. *)	Nm / in.lbs	4 / 35.4	6 / 53.1	9 / 79.7	12 / 106.2	18 / 159.3	25 / 221.25
Speed min.	rpm	100	50	50	35	25	20
Speed max. *)	rpm	1000	740	550	380	280	220
Diameter	mm / in.	36 / 1 <sup>27</sup> / <sub>64</sub>	36 / 1 <sup>27</sup> / <sub>64</sub>	36 / 1 <sup>27</sup> / <sub>64</sub>	36 / 1 <sup>27</sup> / <sub>64</sub>	36 / 1 <sup>27</sup> / <sub>64</sub>	36 / 1 <sup>27</sup> / <sub>64</sub>
Length	mm / in.	298 / 11.6	298 / 11.6	298 / 11.6	298 / 11.6	298 / 11.6	298 / 11.6
Weight	kg / lbs	1.2 / 2.64	1.2 / 2.64	1.2 / 2.64	1.2 / 2.64	1.2 / 2.64	1.2 / 2.64
Noise level	dB (A)	60	60	60	60	60	62
Line voltage (DC)	V	48	48	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")	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")	E6.3 (1/4")	E6.3 (1/4")

\*) as per VDI/VDE 2647 Directive

1) The motor cable, 2.5 meters long, is solidly connected to the screwdriver

Motor cable	Motor cable for screwdrivers, size 19, 22, 27 and 36	straight connection	with 90° angle connection
Length 2.5 m / 8.2 ft. (standard)	Part no.	385442A	385442E
Length 5 m / 16.4 ft.	Part no.	385442B	385442F
Length 8 m / 26.2 ft.	Part no.	385442C	385442G
Length 12 m / 39.4 ft.	Part no.	385442D	385442H

Optionally available: motor cable extension, suitable for all screwdriver sizes

Length 2.5 m / 8.2 ft.	Part no.	385478A
Length 5.5 m / 18.0 ft.	Part no.	385478B
Length 9.5 m / 31.2 ft.	Part no.	385478C

The total length including the motor cable extension must not exceed 12 meters.

## SEQUENCE CONTROLLER AST6/ASTi6

for screwdriver	NANOMAT-EC MICROMAT-EC MINIMAT-EC	320E12-.. (page 4) 320E19-.. (page 4) 320E22-.. (page 5)	
<b>Sequence controller</b> with integrated performance electronics	<b>Type</b> Part no.	<b>AST6-1</b> 428001A	<b>ASTi6-1</b> 428004A
<b>Sequence controller</b> with fieldbus module Profibus port	<b>Type</b> Part no.	<b>AST6-1 PB</b> 428001B	<b>ASTi6-1 PB</b> 428004B
<b>Sequence controller</b> with fieldbus module Profinet port	<b>Type</b> Part no.	<b>AST6-1 PN</b> 428001C	<b>ASTi6-1 PN</b> 428004C
<b>Sequence controller</b> with fieldbus module EtherCat port	<b>Type</b> Part no.	<b>AST6-1 EC</b> 428001D	<b>ASTi6-1 EC</b> 428004D
<b>Sequence controller</b> with fieldbus module Ethernet IP port	<b>Type</b> Part no.	<b>AST6-1 E/IP</b> 428001E	<b>ASTi6-1 E/IP</b> 428004E
Power supply (DC)	V	24	
Power consumption	W	150	
Display		TFT colour display 4.3"	without display
24V input/output interface		14 inputs / 8 outputs	
Ethernet		yes	
Number of connectable screwdriver		1	
Dimensions (W x H x D)	mm / in.	162 x 143 x 65 / 6 3/8 x 5 5/8 x 2 9/16	
Weight	kg / lbs	1.5 / 3.3	
Power supply unit	Part no.	2041061 (included in delivery)	optional accessories
<b>Required accessories</b>		<b>Power supply cable 230 V,</b> length 1.8 m / 5.9 ft.   Part no. 812587	-
		<b>Power supply cable 115 V,</b> length 1.8 m / 5.9 ft.   Part no. 812295	-
<b>Optional accessories</b>		-	<b>DPU110 or DPU210</b> Please find technical data and further details in our brochure D3350E.

## SEQUENCE CONTROLLER AST11


for screwdriver	MICROMAT-EC MINIMAT-EC	320E19-.. (page 4) 320E22-.. and 320E27-.. (page 5)	320E36-..(page 5)		
<b>Sequence controller</b>	<b>Type</b> Part no.	<b>AST11-1</b> 390041A	<b>AST11-1-S</b> 390041B	<b>AST11-2</b> 390042A	<b>AST11-2-S</b> 390042B
Module „safety stop“		no	yes	no	yes
Power unit (AC)	V / Hz	100 - 240 / 50 / 60		100 - 240 / 50 / 60	
Power consumption	W	400		400	
Insulation		IP 54		IP 54	
LC-display		4 x 20		4 x 20	
24V input/output interface		12 inputs / 8 outputs		12 inputs / 8 outputs	
Membrane keyboard		yes		yes	
RS 232 Interface		yes		yes	
Ethernet		yes		yes	
Amount of connectable screwdrivers		1		1	
Dimensions (W x H x D)	mm / in.	160x295x200 / 6 <sup>19</sup> / <sub>64</sub> x 11 <sup>39</sup> / <sub>64</sub> x 7 <sup>7</sup> / <sub>8</sub>		160x295x200 / 6 <sup>19</sup> / <sub>64</sub> x 11 <sup>39</sup> / <sub>64</sub> x 7 <sup>7</sup> / <sub>8</sub>	
Weight	kg / lbs	5.8 / 12.76		6 / 13.2	
<b>Required accessories</b>					
<b>Power supply cable</b> Length 1.8 m/5.9 ft. (EU)	Part no.			385443A	
<b>Power supply cable</b> Length 1.8 m/5.9 ft. (USA)	Part no.			385443B	
<b>Power supply cable</b> Length 2.5 m/8.2 ft. (China)	Part no.			385443C	

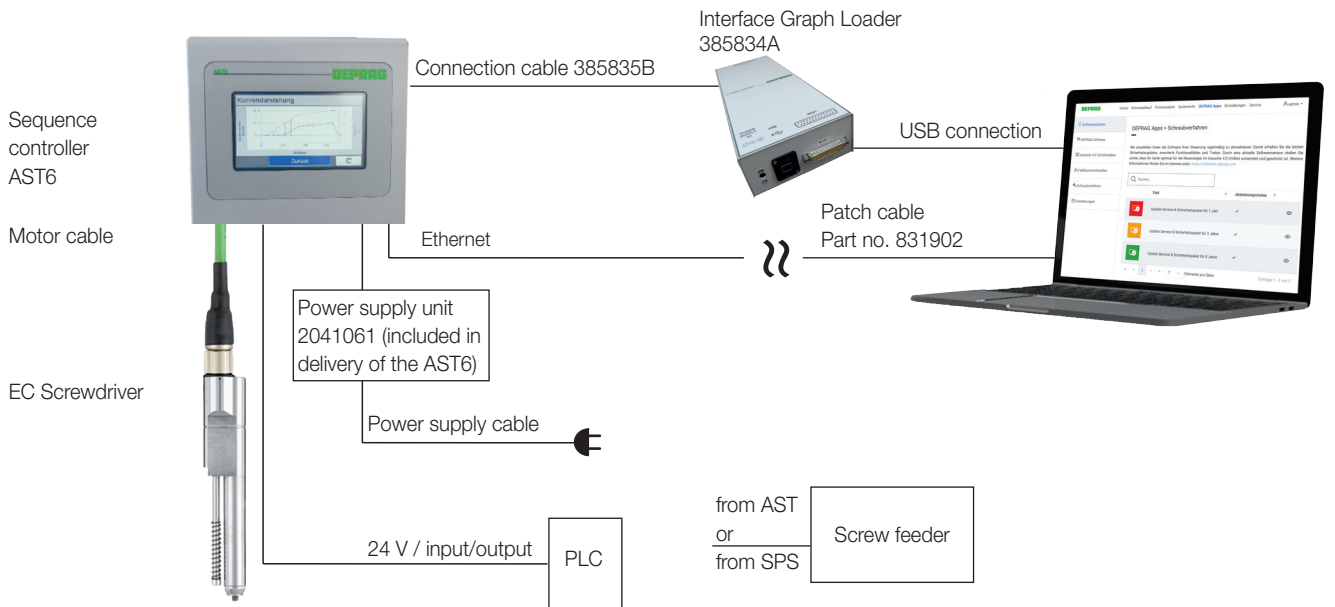
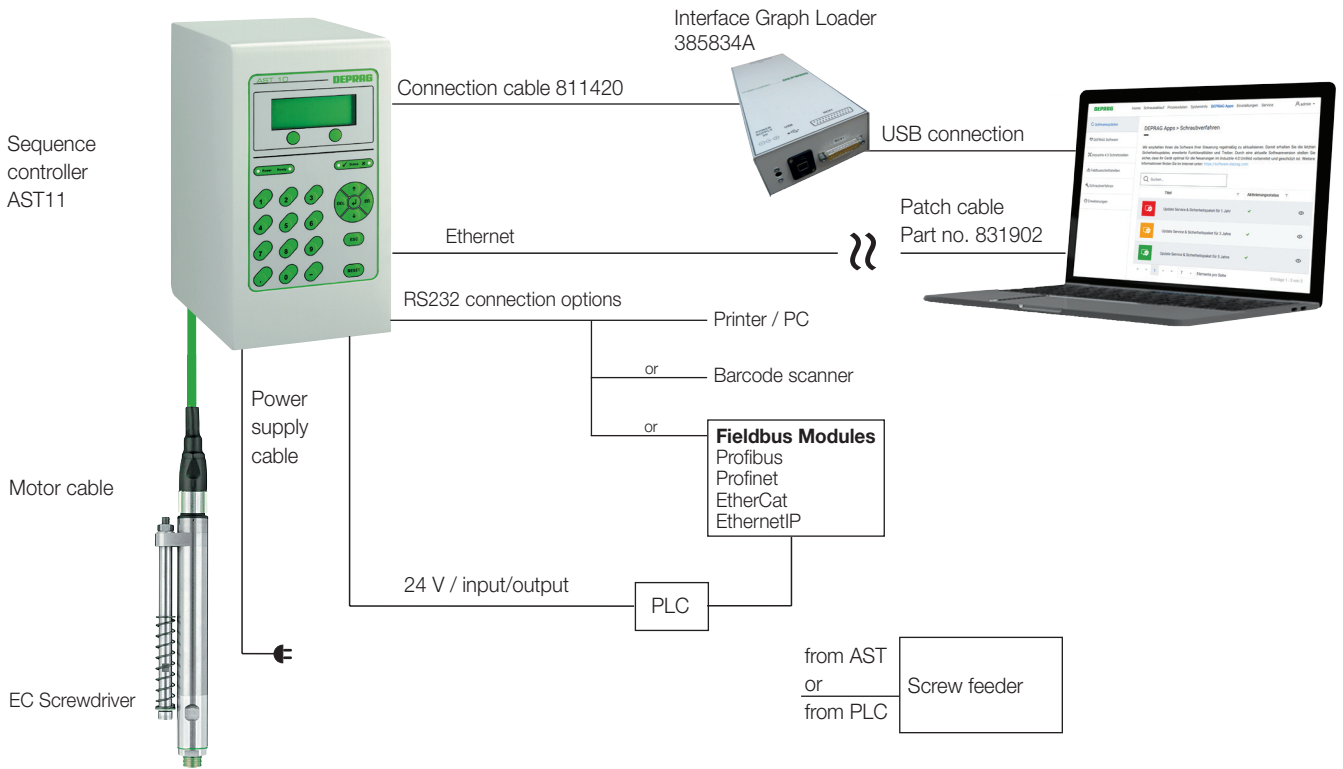
## SYSTEM COMPONENTS

Optional Accessories for sequence controller		AST6-1	ASTi6-1	AST11
Patch cable (2m) (connection ASTx -PC)	Part no.	831902 (included in delivery)		831902
Plug RJ45-IP54	Part no.	-		385453A
Part sensor capacitive M18	Part no.	-		354841C
Base	Part no.	416004A		405278A
Cable socket (slide connector voltage supply)	Part no.	-	810122 (included in delivery)	-
ASTi6-1 reset plug	Part no.	-	428005 A (included in delivery)	-
Power supply unit + power supply cable 230 V	Part no.	-	2041061 + 812587	-
Power supply unit + power supply cable 115 V	Part no.	-	2041061 + 812295	-
Touch pen	Part no.	832190		-
Slide connector 26pol. for input/output interface	Part no.	832625		-
Printer Type ND350	Part no.	-		112462A
Field bus module Profibus	Part no.	-		428010A
Field bus module Profinet	Part no.	-		428010B
Field bus module EtherCAT	Part no.	-		428010C
Field bus module EtherNet/IP	Part no.	-		428010D
<b>Required accessories:</b>				207725A (EU)
Connection cable AST11 to field bus module	Part no.	-		207725B (US)

Optional additional software for sequence controller		AST6-1	ASTi6-1	AST11
<b>Interface Graph Loader</b> (Hardware and Software)   activation key	Part no.	385834A	118742	385834A   118742
Connection cable (ASTxx - Graph Loader)	Part no.	385835B		811420
<b>Software ASTxx Serial Remote</b> (activation key) for the simple storage of screwdriving curves and result data to a PC	Part no.	206565		206565
<b>Software Statistics</b> (activation key)	Part no.	206081		206081
<b>Software Datalogger</b> (activation key)	Part no.	202699		202699
<b>Software Friction value screwdriving</b> (activation key)	Part no.	201820		201820
<b>Software Graph Viewer</b> for sequence controller AST (activation key)	Part no.	128901		128901
<b>Software DEPRAG Data eXchange</b> for sequence controller AST (activation key)	Part no.	132680		132680
<b>Software TIA Link</b> (activation key)	Part no.	135839		135839
<b>Software TwinCAT Link</b> (activation key)	Part no.	140996		140996
<b>DEPRAG Cockpit Advanced</b> 1/5/10/20/50 licenses	Part no.	-		145795/145796/145797/145798/145799
<b>DEPRAG Cockpit Professional</b> 1/5/10/20/50 licenses	Part no.	-		145440/142967/142968/142978/142979

For more details to the software products, please see brochure D3900E.

 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

**DEPRAG SCHULZ GMBH u. CO.**

P.O. Box 1352, D-92203 Amberg, Germany  
Carl-Schulz-Platz 1, D-92224 Amberg  
Phone (+49) 9621 371-0, Fax (+49) 9621 371-120  
[www.deprag.com](http://www.deprag.com)  
[info@deprag.de](mailto:info@deprag.de)

CERTIFIED AS PER DIN EN ISO 9001

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