

## MINIMAT-EC-Servo Screwdriver handheld

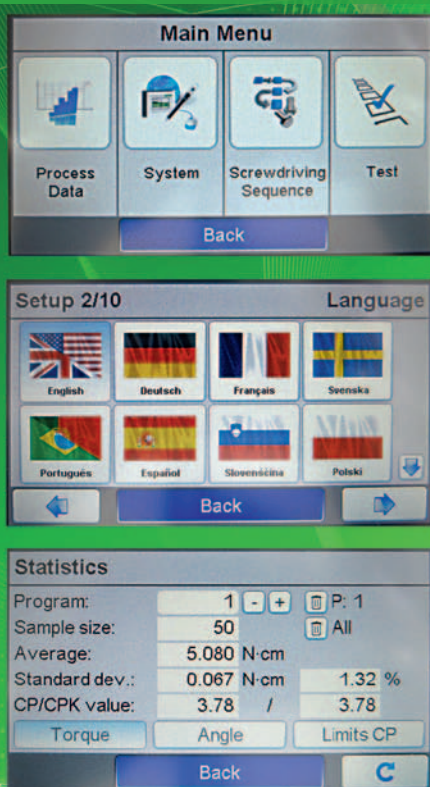
straight handle design - torque ranges between 0.01 - 2.0 N·m

The flexible EC-Servo screwdriver for low torque applications

- sensor controlled
- flexible
- data recording
- highly accurate
- ESD-capable

The EC-Servo screwdriver with highly dynamic drive technology combined with the AST5-S series controller offers maximum flexibility and 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 process parameters. Through the combination of different screwdriving strategies with flexible tightening parameters, multi-step screw run-down sequences can be realized in one assembly cycle.

### Handheld Screwdriver electric





**Screwdriving System**  
consisting of the components:

- EC-Servo Screwdriver
- Sequence Controller
- Power supply cable

## ADVANTAGES

### DEPRAG EC-SERVO SCREWDRIVER – flexible for the highest standards

The DEPRAG EC-Servo screwdrivers with matched AST5-S programmable sequence controllers allow unrestricted programming of the screw tightening process. Within the power range of the selected tool; the torque, speed, stand-by time and direction of rotation can be adjusted individually to the assembly requirement. The outstanding features of handheld EC-Servo screwdrivers are torque precision and flexible range of control functions – perfect conditions for process reliability and precise control.

The permanent magnet DC electric motors ensure low maintenance operation. They are ideally suited for screwdriving applications due to their outstanding dynamics and an wide achievable torque values. The integrated torque transducer as well as angle measurement, allows precise control of multistage screwdriving processes and documentation of the resulting values.

With these screwdrivers a torque accuracy of < 1% standard deviation \*) and a Cmk value of  $\geq 1.67$  at a tolerance of  $\pm 5\%$  is possible. A Cmk value of 1.67 equates to an error rate of just 0.6 per one million assemblies.

\*) standard deviation of the types 325EGA22-00005 and 325EGA22-00012: <2%



### DEPRAG SEQUENCE CONTROLLER AST5-S – compact size for torque up to 2 N·m



- highest precision for lowest torque ranges
- small size for confined spaces
- color touch screen with 4.3" TFT display
- torque control/angle monitoring
- angle control/torque monitoring
- friction-torque testing and friction-controlled fastening to torque
- 100 freely programmable sequence programs

The DEPRAG sequence controller AST5-S is the ideal controller for manual screw assemblies in combination with the tried and tested DEPRAG EC-Servo screwdrivers of the MINIMAT-EC-Servo (size 22) series within a torque range of 0.01 N·m – 2.0 N·m.

**Operator friendly:** The sequence controller is 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 AST5-S allows free programming of your manual screwdriving sequences for hand-held screwdriving tools. If required, further screwdriving programs can quickly and easily be set-up modifying the existing standard program.

**High number of programs:** The colour TFT touch screen allows fast access to and programming of up to 100 user defined screwdriving sequences.

**Web browser based interface:** Alternatively, to set parameters and access additional control functions, simply use any common web browser. Additional software is not required.

**Small size:** Due to its small size the controller is particularly suitable for use in manual work stations with confined spaces.

**Storage, documentation and evaluation:** The AST5-S records the screwdriving results for the last 7 production days. Additional features include the graphic display of screwdriving graphs, integrated PLC functions and comprehensive analysis options. A firm-ware update service and comprehensive software packages for screw joint analysis, documentation and process data collection are optionally available.

## EXAMPLES OF THE FUNCTIONS DISPLAY ON THE AST5-S



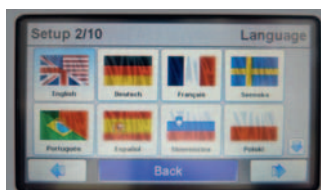
Main menu



Graphic display of screwdriving graphs



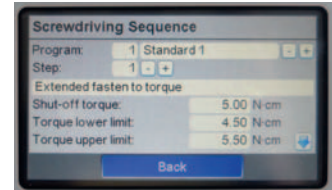
Statistics display



Web interface and controller display (available in 13 languages)





Program selection



Program set-up

## SYSTEM COMPONENTS

### MINIMAT-EC-Servo Screwdriver handheld, Straight handle design, size 22, ESD-capable

Screwdriver		Type	325EGA22-00005	325EGA22-00012	325EGA22-00025	325EGA22-00050	325EGA22-00080
Push-to-start		Part no.	104400A	104400B	104400C	104400D	104400E
Torque min.		N·m / in.lbs	0.01 / 0.09	0.03 / 0.27	0.05 / 0.45	0.1 / 0.9	0.16 / 1.42
Torque max. *)		N·m / in.lbs	0.05 / 0.45	0.12 / 1.06	0.25 / 2.21	0.5 / 4.42	0.8 / 7.08
Speed min.		rpm	120	120	100	80	60
Speed max. *)		rpm	1500	1500	2000	1600	1200
Diameter		mm / in.	30.5 / 1.2	30.5 / 1.2	30.5 / 1.2	30.5 / 1.2	30.5 / 1.2
Length		mm / in.	230.5 / 9	230.5 / 9	230.5 / 9	230.5 / 9	230.5 / 9
Weight		kg / lbs.	0.6 / 1.32	0.6 / 1.32	0.6 / 1.32	0.6 / 1.32	0.6 / 1.32
Noise level		dB (A)	60	60	60	60	60
Line voltage (DC)		V	24	24	24	24	24
Internal hex drive DIN ISO 1173			B3 (3mm)	B3 (3mm)	B3 (3mm)	B3 (3mm)	B3 (3mm)
Suitable inserting tools and connection parts with inserting end DIN ISO 1173			A3 (3mm)	A3 (3mm)	A3 (3mm)	A3 (3mm)	A3 (3mm)
<b>Optional equipment:</b>							
Spring sleeve cpl., without screw suction	Part no.		403280K				
Spring sleeve cpl., with screw suction	Part no.		403280L				
Screwdriver adapter	Part no.		4008331W				
Support ring	Part no.		389775C				
Screwdriver		Type	325EGA22-00120	325EGA22-00200			
Push-to-start		Part no.	104400F	104400G			
Torque min.		N·m / in.lbs	0.18 / 1.6	0.4 / 3.54			
Torque max. *)		N·m / in.lbs	1.2 / 10.6	2.0 / 17.7			
Speed min.		rpm	50	30			
Speed max. *)		rpm	900	550			
Diameter		mm / in.	30.5 / 1.2	30.5 / 1.2			
Length		mm / in.	229.5 / 8.95	229.5 / 8.95			
Weight		kg / lbs.	0.6 / 1.32	0.6 / 1.32			
Noise level		dB (A)	60	60			
Line voltage (DC)		V	24	24			
Internal hex drive DIN ISO 1173			F6.3 (¼")	F6.3 (¼")			
Suitable inserting tools and connection parts with inserting end DIN ISO 1173			E6.3 (¼")	E6.3 (¼")			
<b>Optional equipment:</b>							
Spring sleeve cpl., without screw suction	Part no.		364672A				
Spring sleeve cpl., with screw suction	Part no.		364672C				
Screwdriver adapter	Part no.		4008331W				
Support ring	Part no.		389775C				

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

### SEQUENCE CONTROLLER AST5-S

Sequence controller	Type	AST5-S
with integrated performance electronics	Part no.	104449A
Voltage	V	24
Power input	W	150
Display		TFT-colour display 4.3"
24V input/output interface		-
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)

#### Required Accessories

<b>Power supply cable</b> 230 V length 1.8 m / 5.9 ft.	Part no.	812587
<b>Power supply cable</b> 115 V length 1.8 m / 5.9 ft.	Part no.	812295

#### Optional Accessories

Patch cable (2m) (connection AST5-PC)	Part no.	831902
Base	Part no.	416004A
Touch pen	Part no.	832190
<b>Interface Graph Loader</b> (hardware and software)	Part no.	385834A 1) see description on page 4
Connection cable (AST5 - Graph-Loader)	Part no.	385835A
<b>Software ASTxx Serial Remote</b> (release code) for the simple storage of screwdriving curves and result-data to a PC	Part no.	206565 2) see description on page 4

# SYSTEM COMPONENTS

## Optional Accessories

<b>Software</b> Graph 10E (release code)	Part no.	202698	
<b>Software</b> statistic (release code)	Part no.	206081	
<b>Software</b> datalogger (release code)	Part no.	202699	
<b>Software</b> Friction value screwdriving (release code)	Part no.	201820	
<b>Software</b> GRAPH10 BIN-> CSV	Part no.	201992	3) see description below
<b>Software Graph Viewer</b> (for sequence controller AST) / activation	Part no.	128900/128901	4) see description below
<b>Software</b> Deprag Data eXchange (for sequence controller AST) / activation	Part no.	132679/132680	5) see description below

## Description of the software

**1) Interface Graph Loader (hardware and software)** - The storage of screwdriving graphs and end value data sets (e.g. torque, angle etc.) for manual work stations and screwdriving stations can be carried out automatically using the Interface Graph-Loader. The corresponding software enables immediate display on the computer screen of the current screwdriving graph, the screw assembly can be evaluated straight after completion and \*.csv and \*.bin files can be saved in individual directories.

**2) Software ASTxx Serial Remote (release code)**

The program ASTxx Serial Remote is started on a PC and is controlled by commands over a serial interface (COM-Port). With this program, screwdriving curves and result-data can be transferred fast and simply onto a PC. The PLC controls when and which data should be stored. The storage place (also the directory) on the PC is determined by the PLC as well. The directory is setup automatically on the PC.

**3) Software GRAPH10 BIN-> CSV** - The software converts your binary files into csv files for further processing.

**4) Software Graph Viewer for evaluation of screwdriving curves**

During each screw assembly when using a sequence controller AST, the relevant measurement values are recorded in a file. There is now a new software product: the DEPRAG Graph Viewer, to simply and easily evaluate and analyse these measurement values.

Visualisation of measurement values over time

In this visualisation, various measurement sizes can be shown in relation to the screwdriving procedure. All available measurement values can be displayed in chronological order.

Visualisation of measurement values over angle

In this visualisation, the angle can be analysed in relation to the screwdriving procedure. The y-axis can be freely chosen by the user. This can e.g. enable analysis of angle in relation to torque or angle in relation to motor current, etc.

In order to precisely analyse the screw assembly, a video can be played in visualisation over angle. Use the "start" and "pause" buttons in the same way as a video player to visualise the curve sequence of the screwdriving process. Individual sequences can be selected and displayed using the time bar.

Superposition of measurement values over time / over angle

As well as visualisation over angle and visualisation over time, there is also an option to display several curves at the same time in order to draw correlations and recognise trends. Any number of curves can be added. It is also possible to align curves to specific synchronisation points and hide or show screwdriving steps.

• **Simple filtering and synchronisation in search history**

Screwdriving curves can be filtered according to program step or by torque. All displayed curves can be coordinated to one synchronisation point.

• **Easy operation**

The required units, sizes and contents can be flexibly selected by the user.

• **Several display views at one time**

In order to compare several curves, more than one screwdriving curve can be opened at the same time.

• **Usability & "touch first"**

The new software has been developed to be "touch first" and allows easy operation – without mouse or keyboard.

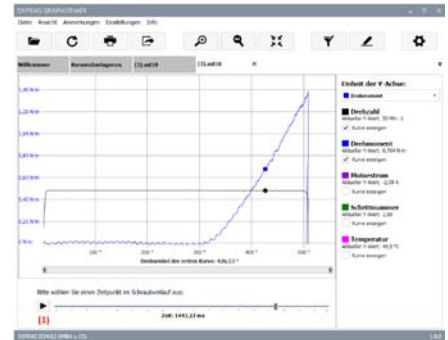
• **Additional features**

- Add individual texts and reference arrows
- Conversion of units
- Save and load files
- Export files
- Zoom
- Multi-language (German, English)
- Print curve data
- Download directly from controller

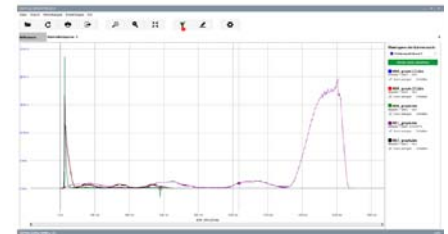
• **System prerequisites**

- Windows 7, 8, 10
- The software is available as a download and requires activation

➤ **Use with current AST software version is recommended.**



Visualisation over angle

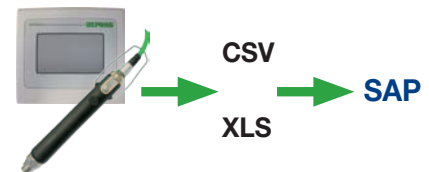


Superposition over time

**5) Software Deprag Data eXchange for AST sequence controllers enables DEPRAG graphic files to be exported either as csv or Excel files**

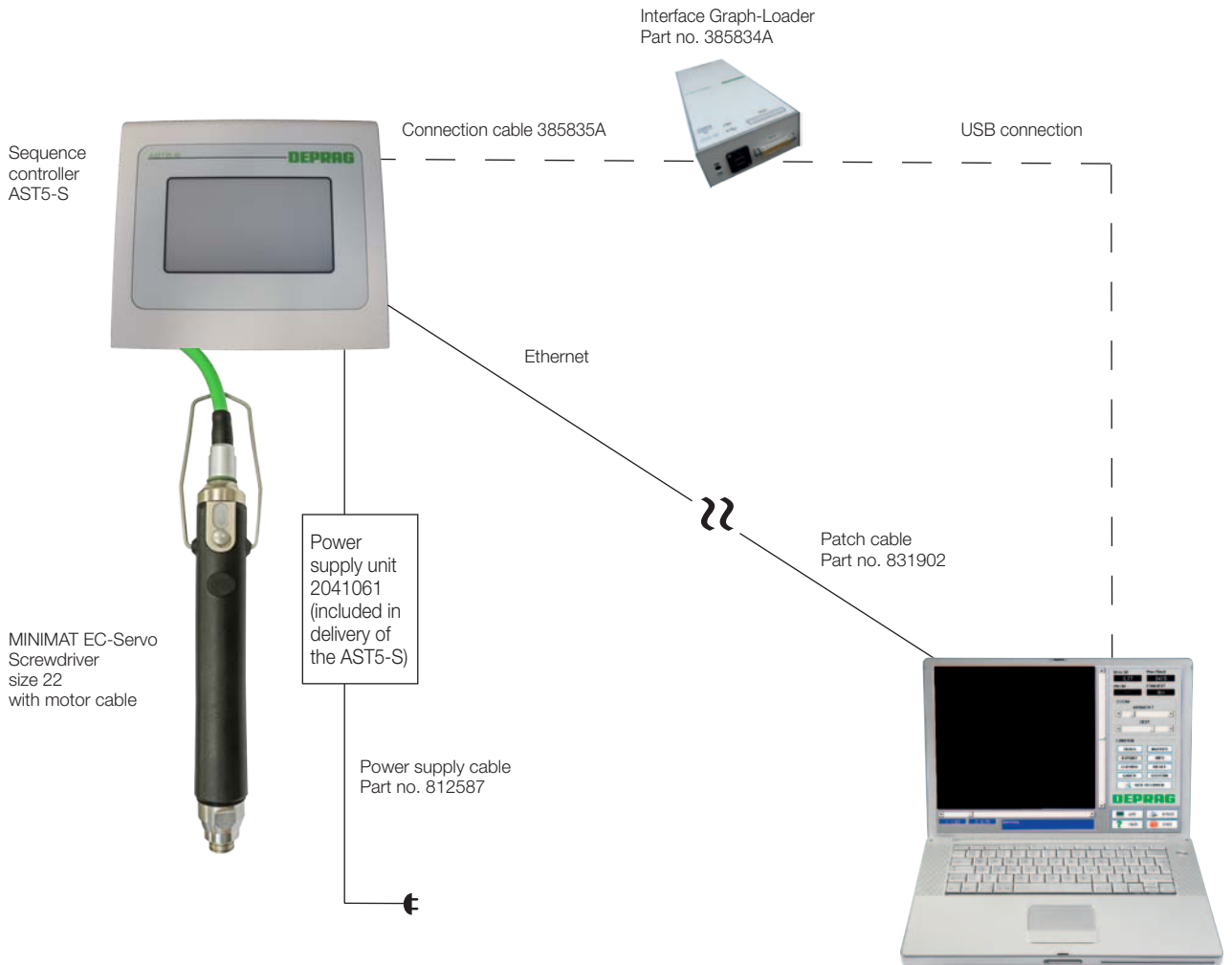
AST sequence controllers, the adaptive screwdriving system ADAPTIVE DFS and the ComCenter document relevant processing data for every screw assembly, which is then saved in a distinctive DEPRAG format. The so-called "graphic files" contain all screw curves, end values and details relating to the screwdriving process and are only readable by DEPRAG's own software solutions. In order to use and analyse this data in other systems, it is necessary to transform the internal format into a universal machine-readable format. The new software solution DEPRAG Data eXchange enables DEPRAG graphic files to be exported either as csv or Excel files. This data can now be used in other software solutions. Optional areas of application include:

- integration in a databank
- analysis in Matlab
- SAP integration
- filing in customer-specific processing software



**Compatibility:** all Windows systems (7, 8, 10) without any need for configuration. The software configures itself and is ready to run with just one click.

# EXAMPLE



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