

## Screwdriver Spindles electric



## MINIMAT-EC-Servo Screwdriver Spindles

Maximum Flexibility and Process Control

Straight Spindle Form - Torque range from 0.2 Nm - 500 Nm

Angle Head Design - Torque range from 5 Nm - 70 Nm

- powerful
- flexible
- high precision
- full documentation capability

MINIMAT-EC-Servo screwdriver spindles in connection with the sequence controller AST40 allow free programming of the screw tightening process and offer maximum flexibility, accuracy and process control. Torque, speed, angle, drive direction and sequence delay times can be customized to the individual screwdriving task within the power range of the selected screwdriver spindle.

The integrated torque and angle sensor module employs non contact signal transmission techniques and enables precise control of the screwdriving process as well as the documentation of the screwdriving results and process parameters and also guarantees the highest shut-off accuracy.

The EC-Servo screwdriver is suitable for applications with the most demanding quality requirements – where direct measurement and control methods are required.



## ADVANTAGES

- High power density
- High shut-off accuracy
- Flexible
- Noise immunity
- Comprehensive documentation options
- System diagnostics
- Extensive integration and control options

The application of a brushless servomotor with high power density is essential to the maintenance free operation of the EC drive. It also delivers excellent dynamics and high peak torque in a compact form – ideally suited to the screw tightening process.

Torque accuracies of < 1% standard deviation and thus Cmk values of  $\geq 1.67$  with a tolerance of  $\pm 5\%$  can be reached \* with MINIMAT-EC-Servo stationary screwdrivers. Statistically speaking, the error rate is less than 0.6 per one million screw assemblies.

\*) under suitable process conditions

The screwdriving system consists of the **EC screwdriver spindle**, **AST40 screwdriver sequence controller** and a single **connection cable** that has been tested for extreme loading conditions. The single connection cable services the power and signal transmission functions between the screwdriver and controller using digital technology as most suitable for longer cable lengths.

## DEPRAG SCREWDRIVING CONTROLLER AST40/ASTi40

- Torque range: 0.2 - 500 Nm
- For MINIMAT-EC-SERVO screwdriver spindles
- Number of multi-level screw sequences: 120
- Documentation options: internal storage, output via RS232 or Ethernet (Datalogger), printer interface
- PLC interface: input/output, Profibus, Profinet, EtherCAT, EthernetIP

The sequence controller AST40/ASTi40 is a controller with integrated power supply. Within the performance range of each spindle torque, speed, waiting period and rotational direction can be individually customized to the screw assembly task.

Extensive programming, control and documentation interfaces offer maximum flexibility for integration into existing process environments. Several communication options include input/output, various field bus interface options and an integrated web server for online screwdriver program configuration, data backup and screwdriver graph analysis via Ethernet.

All common screw assembly sequence programs are embedded in the AST40 screwdriver controller in the form of commands with parameters. Commissioning of an application can be completed in just a few steps. All required programming and setup functions are made available through the web interface so that no additional software is required, only a PC with a browser.

When choosing the option ASTi40 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 AST40 display.



AST40 with 7" touch display



ASTi40 for installation into a switch cabinet

## EC-SERVO SCREWDRIVER SPINDLE

4 available sizes  
in straight spindle design



311E27-xx    311E36-xx    311E42-xx    311E63-xx

**NEW**

size 36  
now available  
in angle head design



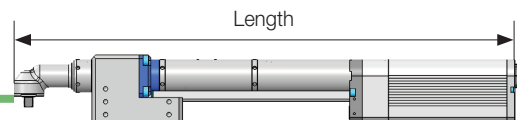
For assembly in confined spaces.

<b>MINIMAT-EC-Servo, straight spindle form</b>		<b>size 27</b> with quick change chuck			
<b>Screwdriver</b>	<b>Type</b> Part no.	<b>311E27-0010</b> 413400A	<b>311E27-0020</b> 413400B	<b>311E27-0050</b> 413400C	<b>311E27-0120</b> 413400E
<b>Screwdriver with redundant measuring system for torque and angle</b>	<b>Type</b> Part no.	<b>311ER27-0010</b> 101624A	<b>311ER27-0020</b> 101624B	<b>311ER27-0050</b> 101624C	<b>311ER27-0120</b> 101624E
Torque min.	Nm/in.lbs	0.2 / 1.77	0.4 / 3.54	1 / 8.85	2.4 / 21.24
Torque max.	Nm/in.lbs	1 / 8.85	2 / 17.7	5 / 44.25	12 / 106.2
Speed min.	rpm	100	60	40	20
Speed max.	rpm	1600	1500	800	400
Diameter	mm/in.	27 / 1.05	27 / 1.05	27 / 1.05	27 / 1.05
Length 311E / 311ER	mm/in.	360/14.05 / 433/16.9	360/14.05 / 433/16.9	360/14.05 / 433/16.9	360/14.05 / 433/16.9
Weight 311E / 311ER	kg/lbs	1.2/2.64 / 1.4/3.1	1.2/2.64 / 1.4/3.1	1.2/2.64 / 1.4/3.1	1.2/2.64 / 1.4/3.1
Noise level	dB(A)	68	68	68	68
Internal hex. drive DIN ISO 1173		F6.3	F6.3	F6.3	F6.3
Suitable tool inserts and connecting components with a drive as per DIN ISO 1173		E6.3	E6.3	E6.3	E6.3

<b>MINIMAT-EC-Servo, straight spindle form</b>		<b>size 36</b> with quick change chuck		
<b>Screwdriver</b>	<b>Type</b> Part no.	<b>311E36-0150</b> 205000A	<b>311E36-0300</b> 205000C	<b>311E36-0500</b> 205000D
<b>Screwdriver with redundant measuring system for torque and angle</b>	<b>Type</b> Part no.	<b>311ER36-0150</b> 108717A	<b>311ER36-0300</b> 108717C	<b>311ER36-0500</b> 108717D
<b>Screwdriver with integrated off-set gearing (to minimize the center distance)</b>	<b>Type</b> Part no.	<b>311E36-0160-SV1 **)</b> 104472A	-	-
Torque min. 311E / 311ER 311E36-0160-SV1	Nm/in.lbs	3 / 26.55 3.2 / 28.32	6 / 53.1	10 / 88.5
Torque max. 311E / 311ER 311E36-0160-SV1	Nm/in.lbs	15 / 132.75 *) 16 / 141.6 *)	30 / 265.5 *)	50 / 442.5 *)
Speed min.	rpm	50	30	20
Speed max.	rpm	1000	600	380
Diameter	mm/in.	36 / 1.4	36 / 1.4	36 / 1.4
Length 311E / 311ER 311E36-0160-SV1	mm/in.	473/18.45 / 575/22.42 487/ 19	476/18.56 / 578/22.54	476/18.56 / 578/22.54
Weight 311E / 311ER 311E36-0160-SV1	kg/lbs	2.8/6.2 / 3.2/7.04 3.6/7.92	2.8/6.2 / 3.2/7.04	2.8/6.2 / 3.2/7.04
Noise level	dB(A)	62	62	62
Internal hex. drive DIN ISO 1173		F6.3	F11.2	F11.2
Suitable tool inserts and connecting components with a drive as per DIN ISO 1173		E6.3	E11.2	E11.2

\*) With a voltage below 180V the maximum torque will be reduced to 80% of the specified value.  
\*\*) For assembly in confined spaces.

<b>MINIMAT-EC-Servo, straight spindle form</b>		<b>size 42</b> with quick change chuck		<b>size 63</b>		
<b>Screwdriver</b>	<b>Type</b> Part no.	<b>311E42-0300</b> 206000B	<b>311E42-0800</b> 206000D	<b>311E63-1800</b> 416400D	<b>311E63-3500</b> 416400F	<b>311E63-5000</b> 416400H
<b>Screwdriver with redundant measuring system for torque and angle</b>	<b>Type</b> Part no.	<b>311ER42-0300</b> 101625B	<b>311ER42-0800</b> 101625D	<b>311ER63-1800</b> 107200D	<b>311ER63-3500</b> 107200F	<b>311ER63-5000</b> 107200H
Torque min.	Nm/in.lbs	6 / 53.1	16 / 141.6	36 / 318.6	70 / 619.5	100 / 885
Torque max.	Nm/in.lbs	30 / 265.5	80 / 708	180 / 1593	350 / 3097.5	500 / 4425
Speed min.	rpm	50	20	15	10	10
Speed max.	rpm	890	330	300	155	90
Diameter	mm/in.	42 / 1.64	42 / 1.64	63 / 2.46	63 / 2.46	63 / 2.46
Length 311E / 311ER	mm/in.	478/18.64/81/22.66	478/18.64/81/22.66	617/24.06/745/29.1	617/24.06/745/29.1	617/24.06/745/29.1
Weight 311E / 311ER	kg/lbs	4.2/9.24 / 5/11	4.2/9.24 / 5/11	12.9/28.38 / 15/33	12.9/28.38 / 15/33	12.9/28.38 / 15/33
Noise level	dB(A)	66	66	73	73	73
Internal hex. drive DIN ISO 1173		F11.2	F11.2	-	-	-
External square drive DIN 3121		-	-	F20 (3/4")	F20 (3/4")	F20 (3/4")
Suitable tool inserts and connecting components with a drive as per DIN ISO 1173 with a drive as per DIN 3121		E11.2	E11.2	-	-	-
		-	-	H20 (3/4")	H20 (3/4")	H20 (3/4")



MINIMAT-EC-Servo, angle head design		size 36		
Screwdriver	Type	311EW36-0220-F10	311EW36-0420-F10	311EW36-0700-F12.5
	Part no.	108121A	108121B	108121C
Torque min.	Nm/in.lbs	5 / 44.25	9 / 79.65	14 / 123.9
Torque max.	Nm/in.lbs	22 / 194.7	42 / 371.7	70 / 619.5
Speed min.	rpm	35	20	10
Speed max.	rpm	650	350	200
Diameter	mm/in.	36 / 1.4	36 / 1.4	36 / 1.4
Length	mm/in.	554 / 21.6	554 / 21.6	557.5 / 21.74
Weight	kg/lbs	4.8 / 10.56	4.8 / 10.56	5.1 / 11.22
Noise level	dB(A)	68	62	62
External square drive	DIN 3121	F10	F10	F12.5
Suitable tool inserts and connecting components with a drive as per DIN 3121		G10	G10	G12.5

**Optional Accessories**

<b>Machine Capability Study Torque *)</b>	Part no.	000717	- Evaluation of 50 measured values - Idle speed, Average - Standard deviation, Cm-Value, Cmk-Value
<b>Machine Capability Study Torque angle *)</b>	Part no.	000718	

\*) Additional services, e.g. calibration of screwdrivers, can be found in our catalog D3330E.

Motor Cable	Length	Part no.
	5 m/16.4 ft (standard)	8337252
	8 m/26.2 ft	8337253
	12 m/39.4 ft	8337254

The screwdriver spindles size 27 and type 311E36-0150 (size 36) can also be delivered with an automatic screw feed system. Please contact us for more information!

Sequence Controller		AST40		ASTi40	
for screwdriver		311E(R)27/36/42 311EW36	311E(R)63	311E(R)27/36/42 311EW36	311E(R)63
<b>Sequence controller</b>	<b>Type</b>	<b>AST40-1</b>	<b>AST40-2</b>	<b>ASTi40-1</b>	<b>ASTi40-2</b>
Basic version with input/output interface	Part no.	385588A	387022A	428006A	387044A
<b>Sequence controller</b>	<b>Type</b>	<b>AST40-1 PB</b>	<b>AST40-2 PB</b>	<b>ASTi40-1 PB</b>	<b>ASTi40-2 PB</b>
with fieldbus module Profibus port	Part no.	385588B	387022B	428006B	387044B
<b>Sequence controller</b>	<b>Type</b>	<b>AST40-1 PN</b>	<b>AST40-2 PN</b>	<b>ASTi40-1 PN</b>	<b>ASTi40-2 PN</b>
with fieldbus module Profinet port	Part no.	385588C	387022C	428006C	387044C
<b>Sequence controller</b>	<b>Type</b>	<b>AST40-1 EC</b>	<b>AST40-2 EC</b>	<b>ASTi40-1 EC</b>	<b>ASTi40-2 EC</b>
with fieldbus module EtherCAT port	Part no.	385588D	387022D	428006D	387044D
<b>Sequence controller</b>	<b>Type</b>	<b>AST40-1 E/IP</b>	<b>AST40-2 E/IP</b>	<b>ASTi40-1 E/IP</b>	<b>ASTi40-2 E/IP</b>
with fieldbus module EtherNet/IP port	Part no.	385588E	387022E	428006E	387044E
<b>Sequence controller</b>	<b>Type</b>	<b>AST40-1 RS232</b>	<b>AST40-2 RS232</b>	<b>ASTi40-1 RS232</b>	<b>ASTi40-2 RS232</b>
with interface AST40 RS232 for data output, format programmable via web page	Part no.	385588F	387022F	428006F	387044F
<b>Technical data:</b>					
Power unit (AC)	V / Hz	100 - 240 / 50/60		100 - 240 / 50/60	
Insulation		IP54		IP54	
TFT-display (touch)		7", 800x480		-	
24V input/output interface		27 inputs / 30 outputs		27 inputs / 30 outputs	
Dimensions (W x H x D)	mm / in.	232 x 315 x 205 / 9.05 x 12.3 x 8		232 x 315 x 205 / 9.05 x 12.3 x 8	
Weight	kg / lbs	approx. 13 / 28.6		approx. 13 / 28.6	
Number of screwdriving programs (start via I/O interface or fieldbus)		120		120	
Number of screwdriving programs created via http		unlimited		unlimited	
<b>Included in delivery</b>					
Patch cable (connection cable ASTi40-PC)	Part no.	-		831902	
<b>Optional accessories</b>		-		<b>DPU110 or DPU210</b> Please find technical data and further details in our product catalog D3350E.	

## SYSTEM COMPONENTS

### Required Accessories

<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 1.8 m/5.9 ft (Brazil)	Part no.	385443D
<b>Power supply cable</b>	Length 2.5 m/8.2 ft (China)	Part no.	385443C

Optional accessories suitable for controller	Type	AST40	ASTi40
Table stand	Part no.	300085A	-
Patch cable 2 m	Part no.	831902	-
ASTi40 reset plug	Part no.	-	425080A
Touch pen	Part no.	832190	-
<b>Bus cable</b> Length 2 m/6.56 ft, IP68 RJ45 - open wires (no connector) Cat.6	Part no.	138689	138689
<b>Bus cable</b> Length 5 m/16.4 ft, IP68 RJ45 - open wires (no connector) Cat.6	Part no.	138690	138690
<b>Bus cable</b> Length 2 m/6.56 ft, IP68 RJ45 - RJ45 Cat.6	Part no.	138685	138685
<b>Bus cable</b> Length 5 m/16.4 ft, IP68 RJ45 - RJ45 Cat.6	Part no.	138686	138686
<b>Bus cable</b> Length 2 m/6.56 ft, IP68 RJ45 - IP68 RJ45 Cat.6	Part no.	138687	138687
<b>Bus cable</b> Length 5 m/16.4 ft, IP68 RJ45 - IP68 RJ45 Cat.6	Part no.	138688	138688

### Optional Additional Software

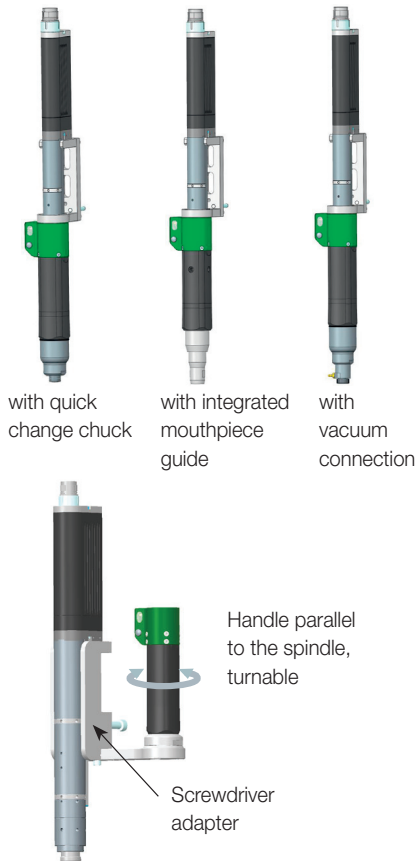
<b>Interface Graph Loader</b> (hardware and software)	Part no.	385834A
Connection cable (AST40 - Graph Loader)	Part no.	385835D
<b>Software ASTxx Serial Remote</b> (activation key) for the simple storage of screwdriving curves and result-data to a PC	Part no.	206565
<b>Software Datalogger</b> (activation key)	Part no.	202699
<b>Software Friction value screwdriving</b> (activation key)	Part no.	201820
<b>Software DEPRAG Clamp Force Control - DEPRAG CFC</b> (activation key)	Part no.	109108
<b>Software Statistics</b> (activation key)	Part no.	206081
<b>Software Graph Viewer</b> for sequence controller AST (activation key)	Part no.	128901
<b>Software DEPRAG Data eXchange</b> for sequence controller AST (activation key)	Part no.	132680
<b>Software TIA Link</b> (activation key)	Part no.	135839
<b>Software TwinCAT Link</b> (activation key)	Part no.	140996
<b>Software Open Protocol</b> (activation key)	Part no.	178341
<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
<b>DEPRAG GraphViewer Cloud</b> (activation key)	Part no.	193198

For more details to the software products, please see product catalog 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.

## COMPONENTS for the use in manual work stations - also in connection with feeder



### Handle in line with spindle with quick change chuck

For EC-Servo screwdriver spindles		311E27-xxxx	311E36-0150	311E36-0300 311E36-0500
Handle	Part no.	425800A	425900A	425900B
Internal hex. drive DIN ISO 1173		F6.3	F6.3	F11.2

### Handle in line with spindle with vacuum connection

For EC-Servo screwdriver spindles		311E27-xxxx	311E36-0150	311E36-0300 311E36-0500
Handle	Part no.	425800E	425900F	425900G
Internal hex. drive DIN ISO 1173		F6.3	F6.3	F11.2

### Handle in line with spindle with integrated mouthpiece guide for the use in connection with an automatic feeder

For EC-Servo screwdriver spindles		311E27-xxxx	311E36-0150
Handle, Length of stroke 80 mm	Part no.	4258001B	425900C
Handle, Length of stroke 100 mm	Part no.	4258001C	425900D
Handle, Length of stroke 120 mm	Part no.	4258001D	425900E

### Handle at side of spindle

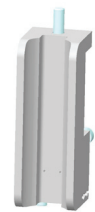
For EC-Servo screwdriver spindles		311E36-xxxx/311E42-xxxx
Handle	Part no.	1029831A

All the handles have an LED status display (OK/NOT OK), an ergonomic start lever and an additional button for reversal or to start a screwdriving program. Operating elements can be adapted to a specific application by selecting the operating mode. In this way for example the tool can be pre-programmed so that a second screwdriving program can be started directly by pressing the switch (e.g. a loosening program). Alternatively the mode can be selected so that the button is used for the pre-selection of the screwdriving program started via lever.

### Required Accessories

For EC-Servo screwdriver spindles		311E27-xxxx	311E36-xxxx	311E42-xxxx
Weight of the screwdriver spindle	311E	1.2 kg/2.64 lbs	2.8 kg/6.16 lbs	4.2 kg/9.24 lbs
<b>Linear stand</b>	Part no.	408010A	408010B	408010C
for torque reaction up to	Nm/in.lbs	20/177	50/443	150/1328
Weight of the horizontal arm	kg/lbs	2/4.4	6.7/14.74	13.7/30.14
<b>Screwdriver adapter</b> for the attachment to a linear stand with handle in line with spindle	Part. no.	4008333C	4008333B	-
<b>Screwdriver adapter</b> for the attachment to a linear stand with handle parallel to the spindle	Part. no.	-	133162A	102982A
<b>Connection cable</b> to AST40	Part. no.	385584A	385584A	385584A
<b>Connection cable</b> to PLC	Part. no.	385584B	385584B	385584B

The suitable linear stands and balancers can be found in our product catalog D3345E. In order to select the appropriate balancer please consider the weight of the horizontal arm, the weight of the screwdriver and additionally a mass of 1 kg for the screwdriver adapter and the handle. To split the weight we highly recommend to use 2 balancers.



Screwdriver adapter  
102982A/133162A



Turn fixture 917333A

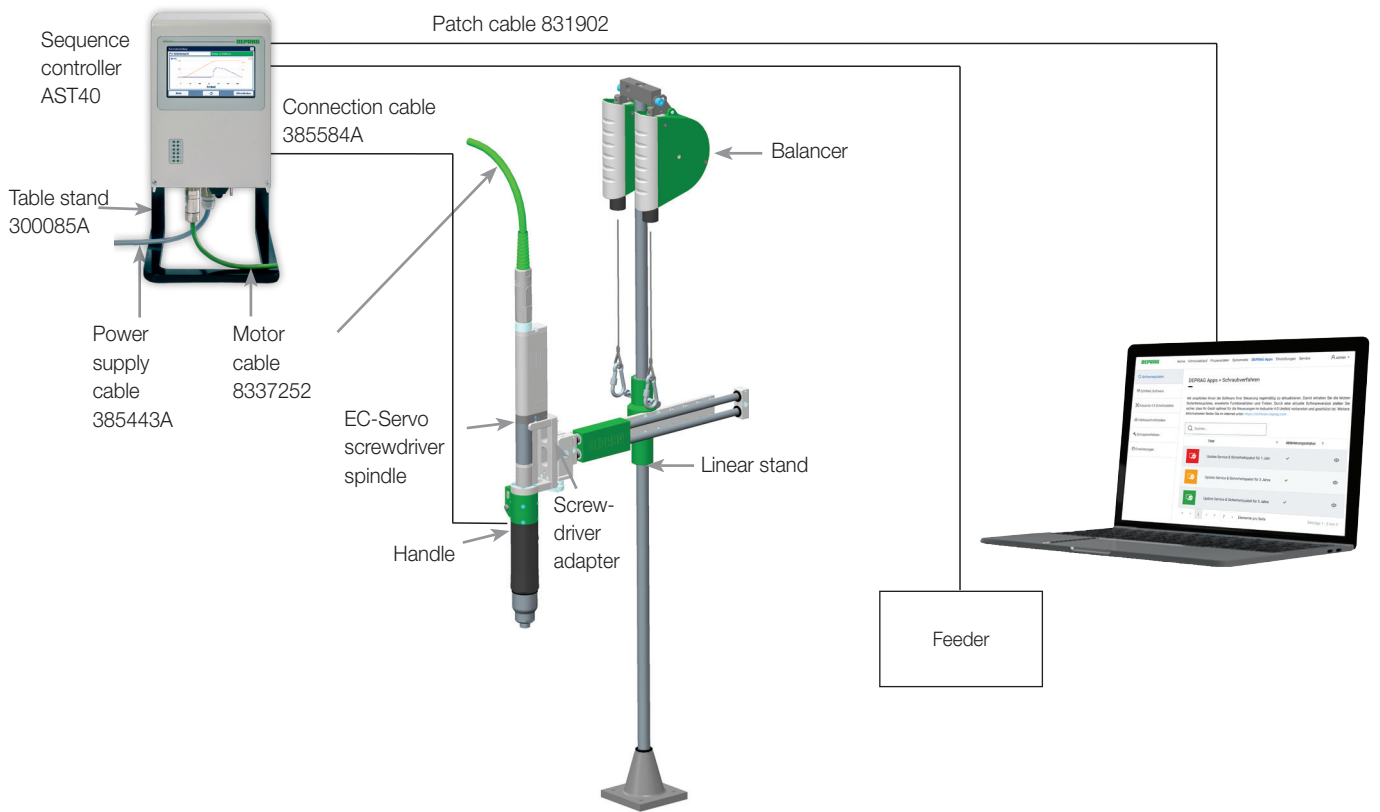


Support ring 398704A

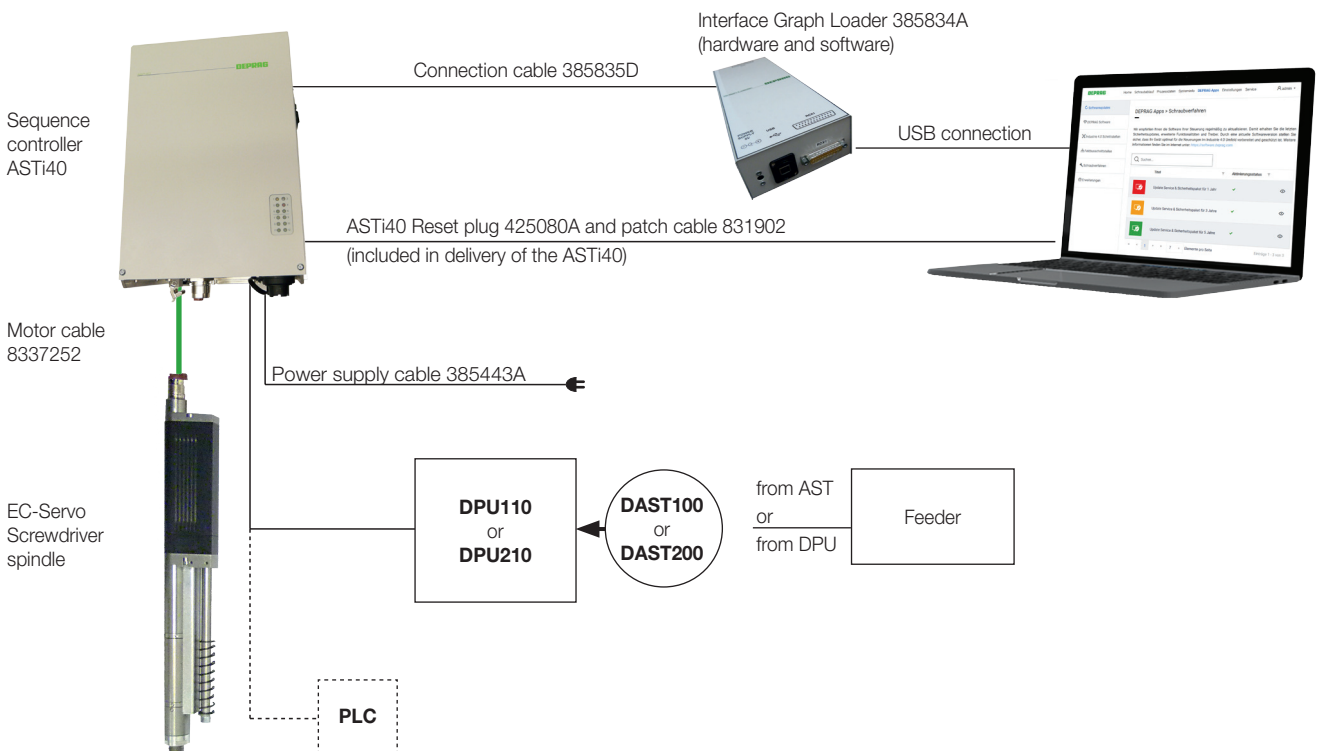
Optional accessories for EC-Servo screwdriver spindles		311E27-xxxx	311E36-xxxx
<b>Turn fixture</b>	Part no.	917333A	on request
The rotary unit is integrated between the screwdriver adaptor and handle and enables rotation of the handle. Ergonomic handling is therefore guaranteed even on larger work surfaces.			
<b>Please note:</b> When using the rotary unit with the version of the handle with quick change chuck or vacuum connection the holder on the handle must be replaced by the holder part number 917695 which must be ordered separately.			
<b>Support ring</b>	Part no.	398704A	398704A
The support ring can not be used in connection with handle with integrated mouthpiece guide.			
<b>Support ring</b> suitable for handle with integrated mouthpiece guide	Part no.	398704C	398704C

Please note: when used as a handheld screwdriver only 3 screwdriving programs are available

# SYSTEM OVERVIEW when used in manual work stations



# SYSTEM OVERVIEW in connection with ASTi40

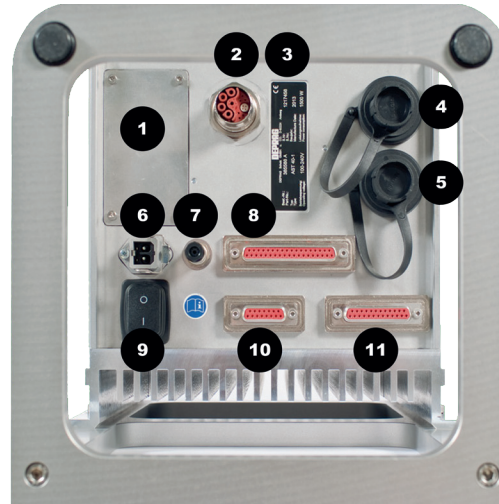


## SYSTEM OVERVIEW in connection with AST40

Sequence controller AST40  
connected to the screwdriver  
via motor cable



## OVERVIEW INTERFACES of the AST40



Bottom of the control

- 1 = fieldbus or printer interface (optional)
- 2 = motor cable connection
- 3 = type plate
- 4 = USB interface for system image generation
- 5 = Ethernet connection
- 6 = power supply
- 7 = 2-channel emergency stop
- 8 = I / O interface PLC 1
- 9 = on / off switch
- 10 = I / O interface PLC 3 (reload signal)
- 11 = I / O interface PLC 2

# DEPRAG

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