



Screwdriving technology

Automation

Air motors

Air tools

DEPRAG

**Screwdriver Spindles
electric**

MINIMAT-EC-Servo Screwdriver Spindles

Maximum flexibility and processing reliability

Straight design – torque ranges between 5 Nm - 270 Nm

- flexible
- documentation features
- high precision
- sensor control

The MINIMAT-EC-Servo screwdriver spindle in connection with the sequence controller AST30 enables free programming of the screw tightening process and features maximum flexibility and processing reliability.

Within the performance range of the screwdriver, torque, speed, stand-by and turn-direction may be individually adapted to fit the required tightening process.

The integrated transducer for torque and angle permits the exact control and supervision of the tightening process, as well as the documentation of important processing parameters. Thus, the highest possible precision during the tightening process is guaranteed.

The EC servo screwdriver is used in applications with high safety requirements in which a direct measurement system is required.

The brushless EC-motor is the reason for the maintenance-free operation, eliminating wear-and-tear parts. It also achieves a high motor dynamics and is capable of reaching the necessary high peak-torque required for fastener tightening.

The DEPRAG screwdrivers based on EC-technology enable a torque accuracy of < 1% standard deviation, which can be relied upon after millions of cycles. Thus, a Cmk value of ≥ 1.67 with a tolerance requirement of $\pm 5\%$ 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.

To operate the screwdriver spindle, a sequence controller AST30 with integrated power supply, a motor cable and a measuring cable is necessary. The cables are available in different lengths.

Comprehensive software addition modules enable data registration and graph display for statistic evaluation and screw joint analysis.

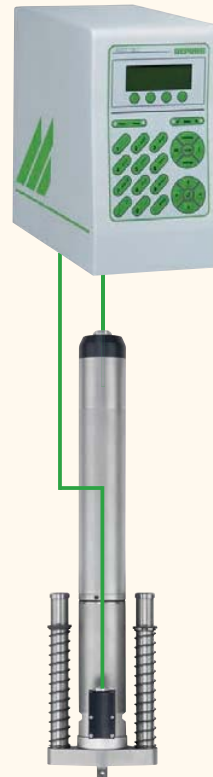
Position dependent programme selection, monitoring of the screw sequence and further functions for increased processing reliability are realisable in combination with a position control stand.



SYSTEM OVERVIEW

Screwdriving System consisting of:

- **EC-SERVO SCREWDRIVER**
- **SEQUENCE CONTROLLER AST30-2**
- **MOTOR CABLE**
- **MEASURING CABLE**



SYSTEM COMPONENTS

MINIMAT-EC-Servo Screwdriver Spindles



Screwdriver reversible		Type	310E56-022	310E56-040	310E56-090	310E56-140	310E56-270
Part no.			390004 D	390004 A	390004 B	390004 C	389520 E
Torque	min.	Nm / in.lbs	5 / 44.3	8 / 70.8	15 / 132.8	25 / 221.3	50 / 442.5
Torque	max.	Nm / in.lbs	22 / 194.7	40 / 354	90 / 796.5	140 / 1239	270 / 2389.5
Speed	min.	rpm	50	25	10	10	5
Speed	max.	rpm	1500	800	350	300	100
Diameter		mm / in.	56 / 2 13/64	56 / 2 13/64	56 / 2 13/64	56 / 2 13/64	56 / 2 13/64
Length		mm / in.	520 / 20 15/32	520 / 20 15/32	520 / 20 15/32	520 / 20 15/32	580 / 22 27/32
Weight		kg / lbs	7 / 15.4	7.2 / 15.8	7.3 / 16	7.3 / 16	7.7 / 16.9
Noise level		dB (A)	62	62	62	62	62
Line Voltage (DC)		V	300	300	300	300	300
Internal hex. drive DIN 3121			F12.5 (1/2")	F12.5 (1/2")	F12.5 (1/2")	F12.5 (1/2")	F20 (3/4")
Suitable tool inserts and connecting components with a drive as per DIN 3121			G12.5 (1/2")	G12.5 (1/2")	G12.5 (1/2")	G12.5 (1/2")	H20 (3/4")
Torque measuring system							
DMS (strain gage) fully bridged			yes	yes	yes	yes	yes
accuracy classification			1	1	1	1	1
Angle encoder							
channel			A-B-I	A-B-I	A-B-I	A-B-I	A-B-I
resolution		degree	1	1	1	1	1

Please find suitable tool inserts in our brochure D 3320 E.

SYSTEM COMPONENTS

Sequence Controller

Sequence controller	Type	AST30-2-230 V	AST30-2-115V	
for Screwdriver 310E56-xxx	Part no.	388721 A	388721 B	
Power unit (AC)	V / Hz	230 / 50 (60)	115 / 50 (60)	
Insulation		IP54	IP54	
LC-display		4 lines	4 lines	
24V input/output interface		8 inputs / 8 outputs		
Membrane keyboard		yes	yes	
RS 232 interface		yes	yes	
Profi bus		yes	yes	
Ethernet		optional	optional	
Amount of connectable spindles		1	1	
Dimensions (W x H x D)	mm / in.	170 x 295 x 340 / 6 11/16 x 11 5/8 x 13 3/8		
Weight	kg / lbs	9.5 / 21	9.7 / 21.3	

- Highest precision over the entire torque range
- Torque control/angle monitoring
- Angle control/torque monitoring
- Friction coefficient defined screw joint
- 32 freely programmable sequences
- Comprehensive analysis functions
- Available communication ports: Ethernet, RS232, PLC-input/output, Profibus
- Can be used in combination with DEPRAG feeders
- For manual and stationary applications

The sequence controller already contains ready-to-use basic programs with common tightening processes, so that the operation can take place using just a few steps.

This necessitates the connection to a standard PC with the supplied Windows®-Software TC 30-PC.

The integrated display- and operating key-pad visualizes the operating conditions and screwdriving results and it also allows the direct changing of screwdriving parameter (i.e. speed, shut-off torque) required for the production-process - without having a PC-connection.

Over the operating keypad or the I/O-port of the controller it is possible to change the two available default screwdriving programs. Once the cycle finishes, a status signal is optically displayed on the controller and also reported back to the PLC, if a PLC is used.

When using this EC-system with a PLC, then the communication can be made using the standard supplied Profibus port.

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.

When using either bus-ports, Profibus or Ethernet (optional) and if those ports are connected with an IP-system, then the complete assembly process (screwdriving-curve, statistics, archiving) and the data-exchange between computers is possible.

When the TC 30-PC data logger software (optional equipment) is used, it is possible to transfer the measuring data of several controllers to a PC using different ports (i.e. USB, Ethernet).

Programming kit no. 385426 C (consisting of operating manual, software package and programming cable) is a single standard component of the sequence controller.

Motor cable

Standard		Type	KMO AST30-5m
Length	5 m / 16.4 ft.	Part no.	388730 A
Alternatives		Type	KMO AST30-2.5m
Length	2.5 m / 8.2 ft.	Part no.	388730 D
		Type	KMO AST30-8m
Length	8 m / 26.2 ft.	Part no.	388730 B
		Type	KMO AST30-12m
Length	12 m / 39.4 ft.	Part no.	388730 C



Measuring cable

Standard		Type	KME AST30-5m
Length	5 m / 16.4 ft.	Part no.	388731 A
Alternatives		Type	KME AST30-2.5m
Length	2.5 m / 8.2 ft.	Part no.	388731 D
		Type	KME AST30-8m
Length	8 m / 26.2 ft.	Part no.	388731 B
		Type	KME AST30-12m
Length	12 m / 39.4 ft.	Part no.	388731 C

Your application requires torques up to 500 Nm - do contact us and we will help you find a solution.


Options to combine the EC-screwdriver technology can be found on the last page as well as in the Internet on www.deprag.com

OPTIONAL EQUIPMENT

 <p>Interface Graph-Loader</p>	PC-Software	Type	TC30-PC
		Part no.	828560
	TC 30-PC statistic	Part no.	828634
	TC 30-PC data logger	Part no.	829085
	TC 30-PC to QS-STAT conversion programme**) (additional modules at request)	Part no.	830458
 <p>Ethernet-Module</p>	Software Addition:		
	Shut-off at effective torque	Part no.	829613
	Friction controlled fastening to torque	Part no.	829614
	Interface Graph Loader (hardware and software)	Part no.	385834 A
	Connection cable (AST30 - Graph-Loader)	Part no.	385835 C
	Software update (Graph Loader)	Part no.	206517
	Ethernet-Module	Type	AST30-EN
		Part no.	388729 A
	Programming cable PC to AST30 (USB)	Part no.	831420
	Printer	Type	ND 100 *)
		Part no.	823476
	Cable AST30 to ND100	Part no.	385419 A
	Data cable AST30 to PC	Part no.	385423 A
	Support for AST30	Part no.	947405 A


*) for additional technical data please refer to catalog D 3022 E

**) in conjunction with data logger only

	To suit controller	Type	AST30-..
	Toolbox	Type	TB 7
		Part no.	398097 A
	Data:		
	Tool holders		7
	Tool size	mm / in.	upto Ø 24 / 0.9 (AF 19)
	Voltage	V	DC 24
	Amperage	mA	100
	Input / output interface		SUB-D 15-pin connector
	Start signal		4-pin connector
	Dimensions (W x H x D)	mm / in.	225 x 50 x 120 / 8.8 x 1.9 x 4.7
	Weight	kg / lbs	1.2 / 2.6
	Optional equipment:		
	Connecting cable AST30 - Toolbox	Part no.	950443 A

This Toolbox increases the AST30 application range concerning both manual working stations and in conjunction with PLC controllers. It can be used with upto 7 tools with a diameter of upto 24 mm (AF 19). The selection of the AST30's screwdriving programs will be done automatically and will suit the selected tool. LED's will show the OKAY/NOT OKAY assemblies as well as the readiness of the Toolbox and the AST30. Through the 24 Volt input/output interface the Toolbox will be connected directly to the AST30 or a PLC controller. Applicability of the start signal will be checked in conjunction with the handles (see below) and this allows for the best possible operator handling and process security.

Conversion to manual use - also in connection with screw feeding machine

	To suit screwdriver spindle	Type	310E56-..	
	Handle (at side of spindle) with and without screwfeeding			
	Rocker switch version only	Part no.	961938 N	
	Linear stand			
	Torque range	15 - 50 Nm	Part no.	408010 B
		50 - 150 Nm	Part no.	408010 C
	Screwdriver adapter			
	for linear stand	15 - 50 Nm	Part no.	920631
	50 - 150 Nm	Part no.	920632	

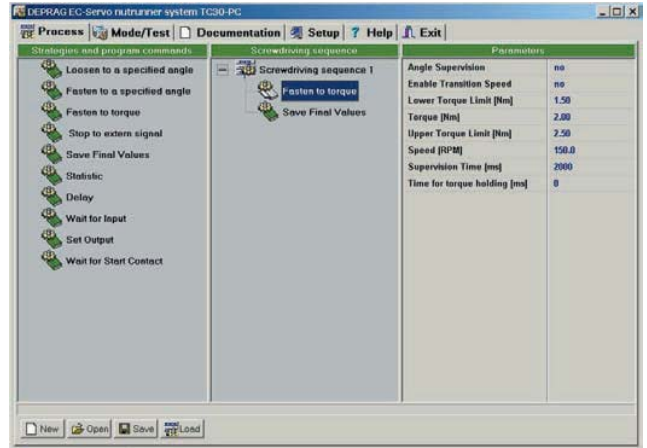
Please find suitable balancers in our brochure D 3340 E – Workplace equipment and accessories

With the use of these handles (in combination with the linear stand) our EC spindles can also be operated in manual work places.

EASY PROGRAMMING OF THE TC 30-PC SOFTWARE

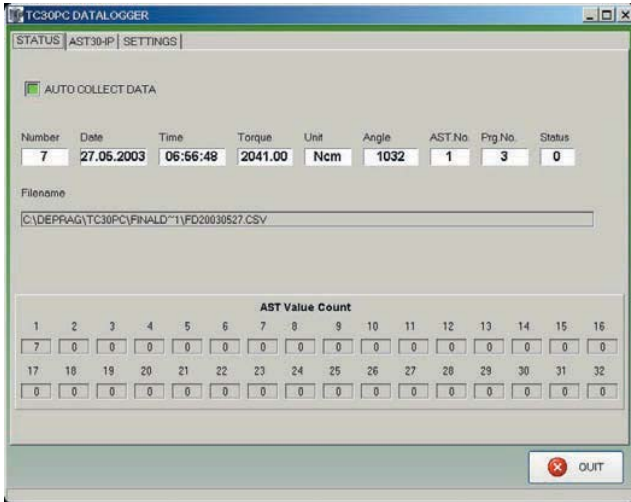


Master menu of the PC software



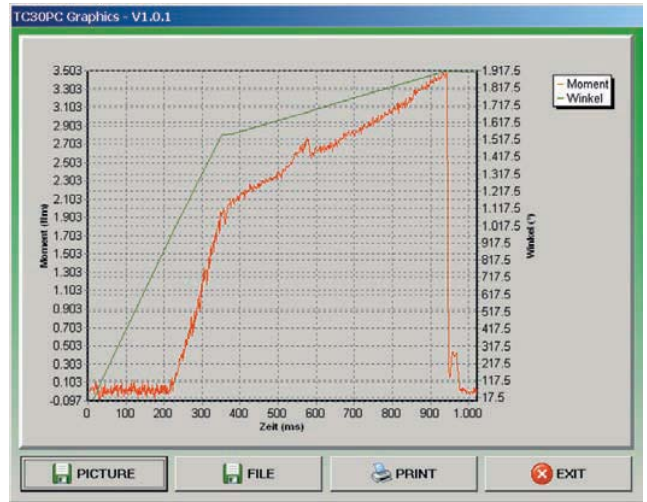
Software for set-up of screwdriving program

Additional modules for TC30-PC software



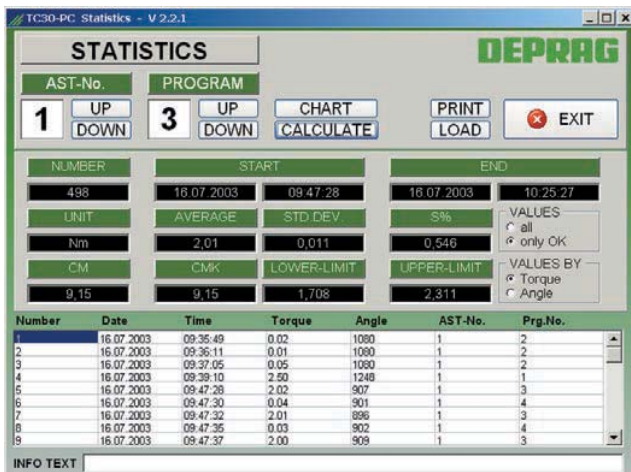
TC30-PC data logger

for storing screwdriving data of up to 32 screwdriver controllers in one file. This can be handled further by MS-Excel or AST30-statistics-software.



TC30-PC graphic (included in delivery)

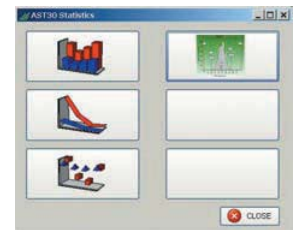
for graphics analysis of different screw joints.



TC30-PC statistic

Statistics software for evaluation of the screwdriving data and calculation of average value, standard deviation and cmk value.

For the graphic display several alternatives may be selected.



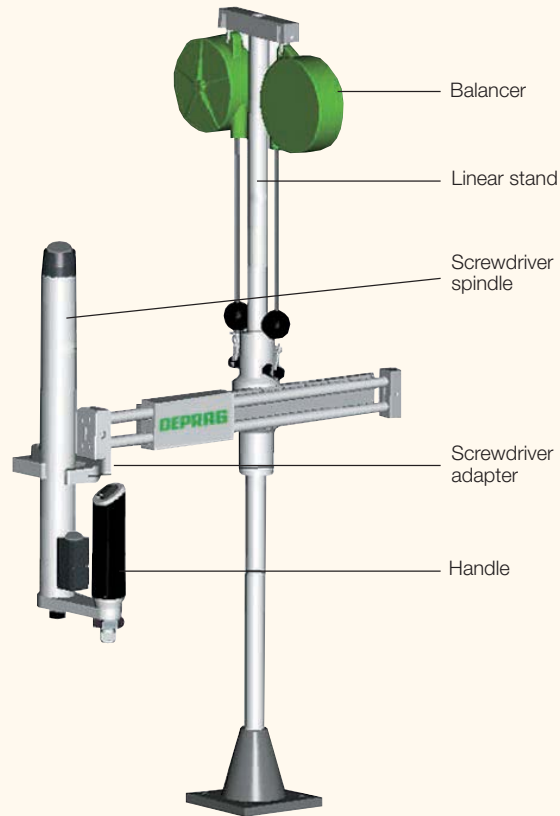
Selection of the display



Gauss distribution presentation

EXAMPLES

**Without screwfeeding,
handle at side of spindle**



Linear stand

Balancer

Cable set

Screwdriver spindle

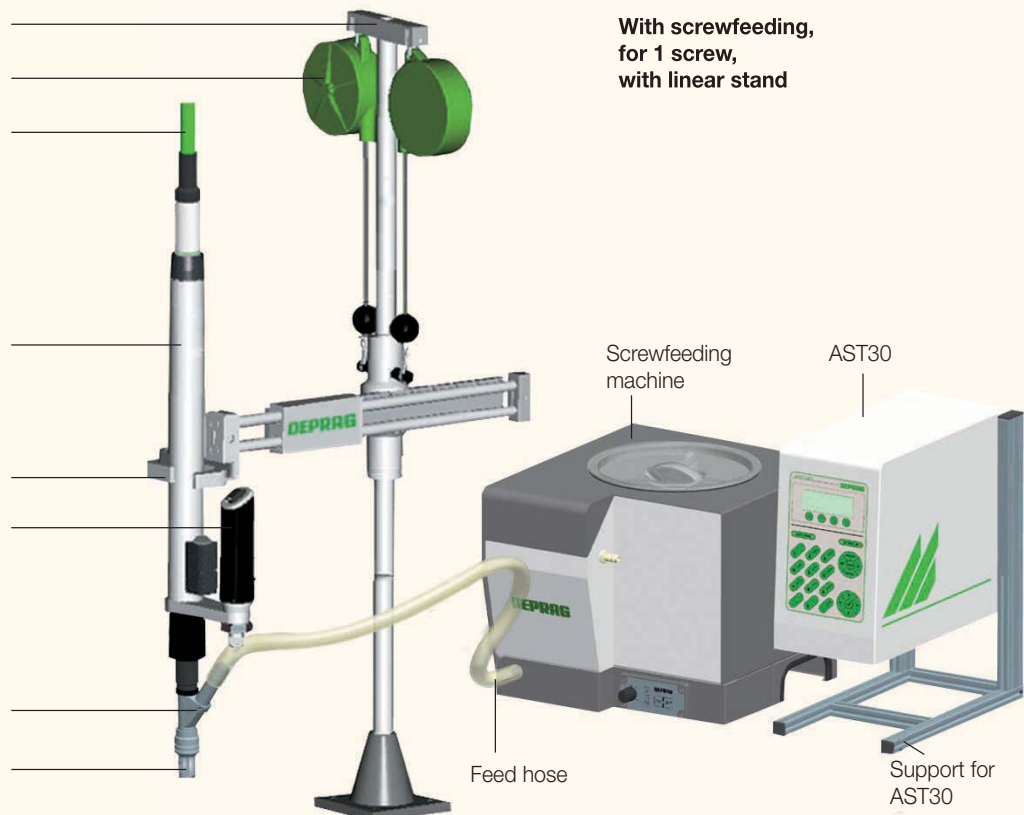
Screwdriver adapter

Handle

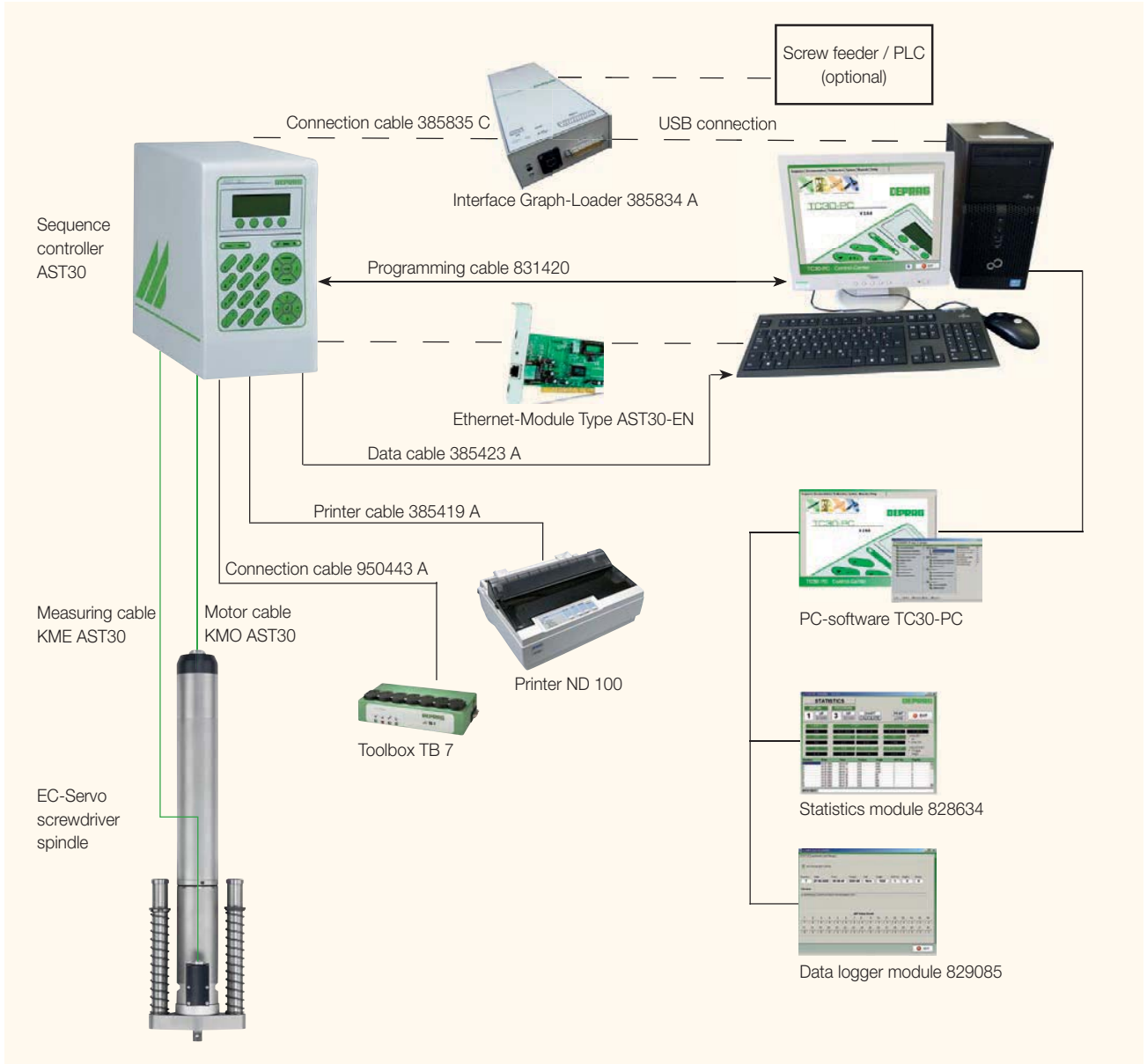
Mouthpiece

Nosepiece

**With screwfeeding,
for 1 screw,
with linear stand**



OPTIONS TO COMBINE THE EC-SCREWDRIVER TECHNOLOGY



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