

## MICROMAT-F / MINIMAT-F SCREWDRIVING SYSTEM

The screwdriving system with additional function control

- Handheld screwdriver
- Multi function control
- Pneumatic control

The handheld screwdrivers in connection with the function controller and the pneumatic control offer a complete solution for the process reliability of your manual assemblies.





- counts screwdriving cycles - supervises assembly times
- only shuts-off when the preset torque is reached
- recognizes change of parts
- controls itself - 100 %
- design selection of the screwdriver according to application (inline, pistolgrip, angle-head)
- eliminates a costly follow-up check

After detecting the start signal from the screwdriver (operator push down or start trigger), the air supply to the driver is enabled via the new multi function control combined with the pneumatic control.

When reaching the preset torque value, the screwdriver stops by way of the extremely accurate shut-off clutch.

In connection with the pneumatic control and a sensor in the screwdriver (MICROMAT-F/MINIMAT-F) the multi function control is able to confirm the correct screw assembly sequence. The screw tightening time is compared to a minimum/maximum preprogrammed time window. If the screw tightening time is too short (cross thread) or too long (stripped screw) the operator is alerted by a failure message. In addition an onboard sensor confirms that the screwdriver is enabled until the clutch mechanism is disengaged insuring that the cycle was not terminated as a result of the operator lifting the screwdriver prematurely. This confirms that the tightening process was carried out properly without material failures or influence by the operator.

In addition, the number of screw assembly operations per part can be controlled. No screw will be forgotten!

Reliable pass/fail process monitoring is only guaranteed with the use of a non reversible screwdriver. In order to assure best possible process quality, we recommend to apply right-hand rotation drivers wherever possible.

In short, the screwdriver with multi function control monitors itself and assures a 100% integrity of your assembly.

The MICROMAT-F / MINIMAT-F screwdriver incorporates the well-known advantages of the DEPRAG MICROMAT / MINIMAT screwdriver series and also oilfree operation is possible.

When connected to an automatic screwfeeder, the feeding of the screw is controlled by the multi function control. The controller is connected to the screwfeeder using an optionally available SZG-connection set.

- **highest process reliability: controls itself up to 100%**
- **counts screwdriving cycles - supervises assembly times**
- **only shuts-off when the preset torque is reached**
- **recognizes change of parts**
- **allows the connection of up to 3 different screwdrivers**
- **design selection of the screwdrivers according to application (inline, pistolgrip, angle-head)**
- **individual screw-process configuration through free programmability**
- **integrated torque measuring function, diagnostics and evaluation**
- **comprehensive documentation possibility**
- **highest operator friendliness through graphical touch screen**



This controller can also manage up to three different screwdriver model connections of the series MICROMAT-F and MINIMAT-F.

The function control fc20 distinguishes itself through an exceedingly high process reliability, individual screw-process configuration by the free programmability, integrated torque measuring function, extensive diagnostics- and analysis possibilities, as well as comprehensive documentation possibility and comfortable operator guidance.

### **Highest process reliability: controls itself up to 100%.**

The quality criteria connected with the screwdriving process are automatically supervised and analyzed. In case of a faulty screw assembly cycle, for example due to mishandling of the screwdriver, faulty assembly materials or an interrupted screw assembly cycle, the failure can be reset by the operator or if preferred by a qualified specialist when utilizing the available password protection function. The positive shut-off function of the clutch is monitored via an internal sensor also the minimum/maximum screw assembly time per screw and the number of good screw joints per production part are compared to the preset values in the controller. Only the positive feedback of all individual signals allows a change of the part - 100% process reliability.

### **Individual screw-process configuration through free programmability**

For maximal 7 sequences each sequence consisting of up to 99 programs, any screwdriving process can be individually generated. The new fc20 contains freely usable power outputs. So, it is easy to integrate a part-lock feature into the assembly process. The Operator can also program additional processing steps by himself.

The new function control recognizes up to three part sensors and so guarantees a reliable presence- and positioning control of even multi-level parts.

### **Torque measuring functions, comprehensive diagnostics- and evaluation possibilities**

Comprehensive diagnostics possibilities round-off the wide application spectrum of the screwdriving control fc20. By the use of an optional external rotary transducer, the operator is able to control the - on the screwdriver preset torque, directly on the part to be assembled, which is a big relief for maintenance and quality management. The integrated diagnostics functions are capable to test every in- and output of the control and additionally displays their operating status. An internal voltage control assures the continued functional safety of the fc20.

### **Comprehensive documentation possibility**

For each products, the assemblies that took place are clearly assigned. An optional connected barcode-reader reads the barcode on any part to be assembled and then stores the final-values for each individual assembly together with this barcode. These final-values are stored for seven days and can be transmitted for the traceability of the production over the integrated serial port to a PC. That way, each program step is statistically retained. The number of good- and bad assemblies, as well as the average assembly time allow the control and optimization of the assembly process. The communication with a host controller (PLC or industrial PC) is possible through the integrated 24V I/O-port. The fc20 offers five power outputs.

### **Highest operator friendliness through graphical touch screen**

An integrated graphical touch screen with a clear structure and a color-coded difference of the results, lead the operator intuitively to the desired submenus. The submenus allow the simple selection of assembly-sequences, programs and diagnostic functions.

## SYSTEM COMPONENTS

<b>MICROMAT-F Screwdriver, straight handle design</b>		<b>Motor Size 0</b>			
Driver right rotation	<b>Type</b>	<b>345F-308</b>	<b>345F-408</b>	<b>345F-708</b>	<b>345F-508</b>
	Part no.	399400A	399400B	399400C	399400D
<b>Screwdriver</b>	<b>Type</b>	<b>345FZ-308</b>	<b>345FZ-408</b>	<b>345FZ-708</b>	<b>345FZ-508</b>
in combination with feeder	Part no.	399445A	399445B	399445C	399445D
Screws	up to	M3	M3	M3	M3
Torque min.	Ncm / in.oz	2 / 3	2 / 3	2 / 3	2 / 3
Torque max. (soft pull-up)	Ncm / in.oz	50 / 70	55 / 78	70 / 97	70 / 97
Torque max. (hard pull-up)	Ncm / in.oz	60 / 83	55 / 78	70 / 97	70 / 97
Speed, idling	rpm	1600	1100	600	350
Internal hex. drive DIN ISO 1173		B 3 (3 mm/.118")	B 3 (3 mm/.118")	B 3 (3 mm/.118")	B 3 (3 mm/.118")

Further technical details see leaflet D3420E.

<b>MINIMAT-F Screwdriver, straight handle design</b>		<b>Motor Size 1</b>				<b>Motor Size 2</b>			
Driver right rotation	<b>Type</b>	<b>347F-218</b>	<b>347F-318</b>	<b>347F-518</b>	<b>347F-618</b>	<b>347F-228</b>	<b>347F-328</b>	<b>347F-428</b>	<b>347F-528</b>
	Part no.	397061A	397061B	397061C	397061D	386365A	386365B	386365D	386365C
<b>Screwdriver</b>	<b>Type</b>	<b>347FZ-218</b>	<b>347FZ-318</b>	<b>347FZ-518</b>	<b>347FZ-618</b>	<b>347FZ-228</b>	<b>347FZ-328</b>	<b>347FZ-428</b>	<b>347FZ-528</b>
in combination with feeder	Part no.	397064A	397064B	397064C	397064D	390846A	390846B	390846D	390846C
Screws	up to	M3	M3	M3	M3	M4	M4	M4	M5
Torque min.	Nm / in.lbs	0.3 / 3	0.3 / 3	0.2 / 2	0.2 / 2	0.5 / 5	0.4 / 4	0.4 / 4	0.3 / 3
Torque max. (soft pull-up)	Nm / in.lbs	1 / 9	1.4 / 12	2 / 18	2 / 18	1.8 / 16	3 / 26	4 / 35	5 / 44
Torque max. (hard pull-up)	Nm / in.lbs	1 / 9	1.4 / 12	2 / 18	2 / 18	2 / 18	3.2 / 28	4.5 / 40	5 / 44
Speed, idling	rpm	1900	1300	900	600	4000	1550	1000	680
Internal hex. drive DIN ISO 1173		F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")

<b>MINIMAT-F Screwdriver, straight handle design</b>		<b>Motor Size 2.5</b>				<b>Motor Size 3</b>			
Driver right rotation	<b>Type</b>	<b>345F-7258</b>	<b>345F-3258</b>	<b>345F-4258</b>	<b>346F-238</b>	<b>346F-738</b>	<b>346F-338</b>	<b>346F-438</b>	
	Part no.	401537A	401537B	401537C	396359B	396359C	396359D	396359E	
		These types are also available in combination with feeder.				These types are also available in combination with feeder.			
Screws	up to	M5	M6	M6		M5	M6	M6	M8
Torque min.	Nm / in.lbs	1 / 9	1 / 9	1 / 9		2 / 18	2 / 18	2 / 18	2 / 18
Torque max. (soft pull-up)	Nm / in.lbs	5 / 44	10 / 88	12 / 106		5 / 44	8 / 71	14 / 123	20 / 177
Torque max. (hard pull-up)	Nm / in.lbs	6 / 53	10 / 88	12 / 106		6 / 53	9 / 80	14 / 123	20 / 177
Speed, idling	rpm	1100	680	310		2500	1400	750	400
Internal hex. drive DIN ISO 1173		F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")		F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")

Incl. 3 m / 10 ft. air supply hose (lengths up to 5 m / 16.4 ft. available). Further technical details see leaflet D3430E.

<b>MINIMAT-F Screwdriver, angle-head design</b>		<b>Motor Size 2</b>			<b>Motor Size 2.5</b>	
Driver right rotation	<b>Type</b>	<b>377F-321</b>	<b>377F-421</b>	<b>377F-521</b>	<b>376F-7251</b>	<b>376F-3251</b>
	Part no.	389689B	389689D	389689C	392061A	392061B
Screws	up to	M4	M5	M5	M6	M6
Torque min.	Nm / in.lbs	0.4 / 4	0.4 / 4	0.3 / 3	1.5 / 13	1.5 / 13
Torque max.	Nm / in.lbs	3.5 / 31	4.5 / 40	6.5 / 57	8 / 70	15 / 132
Speed, idling	rpm	820	530	450	810	410
External square drive DIN 3121 *)		E 6.3 (1/4")	E 6.3 (1/4")	E 6.3 (1/4")	E 6.3 (1/4")	E 6.3 (1/4")

<b>MINIMAT-F Screwdriver, angle-head design</b>		<b>Motor Size 3</b>			<b>Motor Size 4</b>		
Driver right rotation	<b>Type</b>	<b>377F-731-E12.5</b>	<b>377F-331-E12.5</b>	<b>377F-431-E12.5</b>	<b>377F-941-E12.5</b>	<b>377F-741-E12.5</b>	<b>377F-841-E12.5</b>
	Part no.	404085C	404085D	404085E	204209B	204209C	204209D
Screws	up to	M6	M8	M10	M10	M10	M12
Torque min.	Nm / in.lbs	4 / 35	4 / 35	4 / 35	8 / 70	8 / 70	8 / 70
Torque max.	Nm / in.lbs	13 / 115	23 / 204	33 / 292	32 / 283	46 / 408	65 / 575
Speed, idling	rpm	840	450	240	410	270	185
External square drive DIN 3121		E 12.5 (1/2")	E 12.5 (1/2")	E 12.5 (1/2")	E 12.5 (1/2")	E 12.5 (1/2")	E 12.5 (1/2")

Incl. 3 m / 10 ft. air supply hose (lengths up to 5 m / 16.4 ft. available). Further technical details see leaflet D3450E.

\*) Please contact us, if you need any other drive variations than shown.

### Remark:

Details on our feeding systems can be found in brochure D3820E.

<b>MINIMAT-F Screwdriver, pistolgrip</b>		<b>Motor Size 2</b>					
Driver right rotation lower air-inlet	<b>Type</b> Part no.	<b>347F-227</b> 391735A	<b>347F-327</b> 391735B	<b>347F-427</b> 391735D	<b>347F-527</b> 391735C		
Driver right rotation upper air-inlet	<b>Type</b> Part no.	<b>347F-227O</b> 391473A	<b>347F-327O</b> 391473B	<b>347F-427O</b> 391473D	<b>347F-527O</b> 391473C		
Screws	up to	M3	M4	M4	M5		
Torque min.	Nm / in.lbs	0.4 / 4	0.4 / 4	0.4 / 4	0.3 / 3		
Torque max. (soft pull-up)	Nm / in.lbs	1.5 / 13	3 / 26	3.5 / 31	5 / 44		
Torque max. (hard pull-up)	Nm / in.lbs	1.8 / 16	3.2 / 28	4 / 35	5 / 44		
Speed, idling	rpm	4000	1550	1000	680		
Internal hex. drive DIN ISO 1173		F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")		
Driver reversible lower air-inlet	<b>Type</b> Part no.	<b>347F-227U</b> 395047A	<b>347F-327U</b> 395047B	<b>347F-427U</b> 395047D	<b>347F-527U</b> 395047C		
Driver reversible upper air-inlet	<b>Type</b> Part no.	<b>347F-227OU</b> 395052A	<b>347F-327OU</b> 395052B	<b>347F-427OU</b> 395052D	<b>347F-527OU</b> 395052C		
Screws	up to	M3	M4	M4	M5		
Torque min.	Nm / in.lbs	0.4 / 4	0.4 / 4	0.4 / 4	0.3 / 3		
Torque max. (soft pull-up)	Nm / in.lbs	1.5 / 13	3 / 26	3.5 / 31	5 / 44		
Torque max. (hard pull-up)	Nm / in.lbs	1.8 / 16	3.2 / 28	4 / 35	5 / 44		
Speed, idling	rpm	3000	1100	750	500		
Internal hex. drive DIN ISO 1173		F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")		
<b>MINIMAT-F Screwdriver, pistolgrip</b>		<b>Motor Size 2.5</b>			<b>Motor Size 3 *)</b>		
Driver right rotation	<b>Type</b> Part no.	<b>345F-7257</b> 394625A	<b>345F-3257</b> 394625B	<b>345F-4257</b> 394625C	<b>346F-737</b> 400561C	<b>346F-337</b> 400561D	<b>346F-437</b> 400561E
Screws	up to	M5	M6	M6	M6	M6	M8
Torque min.	Nm / in.lbs	1 / 9	1 / 9	1 / 9	2 / 18	2 / 18	2 / 18
Torque max. (soft pull-up)	Nm / in.lbs	5 / 44	10 / 88	12 / 106	8 / 71	14 / 124	20 / 177
Torque max. (hard pull-up)	Nm / in.lbs	6 / 53	10 / 88	12 / 106	9 / 80	14 / 124	20 / 177
Speed, idling	rpm	1025	525	270	1400	750	400
Internal hex. DIN ISO 1173		F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")
Driver reversible	<b>Type</b> Part no.				<b>346F-737U</b> 402845C	<b>346F-337U</b> 402845D	<b>346F-437U</b> 402845E
Screws	up to				M6	M6	M8
Torque min.	Nm / in.lbs				2 / 18	2 / 18	2 / 18
Torque max. (soft pull-up)	Nm / in.lbs				7 / 62	12 / 106	20 / 177
Torque max. (hard pull-up)	Nm / in.lbs				8 / 71	12 / 106	20 / 177
Speed, idling	rpm				1200	650	320
Internal hex. drive DIN ISO 1173					F 6.3 (1/4")	F 6.3 (1/4")	F 6.3 (1/4")

Incl. 3 m / 10 ft. air supply hose (lengths up to 5 m / 16.4 ft. available).  
Further technical details see leaflet D3435E.

\*) lower air-inlet and upper air-inlet

<b>Screwdriver Style</b>	<b>Suitable tool inserts and connecting components</b>
Internal hex. drive DIN ISO 1173 - B 3 (3 mm)	with a drive as per DIN ISO 1173 - A 3 (3 mm)
Internal hex. drive DIN ISO 1173 - F 6.3 (1/4")	with a drive as per DIN ISO 1173 - E 6.3 (1/4")
External square drive DIN 3121 - E 6.3 (1/4")	with a drive as per DIN 3121 - G 6.3 (1/4")
External square drive DIN 3121 - E 12.5 (1/2")	with a drive as per DIN 3121 - G 12.5 (1/2")

Please also find suitable tool inserts in our brochure D3320E.



It is necessary to use a torque reaction support (e.g. stand, handgrip) for maximum torque: over 4 Nm for straight design, over 10 Nm for pistol grip and over 60 Nm for angle design. Suitable torque reaction supports can be found in our brochure D3345E.

## SYSTEM COMPONENTS

### Multi function controllers fc20 and fc11

Function control	Type	fc20	fc11
	Part no.	385523A	385858A
Amount of connectable drivers		3	1
Voltage	V / Hz	100 - 240 AC / 50 - 60	100 - 240 / 50/60
Power consumption	VA	40	30
Display and operation		TFT - graphic display 4.3" (480x272 pixel) with touch screen	LC-display alphanumeric 4-lines, 16 digits per line
Operation via		touch screen	keypad
RS232 interface		yes	no
PLC interface		yes	yes
Power output		yes (5 pieces)	-
Connection for part sensor		yes (3 pieces)	yes (on pc11)
Connection for in-line torque transducer		yes	-
Dimensions (W x H x D)	mm / in.	243 x 200 x 90 / 9.5 x 7.8 x 3.5	160 x 80 x 40 / 6.2 x 3.1 x 1.55
Weight	kg / lbs	2.9 / 6.4	0.52 / 1.1

### Pneumatic controllers pc20 and pc11

Pneumatic control	Type	pc20	pc11
	Part no.	3875512A	3875513A
Supply air connection		1/4" (Plugs nominal size 7.8)	1/4" (Plugs nominal size 7.8)
Operation pressure	bar / PSI	5 - 6.3 / 71 - 90	5 - 6.3 / 71 - 90
Air flow	m <sup>3</sup> /min / cfm	0.1 - 0.96 / 3.5 - 33.9	0.1 - 0.96 / 3.5 - 33.9
Connection for screw feeder *)		yes	yes
Connection for part sensor		directly on fc20	yes
Connection for signal break		yes	Possible in connection with adapter
Dimensions (W x H x D)	mm / in.	160 x 90 x 160 / 6.2 x 3.5 x 6.2	160 x 90 x 160 / 6.2 x 3.5 x 6.2
Weight	kg / lbs.	1.2 / 2.6	1.2 / 2.6

**Suitable for function control fc20 in connection with pneumatic control pc20**

<b>Suitable for</b>	<b>Type</b>	<b>fc20 / pc20</b>
Proximity switch for parts control		
capacitive M18	Part no.	354841F
capacitive M12	Part no.	354841D
inductive M18	Part no.	354906D
Screwfeeder connection set		
cable length 1 m (3.3 ft.) / 2 m (6.6 ft.) / 3 m (9.9 ft.)	Part no.	3568501C / 3568501D / 3568501E
Sensor (for signal break screw presenter)		
for SG1211	Part no.	399525F
for SG0211	Part no.	399525G
Touch pen	Part no.	832190
Printer type ND100	Part no.	823476
Connection cable (fc20 - ND100)	Part no.	349938A
Table stand	Part no.	416760A
In-line torque transducer (for torque measurement)		
0.2-2 Nm / 0.5-5 Nm / 1-10 Nm / 2-20 Nm	Part no.	385481B/C/D/E
Connection cable for in-line torque transducer		
2 m (6.6 ft.) / 4 m (13.2 ft.) / 6 m (19.8 ft.)	Part no.	385486A/B/C

**Suitable for function control fc11 in connection with pneumatic control pc11**

<b>Suitable for</b>	<b>Type</b>	<b>fc11 / pc11</b>
Proximity switch for parts control		
capacitive M18	Part no.	354841E
inductive M18	Part no.	354906A
Screwfeeder connection set		
cable length 1 m (3.3 ft.) / 2 m (6.6 ft.) / 3 m (9.9 ft.)	Part no.	3568501C / 3568501D / 3568501E
Sensor (for signal break screw presenter)	Part no.	399525A (for 1211-ES)
Adapter (for the connection of sensor and pc11)	Part no.	399526A
Sensor (for signal break screw presenter)	Part no.	399525B (for 0211-EP)
Adapter (for the connection of sensor and pc11)	Part no.	399526A
Mounting angle for fc11 and pc11	Part no.	205905A

# DEPRAG

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