



DEPRAG



Services

- Torque Adjustment on Screwdrivers
- Screw Joint Analysis
- Cmk – Machine Capability Study
- Calibration
- Power Curve Analysis
- Training at DEPRAG
- Service by Remote-Access
- Training at the customer
- Maintenance and Upkeep – at the customer
- Service-Hotline 24 Hours - 365 Days





DEPRAG always strives to solve any service request to the full satisfaction of our customer and within the fastest time possible.

The best and most economical procedure is to establish a phone connection between our service personnel and the customer's technician who may have actually been trained by DEPRAG on the supplied system.

If the service issue cannot be solved over the phone, then our service department will immediately take steps to find a solution. According to the contractual agreement with the customer, DEPRAG may dispatch a service technician if the place of service is local.

The primary service contact at DEPRAG Germany is the Service Manager: Mr. Siegert, who can be reached at +49 (0) 9621 371 256.

Our service technicians will always give phone support during our standard working hours. For exceptional cases, we can also provide service personnel, which is on stand-by.

If a service issue arises outside the standard working hours, then a HOTLINE staff-member will accept calls at + 49 (0) 700 00 371 371. The HOTLINE staff-member will immediately help with phone support or – if the problem cannot be solved – our staff-member will transmit the service request to the appropriate department to be handled the next work day.

For all standard component deliveries, we refer to our delivery terms and request that a defective item is returned to us. An on-the-spot repair can only be performed if an order is placed.

To enable our customer to remedy smaller malfunctions by themselves, we offer training courses for screwdrivers and screwfeeders several times a year. We recommend that our customer stocks the general wear- and spareparts at his own facility to minimize downtimes.



**Servicemanager Mr. Siegert,
Phone +49 (0) 9621 371 256**

During regular work hours

**Service-Hotline
Phone +49 (0) 700 00 371 371**

24 Hours - 365 Days

Torque Adjustment

Principally, all DEPRAG Screwdrivers are set - on delivery - to the maximum torque.

If so required by our customer, DEPRAG will gladly preset any Screwdriver to a defined torque.

The measuring results are documented in form of a printout, showing the measuring data received by the torque transducer and the measuring instrument. The calibration certificate includes a measuring series with 10 cycles showing the individual torque values, as well as the corresponding average torque and the absolute and relative standard deviation.



DME 200 for the torque adjustment on handheld Screwdrivers

Messprotokoll



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Internet: <http://www.deprag.com>
E-Mail: DEPRAG@T-ONLINE.DE
Leiter Qualitätsmanagement Herr Heusch

Auftragsnummer: _____

Schraubertyp: 347-518U

Referenzmessgerät: DME 200

Berichtsnummer vom Referenzmessgerät: 845940

Seriennummer: 1078671

anzustellendes Drehmoment: 0,65Nm

Referenzmessplattform: MP 200 E

Seriennummer der Referenzplattform: 891878

Messwert 1	Messwert value 1	0,58	Yes
Messwert 2	Messwert value 2	0,58	Yes
Messwert 3	Messwert value 3	0,58	Yes
Messwert 4	Messwert value 4	0,57	Yes
Messwert 5	Messwert value 5	0,58	Yes
Messwert 6	Messwert value 6	0,58	Yes
Messwert 7	Messwert value 7	0,58	Yes
Messwert 8	Messwert value 8	0,57	Yes
Messwert 9	Messwert value 9	0,58	Yes
Messwert 10	Messwert value 10	0,58	Yes
Mittelwert M	average	0,58	Yes
Standardabweichung s [11]	Standard deviation	0,009	Yes
rel. Standardabweichung %	rel. Standard deviation %	1,55%	Yes

Messungen durchgeführt durch: *Heusch*

Datum: 26.10.2006

Interfaced by: Heusch

Die verwendeten Normale zur Kalibrierung der Referenzmeßgeräte sind rückführbar an die
Physikalische - technische Bundesanstalt.

DIN 9139 Teil 1
DIN 9139 Teil 2

Calibration certificate of a measuring series with 10-cycles



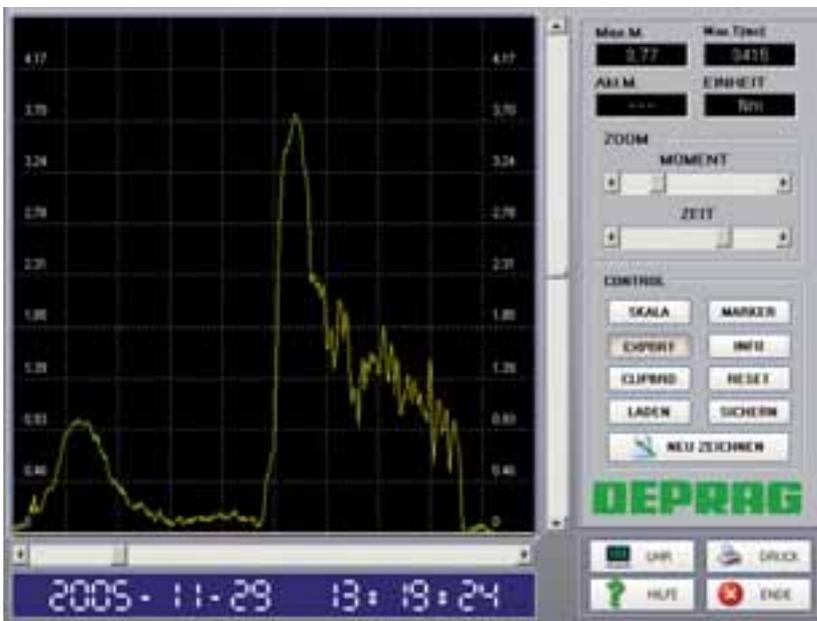
DME 200 PC used for screw Joint Analysis

Screw Joint Analysis

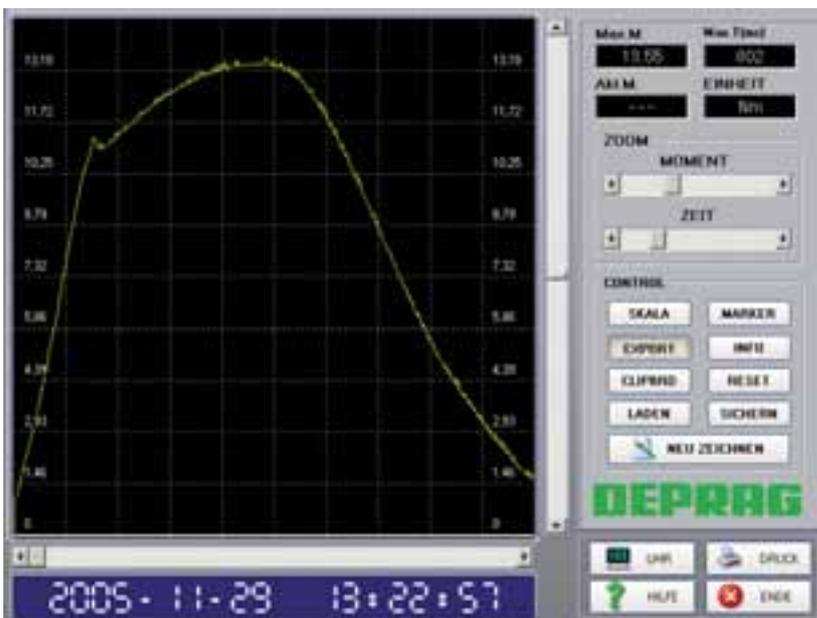
A screw joint analysis allows not only the determination of the screwdriving parameter for the Screwdrivers integrated by us into an automatic Screwdriving Machine, but it is now also offered as a special service to our customers.

We require the following components for a complete Screw Joint Analysis:

- five complete sample parts
- 10 required sample screws (for each screw location)



Standard-Analysis



Special-Analysis

Standard Analysis

To determine a screwdriving process and the best-suited shut-off torque of our Screwdrivers, we can perform a screw joint analysis. For a valid analysis, we require the actual parts to be assembled, as well as the respective fasteners.

When considering all the values influencing a screwdriving process, such as material of the parts to be assembled, washers, screw threads, required cycle time, etc., a suitable pneumatic or EC-electric Screwdriver can be selected. The parts to be assembled will be fixtured in the same manner as in an actual production run. Thereafter, the screw is tightened using a Screwdriver with a torque far above the expected seating torque, so that the connection is over-torqued and fails.

The result may be that – according to the constructive layout of the screw joint – the screw gets torn up or the thread is stripped.

During this process, the torque, the cycle time and maybe even the angular displacement, is acquired, documented and stored. Thereafter, the torque is displayed in a diagram.

The diagram, showing a curve of the screwdriving process, can now easily be evaluated and the best possible processing parameter for an automatic Screwdriver can be determined.

Special Analysis

This analysis uses the torque/angle measurement procedure. The screw connection is tightened with an increased torque and then turned to a corresponding angle. This method allows us to obtain the breakaway torque, the actually applied torque, as well as any setting of the joint, which can easily be recognized. Again, the analysis is displayed using graphics.

Machine Capability Study (CMK)

This analysis examines whether the applied production machine is even capable to accurately handle the production requirement. This method is known as the Machine Capability Study or also Short-Term Capability. This method uses indexes (C_m and C_{mk}) to confirm that the desired quality is within the preset limits.

For a screw-tightening process, the torque is the deciding medium. To perform this analysis, it is necessary to keep any influencing criteria constant during the tightening process. We defined a reproducible test set-up, which is valid for the machine capability study of all Screwdrivers. Since only the influence of the machine (with all its components) on the production process is to be verified, such an analysis can be done using 50 continued measuring samples under optimal conditions.

For the machine-capability acquisition, there is a correlation between the required tolerance values (upper and lower limits), the standard deviation and the machine capability index C_{mk} .

How are these values to be interpreted?
 The C_{mk} value is a probability value based on the number of faulty assemblies, which lie outside of the required tolerances. A C_{mk} value of 1.63 states that there will be one faulty assembly in a total of one Million assemblies.

Each individual test cycle is documented and is taken into consideration during the evaluation of the analysis.

The testing process must have special qualifications to allow this type of detailed measuring method. The measuring sequence may at most have an inaccuracy of Class 1 per DIN 51309.

The test capability of the measuring equipment has to have a static recalibration every 12 months, using a specially calibrated measuring chain.

These machine capability studies are documented in a comprehensive certificate, which shows the capability index, a histogram and the measuring sequence.

DEPRAG Schulz GmbH & Co.
26.01.2005

Schraubertyp: 347F-528
Screwdriver type:

C-Wert:
Calibration value:

C-Offset Wert:
Calibration offset value:

DEPRAG

Maschinenfähigkeitsuntersuchung
MACHINE CAPABILITY CALCULATION

Fabrikationsnummer: 998725
serial nr.:

Leerlaufdrehzahl: 740 U/min
speed, idling rpm

Drehzahl Voranzug: U/min
rpm 1 (insertion process)

Drehzahl Endanzug: U/min
rpm 2 (tightening process)

Meßwert-Nr.	Meßwert in Nm
1	3,05
2	3,05
3	3,07
4	3,05
5	3,04
6	3,04
7	3,05
8	3,02
9	3,03
10	3,02
11	3,04
12	3,06
13	3,03
14	3,04
15	3,02
16	3,05
17	3,03
18	3,01
19	3,08
20	3,05
21	3,08
22	3,07
23	3,04
24	3,07
25	3,02
26	3,03
27	3,07
28	3,03
29	3,09
30	3,06
31	3,08
32	3,01
33	3,05
34	3,08
35	3,06
36	3,04
37	3,08
38	3,03
39	3,08
40	3,02
41	3,03
42	3,03
43	3,02
44	3,04
45	3,04
46	3,01
47	3,00
48	3,04
49	3,05
50	3,05

Auswertung
Calculation

Mittelwert M= 3,0436 Nm
Average=

Standardabweichung S= 0,0212 Nm
Standard deviation=

relative Standardabweichung: 0,70 %
Relative standard deviation=

Oberer Grenzwert OGW= 3,30 Nm
Upper Tolerance Value (UTV)=

Unterer Grenzwert UGW= 2,70 Nm
Lower Tolerance Value (LTV)=

Maschinenfähigkeit C_m= 4,72

Maschinenfähigkeitsindex C_{mk}= 4,04

Häufigkeitsverteilung
Frequency distribution

Meßwertverlauf
Measured values

Prüfer:

Änderungsstand 05/04

Machine Capability Study-Protocol

Kalibrierschein		Calibration Certificate		DEPRAG																																																																																
<input type="checkbox"/> Kalibrierung von abgelesenen Calibration from read <input type="checkbox"/> Kalibrierung nach Reparatur Calibration after repair <input checked="" type="checkbox"/> alle Kalibrierung Overall calibration		DEPRAG SCHULZ GmbH & Co. Postfach 1362, D-80229 Amberg Rufnummer 09371-371-6, Fax 09371-371-123 Internet: www.deprag.com E-Mail: SERVICE@DEPRAG.COM Labor (Zertifizierung) nach DIN EN ISO 9001																																																																																		
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Anmerkungen/Remarks: Diese Kalibrierung erfüllt die Anforderungen an die Kalibrierung nach DIN EN ISO 9001. This calibration certificate meets the requirements for calibration according to DIN EN ISO 9001.																																																																																				
DEPRAG SCHULZ GmbH & Co. 09371-371-6																																																																																				

Calibration Certificate

Calibration

A common requirement for Quality Assurance includes the traceability of the used measuring systems to national standards. This requirement is in general based on ISO 9000 quality demands. Traceability is possible if a measuring system or a measuring instrument was calibrated using equipment whose calibration can again be traced in an uninterrupted string to National Standards.

The offered factory calibration includes the testing, calibration, certification and the calibration certificate showing the traceability to National Standards per ISO/IEC 17025.

For how long is the calibration valid?

Principally, any calibration is only valid at the time it is done. The establishing of calibration intervals lies solely with the user. The application, meaning the environmental conditions at the production area, the machine workload, the frequency and the safety requirements of the product to be assembled, are of vital influence to establish calibration intervals. If equipment is to be installed into mass production areas, then it is certainly more appropriate, to establish shorter calibration intervals, compared to equipment that is only used in a calibration laboratory. The general rule is to set test cycles between approximately 3 months to 3 years.

We recommend to check our measuring systems at least once per year and to have DEPRAG recalibrate your equipment, if it shows unacceptable variations.

Measuring Components

In principle, every component of a measuring chain is calibrated independently from each other. Measuring instruments for the Piezo transducer are subjected to a comparison measurement using a charge calibrator, and measuring instruments for strain-gauge transducers require a DMS-calibrator. They are connected over a DKD-Calibration to the National Standards of the Physikalisch-Technische Bundesanstalt (PTB) and correspond to the highest quality requirements. The transducers are calibrated using specialized calibration devices with traceable reference-measuring-systems.

Measuring Chain

Alternatively to the calibration of single components, it is possible to calibrate the entire measuring chain. This makes sense only, if the goal is to minimize the deviation. The calibration of individual instruments, however, offers the advantage that each individual component can be exchanged. Any calibration process is submitted to the customer in the form of a calibration certificate, showing the calibration results and confirming the traceability of the equipment. The basis for any calibration process is the currently valid norm, which in our case is DIN EN ISO/IEC 17025 (general instructions for the accreditation of Test – and Calibration Laboratories). Of course any DEPRAG calibration or test procedure fulfills the before-stated requirements. A renowned auto manufacturer has verified several times that our process does indeed correspond with all necessary norm requirements.

EC-Electric Screwdrivers and EC-Servo Screwdrivers

The calibration value is acquired and/or checked and documented on a calibration certificate or stored inside the Screwdriver.

Piezo Measuring Screwdriver

The C-Screwdrivers (Piezo Transducer) – all motor sizes – are tested on a specialized calibration device in regards to their function. Simultaneously we use this calibration device to determine the calibration value for the measuring transducer. The values will be consolidated into one certificate and documented on a so-called Manufacturer's Test Certificate.

Power Analysis

We are able to utilize our Power Test-Station to test the most different types of air-operated tools and machines (motors, polishers, drills, etc.), which are either made by DEPRAG or other manufacturers. Hydraulic and electric drives, which fall into the limits (shown below), can be analyzed as well. According to a customer request, DEPRAG can determine characteristics in regards to torque or speed (Torque / Power Output, Speed / Performance).

Torque Regulation:

The characteristics are determined by regulating the torque.

Starting with the torque $M = 0$ (corresponds to the no-load-speed of the tool to be examined), the torque can be gradually increased until maximum 500 Nm [4,425 inch pounds].

Speed Regulation:

The characteristics are determined by regulating the speed.

For each test process and in accordance with the specified requirements, the maximum speed, the minimum speed and the maximum torque can be defined accordingly.

To document this, a test certificate is produced showing the power curve of the tested machine.

The following technical data should be used as a guideline:

Equipment to be tested having a speed of:

0 - 12,000 rpm

Equipment to be tested having a torque of:

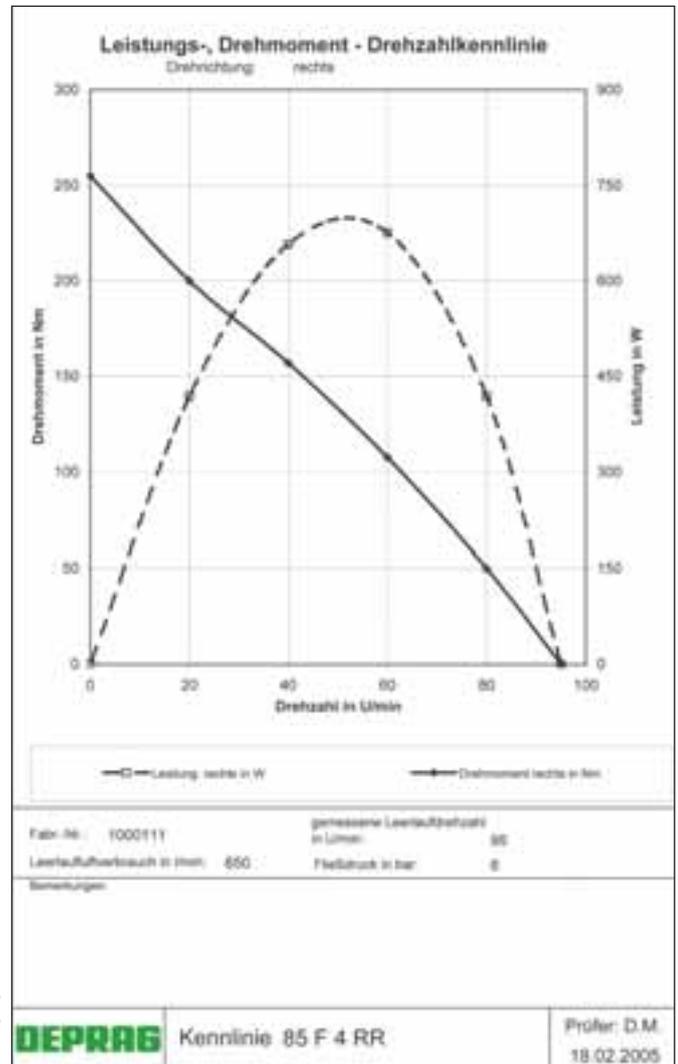
0,1 - 500 Nm [0.8 - 4,425 inch pounds]

Right Angle Torque:

500 Nm / 4,425 inch pounds from 0 to 400 rpm

10 Nm at 12,000 rpm

If it is necessary to use special adapters or fixtures to achieve a viable test, we will produce those items at customer's expense.



Test Certificate
(Power Curve of the tested machine)

In-House Training offered by DEPRAG

To facilitate the seamless integration of our tools and machines at your facility, DEPRAG offers in-house training courses, which are held at non-specific intervals and which are intended to train maintenance and repair personnel.

Each training course consists of no more than 5 - 6 trainees plus one instructor.

The course is hands-on on purpose. This allows each participant to put the verbal instructions into actual practice.

For further inquiries please contact your local DEPRAG representative.

We offer the following course subjects:

- Maintenance and Repair for
 - Air-Operated Screwdrivers
 - Screwfeeding Machines
 - and / or
 - EC-Screwdriving Systems

Should you be interested, please let us know and we will send you a registration form and a training program with the exact dates. We will be glad to help with any hotel reservations.

On-Site Installation

Our service technicians also train Machine Operators during on-site installation. Because of the thorough training and the technical know-how of the technicians, our customers achieve the highest installation efficiency.

Providing the best possible care during the entire installation process, is a must for DEPRAG.

Maintenance and Upkeep at the customer

Our machines possess a high measurement of up-time.

With regularly imposed service intervals, it is possible to achieve maximum productivity with a very low amount of downtime.

DEPRAG offers a **maintenance contract**, which takes customer-specific run-times and service-dates into consideration.

Our service personnel is ready to support the customer with preventive maintenance as well as upkeep instructions and can provide assistance with refitting and software modifications.

Tele-Service

Our Service Technician logs into the customer's machine, using a remote-access module (modem). This feature allows us to check machine data and system condition and to adjust, change or expand the existing software.

If a malfunction occurs, we can determine the cause and change the program sequence.

The fast response provided by our Tele-Service reduces service-related expense, since in most cases it eliminates on-site service calls.

Service-Hotline 24 Hours / 365 Days

To offer the best possible service, we recommend for our customer to enter a so-called **Hotline Service Contract** with DEPRAG. Such a contract can be entered already at the time of machine purchase or any time after machine was installed.

The Hotline SERVICE is available 24/7 (24 hours, 7 days, all year).

Our service technicians can offer technical solutions for your machine problems and malfunctions. Especially, when using a remote-access module (modem), the cause can be easily determined and promptly solved. Should it be necessary to dispatch a service technician for a service call, then a trip will immediately be scheduled and confirmed. This time-reactive service is also a component of a DEPRAG Hotline-Service-Contract.

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