KOERZIMAT ® CS 1.096

Fig.1 KOERZIMAT CS 1.096 components

The KOERZIMAT CS 1.096 is a PC-supported measuring device for precise, automatic determination of the **coercive field strength H_{cJ}** and optionally of the **weight-specific saturation magnetization** $_s$ and of the **density** on ferromagnetic materials and components.

Application

H_{cJ} measurement[1]
★ Monitoring of exudations and thermal treatments on steel types
★ Control of electromechanical components in the electronics, automobile, computer and clock industry for their magnetic parameters
★ Monitoring of manufacturing stages in the production of components with highly permeable materials such as: annealing, mechanical processing, sealing in plastic
★ Assessment of the structure of hard metals after the sintering process

σ_s measurement[2]
★ Examination of the unsintered powder (oxidation) for hard metal production
★ Indirect determination of the carbon content or of the exposed cobalt or nickel content of the hard metal in the production process
★ Determination of the magnetizable material part of (cobalt, nickel, ferrite etc.) materials and also indirect determination of martensite and austenite
★ Quality control of magnetic powder of ferrite, cobalt and rare earths before and after the sintering process
★ Research and development of new alloys and magnetic materials

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® Registered trademark
[1] H_{cJ} is the designation according to DIN IEC 50-221. The previous spelling was $_JH_c$.
[2] Weight-specific saturation magnetization σ_s, which can be determined within the Ms measurement (from page 5)

H$_{cJ}$ measurement

Features

- Extremely simple operation through WINDOWS user interfaces for single measurements (parameter setting) and serial measurements (SPC)
- Convenient management and archiving of parameter sets for different test pieces
- Learning program for automatic determination of the measuring parameters for unknown test parts
- Automatic measuring range selection for residual field and coercive field strengths
- Automatic compensation for offset and balance with temperature monitoring of the coil and request to balance
- High reproducibility and precision through mathematical evaluation methods (regression)
- Recording of all data (order, parameter, readings, sorting, statistics) in a database (ACCESS format) and print out of H$_{cJ}$ report and hard metal report
- Creation of customer-specific reports with MS ACCESS or MS EXCEL
- Magnetization field strength 500 kA/m
- Online help function

Mode of operation and function

The coercive field strength H$_{cJ}$ is determined in the KOERZIMAT coil in an open magnetization circuit according to EN 10330 . To do this, the test part is magnetized in the coil to the saturation. The polarization of the test part is measured with FÖRSTER probes and a reverse field is subsequently built up until the polarization becomes zero. The reverse field strength H is the coercive field strength H$_{cJ}$ in the case of zero polarization of the test part.
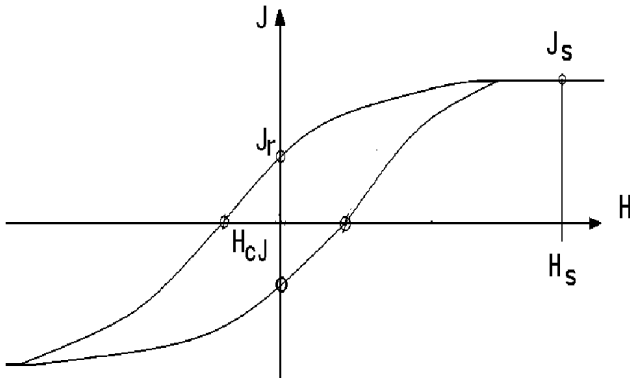

Fig. 2 Magnetization curve

Construction

To measure the coercive field strength H$_{cJ}$, the following components are required:

- KOERZIMAT CS measuring module
- KOERZIMAT coil 40 or 60
- Standard PC with 2000, XP
- KOERZIMAT PC software CD H$_{cJ}$

The KOERZIMAT CS measuring module is connected to the PC via the COM1 for the H$_{cJ}$ measurement.

Figures 3 and 4 show the user interface in the **operating mode H$_{cJ}$ measurement**. In this operating mode, **single** and **serial measurement** are differentiated. Both user interfaces are divided into different fields which are used either for the dialog with the operator or to indicate or display the results.

Fields for the **operator dialog** are:
- Menu bar
- Testpiece setting (field names freely selectable)
- Setting parameters H$_{cJ}$ (only single measurement)
- Measuring value series (only serial measurement)
- Keyboard

Fields for the **results display** or **representation**:

In H$_{cJ}$ single measurement
- Residual field (curve)
- Coercive field strength (numerical value).

In H$_{cJ}$ serial measurement (Fig. 4)
- Register 1:Series of measurements and 2:Single measurement (upper half of the screen)
- Registers 3: Histogram coercive feld strength, 4:Series of measurements, 5:Histogram Rel. Remanence, 6:Rel. Remanence

On register "series of measurements" a curve from the single measurements with colored tolerance limits is displayed.

On register "Histogram" measurement results are displayed as bar charts.
- Sorting (group classification "Good", "Intervention", "Rejects" and "Total" as numerical values for HC:, HR:, MS:)
- Statistics (statistically relevant values like "maximum value", "minimum value", "arithmetic average value" and "standard deviation" in numerical display for HC:, HR:, MS:)
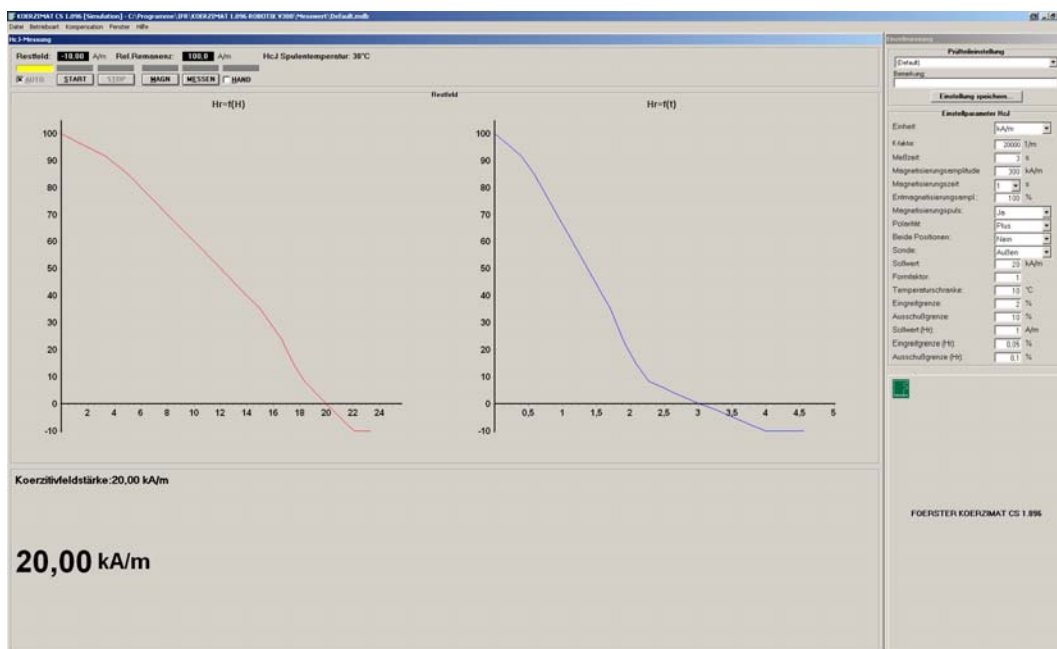

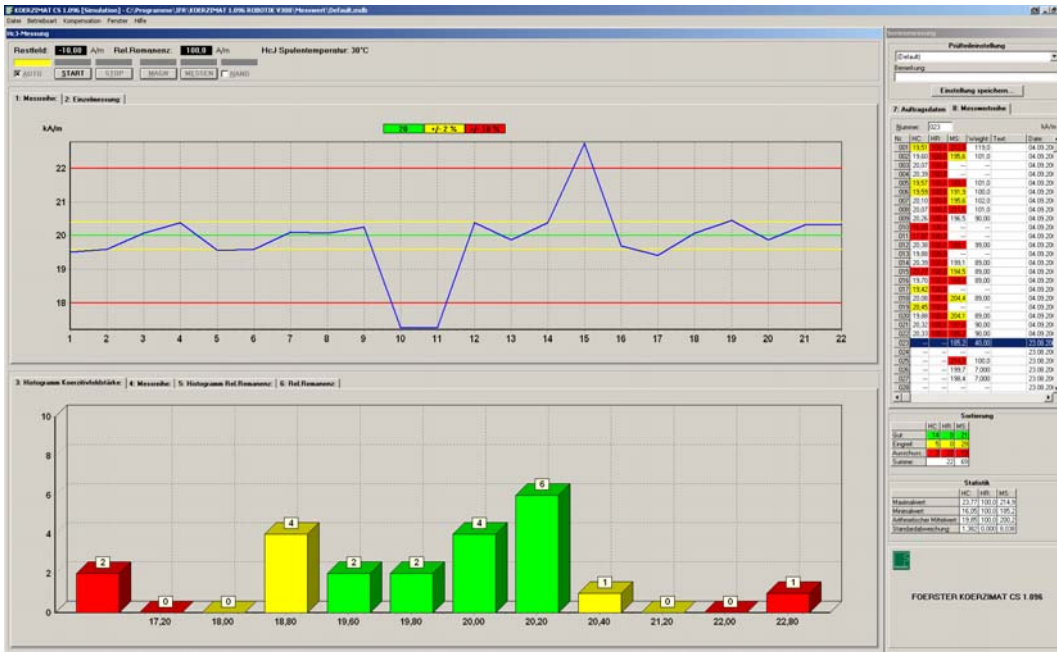*Fig. 3 User interface: single measurement H$_{cJ}$*

Fig. 4 User interface: serial measurement H_{cJ}

Meßwertreport Koerzitivfeldstärke HcJ

Datei: C:\Programme\KOERZIMAT 1.096_D\Test1.MDB

Parameter:

Auftragsdaten:		Parameter: HcJ		Parameter: HcJ	
Datum/Zeit	20.02.01 15:26:39	Einheit	kA/m	Beide Positionen	No
Auftrag		Meßzeit	3 sec	Innensonde	No
Prüfteil		Magn. Zeit	3 sec	Temp. Schranke	5°C
Charge		Magn. Ampl.	200 kA/m	Formfaktor	1,00
Losgröße		Entmagn. Ampl.	100 %	Sollwert	20,00
Ofen		Magn. Puls	No	Eingreifgrenze	10,00 %
PrüferIn		Polarität	+	Ausschußgrenze	13,00 %
Kommentar					

Meßwerte:

Nr.	HcJ	rel. Rem.	Bemerk.	Nr.	HcJ	rel. Rem.	Bemerk.	Nr.	HcJ	rel. Rem.	Bemerk.
38	19,20	100,0		39	20,84	100,0		40	22,70	100,0	OFL_rauh
41	19,63	100,0		42	20,85	100,0		1	22,34	100,0	
2	21,82	100,0		3	19,77	100,0		4	22,16	100,0	
5	24,78	100,0		6	22,97	100,0		7	17,21	100,0	
8	22,02	100,0		9	17,60	100,0		10	21,54	100,0	
11	19,69	100,0		12	18,15	100,0		13	20,09	100,0	
14	19,66	100,0		15	22,11	100,0		16	22,78	100,0	
17	19,74	100,0		18	18,54	100,0		19	20,10	100,0	
20	20,23	100,0		21	22,21	100,0		22	18,98	100,0	
23	20,60	100,0		24	20,57	100,0		25	19,10	100,0	
26	17,47	100,0	Kante	27	21,39	100,0		28	19,93	100,0	
29	21,00	100,0		30	23,84	100,0		31	21,43	100,0	
32	19,92	100,0		33	20,15	100,0		34	21,25	100,0	
35	20,52	100,0		36	17,61	100,0		37	19,79	100,0	

Sortierung:

Gut	28
Eingreif	8
Ausschuß	6
Summe	42

Statistik:

Maximaler Wert	24,78
Minimaler Wert	17,21
Arithmetischer Mit	20,53
Standardabweichung	1,725

Fig. 5 Measuring value report H_{cJ}

Fig. 5 shows the print-out of a measured value report which displays order data, measuring parameter, the measured values and the statistics of the measured values.

Ms measurement[1] - measuring system for the hard metal industry

Features

- Extremely simple operation through WINDOWS user interface for the single measurements (parameter setting) and serial measurement (SPC)
- Convenient management and archiving of parameter sets for different test parts
- Remote control of the precision scales from the user interface (counterbalancing, reading in of weight and buoyancy) and automatic calculation of volumes and density
- Determination of the magnetic moment m, of the weight-specific saturation magnetization σ_s and of the magnetizable material part in % with a saturation magnet
- Calibration of the measuring system with calibration specimen
- Entry of additional data e.g. hardness, texture, break and porosity. Field names freely selectable in a dialog window
- Creation of a customer-specific report with MS ACCESS or MS EXCEL.
- Recording of all data (order, parameter, measured values, sorting, statistics) in a database (ACCESS format) and print-out of a hard metal report
- XML-interface when using a KOERZIMAT ROBOTICS fully automatic parts feeder system
- Online help function

Mode of operation and function

To perform the measuring procedure on hard metals, the KOERZIMAT measuring module and the Ms module can be used. Additionally, a saturation magnet and precision scales are required. The weight of the test part is determined initially with the precision scales. If the scales have a density module, the buoyancy and the density can be calculated. The test part is subsequently positioned in the air gap of a saturation magnet using a shield. When pulling the test part out of the magnet according to the IEC 60404-14 "pull method", the magnetic moment is measured by means of a helmholtz measuring coil and a fluxmeter. The weight-specific saturation magnetization σ_s is calculated from the magnetic moment ratio to weight. To calculate the magnetic part in %, the corresponding material constants must be selected. The following, editable table indicates some material constants. The table values are indicated in 10^{-6} Tm^3/kg or 10^{-7} Tm^3/km but can also be selected in the units Gauss*cm^3/g and $4\pi\sigma_s$ in Gauss*cm^3/g.

Co	201
Ni	68,5
Fe	273
Fe3_C	166
Fe2_O3	100,5
Fe3_O4	115,5
Fe12_O19_Ba	90,5

Table 1 Material constants for 10^{-6} Tm^3/kg

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[1] Ms measurement is the generic term for all measurements which can be determined by the user interface s. Fig. 7.

Construction

The following components are required for measuring the weight-specific saturation magnetization σ_s:

- KOERZIMAT CS 1.096 measuring module (s. Fig. 1) or an optional Ms module as a "stand alone" device
- Saturation magnet
- Precision scales
- KOERZIMAT PC software CD H_{cJ} and Ms or CD Ms for use of the Ms module PC software
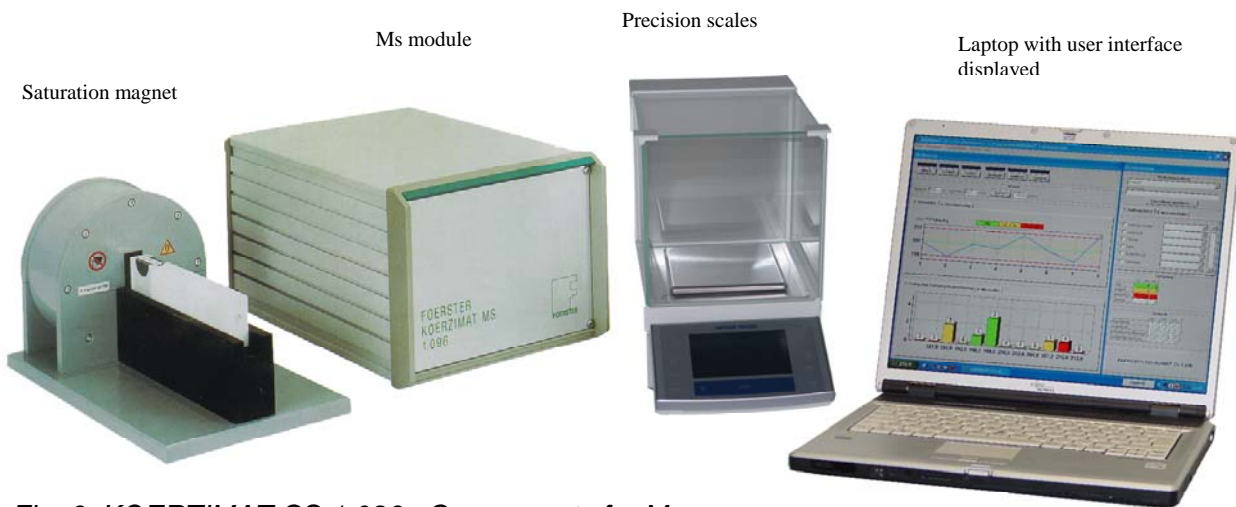

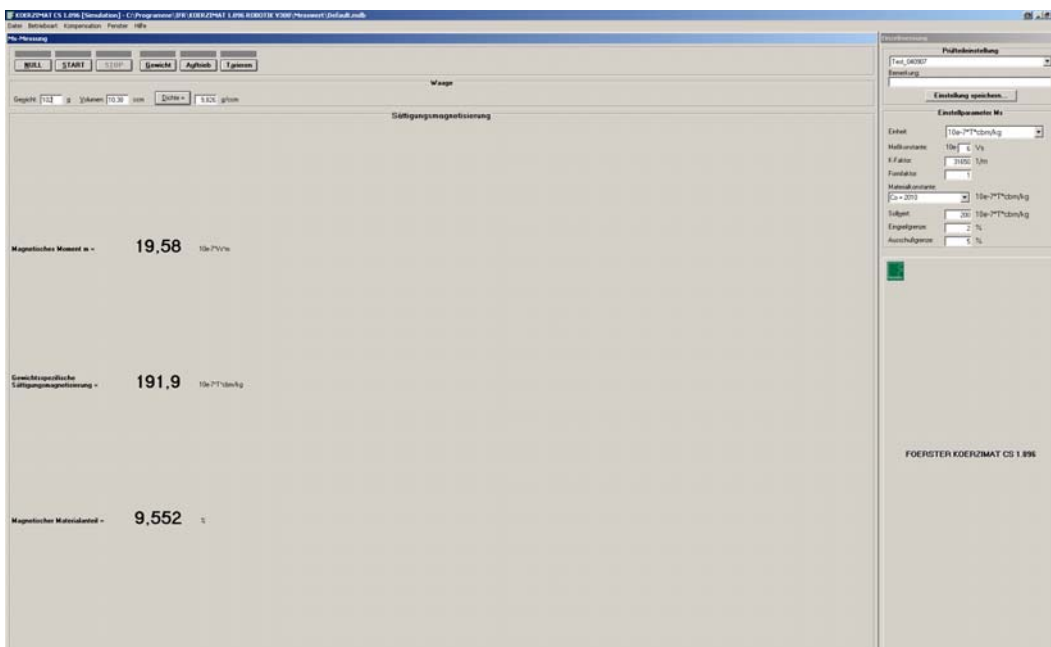*Fig. 6 KOERZIMAT CS 1.096 –Components for Ms meas*

Fig. 7 User interface, single Ms measurement and setting parameters Ms

Fig. 8 User interface: serial measurement Ms with displayed line graph, histgram and table of the measured values

Figures 7 and 8 show the user interfaces in the **operating mode Ms measurement**. In this operating mode, **single and serial measurement measurement** are differentiated. Both user interfaces are divided into different fields which are used either for the dialog with the operator or to indicate or display the results.

Fields for the user dialog are:
- Menu bar
- Testpiece setting (Field names freely selectable)
- Setting parameters Ms (only individual measurement)
- Measuring value column or order data (only serial measurement)
- Keyboard

Fields for **results indication or representation**:

In Ms single measurement (Fig. 7)
- Saturation magnetization
- Magnetic moment m
- Weight-specific saturation magnetization
- Magnetic material part

In Ms serial measurement (Fig. 8)
- Register 1:Measuring column (upper half of the screen) (curve from the single measurements with freely selectable tolerance limits displayed)
- Register 2:Single measurement (upper half of the screen)
- Register 3:Histogram of the saturation magnetization and
- Register 4:Measuring column

On register "series of measurements" a curve from the single measurements with colored tolerance limits is displayed.

On register "Histogram" measurement results are displayed as bar charts.
- Sorting (group classification "Good", "Intervention", "Rejects" and "Total" as numerical value for HC:, HR:, MS:)
- Statistics (statistically relevant values like "maximum value", "minimum value", "mathematical average" and "standard deviation" in numerical display for HC:, HR:, MS:)

Fig. 9 shows the typical structure of a hard metal report which represents the parameters in the upper part with which the measurement has been carried out. In the centre section, the measuring results are indicated whereby freely generated data can be filed for each measured value, e.g. comments concerning hardness, porosity, structure and breaks. The statistical values are provided in the lower section.

Hartmetallreport

Datei: C:\Programme\KOERZIMAT 1.096_D\Test5.MDB

Parameter:

Auftragsdaten:		Parameter: HcJ		Parameter: HcJ		Parameter: σs	
Datum/Zeit	02.02.01 11:36:58	Einheit	kA/m	Beide Positionen	Nein	Einheit	10e-7*T*m³/kg
Auftrag		Meßzeit	3 sec	Innensonde	Nein	Meßkonstante	10e- 7 Vs
Prüfteil		Magnet. Zeit	3 sec	Temp. Schranke	5 °C	Meßspule:K-Faktor	31650,00
Charge		Magnet. Amplitude	200 kA/m	Formfaktor	1,00	Formfaktor	1,00
Losgröße		Entmagnet. Amplit.	100 %	Sollwert	20,00	Materialkonstante	Co = 2010
Ofen		Magnet. Puls	Nein	Eingreifgrenze	2,00 %	Sollwert	100,0
Prüferln		Polarität	+	Ausschußgrenze	5,00 %	Eingreifgrenze	4,00 %
Kommentar						Ausschußgrenze	5,00 %

Meßwerte:

Nr.	Koerzitivfeld-stärke HcJ	Gewicht G g	Volumen V cm³	Dichte D g/cm³	Sättig.magn. 10e-7*T*m³/kg	Materialant. %	Bemerk.	Härte	Porosität	Gefüge	Bruch
1		101,0	10,13	9,970	97,94	4,872	Güte 2	H12	P12	G34	B16
2		102,0	10,23	9,970	98,19	4,885					
3		101,0	10,13	9,970	101,5	5,051					
4		101,0	10,13	9,970	94,48	4,700					
5		102,0	10,23	9,970	105,6	5,257					
6		101,0	10,13	9,970	95,47	4,750					
7		102,0	10,23	9,970	100,7	5,010					
8		101,0	10,13	9,970	97,26	4,839					
9		102,0	10,23	9,970	98,30	4,890					
10		101,0	10,13	9,970	98,43	4,897					

Sortierung:

	HcJ	Ms
Gut	0	7
Eingreif	0	1
Ausschuß	0	2
Summe	0	10

Statistik:

	HcJ	Ms
Maximaler Wert	0,000	105,6
Minimaler Wert	0,000	94,48
Arithmetischer Mittelwert	0,000	98,78
Standardabweichung	0,000	3,175

Fig. 9 Hard metal report

KOERZIMAT Components

KOERZIMAT CS Measuring module

The measuring module (Fig. 1) contains the performance, measuring and control electronic for H_{cJ} measurement and connection sockets for the KOERZIMAT coil and FOERSTER probes.

In addition to this it contains connection sockets for Ms measurement for the Helmholtz coils of the saturation magnets to the fluxmeter, the remote control, the semiautomatic parts feed and a serial interface RS232 for the PC. A XML interface for communication with a PPS is available.

KOERZIMAT coil

Two coils with a clear width of 41mm and 62mm internal diameter are available for H_{cJ} measurement. The coils are equipped for suppression of static and dynamic magnetic fields by means of a screen for determining/monitoring the polarization state of the measuring coil. Two ventilators are installed for cooling. FOERSTER probes are used as measuring elements.
In the case of very small test part mass, KOERZIMAT internal probes can be used.

Ms module

The Ms module contains the fluxmeter. On its rear side, there are the connection sockets for the helmholtz coils of the saturation magnet to the fluxmeter, the remote control, the PC and semi-automatic parts feed for interconnection to the measuring system. The module works independently of the H_{cJ} measurement.

Saturation magnet

The saturation magnet consists of a shielded permanent magnet with a large air gap and high field strength. Helmholtz measuring coils are arranged in the air gap. A guide mechanism and a test piece shield are available for positioning the test part in the magnet.

Precision scales

The weight of the test part with a resolution specifically adapted to the measuring task from 1 mg to 10µg is required for measuring the weight-specific saturation magnetization $_s$. If the scales possess an additional density module, the buoyancy and through this the volume are determined. The density is calculated from the weight and the volume. The scales must be equipped with a serial interface RS232 for connection to the PC. The KOERZIMAT PC software has a driver program for the scales from Mettler e.g. AE50, AE100, PM400, AG204, PG503, XS203S, XS403S, XS204DR and Sartorius e.g. MC200P, BP310, LC620P.

PC

As a PC, a standard PC Pentium III, DIE harddisc, CD-ROM drive and 2 RS 232 interface is required. The KOERZIMAT software operates under Windows 2000, XP.

In the H_{cJ} measurement, the KOERZIMAT CS 1.096 measuring module is connected to the PC via COM1.
The measuring module is connected via COM1 and the scales via COM2 for the Ms measurement.

KOERZIMAT PC software

The KOERZIMAT PC software (32-bit versions) forms the display and user interface for the H_{cJ}- and Ms measurement. It operates under Windows 2000 and XP.

Depending on the software version, the user can switch interactively between the H_{cJ} and M_s measurement on the user interface or the specific user interface H_{cJ} or Ms measurement is respectively available.

The data of all measurements are stored in database files and can be printed accordingly as a "measured value report coercive field strength H_{cJ}" or in a hard metal report.

Additionally, the measured values can be exported as a file for use in other programs, e.g. MS Excel.

Furthermore order data and test piece settings as well as in case of the use of a KOERZIMAT ROBOTICS fully automatic parts feeder system tray identification and test piece positioning on the tray can be imported from a PPS via a XML interface. Measuring results can be exported to a PPS via a XML interface.

Technical Data

KOERZIMAT measuring module

Mains supply (zero conductor and earthing contact must be on the same potential (bridged))

230V, 50 or 60 Hz

isolating transformer

Trenntrafo 15 kVA

230 V

115 V

115 V

N

Erde
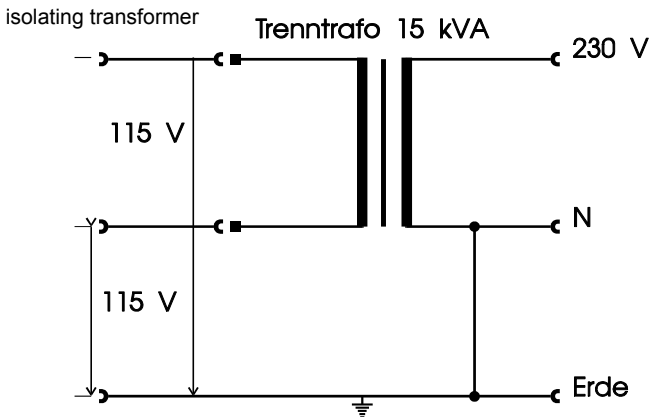
permitted main voltage fluctuations	±10% of nominal value
permitted main voltage frequency fluctuations	±1 Hz
for other mains supply	Isolating transformer 15 kVA required

Conductor cross section

Cable length to: 20m 35m 60m 140m
Conductor cross section: $1.5mm^2$-$2.5mm^2$-$4mm^2$-$10mm^2$

Power consumption (device)

Momentary for magnetization 3700 VA, average consumption 100 to 800 VA depending on setting

Power supply fuse

Automatic circuit breaker with c or k characteristic

Permitted ambient temperature area

0 to +45 C

Measuring module mass

approx. 34 kg

System of protection

IP 32

KOERZIMAT Ms module

Mains supply	115V, 230V, 50 or 60Hz
Permitted mains supply fluctuations	±10% of nominal value
Permitted mains supply frequency fluctuations	±1 Hz

Permitted ambient temperature area

0 to +45 C

Ms module mass

approx. 10 kg

System of protection

IP 32

Power consumption (device)

Average power consumption 100 VA

H$_{cJ}$ measurement

Absolute measurement uncertainty	< ± 1 % of measured value according to standard EN 10330; specimens complying with this standard can be measured by comparision measurement (works standard)
Execution of measurement	automatic or manual

Coercive field strength measuring area	auto range 0 to 100 kA/m
Coercive field strength measuring time	adjustable from 1 to 10 s
Magnetization amplitude	0 to 400 kA/m
Magnetization time	Adjustable from 2.5 to 25 s
Measurement uncertainty of the measuring field	±0,2% of measured value
Residual field measuring area	auto range ±0 to 100 A/m
Compensation area for: OFFSET and BALANCE	±10 A/m

Ms measurement

Linearity (% of full scale deflection)	± 0.1 %
Full scale deflection	10^{-7}: 8.191 x 10^{-4} Vs 10^{-6}: 5.47 x 10^{-3} Vs 10^{-5}: 3.36 x 10^{-2} Vs 10^{-4}: 2.52 x 10^{-1} Vs
Precision for calibration with Ni	0.5%
Precision with Co samples within the homogeneous area	± 1%
Temperature coefficient	1 x 10^{-6}/°C of 0 to+ 45 °C
Noise	1x 10^{-8} Tm^3/kg $\approx$ 0,05 mg Co
Sensitivity	2 x 10^{-8} T m^3/kg $\approx$ ca. 0,1 mg Co
Measuring time	approx. 3 s (without weight determination)

KOERZIMAT coils

	Clear width	
	41 mm	62 mm
Magnetization field strength [1] in:		
Homogeneous field	200 kA/m	200 kA/m
Homogeneous field with additional impulse	400 kA/m	350 kA/m
Measuring field strength	100 kA/m	50 kA/m
Homogeneous field area (deviation $H_c < 0,5\%$)	170 mm	120 mm

Permitted ambient temperature   0 to +45 C

Cooling   through two ventilators

System of protection   IP 32

Mass	Approx. 65 kg	Approx. 85 kg

Measuring element
for small sample masses   1 FÖRSTER probe pair
KOERZIMAT internal probes 40 or 60
we recommend the use of internal probe with
probes having a magnetic moment starting at m
$< 0.2 \times 10^{-7}$ Vsm^3 [2]

Max. measuring field strength with internal   to 25 kA/m

Saturation magnet

Air gap   70x60x26 mm^3

Field in the air gap   1.15 T (11.500 Oe)

Mass   approx. 18 kg
Calibration standard set HcJ + Ms
Consisting of:

7 hard metal disks in case with nominal measur-
ing values   65;105;131;250;343;467;378 each x10^{-7} Tm^3/kg
3,5;4,6;5,0;12,1;13,5;16,3;23 kA/m

Calibration standard HcJ, hard nominal   19 kA/m
Calibration standard HcJ, soft nominal   35 A/m

Dimensions
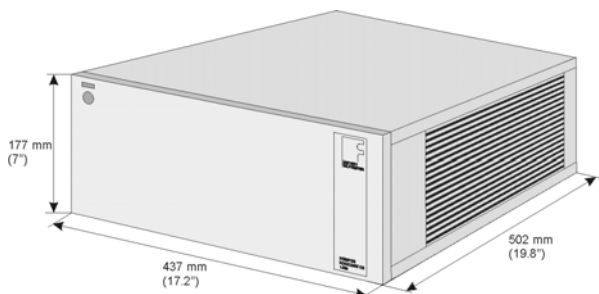
Fig. 10 Dimensions, KOERZIMAT CS measuring module
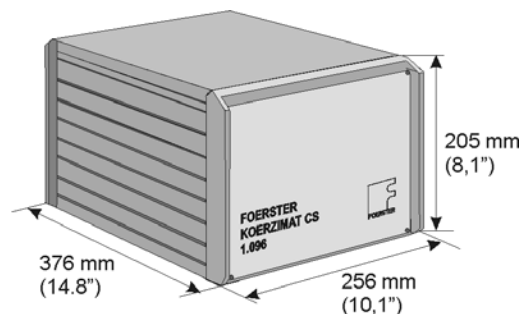

Fig. 11 KOERZIMAT 1.096 Ms module

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[1] Typical for a coil temperature d_u=25 C
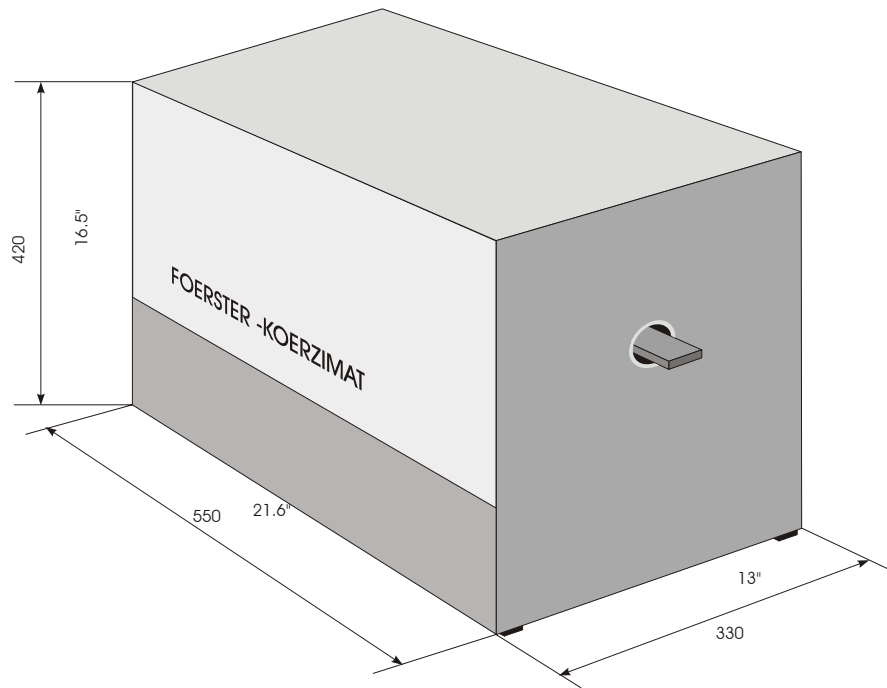[2] matches approx. to a Co mass of 10mg

12

Fig. 12 KOERZIMAT coil

Fig. 13 Slide for KOERZIMAT coils 40(bottom)
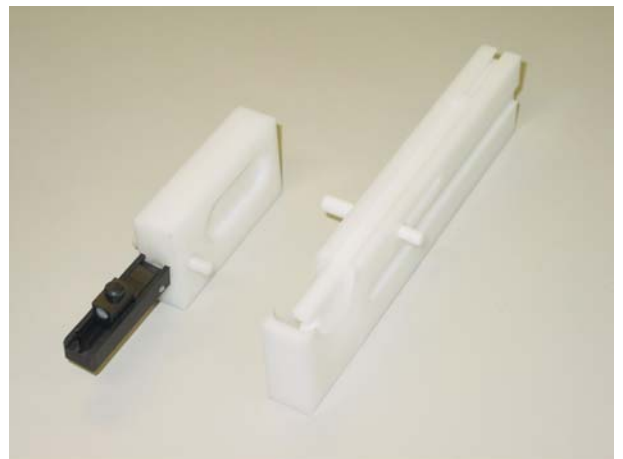*and KOERZIMAT coil 60 (top)*

Fig. 14 Test piece slide, long (right) and slide, short
(left) for the saturation magnet

Fig. 15 KOERZIMAT saturation magnet

Analysewaage m. Windschutz
Analysis scale w. Glass wind shield
014 123 2
Kabel/cable
014 119 4

Kalibrierstandard-Sätze mit Werkszertifikat:
Calibration standards sets with IFR certificate:
HcJ+Ms HM 162 255 2
HcJ+Ms kompl./compl. 162 243 9
HcJ hart/hard 162 256 0
HcJ weich/soft 162 267 6

KOERZIMAT PC SW CDs:
Dichtemessung/Density meas.   159 918 6
Semi Auto+HcJ+Ms 159 407 9
Ms 159 506 7
Demo 159 507 5

KOERZIMAT PC Software CD HcJ
159 505 9

KOERZIMAT PC Software CD
HcJ + Ms 159 504 0

PC mit RS 232
PC with RS 232

Präzisionswaage
Precision scale
030 826 9

Kabel/cable
030 796 3

Dichtebestimmungs kit
Density determination kit
014 148 4

Bedienungsanleitung
Operating instruction manual

PC-Kabel/PC cable
031 402 1 o. Abb./without ill.
Adapter 9S/25P 031 403 0 o. Abb./without ill.

KOERZIMAT CS Meßmodul
KOERZIMAT CS measuring module
140 611 6

Fernbedienung
Remote control
148 234 3

Schieber f. Innensonde 60
Slide for internal probe 60
109 298 7

KOERZIMAT-Innensonde 60
KOERZIMAT internal probe 60
109 299 5

Schieber f. Spule 60
Slide for coil 60
155 374 7

Schieber f. Innensonde 40
Slide for internal probe 40
109 279 0

KOERZIMAT-Innensonde 40
KOERZIMAT internal probe 40
109 280 4

Fluxmeterkabel   Prüfteilschieber
fluxmeter cable   Testpiece slides
1111833   kurz/short 1486993
o. Abb.   lang/long 1465880
without ill.   Prüfeinsatz/test insert
                  8mm 1472062
                  12mm 1473379
                  blank 1547372

Schieber f. Spule 40
Slide for coil 40
153 844 6

KOERZIMAT-Spule 60
KOERZIMAT coil 60
149 278 0

Sättigungsmagnet
Saturation magnet
114 981 4

Schieber mit Prüfeinsatz
s. Kap.5.2
Slides with test insert
s. Chap.5.2

KOERZIMAT-Spule 40
KOERZIMAT coil 40
149 277 2

Standard Funktionspaket/Standard functional set HcJ + Spu40 1.096.80   148 865 1
Standard Funktionspaket/Standard functional set HcJ + Ms + Spu40 1.096.85   111 186 8

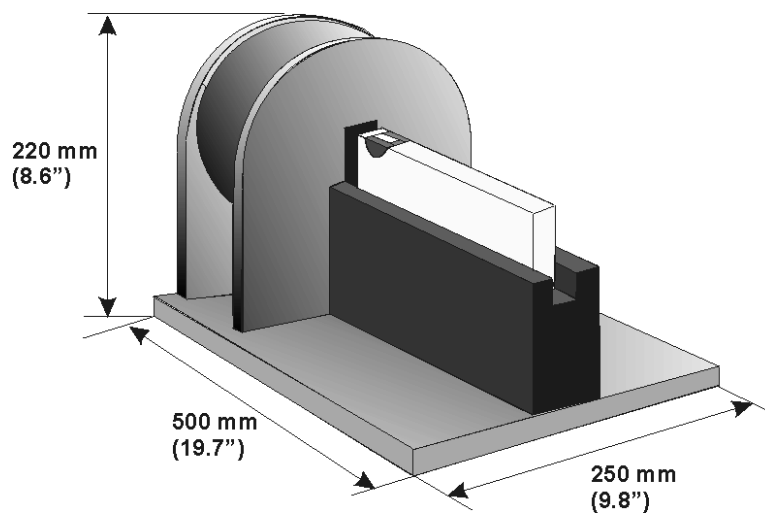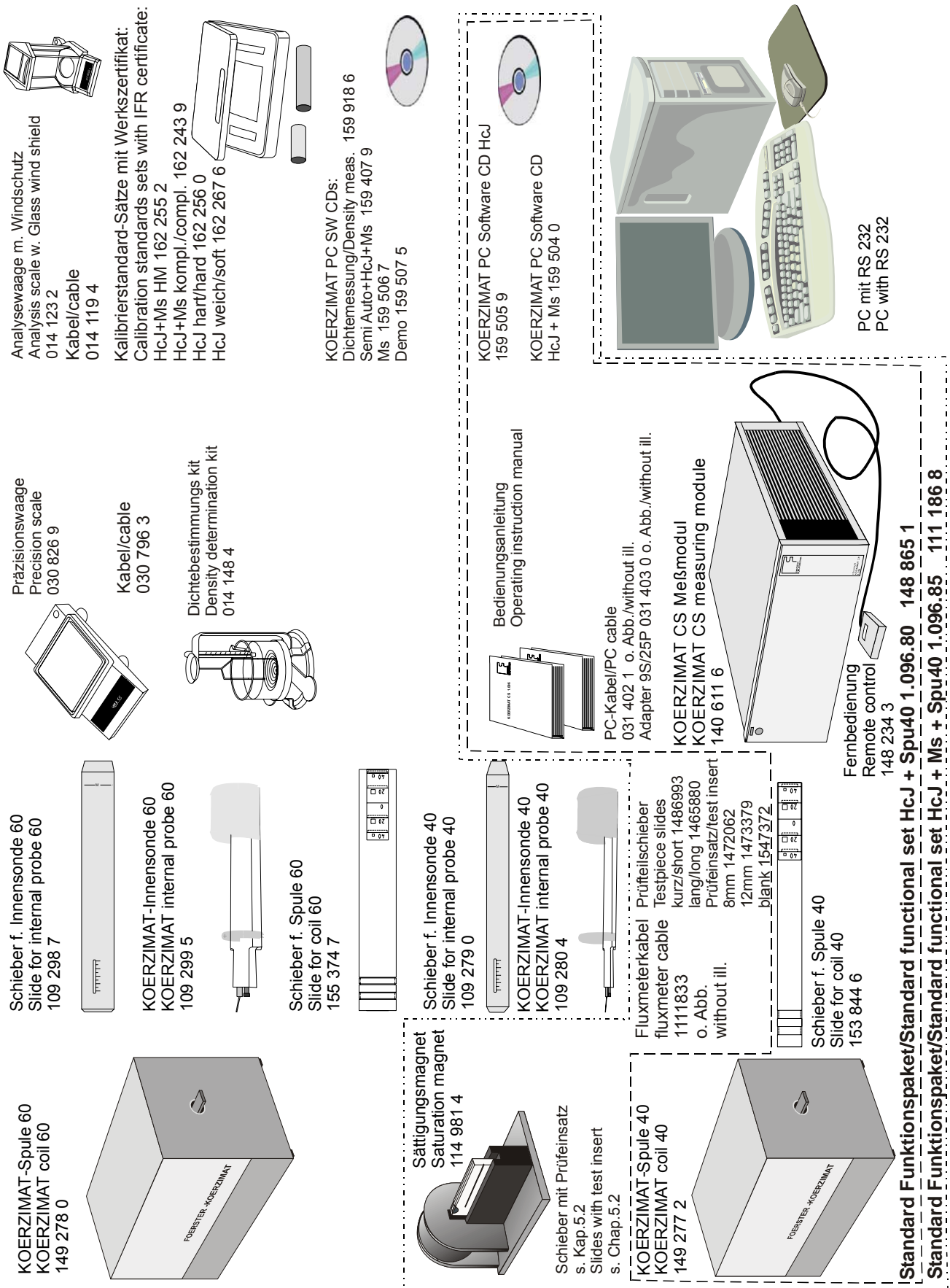*Fig. 16 KOERZIMAT CS 1.096 Standard components and standard function package HcJ+coil 40 1.096.80 and HcJ+Ms+coil 40 1.096.85*

KOERZIMAT PC Software CD
Ms 159 506 7

RS 232 Mini-adapter S9/25P
031 403 0
o. Abb./without fig.

PC Kabel/PC cable
031 402 1

Ms-Messmodul
Ms-measuring
module
159 784 1

Bedienungsanleitung
deutsch
Operating instructions
English

Fernbedienung
Remote control
148 234 3

Sättigungsmagnet
Saturation magnet
114 981 4

Prüfteilschiebersatz Ms
s.S.16
Testpice slides set Ms
s. p. 16

Schieber und Prüfeinsätze
s. Bilder 21 bis 26
Slides and test inserts
s. figures 21 to 26

Fluxmeterkabel
Fluxmeter cable
111 183 3

Standard Funktionspaket/
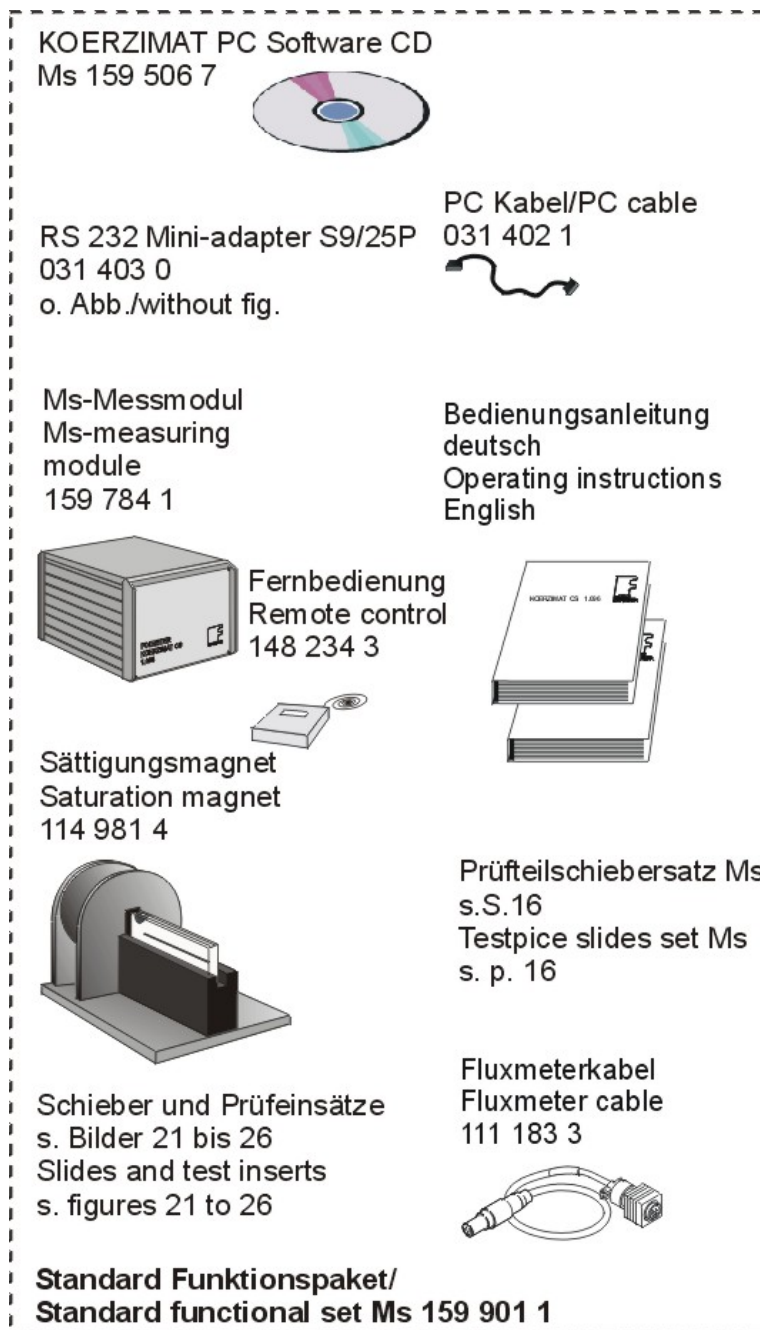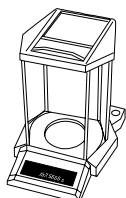**Standard functional set Ms 159 901 1**

Fig. 17..Standard function package Ms 1.096.90

KOERZIMAT PC-Software CD V3.X
Dichtemessung
1843931

Analysewaage
Analysis scale
0321591

Kabel/cable
0321575

PC mit Rs232
PC with RS 232

Fig. 18 Density measurement as "Stand alone" solution

Ordering instructions

Designation	Part No.	Order No.

Standard function packages

	Part No.	Order No.
KOERZIMAT CS HcJ + coil 40	1.096.80	148 865 1

consisting of:
KOERZIMAT CS measuring module
KOERZIMAT PC software CD HcJ
Remote control with 3m cable
PC cable 1.8m 9 pole P/9 pole S
RS232 Miniadapter 9 pole S/25 pole P
KOERZIMAT coil 40
Slide for coil 40
Operating instructions KOERZIMAT CS
KOERZIMAT PC -anywhere CD

	Part No.	Order No.
KOERZIMAT CS HcJ + coil 40	1.096.85	111 186 8

consisting of:

KOERZIMAT CS measuring module
KOERZIMAT PC software CD HcJ + Ms
Remote control with 3m cable
PC cable 1.8m 9 pole P/9 pole S
RS232 Miniadapter 9 pole S/25 pole P
KOERZIMAT coil 40
Slide for coil 40
Fluxmeter cable 3m
Saturation magnet, basic device
Slide, long
Slide, short
2x **Test insert**, blank
Test insert, 8mm
Test insert, 12mm
Operating instructions KOERZIMAT CS
KOERZIMAT PC-anywhere CD

	Part No.	Order No.
KOERZIMAT CS Ms	1.096.90	159 901 1

consisting of:

KOERZIMAT Ms measuring module
KOERZIMAT PC software CD MS
Remote control with 3m cable
PC cable 1.8m 9 pole P/9 pole S
RS232 Miniadapter 9 pole S/25 pole P
Saturation magnet, basic device
Fluxmeter cable 3m
Slide, long

Designation	Part No.	Order No.
Continuation of package	1.096.90	159 901 1
Slide, short		
2x **Test insert,** blank		
Test insert, 8mm		
Test insert, 12mm		
Operating instructions KOERZIMAT CS		
KOERZIMAT PC-Anywhere CD		
Testpiece slide set Ms	1.096.88	155 021 7
consisting of:		
Slide, long		
Slide, short		
2x **Test insert,** blank		
Test insert, 8 mm		
Test insert, 12 mm		

Standard components

Designation	Part No.	Order No.
KOERZIMAT CS measuring module	**1.096.01**	**140 611 6**
KOERZIMAT Ms measuring module	**1.096.01-1002**	**159 784 1**
KOERZIMAT PC-Software CD V3.x Robotik HcJ+Ms	**1.096.01-8037**	**186 318 5**
KOERZIMAT PC software CD V3.x semiautomatic parts feeder +HcJ+Ms	**1.096.01-8031**	**184 391 5**
KOERZIMAT PC software CD V3.x HcJ+Ms	**1.096.01-8032**	**184 392 3**
KOERZIMAT PC software CD V3.x HcJ	**1.096.01-8033**	**184 388 5**
KOERZIMAT PC software CD V3.x MS	**1.096.01-8034**	**184 389 3**
KOERZIMAT PC software CD V3.x Density measurement	**1.096.01-8036**	**184 393 1**
KOERZIMAT PC software CD V3.x Demo	**1.096.01-8035**	**184 394 0**
KOERZIMAT PC-Software CD V3.x Robotik HcJ+Ms/upgrade	**1.096.01-8015**	**186 319 3**
KOERZIMAT PC-Software CD V3.x Manipulator+HcJ+Ms / upgrade	**1.096.01-8011**	**184 395 8**
KOERZIMAT PC-Software CD HcJ+Ms/upgrade	**1.096.01-8012**	**184 396 6**
KOERZIMAT PC-Software CD HcJ/upgrade	**1.096.01-8013**	**184 397 4**
KOERZIMAT PC-Software CD MS/upgrade	**1.096.01-8014**	**184 398 2**
Remote control	**1.096.01**	**148 234 3**
Test part feed, semiautomatic	**1.096.89**	**126 890 2**
KOERZIMAT Robotik, complete	**1.096.92**	**180 364 6**
KOERZIMAT Robotik, with conversion kit	**1.096.93**	**180 149 0**
KOERZIMAT PC-Anywhere CD Host only	**1.096.01-8020**	**180 233 0**
KOERZIMAT PC, German with flat screen	**1.096.01-9013**	**031 385 8**
PC KOERZIMAT, English with flat screen	**1.096.01-9017**	**033 178 3**
PC cable 1.8m 9 pole P/9 pole S	**777-621**	**031 402 1**
RS232 Miniadapter 9 pole S/25 pole P	**243-0352**	**031 403 0**
KOERZIMAT coil 40	**1.096.01-6645**	**183 284 0**
Slide for coil 40	**1.096.01**	**153 844 6**
KOERZIMAT internal probe 40	**1.095.01-6742**	**109 280 4**
Slide for internal probe 40	**1.095.01-6741-10**	**109 279 0**
KOERZIMAT coil 60	**1.096.01**	**149 278 0**
Connecting rail, modification kit, coil 6642 + 6643	**1.096.01-9902**	**1803930**
Connecting rail, modification kit, coil 6662 + 6663	**1.096.01-9904**	**1804812**
Connecting rail, modification kit, coil 6664	**1.096.01-9907**	**1831968**
Slide for coil 60	**1.096.01**	**155 374 7**

FOERSTER

Designation	Parts No.	Order No.
KOERZIMAT internal probe 60	**1.095.01-6762**	**109 299 5**
Slide for internal probe 60	**1.095.01-6761-10**	**109 298 7**
Switchbox coil-internal probe	**1.096.01-9018**	**186 362 2**
Saturation magnet, basic device	**1.096.01-4001**	**114 981 4**
Saturation magnet for test piece feed	**1.096.01**	**152 514 0**
Slide, long	**1.096.01**	**146 588 0**
Test insert, blank	**1.096.01**	**154 737 2**
Test insert, 8 mm	**1.096.01**	**147 206 2**
Test insert, 12 mm	**1.096.01**	**147 337 9**
Slide, short	**1.096.01**	**148 699 3**
Fluxmeter cable 3m	**1.096.01**	**111 183 3**
Analysis scales with wind protection XS 403 DR	**XS403S**	**032 156 7**
Cable RS9M-RS9F, 2m, RS 232	*** 11101052**	**032 157 5**
Extension cable for terminal	*** 11600517**	**032 161 3**
Density determination kit f. XS203S	*** 11132680**	**032 158 3**
Wind protection PRO f. XS203S	*** 11131651**	**032 162 1**
Analysis scales XS204DR incl. wind high protection	*** 11106006**	**032 159 1**
Density determination kit for scales XS204DR	*** 11106706**	**032 160 5**
Calibration standard set HcJ hard with IFR certificate	**1.096.01-9003**	**162 256 0**
Calibration standard set HcJ soft with IFR certificate	**1.096.01-9004**	**162 267 6**
Calibration standard set HcJ +Ms HM with IFR certificate	**1.096.01-9002**	**162 255 2**
Calibration standard set HcJ+Ms compl. with IFR certificate	**1.096.01-9001**	**162 243 9**
Calibration standard HcJ soft IFR certificate	**1.095.01-9301-0002**	**138 777 4**
Service Kit LT1/2	**1.096.01**	**030 754 8**
Tray 4x8 pocket/25x35mm	**1.096.01-1050-9001**	**180 345 0**
Calibration HcJ KOERZIMAT CS	**1.096 KAL**	**148 231 9**
Calibration HcJ+Ms KOERZIMAT CS	**1.096 KAL**	**125 065 5**
Calibration of KAL.STD. HcJ KOERZIMAT, IFR certificate	**1.096 ME**	**126 930 5**
Calibration of KAL.STD MS KOERZIMAT, IFR certificate	**1.096 ME**	**125 066 3**
User training 2-day KOERZIMAT CS	**1.096.01 AS**	**125 067 1**
Operating instructions KOERZIMAT CS V3.08	**1.096 HCJ UA06/DE_08/07**	**187 951 0**
Operating instructions, **English** KOERZIMAT CS V3.08	**1.096 HCJ UA06/EN_08/07**	**187 952 9**
Operating instructions, test piece feed, semiautomatic	**1.096 MAN UA06/DE_09/05**	**138 447 3**
Operating instructions, **English** test piece feed, semiautomatic	**1.096 MAN UA06/DE_09/05**	**138 514 3**
Operating instructions, **Robotik V3.08** fully automatic test piece feeder	**1.096 UA06/DE_08/07**	**181 714 0**
Operating instructions Robotics V3.08 fully automatic test piece feeder	**1.096 UA06/EN_08/07**	**181 715 9**