Calibration Equipment
for Testing Systems

Calibration Equipment
for Materials Testing Systems

Equipment for the verification and calibration of materials testing machines and extensometers according to ISO 376 and other international standards.

The equipment is designed for the following applications:

- **Official Calibration Purposes**
- **Calibration of Testing Machines**
- **Standard Calibrations**
- **Industrial Process Controls (ISO 9000 a.s.o.)**

Our reference load cells are designed to calibrate any type of testing machine for quality control purposes as well as for obtaining an official calibration certificate. Whenever forces have to be measured accurately, two methods are possible. Either by using dead-weight machines which are quite expensive and hard to operate and not very common, or by using testing machines equipped with a transfer force transducer. This solution is much more flexible and relatively cheap. The technical specification is in compliance with ISO 376 (formerly EN 10002-3) Class "05" and "00" (eventually Class "1") regulations and is part of the control tools required for, among others, the application of ISO 9000 regulations. Now available, standard reference transducers with digital output and dedicated ISO 376 software allowing a direct link between the transducer and the computer, a cost effective solution of the measurement chain.

Besides that we offer a wide range of extensometer calibration equipment for the verification of the axial linearity as well as the initial gauge length.

For all the equipment different digital indicators are available. They can be interfaced to a PC in connection with our calibration software packages. This allows a data acquisition, analysis, calculation and print-out of calibration reports.

Content - Section U

Tension / Compression Reference Load Cell

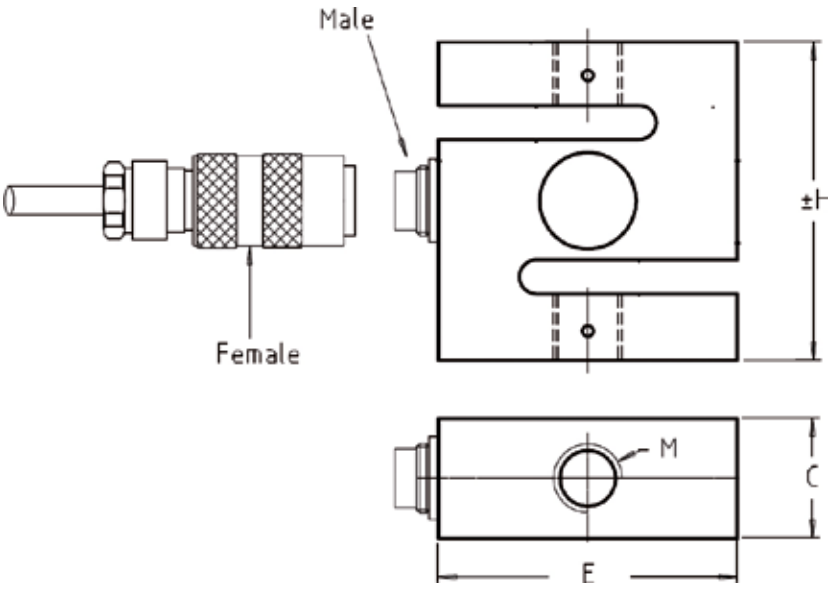
Series 2712/15 200 N - 100 kN

Very compact and accurate reference load cells for compression and tensile loading available in accuracy class 0.5 and 00. Very light weight made from aluminium. Mounting adapters according to your needs.

Type 2712		0.2	0.5	1	2	5	10
Static Capacity max.	kN	0.200	0.500	1	2	5	10
Overall Height	mm	72	72	72	72	88	88
Overall Width	mm	55	55	55	55	70	70
Overall Depth	mm	25	25	25	25	30	30
Central Thread		M8	M8	M8	M12	M16	M16
Nominal Displacement	mm	<0.40	<0.40	<0.40	<0.35	<0.35	<0.30
Weight	kg	0.42	0.42	0.42	0.42	0.6	0.6

Type 2715		20	30	50	75	100
Static Capacity max.	kN	20	30	50	75	100
Overall Height	mm	116	116	116	130	130
Overall Width	mm	98	98	98	118	118
Overall Depth	mm	38	38	38	56	56
Central Thread		M24	M24	M24	M36	M36
Nominal Displacement	mm	<0.35	<0.35	<0.35	<0.60	<0.60
Weight	kg	2.6	2.6	2.6	5.2	5.2

General Specifications	Class	0.5	00
Accuracy Class ISO 376		0.5	00
Hysteresis	% of rated output	<±0.15	<±0.07
Reproducibility error	% of rated output	<±0.10	<±0.05
Repeatability error	% of rated output	<±0.05	<±0.025
Creep error over 30 min	% of rated output	<±0.05	<±0.025
Zero shift after loading	% of rated output	<±0.025	<±0.012
Temperature influence on span	% of rated output / °C	<±0.035	<±0.015
Temperature influence on zero	% of rated output / °C	<±0.03	<±0.023
Maximum Force	% of full scale	110	110
Breaking Force	% of full scale	>300	>300
Nominal Sensitivity	mV / V	2	2
Input Resistance	Ohm	350	350
Nominal Temperature Range	°C	-10 to +45	-10 to +45



Tension / Compression Reference Load Cell

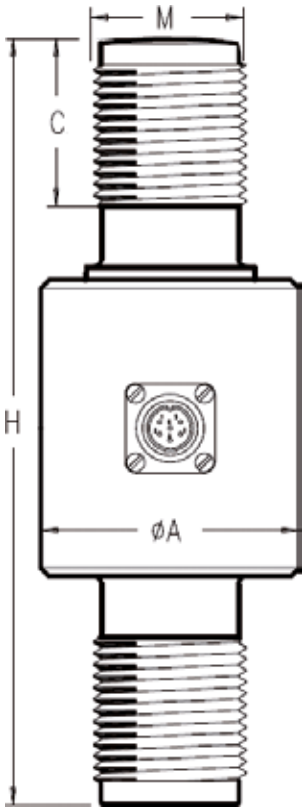
Series 5100 50 kN - 1500 kN

Very high capacity and accurate reference load cells for compression and / or tensile loading available in accuracy class 0.5 and 00. Sturdy made from stainless steel. Mounting adapters according to your needs.

Type 5100		50	100	150	200	300	500	1000	1500
Static Capacity max.	kN	50	100	150	200	300	500	1000	1500
Overall Height (H)	mm	125	170	190	190	265	265	340	340
Thread (M)		M24	M30	M45	M45	M64	M64	M90	M90
Thread Height (C2)	mm	26	35	44	44	65	65	85	85
Width (A)	mm	50	60	75	75	88.5	88.5	111	111
Nominal Displacement	mm	<0.08	<0.15	<0.16	<0.16	<0.25	<0.25	<0.42	<0.42

Type 5100		2000	3000	5000	7500	10000	15000	20000	30000
Static Capacity max.	MN	2	3	5	7.5	10	15	20	30
Overall Height (H)	mm	430	430	520	590	590	710	860	930
Thread (M)		M125	M125	M160	M200	M200	M250	M330	M360
Thread Height (C2)	mm	128	128	158	185	185	230	300	330
Width (A)	mm	150	150	180	220	220	280	360	390
Nominal Displacement	mm	<0.65	<0.65	<0.73	<0.83	<0.83	<1.00	<1.20	<1.60

General Specifications	Class	0.5	00
Accuracy Class ISO 376		0.5	00
Hysteresis	% of rated output	<±0.15	<±0.07
Reproducibility error	% of rated output	<±0.10	<±0.05
Repeatability error	% of rated output	<±0.05	<±0.025
Creep error over 30 min	% of rated output	<±0.05	<±0.025
Zero shift after loading	% of rated output	<±0.025	<±0.012
Temperature influence on span	% of rated output / °C	<±0.035	<±0.015
Temperature influence on zero	% of rated output / °C	<±0.03	<±0.023
Maximum Force	% of full scale	150	150
Breaking Force	% of full scale	>300	>300
Nominal Sensitivity	mV / V	1.5 / 2	1.5 / 2
Input Resistance	Ohm	350	350
Nominal Temperature Range	°C	-10 to +45	-10 to +45



Tension / Compression Reference Load Cell

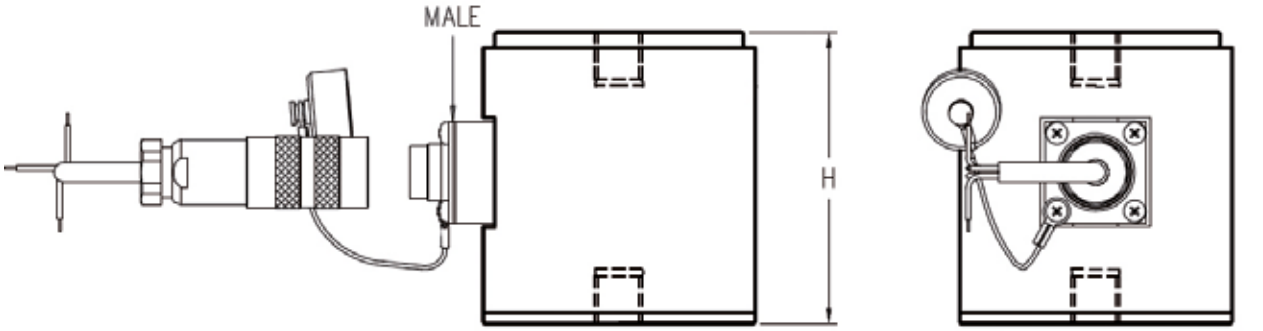
Series 5062 100 N - 50 kN

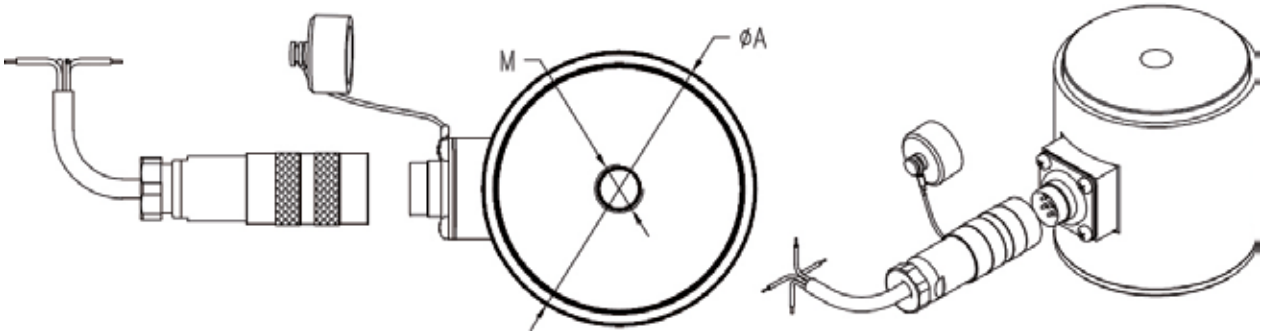
Very compact and accurate reference load cells for compression and tensile loading available in accuracy class 0.5 and 00. Made from aluminium (up to 5 kN) or steel. Mounting adapters and pads according to your needs.

Type 2712		0.1	0.2	0.3	0.5	1	1.5	2	3
Static Capacity max.	kN	0.100	0.200	0.300	0.500	1	1.5	2	3
Overall Height (H)	mm	75	75	75	75	75	75	75	75
Width Ø (A)	mm	70	70	70	70	70	70	70	70
Central Thread (M)		M8	M8	M8	M8	M8	M8	M8	M12
Nominal Displacement	mm	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.35
Weight	kg	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Type 2715		3	5	7.5	10	15	20	30	50
Static Capacity max.	kN	3	5	7.5	10	15	20	30	50
Overall Height (H)	mm	75	75	100	100	100	100	150	150
Width Ø (A)	mm	70	70	70	70	90	90	90	90
Central Thread (M)		M12	M12	M16	M16	M16	M16	M20	M20
Nominal Displacement	mm	<0.35	<0.35	<0.35	<0.35	<0.40	<0.40	<0.60	<0.60
Weight	kg	0.5	0.5	2.1	2.1	3.2	3.2	5.3	5.3

General Specifications	Class	0.5	00
Accuracy Class ISO 376		0.5	00
Hysteresis	% of rated output	<±0.15	<±0.07
Reproducibility error	% of rated output	<±0.10	<±0.05
Repeatability error	% of rated output	<±0.05	<±0.025
Creep error over 30 min	% of rated output	<±0.05	<±0.025
Zero shift after loading	% of rated output	<±0.025	<±0.012
Temperature influence on span	% of rated output / °C	<±0.035	<±0.015
Temperature influence on zero	% of rated output / °C	<±0.03	<±0.023
Maximum Force	% of full scale	500	500
Breaking Force	% of full scale	>500	>500
Nominal Sensitivity	mV / V	2	2
Input Resistance	Ohm	350	350
Nominal Temperature Range	°C	-10 to +45	-10 to +45





Compression Only Reference Load Cell

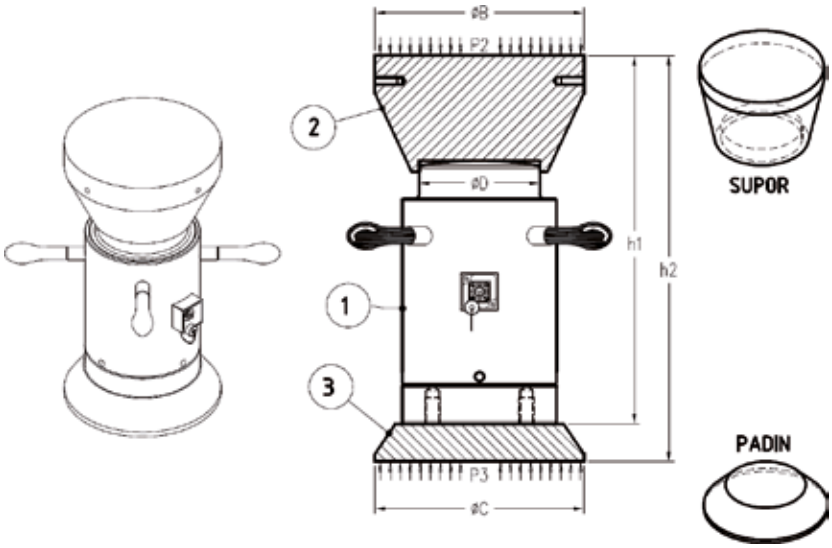
Series 3110 50 kN - 10 000 kN or higher

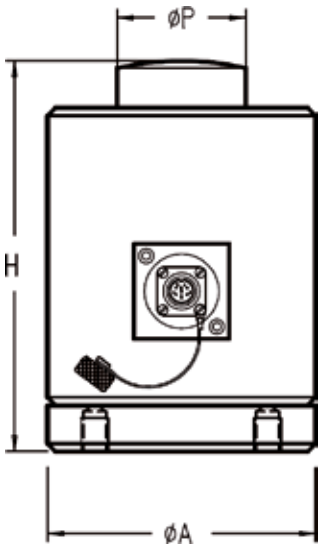
Very high capacity and accurate reference load cells for compression only loading available in accuracy class 0.5 and 00. Sturdy made from stainless steel. Higher forces according to your needs.

Type 5100		50	100	150	200	300	500	750
Static Capacity max.	kN	50	100	150	200	300	500	750
Overall Height (H)	mm	135	135	135	135	160	160	190
Ø B	mm	36	36	36	36	56	56	64
Ø A	mm	64	64	64	64	89	89	99
Weight	kg	2	2.2	2.2	2.2	4.5	4.5	6
Nominal Displacement	mm	<0.12	<0.18	<0.18	<0.18	<0.20	<0.20	<0.34
Upper Loading Pad Ø B	mm	69	69	69	69	79	79	114
Lower Loading Pad Ø C	mm	n.n.	n.n.	n.n.	n.n.	n.n.	n.n.	129
Height H1	mm	174	174	174	174	200	200	248
Height H2	mm	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	273

Type 5100		1000	1500	2000	3000	5000	7500	10 000
Static Capacity max.	MN	1000	1500	2	3	5	7.5	10
Overall Height (H)	mm	190	225	225	270	350	460	460
Ø B	mm	64	90	90	125	160	200	200
Ø A	mm	99	119	119	159	205	294	294
Weight	mm	6	20	20	42	90	243	243
Nominal Displacement	mm	<0.34	<0.35	<0.35	±0.4	±0.5	±0.7	±0.7
Upper Loading Pad Ø B	mm	114	164	164	195	248	308	353
Lower Loading Pad Ø C	mm	129	158	158	248	248	353	353
Height H1	mm	248	317	317	360	476	615	640
Height H2	mm	273	342	342	420	506	650	675

General Specifications	Class	0.5	00
Accuracy Class ISO 376		0.5	00
Hysteresis	% of rated output	<±0.15	<±0.07
Reproducibility error	% of rated output	<±0.10	<±0.05
Repeatability error	% of rated output	<±0.05	<±0.025
Creep error over 30 min	% of rated output	<±0.05	<±0.025
Zero shift after loading	% of rated output	<±0.025	<±0.012
Temperature influence on span	% of rated output / °C	<±0.035	<±0.015
Temperature influence on zero	% of rated output / °C	<±0.03	<±0.023
Maximum Force	% of full scale	150	150
Breaking Force	% of full scale	>300	>300
Nominal Sensitivity	mV / V	1.5 / 2	1.5 / 2
Input Resistance	Ohm	350	350
Nominal Temperature Range	°C	-10 to +45	-10 to +45





Compression Only Reference Load Cell

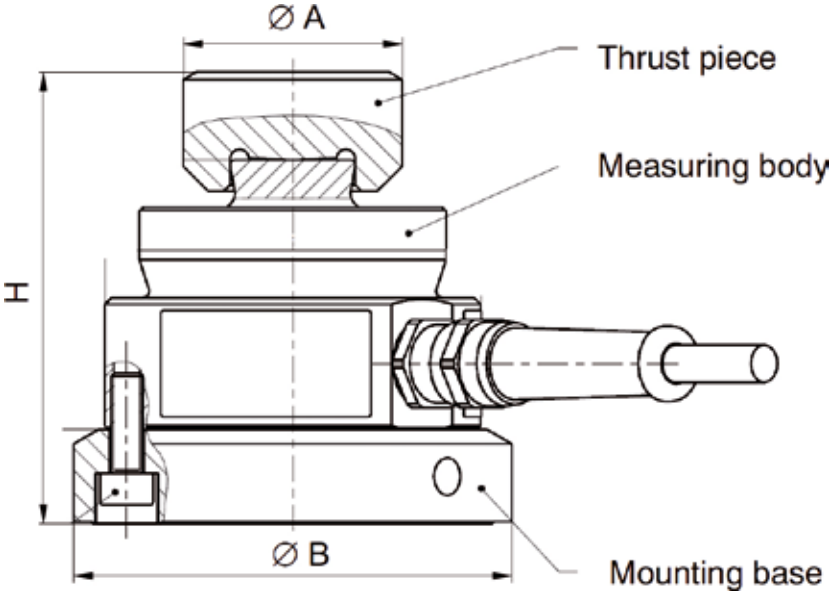
Series 18 10 - 5000 kN

Very compact and low weight force transducer including force application adapters. Made from stainless steel for optimum test results and to prevent error loads.

Type 18		10	20	50	100	200
Static Capacity max.	kN	10	20	50	100	200
Overall Height (H)	mm	72	72	72	89	89
Diameter Upper (Ø A)	mm	35	35	35	45	45
Diameter Lower (Ø B)	mm	70	70	70	75	75
Nominal Displacement	mm	0.13	0.11	0.13	0.17	0.19
Weight	kg	1.2	1.2	1.2	2.3	2.3
Limit Force	%	170	170	170	170	170
Breaking Force	%	400	400	400	400	400

Type 18		300	500	1000	2000	3000	5000
Static Capacity max.	kN	300	500	1000	2000	3000	5000
Overall Height (H)	mm	112	157	171	239	254	303
Diameter Upper (Ø A)	mm	58	85	100	135	135	160
Diameter Lower (Ø B)	mm	95	130	150	230	230	275
Nominal Displacement	mm	0.23	0.26	0.45	0.62	0.79	1.08
Weight	kg	3.9	10.4	15.3	45.6	52.6	90.4
Limit Force	%	170	170	170	150	150	135
Breaking Force	%	400	400	400	320	320	290

General Specifications	Class	0.5
Accuracy Class ISO 376		0.5
Hysteresis	% nominal Force	0.08
Reproducibility error	% nominal Force	0.08
Repeatability error	% nominal Force	0.04
Creep error over 30 min	% nominal Force	0.03
Zero shift after loading	% nominal Force	0.012 (10 - 300 kN) / 0.024 (500 - 500 kN)
Temperature influence on span	% nominal Force	0.01
Temperature influence on zero	% nominal Force	0.01
Nominal Sensitivity	mV / V	2
Input Resistance	Ohm	4450
Nominal Temperature Range	°C	-10 to +40

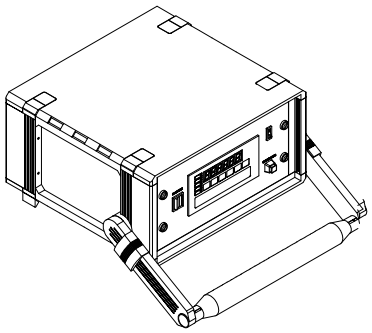


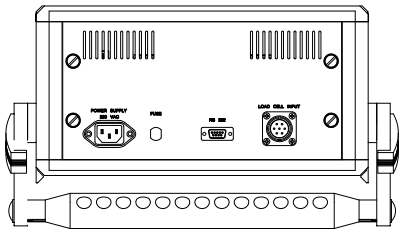
Digital Indicator for Reference Load Cells

Type INDI

Portable and high accuracy indicator is specially designed to be used with force transducers with accuracy class 0.5 and 00 according to ISO 376.

Specifications	INDI
Display	6 digits
Units	N, kg, mV/V
Accuracy Class	0.01%
Non-Linearity	<0.002% of full scale
Internal Resolution	550.000 divisions
Conversion speed	17 / s
Temperature influence on span	<2 ppm/°C
Temperature influence on zero	<2 ppm/°C
Long Term Stability	<.005% of full scale per year
Digital Output	RS-232C (Option RS-485)
Analog Output	0 - 10 Volt / 4 - 20 mA
2 Independent Set Points	24 VDC - 100 mA (transistor output)
Operating Temperature	-10 - +40°C
Dimensions W x D x H	372 x 429 x 164 mm
Power Supply	230 V, 50 Hz (Option: internal rechargeable Battery)
Weight	6.7 kg



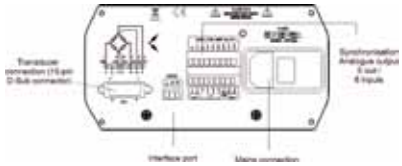


Digital Indicator for Reference Load Cells

Type SCOUT

Compact indicator in desktop housing with four limit switches, peak value stores (min., max., peakt-to-peak), envelope function and instantaneous values. Available in class 0.5 and 00.

Specifications	SCOUT
Display	10 digits
Units	N, kg, mV/V
Keyboard	7 buttoms
Accuracy Class	0.01%
Temperature influence on span	0.01%
Temperature influence on zero	0.01%
Long Term Stability	<0.2 over 48 hrs
Digital Output	RS-232
Analog Output	0 - 10V
Limit Value Switch	4 (Gross, Net, Peak Value)
Response Time	0.83 ms
Peak Value Stores	2 (positive, negative, peak-to-peak)
Update Rate	0.03 ms
Operating Temperature	-20 - +50°C
Dimensions W x D x H	176 x 98 x 212 mm
Power Supply	230 V, 50 Hz
Weight	1.9 kg



High Resolution Digital Indicator

Type MGC - PLUS

**High resolution digital indicator of 1'000'000 digits. The configuration is very flexible and available according to customer requirements.
Up to 5 analog signals (gross, net, maximum, minimum, peak-to-peak).**

Flexibility: The built-in standard PC, the two PCMCIA slots and the modular architecture of the MGC - PLUS plus allow you to freely expand your system. You can add new modules when you like - and in the future - to suit changed requirements. As well as making analogue signals constantly available for every measurement channel, the MGC - PLUS also gives you high-speed, digital data acquisition at high resolution.

Connect up any type of transducer: Whether you want to measure force, displacement, pressure, temperature, torque, acceleration, strain, stress, voltage, current, frequency or resistance - at low or high speeds - you will find a dedicated MGC - PLUS module which is ideally suited to your requirements. For static measurement tasks where high resolution, long-term stability and immunity to noise are a priority, e.g. during calibration, you can find 225 Hz or 600 Hz carrier-frequency modules with an accuracy class of up to 0.0025. A DC amplifier is also available for dynamic measurements up to 50 kHz. Messages transmitted via a CAN bus (for instance, in cars or trucks) can be acquired in parallel with mechanical parameters. In each single-channel amplifier, transducer data and channel-specific settings are stored in a non-volatile EEPROM.

Analog - precise and flexible digital - high-speed, high-resolution: Single-channel measurement modules have up to five analogue signals (gross, net, maximum, minimum, peak-to-peak); these can be fed to two analogue outputs according to choice. Hardware functions such as zero balancing, taring or parameter transfer can be controlled via PLC-compatible contacts. Measurement signals are sampled simultaneously and in parallel using three channel-independent sampling rates. The highest sampling rate is 19.2 kHz/channel. The high 20-bit resolution enables you to acquire very small to very large signal amplitudes without switching the measuring range. You will achieve significant data reduction even during a measurement task with the assistance of the comprehensive trigger functions.

Modular architecture: Your requirements change from day to day, and so does the MGC - PLUS. As it's a modular system, you can select exactly the components you need for your current measurement tasks. For example, you may choose to start with the purely analog features and only later add the module for high-speed, digital data acquisition. The instrument can be fully computer-controlled; for manual settings you can call up all functions using a display and control panel. Multi-channel MGC - PLUS modules maximize the number of functions, minimize space requirements and provide an excellent price-performance ratio.

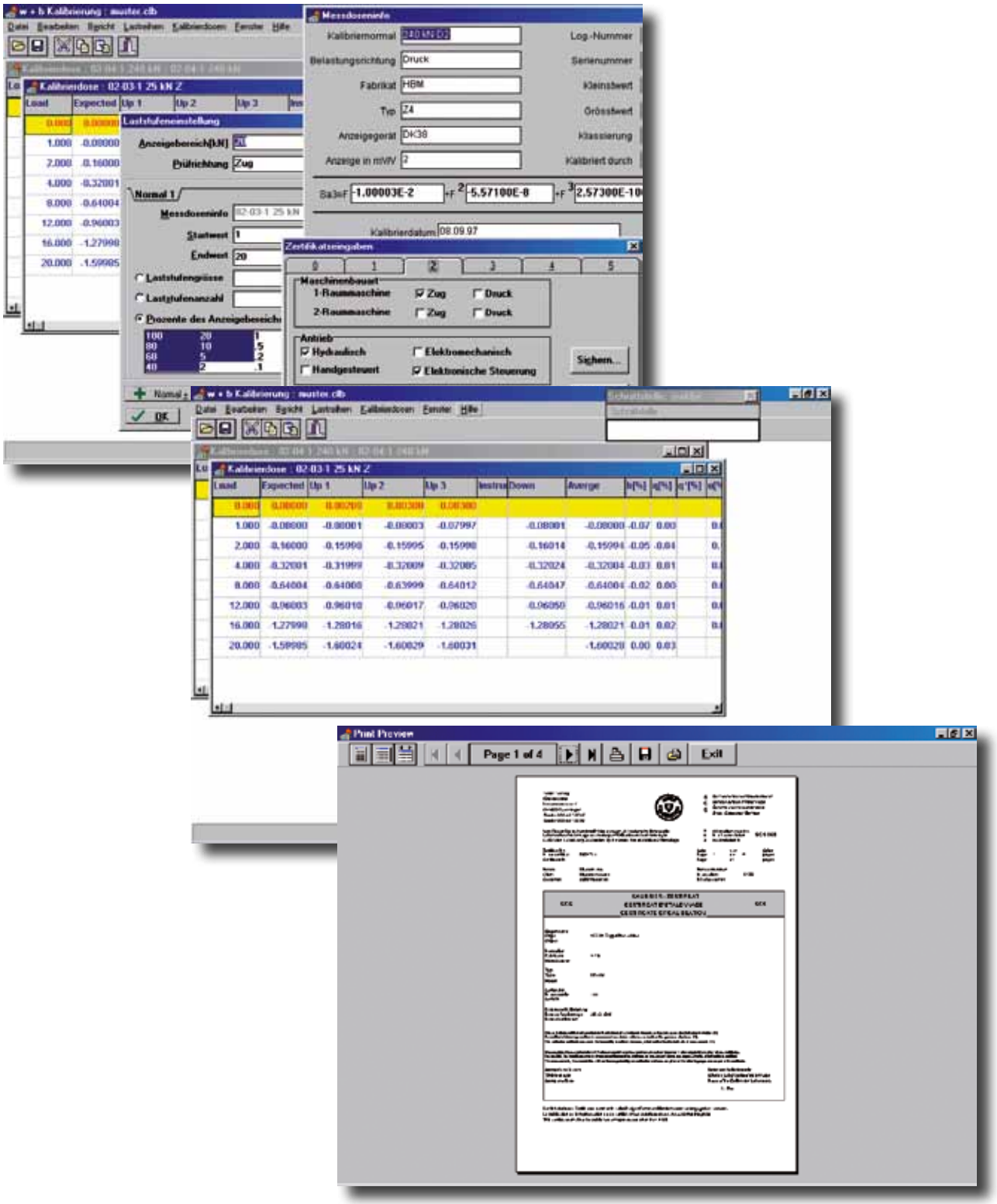
Data logging and intelligent data reduction: Using modern measurement systems you can easily generate and store gigabytes of data, but the subsequent processing is inevitably time-consuming. MGC - PLUS helps you solve this problem through intelligent data reduction.

Specifications	MGC - PLUS
Display	LCD
Keyboard	alphnumeric keypad, 4 function keys, cursor and dialog keys
Accuracy Class	0.03
Digital Output	RS-232, RS-485, Ethernet
Analog Output	0 - 10V
Analog Signals	up to 5 (gross, net, max., min., peak-to-peak)
Operating Temperature	-20 - +60°C
Dimensions W x D x H	104 x 146 x 205 mm (19" Housing)
Power Supply	230 V, 50 Hz
Weight	3.1 kg

Calibration Software

KALIB

Automatic read-in of values from digital indicator. With database for calibration of load cells, automatic calculation of errors with graph, classification according international standards and calibration certificate print-out.



Axial Extensometer Calibrator

Type KMF 100

The universal design of the KMF 100 allows to test the linearity of a variety of extensometers with highest accuracy easily and rapidly, as also to calibrate amplifiers with respect to the rated stroke of extensometers.

The calibrator has two removable measuring pins, to which different extensometers can be clamped. In addition round detectors like LVDTs or dial gauges can be tested by use of reduction pieces (optional accessories). The measurement accuracy meets the requirements of the best class of the EN ISO 9513 for calibrators. The calibrator KMF 100 is equipped with a high accuracy, incremental measuring system. An built-in opto-electronic measuring head scans the graduation marks on a glass scale. This system rules out changes of the high accuracy. A play-free sliding carriage can be positioned by a spindle in a sturdy and stable housing. The measurement axis of the KMF 100 could be separated from the test axis and parallel be shifted into the housing of the KMF 100. The result is a very low total height, a great measuring stroke and a lot of ways for clamping. The weight and the clamping force of the extensometers are not transferred to the measuring system by the sliding carriage. The fine adjustment can be done sensitively and precisely by means of a great handwheel. For fast adjustment the handwheel can be used like a flywheel.

Technical Data	KMF 100
EN ISO 9513 Accuracy Class	0.2
Measuring Range	100 mm
System Resolution	0.1 µm
Indication Error	± 0.2 µm
Diameter Measuring Pins	16 mm
Weight	12 kg

Axial Extensometer Calibrator

Type 3590 - VHR

This calibrator has 0.02 micrometers resolution and 50 mm of measuring range. The 3590VHR meets the accuracy and resolution requirements of ISO 9513 Class 0.5 over the full measuring range of the calibrator.

The 3590VHR uses a coarse adjustment screw for large displacements, coupled with a fine adjustment screw that allows fine adjustment to withing approximately 0.025 microns.
The calibrator gets connected by USB to a PC with a provided calibration software. The autozero function herein is a great help in calibrating. Just activate it to start readings from zero. The digital display reduces operator error.
A wide range of adapters are available upon request. The calibrator comes standard with smooth round adapters of 10 mm diameter. For very long gauge length extensometers, an optional extension post is available.

Technical Data	Type 3590 - VHR
EN ISO 9513 Accuracy Class	0.5
Measuring Range	50 mm
System Resolution	0.02 µm
System Accuracy	± 19 µm
Diameter Measuring Pins	10 mm

Axial Extensometer Calibrator
Series KMF 3

The KMF 3 is an economical and universal instrument for checking a large variety of extensometers and for setting the gain of their measurement amplifiers.

A linearity test of extensometers is possible only within the system accuracy of the KMF 3. For linearity checks of extensometers with the accuracy class between 0.2 and 1 the calibrator KMF 01 or KMF 1 is necessary (according to European Norm EN ISO 9513). In the horizontal position of the KMF 3 even inductive transducers (e.g. LVDTs) can be clamped on through the base plate for testing. Its low weight and handy construction make it highly suitable for field work.
On a stable frame a digital micrometer is fixed having a non-rotating spindle with a stroke of 50 mm. The micrometer can be set to zero at any desired position. The spindle is extended with a measuring pin (Ø 12 mm). Inside the frame the extensometer or inductive transducer can be affixed for testing. Holders with tungsten carbide plate for gauge heads and threaded holders (M4 x 0.5) can be attached instead of the upper measuring pin. The base supports of the instrument can be changed so that a 3 - or 4 -point support may be selected. All parts are made of corrosion resistant materials (hard-chrome plated columns, coated aluminium and stainless steel). A data interface for the printer DP - 1DX is available with the digital micrometer Mitutoyo 164 - 161.

Technical Data	KMF 3
Measuring Range	50 mm
System Resolution	1 µm
Diameter Measuring Pins	12 mm
Movement of 1 Turn	0.5 mm
Weight	2.5 kg

Initial Gauge Length Calibration
Type KMF 20

For the exact measurement of the gauge length (Lo) a microscope giving a bright image and having high resolution is used.

The microscope for the measurement of Lo consists of a 10 times enlarging eye piece with a reticule, prism systems for rotating the image and exchangeable objectives with an illumination device.
For the measurement of Lo objectives with 2 or 4 times enlargement are recommended. If the microscope is to be used for other purposes as well a 6 x or 10 x objectives can also be supplied. Please note: with increasing enlargement the brightness, the field of depth and image field diameter decrease.
The light is switched on by turning the lamp head and therefore the object to measure is illuminated optimally. The best distance to the object to measure is approximately 40 mm. The reticule is focused by turning the black knurled ring of the eye piece and thus any vision defect is corrected. The chrome-plated knurled ring serves to adjust the reticule.

Technical Data	KMF 20	
Measuring Distance	300 mm	500 mm
System Accuracy	30 µm	50 µm
Display Steps	10 µm	10 µm
Weight	4.5 kg	6.5 kg

walter+bai

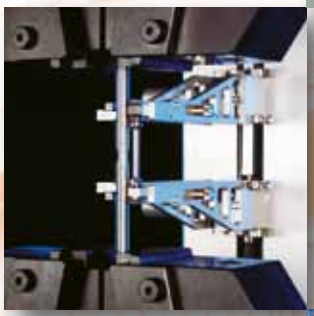
walter + bai ag
Testing Machines

Industriestrasse 4
CH-8224 Löhningen, Switzerland

Tel. +41 52 687 25 25
Fax +41 52 687 25 20

info@walterbai.com, www.walterbai.com

- Static Universal Testing Machines, Electromechanically or Servohydraulically driven
- Dynamic Multipurpose Testing Systems for Advanced Material and Component Testing
- Torsion, Rotary Bending, Impact Pendulum Testing Machines
- Hydrostatic Pressure Testing Systems
- Customer Specific Testing Machines, Modernisation of Existing Testing Machines



- Accessories for Material Testing, incl. Digital Controllers, Application Software, Hydraulic Power Supply, Grips and Fixtures, Extensometers, Furnaces and Climatic Chambers, a.s.o.
- After-Sale Service at Customers Laboratory
- Calibration of Material Testing Machines