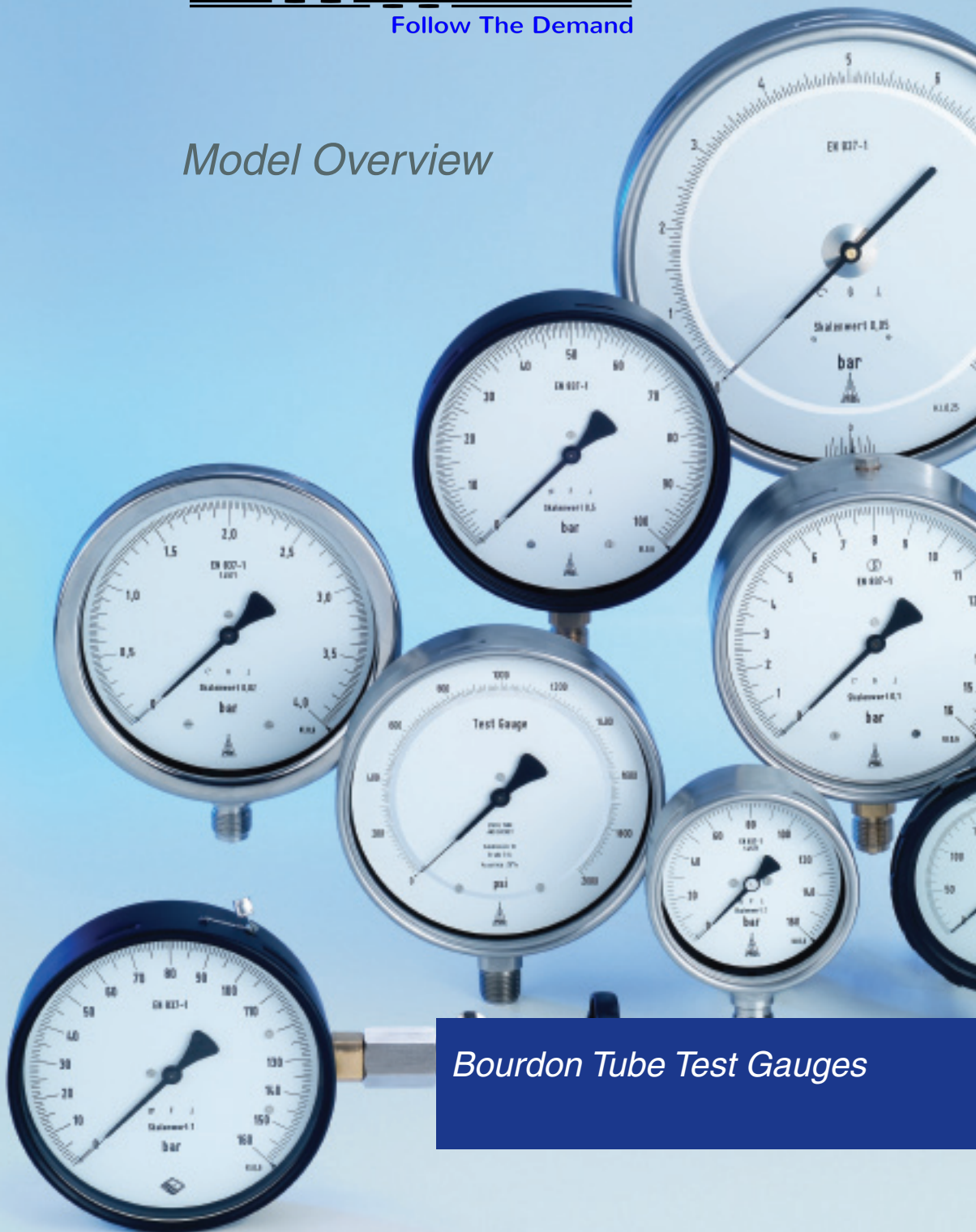


Model Overview



Bourdon Tube Test Gauges

Contents

Following you will find an overview of our models and data sheets that are grouped together under **catalogue heading 2**, i.e. Bourdon tube test gauges of accuracy class 0.6 acc. to EN 837-1 and better, as well as a short description of the characteristic model features:

➡	General Features	P. 3 – 4
➡	Features of Measurement	P. 5 – 6
➡	Accessorie	P. 6
➡	Standard Pressure Ranges / Scale	P. 7
➡	Model Overview	P. 8 – 9
➡	Special Versions	P. 10 – 11

The complete catalogue is also available on CD-ROM with annual updates.



Further Catalogue Headings

No.	1	Bourdon tube pressure gauges accuracy class 1.0 to 2.5 according to EN 837-1, pressure ranges 0.6 to 4000 bar and 10 to 60,000 psi
No.	3	Diaphragm pressure gauges with horizontal diaphragm, pressure ranges 10 mbar to 40 bar
No.	4	Diaphragm pressure gauges with vertical diaphragm, pressure ranges 0.6 to 40 bar
No.	5	Duplex gauges / Differential pressure gauges /
No.	6	Capsule gauges for low pressure, 2.5 mbar to 600 mbar; Liquid column manometers, 10 mbar to 100 mbar
No.	7	Chemical seals (diaphragm seals, in-line seals)
No.	8	Thermometers
No.	9	Electronics 9.1 Limit switch contact assemblies for pressure gauges and thermometers 9.2 Pressure transmitters 9.3 Digital displays
No.	10	Pressure gauge test equipment (Dead weight testers, comparison pumps)
No.	11	Pressure gauge accessories

We can offer wide ranging approvals for various instruments, details upon request.

Application and Selection

Bourdon tube test gauges are applicable for measuring pressure (and/or vacuum) between 0-0.6 and 0-1600 bar (0-10 to 0-30,000 psi) for fluid and gaseous media.

These mechanical pressure gauges are manufactured with highest precision from high quality components.

What distinguishes these test gauges from standard pressure gauges is the low friction movement, the high-grade measuring element with a distinct higher accuracy, a precision scale with fine division as well as a knife edge pointer for exact reading

Common applications for Bourdon tube test gauges:

- ▶ Accurate process control
- ▶ Control and adjustment of operating pressure gauges
- ▶ Test stands, testing devices
- ▶ Calibration laboratories, gauging offices
- ▶ Material tests
- ▶ Research institutes, laboratories
- ▶ Aerotechnics, aerospace engineering
- ▶ Reactor technology et. al.

EN 837-2 has to be considered for the selection of the suitable model (please compare the selection criteria described in our "Mounting and Operating Instructions" that are to find as pdf file also on our web site).

In particular it has to be considered that the pressure medium may not corrode any of the wetted parts.

Standard Materials for Wetted Parts

Code no. -1 (up to 0-600 bar) = Connection brass
Bourdon tube bronze
(higher pressure ranges
CuBe resp. stainl. steel 316 Ti (1.4571))

Code no. -3 (up to 0-1600 bar) = Connection stainl. steel 316 Ti (1.4571)
Bourdon tube stainl. steel 316 Ti (1.4571)
(higher pressure ranges NiFe alloy)

Further more available for most models:

Code no. - 6 (up to 0-400 bar) = Connection and Bourdon tube: Monel

Process Connections

The standard connection of our Bourdon tube test gauges is

- ▶ ½" BSP

in accordance with EN 837-1.

But almost all models are also available with connection threads

- ▶ ½" NPT, or ▶ M 20 x 1.5
- without extra charges.

Numerous special versions are available at option.

Do not hesitate to contact our sales team for your inquiries.



Liquid Fillings

are used to protect the internals against damages caused by severe vibrations or pulsations, and to exclude ambient corrosives or condensation etc. They are available for pressure ranges 0-2.5 bar and up.

Standard filling: glycerine resp. special oil when provided with electrical accessories (model: ...Oe).

Special filling liquids for temperatures below -20 °C (-4 °F) are available upon request.

Specifics

➤ Factory **serial number** stamped on the dial.

➤ Available **Certificates for the accuracy:**

Test certificate 3.1 according to EN 10204

Test certificate by official authority (German Gauging Office)

(only for versions ordered with option "appropriate for official verification")

DKD calibration certificate

➤ Versions appropriate for **officially verification** are provided with a lead seal (acc. to EN 837-1).

➤ Test gauges with pressure ranges 0-25 bar (0-400 psi) and below: **calibrated with air** ("G" on the dial for gas)

Test gauges 0-40 bar (600 psi) and above:

calibrated with oil ("F" on the dial for fluid).

Upon request: Calibration with air up to 0-160 bar (2,000 psi)

Calibration with oil for 0-4 bar (60 psi) and up

☞ Test gauges with "G" on the dial should only be used for measuring gaseous media, and those with "F" on dial only for fluids. Otherwise significant inaccuracies can be caused.

Please be aware that the **vacuum** range of compound gauges for fluid media ("F") cannot be calibrated and tested. These test gauges can be considered as **vacuum protected** only.

Pressure Ranges

According to EN 837-1, **bar** is the preferred unit of pressure.

In the model overview (page 8 ff) you will find the pressure ranges stated in bar.

But in fact there are numerous different pressure units available, such as psi (compare page 7), inches of water ("WC"), kg/cm², kPa, MPa. Dual or triple scales are also possible.

Special scales for almost all our pressure gauge models can be delivered upon request.

Special Options

There are numerous options available for almost all models of pressure gauges, though you will find only a few versions mentioned in the following model overview (page 8 ff).

More detailed descriptions of the available options and special versions are to find in the relevant data sheets. Further individual special configurations are possible upon request.

Accuracy According to EN 837-1

Standard: Accuracy class 0.6 according to EN 837-1
[Accuracy error less than 0.6 % of full span at reference temperature +20 °C (+68 °F)]

Option: Accuracy class 0.25 according to EN 837-1
[Accuracy error less than 0.25 % of full span at reference temperature +20 °C (+68 °F)]

Construction

The internals are basically constructed equally for all models. Bourdon tube, socket with thread connection, movement, dial, and pointer together constitute the complete measuring device, which would be able to function also without the case. The case with ring and lens just protects the pressure element against influences from outside.

All pressure gauges have an internal springable zero stop pin at the movement.



Elastic element,
Bourdon tube type, C-form

Elastic element, Bourdon
tube type, helical (coiled)

Dial and Pointer

The nominal ranges, scale spacings, scale numberings and dial markings for bar pressure ranges are in accordance with EN 837-1.

Standard dials show a black scale on a white background. Pressure ranges and subdivisions see table on page 7.

The knife-edge pointer for exact reading is made of aluminum black.

Movement

Our low friction high quality movement is made of brass/German silver.

Stainless steel movements are available upon request (extra charges).

Pressure Limitations

To guarantee a long service life, the selection of the pressure gauge should be such that the working pressure does not exceed 75% of the maximum scale value for steady pressure or 65% of the maximum scale value for cyclic pressures (according to EN 837-2).

Maximum pressure limitations of the test gauges:

- at steady pressure: full scale value
- at cyclic pressure: 90% of the full scale value
- overpressure: max. 130% of full scale value

Features of Measurement...

Temperature Limitations

➡ **Storage temperature:** $-40\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$ / $+158\text{ }^{\circ}\text{F}$)
 With glycerine filling: $-20\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$ ($-4\text{ }^{\circ}\text{F}$ / $+158\text{ }^{\circ}\text{F}$)

➡ **Ambient temperature:**

Filled versions $-20\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$ ($-4\text{ }^{\circ}\text{F}$ / $+140\text{ }^{\circ}\text{F}$)

Dry versions or special filling $-40\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$ / $+140\text{ }^{\circ}\text{F}$)

➡ **Medium temperature:**

•Version –1 Soft soldered $+60\text{ }^{\circ}\text{C}$ ($+140\text{ }^{\circ}\text{F}$)
 Silver brazed $+100\text{ }^{\circ}\text{C}$ ($+212\text{ }^{\circ}\text{F}$)

•Version –3 Dry versions $+200\text{ }^{\circ}\text{C}$ ($+392\text{ }^{\circ}\text{F}$)
 Filled versions $+100\text{ }^{\circ}\text{C}$ ($+212\text{ }^{\circ}\text{F}$)
 Model RFÜ $+100\text{ }^{\circ}\text{C}$ ($+212\text{ }^{\circ}\text{F}$)

Please consider any further limitations that are possibly to find in our data sheets.

➡ **Reference Temperature:** $+20\text{ }^{\circ}\text{C}$ ($+68\text{ }^{\circ}\text{F}$)

Operating temperatures of the measuring system (elastic element and movement) different from $+20\text{ }^{\circ}\text{C}$ ($+68\text{ }^{\circ}\text{F}$) will cause additional deviations of the pressure indication. These can be up to 0.4 % f.s. per each 10 K ($18\text{ }^{\circ}\text{F}$) in accordance with EN 837-1.

Accessories

Electrical Accessories

Electrical accessories (compare catalogue heading 9) may be installed upon request, although this option is rarely inquired



Chemical Seals

Best gauges can also be provided with diaphragm seals or in-line seals upon request (compare catalogue heading 7).



**Standard Pressure Ranges / Scale Division
Accuracy Class 0.6 EN 837-1**

Pressure ranges DIN EN 837-1 bar	Subdivision ¹⁾		Pressure ranges psi	Subdivision ¹⁾	
	NCS 160 NCS 250	NCS 100		NCS 160 NCS 250	NCS 100
- 0.6 - 0	0.005	0.005	—	—	—
- 1 - 0	0.005	0.01	30" Hg vac. - 0	0.2" vac	0.2" vac.
- 1 / + 0.6	0.01	0.02	30" Hg vac. - 15		
- 1 / + 1.5	0.02	0.02	30" Hg vac. - 30		
- 1 / + 3	0.02	0.05	30" Hg vac. - 60		
- 1 / + 5	0.05	0.05	30" Hg vac. -100	upon request	upon request
- 1 / + 9	0.05	0.1	30" Hg vac. -160		
- 1 / +15	0.1	0.2	30" Hg vac. -200		
- 1 / +24	0.2	0.2	30" Hg vac. -300		
			30" Hg vac. -600		
0 - 0.6	0.005	0.005	0- 10	0.05	0.1
0- 1.0	0.005	0.01	0- 15	0.1	0.1
0- 1.6	0.01	0.02			
0- 2.5	0.02	0.02	0- 30	0.2	0.2
0- 4	0.02	0.05	0- 60	0.5	0.5
0- 6	0.05	0.05	0- 100	0.5	1
0- 10	0.05	0.1	0- 160	1	2
0- 16	0.1	0.2	0- 200	1	2
0- 25	0.2	0.2	0- 300	2	2
			0- 400	2	5
0- 40	0.2	0.5	0- 600	5	5
0- 60	0.5	0.5	0- 800	5	10
			0- 1,000	5	10
0- 100	0.5	1	0- 1,500	10	10
0- 160	1	2	0- 2,000	10	20
0- 250	2	2	0- 3,000	20	20
			0- 4,000	20	50
0- 400	2	5	0- 5,000	25	50
			0- 6,000	50	50
0- 600	5	5	0-10,000	50	100
0- 1000	5	10	0-15,000	100	100
0- 1600	10	20	0-20,000	100	200
			0-30,000	200	200

¹⁾ partially finer scale divisions for versions with mirror scale

**Standard Pressure Ranges / Scale Division
Accuracy Class 0.25 EN 837-1**

Pressure ranges DIN EN 837-1 bar	Subdivision NCS 250 (160)	Pressure ranges psi	Subdivision NCS 250 (160)
- 0.6 - 0	0.002	—	—
- 1 - 0	0.005	30" Hg vac.- 0	0.1" vac.
- 1 / + 0.6	0.005	30" Hg vac.- 15	
- 1 / + 1.5	0.01	30" Hg vac.- 30	
- 1 / + 3	0.02	30" Hg vac.- 60	upon request
- 1 / + 5	0.02	30" Hg vac.- 100	
- 1 / + 9	0.05	30" Hg vac.- 160	
- 1 / +15	0.05	30" Hg vac.- 200	
- 1 / +24	0.1	30" Hg vac.- 300	
		30" Hg vac.- 600	
0 - 0.6	0.002	0- 10	0.05
0- 1	0.005	0- 15	0.05
0- 1.6	0.005		
0- 2.	0.01	0- 30	0.1
0- 4	0.02	0- 60	0.2
0- 6	0.02	0- 100	0.5
0- 10	0.05	0- 160	0.5
0- 16	0.05	0- 200	1
0- 25	0.1	0- 300	1
		0- 400	2
0- 40	0.2	0- 600	2
0- 60	0.2	0- 800	5
		0- 1,000	5
0- 100	0.5	0- 1,500	5
0- 160	0.5	0- 2,000	10
0- 250	1	0- 3,000	10
		0- 4,000	20
0- 400	2	0- 5,000	25
		0- 6,000	20
0- 600	2	0-10,000	50

➔ **EN 837-1 lays down minimum scale divisions.**
Some of our scales have finer subdivisions.



Standard Cases Black

Model	RFÜ	RFB, RFBG	RFQB	RFPB 160-1 RFPCh 160-1
Case	Black, bezel	Carbon steel black, bayonet ring	Square case, wide black front frame	Carbon steel black RFPB, at option stainless steel RFPCh, bayonet ring
Case Filling	without	without: RFB with: RFBG 160	without	without
Nominal Case Sizes (NCS)	160, 250 (6", 10")	160 (6"): RFB, RFBG 250 (10"): RFB	144 x 144 (5.67" x 5.67")	160 (6")
Pressure Ranges	0-0.6 bar ... 0-1600 bar	0-0.6 bar ... 0-1600 bar RFB 0-2.5 bar ... 0-1600 bar RFBG	0-0.6 bar ... 0-1600 bar	0.6 bar ... 0-600 bar
Accuracy Class	0.6	0.6	0.6	0.6
Wetted Parts	-1 Copper alloy* -3 Stainless steel**	-1 Copper alloy* -3 Stainless steel**	-1 Copper alloy* -3 Stainless steel**	-1 Copper alloy* -3 Stainless steel
Process Connection	½" BSP Bottom or lower back	G ½ B Bottom or lower back	G ½ B Lower back	At 3 o'clock on the right side; pressure gauge valve suitable for M20x1.5 male test connection
Mounting Devices at Option	Front mounting flange Rear mounting flange Mounting ring (RFÜ 160)	Front mounting flange Rear mounting flange U-clamp (RFB 160)	U-clamp for panel mounting	Portable box, and accessories for test flange connection
Data Sheets	2100	2101	I-2500	2102

* ≥ 100 bar: Bourdon tube stainless steel; max. pressure range 0-600 bar

** ≥ 1000 bar: Bourdon tube NiFe-alloy



Stainless Steel Case

Model	RFCha, RFChaG	RFCh, RFChG	RSCh, RSChG
Case	Stainless steel, wide bayonet ring	Stainless steel, bayonet ring	Safety case S3 EN 837-1 stainless steel, bayonet ring, solid front / blow-out back
Case Filling	without: RFCha with: RFChaG	without: RFCh with: RFChG 160	without: RSCh with: RSChG
Nominal Case Sizes (NCS)	160 (6")	160 (6"): RFCh, RFChG 250 (10"): RFCh	160 (6")
Pressure Ranges	0-0.6 bar ... 0-1600 bar RFCha 0-2.5 bar ... 0-1600 bar RFChaG	0-0.6 bar ... 0-1600 bar RFCh 0-2.5 bar ... 0-1600 bar RFChG	0-0.6 bar ... 0-1600 bar RSCh 0-2.5 bar ... 0-1600 bar RSChG
Accuracy Class	0.6	0.6	0.6
Wetted Parts	-1 Copper alloy* -3 Stainless steel**	-1 Copper alloy* -3 Stainless steel**	-1 Copper alloy* -3 Stainless steel**
Process Connection	½" BSP Bottom or lower back	½" BSP Bottom or lower back	½" BSP Bottom
Mounting Devices at Option	Front mounting flange Rear mounting flange U-clamp for panel mounting	Front mounting flange Rear mounting flange U-clamp for panel mtg. (RFCh 160)	Front mounting flange Rear mounting flange
Data Sheets	2200	2201	2600

* ≥ 100 bar: Bourdon tube stainless steel; max. pressure range 0-600 bar

** ≥ 1000 bar: Bourdon tube NiFe-alloy



Class 0.25 according to EN 837-1

The precision test gauges of accuracy class 0.25 are delivered with:

Mirror Scale: Graduation 270 degrees

At option: **Zero adjustment** by turnable dial (± 5 scale graduations)

Model RFÜ:

Adjustment screw frontside (through the bezel)

Models RFB, RFCh:

Adjustment screw at the right side

Pressure ranges: Version – 1 0-0.6 up to 0-600 bar
Version – 3 upon request

Nominal case size: 250 (10") [NCS 160 (6") upon request]

Examples of Special Options

You may request various options for certain models to receive the suitable version for your special application, e.g.:

Front mounting flange (Fr) or back mounting flange (Rh), and for certain versions **U-clamp** for panel mounting (BFr)

Mirror scale, parallax-free

Zero adjustment (dry versions, NCS 160, 250 only) by a turnable dial (± 5 scale graduations), adjustment screw frontside (model RFÜ, through the bezel), resp. at the right side (models RFB, RFCh, RFCha)

Bleeding port at the tip of the Bourdon tube (dry versions only), e. g. for car brake testers and other hydraulic applications; also applicable for flushing the Bourdon tube

Maximum indicating pointer (with acrylic glass lens) for keeping the maximum pressure of a process operation (pressure spikes) indicated

Special scales, e. g. dual scales, coloured scale areas, coloured fields on the dial background, dial inscriptions, logos

Inlet port restrictor screw

Acrylic glass lens or laminated safety glass*

* standard for many versions



Nominal Case Size 100 (4")

Precision gauges of accuracy class 0.6 are also available in nominal case size 100 (4") upon request.

Models: Stainless steel cases:

RFCh, RFChG 100	Narrow bayonet ring
RFCha, RFChaG 100	Wide bayonet ring
RFSch, RFSchG 100	S3 safety bayonet ring case, solid front and blow-out back

Polyamide 6B case, black:

RFK, RFKG 100	Screw ring case, rugged type
RFÜ 100	Bezel ring carbon steel black

Also our test gauge versions in NCS 100 (4") can be provided with many extras upon request!

Standards Abroad

For the worldwide export you are welcome to inquire also for pressure gauge versions in accordance to foreign standards.

We, for example, manufacture test gauges according to the Russian standard with accuracy $\pm 0.6\%$, 0.4% , 0.25% and 0.15% .

Specifics for class 0.4 and better: special movement with eccentric adjustment

Class 0.25 and up additionally: antiparallax pointer and dial over 315°

Test Gauges according to the American standard ASME are also part of our daily supply. For the US market test gauges are usually requested with accuracy "Grade 3A", meaning accuracy $\pm 0.25\%$ (without further restrictions of the hysteresis within the range of tolerance), and provided with mirror dial, at option with zero adjustment (turnable dial).

But you can receive also versions and dials in accordance to other foreign standards upon request.



Company:	Limit Africa pty(ltd)
Physical Address:	cnr Berguis & Erasmus STR, Secunda, 2302
Postal Address:	P.O.Box 15011, Secunda, 2302
Tel Number:	(017) 634 4852
Registration Number:	2005/000670/07
VAT Number:	4750220784