Thermometers with Capillary Line

Bayonet Ring Case Stainless Steel

Accuracy Class 1 Nom. Sizes 100 (4") 160 (6")

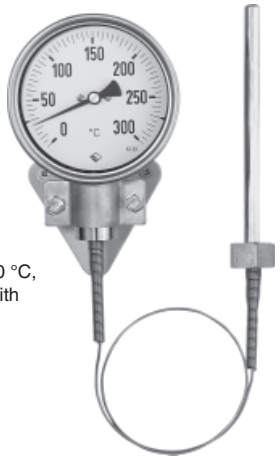
Models **TFCh, TFChG**

Standard (TFCh) or with Case Filling (TFChG)

Application

These thermometers are designed to meet the requirements of industrial temperature measurement, for fluid or gaseous media. They are suitable also for aggressive media as to find in chemical industries, petrochemistry, process technology, apparatus engineering and food and beverage industries.

Nom. case size (NCS):	100, 160 (4", 6")
Accuracy class (EN 13190):	1
Reference temperature	+ 23 °C ± 2 °C (+ 73.4°F ±3.6)
Temperature ranges (EN 13190):	Nominal / measuring ranges as in table below; temperature differences between 80 K to 600 K
Ambient temperature limits:	-20 to +60 °C (-4 °F to +140 °F)
Max. allowed static pressure[1]	25 bar (350 psi) at the stem
Protection type (EN 60529 / IEC 529)	Model TFCh: IP 55 Model TFChG: IP 65



TFCh 100 Mgh, 0/300 °C, stem type A3; here with gauge holder bracket stainless steel

Standard Configuration

Case	and Bayonet ring 304 stainless steel 1.4301, TFCh without case filling, TFChG case filling silicone oil
Window	Single strength glass
Connection	Bottom connection, optional: lower back (**r..**), connection types: see page 4
Capillary line	Stainless steel, Ø 2 mm (.08"), with buckle protection at both ends, up to 1 m (~ 3 feet) long (standard), up to 15 m (~ 49 feet) at option, but with restrictions depending on measuring range (>15 m / ~ 49 feet upon request)
Stem material	316 stainless steel (1.4571)
Principle of measurement	Inert gas expansion system (measuring system nitrogen-filled, non-toxic and environmentally safe)
Movement	Brass / German silver
Adjustment	± 6 % with adjustment screw from outside
Dial	Aluminum alloy, black figures, white background
Pointer	Aluminum black

Nominal Range (°C)	Measuring Range (°C)	Scale Interval (°C)	Temperature Difference ΔT (K)
-50 / 50	-40 / 40	1	100
-30 / 50	-20 / 40	1	80
-30 / 120	-10 / 100	2	150
-30 / 170	-10 / 150	5	200
-20 / 60	-10 / 50	1	80
-20 / 80	-10 / 70	1	100
0 / 80	10 / 70	1	80
0 / 100	10 / 90	1	100
0 / 120	20 / 100	2	120
0 / 150	20 / 130	2	150
0 / 160	20 / 140	2	160
0 / 200	20 / 180	5	200
0 / 300	30 / 270	5	300
0 / 350	50 / 300	5	350
0 / 400 [3]	50 / 350	10	400
0 / 500 [3] [4]	50 / 450	10	500
0 / 600 [2] [3] [4]	100 / 500	10	600
50 / 300	80 / 270	5	250
50 / 400	100 / 350	5	350
100 / 500	150 / 450	10	400
100 / 600 [2]	150 / 550	10	500

[1] Stem A2 if used without thermowell only; stem A7 for medium without pressure only

[2] for stem Ø 6 mm (.24") upon request

[3] not with electr. accessories

[4] Capillary line > 5 m (~16 feet) upon request.

Special Options

- Other process connections upon request
- Center back connection upon request
- Stem with compression fitting, adjustable on the stem, similar to A7, but sealing on the capillary
- Stem type A5: compression fitting made of carbon steel up. request
- Stem with thermowell, compare data sheets 8310 to 8320
- Other nominal ranges, other measuring units, e.g. °F or K, or other special scales, such as dual scales (e.g. °C/°F) or others
- Capillary line with flexible armour stainless steel
- Red mark or stationary red pointer on the dial, or stationary red pointer with external adjustment
- Maximum indicating pointer, external adjustment (acrylic glass lens respectively polycarbonate [details upon request])
- Movement stainless steel
- Acrylic glass window, laminated safety glass upon request
- GL resp. DNV approval
- Other than vertical installation
- Gauge holder bracket (for version Mgh) aluminum black or stainless steel, distance 60, 100 or 160 mm (2.36", 3.94", or 6.3"), compare page 2
- **Electrical accessories**, compare page 3

How to Order

Model:	**TFCh** or **TFChG**
Nominal case size:	**100** (4") or **160** (6")
Code letters for case configuration:	**Mgh, Rh, Fr, rFr, rBFr** (NCS 160 unfilled only; NCS 100 model TFChg/TFChgG 100 rBFr only), compare page 2
Temperature range:	Nominal range acc. EN resp. table left, e.g. **0-100 °C** or **-30/120 °C**
Stem version:	— Type: **A1**, **A2, A3**, **A4**, **A5, A6, A7** — Ø **6**[5], **8**, **10** or **12** mm (inches see p. 4) — Stem length **L** resp. **L1** (see page 4) — Immersion length **ET** (see page 4) — Process connection (see page 4) e.g. **G ½ B** (½" BSP), **M 20 x 1.5**
Special options:	e.g. version Mgh with gauge holder bracket (compare page 2), others see above; Thermowells for stems see data sheets 8310 ff

Examples for Ordering Information:

- Item 1: TFCh 160, Mgh, 0-200 °C, 1 m capillary line st.st., A3, Ø 10 mm, L = 100 mm (ETmin 45 mm), M 20 x 1.5, 316 stainl. steel;
  Item 2: Gauge holder bracket, ordering no. Z-063002 (see p.2)
- TFChG 100, rFr, +50/300 °C, 3 m capillary line st.st., stem A6, Ø 12 mm, L1 = 250 mm (ETmin 35 mm), ¾" BSP, 1.4571

[5] Price and delivery time upon request.

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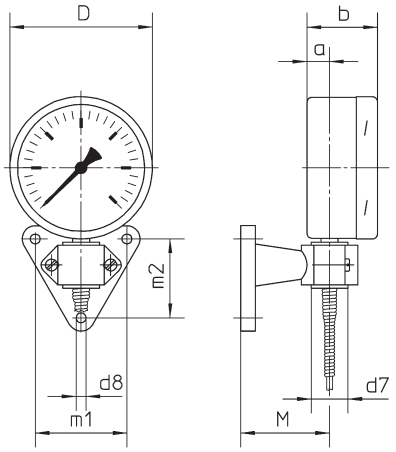
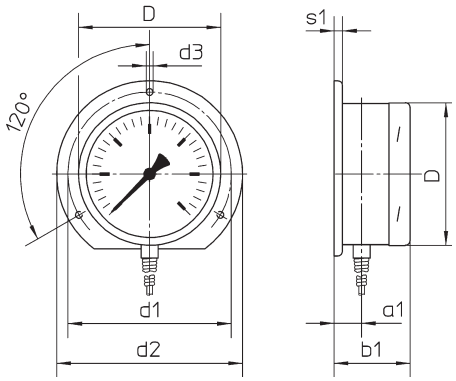
9/03

Case Configurations, Code Letters, Dimensions and Weight

Bottom connection,
for mounting with gauge holder bracket,
code letters: **Mgh**

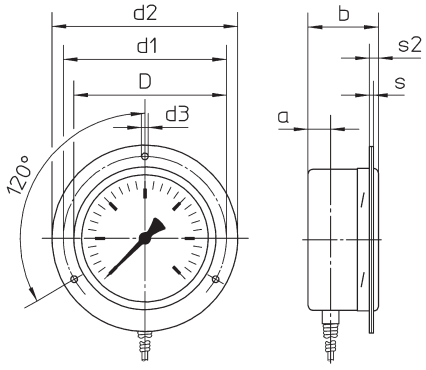


Bottom connection,
rear mounting flange,
code letters: **Rh**



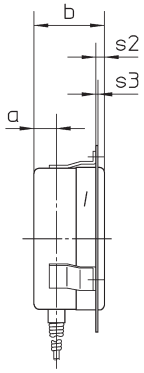
Bottom connection,
front mounting flange,
ordering code: **Fr**

Model TFCh (no case filling)



Front flange with longholes attached to the case and a separate cover front flange

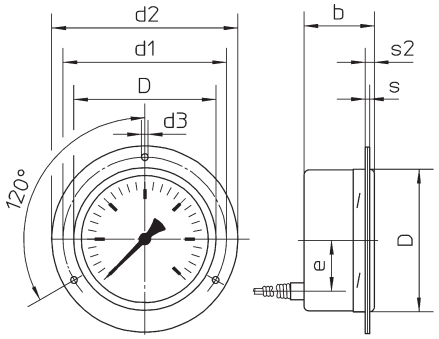
Model TFChG
(liquid filled case)



Mounting brackets welded to the case and a separate cover front flange

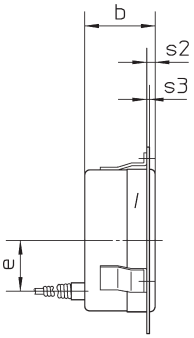
Lower back connection,
front mounting flange,
code letters: **rFr**

Model TFCh (no case filling)



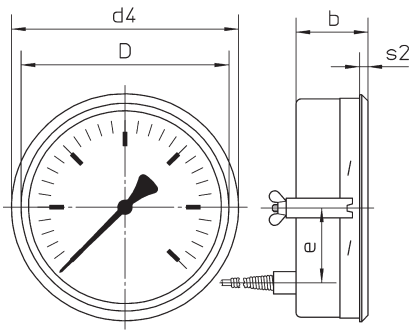
Front flange with longholes attached to the case and a separate cover front flange

Model TFChG
(liquid filled case)

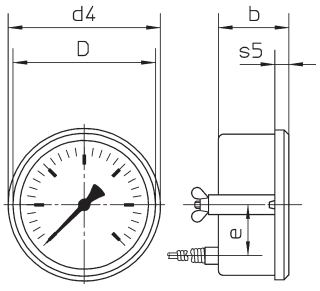


Mounting brackets welded to the case and a separate cover front flange

Model TFCh 160 (no case filling) **only**
Lower back connection,
U-clamp for panel mounting[3)],
code letters: **rBFr**



Nom. size 100 (4") model TFChg / TFChgG 100 only
Lower back connection,
U-clamp for panel mounting, crimped-on ring,
code letters for case configuration (model see above)**: rBFr**



Dimensions (mm **/ inches) and Weight (** kg **/ lb)**

NCS	a	a1	b	b1	D	d1	d2	d3	d4	e	s	s1	s2	s3	s5	Weight (approx.) TFCh	Weight (approx.) TFChG
100					101	116	132	4.8	106	36					10	.50	.80
4"	16	19.5	50	54	**3.98**	**4.57**	**5.2**	**.19**	**4.17**	**1.42**	2	6		1	**.39**	**1.10**	**1.80**
160	**.63**	**.77**	**1.97**	**2.13**	161	178	196	5.8	167	53	**.08**	**.24**		**.04**	—	1.00	1.90
6"					**6.34**	**7**	**7.72**	**.23**	**6.57**	**2.09**						**2.20**	**4.20**

Accessories for Version Mgh: **Gauge Holder Bracket**

Material	d7	d8	m1	m2	Distance / Ordering Number*					
Aluminum black	26	7	65	56	60	Z-06 70 01	100	Z-06 70 02	160	Z-06 70 03
Stainless steel	**1.02**	**.28**	**2.56**	**2.20**	**2.36**	06 30 01	**3.94**	Z-06 30 02	**6.30**	06 30 03

*Ordering numbers beginning with Z = item available from stock (without obligation)

Versions with Electrical Accessories

When electrical accessories such as standard or magnetic contacts, inductive or electronic limit switches are installed into the case, all outside dimensions remain unchanged except of the front-to-back sizes (dimensions b / b1).
For detailed information about use and operation of mechanical, inductive, or electronic limit-switch contact assemblies see our **general information leaflet 9000**.

Further information, especially about the available make/break operations, are to find in the data sheets for the individual models of limit-switch contact assemblies:

Mechanical	Data sheet **9100**
(Standard and magnetic contacts)	
Inductive	Data sheet **9200**
Electronic	Data sheet **9201**

Window
Acrylic glass respectively polycarbonate (details upon request); optional available (upon request): single strength glass or laminated safety glass (extra charges)

Case Filling
The model code for the liquid filled version with built-in electrical accessories is **TFCh<u>Oe</u>**. The instrument configuration is similar to model TFChG (except front-to-back size and port for the electrical connection) but the filling liquid is a special oil.

Minimum Temperature Range
Full span 100 K

Electrical Connection
Our models TFCh and TFChOe with built-in standard or magnetic contact are supplied with a universal plug connector.
With built-in inductive and electronic limit-switch contact assembly they are supplied with a terminal box.

The universal plug connector has 6 terminals and a ground terminal. The terminal box has 6 terminals only.

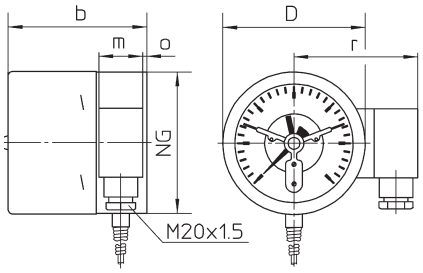
The mounting position of the universal plug connector resp. the terminal box is shown in the drawings below.

Another position of the electrical connection is possible upon request at extra charges only.

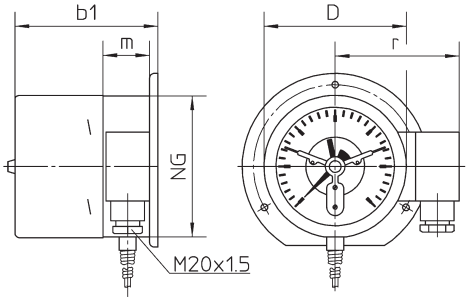
Other electrical connections are also availble upon request (extra charges).

4-fold limit-switch contact assemblies
cannot be built into cases of nom. size 100 (4").

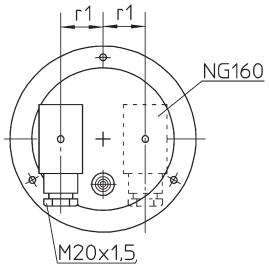
Bottom connection,
version for gauge holder bracket (Mgh)
Universal plug connector or terminal box



Bottom connection,
rear mounting flange (Rh)
universal plug connector or terminal box

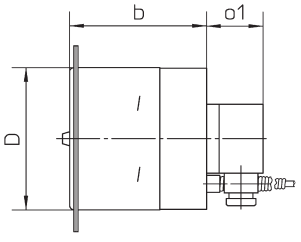


Lower back connection,
front mounting flange (rFr)
Universal plug connector or terminal box

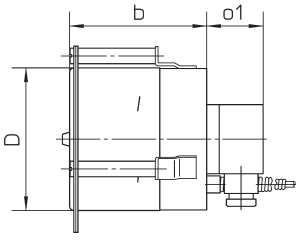


Front flange with longholes attached to the case and a separate cover front flange

<u>Model TFCh (unfilled)</u>



<u>Model TFChOe (case filling)</u>



Mounting brackets welded to the case and a separate cover front flange

Dimensions (mm **/ inches) and Weight (** kg **/ lb)**

NG	b	b1	D	m	o	o1	r	r1	Weight (approx.) [3] TFCh	Weight (approx.) [3] TFChOe
100	98.5 [1]	101 [1]	101		3		88	30	.70	1.50
4"	**3.88**	**3.98**	**3.98**	31	**.12**	40	**3.46**	**1.18**	**1.50**	**3.30**
160	105 [2]	109 [2]	161	**1.22**	6	**1.57**	119	55	1.30	2.70
6"	**4.13**	**4.29**	**6.34**		**.24**		**4.69**	**2.17**	**2.90**	**6.00**

[1] valid for 1, 2 and 3 x limit-switch contact assembly
[2] For inductive or electronic limit switches with 2 similar make/break operations (i.e. I 11 or E 22, also as part of 3x inductive resp. electronic contact assemblies) and for 3 and 4x standard or magnetic contacts please add 10 mm (**.39"**) to length b and b1.
[3] appr. weights for case with bottom connection and with 2 contacts

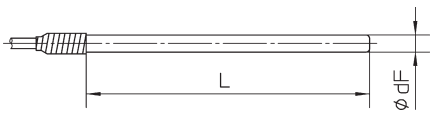
Stem Types and Connections / Stem with Capillary Line (Thermowells see data sheets 8310 to 8320.)

Stem Material: 316 stainless steel (1.4571, including fittings) [1]

Dimensions (mm / inches)

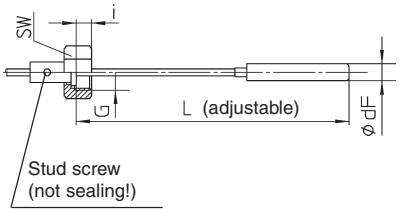
Stem type A 1 (EN 13190 Form 1)
Plain stem (without thread connection),
stem length = **L** = free selection, but L has to be ≥ minimum length (see below), basic for stem type A5; suitable thermowells: see data sheet 8320.

Ø d_F [3]	6 [2]	8	10	12
	.24	**.31**	**.39**	**.47**



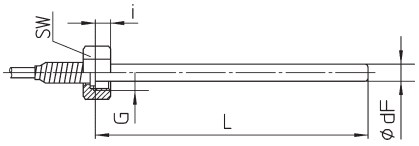
Stem type A 2
Plain stem, with union nut adjustable on the capillary line (acc. to the required immersion length), for thermowells (see data sheet 8312) or vertical installation in unpressurized medium (no sealing at the entrance of the capillary line!), female thread M 20 x 1.5 or G ½ (½" BSP female), stem length = **L** (≥ minimum length of stem type A1 plus capillary up to stop face of the union nut) = free selection, but L has to be ≥ minimum length (see below)

Ø d_F [3]		G	SW	i
6 [2]	**.24**	M20x1.5	27	10
8	**.31**			
10	**.39**	G ½	**1.06**	**.39**
12	**.47**	**½"BSP**		



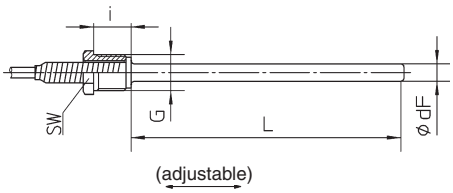
Stem type A 3 (EN 13190 Form 5)
Stem with turnable union nut M 20x1.5 or G½ (½" BSP female), stem length = **L** (immersion length up to the stop face of the union nut) free selection, but L has to be ≥ minimum length (see below), basis for stem type A 6,
suitable thermowells: see data sheet 8312.

Ø d_F [3]		G	SW	i
6 [2]	**.24**	M20x1.5	27	10
8	**.31**			
10	**.39**	G ½	**1.06**	**.39**
12	**.47**	**½"BSP**		



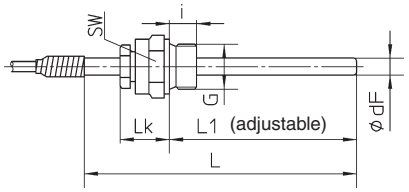
Stem type A 4 (EN 13190 Form 4)
Stem with loose nut with external (male) thread M 20 x 1.5 or G ½ B (½" BSP male), stem length = **L** (immersion length up to the stop face for connection) = free selection, but L has to be ≥ minimum length (see below), exclusively for installation into thermowell, see data sheets 8310, 8311.

Ø d_F [3]		G	SW	i
6 [2]	**.24**	M20x1.5	22	20
8	**.31**			
10	**.39**	G ½ B	**.87**	**.79**
12	**.47**	**½"BSP**		



Stem type A 5 (EN 13190 Form 2)
As type A 1, but with compression fitting, adjustable on the stem (attention: L1 has to be ≥ minimum length of stem type A1!), external (male) connection thread G ½ B (½" BSP), stem length = **L** = free selection, but L has to be ≥ minimum length (see below)

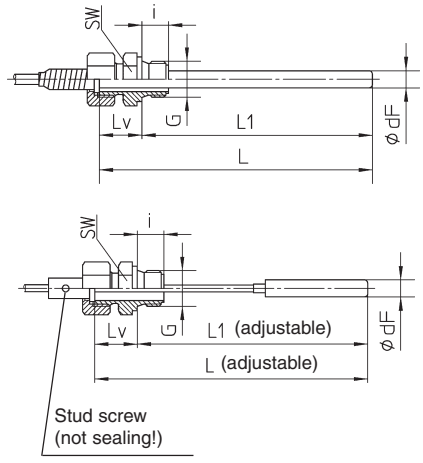
Ø d_F [3]		G	SW	i	L_K
6 [2]	**.24**				
8	**.31**	G ½ B	27	14	~37
10	**.39**	**½"BSP**	**1.06**	**.55**	**1.46**
12	**.47**				



Stem type A 6
As type A 3 (with union nut), but with double male adapter fitting, external (male) threads M 20 x 1.5 or G½ B (½" BSP), M 24 x 1.5 , M 27 x 2 or G ¾ B (¾" BSP), stem length = **L1** (immersion length up to sealing face of the fitting) = free selection, but L1 has to be ≥ minimum length (see below)

Stem type A 7
As type A 2, but with double male adapter fitting, for vertical installation in unpressurized medium (no sealing at the entrance of the capillary line!), external (male) threads M 20 x 1.5 or G ½ B (½" BSP), M 24x1.5, M 27x2 or G ¾ B (¾" BSP), stem length = **L1** (≥ minimum length of stem type A1 plus capillary up to sealing face of the fitting) = free selection, but L1 has to be ≥ minimum length (see below)

Ø d_F [3]		G	SW	i	L_V
6 [2]	**.24**	M20x1.5			
8	**.31**		27	14	25
10	**.39**	G ½ B	**1.06**	**.55**	**.98**
		½" BSP			
6 [2]	**.24**	M24x1,5			
8	**.31**		32	16	27
10	**.39**	M27 x 2	**1.26**	**.63**	**1.06**
12	**.47**	G ¾ B			
		¾" BSP			



Minimum Immersion Length and Minimum Stem Length (mm / inches)

		Mininum Immersion Length ET min [4]				Minimum Stem Length L and L1 (mm) [5]											
Stem type (relevant length L or L1)		**all**				**A1, A4** (L)				**A2, A3** (L) / **A6, A7** (L1)				**A5** (L)			
	Stem Ø [2] [3]	12 **.47**	10 **.39**	8 **.31**	6 [2] **.24**	12 **.47**	10 **.39**	8 **.31**	6 [2] **.24**	12 **.47**	10 **.39**	8 **.31**	6 [2] **.24**	12 **.47**	10 **.39**	8 **.31**	6 [2] **.24**
Capillary line < / = 5m	**NR** [6] **≤ 500 °C**	35 **1.38**	45 **1.77**	75 **2.95**	120 **4.72**	40 **1.57**	50 **1.97**	80 **3.15**	125 **4.92**	50 **1.97**	60 **2.36**	90 **3.54**	135 **5.31**	75 **2.95**	85 **3.35**	115 **4.53**	160 **6.30**
	NR [6] **> 500 °C**	75 **2.95**	105 **4.13**	165 **6.50**	285 **11.22**	80 **3.15**	110 **4.33**	170 **6.69**	290 **11.42**	90 **3.54**	120 **4.72**	180 **7.09**	300 **11.81**	115 **4.53**	145 **5.71**	205 **8.07**	325 **12.80**
Capillary line > 5 m < / = 15 m	**NR** [6] **≤ 500 °C**	53 **2.09**	80 **3.15**	115 **4.53**	190 **7.48**	58 **2.28**	85 **3.35**	120 **4.72**	195 **7.68**	68 **2.68**	95 **3.74**	130 **5.12**	205 **8.07**	93 **3.66**	120 **4.72**	155 **6.10**	230 **9.06**
	NR [6] **> 500 °C**	150 **5.91**	200 **7.87**	320 **12.60**	570 **22.44**	155 **6.10**	205 **8.07**	325 **12.80**	575 **22.64**	165 **6.50**	215 **8.46**	335 **13.19**	585 **23.03**	190 **7.48**	240 **9.45**	360 **14.17**	610 **24.02**

[1] for A5: compression fitting carbon steel optional upon request
[2] Stem Ø 6 mm (.24"): Price and delivery time upon request
[3] other stem Ø upon request
[4] The minimum immersion length depends on the stem diameter and the temperature range. Out of the required minimum immersion length and the stem type results the minimum stem length.
[5] Depending on the stem type either the stem length L or L1 has to be stated when ordering, see the quoted dimension in brackets next to the stem type in this table.
[6] NR = nominal temperature range (= scale)

The information in this leaflet is given in good faith but we reserve the right to make changes without notice.