

Gas-actuated Thermometers, with Capillary Line

Bayonet ring case stainless steel
With limit switch contact assembly

TFCh
TFChOe

This data sheet contains information on the maximum possible number of contacts, on electrical connections, ordering information and options concerning the models TFCh and TFChOe with limit switch contact assemblies (with low-action, magnetic, electronic or inductive contacts), as well as dimensional drawings with the position of the electrical connections.

Data sheet 8221 contains all details concerning the available versions of models TFCh and TFChG without limit switches. These details as well as the required ordering information apply also to the version with limit switches, unless otherwise stated below. Instead of silicone oil, a special oil is used for liquid-filled thermometers with limit switches. The model code for instruments with case filling is TFChOe.

Model overview 9.1000 contains general and detailed definitions, applications and operating principles for the respective limit switch types. It also provides detailed information on the selection, switching functions and minimum spans, on operating conditions, explosion protection, options and others.



Standard Versions

Available Limit Switch Contact Assemblies

1. **Direct** (electromechanical)
 - 1.1 Low-action contact **S**
 - 1.2 Magnetic contact **M**
2. **Indirect** (contact-free)
 - 2.1 Electronic contact **E**
 - 2.2 Inductive contact **I**
 - 2.3 Pneumatic contact **P** upon request

Maximum Possible Number of Contacts

	NCS 100 case filling		NCS 160 case filling	
	without	with	without	with
up to 3 x S 4 x S ¹⁾	○ upon request	–	○ ○	– –
up to 3 x M 4 x M ¹⁾	○ upon request	○ –	○ ○	○ upon request
up to 3 x E 4 x E	○ upon request	○ –	○ upon request	○ upon request
up to 3 x I 4 x I	○ upon request	○ –	○ upon request	○ upon request

○ = available

Degree of Protection (DIN EN 60 529/IEC 529)
IP65

Nominal Case Sizes
100, 160 mm (4, 6")

Window
Polycarbonate

Adjusting Mechanism Limit Setting Pointer

All instruments are equipped with an adjusting lock in the window. With the removable key, the limit setting pointer can be externally set to the value of the desired switch point.

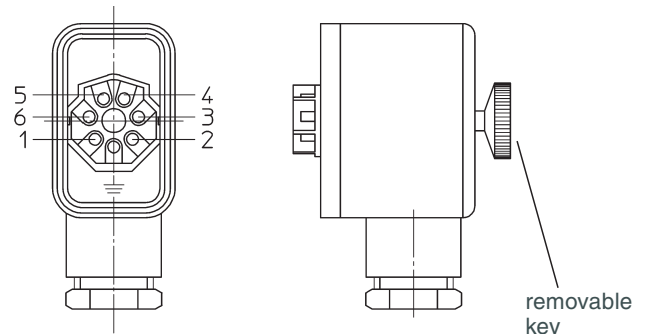
Electrical Connection

- for limit switch (S/M): plug connector
- for limit switch (E): terminal box black
- for limit switch (I): terminal box blue, for identification of an intrinsically safe circuit, anything else as E

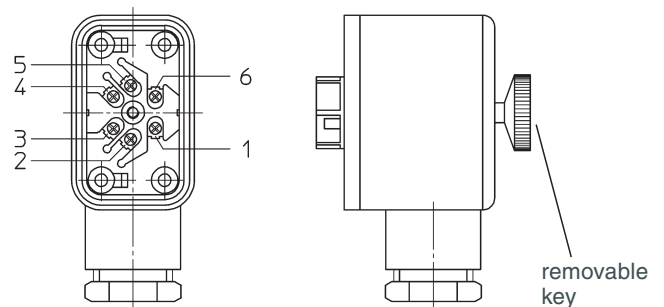
Plug Connector and Terminal Box

IP65, 6-pin, with M20x1.5 screwed cable gland with strain relief, terminals numbered according to wiring diagram (on the device), protective contact available

Plug Connector



Terminal Box



For the position of the electrical connection, please refer to the dimensional drawings, see pages 2 and 4 (cable entry).

¹⁾ optionally as double change-over contact

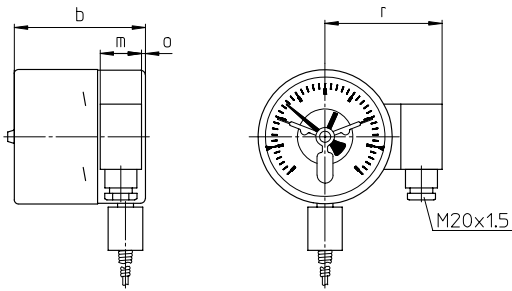
Case Configurations, Code Letters, Dimensional Data and Weights

Compared to the basic models, there are deviations in the front-to-back sizes, see table.
Please refer to data sheet 8221 for the other dimensional data.

Vertical Bottom Capillary Line Position

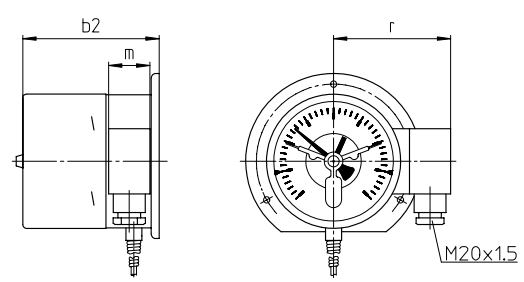
With mounting device for gauge holder bracket¹⁾

code letters: **Mgh**



With back flange for surface mounting

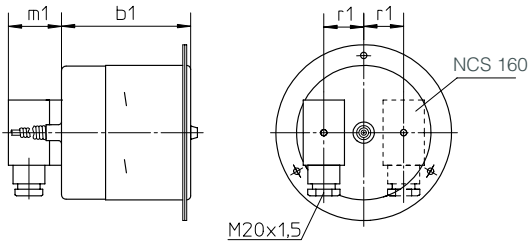
code letters: **Rh**



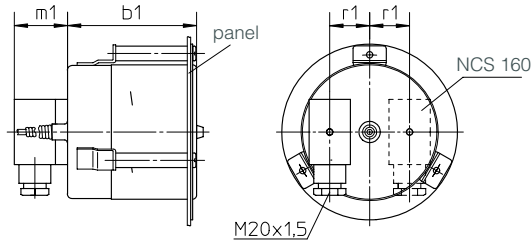
Centre Back Capillary Line Position

With front flange for panel mounting

code letters: **rmFr**
without case filling

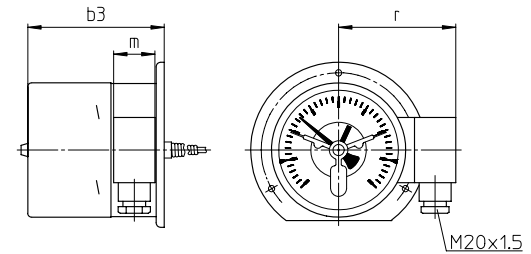


code letters: **rmFr**
with case filling



With back flange for surface mounting

code letters: **rmRh**



Dimensional Data (mm/inch) and Weights (kg/lb)

NCS/type	b/b1	b3	m	m1	o	r	r1	approx. weight ²⁾	
								TFCh	TFChOe
100 1, 2 and 3 contacts	99 3.9	103 4.06	31 1.22	42 1.65	3 0.12	94 3.7	29.5 1.16	0.95 2.09	1.50 3.31
100 4 contacts	106 4.17	110 4.33	31 1.22	42 1.65	3 0.12	94 3.7	29.5 1.16	0.95 2.09	—
160 all limit switches with 1 and 2 contacts (I11, I22, see next row)	105 4.13	108 4.25	31 1.22	42 1.65	6 0.24	121 4.76	55 2.17	1.40 3.09	3.00 6.61
160 all limit switches with 3 and 4 contacts and I11 and I22	115 4.53	118 4.65	31 1.22	42 1.65	6 0.24	121 4.76	55 2.17	1.45 3.2	3.10 6.81

¹⁾ Dimensional data of the gauge holder bracket according to DIN 16 281.

²⁾ The data are examples and relate to models TFCh and TFChOe, A3, dF = 12, L = 200 mm, L_{FL} = 1 m, G½, E12 and M1221.

Ordering Information, Limit Setting Pointer

Basic Model: Gas-actuated Thermometer with Capillary Line, with Limit Switch Contact Assembly TFCh, TFChOe

When installing limit switches, the order text of the basic device is supplemented by	code letters	S	low-action contact		
		M	magnetic contact	e.g.	M
		E	electronic contact		
		I	inductive contact		
	code number	1	making contact		
	for the switching function (clockwise direction of action at rising temperature)	2	breaking contact	e.g.	2
		3	single change-over contact as low-action or magnetic contact		
		11	1 st and 2 nd making contact		
		12	1 st making contact / 2 nd breaking contact		
		21	1 st breaking contact / 2 nd making contact		
		22	1 st and 2 nd breaking contact		
		33	double change-over contact as low-action or magnetic contact		

Please note To ensure optimum functioning of the devices with limit switch, please specify in your order text:

- switching temperatures
- switching ranges, which are beyond the adjustment ranges defined by us
- if you require a counterclockwise switching direction

Information on limit switch contact assemblies with 3 or 4 contacts see below

Options	for all limit switch types	adjusting lock with non-removable key
		limit switch contact assembly with pneumatic contact upon request
		switching distance fixing (from 2 contacts onwards) upon request
	S/M contacts	separated circuits
		wire break control (parallel resistor for each contact)
		contact pins made of special materials upon request
	E contacts	PNP switching output as 2-wire connection
	I contacts	safety version SN or S1N
		reactionless interval switching for NCS 160 with 2 contacts, interval relay required
	options for electrical connection see page 4	
other position of the electrical connection upon request		

Example: TFChOe 100 Rh, 0 – 200 °C, A3, dF = 12, L=150 mm, L_{FL}=1 m, G¹/₂, E1

Information on Limit Switches with 3 and 4 Contacts

In contrast to thermometers with 2 contacts, thermometers with 3 or 4 contacts do not always allow the limit setting pointers to be adjusted one above the other.

Behaviour of the limit setting pointers to each other

Type limit switch	3 limit setting pointers		4 limit setting pointers	
	NCS 100	NCS 160	NCS 100	NCS 160
S, M	adjustable one above the other		only 3 pointers adjustable one above the other	
E, I	only 2 pointers adjustable one above the other		only the two middle pointers adjustable one above the other	only 3 pointers adjustable one above the other

Switching functions

Those limit setting pointers with 3 and 4 contacts, which are not adjustable one above the other, are separated by a point when indicating the switching function.

Example: M 222.1 4-fold; 3rd and 4th limit setting pointer not adjustable one above the other
 E 1.22.1 4-fold; only the two middle pointers adjustable one above the other

Minimum distance of the limit setting pointers, which are not adjustable one above the other (in degree)

Type limit switch	NCS 100	NCS 160
S, M	15	10
E, I	35	28

Options

Electrical Connection

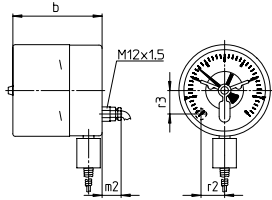
Cable entry

- For instruments without case filling
- IP65
- Cable entry M12x1.5 with strain relief and 1 m connection cable (connection cable longer than 1 m upon request)
- Available for max. 4 x S/M

Bottom Capillary Line Position

With mounting device for gauge holder bracket¹⁾

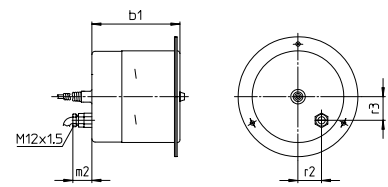
code letters: **Mgh**



Centre Back Capillary Line Position

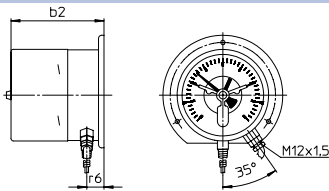
With front flange for panel mounting

code letters: **rmFr**
without case filling

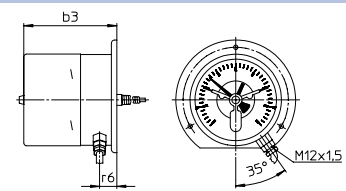


With back flange for surface mounting

code letters: **Rh**



code letters: **rmRh**
without case filling



Dimensional Data (mm/inch) and Weights (kg/lb)

NCS/type	b/b1	b2/b3	m2	r2	r3	r6	approx. weight ²⁾ TFCh
100 1, 2 and 3 contacts	99 / 3.9	103 / 4.06	21 / 0.83	26 / 1.02	26 / 1.02	21 / 0.83	0.95 / 2.09
100 4 contacts	106 / 4.17	110 / 4.33	21 / 0.83	26 / 1.02	26 / 1.02	21 / 0.83	0.95 / 2.09
160 all limit switches with 1 and 2 contacts	105 / 4.13	108 / 4.25	21 / 0.83	36 / 1.42	50 / 1.97	18 / 0.71	1.40 / 3.09
160 all limit switches with 3 and 4 contacts	115 / 4.53	118 / 4.65	21 / 0.83	36 / 1.42	50 / 1.97	18 / 0.71	1.45 / 3.2

Plug connector DIN EN 17 5301-803

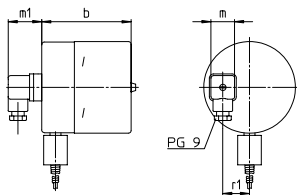
- IP65, 3-pin and protective contact
- Available for max. 2 x S/M or 1 x E/I
or 2 x E for option PNP switching output as 2-wire connection

Plug connector DIN EN 17 53 01-803 construction type A – for instruments without case filling

Bottom Capillary Line Position

With mounting device for gauge holder bracket¹⁾

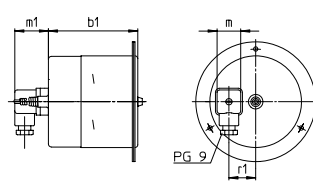
without code letters



Centre Back Capillary Line Position

With front flange for panel mounting

code letters: **rm**



Dimensional Data (mm/inch) and Weights (kg/lb)

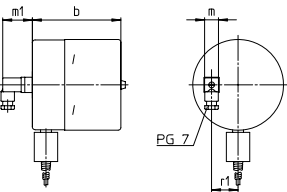
NCS	b/b1	m	m1	r1	approx weight ²⁾ TFCh
100	99	26	37	29.5	0.95
4"	3.9	1.02	1.46	1.16	2.09
160	105	26	37	55	1.40
6"	4.13	1.02	1.46	2.17	3.09

Plug connector DIN EN 17 53 01-803 construction type C – for instruments without and with case filling

Bottom Capillary Line Position

With mounting device for gauge holder bracket¹⁾

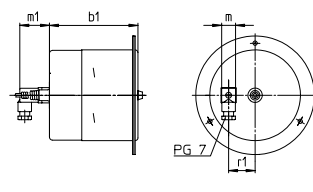
without code letters



Centre Back Capillary Line Position

With front flange for panel mounting

code letters: **rm**



Dimensional Data (mm/inch) and Weights (kg/lb)

NCS	b/ b1	m	m1	r1	approx weight ²⁾ TFCh	TFChG
100	99	15.5	33	29.5	0.95	1.50
4"	3.9	0.61	1.3	1.16	2.09	3.31
160	105	15.5	33	55	1.40	3.00
6"	4.13	0.61	1.3	2.17	3.09	6.61

Circular plug connector

- With 2 m die cast cable upon request

The circular plug connectors have roughly the same position of connection as the cable entries, see above.

Angular cable box



Straight cable box upon request



¹⁾ Dimensional data of the gauge holder bracket according to DIN 16 281.

²⁾ The data are examples and relate to models TFCh and TFChOe, A3, dF = 12, L = 200 mm, L_{FL} = 1 m, G_{1/2}, E12 and M1221.