

### Resistance Thermometers Model TR602, for Flat Surfaces Model TR603, for Pipe Surfaces

WIKA Data Sheet TE 60.35



#### Application

- To measure surface temperatures on flat surfaces or pipes in laboratories and industrial applications.

#### Special Features

- Application ranges up to max. 250 °C
- Easily interchanged, no thermowell necessary
- Mounting: screwed, welded or by means of worm drive hose clip
- Cable insulation made of PVC, Silicon or PTFE
- Intrinsically safe versions (ATEX)

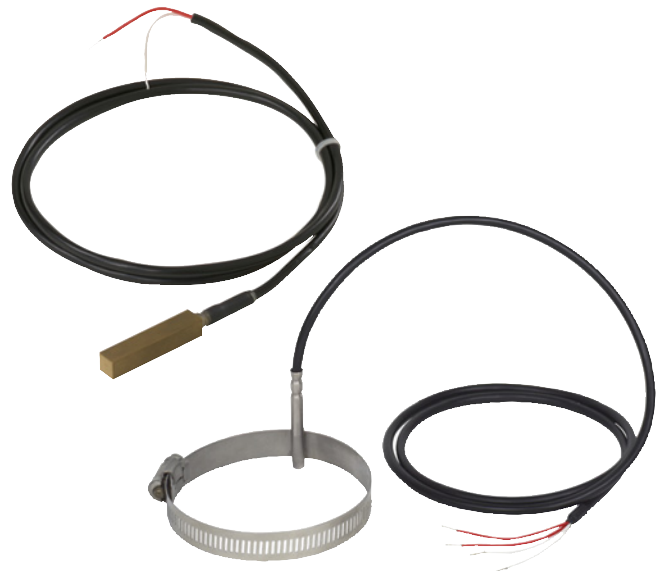


Fig. left: Resistance Thermometer Model TR602 for surfaces  
Fig. right: Resistance Thermometer Model TR603 for pipes

#### Description

##### Probe

In the case of resistance thermometers for flat surfaces, the probe is installed into a contact block, which can be screwed or welded to the vessel surface. Thermometer designs for pipes will simply be fixed with a worm drive hose clip.

##### Cable

There are various insulating materials available to match different environmental conditions. The free end of the cable is made up ready for connection, or fitted with plugs and/or sockets as optional extras.

Intrinsically safe designs are available for applications in hazardous areas.

The models of the TR60X series are provided with a type test certificate for "intrinsically safe" type of protection according to directive 94/9/EC (ATEX).

Manufacturer's Declarations in accordance with EN 50 020 are also available.

## Sensor

### Application range

The application range of the sensor is limited by the permissible ambient temperature of the cable insulation.

### Sensor method of connection

- 2 wire
- 3 wire
- 4 wire

With 2 wire connection the lead resistance of the cable compounds the error.

### Sensor limiting error

- class B to DIN EN 60 751
- class A to DIN EN 60 751

It makes no sense to combine 2 wire connection with class A, because the lead resistance of the cable overrides the higher sensor accuracy.

### Basic values and limiting errors

Basic values and limiting errors for the platinum measurement resistances are laid down in DIN EN 60 751.

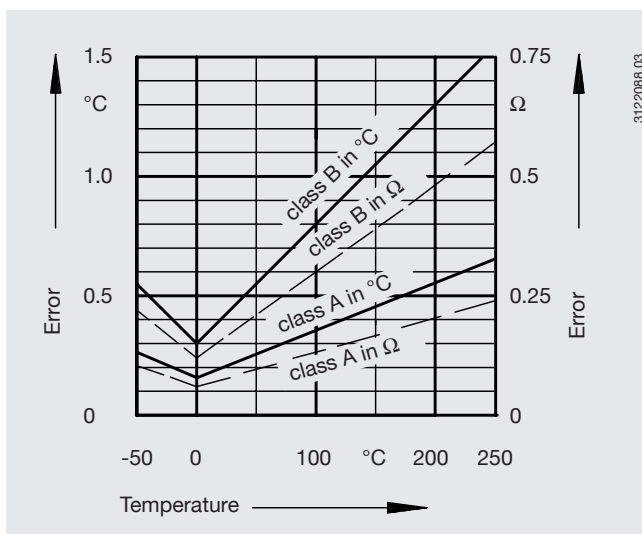
The nominal value of Pt100 sensors is 100 Ω at 0 °C. The temperature coefficient α can be stated simply to be between 0 °C and 100 °C with:

$$\alpha = 3.85 \cdot 10^{-3} \text{ } ^\circ\text{C}^{-1}$$

The relationship between the temperature and the electrical resistance is described by polynomes which are defined in DIN EN 60 751. Furthermore, this standard lays down the basic values in °C stages.

Class	Limiting error in °C
A	$0.15 + 0.002 \cdot  t $ <sup>1)</sup>
B	$0.3 + 0.005 \cdot  t $

1) |t| is the value of the temperature in °C without consideration to the sign



Basic values and limiting errors for the platinum measuring resistors per DIN EN 60 751

Temperature (ITS 90) °C	Basic value Ω	Limiting error Class A		Class B	
		°C	Ω	°C	Ω
-50	80.31	± 0.25	± 0.10	± 0.55	± 0.22
0	100	± 0.15	± 0.06	± 0.3	± 0.12
50	119.40	± 0.25	± 0.10	± 0.55	± 0.21
100	138.51	± 0.35	± 0.13	± 0.8	± 0.30
150	157.33	± 0.45	± 0.17	± 1.05	± 0.39
200	175.86	± 0.55	± 0.20	± 1.3	± 0.48

## Probe

Design: rigid tube, firmly connected to the process connection

Material: stainless steel

Other versions on request.

## Process connection

### TR602 for flat surfaces

Design: contact block for screwing or welding to flat surfaces

Material: stainless steel

Dimensions: see drawing

Other versions on request.

### TR603 for pipe surfaces

Design: worm drive hose clip

Material: stainless steel

## Cable

Core material: Cu (strand)

Core cross section: approx. 0.22 mm<sup>2</sup>

Number of cores: according to number of sensors and method of sensor connection

Wire ends: bare

Insulation (material / permissible ambient temperature):

PVC -20 °C ... +100 °C

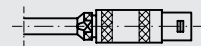
Silicon -50 °C ... +200 °C

PTFE -50 °C ... +250 °C

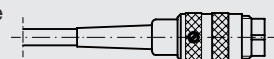
## Connector, fitted to cable (optional)

- Lemo, size 1 S (male) for cable diameters up to 4.5 mm
- Lemo, size 2 S (male) for cable diameters up to 8 mm
- Binder connector (male)
- Lemo or Binder connectors (female) on request
- Mating connectors are available

Lemo connector (male) at cable

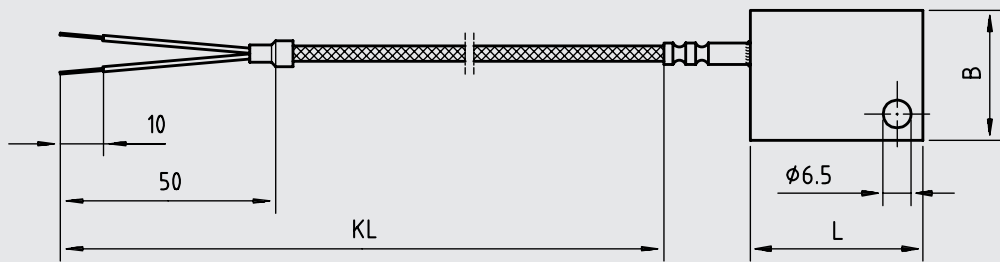


Binder connector (male) at cable



**Dimensions in mm**

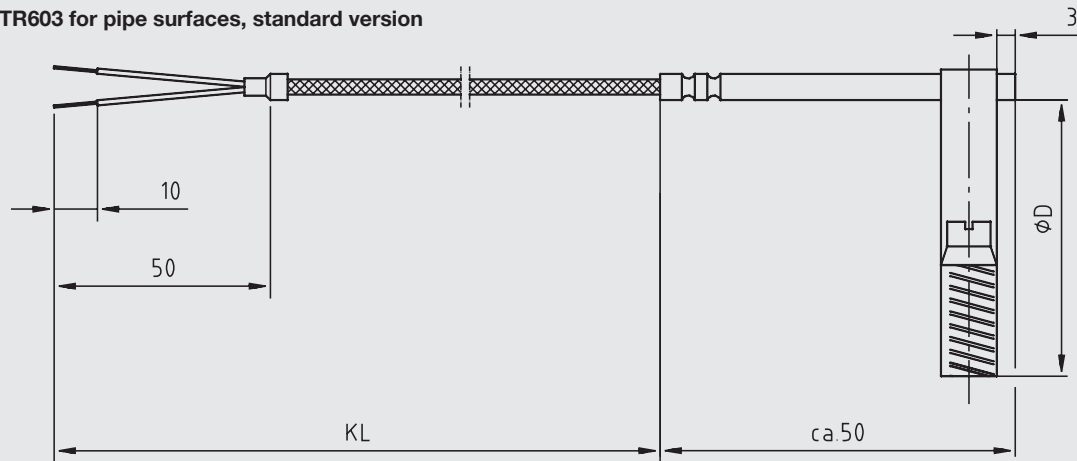
TR602 for flat surfaces, standard version



Legend:

- Ø D For pipe diameter
- H Height of contact block, not shown
- KL Cable length

TR603 for pipe surfaces, standard version



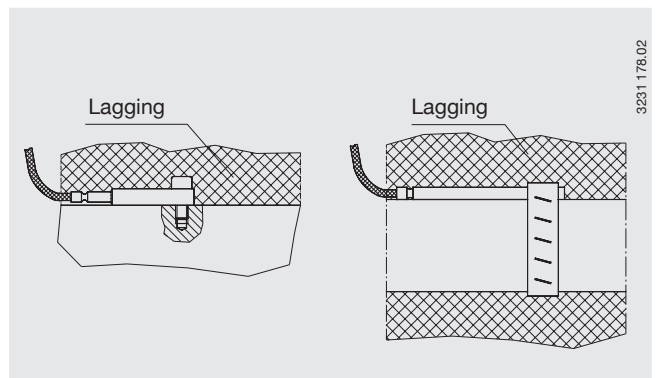
Process connection	Dimensions in mm			
	Ø D	B	L	H
Contact block 30 x 40 x 8 mm	–	30	40	8
Worm drive hose clip for pipe diameter 7 mm ... 17 mm	7 ... 17	–	–	–
Worm drive hose clip for pipe diameter 14 mm ... 34 mm	14 ... 34	–	–	–
Worm drive hose clip for pipe diameter 17 mm ... 57 mm	17 ... 57	–	–	–
Worm drive hose clip for pipe diameter 60 mm ... 75 mm	60 ... 75	–	–	–
Worm drive hose clip for pipe diameter 78 mm ... 93 mm	78 ... 93	–	–	–
Worm drive hose clip for pipe diameter 97 mm ... 112 mm	97 ... 112	–	–	–

**Mounting instructions**

The basic requirements to ensure perfect measurement results is to retain good thermal contact between the probe and the outside wall of the tank or pipe. Minimal heat loss to the ambient from the probe and measuring point is imperative.

The probe should have direct metallic contact with the measuring point and have firm contact with the measuring point.

Lagging must be applied where the probe has been mounted to avoid error due to heat loss. This lagging must have sufficient temperature resistance and is not provided with the probe.



## Explosion protection (optional)

TR60X series resistance thermometers are available with a type-examination certificate for "intrinsically safe" ignition protection (TÜV 02 ATEX 1793 X).

These thermometers comply with the requirements of directive 94/9/EC (ATEX), EEx-i, for gases and dust.

Manufacturer's Declarations in accordance with EN 50 020 are also available.

The classification / suitability of the instrument (permissible power  $P_{max}$ , neck length and permissible ambient temperature) for the respective category is shown on the type-examination certificate and in the operating instructions.

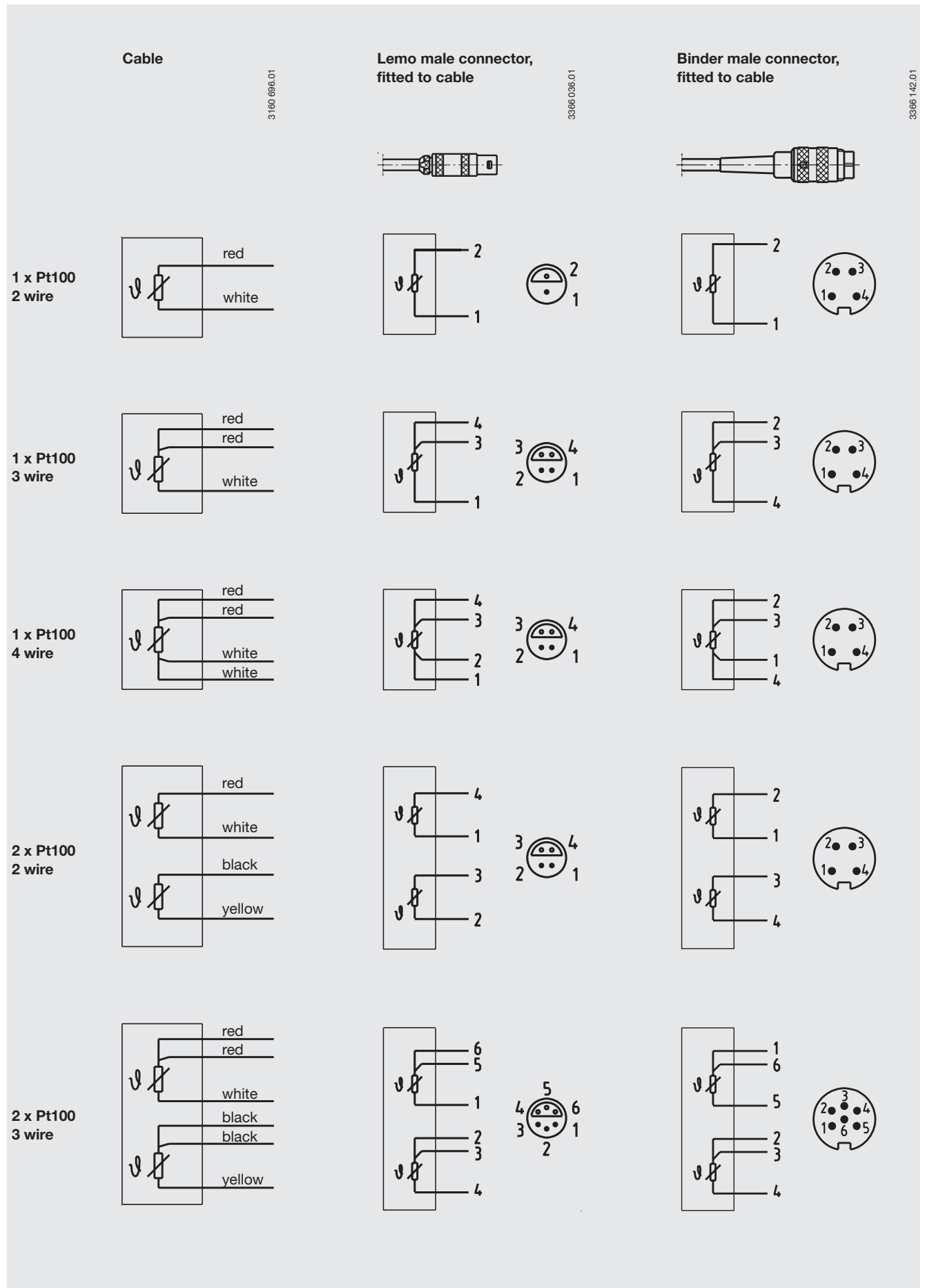
### **Note:**

When mounting thermometers with flying leads, installation personnel must ensure that installation is carried out properly and in compliance with the appropriate regulations.

If the cable ends of the thermometer are within the hazardous area, suitable adapters / connectors must be used.

Flying leads must be connected outside the hazardous area or, when operated in explosive atmospheres caused by dust, within a case which is certified according to the 94/9/EC and EN 50 281-1-1 directives and provides an ingress protection of at least IP 65. A minimum air and leakage path of 2 mm must be ensured.

**Electrical connection**



**Ordering information, Model TR602**

Field No.	Code	Features	
<b>Explosion protection</b>			
1	Z	without	
	Y	according to directive 94/9/EC (ATEX) EEx-i G for gases <sup>1)</sup>	
	H	according to directive 94/9/EC (ATEX) EEx-i GD for gases and dusts <sup>1)</sup>	
<b>Type and number of sensors</b>			
2	V	1 x Pt100 application range limited by max. allowed cable temperature	
	W	2 x Pt100 application range limited by max. allowed cable temperature	
	?	other <i>please state as additional text</i>	
<b>Sensor method of connection</b>			
3	2	2 wire	
	3	3 wire	
	4	4 wire	
<b>Sensor limiting error</b>			
4	B	class B to DIN EN 60 751	
	A	class A to DIN EN 60 751 (max. 450 °C) <i>not with 2 wire connection</i>	
	?	other <i>please state as additional text</i>	
<b>Process connection</b>			
5	KB	contact block 30 x 40 x 8 mm (W x L x H)	
	??	other <i>please state as additional text</i>	
<b>Process connection material</b>			
6	9	stainless steel	
	?	other <i>please state as additional text</i>	
<b>Cable</b>			
7	P	PVC, application range -20 °C ... +100 °C	
	S	Silicon, application range -50 °C ... +200 °C	
	T	PTFE, application range -50 °C ... +250 °C	
	?	other <i>please state as additional text</i>	
<b>Cable length</b>			
8		length in mm, e.g. 0850 for 850 mm	
	????	longer than 9999 mm <i>please state as additional text</i>	
<b>Connector, fitted at cable</b>			
9	Z	without	
	6	Lemo, size 1 S (male), max. temperature at connector 85 °C	
	F	Lemo, size 1 S (male) with mating connector (female), max. temperature at connector 85 °C	
	?	other <i>please state as additional text</i>	
<b>Additional order info</b>			
10	YES	NO	
	1	Z	quality certificates <i>see price list</i>
11	T	Z	additional text <i>Please state as clearly understandable text!</i>

1) Please observe the operating instructions and the type examination certificate.

**Order code:**

TR602	-	1	-	2	3	4	-	5	-	6	7	8	9	-	10	11

**Additional text:** \_\_\_\_\_

**Ordering information, Model TR603**

Field No.	Code	Features	
		<b>Explosion protection</b>	
1	Z	without	
	Y	according to directive 94/9/EC (ATEX) EEx-i G for gases <sup>1)</sup>	
	H	according to directive 94/9/EC (ATEX) EEx-i GD for gases and dusts <sup>1)</sup>	
		<b>Type and number of sensors</b>	
2	V	1 x Pt100 application range limited by max. allowed cable temperature	
	W	2 x Pt100 application range limited by max. allowed cable temperature	
	?	other <i>please state as additional text</i>	
		<b>Sensor method of connection</b>	
3	2	2 wire	
	3	3 wire	
	4	4 wire	
		<b>Sensor limiting error</b>	
4	B	class B to DIN EN 60 751	
	A	class A to DIN EN 60 751 (max. 450 °C) <i>not with 2 wire connection</i>	
	?	other <i>please state as additional text</i>	
		<b>Process connection</b>	
5	S0	worm drive hose clip for pipe diameter 7 mm ... 17 mm	
	S1	worm drive hose clip for pipe diameter 14 mm ... 34 mm	
	S2	worm drive hose clip for pipe diameter 17 mm ... 57 mm	
	S3	worm drive hose clip for pipe diameter 60 mm ... 75 mm	
	S4	worm drive hose clip for pipe diameter 78 mm ... 93 mm	
	S6	worm drive hose clip for pipe diameter 97 mm ... 112 mm	
	??	other <i>please state as additional text</i>	
		<b>Process connection material</b>	
6	9	stainless steel	
	?	other <i>please state as additional text</i>	
		<b>Cable</b>	
7	P	PVC, application range -20 °C ... +100 °C	
	S	Silicon, application range -50 °C ... +200 °C	
	T	PTFE, application range -50 °C ... +250 °C	
	?	other <i>please state as additional text</i>	
		<b>Cable length</b>	
8		length in mm, e.g. 0850 for 850 mm	
	????	longer than 9999 mm <i>please state as additional text</i>	
		<b>Connector, fitted at cable</b>	
9	Z	without	
	6	Lemo, size 1 S (male), max. temperature at connector 85 °C	
	F	Lemo, size 1 S (male) with mating connector (female), max. temperature at connector 85 °C	
	?	other <i>please state as additional text</i>	
		<b>Additional order info</b>	
10	YES	NO	
	1	Z	quality certificates <i>see price list</i>
11	T	Z	additional text <i>Please state as clearly understandable text!</i>

1) Please observe the operating instructions and the type examination certificate.

**Order code:**

TR603	-	1	-	2	3	4	-	5	-	6	7	8	9	-	10	11

**Additional text:** \_\_\_\_\_

**OBSOLETE**

Specifications and dimensions given in this leaflet represent the state of engineering at the time of printing.  
Modifications may take place and materials specified may be replaced by others without prior notice.



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