



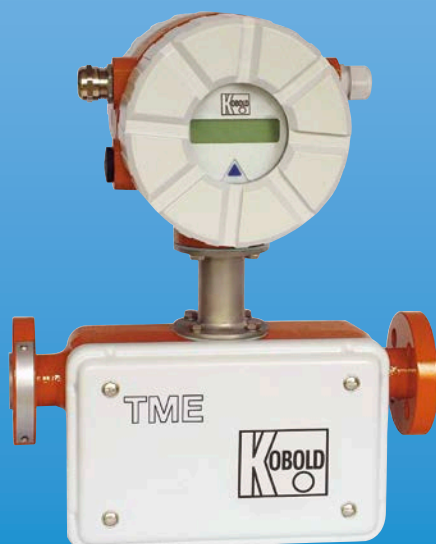
# Coriolis Mass Flow Meter

for liquids and gases



measuring  
•  
monitoring  
•  
analysing

TME



- Measuring range:  
0 - 60 kg/h ... 0 - 60 000 kg/h water
- Accuracy:  $\pm 0.15$  of reading  
 $\pm$  zero-point stability
- $p_{\max}$ : PN40  $t_{\max}$ :  $-40 \dots +180 \text{ }^\circ\text{C}$
- Connection: flange DN10 ... DN80,  
 $\frac{1}{2}$ " ... 3" class 150
- Material: 1.4404 (316 L) / 1.4571  
(316 Ti)
- Options: contacts, analogue output  
with HART®, Profibus-PA®,  
Fieldbus® Foundation™ or  
Modbus RTU

GS

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### Description

The Kobold Mass Flow Meter type TME utilizes the Coriolis principle of operation to measure mass flow. Density and temperature are simultaneously monitored and volumetric flow is additionally calculated with these parameters. The TME Series is available with a direct mounted transmitter or in a remote mounted configuration.

The TME Series can be used to meter nearly all liquid or gaseous media and was especially designed to operate in many standard applications. It is applied in many different industrial branches. The TME Series is also used for precise dosing as well as in loading and unloading applications. Approvals for service in custody transfer (fiscal metering) applications are also available.

The TME is easy to install due to a rugged housing (cast iron). A superior efficient heating is optionally available.

### Application Areas

- chemical industry
- petrochemical industry
- oil industry
- gas industry

### Technical Details

#### Sensor

Measuring principle: Coriolis  
 Measurable media: liquids and gases  
 Material  
     flow tubes,  
     splitter, flanges: stainless steel 1.4404 (316 L) / 1.4571 (316 Ti)  
     housing: cast iron  
 Process connections: flanges acc. EN 1092, ASME B16.5, DIN 2512  
     special connections on request  
 Nominal pressure: PN 40, ASME CI 150/300  
 Process temperature: -40...+180 °C (-40...+ 356 °F)  
 Ambient temperature: -40...+100 °C (-40...+ 212 °F)

Protection class: IP 65 (EN60529)  
 Certificates and approvals  
     explosion protection: sensor circuits: intrinsically safe  
     DMT 01 ATEX E 149 X  
     Ⓢ II ½ G EEx ia IIC T6–T2  
     (approval for zone 0 inside flow tubes available)  
 PED: pressure equipment directive 97/23/EC

#### Transmitter UMC3

Material:  
     housing: aluminium (painted)  
     display cover: safety class  
 Mounting: integrated or remote mounted (junction box or plug in connector)  
 Power supply: 19 - 36 V<sub>DC</sub>, 24 V<sub>AC</sub> +/-20%, 90 - 265 V<sub>AC</sub>  
 Outputs:  
     Current: galvanically isolated  
     2 x 0 (4) - 20 mA  
     Binary 1: active, potential free 24 V<sub>DC</sub>, max. 200 mA  
     passive, optocoupler, U<sub>i</sub> = 30 V, I<sub>i</sub> = 200 mA, P<sub>i</sub> = 3 W  
     Frequency: 1 kHz  
     Binary 2: passive, optocoupler, U<sub>i</sub> = 30 V, I<sub>i</sub> = 200 mA, P<sub>i</sub> = 3 W  
     Status: passive, optocoupler, U<sub>i</sub> = 30 V, I<sub>i</sub> = 200 mA, P<sub>i</sub> = 3 W  
     Input binary: counter reset  
 Ambient temperature: -20... +60 °C (-4... 140 °F)  
     integrated transmitter with approvals 0 to 4  
     -20... +80 °C (-4... +176 °F)  
     remote mounted transmitter with approvals 5 and 6  
 Protection class: IP 68 (EN60529)  
 Communication: HART®  
     Profibus-PA®  
     Modbus RTU (RS 485)  
 Accuracy  
     Liquid: ±0.15% of reading  
     ±zero point stability  
     Gas: ±0.5% of reading  
     ±zero point stability  
     Density (liquid): ±0.005 g/cm<sup>3</sup> with density calibration  
     ±0.003 g/cm<sup>3</sup> with special density calibration  
 Volume: ±0.2% of reading  
     ± zero point stability

**Transmitter UMC4**

Power supply:	19 - 36 V <sub>DC</sub> , 90 - 265 VA 50/60 Hz
Signal outputs:	Galvanically isolated
Current outputs:	2 x 4-20 mA, passive (in hazardous applications intrinsically safe or non IS)
Communication:	HART®
Current output 1:	adjustable as mass flow, volume flow, density, temperature
Current output 2:	adjustable as mass flow, volume flow, density, temperature
Binary output 1:	adjustable as pulse or frequency output -set as pulse output: pulse duration: standard 50 ms adjustable from 0.1... 2000 ms mark to space ratio 1:1 if the adjusted pulse duration is not reached
Pulse value:	1 pulse/unit adjustable from 0.001-100.0 (in decades increments) -set as frequency output: max. 1 KHz passive, via opto coupler, U <sub>max</sub> =30 V I <sub>max</sub> =60 mA
Binary output 2:	-set as status output: adjustable as forward flow, reverse flow, MIN/MAX flow, MIN/MAX density, MIN/MAX temp., alarm 2 <sup>nd</sup> pulse output (90° phase shifted) passive, via opto coupler, U <sub>max</sub> =30 V I <sub>max</sub> =60 mA,

**Meas. Accuracy**

Liquid:	± 0.15% of actual ± ZP-stability
Gas:	± 0.5% of actual ± ZP-stability
Density (liquid):	± 0.005 g/cm <sup>3</sup> c/w density calibration ± 0.002(1) g/cm <sup>3</sup> c/w special density calibration
Volume:	± 0.2% of actual ± ZP-stability
Ambient temperature:	-20 °C ... +60 °C
Protection:	IP 68 (EN60529)

CE-marking:	EMV-guide line 2004/108/EC EN 61000-6-3:2001 emissions EN 61000-6-2:1999 immunity Explosion Protection Directive 94/9/EC
Approvals:	Explosion protection: BVS 10 ATEX E 110 X II (1)2 G Ex d [ia Ga] IIC T4-T3 Gb Ta -20 °C ... 60 °C
PED:	pressure Equipment Directive 97/23/EC

**Certifications and Approvals**

Explosion protection:	BVS 05 ATEX E 021 X
Increased safety	
EEx e (connection):	⊕ II (1)2G EEx de [ia] IIC/IIB T6-T3
Explosion proof	
EEx d (connection):	⊕ II (1)2G EEx d [ia] IIC/IIB T6-T3
Signal output/ input:	Intrinsically safe or not intrinsically safe NEPSI approval cert. No. GYJ06477
CE-marking:	Explosion protection directive 94/9/EC EMC-directive 2004/108/EC
Electromagnetic compatibility:	EN 61000-6-3:2001 (emissions residential environments) EN 61000-6-2:1999 (immunity for industrial environments) EN 55011:1998+A1:1999 group1, class B (radio interference) EN 61000-4-2 to DIN EN 61000-4-6 EN 61000-4-8 EN 61000-4-11 EN 61000-4-29 EN 61326

**Measuring Ranges**

Model	Min. measuring range [kg/h (lbs/min)]	Max. measuring range [kg/h (lbs/min)]	Nominal (Δp=1 bar) [kg/h (lbs/min)]	Zero point stability (of range) [kg/h (lbs/min)]
TME-S80	60 [2.2]	600 [22.0]	370 [13.6]	0.06 [0.00]
TME-S85	120 [4.4]	2500 [91.9]	1250 [45.9]	0.25 [0.01]
TME-S90	600 [22.0]	12 000 [440.9]	6000 [220.5]	1.2 [0.0]
TME-S95	3000 [110.2]	30 000 [1102.3]	19 000 [698.1]	3 [0.1]
TME-S58	6000 [220.5]	60 000 [2204.6]	60 000 [2204.6]*	6 [0.2]

Reference condition: according to IEC 770: Water at 20 °C

\* (Dp=0.89 bar)



**Order Details Sensor** (Example: TME-S80 301B 0 U 1 0 0 0)

Model	Material	Measuring range <sup>1)</sup> (water)	Process connection <sup>2)</sup>	Heating / Cooling element	Flow direction
TME-	S = stainless steel	80 = 0 - 600 kg/h (min. 0 - 60 kg/h)	301B = flange DN10 PN40 form B1 DIN EN 1092-1 201R = flange ½" class 150 RF 221R = flange ½" class 300 RF	0 = without 1 = with connection Ermeto EO12 2 = with connection DN 15 PN40 form B1 DIN EN 1092-1 3 = with connection ½" class 150 RF ASME B16.5-2003	U = bottom to top O = top to bottom L = left to right R = right to left
		85 = 0 - 2500 kg/h (min. 0 - 120 kg/h)	305B = flange DN15 PN40 form B1 DIN EN 1092-1 202R = flange ¾" class 150 RF		
		90 = 0 - 12000 kg/h (min. 0 - 600 kg/h)	309B = flange DN25 PN40 form B1 DIN EN 1092-1 203R = flange 1" class 150 RF 223R = flange 1" class 300 RF		
		95 = 0 - 30000 kg/h (min. 0 - 3000 kg/h)	321B = flange DN50 PN40 form B1 DIN EN 1092-1 206R = flange 2" class 150 RF 226R = flange 2" class 300 RF		
		58 = 0 - 60000 kg/h (min. 0 - 6000 kg/h)	331B = flange DN80 PN40 form B1 DIN EN 1092-1 208R = flange 3" class 150 RF 228R = flange 3" class 300 RF		

**Order Details Sensor** (continued)

Sensor	Approvals	Certificates	Special version
1 = integrated transmitter up to 100 °C	0 = without A = ⓈII ½ G Eex ia IIC T6 - T2, FM/FMC CL I, DIV 1, GPS ABCD T B = NEPSI	0 = without 1 = Certificate of compliance with the order 2.1 2 = Test report 2.2 B = Inspection certificate 3.1 incl. material certificate C = Inspection certificate 3.2 incl. material certificate	0 = without 1 = density calibration 3-points (not for range '80') X = with (separate specification necessary)
2 = integrated transmitter up to 150 °C			
3 <sup>3)</sup> = remote mounted transmitter up to 100 °C, M20 x 1.5			
4 <sup>3)</sup> = remote mounted transmitter up to 180 °C, M20 x 1.5			
6 <sup>3)</sup> = remote mounted transmitter up to 100 °C, ½" NPT			
7 <sup>3)</sup> = remote mounted transmitter up to 180 °C, ½" NPT			

<sup>1)</sup> Measuring range for other liquids and gases on request

<sup>2)</sup> Other flange-form on request

<sup>3)</sup> Please order cable glands separately, see accessories

**Necessary details for dimensioning the TME instrument**

- Medium
- Process temperature min./max.
- Ambient temperature min./max.
- Measuring range
- Operating pressure
- Viscosity
- Density



**Order Details Transmitter UMC3** (Example: UMC3 - A 0 1 A 0 0K)

Model	Kind of mounting	Display / Interface Board	Power supply	Output
UMC3-	<b>A</b> = integrated transmitter, ½" NPT	<b>0</b> = without <b>1</b> = integrated in transmitter housing, ambient temperature up to 60°C <b>2<sup>2)</sup></b> = remotable, separate board plus panel mounting adapter set	<b>1</b> = 90 - 265 V <sub>AC</sub> , 50/60 Hz <b>2</b> = 19 - 36 V <sub>DC</sub> , 24 V <sub>AC</sub> (± 20%), 50/60 Hz	<b>A</b> = analogue output 0(4) - 20 mA with/without HART®, pulse output passive U <sub>m</sub> = 30 V <sub>DC</sub> , status output passive U <sub>m</sub> = 30 V <sub>DC</sub> <b>B<sup>3)</sup></b> = analogue output 0(4) - 20 mA with/ without HART®, pulse output active 24 V <sub>DC</sub> , status output passive U <sub>m</sub> = 30 V <sub>DC</sub> <b>D<sup>4)</sup></b> = Profibus-PA® (EEx ia IIC), all analogue and binary outputs disabled <b>F<sup>5)</sup></b> = Modbus RTU (RS485) analogue output 0(4) - 20 mA <b>J</b> = Fieldbus® Foundation™
	<b>B</b> = integrated transmitter, M20 x 1.5			
	<b>C<sup>1)</sup></b> = remote mounted transmitter with terminal block, ½" NPT			
	<b>D<sup>1)</sup></b> = remote mounted transmitter with terminal block, M20 x 1.5			
	<b>E<sup>1)</sup></b> = remote mounted transmitter with plug-in connector, ½" NPT			
	<b>F<sup>1)</sup></b> = remote mounted transmitter with plug-in connector, M20 x 1.5			

**Order Details Transmitter UMC3** (continued)

Approvals	Protection (signal output)
<b>0</b> = without	<b>0K</b> = without
<b>1</b> = ⓈII(1)2G Eex de [ia] IIB/IIC T3-T6 for ambient temperature up to 60°C	<b>1K</b> = EEx ia <b>2K</b> = EEx e (not intrinsically safe)
<b>2</b> = ⓈII(1)2G Eex d [ia] IIB/IIC T3-T6 for ambient temperature up to 60°C	
<b>4</b> = NEPSI for ambient temperature up to 60°C	
<b>5</b> = ⓈII(1)2G Eex de [ia] IIB/IIC T3-T6 for ambient temperature up to 80°C	
<b>6</b> = ⓈII(1)2G Eex d [ia] IIB/IIC T3-T6 for ambient temperature up to 80°C	

<sup>1)</sup> - Includes wall mounting bracket, pipe mounting bracket must be ordered separately (see accessories)  
 - Connection cable (sensor to transmitter) and cable gland must be ordered separately (see accessories)  
<sup>2)</sup> Connection cable must be ordered separately  
<sup>3)</sup> Signal output in EEx ia not possible  
<sup>4)</sup> Not available with approval 4  
<sup>5)</sup> Not available with approval 4, 5, or 6 and not with signal output protection 2



**Order Details Transmitter UMC4** (Example: UMC4 - B 1 1 A 0 0K)

Model	Kind of mounting	Display / interface board	Power supply	Outputs
UMC4-	<b>B</b> = integral mount, M20 x 1.5 <b>D<sup>1)2)</sup></b> = remote mounted transmitter with terminal connection box, M20 x 1.5 <b>E<sup>1)2)</sup></b> = remote mounted transmitter with 5 m cable, without connection box, M20 x 1.5	<b>1</b> = integrated in transmitter housing, ambient temperature up to 60 °C	<b>1</b> = 90 - 265 V <sub>AC</sub> , 50/60 Hz <b>2</b> = 19 - 36 V <sub>DC</sub> , 24 V <sub>AC</sub> (± 5% - 20%), 50/60 Hz	<b>A</b> = analogue output 1: 4 - 20 mA with HART® analogue output 2: 4 - 20 mA pulse output: passive U <sub>m</sub> = 30 V <sub>DC</sub> status output: passive U <sub>m</sub> = 30 V <sub>DC</sub>

**Order Details Transmitter UMC4** (continued)

Approvals	Protection (signal output)
<b>0</b> = without <b>2</b> = ⓂI(1)2G Ex d [ia Ga] IIC T3-T4 Gb (terminal compartment Ex d), ambient temperature up to 60 °C	<b>0K</b> = without <b>1K</b> = EX [ia ga] intrinsically safe <b>2K</b> = not intrinsically safe

<sup>1)</sup> Includes wall mounting bracket. Adapter for 2" pipe mounting bracket, select from accessories list  
<sup>2)</sup> Cable gland to be ordered separately

**Order Details Accessories** (Example: TMK - BL KK 005)

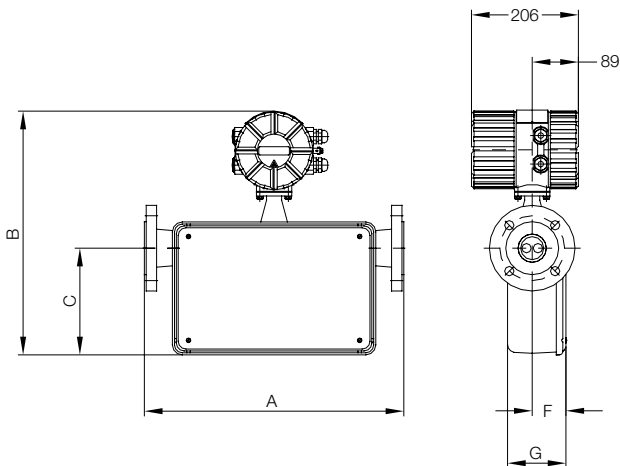
Order number	Model	Version	Cable length/application area
			<b>Cable length</b>
TMK-	BL = connection cable	<b>KK</b> = sensor-transmitter with connection cable <b>SK</b> = sensor-transmitter cable end 1: plug (Harting Han® R23) cable end 2: cable connect <b>SS</b> = plug connection on both sides (Harting Han® R23) <b>UB</b> = transmitter-control unit plug connection	<b>005</b> = 5 m <b>010</b> = 10 m <b>015</b> = 15 m <b>030</b> = 30 m <b>075</b> = 75 m <b>150</b> = 150 m <b>300</b> = 300 m <b>XXX</b> = special length
			<b>Application area</b>
	V = cable gland set	<b>AU</b> = integrated transmitter <b>GU</b> = remote mounted transmitter	<b>NEM20</b> = not Ex, M20 x 1.5 <b>NENPT</b> = not Ex, ½" NPT <b>DEIAM20</b> = EEx de - EEx ia, M20 x 1.5 <b>DEIANPT</b> = EEx de - EEx ia, ½" NPT <b>DEEM20</b> = EEx de - EEx e, M20 x 1.5 <b>DEENPT</b> = EEx de - EEx e, ½" NPT
TM-	ROHRMONT = accessory for 2" pipe mounting		

**Dimensions**

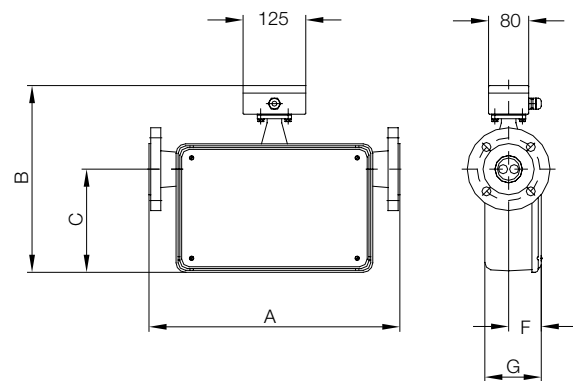
**TME-UMC3**

Model	Process connection	A [mm (inch)]	B				C [mm (inch)]	F [mm (inch)]	G [mm (inch)]
			Integrated transmitter		Remote mounted transmitter				
			-40 ... 100 °C (-40 ... 212 °F)	-40 ... 150 °C (-40 ... 302 °F)	-40 ... 100 °C (-40 ... 212 °F)	-40 ... 180 °C (-40 ... 356 °F)			
<b>TME-S80</b>	DN10 PN40 ASME ½" Cl150/300	300 [11.8]	363 [14.3]	465 [18.3]	265 [10.4]	367 [14.4]	113 [4.4]	58 [2.3]	105 [4.1]
<b>TME-S85</b>	DN15 PN40 ASME ¾" Cl150/300	300 [11.8]	363 [14.3]	465 [18.3]	265 [10.4]	367 [14.4]	113 [4.4]	58 [2.3]	105 [4.1]
<b>TME-S90</b>	DN25 PN40 ASME 1" Cl150/300	400 [15.7]	430 [16.9]	532 [20.9]	332 [13.1]	434 [17.1]	173 [6.82]	65 [2.6]	113 [4.4]
<b>TME-S95</b>	DN50 PN40 ASME 2" Cl150/300	500 [19.7]	471 [18.5]	573 [22.6]	373 [14.7]	475 [18.7]	206 [8.1]	65 [2.6]	113 [4.4]
<b>TME-S58</b>	DN80 PN40 ASME 3" Cl150/300	600 [23.6]	557 [21.9]	659 [25.9]	459 [18.1]	561 [22.1]	290 [11.4]	77 [3.0]	137 [5.4]

**Integrated Transmitter**



**Remote Mounted Transmitter**



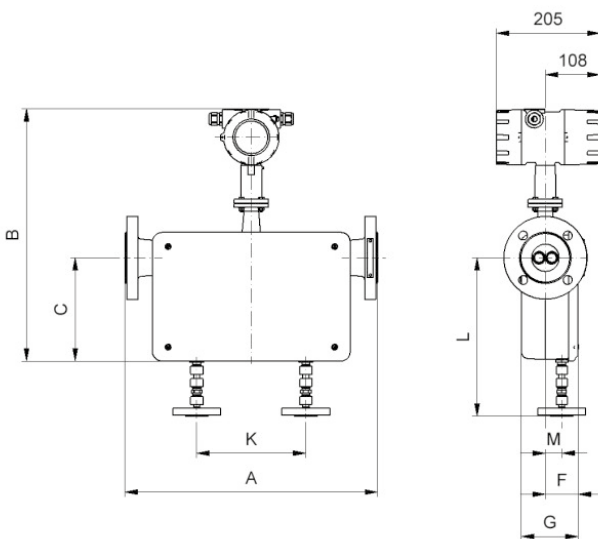


**Dimensions**

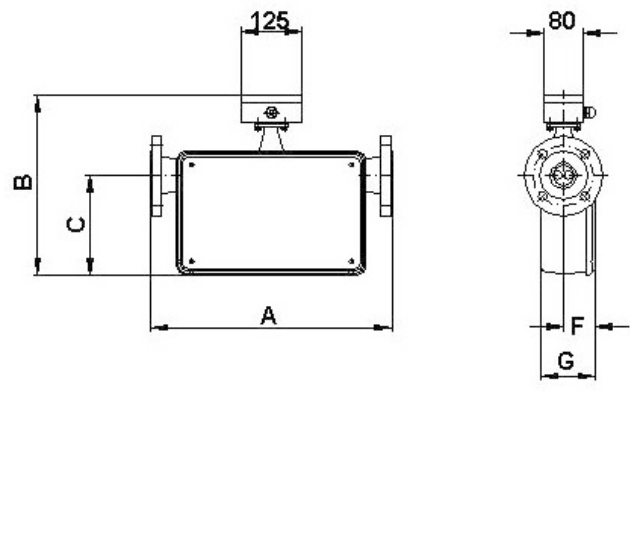
**TME-UMC4**

		A	B				C	F	G
			Integrated transmitter		Remote mounted transmitter				
			-40 ... 100 °C (-40 ... 212 °F)	-40 ... 150 °C (-40 ... 302 °F)	-40 ... 100 °C (-40 ... 212 °F)	-40 ... 180 °C (-40 ... 356 °F)			
Model	End connection	[mm (inch)]	[mm (inch)]	[mm (inch)]	[mm (inch)]	[mm (inch)]	[mm (inch)]	[mm (inch)]	
TME-S80	DN10 PN40 ASME ½" Cl150/300	300 [11.8]	394 [15.5]	496 [19.5]	265 [10.4]	367 [14.4]	113 [4.4]	58 [2.3]	105 [4.1]
TME-S85	DN15 PN40 ASME ¾" Cl150/300	300 [11.8]	394 [15.5]	496 [19.5]	265 [10.4]	367 [14.4]	113 [4.4]	58 [2.3]	105 [4.1]
TME-S90	DN25 PN40 ASME 1" Cl150/300	400 [15.7]	461 [18.1]	563 [22.2]	332 [13.1]	434 [17.1]	173 [6.8]	65 [2.6]	113 [4.4]
TME-S95	DN50 PN40 ASME 2" Cl150/300	500 [19.7]	502 [19.8]	604 [23.8]	373 [14.7]	475 [18.7]	206 [8.1]	65 [2.6]	113 [4.4]
TME-S58	DN80 PN40 ASME 3" Cl150/300	600 [23.6]	588 [23.1]	6590 [27.2]	459 [18.1]	561 [22.1]	290 [11.4]	77 [3.0]	137 [5.4]

**Integrated Transmitter**



**Remote Mounted Transmitter**



**Weights**

		Weight	
		Sensor	Transmitter
Model	DN	[kg (lbs)]	[kg (lbs)]
TME-S80	10	13 [28.7]	4.5 [9.9]
TME-S85	15	13 [28.7]	
TME-S90	25	20 [44.1]	
TME-S95	50	27 [59.5]	
TME-S58	80	50 [110.2]	