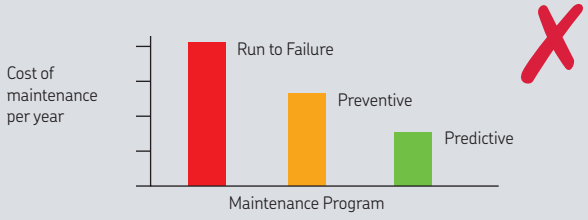
Basic condition monitoring

To help ensure long bearing service life, it is important to determine the condition of machinery and bearings while in operation. Good predictive maintenance will help reduce machine downtime and decrease overall maintenance costs. To help you achieve the maximum service life from your bearings, SKF has developed a wide range of instruments for analysing the critical environmental conditions which have an impact on bearing and machine performance.

Maintenance concepts

Run to failure

Run to failure occurs when repair action is not taken until a problem results in machine failure. Run to failure problems often cause costly secondary damage along with unplanned downtime and maintenance costs.



Maintenance cost comparisons.

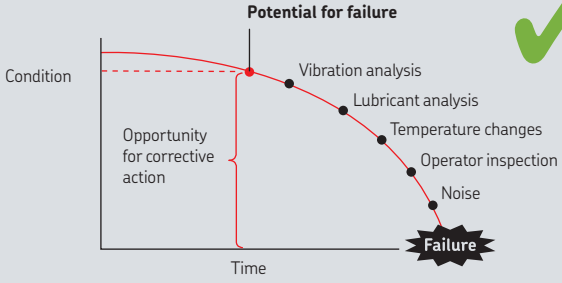
Preventive maintenance

Preventive maintenance implies that a machine, or parts of a machine, are overhauled on a regular basis regardless of the condition of the parts. While preferable to run to failure maintenance, preventive maintenance is costly because of excessive downtime from unnecessary overhauls and the cost of replacing good parts along with worn parts.

Preventive maintenance is similar to the regular service of a car. Often, unnecessary maintenance is performed.

Predictive maintenance

Condition monitoring/predictive maintenance is the process of determining the condition of machinery while in operation. This enables the repair of problem components prior to failure. Condition monitoring not only helps plant personnel reduce the possibility of catastrophic failure, but also allows them to order parts in advance, schedule manpower, and plan other repairs during the downtime. With condition monitoring, machinery analysis takes two overlapping forms: predictive and diagnostic.



Condition based maintenance means repairs are only carried out when required.

SKF has developed a comprehensive range of basic condition monitoring tools suitable for Operator Driven Reliability (ODR) and maintenance technicians. Under ODR, some maintenance practices are owned, managed, and performed by operators. Often, the operators are the best persons equipped for basic inspection activities, as they know their part of the plant very well. They are often sensitive to minor changes in sounds and vibrations that may not be apparent to someone lacking their front-line experience.

Subsequently, minor defects can be corrected quickly, as the operator can undertake simple adjustment and repair tasks. Maintenance technicians also have need for basic condition monitoring tools.
If, for example, abnormal vibrations are detected or if an operator reports an abnormal running condition, then the technician can often use some basic condition monitoring tools to detect the root cause for further evaluation.

SKF basic condition monitoring tools can be used to check a number of properties:

Temperature

Since the dawn of the industrial age, operators and technicians know that abnormal temperatures often indicate that something is wrong with the machine. Thermometers can help find and then measure these hotspots, allowing further analysis to be conducted.

Speed

Machines are usually designed to run at a given speed. If the speed is too slow or too fast, then the overall process can be compromised. Using a hand-held tachometer enables a quick and easy assessment of the machine's running speed.

Visual

Visual inspection of a machine's condition can sometimes be difficult when it's running or when there is a need to inspect the machine internally. A stroboscope can be used to visually freeze the motion of a machine to allow such things as fan blades, couplings and belt drives to be inspected while running. To inspect the internal parts of a machine often requires disassembly. By using an endoscope, it is possible to access the area of interest with minimal disassembly, saving time and money.

Sound

Abnormal sounds from machines often indicate that something is wrong. A stethoscope can be used to help pinpoint the source of the sound and can aid the technician in identifying the problem. Leaks in compressed air systems are costly, not only in energy costs but also due to extra costs in air compressor maintenance. Ultrasonic leak detectors can help detect leaks efficiently, allowing the necessary repairs to be made. Excessive noise can cause worker fatigue, increased accidents and loss of hearing. A sound pressure meter can measure the sound level, allowing corrective measures to be made.

Electrical discharge currents

Electrical discharges are a result of motor shaft voltages discharging to earth through the bearing, causing electrical erosion, lubricant degradation and ultimately bearing failure. An electrical discharge detector can help detect the presence of electrical discharge currents, allowing remedial action to be taken.

Vibration

Abnormal vibrations are often the first indication of a potential machine failure. These vibrations can be caused by such conditions as unbalance, misalignment, looseness of parts, rolling element bearing and gear damage. Vibration analysis instruments and systems, can help detect many serious problems at an early stage, allowing remedial work to be undertaken in a timely manner.

Lubricant condition

To maintain the optimum condition of rolling element bearings, it is essential that the lubricant is in good condition. Checking the oil or grease condition at regular intervals can reduce downtime and greatly prolong the life of rolling element bearings.

Accurate temperature measurement with dual channel capability

Thermometer TKDT 10

The SKF TKDT 10 is suitable for a wide range of applications and has the ability to have two SKF temperature probes connected. A large back-lit LCD display helps ensure that the temperatures can be easily read in almost all lighting conditions.

- Large back-lit LCD display
- Supplied with temperature probe TMDT 2-30 (max. 900 °C / *(1 652 °F)*); suitable for many direct contact applications.
- Can be used with an optional second SKF temperature probe enabling either probe temperature, or the temperature difference between the probes, to be displayed.
- Temperature display can be frozen for ease of reading.
- User selectable auto power off function increases battery life.

Technical data

Designation	TKDT 10
Display	Large back-lit LCD
Displayed resolution	0,1 ° up to 1 000 °, otherwise 1°
Measurement modes	Min, max, average, differential, dual temperature reading
Measurement units	°C, °F, K
Temperature using probe	–200 to +1 372 °C *(–328 to +2 501 °F)*
Accuracy	>–100 °C *(>–148 °F)*: ±0.5% of reading ±1 °C *(1.8 °F)*
Probe compatibility	2 × Type-K connectors
Probe supplied	TMDT 2-30, suitable for use up to 900 °C *(1 650 °F)*
Battery	3× AAA Alkaline type IEC LR03
Operation time	18 hours typical use (backlight on)
Product dimensions	160 × 63 × 30 mm *(6.3 × 2.5 × 1.2 in.)*
Carrying case dimensions	530 × 85 × 180 mm *(20.9 × 3.4 × 7.0 in.)*
Product weight	200 g *(0.4 lb)*

Dual temperature measurement

Temperature difference between the probes

Safe temperature measurement at a distance

Infrared thermometers

SKF offers a wide range of portable, lightweight and easy-to-use infrared thermometers for thermal inspections. These portable tools help you to detect temperature differences in technical and non-technical applications, this in order to perceive information on abnormalities in operating.

SKF Infrared thermometers are fitted with multiple lasers which helps you to easy and more accurate target the object. The TKTL 21, 31 and 40 also offer you the option of measuring temperatures via a temperature probe. The TKTL 40 offers you the possibility of data logging and allows pictures and videos with all measurement information to be taken.

TKTL 11

Basic infrared thermometer

- LCD colour display
- 8 laser targeting
- Fixed emissivity
- High accuracy
- Fast response time
- DS ratio of 16:1

DS ratio
16:1

0,95
Emissivity

TKTL 11

TKTL 21

Advanced infrared thermometer

- LCD colour display
- 8 laser targeting
- Type-K thermocouple probe
- Adjustable emissivity
- High accuracy
- Fast response time
- DS ratio of 30:1

DS ratio
30:1

0,1–1,0
Emissivity

TKTL 21

TKTL 31

High performance infrared thermometer

- LCD monochrome display, backlit
- Dual laser targeting
- Type-K thermocouple probe
- Adjustable emissivity
- High accuracy
- Fast response time
- DS ratio of 75:1

DS ratio
75:1

0,1–1,0
Emissivity

TKTL 31

To help ensure long bearing service life, it is important to determine the condition of machinery and bearings while in operation. Good predictive maintenance will help reduce machine downtime and decrease overall maintenance costs. SKF Infrared thermometers help analysing critical environmental conditions that have an impact on bearing and machine performance.

TKTL 40

Dual laser infrared and contact video thermometer

- 2.2" TFT LCD display
- 640 x 480 pixels digital camera
- Internal memory expandable to 8 GB (Micro SD card)
- Image (JPEG) and video (MP4)
- Humidity and air temperature
- Dual laser targeting
- Type-K thermocouple probe
- Adjustable emissivity
- High accuracy
- Fast response time
- Dewpoint temperature and wet bulb temperature

DS ratio
50:1

0,1–1,0
Emissivity

TKTL 40

SKF Infrared thermometers can also be used for temperature measurements in areas such as

HVAC

- Balance room temperatures
- Monitor supply/return registers
- Test ductwork
- Examine stream traps
- Check furnace performance
- Perform energy audits

Food safety

- Check cold and hot cooking, holding and serving temperatures
- Helps ensure safe and uniform storage and transportation temperatures
- Maintain freezers, walk-ins, ovens, ranges and dishwashers

Furthermore

- Roofing, asphalt, and concrete applications
- Commercial printing
- Plastics moulding
- Fire detection/prevention
- Aviation and marine maintenance

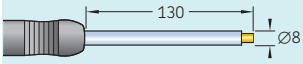
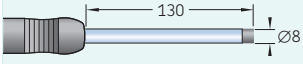
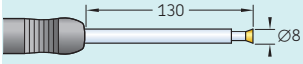
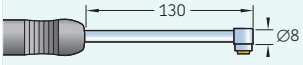
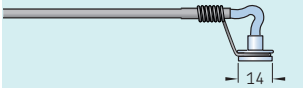
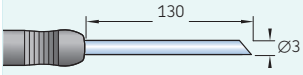
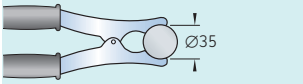
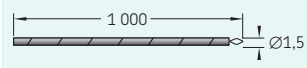
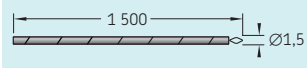
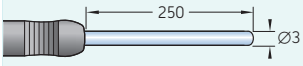
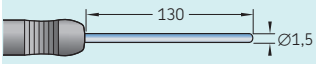
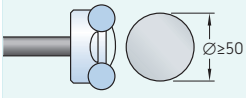
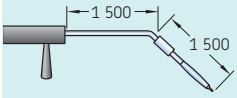
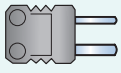
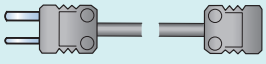
Technical data

Designation	TKTL 11	TKTL 21	TKTL 31	TKTL 40
Temperature range using infrared	–60 to +625 °C (–76 to +1 157 °F)	–60 to +760 °C *(–76 to +1 400 °F)*	–60 to +1 600 °C *(–76 to +2912 °F)*	–50 to +1 000 °C *(–58 to +1 832 °F)*
Temperature range using probe	–	–64 to +1 400 °C *(–83 to +2 552 °F)*	–64 to +1 400 °C *(–83 to +2 552 °F)*	–50 to +1 370 °C *(–58 to +2 498 °F)*
Probe supplied	–	TMDT 2-30 included (max. 900 °C *(1 650 °F)*)	TMDT 2-30 included (max. 900 °C *(1 650 °F)*)	TMDT 2-30 included (max. 900 °C *(1 650 °F)*)
Distance-to-spot ratio	16:1	30:1	75:1	50:1
Emissivity	0.95	0,1-1,0	0,1-1,0	0,1-1,0
Measurement accuracy	+/-2% of reading or 2 °C *(4°F)* whichever is greater	+/-2% of reading or 2 °C *(4 °F)* whichever is greater	+/-1% of reading or 1 °C *(1.8 °F)* whichever is greater	+/-1% of reading or 1 °C *(1.8 °F)* whichever is greater
Operating temperatur	0 to 50 °C *(32 to 122 °F)* 10 to 95% R.H.	0 to 50 °C *(32 to 122 °F)* 10 to 95% R.H.	0 to 50 °C *(32 to 122 °F)* 10 to 95% R.H.	0 to 50 °C *(32 to 122 °F)* 10 to 95% R.H.
Storage	–10 to +60 °C *(–14 to +140 °F)* 10 to 95% R.H.	–10 to +60 °C *(–14 to +140 °F)* 10 to 95% R.H.	–10 to +60 °C *(–14 to +140 °F)* 10 to 95% R.H.	–10 to +60 °C *(–14 to +140 °F)* 10 to 95% R.H.
Response time msec	1 000	1 000	1 000	<300
Displayed resolution	0.1 °C/F (below 999.9), 1° C/F (above 1 000)	0.1 °C/F (below 999.9), 1° C/F (above 1 000)	0.1 °C/F (below 999.9), 1° C/F (above 1 000)	0.1 °C/F (below 999.9), 1° C/F (above 1 000)
Display	Colour backlit LCD	Colour backlit LCD	Monochrome backlit LCD	Colour backlit LCD
Spectral response	8-14 µm	8-14 µm	8-14 µm	8-14 µm
Measurement modes	Maximum temperatures	Maximum; Minimum; Average; Difference (between min and max); Probe/IR dual temperature	Maximum; Minimum; Average; Difference (between min and max); Probe/IR dual temperature	Maximum; Minimum; Average; Difference (between min and max); Probe/IR dual temperature
Alarm modes	–	High and low level alarm with warning sound	High and low level alarm with warning sound	High and low level alarm with warning sound
Laser	8x red targeting laser dots, Class 2	8x red targeting laser dots, Class 2	2x red targeting laser dots, Class 2	2x red targeting laser dots, Class 2
Operating time	Min. 9 hours continuous use	Min. 30 hours continuous use without laser	Min. 140 hours continuous use without laser and back light	Min. 4 hours continuous use
Measurement modes	Max. temperatures	Max, min, differential, average, probe/IR dual temperature modes	Max, min, differential, average, probe/IR dual temperature modes	Max, min, differential, average, probe/IR dual temperature modes
Auto switch off	Automatic, 15 seconds after trigger release	Automatic, 60 seconds after trigger release in IR mode and 12 minutes after trigger release in probe mode	Automatic, 60 seconds after trigger release in IR mode (60 minutes can be manually selected) and 12 minutes after trigger release in probe mode	Automatic, user selectable
HVAC functionalities	–	–	–	Wet bulb, dew point, humidity, air temperature
Photo and video	–	–	–	640 x 480 camera, images (JPEG) and video (3 GP)
Memory	–	–	–	310 MB internal memory; expandable with micro SD card (8 GB max.)
PC connection				Mini USB port, mini USB to USB cable included
Contents	1x IR thermometer (TKTL 11); 2x AAA Alkaline batteries; 1x Instructions for use	1x IR thermometer (TKTL 21); 1x Temperature probe (TMDT 2-30); 2x AAA Alkaline batteries; 1x Instructions for use; 1x Carrying case	1x IR thermometer (TKTL 31); 1x Temperature probe (TMDT 2-30); 2x AAA Alkaline batteries; 1x Instructions for use; 1x Carrying case	1x IR thermometer (TKTL 40); 1x Temperature probe (TMDT 2-30); 1x AC battery charger; 1x Mini USB to USB connection cable 1x Mini tripod 1x Instructions for use; 1x Carrying case
Product dimensions	119,2 × 171,8 × 47,5 mm *(4.7 × 6.8 × 1.9 in.)*	119,2 × 171,8 × 47,5 mm *(4.7 × 6.8 × 1.9 in.)*	203 × 197 × 47 mm *(8.0 × 7.7 × 1.8 in.)*	205 × 155 × 62 mm *(8.1 × 6.1 × 2.4 in.)*
Packing dimensions	253 × 67 × 136 mm *(9.96 × 2.64 × 5.35 in.)*	530 × 85 × 180 mm *(20.9 × 3.4 × 7.0 in.)*	530 × 85 × 180 mm *(20.9 × 3.4 × 7.0 in.)*	530 × 85 × 180 mm *(20.9 × 3.4 × 7.0 in.)*
Product weight (incl. batteries)	255,7 g *(0.56 lb)*	255,7 g *(0.56 lb)*	386,1 g *(0.85 lb)*	600 g *(1.3 lb)*
Total weight	400 g *(0.88 lb)*	1 150 g *(2.54 lb)*	1 300 g *(2.87 lb)*	1 700 g *(3.8 lb)*

Technical data – Thermocouple probes

Probe type	K–type thermocouple (NiCr/NiAl) acc. IEC 584 Class 1
Accuracy	±1,5 °C *(2.7 °F)* up to 375 °C *(707 °F)* ±0,4% of reading above 375 °C *(707 °F)*
Handle	110 mm *(4.3 in.)* long
Cable	1 000 mm *(39.4 in.)* spiral cable (excl. TMDT 2-31, -38, -39, 41)
Plug	K–type mini–plug (1 260-K)

K-type thermocouple probes TMDT 2 series

Dimensions (mm)	Designation	Description	Max. temp	Response time
	TMDT 2-30	**Standard surface probe** For hard surfaces such as bearings, bearing housings, engine blocks, oven shields, etc.	900 °C *(1 650 °F)*	2,3 s
	TMDT 2-43	**Heavy duty surface probe** Same as TMDT 2-30, but with a silicone encapsulated tip for heavy duty applications.	300 °C *(570 °F)*	3,0 s
	TMDT 2-32	**Insulated surface probe** For hard surfaces where electrical wiring might cause short circuiting, e.g. electric motors, transformers, etc.	200 °C *(390 °F)*	2,3 s
	TMDT 2-33	**Right angle surface probe** For hard surfaces in heavy-duty applications, e.g. machine components, engines, etc.	450 °C *(840 °F)*	8,0 s
	TMDT 2-31	**Magnetic surface probe** For hard, magnetic surfaces; the integral heat sink design and low mass minimise thermal inertia and provide an accurate temperature measurement.	240 °C *(460 °F)*	7,0 s
	TMDT 2-35	**Probe with sharp tip** Can be easily inserted into semi-solid materials like food-stuffs, meat, plastic, asphalt, deep-frozen products, etc.	600 °C *(1 110 °F)*	12,0 s
	TMDT 2-36	**Pipe clamp probe** For temperature measuring on pipes, cables, etc. Diameter up to ø 35 mm *(1.4 in.)*.	200 °C *(390 °F)*	8,0 s
	TMDT 2-38	**Wire probe** Thin, lightweight, very fast response, fibreglass insulated.	300 °C *(570 °F)*	5,0 s
	TMDT 2-39	**High temperature wire probe** Thin, light weight, very fast response, ceramic insulation.	1 350 °C *(2 460 °F)*	6,0 s
	TMDT 2-34	**Gas and liquid probe** Flexible shank made of stainless steel for liquids, oils, acids, etc. and for use with high temperatures, e.g. open fire (not for molten metals).	1 100 °C *(2 010 °F)*	12,0 s
	TMDT 2-34/1.5	**Gas and liquid probe** Same as TMDT 2-34 but with thin shank and faster response time. Very flexible, especially suitable for measuring temperature of gases.	900 °C *(1 650 °F)*	6,0 s
	TMDT 2-40	**Rotating probe** For moving or rotating smooth surfaces. Four roller bearings provide suitable contact with the surfaces. Max. velocity 500 m/min.	200 °C *(390 °F)*	0,6 s
	TMDT 2-41	**Non-ferrous foundry probe** Holder including dip-element for molten, non-ferrous metals. Highly resistant to corrosion and oxidation at high temperatures.	1 260 °C *(2 300 °F)*	30,0 s
	TMDT 2-42	**Ambient temperature probe** For measurement of ambient temperature.		
	TMDT 2-37	**Extension cable** For use with all K-type probes. Special lengths are available on request.		

All probes can be used with the SKF digital thermometers TKDT 10, TKTL 20, TKTL 30 and TKTL 40 without recalibration.

Digital devices to gather critical machine data

Tachometers

SKF offers its TKRT range of tachometers, which use laser or contact measurement to determine the rotational and linear speed of rotating equipment. Each handheld device is compact in design, and offers fast, accurate measurement. The laser sensor allows measurements to be made at a safe distance from rotating machinery. Each device is supplied with contact adaptors and uses standard or rechargeable batteries.
Output information is clearly displayed on a large, easy-to-read screen.

Measurement modes include: rotational speed, total revolutions, frequency, surface speed and length – in both metric and imperial units. The breadth of measurement modes, and wide speed range, make the tachometers suitable for use in a variety of applications.

TKRT 10
Digital tachometer

- Laser/contact measuring system
- Wide speed measurement range
- Multiple measurement modes
- Large, back-lit LCD display
- Angular range of ±45° for easy measuring
- Up to 10 readings stored for reference
- Includes basic set of contact adaptors

TKRT 21
Multi-functional digital tachometer

- Laser/contact measuring system
- Wide speed measurement range
- Multiple measurement modes
- Large LCD display
- Includes basic set of contact adaptors
- Uses standard or rechargeable batteries

TKRT 31
Advanced digital tachometer

- Large colour-backlit TFT display
- Measures linear and rotational speed, and distances
- Includes full set of contact adaptors
- Large angular range simplifies measurement, where straight-line access is difficult

TKRT 10

TKRT 21

TKRT 31

The TKRT 10 is a well-established entry level model.

he TKRT 21 offers higher performance, such as a greater measuring distance and angle of operation.

TKRT 31 has a wide speed range and a large number of measurement modes, a colour TFT screen and a full set of contact adaptors.

Enclosed parts for contact measurement

TKRT 10
- Adaptor
- Conical tips
- Wheel

TKRT 21
- Adaptor
- Conical tips
- Wheel

TKRT 31
- Adaptor
- Extension shaft
- Conical tips
- Wheels (2 sizes)

Multiple machines
A wide speed range and diversity of measurement modes makes the TKRT series tachometers suitable for monitoring many types of rotating machinery. These include:

- Electric motors
- Conveyors
- Rotary feeders
- Grinders
- Dryers
- Cooling equipment
- Worm wheels
- Elevators

Industrial applications
Some typical industries and areas where these devices can be used include:

- Power plants
- Recycling
- Automotive
- Materials handling
- Food & beverage
- Paper mills

Technical data

Designation	TKRT 10	TKRT 21	TKRT 31
General			
Memory	10 readings memories	–	Yes, 5 slots
Low battery indicator	Yes	Yes	Yes
Auto switch off	After 15 seconds	Yes	Yes
Display	–	LCD	Multi-line backlight TFT
Display update	–	Continuous	Continuous
Controls	–	Direct selector switches	Direct selector switches
Housing material	–	ABS (plastics)	ABS (plastics)
Measurement			
Optical modes	r/min and Hz	r/min and Hz	r/min and Hz
Contact modes	r/min, metres, inches, yards, feet, per min, Hz	r/min and Hz, meters, feet, inch, per min and per sec	r/min and Hz, meters, feet, inch, per min and per sec
Count modes	Total revs, metres, feet, yards	Distance mode	Distance mode
Speed capture feature	–	Maximum, Minimum or Average rate	Maximum, Minimum or Average rate
Linear speed	0,2 to 1 500 metres/min *(4 500 ft/min)*	Meters, feet, inch, per min and per sec	Meters, feet, inch, per min and per sec
Optical measurement			
Rotational speed range	3 to 99 999 r/min	1 to 99 999 r/min	1 to 99 999 r/min
Accuracy	± 0.05% of reading ± 1 digit	±0.01% of reading ±1 digit	±0.01% of reading ±1 digit
Measuring distance	50 to 500 mm *(1.9 to 19.7 in)*	25 to 1 200 mm *(1 to 47 in)*	25 to 1 200 mm *(1 to 47 in)*
Angle of operation	± 45º	±30°	±30°
Laser sensor	Built-in class 2 laser	Built-in class 2 laser	Built-in class 2 laser
Contact measurement			
Rotational speed range	2 to 20 000 r/min	Max. 20 000 r/min for 36 000 sec	Max. 20 000 r/min for 36 000 sec
Accuracy	± 1% of reading ± 1 digit	±0.1% of reading ±1 digit (> 120 r/min)	±0.1% of reading ±1 digit (>120 r/min or "high accuracy") "low speed accuracy" at < 120 r/min
Contact adaptors	Included with conical tip, conical recess and wheel	Included with removable cones and wheel	Included with removable cones and wheels
Battery and power			
Power source	1x 9V alkaline type IEC 6F22	2 x AA batteries, rechargeable can be used	2 x AA batteries, rechargeable can be used
Run time ca.	12 hours continuous use	50% Laser-On: 12:00 h	20% Display brightness, 50% Laser-On, 50% Bluetooth-On: 8:00 h 100% Display brightness, 50% Laser-On, 50% Bluetooth-On: 3:30 h
Additional power source	6 V DC port (charger not included)	–	–
Size and weight			
Product dimensions	160 × 60 × 42 mm *(6.3 × 2.4 × 1.7 in)*	295 × 70 × 38 mm *(11.6 × 2.8 × 1.5 in)*	295 × 70 × 38 mm *(11.6 × 2.8 × 1.5 in)*
Case dimensions	260 × 85 × 180 mm *(10.3 × 3.4 × 7.0 in)*	260 × 85 × 180 mm *(10.2 × 3.3 × 7.1 in)*	260 × 85 × 180 mm *(10.2 × 3.3 × 7.1 in)*
Unit weight	160 g *(0.35 lbs)*	270g *(0.6 lb)*	270g *(0.6 lb)*
Total weight (incl. case)	680 g *(1.5 lbs)*	850g *(1.9 lb)*	850g *(1.9 lb)*
Operating requirements			
Operating temperature	0 to 50 °C *(32 to 122 °F)*	0 to 40 °C *(32 to 104 °F)*	0 to 40 °C *(32 to 104 °F)*
Storage temperature	- 10 to 50 °C *(14 to 122 °F)*	–20 to 45 °C *(–4 to 113 °F)*	–20 to 45 °C *(–4 to 113 °F)*
Type of protection for indication only	IP 40	IP 40	IP 40
Case contents	1 × Tachometer TKRT 10 1 × Set of 3× contact adaptors 1 × 9V battery 1 × Set of reflective tape 1 × Instructions for use	1 × Tachometer TKRT 21 2 × Conical tips 1 × Wheel 2 × AA batteries 1 × Set of reflective tape 1 × Instructions for use	1 × Tachometer TKRT 31 1 × Extension shaft 2 × Conical tips 2 × Wheels 2 × AA batteries 1 × Set of reflective tape 1 × Instructions for use

Mechanical tachometer provides accurate and reliable condition monitoring

Tachometer TKRT 25M

The TKRT 25M is a mechanical, hand-held tachometer that uses precise contact measurement to determine rotational and linear speed. It provides fast, easy monitoring of machinery such as engines, shafts and conveyer belts. The instrument fits in one hand, requires no batteries and has a large dial gauge display – making it easy to read. As well as being compact and sturdy, the TKRT 25M is supplied with a full set of contact adaptors.

Basic equipment such as the TKRT 25M helps companies to incorporate condition monitoring into their operations without investing in large, sophisticated systems. By measuring the rotational and linear speed of key assets, the TKRT 25M reduces the possibility of catastrophic machine failure.

TKRT 25M offers speed measurement in different metric units. Its large, accurate gauge gives an instant reading in either rpm, or metres per minute. The device is easy to use and is protected by a compact, rugged plastic housing. Because it targets a large angular range, it can perform measurements in areas where straight-line access is difficult.

Although TKRT 25M has wide applicability, it is not suitable for use in ATEX environments.

- Easy-to-use: can be operated with one hand
- Large dial gauge display makes information easy to read
- Gives exact measurements of rotational speed (in revolutions per minute) or linear speed (in metres/min)
- Memory button holds pointer in the last position until reset
- Mechanical operation means that no batteries are needed, so it can be used in many industries
- Compact, sturdy housing

Technical data

Designation	TKRT 25M
Measurement	
Contact modes	rpm and m/min
Rotational speed range	10 to 10000 rpm
Linear speed range	1 to 1000 m/min
Accuracy	±0.5% of measuring range full scale value
Contact adaptors	Included with removable cones and wheel
Display update	Continuous live
Controls	Range selector switch and measure/hold button
General	
Housing material	ABS (plastics)
Product dimensions	155 x 85 x 55 mm *(6.1 x 3.2 x 2.2 in)*
Case dimensions	260 x 85 x 180 mm *(10.2 x 3.3 x 7.1 in)*
Unit weight	300 g *(0.7 lb)*
Total weight (incl. case)	880 g *(1.95 lb)*
Operating temperature	0 to 40 °C *(32 to 104 °F)*
Storage temperature	-10 to 40 °C *(14 to 104 °F)*
Type of protection for indication only	IP40
Case contents	1 × Tachometer, 1 × Extension shaft, 1 × Conical tips, 1 × Wheel, 1 × Instructions for use

High-performance, hand-held stroboscopes for visual inspection

Stroboscopes

SKF offers a wide range of portable TKRS stroboscopes for visual inspection of running machines in challenging industrial environments. These portable tools provide early detection of abnormalities to help schedule maintenance tasks and reduce additional loads on rotating equipment in order to reach planned performance levels. Designed for ease of use, the four TKRS models offer from 3 to 118 ultra-bright LEDs. Each stroboscope features a large screen and multifunctional selector switch to help you quickly navigate to the correct menu. Brightness and performance levels are adjustable.

TKRS 11

- Quick speed selection with rotary button
- Black and white LCD display
- Three ultra-bright LEDs

TKRS 21

- High luminescence with seven ultra-bright LEDs
- Multi-line backlit TFT

TKRS 31

- Built-in laser tachometer with flash synchronization
- Pro-mode with additional features like slow motion phase shift
- Trigger input and output with signal modification

TKRS 41

- Extreme luminescence with 118 ultra-bright LEDs
- Portable operation with built-in rechargeable battery
- Continuous operation for long term inspection with power adapter
- Flash synchronization from laser tachometer or trigger input

General benefits of TKRS series:

- Intuitive operation for fast and easy inspection jobs
- Ergonomic and robust design for portable usage in industrial environments
- Bright LEDs with long lifetime and continuous operation
- Tripod mount for stationary inspection

Applications and industries:

- **General industry** – Inspection of fans, gears, belts, chains, couplings, shafts, etc.
- **Paper** – Quality control
- **Textile** – Setup/Inspection of production processes, especially spindles and weaving patterns
- **Printing** – Quality control
- **Test equipment** – Analysis of materials and components during fast movements, including component behavior under vibration or resonance frequency tests

Technical data

Designation	TKRS 11	TKRS 21	TKRS 31	TKRS 41
Light Power	>2 000 Lux at 3° flash duration and 0,3 m *(12 in.)* distance	>6 200 Lux for at 3° flash duration and 0,3 m *(12 in.)* distance	>5 600 Lux at 3° flash duration and 0,3 m *(12 in.)* distance	8 000 lux at 1° flash duration and 0,3 m *(12 in.)* distance
Brightness (flash duration)	adjustable, 0,2°–5,0°	adjustable, 0,2°–5,0°	adjustable, 0,2°–5,0°	adjustable, 0,025° – 3,0°
Accuracy	±0,02% (±1 digit / ±0,025 µs) whichever is greater	±0,02% (±1 digit / ±0,025 µs) whichever is greater	±0,02% (±1 digit / ±0,025 µs) whichever is greater	±0,02% (±1 digit / ±0,025 µs) whichever is greater
Laser speed measurement	No	No	Yes	Yes
Phase shift	Yes	Yes	Yes with slow motion function	Yes with slow motion function
Run time ca.	ca. 5:30 h @ 1° (100% display brightness) ca. 7:45 h @ 0,2° (20% display brightness)	ca 3:00 h @ 1° (100% display brightness) ca. 6:45 h @ 0,2° (20% display brightness)	ca. 3:45 h @ 1° (100% display brightness) ca. 8:15 h @ 0,2° (20% display brightness)	ca. 2:30 h @ 0,50° (~4000 lux) ca. 5:00 h @ 0,25° (~2000 lux)
Display	Black and White LCD	Multi-line backlight TFT	Multi-line backlight TFT	Multi-line backlight LCD
Power source	3 x AA batteries (included)	3 x AA batteries (included)	3 x AA batteries (included)	internal Li-ion battery (rechargeable); continuous operation with power adapter (included)
Power adapter and charger	N/A	N/A	N/A	110–230 V, 50/60 Hz, EU/US/UK/AUS plugs
External trigger range	N/A	N/A	30 to 300 000 f/min	0 to 300 000 f/min
External trigger connection	N/A	N/A	Plug: 3,5 mm TRS plug (included) Input: 3 - 30 V / max. 5 mA (NPN) Output: up to 30V / max 50 mA (NPN)	Plug: 5-pin plug DIN 41524 (included) Input: 3 - 30 V / max. 5 mA (potentialfree optocoupler)
Signal modification	N/A	N/A	Edge selection, Multiplier, Divider, Delay	Edge selection, Multiplier, Divider, Delay
Instrument dimensions	225 × 78 × 50 mm *(8.9 x 3 x 2 in.)*	225 × 78 × 50 mm *(8.9 x 3 x 2 in.)*	225 × 78 × 50 mm *(8.9 x 3 x 2 in.)*	Without rubber protection 150 × 130 × 112 mm *(6.0 × 5.1 × 4.4 in.)*
Instrument weight (incl. batteries)	0,29 kg *(0.64 lb)*	0,29 kg *(0.64 lb)*	0,3 kg *(0.65 lb)*	1,15 kg *(2.53 lb)*
Case dimensions	260 x 180 x 85 mm *(10.2 x 7.1 x 3.3 in.)*	260 x 180 x 85 mm *(10.2 x 7.1 x 3.3 in.)*	260 x 180 x 85 mm *(10.2 x 7.1 x 3.3 in.)*	345 x 165 x 270 mm *(13.6 x 6.5 x 10.6 in.)*
Total weight (case + instrument)	0,78 kg *(1.7 lb)*	0,78 kg *(1.7 lb)*	0,79 kg *(1.7 lb)*	2,4 kg *(5.3 lb)*

Fast and easy inspection with video function

Endoscopes TKES 10 series

SKF Endoscopes are first line inspection tools that can be used for internal inspection of machinery. They help minimise the need to disassemble machinery for inspection, saving time and money. The compact display unit, with 3.5" backlit screen, allows images and video to be saved and recalled, or to be downloaded and shared with others. Three different models cater to most needs and are equipped with powerful variable LED lighting allowing inspections in dark locations.

- High resolution miniature camera, with up to 2× digital zoom, gives a clear and sharp full screen image
- Available with a 1 metre *(3.3 ft)* insertion tube in three different variants; flexible, semi-rigid or with an articulating tip
- Small tip diameter of 5,8 mm *(0.23 in.)*, with a wide field of view, allows easy access to most applications
- Supplied with a side view adapter allowing inspection of applications such as pipe walls
- Powerful magnets, and a tripod mount on the back of the display unit, allow the display unit to be used "hands free"
- Up to 50 000 photos or 120 minutes of video can be stored on the SD memory card supplied
- Longer flexible and semi-rigid insertion tubes are available as accessories
- Supplied in a sturdy carrying case complete with all necessary cables, universal mains charger and cleaning kit

TKES 10F
Flexible tube

TKES 10S
Semi-rigid tube

TKES 10A
Tube with an articulating tip

Photos and videos can be transferred to PC using the USB cable provided.

Technical data

Designation	TKES 10F	TKES 10S	TKES 10A
Insertion tube and light source	Flexible tube	Semi-rigid tube	Tube with an articulating tip
Image sensor	CMOS image sensor	CMOS image sensor	CMOS image sensor
Resolution (H × V)			
Still image (static)	640 × 480 pixels	640 × 480 pixels	320 × 240 pixels
Video (dynamic)	320 × 240 pixels	320 × 240 pixels	320 × 240 pixels
Size tip (insertion tube) diameter	5,8 mm *(0.23 in.)*	5,8 mm *(0.23 in.)*	5,8 mm *(0.23 in.)*
Tube length	1 m *(39.4 in.)*	1 m *(39.4 in.)*	1 m *(39.4 in.)*
Field of view	67°	67°	55°
Depth of field	1,5–6 cm *(0.6–2.4 in.)*	1,5–6 cm *(0.6–2.4 in.)*	2–6 cm *(0.8–2.4 in.)*
Light source	4 White adjustable LED (0–275 Lux/4 cm)	4 White adjustable LED (0–275 Lux/4 cm)	4 White adjustable LED (0–275 Lux/4 cm)
Probe working temperature	–20 to +60 °C *(–4 to +140 °F)*	–20 to +60 °C *(–4 to +140 °F)*	–20 to +60 °C *(–4 to +140 °F)*
Ingress protection level	IP 67	IP 67	IP 67

Technical data

Display Unit	
Power	5 V DC
Display	3.5" TFT LCD monitor 320 × 240 pixels
Interface	Mini USB 1.1 / AV out / AV in/
Battery (not user serviceable)	Rechargeable Li-Polymer battery (3.7 V). Typically 4 hours operation after a 2 hour charge.
Video out format	NTSC & PAL
Recording medium	SD card 2 GB supplied – storage capacity ±50 000 photos, or 120 minutes video. (SD/SDHC cards up to 32 GB can be used)
Output resolution (H × V)	
Still image (JPEG)	640 × 480 pixels
Video recording format (ASF)	320 × 240 pixels
Temperature range	
Working and storage	-20 to +60 °C *(–4 to +140 °F)*
Battery charging temperature range	0 to 40 °C *(32 to 104 °F)*
Functions	Snapshot, video recording, picture & video review on LCD screen, TV Out, transfer of picture & video from SD card to PC

Easily pinpoints bearing and machine noise

Electronic stethoscope TMST 3

The SKF TMST 3 is a high quality instrument enabling the determination of troublesome machine parts by the detection of machine noises. TMST 3 includes a headset, two different length probes (70 and 300 mm) and a pre-recorded audio CD demonstrating the most common encountered troublesome machine noises, all supplied complete in a sturdy carrying case.

- User friendly and easy to operate, no special training required
- Lightweight ergonomic design makes it easy to operate with one hand
- Excellent sound quality helps to reliably identify the possible cause of the noise
- Excellent quality headset for optimum sound quality even in very high-noise environments
- Pre-recorded demonstration CD and output for analogue recording help facilitate analysis and comparison
- Supplied with two probes, 70 and 300 mm *(2.8 and 11.8 in.)* long
- Adjustable digital volume control up to 32 levels to reach desired volume

Technical data

Designation	TMST 3
Frequency range	30 Hz–15 kHz
Operating temperature	–10 to +45 °C *(14 to 113 °F)*
Output volume	Adjustable in 32 levels
Led indicator	Power on Sound volume Battery low
Maximum recorder output	250 mV
Headset	48 ohm (with ear defender)
Auto switch off	Yes, after 2 min.
Battery	4 × AAA Alkaline type IEC LR03 (included)
Battery lifetime	30 hours (continuous use)
Dimensions handset	220 × 40 × 40 mm *(8.6 × 1.6 × 1.6 in.)*
Probe length	70 and 300 mm *(2.8 and 11.8 in.)*
Carrying case dimensions	360 × 110 × 260 mm *(14.2 × 4.3 × 10.2 in.)*
Weight	
Total weight	1 600 g *(3.5 lb)*
Instrument	162 g *(0.35 lb)*
Headset	250 g *(0.55 lb)*

Quick and easy detection of air leaks

Ultrasonic leak detector TKSU 10

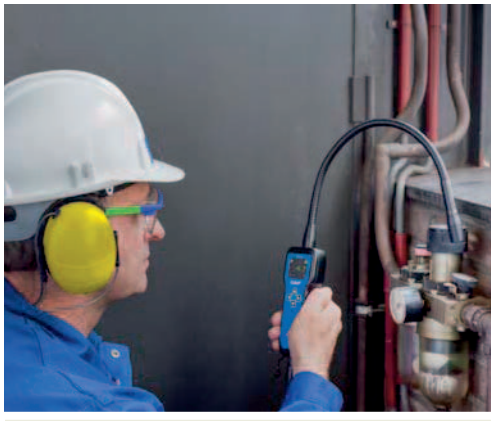
The SKF TKSU 10 is an ultrasonic leak detector that helps users to quickly find leakages in compressed air or vacuum systems. The instrument is very simple to use and features adjustable sensitivity and intuitive guidance for superior leak detection results. Any compressed air system can experience leaks, which amplify the load on compressors and increase costs.

Sensor bandwidth
35 to 42 kHz

The TKSU 10 helps users to easily find leaks from a distance, even in noisy industrial environments, via its ultrasound measurement sensor. The built-in LED display assists the user in adjusting sensitivity and shows the measured ultrasound noise from leaking air, allowing the quantification of leaks and prioritization of repairs.

- Easy to use; no training required
- Leak detection from a distance in noisy industrial environments
- Color LED display assists in adjusting sensitivity settings and shows measurement values
- Reduces energy and maintenance costs via leak identification and repair
- Lightweight, handheld device with industrial headset included
- Independently adjustable sensor sensitivity and headset volume
- Flexible probe helps find leaks in difficult-to-access locations

The TKSU 10 is designed for use in all industries utilizing compressed air, and it is particularly recommended for paper and chemical industries, as well as workshops with air-driven power tools.



Headset features neck-band design to wear with protective helmet

Technical data

Designation	TKSU 10
Keyboard	5 function keys
Measuring range	-6 to 99,9 dBµV (reference 0 dB = 1 µV)
Resolution	0,1 dBµV
Amplification	5 adjustable positions in steps of 6 dB
Maximum output	+83 dB SPL with supplied headset
Headset	25 dB NRR Peltor HQ headset
Battery	2 AA batteries
Battery life	7 hours
Operating temperature	–10 to +50 °C *(14 to 122 °F)*
IP rating	IP42
Flexible rod length	445 mm *(17.51 in.)*
Carrying case dimensions	530 × 110 × 360 mm *(20.9 × 4.3 × 14.2 in.)*
Total weight (incl. case)	3 kg *(6.6 lbs)*

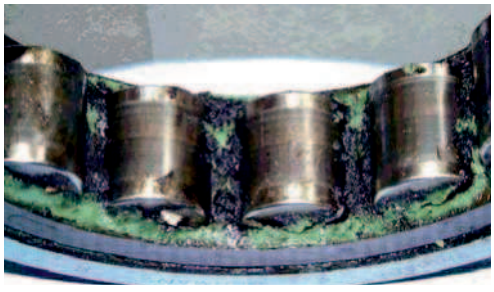
Unique, reliable and safe method to detect electrical discharges in electric motor bearings

Electrical discharge detector pen TKED 1

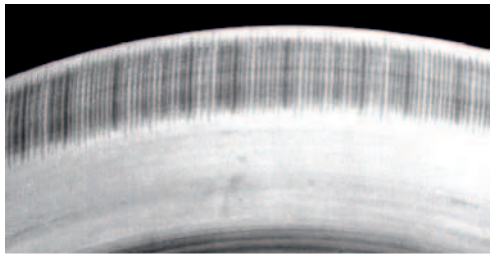
The SKF TKED 1 (EDD Pen) is a simple to use hand-held instrument for detecting electrical discharges in electric motor bearings. Electrical discharges are a result of motor shaft voltages discharging to earth through the bearing, causing electrical erosion, lubricant degradation and ultimately bearing failure.

Electric motors are more vulnerable to suffer electrical erosion in bearings when controlled by a Variable Frequency Drive. When incorporated into a predictive maintenance programme, the EDD Pen can help detect bearings more susceptible to failure, and to a significant degree, prevent unplanned machine downtime.

- Unique remote solution allows operation at a distance from the motors. This helps protect the user from touching machinery in motion
- SKF developed technology [1)]
- No special training required
- Capable of detecting electrical discharges on a time base of 10 seconds, 30 seconds or infinite
- LED backlit screen, allows use in dark environments
- IP 55 can be used in most industrial environments
- Supplied standard with batteries, a spare antenna and language-free instructions for use in a carrying case



Lubricant degradation caused by electrical discharge currents



Fluting marks characteristic of electrical erosion in bearings

[1)] Patent applied for

Technical data

Designation	TKED 1
Power supply	4,5 V 3 × AAA Alkaline type IEC LR03
Time control	
pre-sets	10 or 30 seconds
default	indefinite
Operational and storage temperature	0 to 50 °C *(32 to 122 °F)* –20 to +70 °C *(–4 to +158 °F)*
Ingress protection level	IP 55
Display	LCD counter range: 0 to 99 999 discharges. User selectable backlight and low battery warning
Carrying case dimensions	260 × 85 × 180 mm *(10.3 × 3.4 × 7.0 in.)*
Total case and contents weight	0,4 kg *(0.88 lb)*

Machine monitoring made easy

SKF QuickCollect sensor

The SKF QuickCollect sensor is an easy to use bluetooth enabled handheld sensor that connects to iOS and Android apps on your tablet, smart phone or smart watch (iOS only). Combining vibration and temperature sensing, overall data can be viewed on the spot in real time or pushed to the cloud for future analysis. This SKF QuickCollect sensor is ideal for service, reliability, operations, or maintenance personnel as part of a walk around data collection program.

Features

- Velocity, acceleration enveloping, and temperature measurements
- Bluetooth communication with tablets, smart phones, smart watches
- Easy to use sensor and apps
- Easy to understand indications of machine condition
- Rugged industrial design – Drop test 1.8 m (6 ft.), water and dust resistant (IP65)
- Rechargeable lithium battery (full working day in normal usage)
- Option to connect, store and share data on the Cloud
- Option to connect directly to SKF Remote Diagnostic Services
- Apps for both iOS and Android devices
- Approved to be used in hazardous areas, ATEX, IECEx and CSA Class I Zone

Benefits

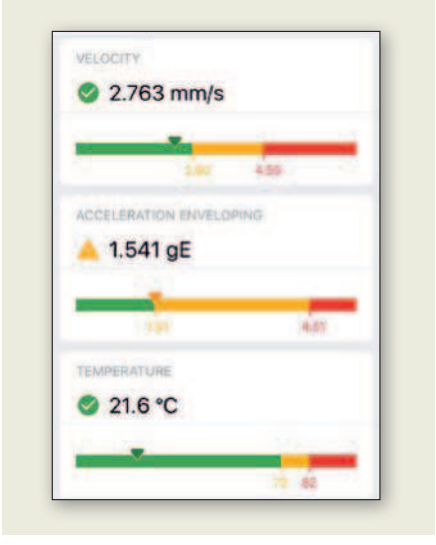
- Gets you started quickly
- Can be used with minimum training and experience
- Identify developing rotating machinery issues before they become problems
- Connect directly to expert advice when you need it
- Expand functionality via apps to grow and compliment your existing maintenance program

Controls and indicators

1. Power button –
Powers the sensor on and off.
2. Battery LED – (Green, Red)
Indicates status of battery charge
3. Communication LED – (Green, Red)
Indicates whether the sensor is connected to an app. Also indicates when firmware updates are in progress.
4. All purpose check LED – (Green, Red, Amber)
Indicates error conditions

Measurement displays

Measurements taken by the sensor are shown on your mobile device, which displays velocity, enveloped acceleration and temperature as shown below:



For more information see publication PUB CM/P2 17198/3