



A new age of thermal mounting and dismounting

Thermal mounting and dismounting History

SCHAEFFLER

Vision 2020

High-efficient inductive solutions for non-dismountable bearings

2012-2013

Application specific solutions



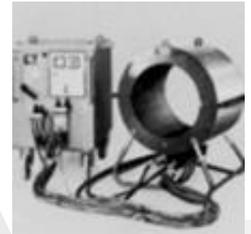
TPlxxx
in
process



2010- 2011

FAG Medium
Frequency Technology
Systems

1950-2000



2006-2009

Optimization of portfolio



HEATING-RING.PASTE-20ML

New age of thermal mounting and dismounting

SCHAEFFLER

Overview

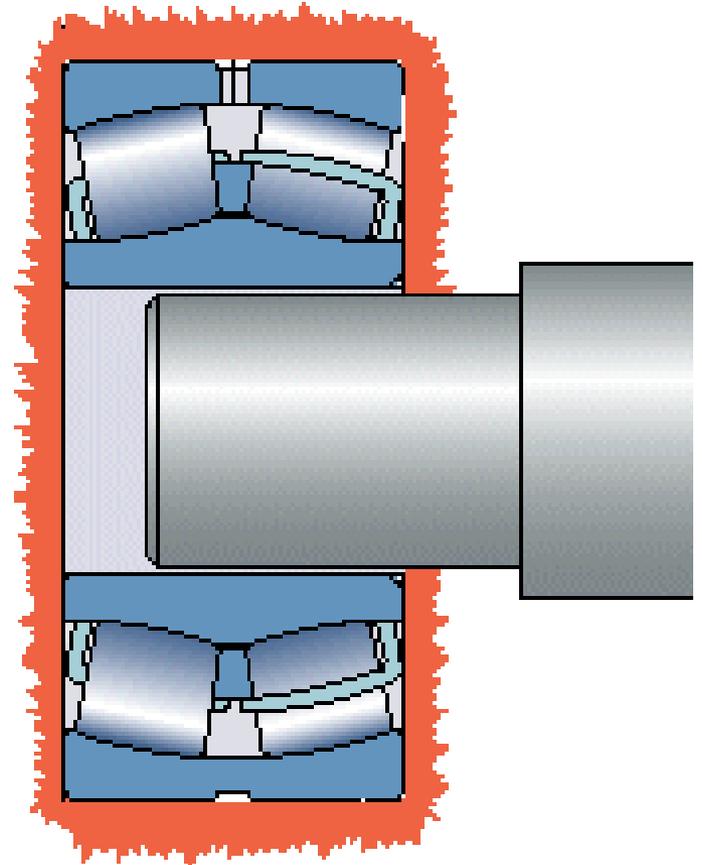
- **Basics**
- **History**
- **Challenge**
- **Solution**
- **Medium frequency technology and application**
- **Features and benefits**

New age of thermal mounting and dismounting

Basics

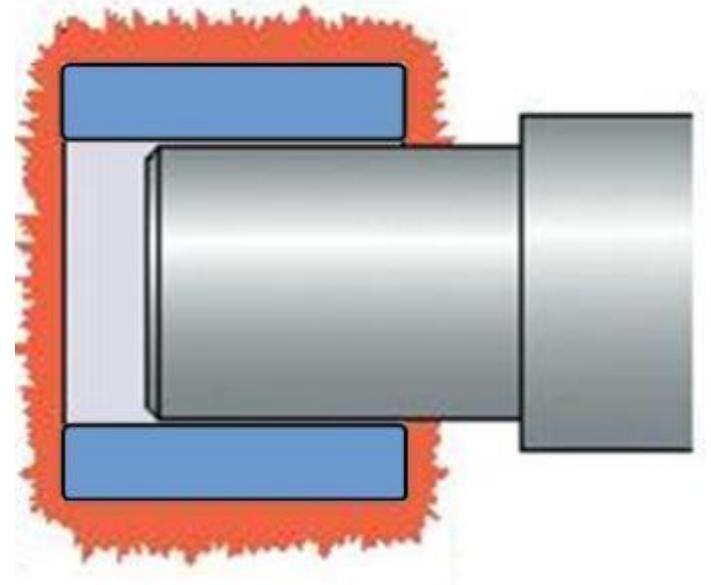
Thermal Mounting Procedure:

- Heating up the bearing
- Bearing is expanding
- Pushing the bearing onto the shaft
- Bearing is shrinking onto the shaft



Thermal Dismounting Procedure:

- Heating up the bearing inner ring quickly
- Bearing inner ring is expanding, but not the shaft
- Removing the bearing from the shaft



Medium Frequency Technology

Traditional inductive heating

SCHAEFFLER

Mounting

Reliable FAG HEATER- family for economic heating of a wide range of various workpieces and for serial mounting.

Dismounting

FAG COIL-systems for dismounting bearing inner rings and other interference fit.



Medium Frequency Technology Challenge

Large and heavy applications

The usability of traditional heating devices is limited particularly in case of:

- very large sized bearings...
- and large housings or other work pieces with complex geometrical shape (e. g. wind energy)

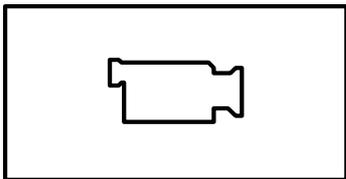


Medium Frequency Technology Solution

SCHAEFFLER

MEDIUM FREQUENCY TECHNOLOGY

- Systems are consisting of
 - Medium frequency generator
 - Inductor

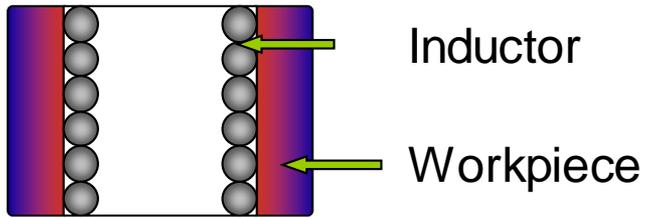


Medium Frequency Technology Solution

Inductor design

Inductors can be designed depending on the requirements as

external field inductor



flexible inductor



flexible inductor with sub frame



fixed inductor

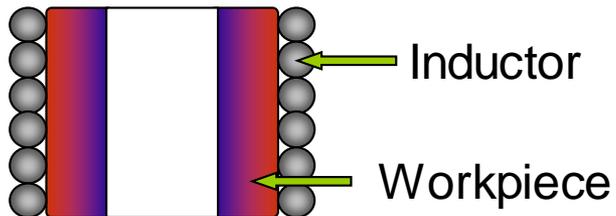


Medium Frequency Technology Solution

Inductor design

Inductors can be designed depending on the requirements as

internal field inductor



flexible inductor



flexible inductor with sub frame



fixed inductor



Medium Frequency Technology Flexible Inductor

SCHAEFFLER

Mounting

- usable for large sized bearings (e. g. wind energy)
- usable for large sized housings and machine carriers



Medium Frequency Technology Flexible Inductor

Mounting complete bearings

Bearing has to be heated in 2 steps in order to ensure radial clearance while heated:

1. Heating outer ring up to mounting temperature by fixing inductor at the outer ring
2. Heating inner ring up to mounting temperature by fixing inductor at the outer ring



Medium Frequency Technology Flexible Inductor

SCHAEFFLER

Dismounting bearing inner rings

- Wrapping inductor around the racetrack of inner ring
- Starting heating procedure
- Removing inner ring after by crane/bearing mate



Medium Frequency Technology Flexible Inductor

SCHAEFFLER

Dismounting gear wheel:

- Shaft has to be equipped with a lifting device
- Gear wheel has to be positioned horizontal by crane onto a stand
- Axial force on the shaft by lifting a few millimeters
- Starting heating procedure
- Gear wheel goes down onto the stand after elimination of interference
- Lifting the shaft out of the gear wheel by crane



Medium Frequency Technology

Wind power customer solution

SCHAEFFLER

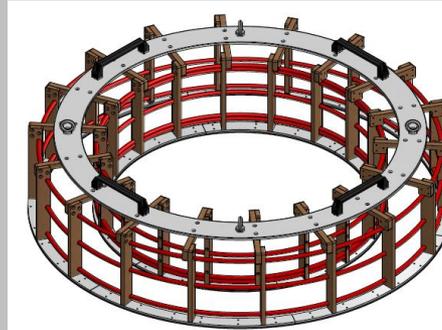
Requirements



Heating of different types SRB (bore diameter 800 mm to 1050 mm for serial mounting):

- shortening heating time
- handling simplification
- reduction energy cost

Product



USP

- HEAT-GENERATOR24 with 24 kW active power
- 3 fixed inductors designed to heat bearing inner ring and outer ring at the same time

USP

Customer Benefit



- Heating time reduction up to 50%: from approx. 50 min to 25 min
- energy cost reduction more than 50%
- equal heating – process reliability
- noise free mounting area

Medium Frequency Technology Generator

SCHAEFFLER

Features

- Air cooled system
- 2 Power Stages:
 - 20 kW: HEAT-GENERATOR20-2
 - 40 kW: HEAT-GENERATOR40-2
- Working frequency from 10 to 25 kHz
- 7" Touch panel
- Program features:
 - Temperature control
 - Time control
 - Temperature difference control
 - Ramp control



Medium Frequency Technology Generator

SCHAEFFLER

Features

- Interface:
 - 2 x socket thermocouple type K
 - USB-port
 - Ethernet
 - Temperature control and identification of connected Inductor
 - Signal tower (max 4 elements)
- Weight and dimension:

HEAT-GENERATOR20-2

30 kg

W x D x H: 275 x 500 x 400 mm

HEAT-GENERATOR40-2

55 kg

W x D x H: 365 x 520 x 708 mm



Medium Frequency Technology Generator

SCHAEFFLER

Versions

HEAT-GENERATOR20-2

(SAP-no. 088129144-0000-10)

Power Output: 20 kW
Voltage: 3 x 380 V to 440 V
Frequency 50 – 60 Hz
Main Fuse: 32 A

HEAT-GENERATOR40-2

(SAP-no. 088129292-0000-10)

Power Output: 40 kW
Voltage: 3 x 380 V to 440 V
Frequency 50 – 60 Hz
Main Fuse: 63 A



Medium Frequency Technology Generator

SCHAEFFLER

Versions

HEAT-GENERATOR20-2-480V

(SAP-no. 088129268-0000-10)

Power Output: 20 kW
Voltage: 3 x 460 V to 500 V
Frequency 50 – 60 Hz
Main Fuse: 32 A

HEAT-GENERATOR40-2-480V

(SAP-no. 088129306-0000-10)

Power Output: 40 kW
Voltage: 3 x 460 V to 500 V
Frequency 50 – 60 Hz
Main Fuse: 63 A



Medium Frequency Technology

Flexible inductor

SCHAEFFLER

Features

- Air cooled
- Operation temperature $T_{max.} = 180\text{ °C}$
- Coil material silicone tube
- Connection generator-inductor by plug/socket
- Inductor "standard length" for service solution:
HEAT-INDUCTOR-16M (length 16m) and
HEAT-INDUCTOR-27M (length 27 m)
are covering a wide range of different sized
workpieces



Medium Frequency Technology

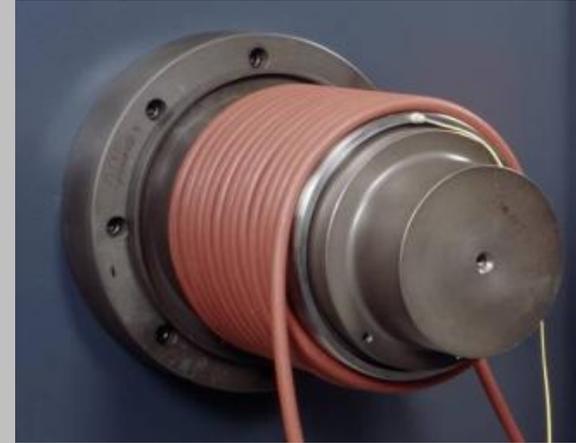
Flexible inductor

SCHAEFFLER

Versions

- **HEAT-INDUCTOR...M**
 - Inductor diameter approx. \varnothing 20 mm
 - Min. bending radius approx. $r=150$ mm
 - Length 12 m to 40 m
- **HEAT-INDUCTOR...M-D15**
 - Inductor diameter approx. \varnothing 15 mm
 - Min. bending radius approx. $r=75$ mm
 - Length 8 m to 12 m

Note: Lower bending radius will cause a corkscrew!



Medium Frequency Technology

Flexible inductor

SCHAEFFLER

- **HEAT-INDUCTOR-8M-D15** (SAP-no. 083551581-0000-10)
- **HEAT-INDUCTOR-12M-D15** (SAP-no. 081415320-0000-10)
- **HEAT-INDUCTOR-14M-D15** (SAP-no. 086251902-0000-10)
- **HEAT-INDUCTOR-16M** (SAP-no. 079238750-0000-10)
- **HEAT-INDUCTOR-20M** (SAP-no. 085805467-0000-10)
- **HEAT-INDUCTOR-24M** (SAP-no. 075644100-0000-10)
- **HEAT-INDUCTOR-27M** (SAP-no. 076576795-0000-10)
- **HEAT-INDUCTOR-30M** (SAP-no. 081269730-0000-10)
- **HEAT-INDUCTOR-40M** (SAP-no. 086299395-0000-10)

Medium Frequency Technology

Necessary Accessory

SCHAEFFLER

Features

Connecting cable set

Generator – flexible Inductors

Generator – fixed Inductors (without fixed inductors for Railway applications)

HEAT-GENERATOR.CONNECT

(SAP-no. 074363166-0000-10)

Dimension:

Ø 25mm, length 2 x 3 m



Medium Frequency Technology Options

SCHAEFFLER

Features

Signal tower with magnet foot

HEAT-GENERATOR.LIGHTS

(SAP-no. 072483679-0000-10)

Acoustical and optical display analogue to generator signal lamps.



Medium Frequency Technology Options

SCHAEFFLER

Features

Fibre blanket for high temperature applications

HEAT-INDUCTOR.COVER1500x300

(SAP-no. 086559311-0000-10)

Flexible inductors are usable up to 180°C

If higher temperatures are requested the flexible inductor has to be protected by a fibre blanket placed between work piece and inductor.

Length x Width:

on request, depending on the
application

Thickness:

approx. 12 mm

Temperature resistance:

up to 500°C



Medium Frequency Technology

Fixed inductor

SCHAEFFLER

Dismounting

Application:

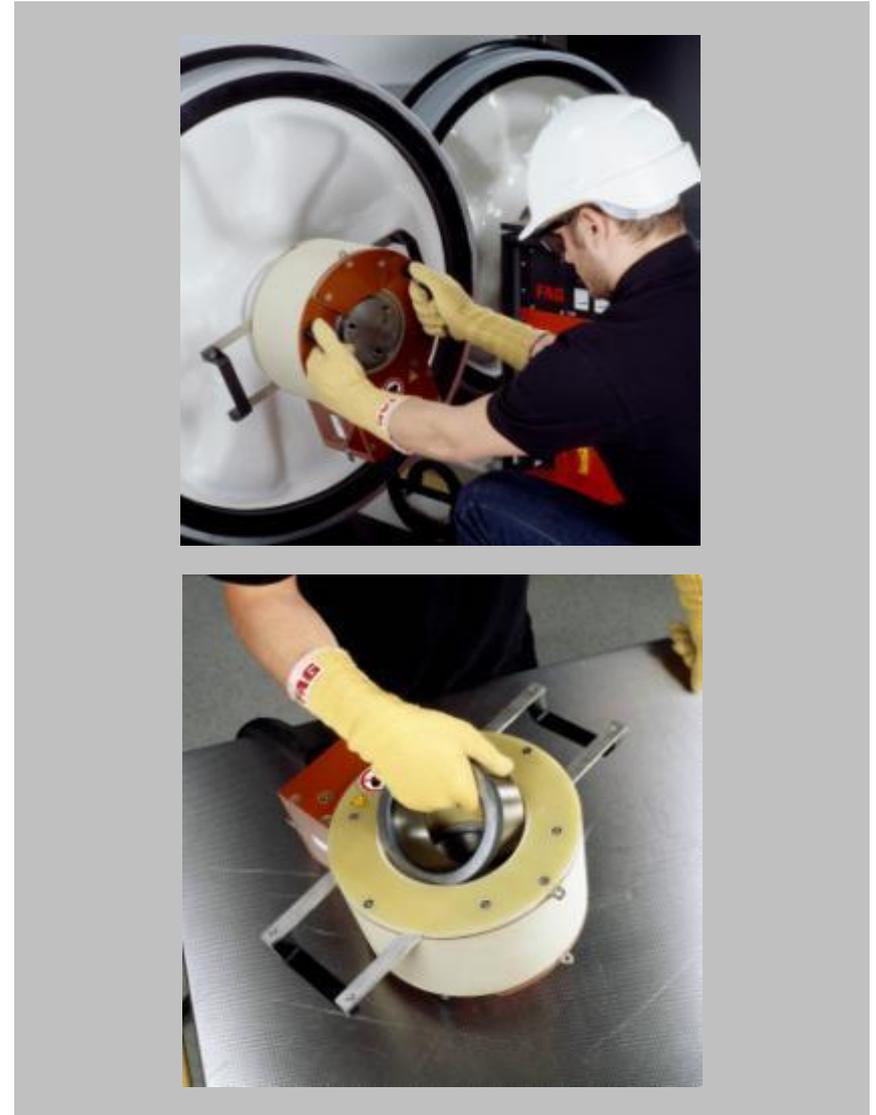
Inner rings of wheel set
bearing WJ/WJP120x240 and
WJ/WJP130x240

Inductor:

HEAT-INDUCTOR-IN157X145

(SAP-no. 072480912-0000-10)

including adapter ring
usable for
WJ/WJP120x240 (120x150x145mm)
and
WJ/WJP130x240 (130x157x145mm)



Medium Frequency Technology

Fixed inductor

SCHAEFFLER

Dismounting

Application:

Labyrinth rings of wheel set bearings

Inductor:

HEAT-INDUCTOR-LAB176X50

(SAP-no. 072480939-0000-10)

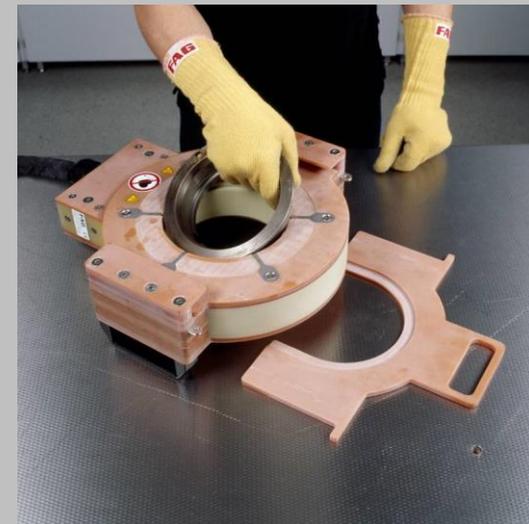
including 2 claws

HEAT-INDUCTOR-LAB176X50.CLAW10

HEAT-INDUCTOR-LAB176X50.CLAW25

and adapter ring

HEAT-INDUCTOR-LAB176X50.SPACER164



Medium Frequency Technology

Fixed inductor

SCHAEFFLER

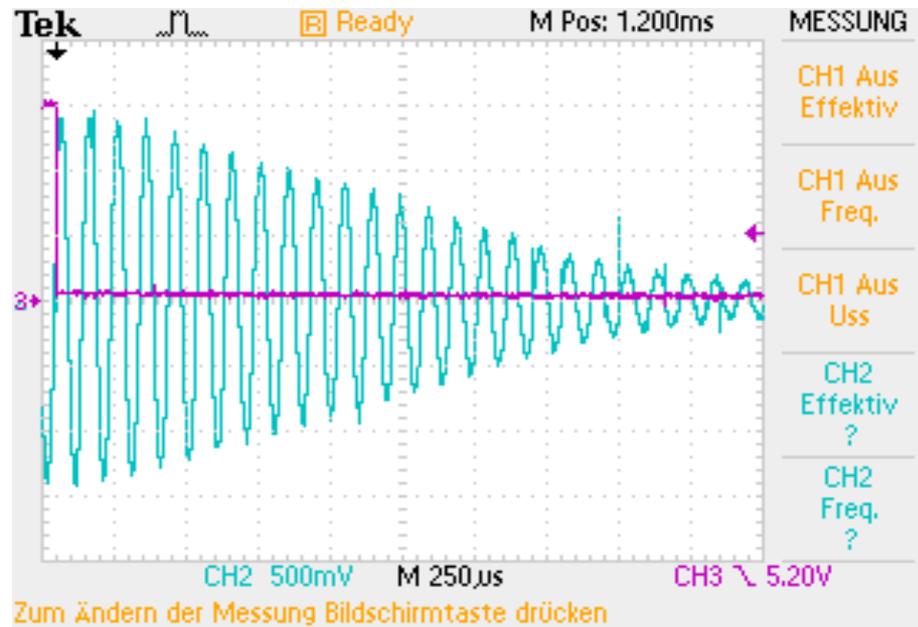
Features

- Air cooled
- Inductor dimensions customized depending on the work piece
- Housing material depending on required operation temperature of the application
- Temperature control of the coil



Medium Frequency Technology

Residual magnetism



Generator current with idling inductor:

When switching off the generator, the current goes down to 0 Ampere within 10 milliseconds. As a result of the linearly attenuation of the current, the residual magnetism of the work piece will be on the same level as before the heating process.

Medium Frequency Technology Application

SCHAEFFLER

Benefits

- Two in one: Mounting and dismounting possible
- Multiplex usability: the flexible inductor can be placed in or around different sized and shaped work pieces.
- Mobile and flexible: large and heavy work pieces (e. g. housings) don't have to be moved.
- Comfortable handling
- Prevention of overheating the work piece.
- Working safety: the system operates noise-free.
- Work piece safety: demagnetizing automatically after heating-up procedure.
- Eco-friendly: energy saving and no water cooling necessary.



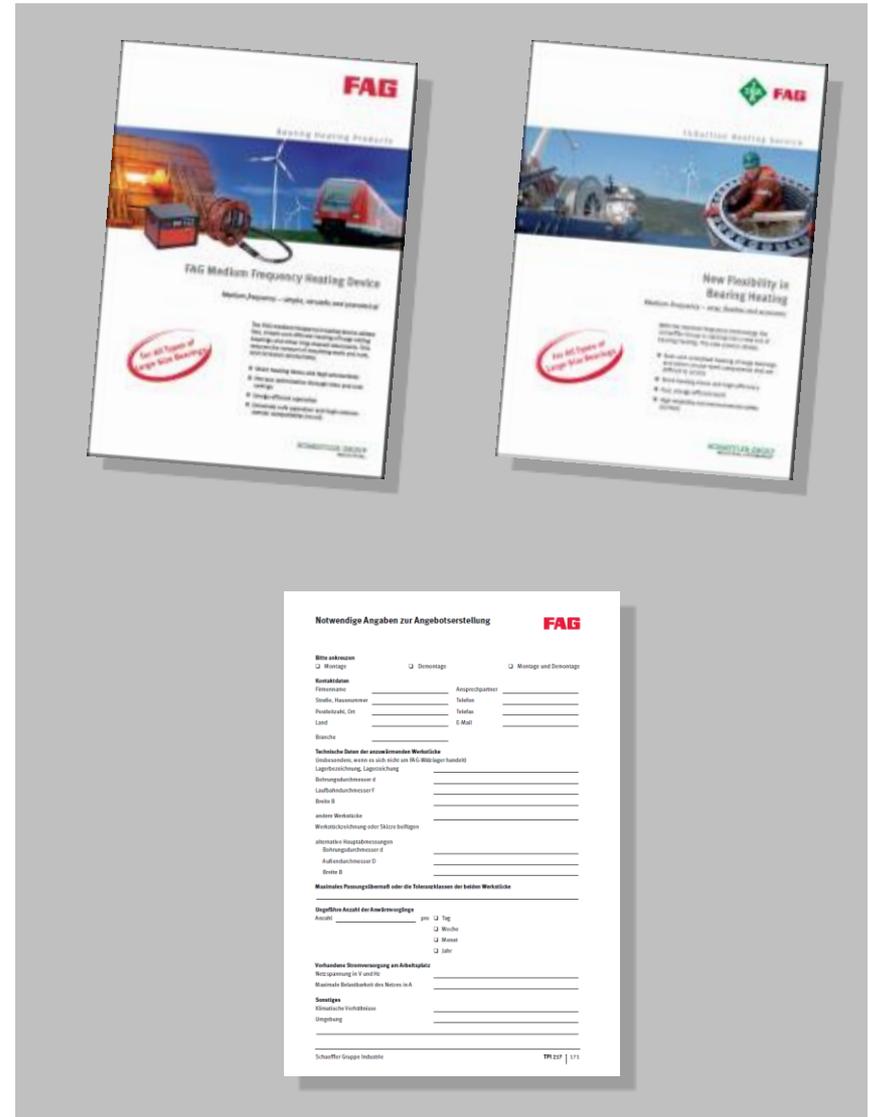
Product information

- Product flyer WL 80376 GB-D
- Service flyer WL 80369 GB-D

How to get an offer:

Send detailed information regarding the application:

- Customer
- Bearing designation / drawing
- Detailed assembly drawing
- Mounting and dismounting requested?
- Description of process and quantity
- Power supply and details at customers location



- Industrial Aftermarket

Mounting Tool Box

SCHAEFFLER



<http://mounting-toolbox.schaeffler.de/en/>

Further information

For further information, please contact:

Global Region Responsible

Tobias Grünbauer

Global Product Sales Services

+49 9721/91-4373

tobias.gruenbauer@schaeffler.com

Together We Move The World



Thank you