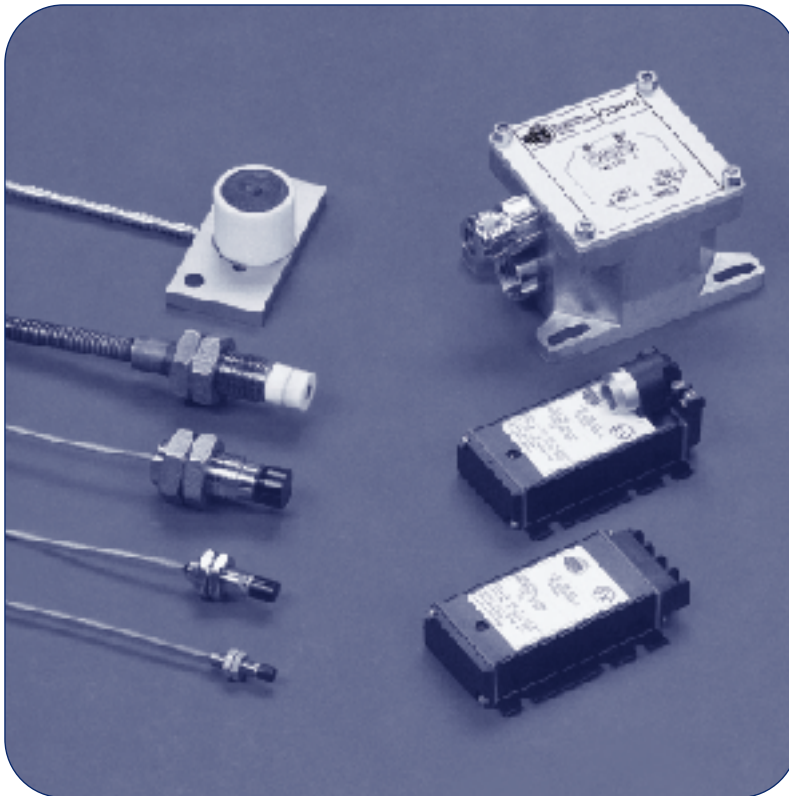


# Displacement Transducers PR 6422/.. - 26/..

## Signal Converters CON 011/021/031

### Mounting Box 025



- Contactless measurement of static and dynamic displacements, e. g.
  - axial and radial shaft movement
  - shaft eccentricity and vibration
  - thrust bearing wear
  - oil film thickness
- Various transducer and converter versions meet all industrial application requirements
- Designed according to international standards, e. g. API 670, DIN 45670, VDI 2059
- Operation in explosion hazardous areas possible
- Part of the RSM 700 , MMS 3000, MMS 6000 and MMG 1000 supervisory system for turbomachines

#### Application:

The eddy current transducer system is designed to measure mechanical parameters such as displacements and vibrations. Applications can be found in many branches in different industries and laboratories.

The contactless measurement principle, the small size as well as the rugged design and the resistance against aggressive environments make the transducers ideal for use on all kinds of turbomachines.

**epro** offers a wide range of equipment to measure and monitor e. g. the following parameters on turbo- and similar machines:

- Clearances between rotating and stator parts
- Vibration of rotating and other machine components
- Dynamic motion and eccentricity of shafts
- Deformation or bending of rotating or stator parts
- Axial and radial shaft movements
- Thrust bearing positions and wear
- Oil film thickness
- Differential expansions
- Housing expansions, valve positions

The design of the transducers and the relevant amplifiers meet the common international standards e. g. API 670, DIN 45670, VDI 2059.

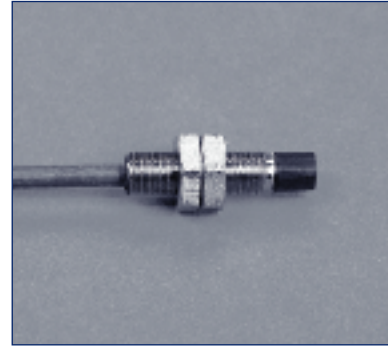
Transducers and signal converters can be used in hazardous areas by using safety barriers. Protection mode: intrinsically safe. Certificate of conformity in accordance with European standard EN 50014/50020 is available.



## Operation and Construction:

The eddy current transducer together with a signal converter CON form an oscillator circuit, whose amplitude of oscillation is damped by the proximity of a metallic object in front of the transducer. The damping characteristics is proportional to the distance between the transducer face and the measuring object.

The transducers with the converters are delivered fully adjusted so that no „on site calibration“ is required. Only the gap between the transducer and the object has to be adjusted, to get the specified signal at the converter output.



Transducer PR 6422/00

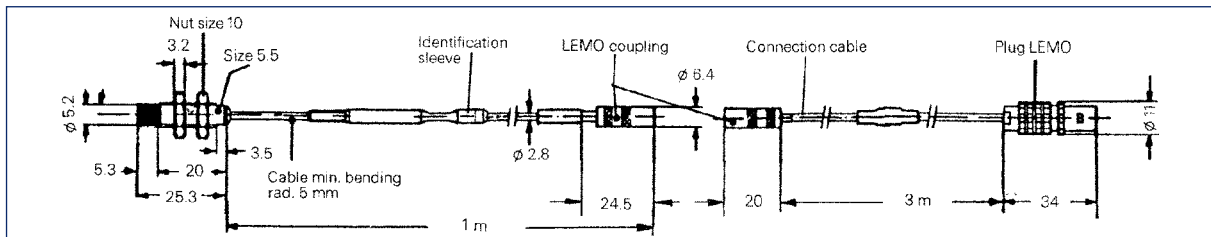
## Displacement transducer versions:

To meet the requirements of specific applications and the various environmental conditions on the machines, transducers in different designs are available.

The transducers PR 6422/.. - PR 6426/.. are the basic products for static and dynamic measurement on all kind of turbo machines.

- Transducer body with threaded case and axial cable outlet or
- Rectangular mounting flange
- Nominal measuring ranges 1 mm to 8 mm
- Body size 6 mm to 18 mm Metric or UNF-size threads
- Transducer connections either with self locking LEMO-plug (waterproof) or with stripped cable end
- Different cable length
- Without or with flexible metal protection
- Versions suitable to meet environmental temperatures in the range -35 °C...+380 °C

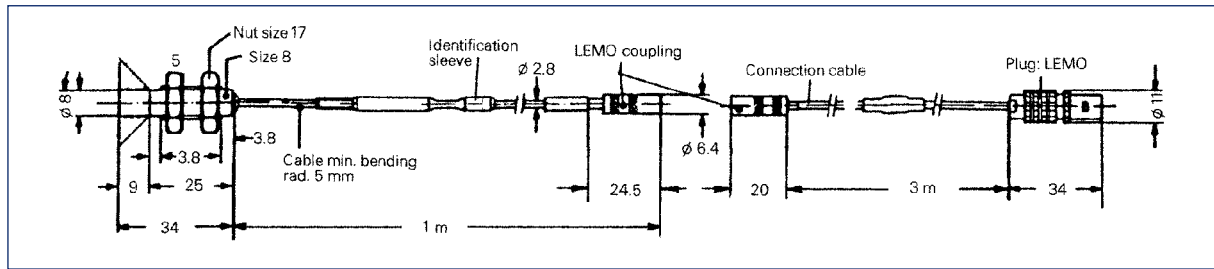
## Displacement transducer PR 6422/..



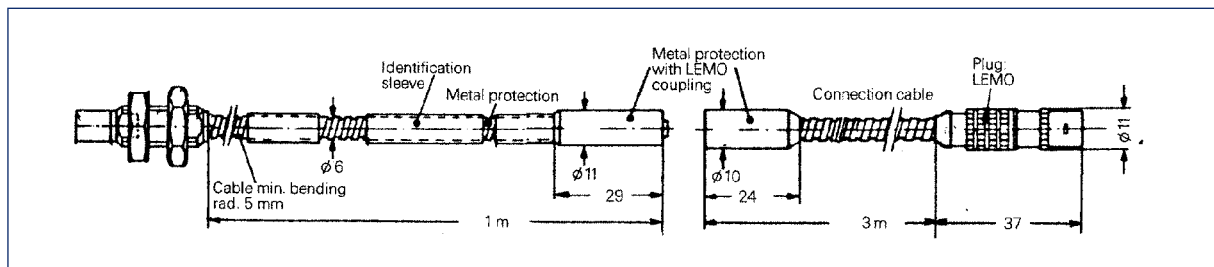
Displacement transducer PR 6422/.. (dimensions in mm)

Selection chart			
Order code	9408 564...	22001	22101
Version	Type no. PR 6422/..	00	10
Rated measuring range	Static: ±0.5 mm, dynamic: 25 µm...250 µm		
Operating temperature range	-35 °C... +180 °C		
Body thread	M6 x 0.5 mm	1/4"-28 UNF-2A	
Cable length	1 m integral + 3 m extension		
Connection to converter CON via	LEMO-plug		
Coupling of extension cable	LEMO-coupling		
Cable	PTFE	PTFE	
Suitable for converter	CON 01. / CON 02.		
Net weight (kg)	0.1	0.1	

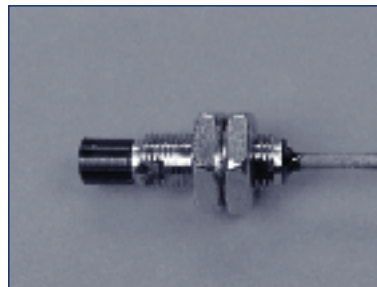
Displacement transducer PR 6423/..



PR 6423/00, PR 6423/10 (dimensions in mm)



PR 6423/11 (dimensions in mm)

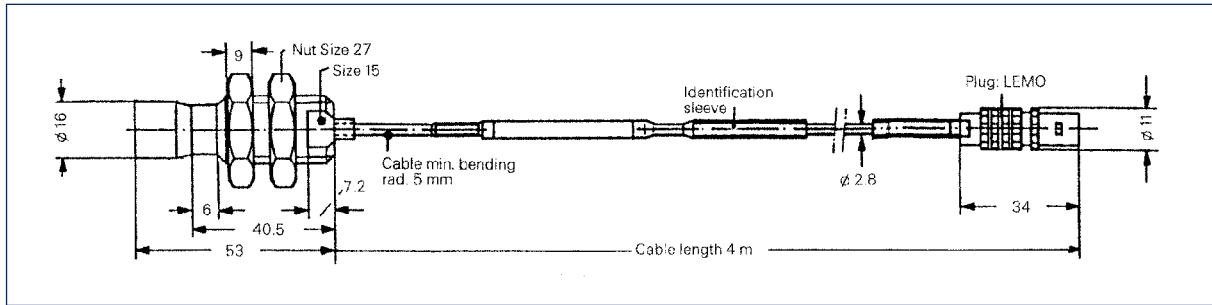


Transducer PR 6423/00

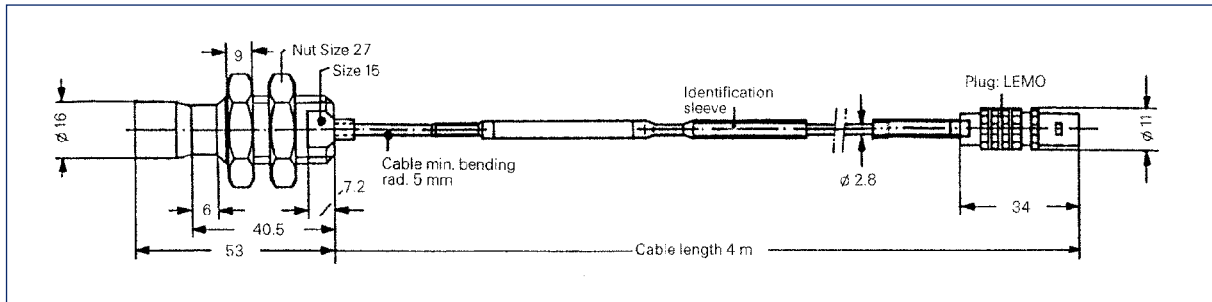
Selection chart

Selection chart					
Order code	9408 564...	23001	23011	23101	23111
Version	Type no. PR 6423/..	00	01	10	11
Rated measuring range	Static: ±1 mm, dynamic: 50 µm... 500 µm				
Operating temperature range	-35 °C...+180 °C				
Body thread	M10 x 1 mm		3/8"-24 UNF-2A		
Cable length	1 m integral + 3 m extension				
Connection to converter CON via	LEMO-plug				
Coupling of extension cable	LEMO-coupling				
Cable protection	PTFE	metal flexible	PTFE	metal flexible	
Suitable for converter	CON 01. / CON 02.				
Net weight (kg)	0.1	0.3	0.1	0.3	

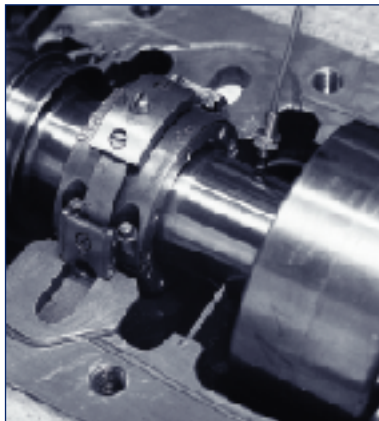
Displacement transducer PR 6424/..



PR 6424/00 (dimensions in mm)



PR 6424/01 (dimensions in mm)



A epro PR 6424 transducer mounted for shaft vibration measurement



Outside view of the above mounting example



Transducer PR 6424/00

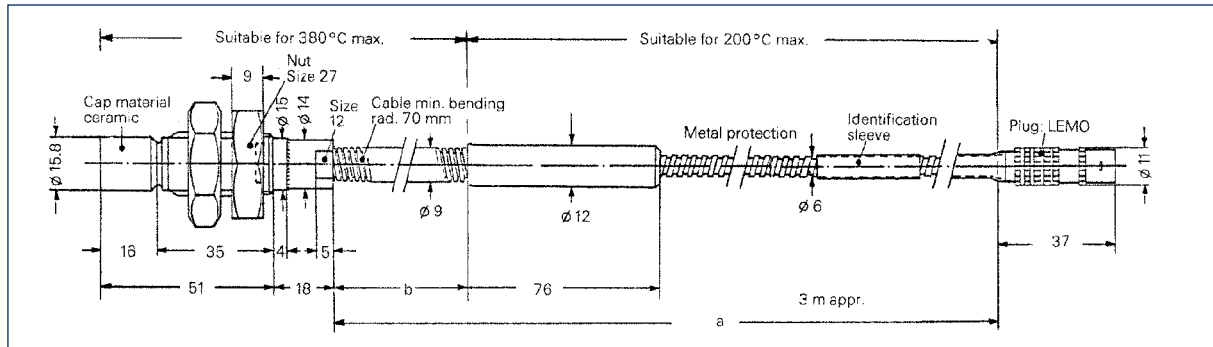
Selection chart

Selection chart			
Order code	9408 564...	24001	24011
Version	Type no.		
	PR 6424/..	00	01
Rated measuring range	±2 mm		
Operating temperature range	- 35 °C... +180 °C		
Body thread	M18 x 1.5 mm		
Cable length total	4 m integral		
Connection to converter CON via	LEMO-plug		
Cable protection	PTFE	metal flexible	
Suitable for converter ...	CON 01. / CON 02.		
Net weight (kg)	0.2	0.4	

### High temperature displacement transducer PR 6425/00

for use in harsh environmental applications as found e.g. on steam turbines.

- Temperature range: 0 °C to max. +380 °C
- Total cable length 4 m, flexible metal tube protected.
- 1 m cable suitable for max. +380 °C
- LEMO-plug (waterproof) connection
- for monitoring of relative shaft vibrations and axial displacements
- with standard output suitable for all repro amplifiers



PR 6425/00 (dimensions in mm)



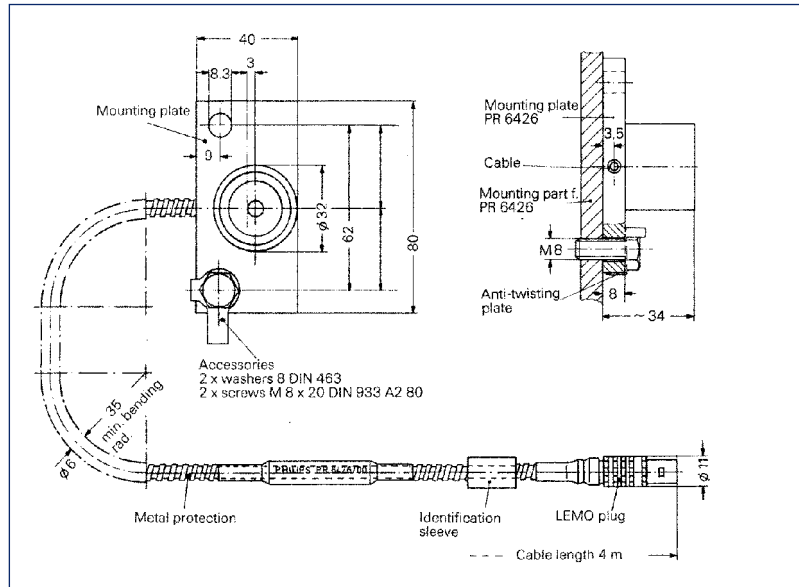
Transducer PR 6425/00

Selection chart	
Order code	9408 56425001
Type no.	PR 6425/00
Rated measuring range	±2 mm
Temperature range	0...+380 °C
Body thread	M 18 x 1.5
Cable length total high temperature part (+380 °C max.)	a = 4 m integral
	b = 0.96 m
Cable protection	metal flexible
Suitable converter	CON 01. / CON 02.
Net weight (kg)	0.5

## Displacement transducer PR 6426/..

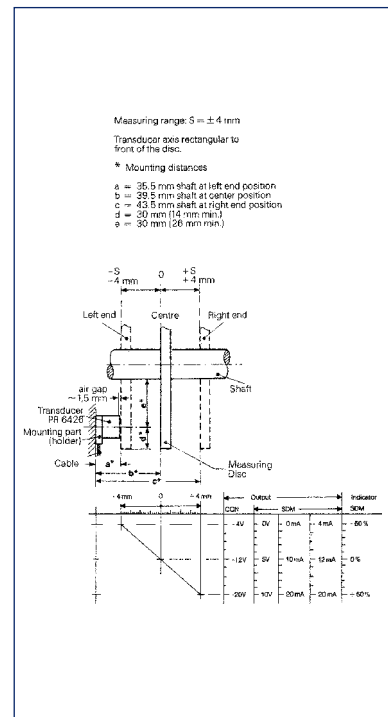
Typically applied to measure shaft positions and displacements against rectangular measuring discs or shaft ends.

- Measuring coil located on a rectangular mounting flange (stainless steel)
- Cable outlet rectangular



PR 6426/00 (dimensions in mm)

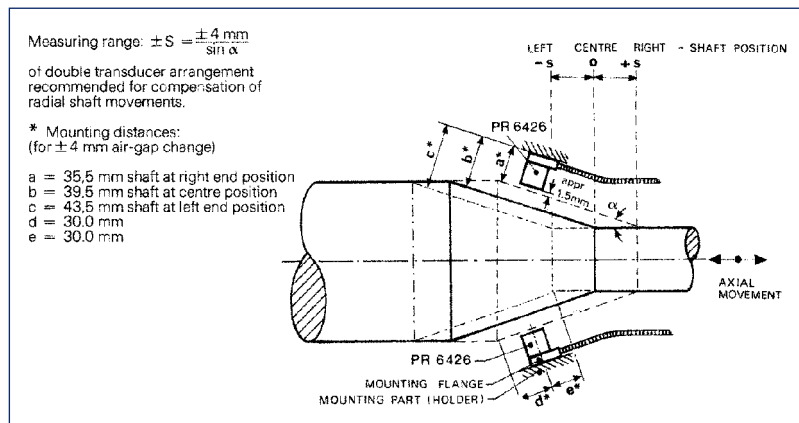
Selection chart		
Order code	9468 564 26001	9210 000 22
Type no.	PR 6426/00	PR 6424/01
Rated measuring range	±4 mm	
Operating temperature range	-35 °C ...+180 °C	
Body	measuring element with rectangular mounting flange (80 x 40 x 8 mm)	
Cable outlet	rectangular	
Cable length total	4 m integral	
Connection to converter CON via	LEMO-plug	
Cable protection	metal flexible	PTFE
Suitable for converter	CON 01. CON 02.	
Net weight (kg)	1.0	0.8



Mounting example PR 6426



Mounting example PR 6426 transducer for measurement of differential expansion



Mounting example PR 6426/..

Technical data transducers PR 6422/.. - PR6426/..					
	PR 6422/..	PR 6423/..*	PR 6424/..	PR 6425/..	PR 6426/..
<b>Measuring range</b> (nominal)**	±0.5 mm	±1 mm	±2 mm	±2 mm	±4 mm
<b>Sensitivity</b> (nominal) (with 42 CR Mo 4 target material)	16 V / mm	8 V / mm*	4 V / mm		2 V / mm
<b>Target object</b> Target material Type of target	electrically conductive steel cylindrical (shafts), plane surfaces, collar on shafts				
Hight of measuring collar on shaft with additional error of 1%	20 mm	25 mm	40 mm	40 mm	60 mm
Peripheral speed of shaft	0...2500 m/s				
Shaft diameter	20mm	25mm	80 mm	80 mm	200 mm
Nominal air gap (middle of range)	0.8 mm	1.5 mm	3.0 mm	3.0 mm	5.5 mm
<b>Ambient temperature</b>					
Operating range:	-35 °C...+180 °C			0...+300 °C	-35 °C...+180 °C
Range without damage	-35 °C...+180 °C			0...+380 °C	-35 °C...+180 °C
Short time max.	up to +200 °C			up to +400 °C	up to +200 °C
Limits for transport and storage	-40 °C...+70 °C				
<b>Body</b> (dimensions see drawings)	M6 x 0.5 1/4"-28 UNF-2A	M10 x 1 3/4"-24 UNF-2A	M18 x 1.5	M18 x 1.5	Mounting flange 80 x 40 x 8
Body material, flange material	Stainless steel				
<b>Connection cable</b>					
Temperature range max.	+200 °C			1 m: +380 °C 3 m: +200 °C	+200 °C
<b>Connections</b>	Versions available: with self locking water tight plug (LEMO) and without plug with stripped cable end (s. selection chart, drawings)				
<b>Pressure</b> , uniformly acting on the transducer and cable	2 bar				6.5 bar
<b>Vibration and shock</b> (nominal) max. at 25°C	5 g at 60 Hz				4 g at 60 Hz

\* typical API 670 version \*\*extended ranges on request

#### Calibration:

On delivery transducers and signal converters are factory-calibrated for standard material (42 CrMo 4:SAE 4140).

Calibration for other materials is possible on request. Only the air gap between transducer and object are needed to be adjusted onsite.

#### Resistance to chemicals:

(at room temperature)

Transducer and cables are resistant to: water, steam, natural gas, helium, bearing lubricants, petrol, benzol, salpeter, carbon tetrachloride, tetrachlorethylene.

#### Standard accessories:

Transducers PR 6422/.. - PR 6425/..

2 x clamping nuts

3 m connection cable for transducers with 1 m cable integral

Transducers PR 6426

2 x M8 x 20 screws

acc. to DIN 933-A2

2 x anti-twisting plates 8.4

acc. to DIN 463-A2

## Signal Converters CON 011, CON 021, CON 031

are available in different versions, to meet the requirements of different applications for turbo machine supervision.

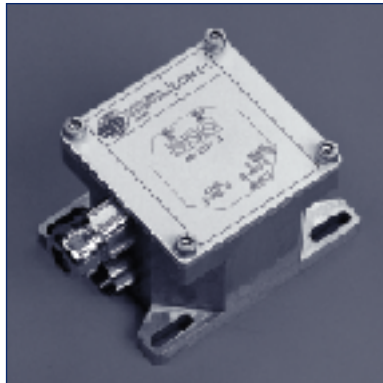
Due to the same circuitry in all converters, they can be used for operating with all different transducers types. Interchangeability is possible without recalibration.

The power supply- and signal output connections are via screw terminals.

The transducer connection is possible

- via high precise self locking plugs (LEMO type) or
- via screw terminal for transducers with stripped cable ends.

All transducers with CON 011 are suitable for installation in hazardous areas with safety barriers. Certificate of conformity in accordance with European standard EN 50014/50020 is available.



CON 011 - IP 67-protection for stand alone field installation for transducers with plug connections. Electronic components protected in compound under a gas tight cover.



CON 021 - IP 20-protection for transducers with LEMO-plug connection.



CON 031 - IP 20-protection with screw terminals for transducers with stripped cable ends to screw operated clamping connections.

### Technical Data:

#### Input:

Connection for eddy current transducer:

PR 6422/.. - PR6426/..

#### Output:

D.C. voltage with a superimposed A.C. voltage corresponding to the shaft vibration.

Connections protected against open and short-circuit and wrong polarity.

Rated output voltage (linear range):

-4...-20 V (-24 V supply)

Max. output voltage: -1...-22 V

Reference output voltage for symmetrical measuring range:

-12 V (with -24 V supply)

Internal resistance: =100

Rise time: <15 μs

#### Effects on Accuracy:

All data with respect to f.s.d.

Linearity error:

with PR 6422: 1.5 %

with PR 6423: 1.0 %

with PR 6424: 1.5 %

with PR 6425: 6.0 %

with PR 6426: 1.5 %

Temperature effect:

Zero point: 200 mV / 100 K

Sensitivity: <2 % / 100 K

Long term drift: 0.3 % max.

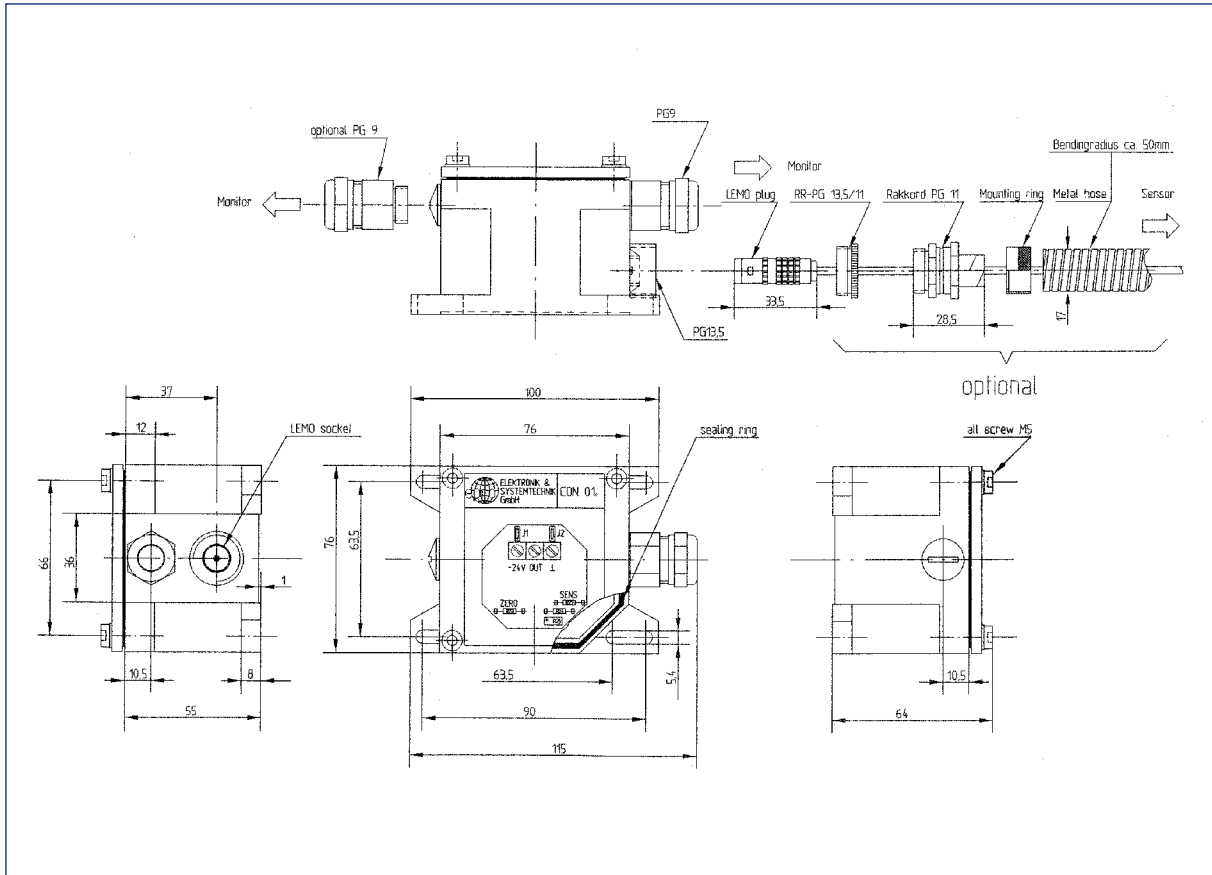
Effect of power supply voltage: <0.2 %/V

Suitable for standard and/or ex-applications acc. to EEx ib IIC T6/T4.

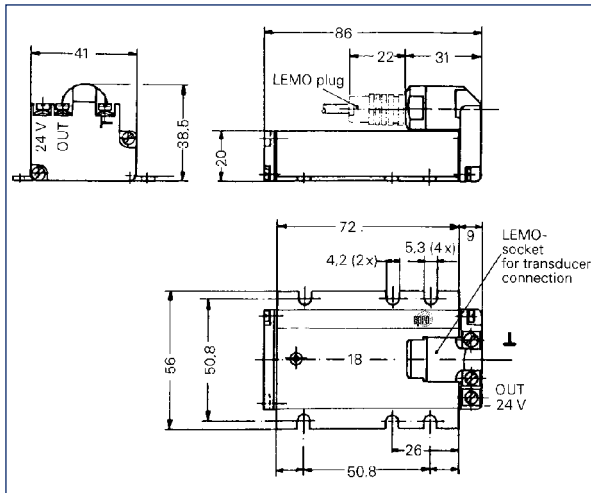
Order code	9200 - 00001	9200 - 00006	9200 - 00007
	CON 011	CON 021	CON 031
Rated frequency range (-3 dB)	0...15 kHz - 3 dB (C < 20 nF) 0...1 kHz 1 %		
Interference voltage (C < 1 μF)	<10 mV pp		
Permissible load resistance	10 K		
<b>Power supply</b>			
Nominal voltage	-23...-32 V nominal -18...-23 V reduced Datas		
Max. ripple	<20 mV pp		
Nominal current	<15 mA		
<b>Environmental conditions</b>			
Temperature:			
- reference value	+23 °C		
- nominal operating range	-35 °C...+70 °C		
- max. operating range	-35 °C...+80 °C		
- limits for storage, transport	-40 °C...+85 °C		
<b>Protection</b>	IP 67	IP 20	IP 20
<b>Vibration</b> (test acc. to IEC 68-2-6)	10...60 Hz max. amplitude =0.35 mm, 60...150 Hz max. 5 g		
Shock (test acc. to IEC 68-2-29)	40 g for 6 ms		
<b>Mechanical data</b>	Case dimensions s. drawings page 9		
<b>Housing material</b>	GD-AISI9Cu3	AlMgSi 0.5 F22	
Mounting	by means of 4 screws		
Weight - gross	0.7 kg	0.12 kg	
- net	0.6 kg	0.2 kg	
<b>Connections</b>			
to transducer	self locking LEMO-plug	screw terminal	
Output and power supply	3-pole screw terminals		
<b>Accessories</b>	instruction manual		



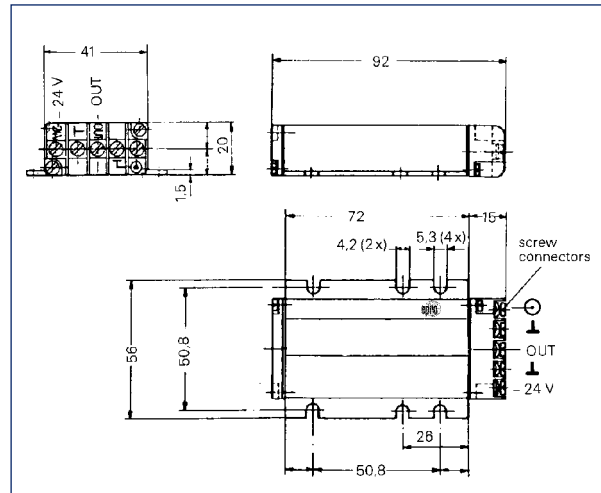
Dimensions Converters CON 011, CON 021, CON 031



Converter CON 011 (dimensions in mm)



Converter CON 021 (dimensions in mm)



Converter CON 031 (dimensions in mm)

## Safety barriers for eddy current transducer / converter system:

**epro** eddy current transducer/converter systems are certified acc. to Cenelec standard (PTB/Germany) to operate safe in hazardous areas by using certified safety barriers.

Applications are found e. g. in the chemical and petrochemical industries. Safety barriers have to be connected between the signal converter and the signal processing modules.

The safety barrier consists of network devices for limiting voltage and current which may pass from safe area into a hazardous area.

Features of the **epro** eddy current system

for machine supervisory operating in hazardous-areas:

- max. safety by certified measuring loops
- certificates according to Cenelec (European) standard
- only one standard type of transducer and converter necessary for both ex- and non-ex application
- safety barriers do not influence electrical data of measuring chains as: sensitivity, accuracy, measuring ranges.

Mounting procedure for safety barriers. The barriers are equipped with a barrier

mounting bar and a plastic mounting device as standard. This allows mounting the barrier insulated on a standard G-profile-DIN-rail.

The barrier mounting bar is joined to the barrier-earth via screws and has screws for earthing connections on both non-hazardous and hazardous side.

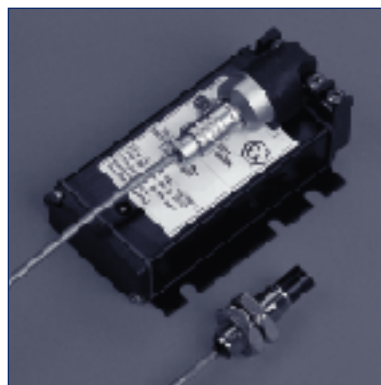
This accessory reduces the mounting efforts on site and fulfils the requirements of mounting devices in hazardous-areas (e. g. IEC144 standard).

## Explosion protection:

The conformity to the European Standard of the **epro** transducer / converter system is certified by PTB / Germany for operation in explosion hazarded areas, if certified safety barriers are used.

Certificate is valid for:  
stand alone unit  
CON 0..  
together with transducers  
PR 6422/.. - PR 6426/..

	CON 0..
Conform to European standards Intrinsic safety protection Certificate of conformity PTB No.	EN 50 014 and EN 50 020  EEx ib IIC T6 Ex-97.D.2207
Ambient temperature $t_{amb}$ . for T6	70 °C
Protection for installation (according to IEC 144)	IP 54
<b>Electrical data</b>  Output and supply circuits only for connection to certified intrinsically safe circuits with following max. permissible values: Sum of non-load voltages Sum of short circuit current Sum of maximum power	      U <sub>o</sub> 28 V DC I <sub>k</sub> 140 mA P <sub>i</sub> 1 W
Internal capacities and inductivities	C <sub>i</sub> 35 nF L <sub>i</sub> 0.1 mH



CON 021 with transducer  
PR 6423

## Converter Junction Box 025

Some supervisory installations need a protection of the electronic devices against harsh environments or mechanical damages.

The **epro** junction BOX 025 is an ideal solution part which fulfils these requirements. It is especially designed for location of signal converter CON 021 or CON 031.

The junction box is a durable glass fibre reinforced polyester weather proof housing in IP65-protection. It can be used for both indoor and outdoor applications. Sealing rings are silicone impregnated to remain airtight over a wide temperature range.

Cable glands for the transducer connection cable as well as for the output cable with rubber adapter rings are supplied as standard

### Technical Data, Box 025:

**External dimensions:**

360 x 90 x 160 mm (w x h x d).

**Material:**

durable glasfibre reinforced polyester  
colour:  
grey, similar to RAL 7000

**Environmental conditions:**

Protection:

IP 65, DIN 40050

Flame protection:

fire retardant acc. to UL94 standard

Impact strength:

7 Nm, DIN 50014

**Ambient temperature range:**

-35 °C...+70 °C

**Humidity:**

5 to 95 % (without condensing)

**Weight:**

2.5 kg (without packing)

3.4 kg (with packing)

**Mounting information:**

distance between holes: 340 x 110 mm

hole diameter: 6.5 mm

**Accessories:**

Cable glands:

5 pcs PG 11 for output cable (7-13 mm  $\varnothing$ )

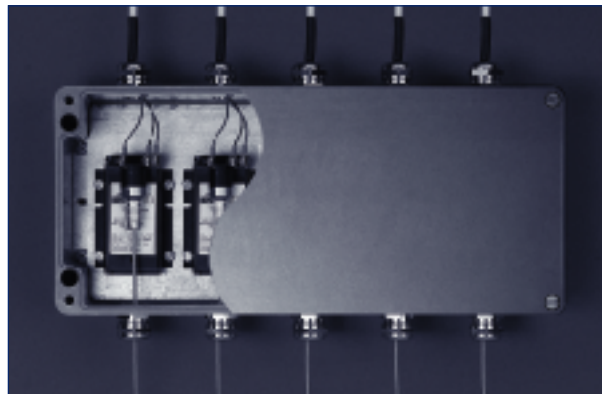
5 pcs PG 11 for transducer cables

**Type No.:**

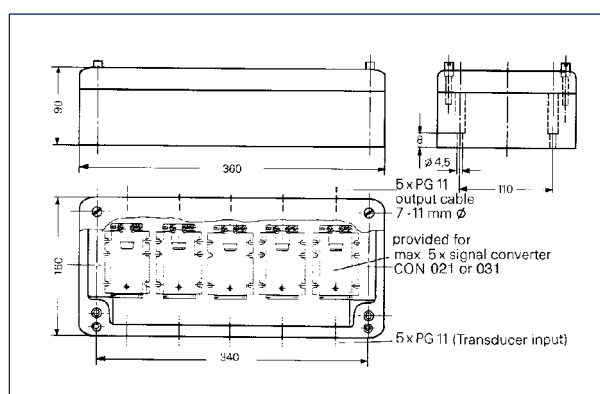
BOX 025

**Order code:**

9408 600 10361



Junction Box 025 with mounted CON 021



Box 025 (dimensions in mm)

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ELEKTRONIK & SYSTEMTECHNIK GmbH

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