Installation Guide
MHM-97857 , Rev 1.11
January 2026

PR 642x

Eddy Current Sensors



EMERSON

Contents

Chapter 1 General 4
1.1 Using this manual 4
1.2 Symbol explanation 4
1.3 Liability and guarantee 4
1.4 Incoming goods inspection 5
1.5 Technical support 5
1.6 Storage and transport 6
1.7 Disposal of the device 6
1.8 China RoHS Compliance 6
1.9 CCC Certification – Eddy current measuring chains 7
1.10 Installation awareness 7
Chapter 2 Safety Instructions 8
2.1 Using the device 8
2.2 Owner's responsibility 8
Chapter 3 Application and Design 9
3.1 The Measuring Chain 9
3.2 The Sensors 9
Chapter 4 Installation and Mounting 10
4.1 Measuring chain and material of measuring target 10
4.2 Choosing the measuring place 10
4.3 Mount the sensor 11
4.3.1 Requirements and hints for the sensor mounting 11
4.3.2 PR 6426 installation 15
4.4 Wiring hints 16
4.5 Sensor cables with LEMO adapter plug 17
Chapter 5 Technical data 19
5.1 Measuring targets 19
5.2 Measuring ranges and sensitivity 20
5.3 Environmental conditions and mechanical design 21
Chapter 6 Drawings 23
Chapter 7 Order Matrix 28
Chapter 8 Certificates 32

1 General

1.1 Using this manual

This manual contains information concerning the proper and correct use of the PR 6422, PR 6423, PR 6424, PR 6425 and PR 6426 eddy current transducers.

For correct and safe use of this device read the entire operating manual prior to installing and operating the device. In particular, comply with all safety instructions contained in the manual.

Do not transfer the device to third parties without including the operating manual.

Note
When requesting technical support for this device, please indicate type and serial number as shown on the type plate as well as the used converter type.

Table 1-1 shows a list of documents that are referred to in this installation guide.

Table 1-1: Referenced documents

MHM-97858	Installation guide CON 011, Converter for PR 642x Eddy Current Sensors
MHM-97859	Installation guide CON 021 and CON 031, Converter for PR 642x Eddy Current Sensors
MHM-97860	Installation guide CON 041, Converter for PR 642x Eddy Current Sensors

1.2 Symbol explanation

Note
This symbol marks passages that contain important information.

⚠ CAUTION

Operations that may lead to malfunctions or faulty measurements, without damaging the device, are marked with this symbol.

⚠ DANGER

A Danger indicates actions that can lead to property damage or personal injuries.

1.3 Liability and guarantee

Emerson is not liable for damages that occur due to improper use. Proper use also includes knowledge of, and compliance with this operating manual.

Customer changes to the device that have not been approved expressly by Emerson, will result in the loss of guarantee.

Due to continuous research and further development Emerson reserves the right to change technical specifications without notice.

1.4 Incoming goods inspection

Check the content of the shipment to ensure that it is complete; visibly inspect the goods to determine if the device has been damaged during transport. The following parts are included in the scope of delivery and must be contained in the shipment.

- Eddy current sensor PR 6422, PR 6423, PR 6423, PR 6425 or PR 6426 (with protection cap)
- Lemo connection cable (only PR 642x/xxx-0xx types)
- Mounting nuts (respectively screws at PR 6426)
- Shrink sleeve for isolating the adapter plug (only PR642x/xxx-0xx types)
- Operating manual for installing and using the sensor

If the contents are incomplete, or if you observe any defects, file a complaint with the carrier immediately. Moreover, inform the responsible Emerson sales organization so your device can be replaced. In this case, attache to the device a non-detachable tag with customer name and the observed defect.

1.5 Technical support

You may need to ship this product for return, replacement, or repair to an Emerson Product Service Center. Before shipping this product, contact Emerson Product Support to obtain a Return Materials Authorization (RMA) number and receive additional instructions.

Product Support

Emerson provides a variety of ways to reach your Product Support team to get the answers you need when you need them:

Phone	Toll free 1 800 833 8314 (U.S. and Canada) +1 512 832 3774 (Latin America) +63 2 8702 1111 (Asia Pacific, Europe, and Middle East)
Email	Guardian.GSC@Emerson.com
Web	http://www.emerson.com/en-us/contact-us

To search for documentation, visit http://www.emerson.com.

To view toll free numbers for specific countries, visit

http://www.emerson.com/technicalsupport.

2 Safety Instructions

To ensure safe operation, carefully observe all instructions in this manual.

The correct and safe use of this device requires that operating and service personnel both understand and comply with general safety guidelines and observe the special safety comments listed in this manual. Where necessary, safety-sensitive points on the device are marked.

⚠ DANGER

Since the sensor is electrical equipment, commissioning and service may be performed only by trained personnel. Maintenance may be carried out only by trained, specialized, and experienced personnel.

2.1 Using the device

Measuring systems with eddy current sensors as PR 6422, PR 6423, PR 6424; PR 6425 and PR 6426 serve in conjunction with eddy current converters as CON 011, CON 021, CON 041, the transmitters with integrated converters of the MMS 3000 series or the transmitter CSI 9360 the measurement of mechanical quantities, such as shaft vibration, shaft displacement and speed (not if CSI 9360 is used).

2.2 Owner's responsibility

If there is a reason to suspect that hazard-free operation, and thus, adequate machine protection is no longer possible, take the device out of operation and safeguard it from unintentional operation. This is the case:

- if the device shows visible damage.
- if the device no longer works.
- after any kind of overload that has exceeded the permissible limits (see technical data of the device for permissible limits).

⚠ DANGER

If device tests must be completed during operation or if the device must be replaced or decommissioned, it will impair the machine protection and may cause the machine to shut down. Make sure to deactivate machine protection before starting such work and reactivate it after work has been completed.

Related information

Technical data

3 Application and Design

3.1 The Measuring Chain

Together with signal converters of the series CON 0x1, integrated converters of the AMS 3000 series, or the AMS 9360 transmitter, the sensors PR 6422 to PR 6426 form eddy current measuring chains for contactless distance, vibration and speed measurements. Different types of sensors and converters allow an optimal adaption to the requirements of the machine to be monitored.

A additional electronic components, like the AMS 6500 ATG system, allow static and dynamic distance measurements, which means it is possible to measure slow axial displacements and quick axial shaft vibrations of rotating machines.

To achieve a high accuracy, the measuring chains consisting of both converter and sensor are adjusted together and delivered as complete measuring chain.

3.2 The Sensors

The PR 642x series includes five eddy current sensor types in different variants as shown in chapter Order Matrix.

Which sensor type is applicable for a measuring application depends on several requirements as desired measuring range, available measuring track, and maximum environmental temperature.

The characteristics of the measuring chain are adapted to the material mainly used for turbo machinery (reference material: 42 Cr Mo 4, according to SAE 4140). The standard adjustment of the measuring chains is generally related to this material; during installation at the machine, you only need to adjust the distance between the head of the sensor and the measuring target. The signal output of the converter determines how you should adjust the sensor.

4.3 Mount the sensor

The following steps describe the mounting of sensor types PR 6422, PR 6423, PR 6424 and PR 6425. For mounting hints regarding the PR 6426 see PR 6426 installation. See also the respective converter manuals as listed inTable 1-1 for further details regarding sensor adjustment.

Procedure

1. Screw in the sensor into the holder.

   Ensure that the threads are clean and smooth-running.

   Do not bend or twist the sensor cable. If the sensor cable has a LEMO adapter plug open it.

   To avoid touching the shaft during installation, the maximum distance between measuring target and sensor head must be adjusted first - screw in the sensor until the converter output voltage starts changing (approximately at -20V DC). Close the LEMO adapter plug for measuring the converter output voltage.

2. Adjust the distance between measuring target and sensor head in accordance to the measuring task.

   Use a voltmeter connected to the converter output to measure the output voltage. Open the LEMO adapter plug at every two turns of the sensor to untwist the cable.

   Ensure that in direction to the sensor head at least two of the threads remain free as shown in Figure 4-2.

3. Secure the sensor by fixing the nuts.

   The maximum torque for fixing the nuts is:

   - PR 6422: 1 Nm (0,1 kpm)
   - PR 6423: 15 Nm (1,5 kpm)
   - PR 6424, PR 6425: 98 Nm (10 kpm)

4.3.1 Requirements and hints for the sensor mounting

This section contains information and installation requirements for the sensor. The final adjustment of the sensor depends on the measuring task and requires a complete measuring chain. The converter, MMS 3000 and CSI 9360 manuals, and the manuals for the evaluation electronics, contain detailed information regarding the final adjustment.

General holder requirement

To mount the sensor, use a stiff and vibration-free holder with a mounting thread for the relevant sensor (PR 6422 to PR6425).

General distance adjustment

For distance adjustment the complete measuring chain consisting of sensor and converter is required as the distance will be generally adjusted by means of the converter output voltage.

Sensor fastening

- Use the enclosed nuts when installing sensors with mounting threads
- When installing sensors with mounting threads captive nuts must be used to avoid loosen of the sensor. Loose parts can fall into the machine and cause damages. A medium grade removable thread locked (for example Loctite® 242, blue) is recommended to secure the sensor.

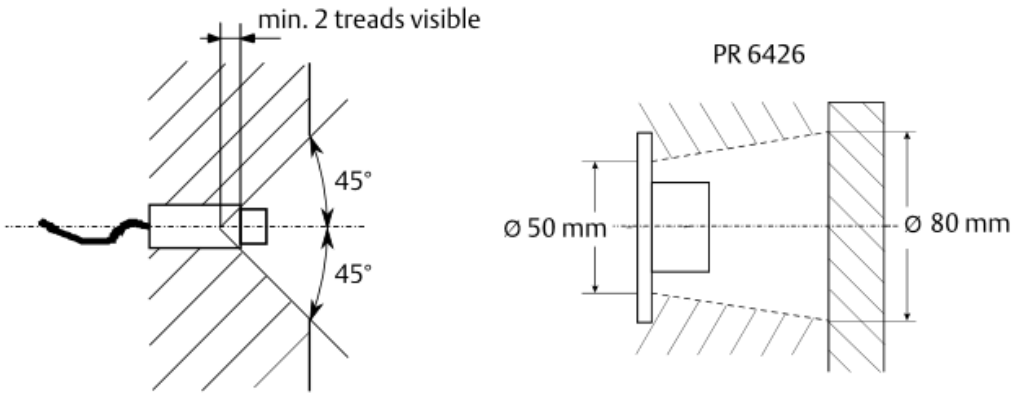
Measuring track on the measuring target

The measuring track on the measuring target must be free from irregularities as scratches, corrosion, stress concentrations, metallurgical segregation, high concentricity, etc. These irregularities may cause changes in the sensor output voltage which are not related to a real position or vibration signal. The signal caused by these irregularities is called runout. For the measuring track a surface finish of 0.41 µm to 0.76 µm is recommended.

Free space

Ensure there is 45° of free space around the sensor head for all sensor types except PR 6426, as shown in the left diagram of Figure 4-2. The right drawing in Figure 4-2 shows the required free space around the PR 6426.

Figure 4-2: Free space around sensor head



Free space PR 6422, PR 6423, PR 6424 and PR 6425: ± 45°

Free space PR 6426: minimum = 80 mm; for nominal range ±4 mm and for extended ranges

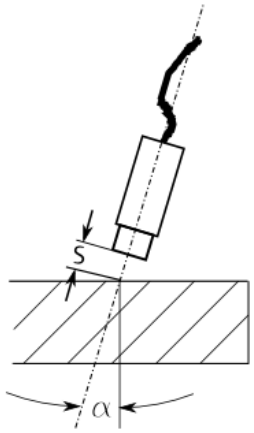
⚠ CAUTION

If you do not ensure the free space specifications, the measuring range at the upper end reduces and the linearity error increases.

Maximum axial tilting angle

Ensure that the maximum axial tilting angle alpha is < 2° if using PR 6422, PR 6423, PR 6424 or PR 6425 as shown in Figure 4-3, or alpha < 1.6° if using PR 6426 as shown in Figure 4-4. There is no significant influence on the measuring result in this case.

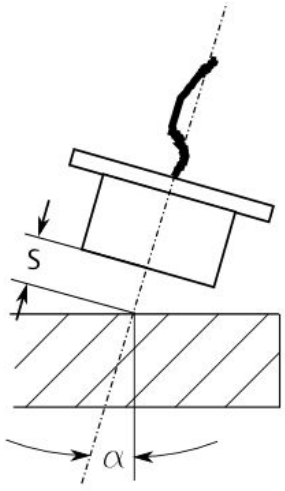
Figure 4-3: Maximum axial tilting if using PR 6422, PR 6423, PR 6424 or PR 6425



S: distance between measuring target and sensor head

Alpha: max. axial tilting angle < 2°

Figure 4-4: Maximum axial tilting if using PR 6426



S: distance between measuring target and sensor head

Alpha: max. axial tilting angle < 1.6°

Maximum tangential offset

Ensure the maximum tangential offset matches the values in Table 4-1. Figure 4-5 shows the definition of the tangential offset.

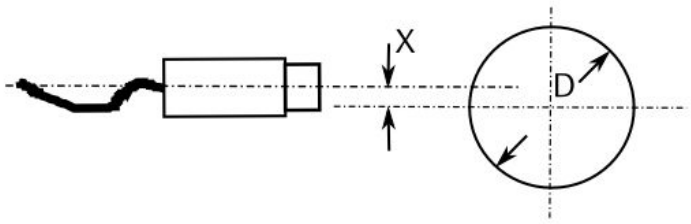
Table 4-1: Maximum tangential offset

Sensor type	Max. offset X	Shaft diameter D
PR 6422	0.2 mm	≥ 15 mm

Table 4-1: Maximum tangential offset *(continued)*

Sensor type	Max. offset X	Shaft diameter D
PR 6423	0.5 mm	≥ 28 mm
PR 6424	0.5 mm	≥ 60 mm
PR 6425	0.5 mm	≥ 60 mm

Figure 4-5: Maximum tangential offset



X: max. tangential offset

D: shaft diameter

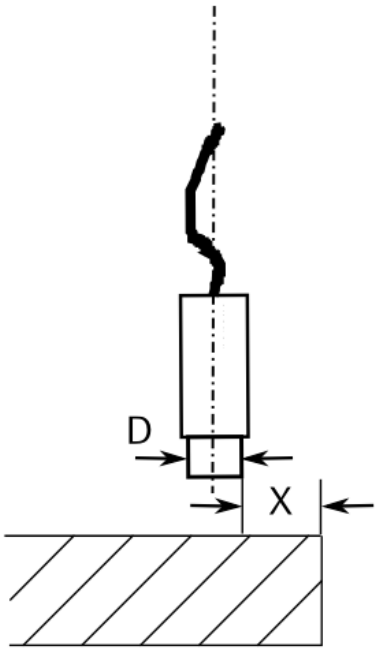
Minimum measuring area

Ensure that the minimum measuring area matches the values in Table 4-2. Figure 4-6 defines of the minimum measuring area.

Table 4-2: Minimum measuring area

Sensor type	X minimum	Sensor head diameter
PR 6422	5 mm	5.2 mm
PR 6423	3 mm	8 mm
PR 6424	3 mm	16 mm
PR 6425	2 mm	15.8 mm
PR 6426	2 mm	32 mm

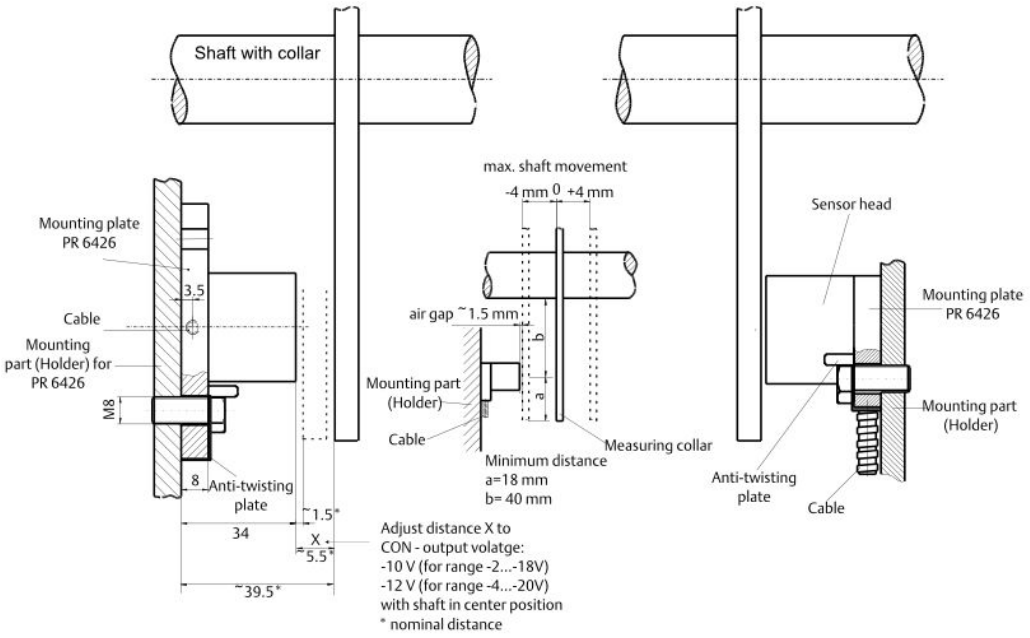
Figure 4-6: Minimum measuring area



4.3.2 PR 6426 installation

Figure 4-7 shows an installation example for the sensor PR 6426. Its reference area is the mounting plate. The nominal distance of the mounting plate to the measuring target in the center position is approx. 39.5 mm. After you fix the mounting screws, bend the safety plate (anti-twisting plate) to prevent the screws from getting loose.

Figure 4-7: Mounting example PR 6426



4.4 Wiring hints

This section contains general information and wiring hints regarding the sensor cable installation. The necessary measures for the proper cable installation depend always on the situation on-site. Observe the following points for a reliable cable installation:

- Do not bend or twist the sensor cables. Cables and connectors must be movable when the sensor is adjusted in its holder.
- Install the cable strain-free and spin-free such that it is protected against mechanical damages.
- Do not shorten the sensor cable or the extension cable of PR 6422 and PR 6423. Rollup the excess cable (rolling diameter ≥100 mm).
- Ensure that no parts of the cable, including the adapter plug, touch any rotating parts of the machine.
- Note that machines can expand or shrink due to temperature influences. Always install the sensor cable with a cable length reserve to compensate for the thermal behavior of the machine.
- Only install cables with a minimum bending radius of 25 mm. For sensor cables with metal protection tubes, the minimum bending radius is 35 mm.
- Avoid oil stream areas for sensor cableways. Be sure that no oil stream or other agitations will permanently move the cable.
- Avoid sensor cableways where the cable is permanently submerged into oil.
- Affix the sensor cable at recurring short distances.

5 Technical data

Only specifications with tolerances are guaranteed. Data without tolerance or without error limits are informative data and not guaranteed.

All specifications are valid for a measuring chain consisting of a sensor PR 6422, PR 6423, PR 6424, PR 6425 or PR 6426 and one of the following converters CON 011, 021, 031 or 041 respectively an integrated converter in a MMS 3000 transmitter adjusted on it.

Related information

Owner's responsibility

5.1 Measuring targets

Measuring target	shafts and plain surfaces			
Sensor	PR 6422	PR 6423	PR 6424 / PR 6425	PR 6426
Shaft diameter	>20 mm	>40 mm	>80 mm	---
Height of target (measuring collar) on the shaft	>20 mm	>25 mm	>40 mm	>80 mm*
Speed of shaft circumference	0 ... 2500 m/s			
Object material	electrical conducting materials			
Reference material	1.7224 (42 Cr Mo 4; SAE 4140)			

* may be less for special installation of the PR 6426

Upon request, measuring chains can be adjusted on the following materials.	Material	Description	Material	Description
	1.7733	24 CrMo V5 5	1.7220	34 CrMo 4
	1.0060	St 60−2	1.7258	24 CrMo 5
	1.0501	C 35	1.1181	CK 35
	1.1191	CK 45	1.8519	31 CrMo V9
	1.4021	X 20 Cr 13	1.4057	X 22 CrNi 17
	1.4122	X 35 CrMo 17	1.4922	X 20 CrMo V12
	1.6582	34 NiCrMo 6	1.7218	25 CrMo 4

Adjustments on brass, copper or other electric conducting materials are possible − in this case differences of the specifications will apply, refer to section Measuring chain and material of measuring target.

5.2 Measuring ranges and sensitivity

Sensor	PR 6422	PR 6423	PR 6424	PR 6425	PR 6426
Nominal measuring range, static measurements	±0,5 mm	±1,0 mm	±2,0 mm	±2,0 mm	±4,0 mm
Nominal measuring range, dynamic, peak – peak (recommended)	25 ... 250 µm	50 ... 500 µm	100 ... 1000 µm	100 ... 1000 ±m	---
Sensitivity for 42 Cr Mo 4	16 V/mm	8 V/mm	4 V/mm	4 V/mm	2 V/mm
Approximate value for nominal distance at the center point of converter output signal *	approx. 0,8 mm	approx. 1,5 mm	approx. 2,7 mm	approx. 2,6 mm	approx. 5,5 mm
Basic air gap *	approx. 0,15 ... 0,35 mm	approx. 0,4 ... 0,7 mm	approx. 0,55 ... 0,95 mm	approx. 0,5 ... 1,0 mm	approx. 1,2 ... 1,8 mm

* With standard measuring ranges (not valid for use of extended measuring ranges)

The sensor PR 6423 corresponds to the API 670 / DIN 45670 standard.

Calibration: If no other material was stated, sensor and converter are adjusted on the standard material (42 Cr Mo 4), refer to section Measuring chain and material of measuring target .

5.3 Environmental conditions and mechanical design

Environmental temperature	
Reference value	+23°C
Nominal operating range PR 6422 and PR6423	-35°C ... +180°C (short time , up to +200°C)
Nominal operating range PR 6424	-35°C ... +120°C
Nominal operating range PR 6426	-35°C ... +150°C
PR 6425 only sensor and first part of the cable	• nominal operating range: permanent 0 ... +380°C • limit range: short time 0 ... +400°C (max. 4 hours, without vibration)
Nominal range for cable in protection hose and connector	permanent 0 ...+175°C short time up to +200°C
Limits for storage and transport	-40°C ... +70°C
Temperature error (according to API 670, only sensor)	PR 6423, PR6424: 4 % per 100 K PR 6425: 4 % per 100 K
Resistance to chemicals (at room temperature)	Sensor and cable are resistant to: water, steam, natural gas, helium, bearing oils, gasoline, benzol, nitric acid, tetracarbonchloride, tetrachlorideethylen
Pressure	
Pressure resistance to sensor head	PR 6422, PR 6423, PR 6424: 10000 hPa PR 6425: 2000 hPa
Pressure and differential pressure resistance at cable outlet	On request
Vibration	
max. Vibration	5g at 60 Hz
Mechanical design	
Dimensions	see Figure 6-1 to Figure 6-5
Sensor and extension cable	up to 200°C temperature resistant, PTFE cable resistant to oil and chemicals; connection of sensor cable and extension cable with coax connector.
Connection to converter	self arresting and water proof connector for CON 011, CON 021, respective devices of the AMS 3000 system and AMS 9360 or stripped cable ends with crimped sleeves for CON 031 and CON 041

PR 6425	High temperature resistant cable at the head (up to 380°C) in a gas-proof metal protection hose, directly connected with PTFE - cable in a not gas-proof metal protection tube
Metal protection tube (PR 642x/x1x–xxx)	stainless steel, not gas–proof

Table 5-1: Additional error

Sensor type	Temperature range	Zero point	Sensitivity
PR 6425	at +300 ... +380°C	---	0.8% per 10 K
PR 6426	at +23 ...+100°C	≤ -0,3 % per 10 K	≤ 0,15 % per 10 K
	at +100 ...+175°C	≤ -0,6 % per 10 K	≤ 0,65 % per 10 K
	at -35 ... +23°C	≤ -0,2 % per 10 K	≤ 0,20 % per 10 K

Related information

Storage and transport

Figure 6-5: Dimensions standard types PR 6426

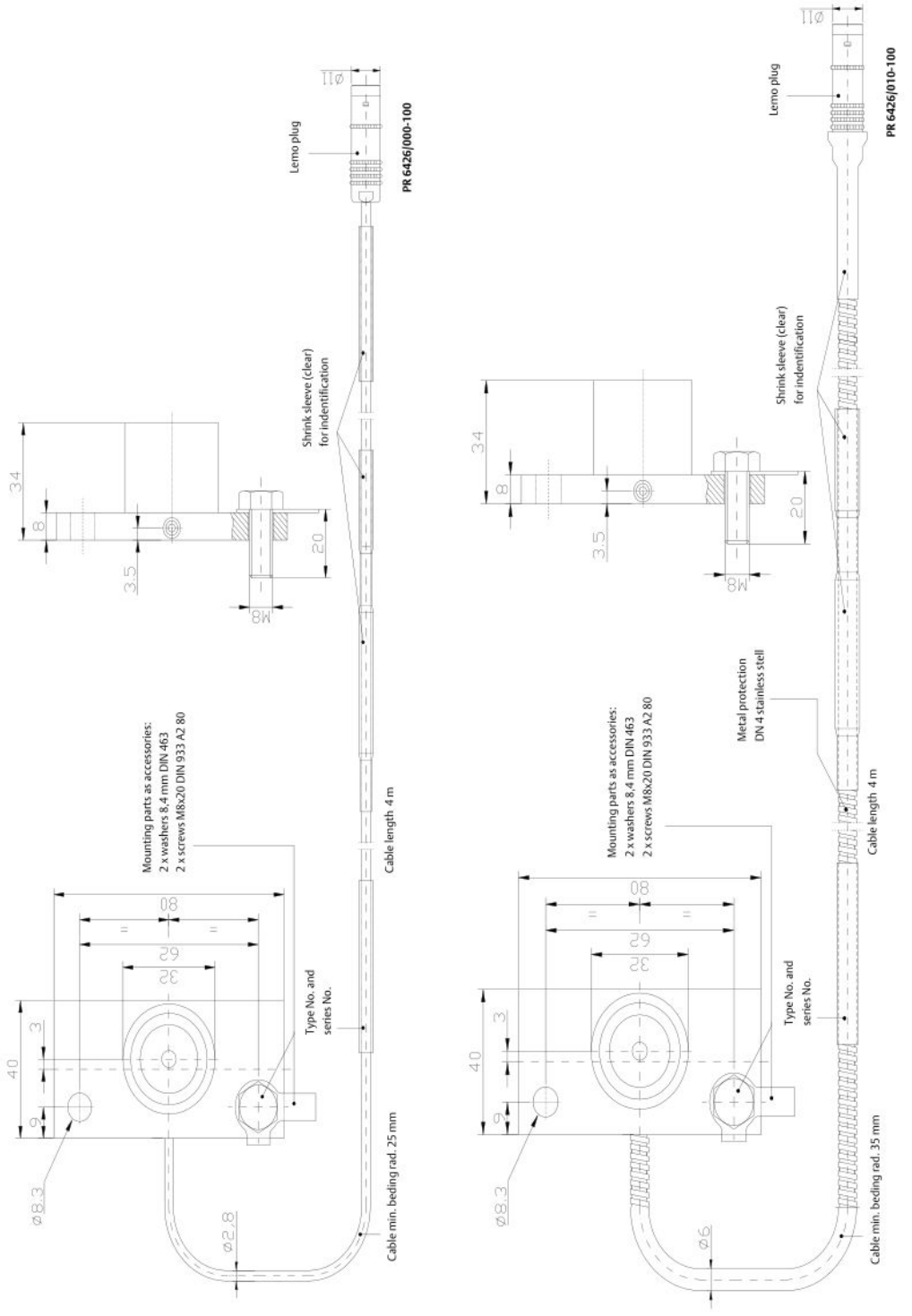


Table 7-5: PR 6424/xxx-xxx *(continued)*

Order Matrix	PR 6424/	X	X	X	-	X	X	X
Total Sensor Length C=Cx+12.5 mm	0(Cx=40 mm), 1(50 mm), 2(60 mm), 3(70 mm), 4(80 mm), 5(90 mm), 6(100 mm), B(150 mm), G(200 mm), M(250 mm), R(290 mm)			X				
Adapter Plug	WITH WITHOUT					0 1		
Total Cable Length	0(4 m), 1(5 m), 4(10 m)						X	
Cable End	LEMO OPEN							0 1

Table 7-6: PR 6424/xxx-xxx – Special versions

Version	Description
PR 6424/xxx-x3x	8 m cable length

Table 7-7: PR 6425/xxx-xxx

Order Matrix	PR 6425/	X	X	X	-	X	X	X
Sleeve Thread	M18x1.5	0						
Armored Cable	WITH		1					
Total Sensor Length	0(69 mm)			0				
Adapter Plug	WITHOUT					1		
Total Cable Length	0(4 m), 1(5 m), 3(8 m), 4(10 m)						X	
Cable End	LEMO OPEN							0 1

Table 7-8: PR 6426/xxx-xxx

Order Matrix	PR 6426/	X	X	X	-	X	X	X
Sleeve Thread	NO THREAD	0						
Armored Cable	WITH WITHOUT		1 0					
Total Sensor Length	Mounting Plate 80 mm x 40 mm			0				
Adapter Plug	WITH WITHOUT					0 1		
Total Cable Length	0(4 m), 1(5 m), 2(6 m), 3(8 m), 4(10 m)						X	
Cable End	LEMO OPEN							0 1

Table 7-9: PR 6426/xxx-xxx – Special versions

Version	Description
PR 6426/xxx-x2x	6 m cable length
PR 6426/xxx-x3x	8 m cable length
PR 6426/xxx-xxx-AS	Additional sealing