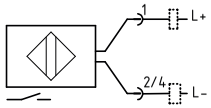
Piston detectors

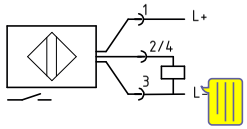
with adapters, optionally with cable break protection

Service manual

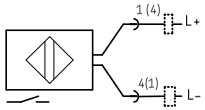
EN

Universal Piston Detector
234-13163-9





Bipolar Piston Detector
234-11454-1



Note!
For use only in combination with SKF lubrication pumps of series KFAS/KFBS/KFGS in the commercial vehicles and farm machinery.

Version 08
22.01.2021
951-150-032-EN

EU Declaration of Conformity in accordance with Directive 2014/30/EU Annex IV

The manufacturer, SKF Lubrication Systems Germany GmbH, Walldorf Plant, Heinrich-Hertz-Str. 2-8, DE - 69190 Walldorf, hereby declares conformity of the electrical device

Designation: **Piston detector**
Type: **Magnetic sensor M.....G**
Item number: **234-13163-9** and **234-11454-1**

with all relevant harmonization legislation of the European Union at the time of placing on the market.

Furthermore, the following Directives and (harmonized) standards were applied in the applicable areas:

2011/65/EU	RoHS II

Standard
EN 60947-5-1:2004/AC:2005
EN 50581:2012

Walldorf, 17.12.2020

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Warranty
The instructions do not contain any information on the warranty. This can be found in our General Terms and Conditions.

Further language versions can be found on the SKF homepage.

Disclaimer of liability
The manufacturer shall not be held liable for damage resulting from:

- Improper usage, assembly, operation, configuration, maintenance, repair, or accidents
- Improper reaction to malfunctions
- Unauthorized modifications to the product
- Intentional or gross negligence
- Use of non-original SKF spare parts

The maximum liability for loss or damage resulting from the use of our products is limited to the purchase price. Liability for indirect damage of any kind is excluded.

Explanation of symbols and signs

	General warning	Symbol	Meaning
	Wear personal protective gear (face mask)	●	Chronological instructions
	Wear personal protective gear (gloves)	○	Bullet list items
	Wear personal protective gear (protective clothing)	☞	Indicates the requirements that must be met for the actions described in the following
	Pressure injection		General notes
	Hot surfaces		

	Warning level	Consequence	Probability
	DANGER	Death, serious injury	Immediate
	WARNING	Serious injury	Possible
	CAUTION	Minor injury	Possible
	NOTE	Property damage	Possible

Table of contents

1. Safety instructions

To convert the piston detector, consult the documentation for the feeder (lifecycle manual, assembly instructions) in which the old piston detector is used. The safety instructions in that documentation must be observed in full.
Further:

- The operator must ensure that these conversion instructions and the corresponding feeder documentation have been read by the person who converts the piston detector or supervises or instructs said person.
- Before removing the defective piston detector, depressurize the affected feeder.
- The operator must also ensure that the staff fully understands the content of the instructions.
- Putting the products into operation or operating them without having read the instructions is prohibited.

2. Scope of delivery/storage

The conversion kit for the piston detectors includes a feeder-specific adapter.
The piston detectors may be used only with this adapter.
A stopper and a cable adapter are also enclosed for the feeder version.
The scope of delivery also includes these conversion instructions.

This service manual must be enclosed with the product documentation (e.g., feeder documentation).

2.1 Storage

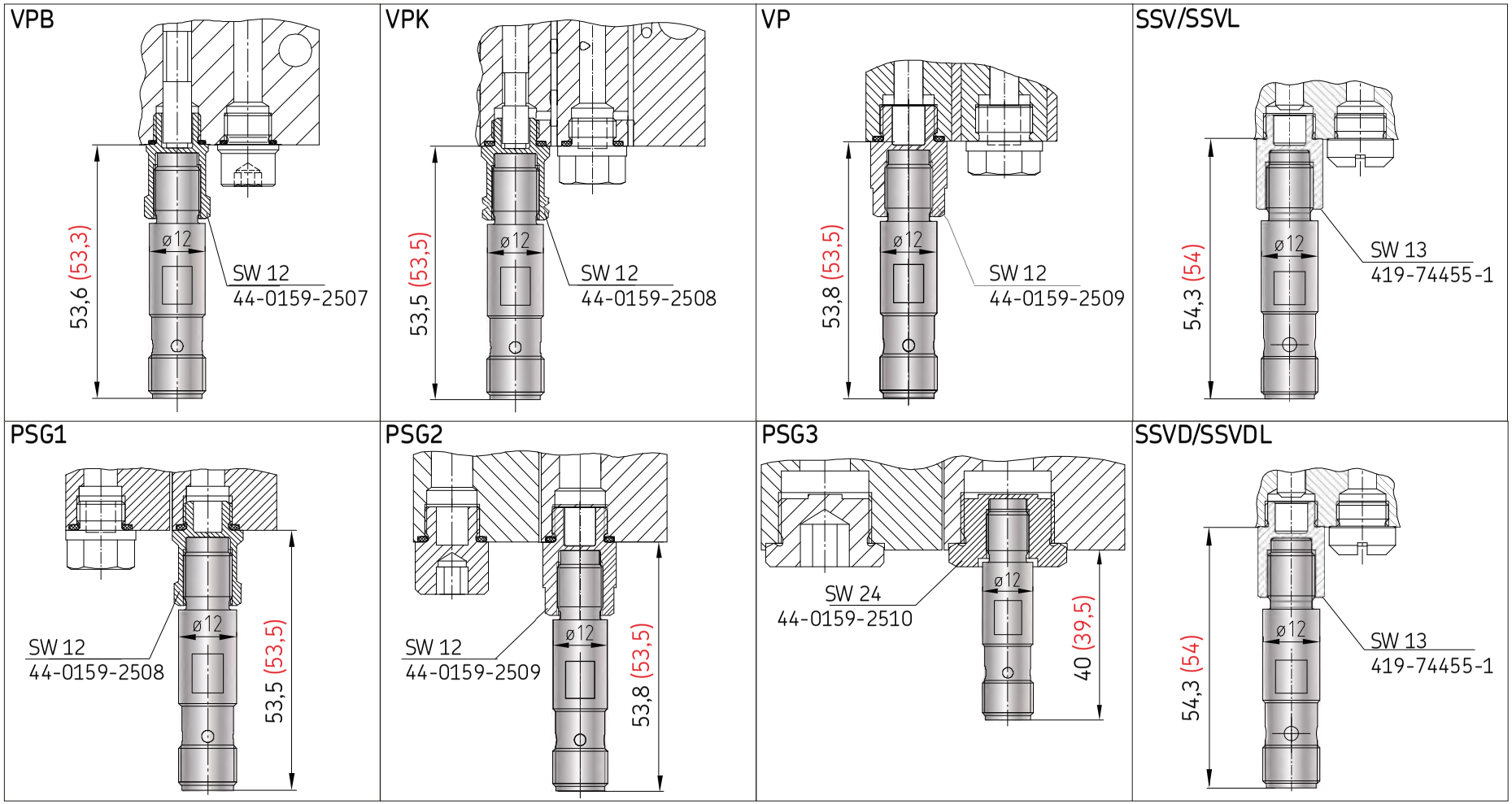
Storage conditions- See feeder documentation and:

- Store in the original product packaging.
- Store protected from nearby sources of heat or cold.
- The permissible storage temperature range corresponds to the operating temperature range (see “Technical data”).

3. Overview, functional description

3.1 Progressive feeder overview with universal piston detector 234-13163-9 or bipolar piston detector 234-11454-1

Mounting dimensions, universal and bipolar piston detectors, Fig. 1



(....) = mounting dimension of previous piston detector

3.2 Design

The universal piston detector 234-13163-9 and the bipolar piston detector 234-11454-1 are position sensors that, together with the respective pressure-resistant adapter, are screwed into the feeder. Through the closed adapter, the sensors detect the feeder piston without coming into direct contact with it.
Hydraulic pressure spikes therefore do not act directly on the front sensor surface the piston detectors.
There are different adapters depending on the feeder series. These differ in terms of thread size and clearance. They are specifically tailored to the respective feeder type and piston type.

The piston detectors automatically detect the clearance between the feeder piston and the piston sensor following several feeder strokes and adjust themselves automatically.

The universal piston detector automatically detects the customer's plug/cable assignment, 2-wire design or 3-wire design (with cable break protection).
The universal piston detector is not suitable for usage in vehicles with KFGS or KFGL lubrication pump due to an undefined pin assignment. The bipolar piston detector is to be used in this case.
The bipolar piston detector is available only in a 2-wire design. The signal voltage can be applied to either pin 1 or pin 4.

3.2.1 Function

When the piston detector is actuated (piston stroke), a yellow LED lights up and indicates correct functioning of the piston detector.

Subsequent replacement of the piston detector during operation is possible in cases of piston detectors with adapter which have already been mounted if the correspondingly designed adapter is also mounted. A check of the adapter version (number of rings) is to be carried out beforehand in accordance with Chapter 5.1.

The piston detectors are available with a corresponding adapter and cable harness (cable harness only on feeder series SSV, SSVL, SSVD,SSVDL, SSVE, SSVD-E as a replacement for all previous detectors of feeder series PSG1, PSG2, PSG3, VP, VPK, VPB, SSV, SSV, SSVD, SSVDL, SSVE, SSVD-E.

VPB metering device, stainless steel version

Due to the material used in the piston (brass), the piston detectors described here are unable to detect the movement of the piston when VPB metering devices in the stainless steel version are used. Instead of the VPB metering device in the stainless steel version, please use a corresponding SSV metering device in the stainless steel version.

3.2.2 Application in commercial vehicles or farm machinery in combination with a KFAS/KFBS or KFGS pump

Bipolar piston detector 234-11454-1 is a replacement for the following piston detectors.

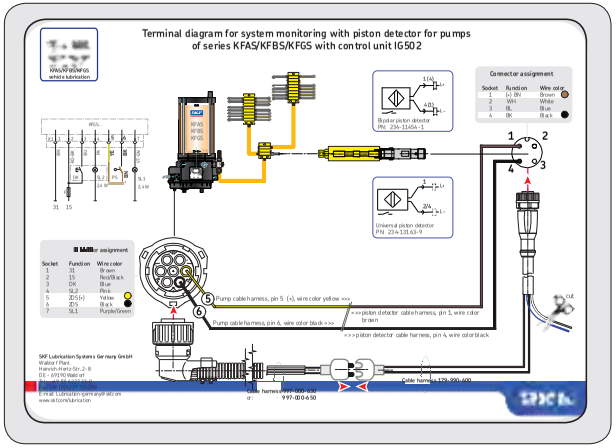
Bipolar piston detector	Replaces previous piston detectors
234-11454-1	177-300-091
	177-300-092
	177-300-096

If a universal piston detector has been ordered accidentally instead of a bipolar piston detector, inspect it for correct connection before installing it in the feeder. This is done by connecting the electrical plug connection (plug M12x1). Then switch on the KFG pump and hold a metallic object in front of the face of the piston detector. If the yellow LED lights up (actuation of the piston detector), the connection was established correctly. If this is not the case, switch the pin assignment in pin 4 (+) and pin 1 (Load) in the power lead.

A detailed terminal diagram for connecting the bipolar piston detector to a KFAS, KFBS or KFGS pump is available at the links on page 1 in the respective national languages (attachment to the PDF).

3.3 Information on feeder series VP; VPB; VPK; PSG1; PSG2; PSG3

If the piston detector is mounted (in contrast with its previous mounting position) on the opposite side of the feeder, the feeder piston must also be rotated.
See the respective feeder documentation for a description of conversion.

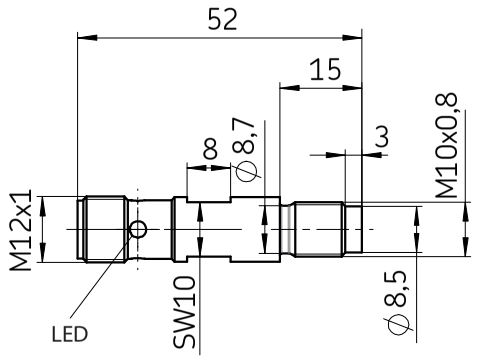


4. Technical data

4.1 General technical data

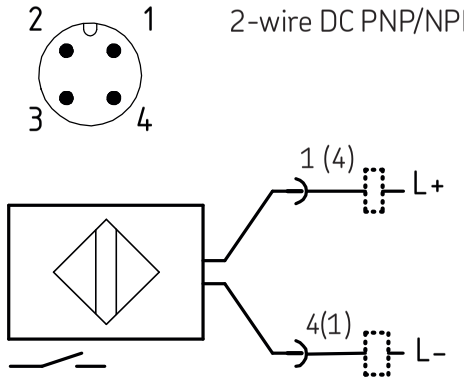
General data		Designation
Field of application		Lubricant feeders
Ambient temperature	[°C]	-40 ....+85
Principle of operation		Piston detector/position sensor
Material		Active area stainless steel (1.4404); housing stainless steel (1.4016), plug: PEI
Mounting type		Mountable flush in associated adapter
Tightening torque	[Nm]	7 ±0.5
Circuit state display	LED	Yellow/lights up on damping
Electrical connection		M12x1 plug-in connection, gold-plated contact

Dimension drawing



Sensing range		
Sensing distance	[mm]	2.2 condition on delivery
Effective sensing distance (Sr)	[mm]	2.2 ±10%
Hysteresis	[% of Sr]	≤ 10
Accuracy/deviations		
Switching point	[% of Sr]	±10%
Reproducibility	[% of Sr]	±10%
Permiss. operating pressure with associated adapter	[bar]	Identical to permiss. operating pressure of the feeder in which the sensor with adapter is installed (see feeder documentation)

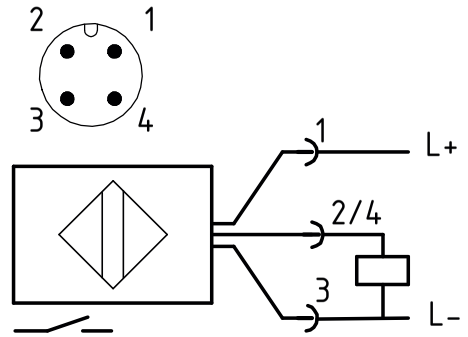
Bipolar piston detector



Electrical data		Universal piston detector	Bipolar piston detector
Design		3-wire DC PNP 2-wire DC PNP/NPN	2-wire DC PNP/NPN
Operating voltage	[V]	10-36 DC, supply class 2 per cULus	
Max. harmonics	[V]	- 10% of max. permissible operating voltage	
Power consumption	[mA]	< 5 only in 3-wire operation	
Safety class		III	
Polarity reversal protection		Yes	Reversible
Output function		NO-contact	
Voltage drop	[V]	3.5	4.5
Minimum load current	[mA]	5	
Residual current	[mA]	< 0.8	
Current-carrying capacity	[mA]	100	
Short-circuit-proof		Yes	
Overload-proof		Yes	
Switching frequency	[Hz]	10, with damping surface Ø 4mm to 7 Hz	
Protection class	[IP]	IP65 / IP68 / IP69K; with cable box screwed on properly	
Immunity to magnetic fields	[mT]	- 0,5 bis +0,5	

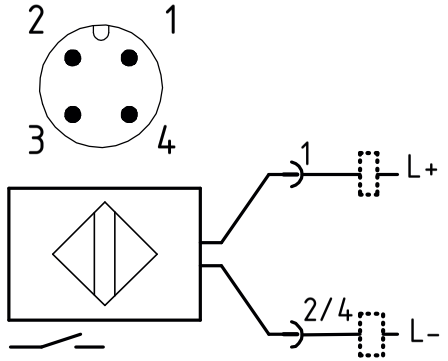
Universal piston detector

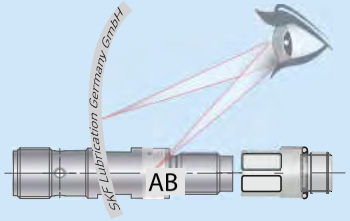
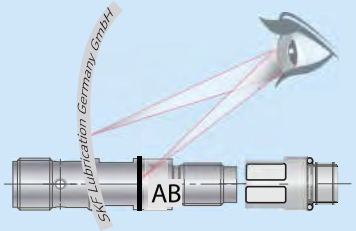
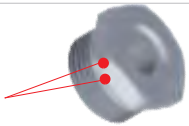
Connector pin assignment with cable break protection 3-wire DC PNP



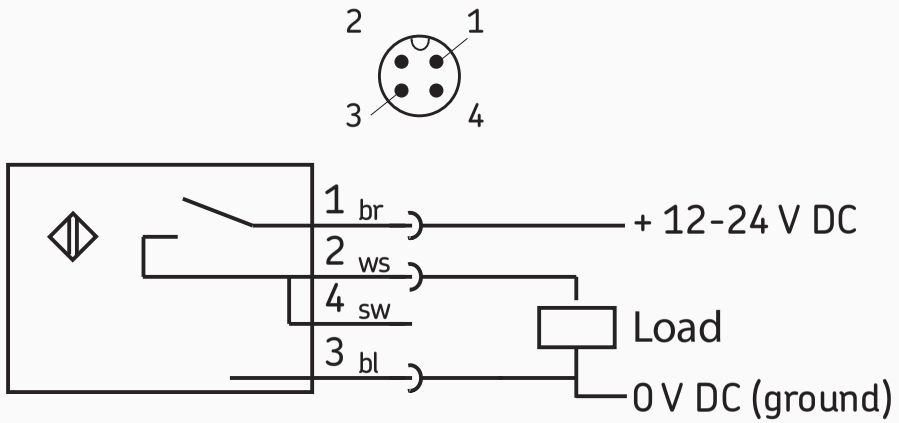
Universal piston detector

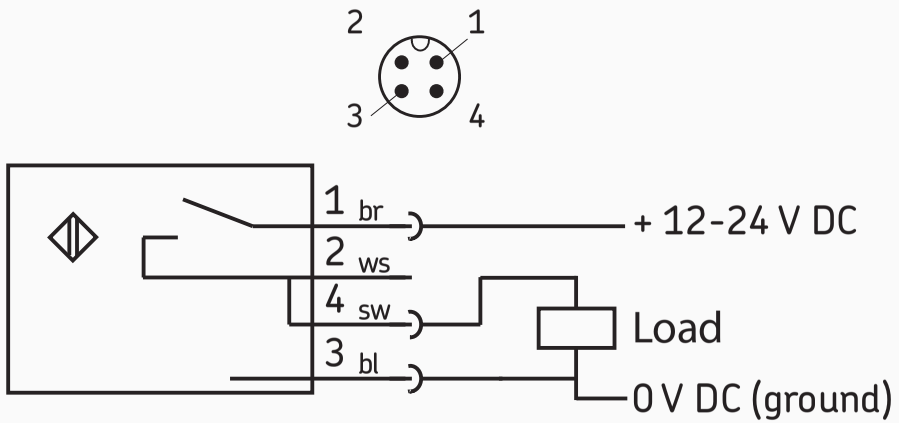
Connector pin assignment without cable break protection 2-wire DC PNP/NPN



Electrical data	Universal piston detector	Bipolar piston detector
	234-13163-9	234-11454-1
Visual differentiations of the piston detectors		
Both of the current piston detectors are equipped with the "SKF Lubrication Systems Germany GmbH" lettering as well as with the code "AB." In addition to this code, the bipolar piston detector also has a thick black circumferential marking ring (▌).		
Visual differentiations of the adapters for:	Marking	Part number
Progressive metering devices of the series VP and PSG2	rings 2  M12x1	**44-0159-2509**
Progressive metering devices of the series VPK andPSG1	rings 3  M10x1	**44-0159-2508**
Progressive metering devices of the seriesVPB	rings 2  M10x1	**44-0159-2507**
Progressive metering devices of the series PSG3	rings 2 	**44-0159-2510**
Progressive metering devices of the series SSV, SSVL, SSVD, SSVDL, SSVC, SLC, VSG, VSL	rings 2  M11x1	**419-74455-1**

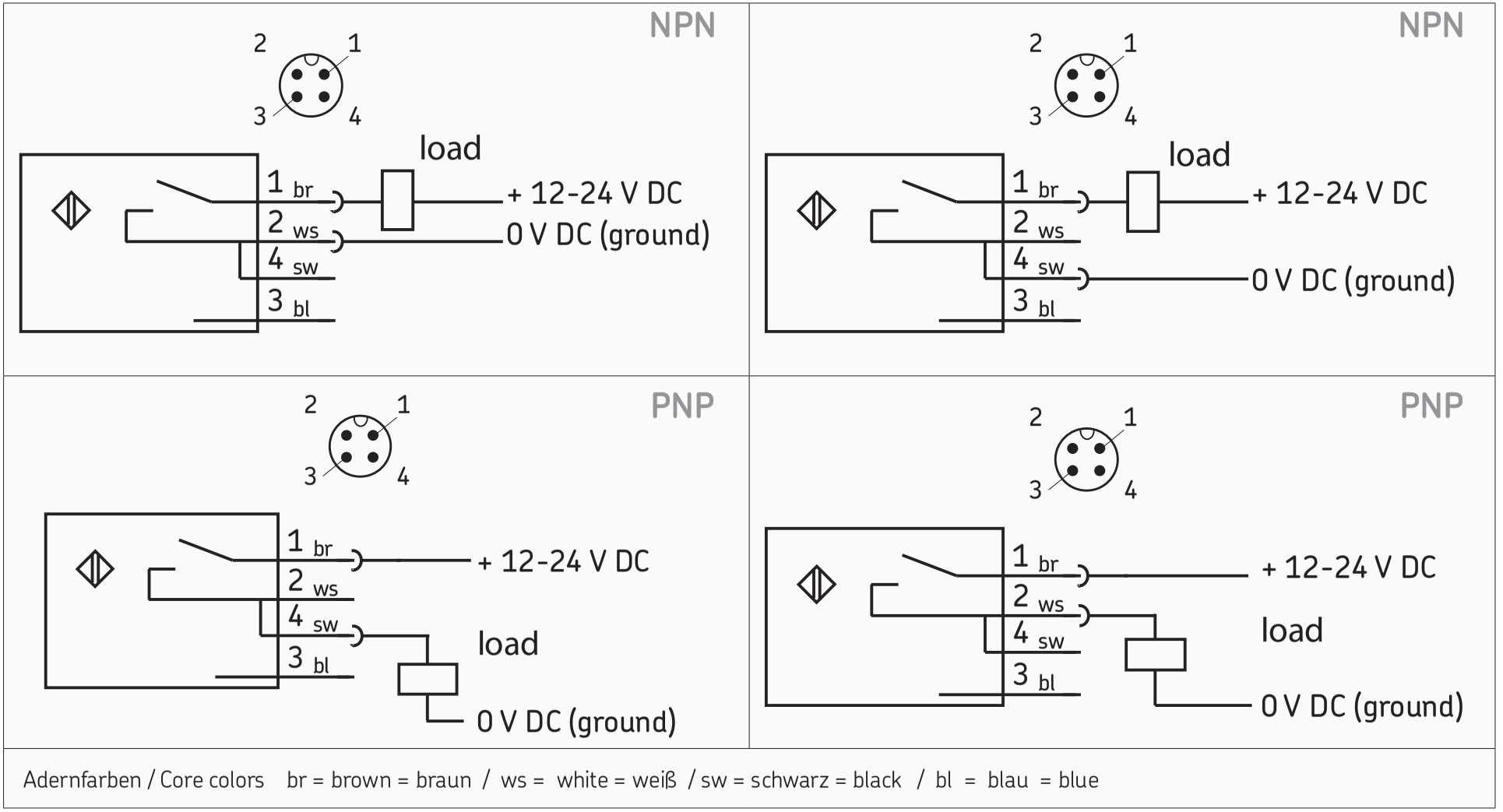
4.2 Connection options 234-13163-9, 12-24V DC, 3-wire PNP





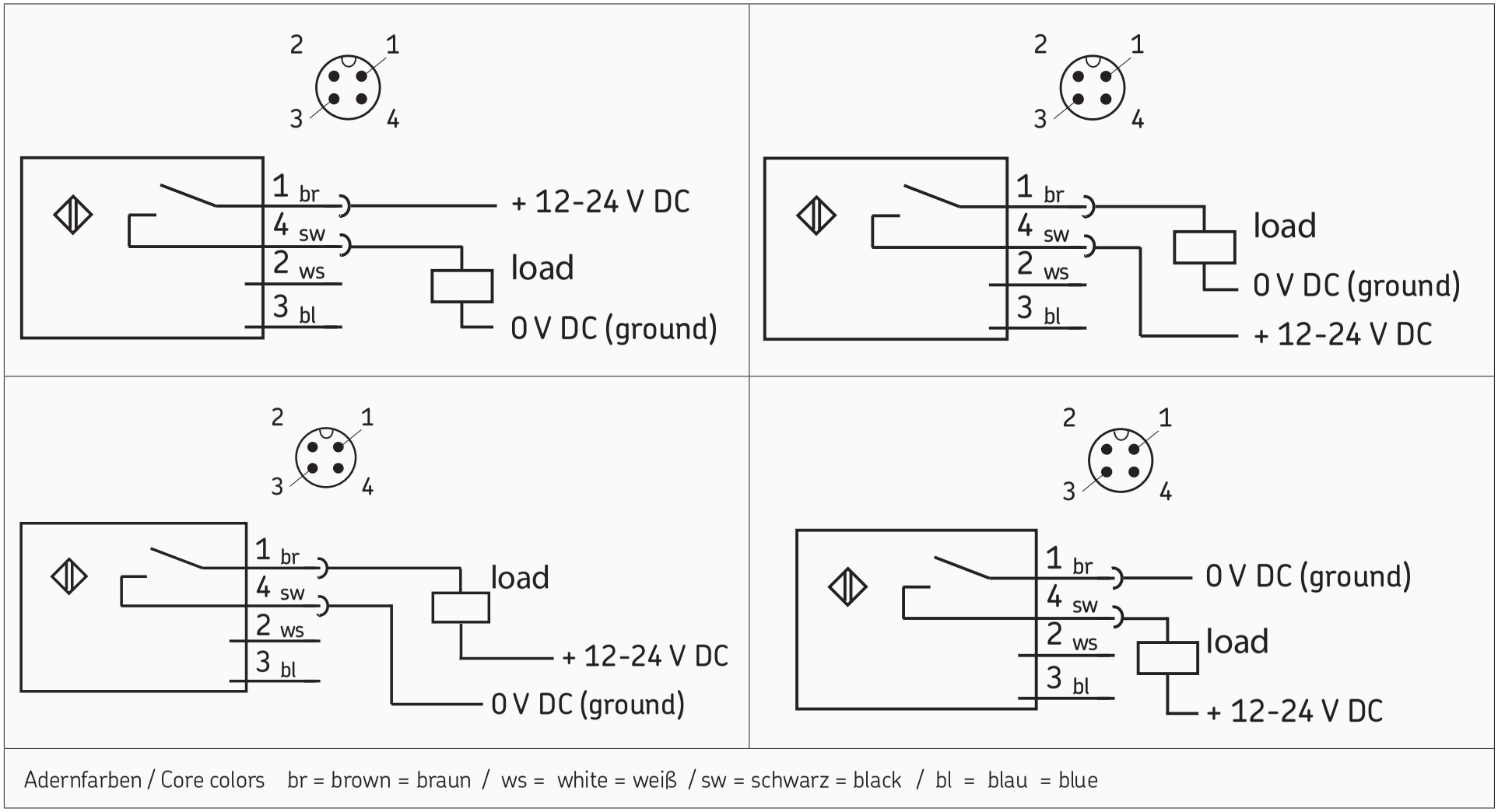
Adernfarben / Core colors br = brown = braun / ws = white = weiß / sw = schwarz = black / bl = blau = blue

4.3 Connection options 234-13163-9, 12-24V DC, 2-wire PNP/NPN



Adernfarben / Core colors br = brown = braun / ws = white = weiß / sw = schwarz = black / bl = blau = blue

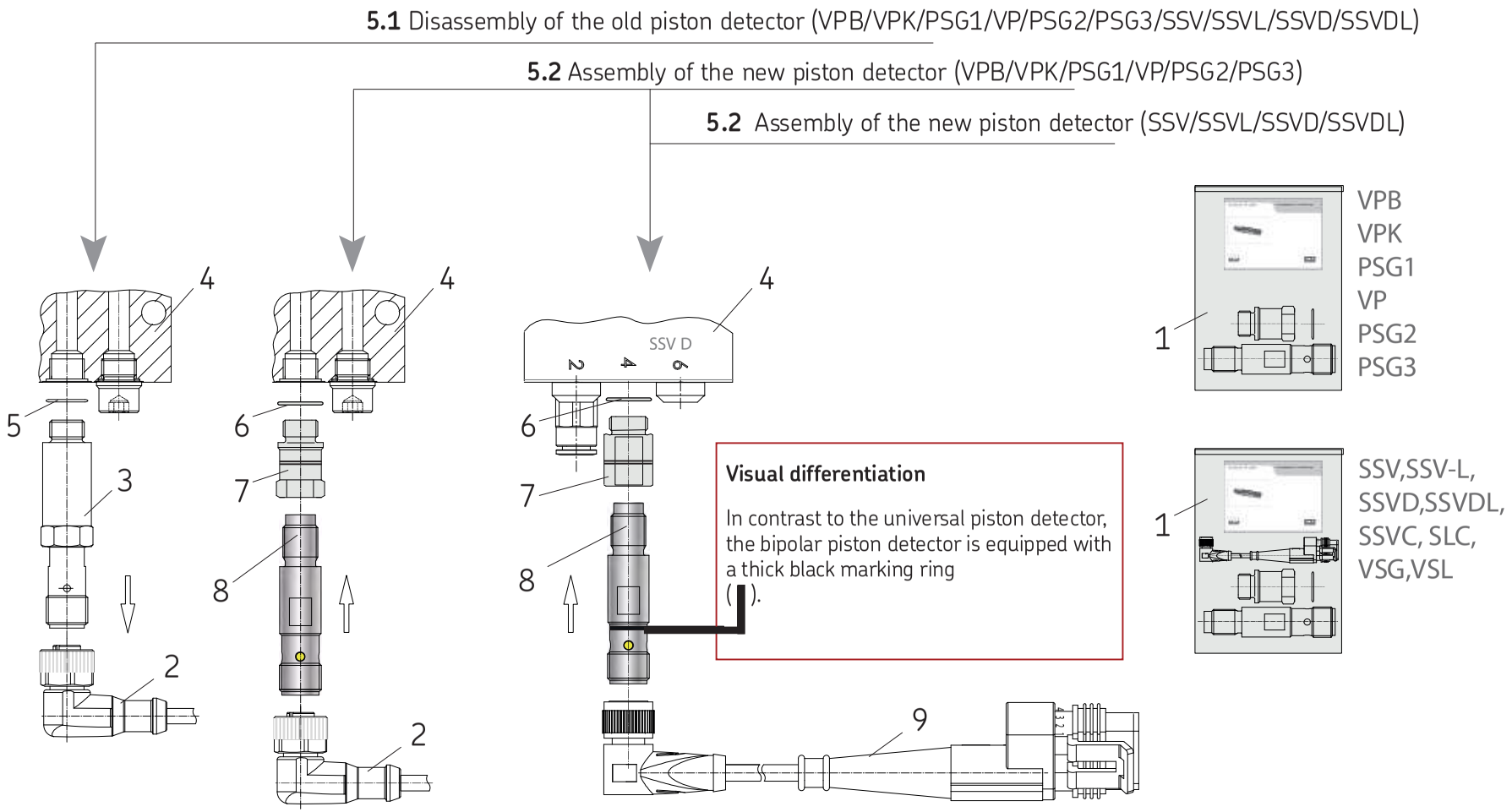
4.4 Connection options 234-11454-1, bipolar 12-24V DC, 2-wire PNP/NPN



Adernfarben / Core colors br = brown = braun / ws = white = weiß / sw = schwarz = black / bl = blau = blue

5. Assembly

Assembly drawing, Fig. 2



5.1 Disassembly of the old piston detector

☞ see Figures 1 to 3

	CAUTION
	Pressure hazard Before beginning conversion work, depressurize the system in which the feeder with the piston detector to be replaced is installed and depressurize the feeder itself.

- Depressurize the lubrication system and the metering device
- If possible, place a drip pan for the discharging lubricant below the corresponding metering device.
- Place individual parts of the new piston detector replacement kit (**1**) ready to hand on a clean storage surface.
- Disconnect the electrical connection cable (**2**) from the old/defective piston detector.
- Loosen and unscrew the defective piston detector (**3**) from the metering device (**4**).
- nachfolgend überprüfen ob bereits ein Adapter (**7**) montiert ist

Afterwards, check whether an adapter (**7**) is already mounted.

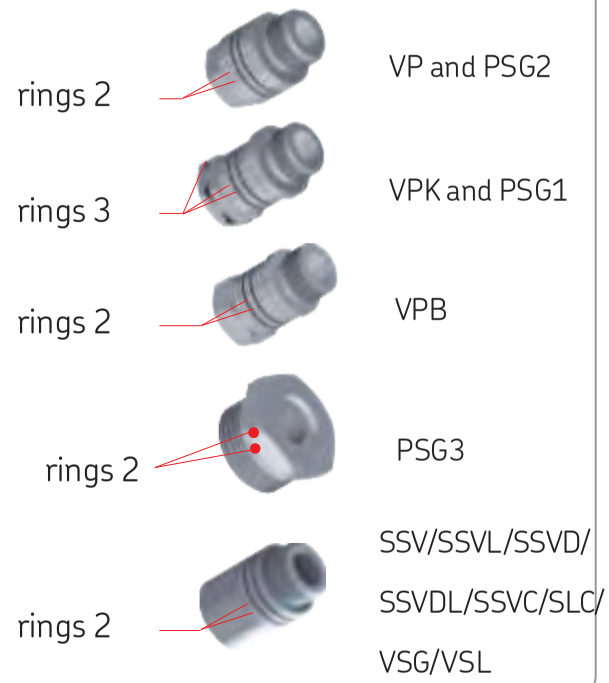
- If present, remove old packing ring (5) from the metering device (4) (VP; VPB; VPK; PSG1; PSG2; SSV/SSVL/SSVD/ SSVDL)

Procedure for metering devices with mounted adapter (7):

☞ The adapters (**7**) have different wall thicknesses suitable for the piston detectors/metering devices. The code of the adapter in accordance with Figure 3 is therefore to be checked prior to the assembly of the piston detector.

- The old adapter (**7**) is to be disconnected from the metering device (4) if the adapter code (rings) of the adapter that is already mounted does not match the code in Figure 3.

Adapter code, Fig. 3



5

5.2 Assembly of the new piston detector

☞ see Figures 1 and 3

- Apply grease to the new sealing ring (**6**) and place it on the new adapter (**7**).
- Apply the adapter (**7**) to the feeder (**4**) and tighten with the following torque:

Adapter torques

VP/PSG2	SW 13	=	20+1Nm
VPK/PSG1	SW 12	=	15+1Nm
PSG3	SW 24	=	70±4Nm
SSV/SSVC/SSVD/SSVE	SW 13	=	15±1Nm
SSVL/SSVDL	SW 13	=	15±1Nm
SSVD/SSVD-E	SW 13	=	15±1Nm
SLC1/SLC2	SW 13	=	15±1Nm
VSG, VSL	SW 13	=	15+1Nm
VPB	SW 12	=	15+1Nm

- Apply new piston detector (**8**) to the adapter (**7**) and tighten gently.

Avoid uncontrolled tightening of the piston detector, as this could cause damage.
Maintain tightening torque of **7$^{\pm 0.5}$ Nm**.

- Tighten the piston detector (**8**) with a torque of **7$^{\pm 0.5}$ Nm**.
- Connect electrical connection cable (provided by customer) (**2**) to the piston detector (**8**).

In case of different cable connection:

- Remove old connection cable (**2**).
- In place of the previous connection cable, connect the supplied adapter cable (**9**) to the piston detector (**8**) and the customer-provided port
- Attach the adapter cable (**9**) in a stress-free position.
- Clean the work area/feeder of lubricant contamination.
- Remove the drip pan.

5.3 Checking the signal

☞ See Figure 2

- ☞ On the subsequent metering device strokes, the signal from the piston detector must be received by the customer's monitoring equipment.
- Check the metering stroke signal from the piston detector on the yellow piston detector LED (flashing) or at the customer's signal connection

6. Malfunctions, causes, and remedies

6.1 Metering devices signal missing

Malfunctions table

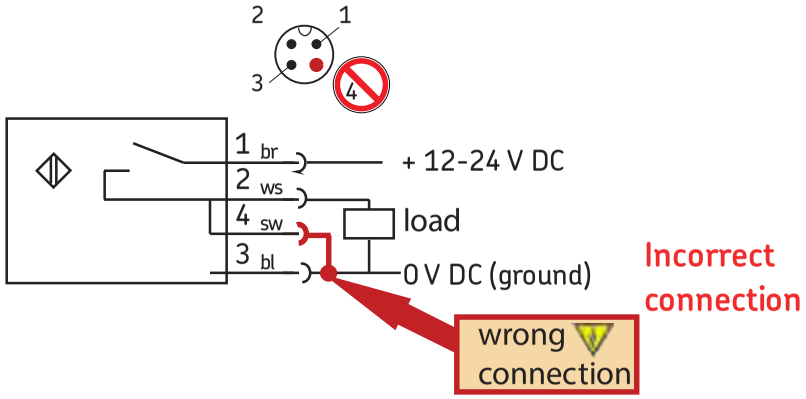
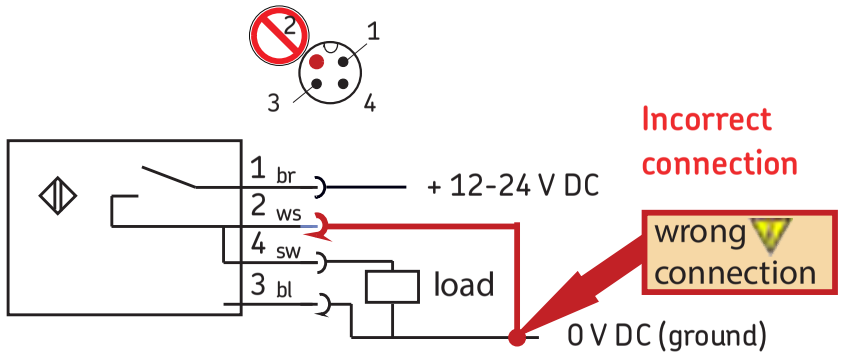
Malfunction	Possible cause	Remedy
None Feeder signal	○ Mechanical blockage of the metering device	• Eliminate the blockage, check the metering device
	○ Socket not connected or connected incorrectly	• Check plug contacts • Install socket correctly
	○ Signal line is broken	• Check signal line
	○ Piston detected is not installed correctly	• Check engagement depth of adapter and piston detector, tighten if necessary
	○ Piston detector overtightened	• Disconnect piston detector, perform functional test, replace piston detector if damaged
	○ Wrong adapter used	• Use only the adapter appropriate for the respective feeder
	○ Universal piston detector ordered instead of a bipolar piston detector; only when connecting to KFG pumps in vehicle lubrication applications	• Swap the pigtails, see Chapter 3.3

Failure table

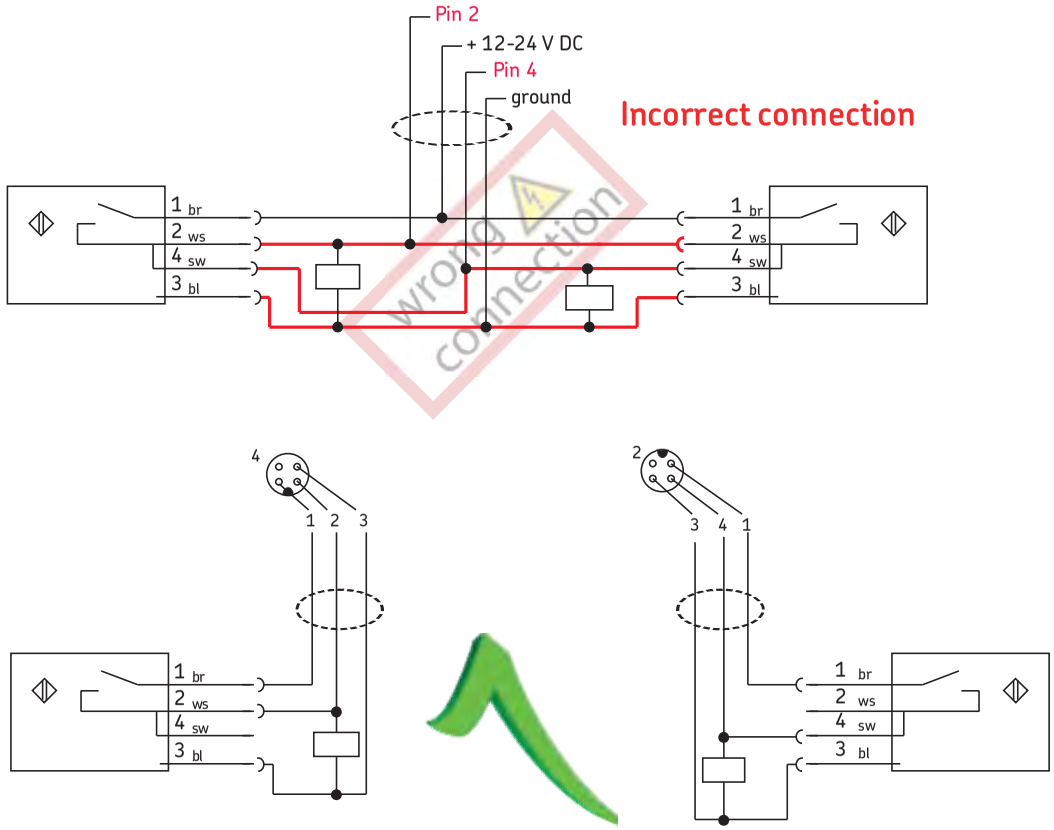
If, after working through the fault causes (previous page), there is still a malfunction in the metering device signal (continuous signal or missing signal), proceed as follows:

Malfunction	Possible cause	Remedy
Continuous signal	○ Positive magnetic field beyond the permissible immunity margin (more than >0,5 mT)	**Requirements:** **The metering device must be functioning correctly, and the piston detector must be connected correctly.** • Check for any excessive magnetic fields in the assembly area of the metering device. Proceed as follows: • Install the metering device with piston detector at a different installation location and carry out a functional test of the piston detector installed in the metering device.. • If the fault (continuous signal or missing signal) no longer occurs, suitable measures should be taken to prevent the excessive magnetic field. Contact SKF Service for assistance. • If the fault (missing signal) continues to occur, return the entire metering device to SKF Service/your dealer -see the manufacturer's address on page 3).
Missing signal	○ Negative magnetic field beyond the permissible immunity margin (less than <-0,5 mT)	

Prohibited connections for the piston detector 234-13163-9

Malfunction	Possible cause	Remedy
Short circuit! If pin 4 is connected to pin 3 (ground), a short circuit will result! When activated, the detector will flicker due to short circuit detection by the detector	Piston detector 234-13163-9 connected incorrectly 	• Connect the piston detector in accordance with chapter 4.2, Connection options 234-13163-9, 3-wire PNP
Short circuit! If pin 2 is connected to pin 3 (ground), a short circuit will result! When activated, the detector will flicker due to short circuit detection by the detector		

Prohibited connections (Y cable)

Malfunction	Possible cause	Remedy
Undefinable signals	**Piston detector is receiving incorrect signals** Sporadic interference will occur if a second sensor or an actuator is connected using a Y metering device cable. 	• Do not connect the piston detector's signal line using a Y metering device cable. SKF recommends using one 3-core signal cable for every piston detector connection..

7. Spare parts

WARNING!

Adapter sleeves can be changed only on depressurized feeders!

Spare parts list

Designation	Order number	Designation	Order number	Quantity
Universal Piston Detector	234-13163-9	2-wire or 3-wire connection		1x each
Bipolar piston detector	234-11454-1	2-wire connection for vehicle lubrication		
VP adapter sleeve	44-0159-2509	VP sealing ring	WVN 501-12x1.5	
VPK adapter sleeve	44-0159-2508	VPK sealing ring	WVN 501-10x1.5	
VPB adapter sleeve	44-0159-2507	VPB sealing ring	WVN501-10x1	
PSG1 adapter sleeve	44-0159-2508	PSG1 sealing ring	96-9120-0062	
PSG2 adapter sleeve	44-0159-2509	PSG2 sealing ring	WVN 532-12x1.5	
PSG3 adapter sleeve	44-0159-2510	PSG3 sealing ring	None	
SSV/SSVL; SSVD/SSVDL adapter sleeve	419-74031-1	SSV/SSVL; SSVD/SSVDL sealing ring	219-13798-3	

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