SCHUCK GROUP

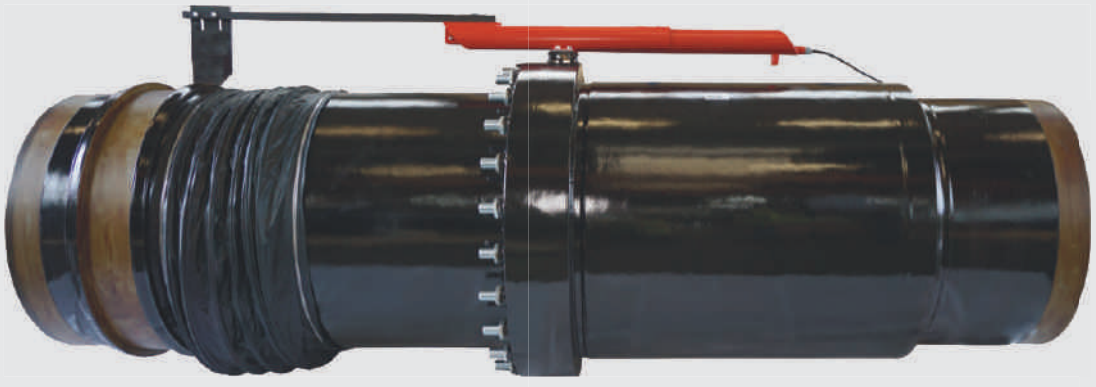
SCHUCK INSTALLATION/OPERATION MANUAL

Linear Compensator for Pipelines
Type SDS and SDS-K

Translation of the original German Operation Manual

Type SDS

Type SDS-K



Introduction

This manual is written for operating, maintenance and supervisory staff.

This manual also describes components and auxiliary units that are not included or are only partially included in the scope of supply.

The visual representation of systems, assemblies and individual components may vary.

The project-specific design and configuration can be learned from the supplied dimensional drawings and wiring diagrams as well as from the component supplier documentation.

The manual must be read, understood and observed by operating staff. We emphasize that Franz Schuck GmbH assumes no liability for damage or malfunctions arising from non-compliance with this manual.

With regard to the illustrations and information in this manual, we reserve the right to make technical modifications which are required for the improvement of components.

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1 Preliminary remarks

NOTICE

Danger of consequential damage due to incorrect operation, maintenance and/or handling!

We explicitly emphasize that we assume no liability for damage or malfunctions arising from non-compliance with this manual.

⇨ Therefore it is important to comply with all instructions in this manual!

This manual is to provide technicians and users trained by the Franz Schuck GmbH with the necessary information for installation and adjustment work and to help in implementing work quickly and correctly.

For your own safety, read this manual carefully and pay particular attention to the highlighted tips. In any case, keep this manual to hand.

Pay special attention to all safety instructions in this manual. You will find the safety instructions in Chapter 2, in the introductions to chapters and before practical instructions. The General Terms and Conditions of the company apply exclusively to all deliveries and performances made by Franz Schuck GmbH, including any future transactions.

1.1 Legal notes

The component may only be installed by skilled staff.

Please check parts upon receipt for any possible damage that may have occurred during transport. Only undamaged parts may be fitted or used.

Any modification(s) of the component are in general prohibited by Franz Schuck GmbH. The manufacturer guarantee becomes void if this prohibition is not complied with!

1.2 Application range

This operation manual applies to the Franz Schuck GmbH product described in this manual.

The appropriate operation manuals for optional accessories must also be observed.

These operation manuals are included in the overall documentation if the accessories belong to the scope of supply from Franz Schuck GmbH.

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2 Safety

2.1 Fundamental safety instructions

2.1.1 General

The component is built according to the state of the art and recognized safety rules. Nevertheless, with its use, there can be dangers to the life and limb of the user or third parties and compromising of the component and other material assets can result.

Only use components in a technically perfect condition (in accordance with the customer dimension sheet, all components present, without visible damage); use them according to specifications in a safety and risk-conscious manner while complying with the operation manual! Remedy faults in particular that could impair safety (or have them remedied)!

2.1.2 Organizational measures

Always keep the operation manual within easy reach!

In addition to the operation manual, heed the generally valid legal and other binding rules concerning accident prevention and environmental protection!

Such duties can affect, e.g. the handling of hazardous materials and the provision/wearing of personal protective equipment and traffic regulations.

Complete operation manual with instructions including duties of supervision and reporting to consider operational particularities, e.g. with regard to work organization, workflows, staff used.

The staff entrusted with activities on the component must have read the operation manual before starting work, and here especially the Safety chapter. During their work is too late. This applies in particular to staff who are only employed occasionally to work on a component, e.g. when setting up or servicing.

Insofar as required or required by regulations, use personal protective equipment!

Observe all safety and hazard instructions for the system/the component!

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Make sure all safety and hazard signs are complete and legible!

Do not make any modifications, attachments or conversions that could impair safety without the approval of the supplier! This also applies to the installation and the adjustment of safety devices and safety valves as well as for welding on load-bearing parts.

Spare parts must correspond to the technical requirements specified by the manufacturer. This is always guaranteed when using original spare parts.

Adhere to the prescribed deadlines, or the deadlines stated in the operation manual, for recurring tests/inspections!

Appropriate workshop equipment is essential for carrying out maintenance work.

Make sure the location of fire extinguishers is clearly indicated and operating instructions are available!
Make sure to observe the fire alarm and fire fighting instructions!

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3 Technical specifications

3.1 Operating data

⚠ DANGER

Risk of injury due to bursting machine parts!

If the permissible limit values are exceeded, parts of the machine can be destroyed, and as a consequence of this people can be injured or killed!

⇨ Always operate machine within the permissible limit values!

All maximum values for capacity, load, pressure, vacuum etc. stated in this operation manual are limit values. These values are the basis for the constructive design and strength calculation of the components, but they are not warranted characteristics according to the law.

The exceeding of or non-compliance with the stated limit values during operation of the machine endangers staff and components and excludes any liability on the part of Franz Schuck GmbH for any damage caused thereby.

3.1.1 Identification plate

All essential technical specifications is summarized on the identification plate.

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Compensator	
Ident.-No.	XXX.YYY.ZZZ
Date	2020/2021
ΔL	+/- 400 mm
Δ∡	+/- 0,4°
Type	Linear Compensator
DN	DN1000
Length (min./max.)	3.850 mm/4.650 mm
PS	8,4 MPa
TS	-30 °C/+60 °C
Direction of flow	See label
CE marking	CE0036
Notified body	TÜV Süd
Weight (with/without locking system)	~ 5,95 t/~ 4,85 t
PT	12,6 MPa
Order-No.	T1900219

Fig. 3-1 Example: Identification plate

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3.1.2 Axial adjustability

For the axial adjustability of the Schuck linear compensator, see the identification plate or the customer dimension sheet.

The standard adjustability is ± 400 mm.

3.1.3 Position of linear compensator

For the delivery state (position of the linear compensator), see the customer dimension sheet.

3.1.4 Flow direction

The recommended flow direction and thus also the recommended installation direction is marked on the linear compensator with an affixed arrow.

A flow in the opposite direction is also permissible in principle. However, higher losses of flow are associated with this.

3.1.5 Piggability

A pig can be built into the linear compensator for cleaning and inspection work. The suitability of the special design of the pig must be approved by the manufacturer of the compensator.

Similarly, there must be an inquiry into the suitability for bidirectional piggability.

3.1.6 Emergency sealing

Schuck linear compensators are normally equipped with a possibility for emergency sealing.

3.1.7 Linear compensator type SDS-K

The Schuck linear compensator type SDS-K is suitable for the complete incorporation into a system with cathodic corrosion protection.

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4 Description

4.1 System overview

Task

The linear compensator balances out voltages and movements in pipelines up to a length of ± 400 mm.

In combination with the measuring device, it forms a system unit for determination of the shift in the pipeline or in the linear compensator.

Components (depiction with locking device)

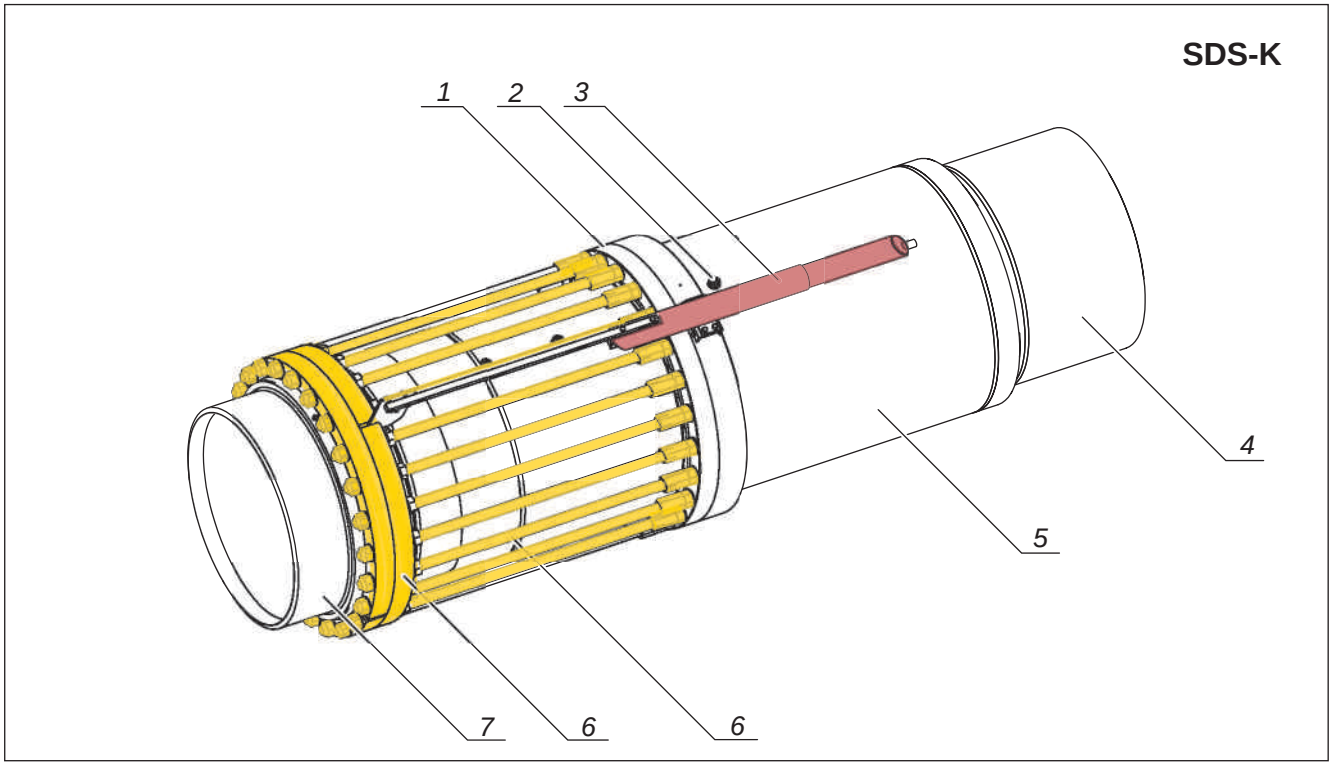

Fig. 4-1 System overview linear compensator with

1 Linear compensator
2 Test opening / possibility for emergency sealing
3 Measurement device for the linear compensator (optional)
4 Connecting pipe
5 Sleeve pipe
6 Locking device (optional, for pressure tests)
7 Telescopic pipe

Function

The linear compensator consists of an inside and an outside pipe. The inside pipe can slide axially in the outside pipe. Both pipes are sealed one against the other.

The position of both pipes to one another can be determined using the measurement device for the linear compensator.

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4.2 Linear compensator

Task

The linear compensator balances out voltages and movements in the pipe system so that the leak tightness of the system is guaranteed despite the shift.

Components (depiction without locking device)

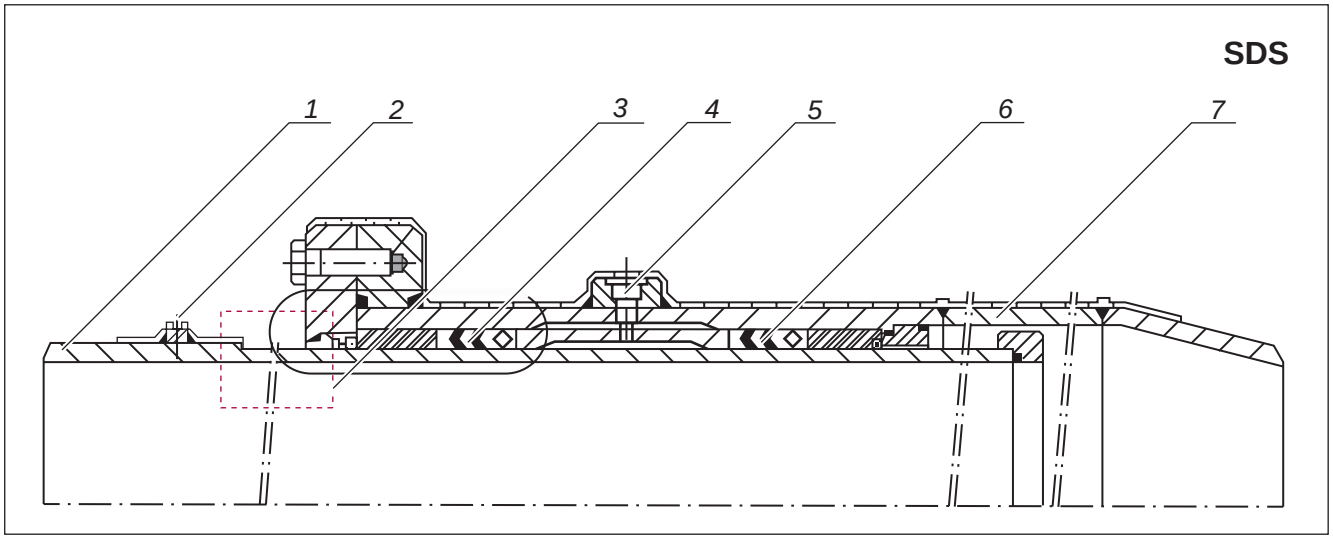

Fig. 4-2 Individual components of linear compensator

1 Telescopic pipe
2 Measurement mark
3 Running surface cover (only for type SDS-K)
4 Main seal B / Secondary seal
5 Test opening/Possibility for emergency sealing
6 Main seal A / Primary seal
7 Sleeve pipe

Function

Two equal main seals seal the system reliably. In case of a leak, an emergency seal can be achieved using a special grease.

With the type SDS-K, the running surface cover permits complete incorporation into the cathodic corrosion protection.

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4.3 Measurement device for the linear compensator

Task

The measurement device enables the specification of the precise value of the movement of the linear compensator.

Components

The measurement device for the linear compensator consists of a steel protective pipe, which is fastened with the help of a welded plate to the telescopic pipe. The PVC sleeve pipe measurement part is fastened in this protective pipe.

Linear compensator with measurement device

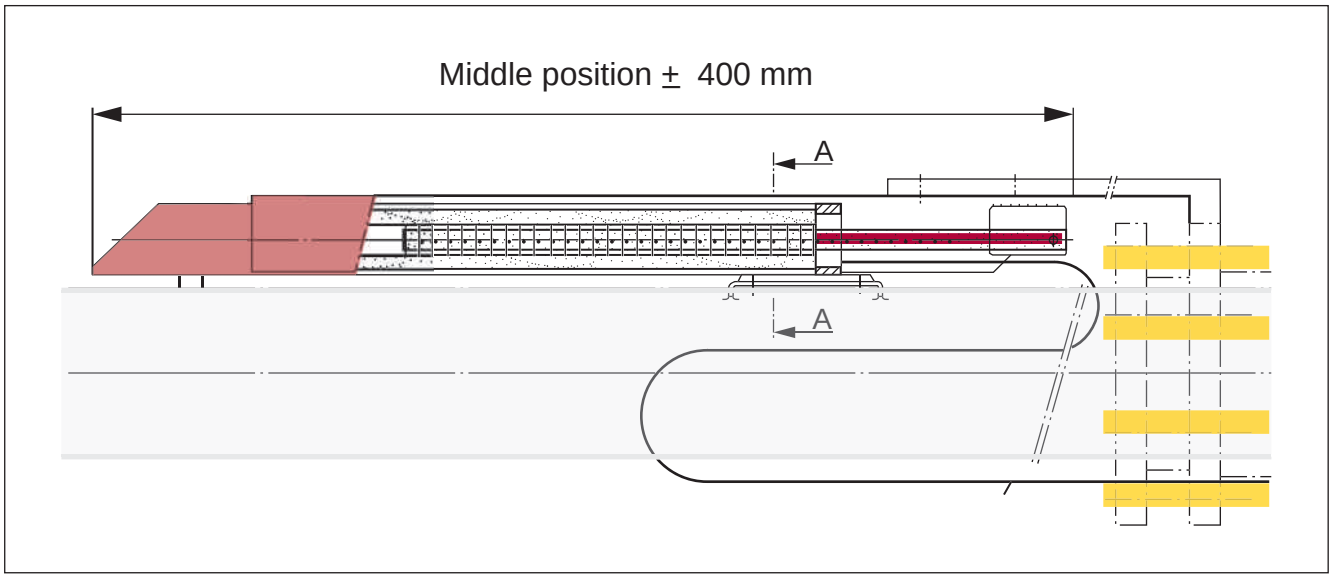

Fig. 4-3 Linear compensator with measurement device

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Measurement procedure

A commercial multimeter is required in order to be able to measures the position of the linear compensator.

Each measurement chain has 3 connection contacts:

- Measurement chain 1: Contacts 1– 3
- Measurement chain 2: Contacts 4– 6

Normally, measurement chain 1 is used to measure the resistance between the connection contacts 1 and 3:

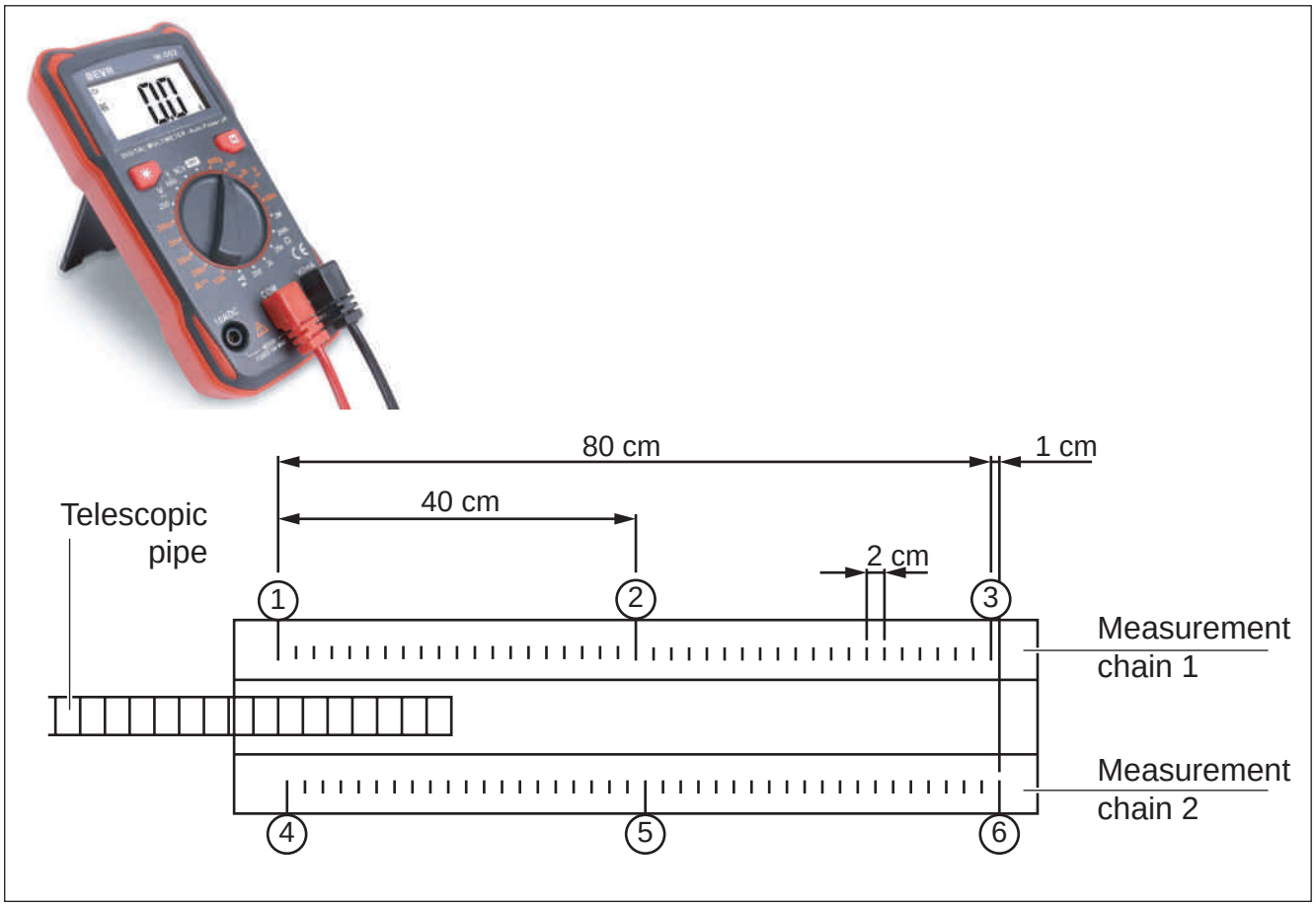

Fig. 4-4 Measurement device for the linear compensator

Measurement values

- Measured value 0 Ω = magnetic rod is pushed in all the way
- Measured value 2,000 Ω = middle position approx. 40 cm
- Measured value 4,000 Ω = magnetic rod is pulled out all the way

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Each measurement can be checked with measurement chain 2 between points 4 and 6, whereby there can be a difference of approx. 100 Ω because the measurement chains are arranged offset by 1 cm.

Tolerances of less than 50 Ω can result from the addition of the production tolerances of the resistances and must be rounded to 100 Ω!

Test measurements

If between 1 and 3 a value less than 2,000 Ω is measured, then between 2 and 3, the same value must be measured and between 1 and 2, 0 Ω must be measured.

If between 1 and 3 a value greater than 2,000 Ω is measured, then between 2 and 3, the value 2,000 Ω must be measured and between 1 and 2, the difference from the total value must be measured.

These test measurements can be made accordingly between the points 4 and 6 on measurement chain 2.

Measurement range

The measurement range is 800 mm maximum.

If diverging measurement values arise, then a measurement chain is not OK.

Example for setting

The measurement device for the linear compensator should be set to a value of 60 cm pulled out (20 cm pushed in).

- Pulled out: 60 cm
- Resolution: 2 cm = 100 Ω
- Factor a = 60 : 2 = 30
- Resistance R between the points 1 and 3
  R = a x 100 Ω = 30 x 100 Ω = 3,000 Ω

Slowly push the magnetic bar into the sleeve pipe measurement part and mark the point where the value 3,000 Ω is reached. Then push the magnetic bar a few cm further in and slowly pull it out until the value 3,000 Ω is reached again and mark this point too. The difference between the two markings will be about 1 cm. The middle between the two markings is the correct installation point.

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Comment

To be heeded is that the measurement result must be corrected by the line resistance.
Due to the arbitrarily long connection cable that is fed out of the measurement device, the location where the linear compensator position should be measured can be selected at will in a freely accessible area regardless of where the linear compensator is installed.
For measurement recording, no electrical auxiliary power is required and the cable lengths for measurement value transmission are not problematic. For example, a commercial multimeter can be used for resistance measurements.
To be noted is that the cable has to be laid in a large loop from the measurement device to the linear compensator, so that damage to the cable due to movement of the measurement device is prevented.

Function(mechanical)

The magnetic bar in the PVC pipe and the densely staggered permanent magnets move in the sleeve pipe measurement part. This magnetic bar is connected to the sleeve pipe flange of the linear compensator via the protective shield and a connecting rod.
The actual electrical part of the measurement device is cast absolutely watertight into the hollow space of the sleeve pipe measurement part. The electrical part consists of two separate measurement chains (measurement loops) that are built on a circuit board

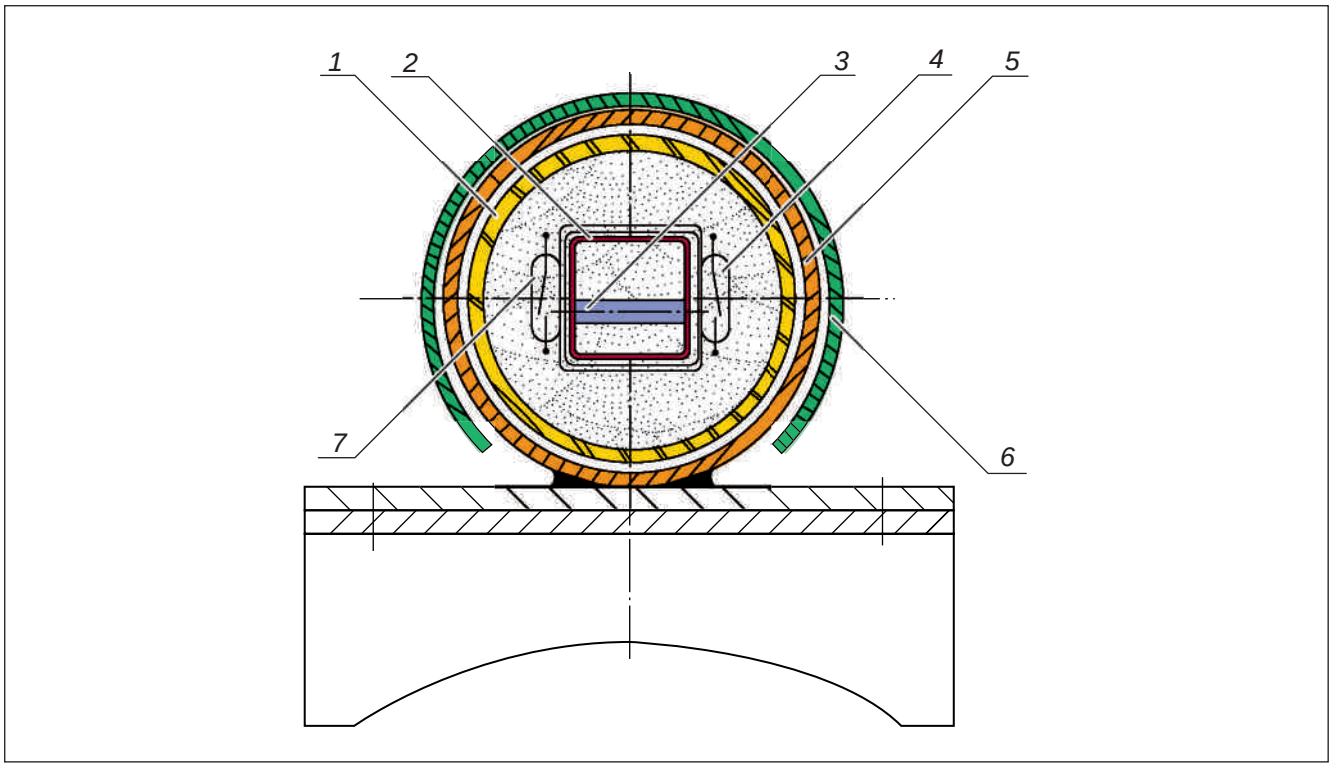

Fig. 4-5 Individual component measurement device for the linear compensator

1 Sleeve pipe measurement part
2 Magnetic bar
3 Permanent magnet
4 Measurement loop 1
5 Protective pipe
6 Protective shield
7 Measurement loop 2

Function(electrical)

Each measurement chain consists of 40 resistors switched in sequence, with which one reed switch apiece is switched in parallel. The reed switches are switched by the magnetic bar, so that the resistance of the measurement chain n changes depending on the position of the magnetic bar.

The distance of the reed contacts is 2 cm, which means that the resolution of each chain is approx. 2 cm. The total resistance of a measurement chain is 4,000 Ω and changes when pushing in the magnetic bar step by step every 2 cm by 100 Ω to 0 Ω (measurement length max. 80 cm).

Overview

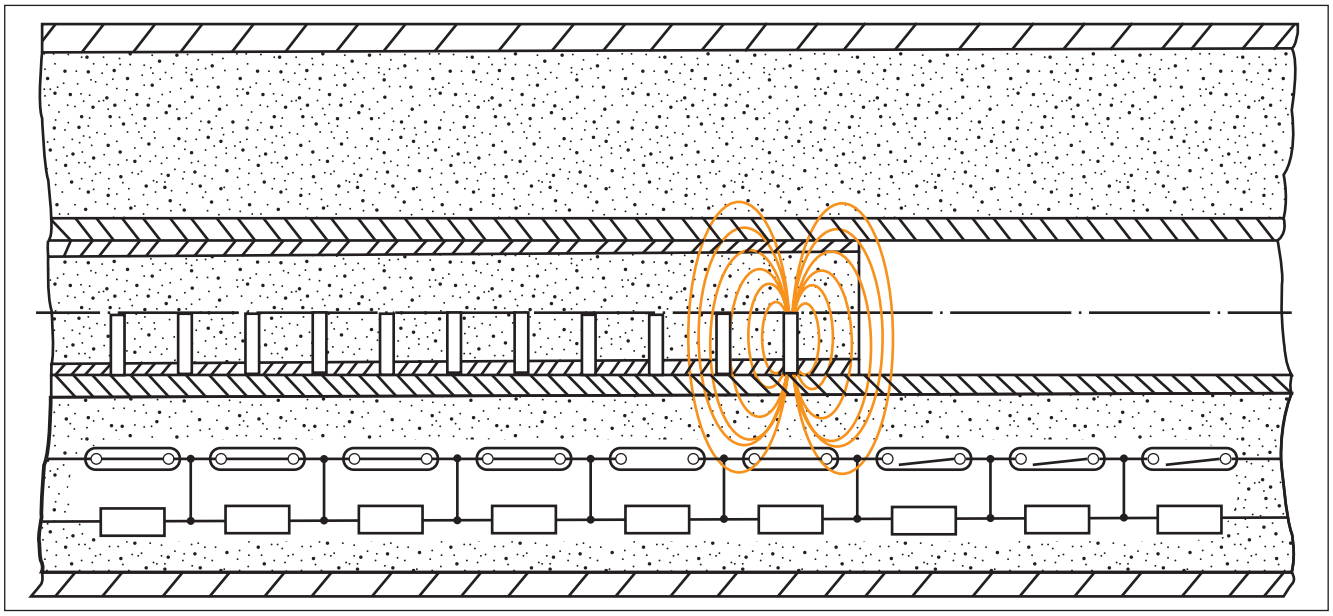

Fig. 4-6 Individual component measurement device for the linear compensator

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5 Installation

NOTICE

Damage to the linear compensator due to improper installation/removal!
Improper installation can cause malfunctions in the entire system!

⇨ Installation may only be performed by trained staff!

⚠ DANGER

DANGER TO LIFE from suspended loads or shifting of loads!
Proceed cautiously when transporting the fitting!

⇨ To lift the fitting only use appropriate lifting devices as well as the designated lifting points!

⇨ Never hang or raise the fitting on drive parts or piping systems!

⇨ Lifting devices, industrial trucks and load-carrying equipment and must comply with the current regulations!

5.1 Check on delivery

Procedure

1. Check the delivery notes to make sure that the delivery is complete.
2. If there are any discrepancies, contact Franz Schuck GmbH immediately.
3. Check delivery for transport damage immediately after receipt.
   In the event of damage, observe the stipulations of the insurance company which, among other things, prescribe that evidence of damage is confirmed immediately by the forwarding agent.
4. If applicable, photograph damage to proof evidence.

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5.2 Installation in the pipeline

Installation at the customer's may only be performed by trained staff.

Prerequisite

- Before the linear compensator is welded into the pipeline, it must be placed on appropriate substructures so that it is not under any stress. Then the pipeline pipes must be welded on so that they do not exert any bending or tension on the linear compensator. Later on, the substructure can be removed.
- If the linear compensator is not installed in a shaft, the linear compensator must either be surrounded with grease bandages (type SDS) or it already has a sleeve in the area of the sliding telescopic pipe (type SDS-K).
- The test opening for separate leak test of the primary and secondary seals must be freely accessible for the pressure test during and after installation.
- The test opening for emergency sealing possibility with special grease must be freely accessible for the pressure test during and after installation.

Procedure

1. Set linear compensator to the desired function (pressure or pull).
2. Weld linear compensator in flow direction.
3. If the linear compensator is incorporated into the pressure test in the pipe network, the locking device must be attached.
4. The linear compensator must be incorporated tension-free into the pipe network and welded in according to the welding instructions. Insulate welding ends and welding seams.
5. Make sure the surface of the hard chromium plated telescopic pipe is clean. Remove any disturbing influences on any possible movements (stones on the substrate, etc.).
6. Heed fixed points in the pipe network.

Additional greasing and lubrication is not necessary since a grease filling in the installed linear compensator ensures the required free movement. This is sufficient for the entire service life.

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6 Operation

6.1 Safety instructions for operation

Comply with the safety instructions and protective measures specified in chapter 2 as well as the applicable legal regulations!

NOTICE

Incorrect operation or incorrect reading off/logging of the fitting can cause damage or function changes!

⇨ Carry out all operational steps carefully.

Transport/installation

Only lift product with beam or other safeguard on both sides.
Use suitable steel cables.

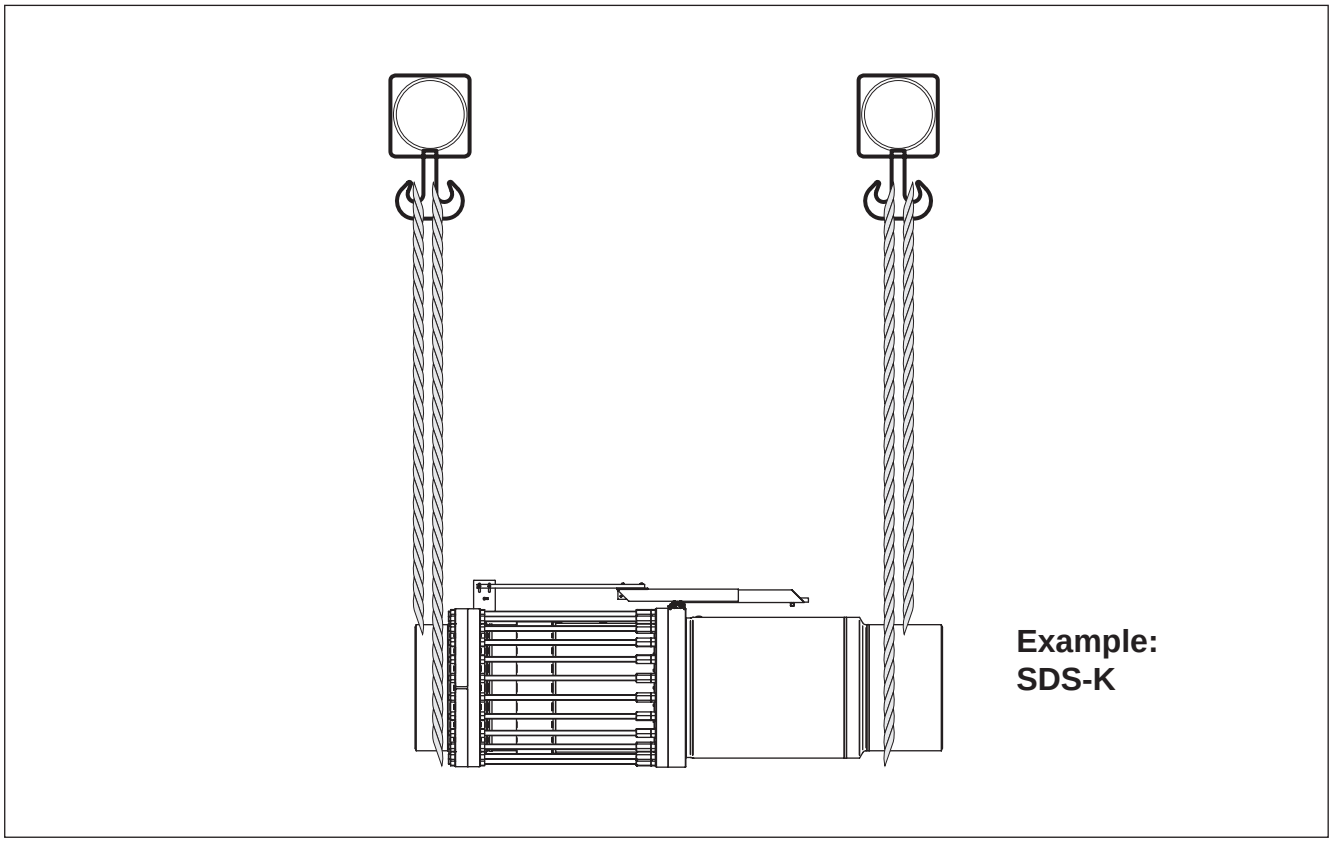

Fig. 6-1 Example: safeguard on both sides

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6.2 Commissioning: Hydraulic pressure test

For the pressure test, the locking device must be attached.

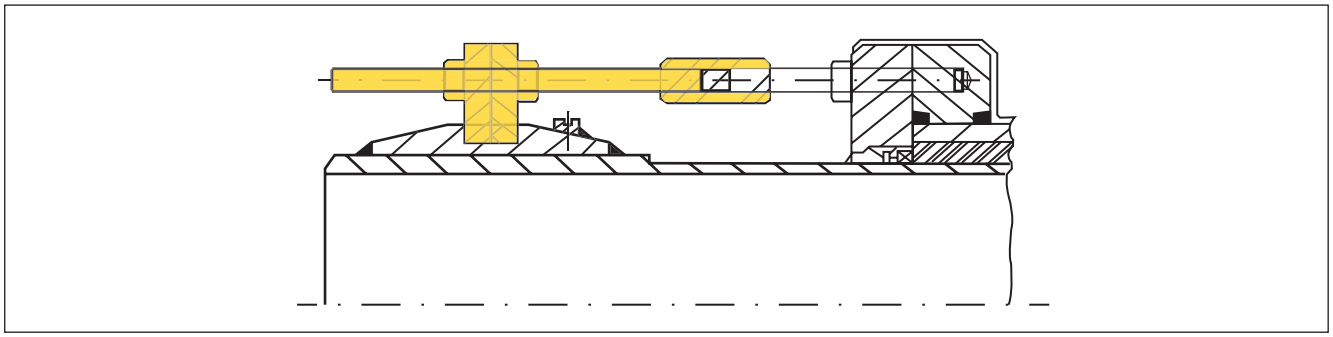

Fig. 6-2 Locking device

Prerequisite

Locking device installed.

Procedure

1. Subject pipeline to water pressure (the amount of the pressure in question is specified in the customer drawing).
2. Keep pressure constant for a few minutes (the respective duration is specified customer-specifically in the drawings), in the process conduct visual test for leakage.
3. After successful pressure test, slowly reduce the water pressure.
4. Drain/clean/[let] the pipeline dry.
5. Remove the locking device.

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6.3 Checking the linear compensator position

Schuck linear compensators are normally delivered in the middle position. For the corresponding delivery state, see the associated customer dimension sheet.

6.3.1 Checking with the linear compensator measurement device

With cable length of 10 m (standard)

If the linear compensator is in the middle position, then a resistance value of 2,000 Ω can be measured on the Schuck measurement device for the linear compensator type Pecont, ➔ Page 4-3, Chapter 4.3.

With cable length of more than 10 m

If Schuck provides a longer connection cable, then the increased resistance value is specified. If, however, a customer connects a longer cable to the measurement device, then the measurement result must be corrected by the line resistance.

For additional notes, please heed the included technical description of the linear compensator measurement device.

6.3.2 Checking with the measurement mark (manual)

Between the measurement mark that is on the linear compensator locking ring and the spectacle blind (front surface), it is possible to measure a corresponding length measurement.
The linear compensator position can be determined by comparing this measurement with the nominal measurement on the customer drawing.

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6.4 Checking the product coating

If while checking the outer or inner coating (via a visual check) defects are determined, then you should contact and inform the manufacturer immediately.

6.5 Checking the running surface cover (only for type SDS-K)

If there is a deformation on the running surface cover, then you should inform the manufacturer about this very soon. The product may not be commissioned or operated with a deformed cover since otherwise there can be compromising of the product function with significant consequential damages.

6.6 Checking the main screw connection

If irregularities occur on the linear compensator main screw connection (on the spectacle blind), then you must inform the manufacturer immediately. In no case may this screw connection be retightened if the line is under pressure. If necessary, the tightening torques are made available by the manufacturer.

6.7 Checking the linear compensator measurement device

The situation with a longer connection cable for the measurement device for the linear compensator will not be discussed in any more detail here, ➔ Page 6-3, Chapter 6.3.1.

If the linear compensator is in the middle position, then a resistance value of 2,000 Ω can be measured on the Schuck measurement device for the linear compensator type Pecont between measurement point no. 1 and no. 3 (measurement chain no. 1).

Each measurement can be checked with measurement chain no. 2 between points 4 and 6, whereby there can be a difference of approx. 100 Ω. If there are significantly greater discrepancies, please contact the manufacturer.

If the linear compensator has reached the end or zero position (4,000 Ω or 0 Ω), then you should inform Schuck about this. Instructions will then be transmitted for how the component can be removed from the line, tested and maintained, put back into the middle position, and then installed and commissioned again.

If irregularities occur on the linear compensator measurement devices, you should inform the manufacturer about this.

All other necessary information is listed in the technical description of the linear compensator measurement device.

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6.8 Checking the main seals

Both main seals (primary and secondary seal) can be tested for leakage separately from one another. The inspection opening between the seals serves to do this. This way, you can determine on which seal there is a leak if there should be a leak.

A leak should be reported to the manufacturer immediately. Among other things, it is possible to create an emergency seal with special grease that can be applied via the inspection opening. However, this may only be done after consultation with the manufacturer.

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7 Maintenance

7.1 Maintenance plan

The product does not require maintenance.

If the linear compensator is completely extended or retracted, remove it after consultation with the manufacturer and put it in the initial position again. Then the linear compensator may still be used.

7.2 Storage

If possible store the fitting in its original packaging.

Take suitable measures to protect the fitting against external influences, dirt and moisture.
Avoid storage outdoors.

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8 Appendix

8.1 CE declaration

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