



## **Assembly and operating Instructions**

### **Variable Area Flow Meters** **SKT / SKP / SKPVC** **SKPk / SKPVck**



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## 1 Foreword

These Installation and Operating Instructions are applicable to devices of series SKT, SKP and SKPVC. Please follow all instructions and information given for installation, operation, inspection and maintenance. The Instructions form an integral part of the device and should be kept in an appropriate place accessible to the personnel in the vicinity of the location. Where various plant components are operated together, the operating instructions pertaining to the other devices should also be observed.

## 2 Safety

### 2.1 Symbol and meaning



Safety notice

This symbol is placed against all directions/information relating to occupational health and safety in these Installation and Operating Instructions and draws attention to danger to life and limb. Such notices should be strictly observed.

### 2.2 General safety directions and exemption from liability

This document contains basic instructions for the installation, operation, inspection and maintenance of the variable area flow meter. Non-observance of these directions can lead to hazardous situations for man and beast and also to damage to property, for which Kirchner und Tochter disclaims all liability.

The operator is required to rule out potentially hazardous situations through voltage and released media energy.



## 2.3 Intended use

The series SKT, SKP and SKPVC device is a variable area flow meter designed for liquids and gases and for installation in vertical pipe runs. Installation in the pipeline should be carried out solely in accordance with these Instructions. The required version of variable area flow meter should be selected on the basis of the pipe diameter at the point of use of the device. The limit values pertaining to the device are given in section 10 and should not be exceeded. Modifications or other alterations to the flow meter may only be carried out by Kirchner und Tochter. Installation in horizontal pipe runs is possible using appropriate pipe bends. The direction of flow must always be from bottom to top.

## 2.4 Information for Operator and operating personnel

Authorized installation, operating, inspection and maintenance personnel should be suitably qualified for the jobs assigned to them and should receive appropriate training and instruction. All persons charged with assembly, mounting, operation, inspection and maintenance duties must have read and understood the operating instructions. Gaskets in contact with the fluid product must be replaced after all maintenance and repair work.

## 2.5 Regulations and guidelines

In addition to the directions given in these Installation and Operating Instructions, observe the regulations, guidelines and standards, such as DIN EN and for specific applications, the codes of practice issued by DVGW (gas and water) and VdS (underwriters) or the equivalent national codes and applicable national accident prevention regulations.

## 2.6 Notice as required by the hazardous materials directive

In accordance with the law concerning handling of waste (critical waste) and the hazardous materials directive (general duty to protect), we would point out that all flow meters returned to Kirchner und Tochter for repair are required to be free from any and all hazardous substances (alkaline solutions, acids, solvents etc.).



Make sure that devices are thoroughly rinsed out to neutralize hazardous substances.



### **3 Transport and storage**

Always use the original packing for transport, handling and storage. Protect the device against rough handling, coarse impact, jolts etc.

## **4 Installation**

### **4.1 Work preparatory to installation**

Preparation of the installation point:

1. Check the pipe run at the point of installation. Variable area flow meters are only suitable for vertical installation and an upward flow direction (from bottom to top). For all other installation situations, appropriate pipe bends need to be fitted in the existing pipeline to ensure upward vertical flow through the device. The region of steady flow should be 4 to 6 x DN upstream and downstream of the location. Control equipment for gaseous media in particular should be installed downstream of the flow meter.
2. If necessary, support the pipeline on both sides of the flow meter to prevent vibration from being transferred to the device.
3. Clean by blowing out or flushing the pipes leading to the device before connecting up.
4. Prepare the installation point before starting to fit the flow meter. Make sure, sealing faces are correctly spaced apart and in true alignment.
5. On no account the VA flow meter should be used to pull the ends of the pipeline together (install free of stresses). Do not tighten union nuts excessively.

Preparation of the flow meter:

1. Take the device out of the transport packaging.
2. Open the variable flow meter and remove the the transportation safety net.
3. Check that the float can move freely in the flow meter.
4. Have ready sealings and sealing material (such as hemp). They do not belong to the scope of delivery.



## 4.2 Installation

1. Remove the insert and the union nuts from the device.
2. Slide the union nuts over the pipe ends at the installation location.
3. Fit the inserts on to the pipe ends.
4. Slide the device at both ends in the installation location.
5. Screw the union nuts to the measuring cylinder and tighten down so that the device is mounted without stresses in the pipeline.

## 5 Start-up

The device must be properly installed before it is started up.

1. Check all device connections.
2. To set the flow: pressurize the pipelines by slowly opening the shut-off valves. On liquid service: carefully vent the pipeline.
3. Check the leak-tightness of all components and if necessary, tighten down threaded joints or screw connections.

## 6 Readings in operation

The flow value is read off from the scale on the glass cone at the top edge of the float. The measured-value readings are only correct when the operating condition at the measuring point (flowing medium, operating pressure and temperature) corresponds to the values marked on the measuring glass. If operating conditions should differ, the measured value must be corrected with the aid of the general float equation.

Information on theoretical basics and an conversion program can be found on our website: [www.kt-flow.de](http://www.kt-flow.de), section physics and calculations.



## 7 Limit value switches Z40 / Z42

The flow meter can be equipped with limit switches to provide local indication with monitoring function.

The limit switches consist of a limit switch (reed switch) that is switched over by the magnet integrated in the float.

The limit switch is guided in a guide slot in the protective case and can be adjusted over the full measuring range. The reed switches have a bistable characteristic.

Uncontrolled current and voltage peaks can occur in the case of inductive or capacitive loads, e.g. from contactors or solenoid valves. Such peaks will also occur, depending on cable geometry, where cables exceed a certain length.

We therefore recommend using an MSR contact protection relay, which is additionally available. This will increase the contact rating and prevent occurrence of inductive and capacitive peaks, thus ensuring long service life of the contacts.

Electrical data and limit values are specified in section 10.3.

### 7.1 Connection of limit value switches



Electrical connection of the device must be carried out in conformity with the relevant VDE regulations (or equivalent national standards) and in accordance with the regulations issued by the local power supply utility.

1. Disconnect the plant from supply before connecting the limit switch.
2. Provide a protective circuit for the switches in keeping with their capacity.
3. Connect line-side fuse elements matched to consumption.
4. Connect the cable using the supplied right-angle plug.



## 8 Maintenance and cleaning

The device is maintenance-free. Should the glass cone become fouled, the device can be removed from the pipeline as follows.

### 8.1 Dismantling and assembly of the measuring cylinder

1. Depressurize the pipeline.
2. Dismantle the device by first removing the union nuts.
3. Remove the measuring cylinder from the installation location.

Assemble in reverse sequence.

## 9 Service

All devices with defects or deficiencies should be sent directly to our repair department. In the service area of the Kirchner und Tochter homepage ([www.kt-flow.de](http://www.kt-flow.de)) you will find the declaration of decontamination as download and more information about returns.

To avoid risks to our employees and the environment, we can only process devices, for which we get a declaration of decontamination certifying that they are safe due to legal regulations. For questions, please contact our sales department, Tel. +49 2065-96090.

### 9.1 Disposal

Please help to protect our environment and dispose workpieces in conformity with current regulations resp. continue using them.



## 10 Technical data

### 10.1 Type series

SKT	measuring tube made of trogamide
SKP / SKP k	measuring tube made of polysulphone / compact design
SKPVC / SKPVC k	measuring tube made of PVC / compact design
...-Z40	with limit value switch NC
...-Z42	with limit value switch NO
...-Z60	with analogue output 4 ... 20 mA

### 10.2 SKT / SKP / SKPVC

Level of nominal pressure of the armature	PN 10 at 20 °C
Operating temperature	polyvinyl chloride: 0 ... 40 °C trogamide: 0 ... 60 °C polysulphone: 0 ... 100 °C
Measuring range	1:10
Accuracy	4 acc. to VDI/VDE 3513, sheet 2
Special scales	see separate table
Connection	glued socket acc. to DIN 8063, optionally thread acc. to DIN 228 T 1 pipe fittings with female thread acc. to ISO 7-1, welded sleeve/butt welded nipple (PP, PVDF, PE)

#### 10.2.1 Materials

Component	Design	SKT	SKP / SKP k	SKPVC / SKPVC k
Measuring tube		trogamide	polysulphone	polyvinyl chloride
Float		PVDF red 1.4571 for DN 65; 8.000 - 60.000 l/h		
Float receptacles		PVDF		
Fittings and insertion parts		PVC optionally PP-, PVDF-, malleable casting Zn, 1.4571		
Gaskets		EPDM, optionally NBR (SKT, SKP, SKP k, SKPVC k), FKM (SKPVC)		
Guiding rod		PEEK (from DN 50; 1.500 - 15.000 l/h) 1.4571 DN 65; 8.000 - 60.000 l/h		



## 10.2.2 Measuring ranges

SKT, SKP and SKPVC					
DN	measuring range				Pressure loss
	H <sub>2</sub> O				in mbar
25	50	-	500	l/h	23
	100	-	1000	l/h	
32	150	-	1.500	l/h	23
	250	-	2.500	l/h	
40	200	-	2.000	l/h	25
	300	-	3.000	l/h	
	600	-	6.000	l/h	
50	600	-	6.000	l/h	25
	1.000	-	10.000	l/h	
	1.500	-	15.000	l/h <sup>1)</sup>	29
65	2.000	-	20.000	l/h <sup>1)</sup>	46
	3.000	-	30.000	l/h <sup>1)</sup>	
	8.000	-	60.000	l/h <sup>1)2)</sup>	

measuring ranges for other substances and operating conditions on request

<sup>1)</sup> with guiding rod made of 1.4571 with PVDF coating

<sup>2)</sup> with float made of 1.4571

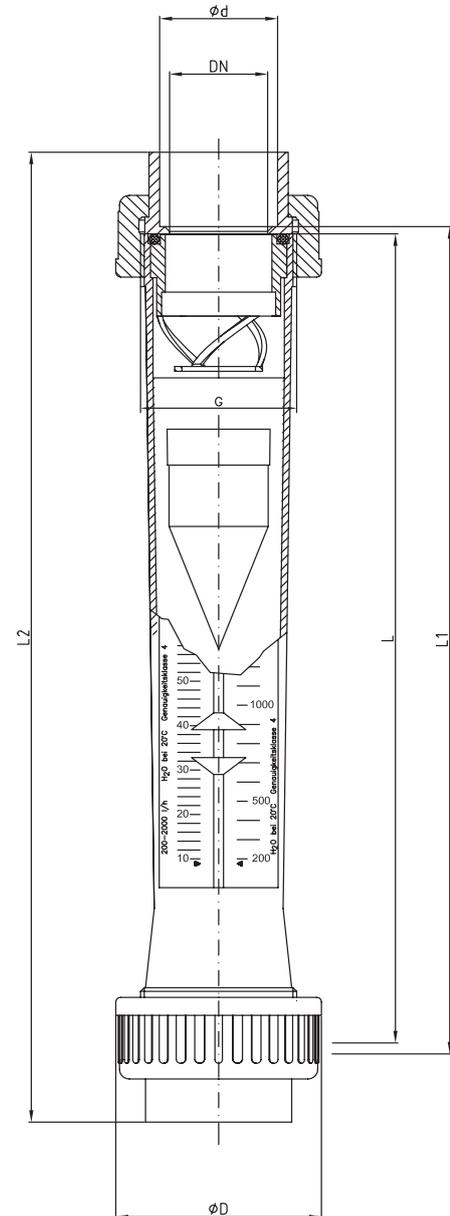
SKPk and SKPVC k					
DN	measuring range				Pressure loss
	H <sub>2</sub> O				in mbar
10	1,5	-	15	l/h	4,6
	2,5	-	25	l/h	
	5	-	50	l/h	
	10	-	100	l/h	
15	8	-	80	l/h	4,5
	15	-	150	l/h	
	20	-	200	l/h	
25	15	-	150	l/h	6
	30	-	300	l/h	
	50	-	500	l/h	
	100	-	1.000	l/h	

measuring ranges for other substances and operating conditions on request



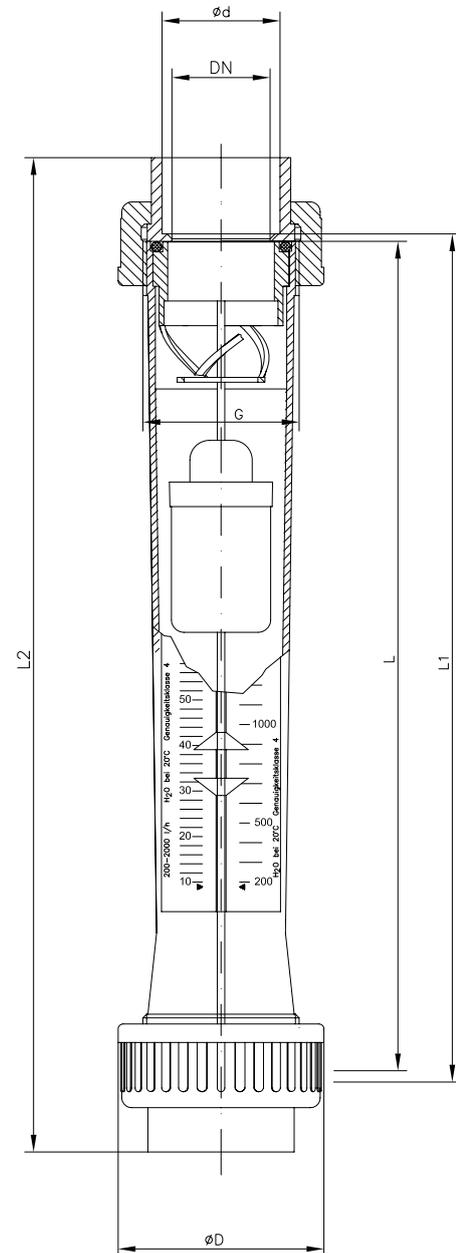
## 10.2.3 Dimensions

SKT / SKP / SKPVC						
DN	G	L	L1	L2	Ød	ØD
25	1 ½	335	341	385	32	60
32	2	335	341	393	40	72
40	2 ¼	335	341	403	50	83
50	2 ¾	335	341	417	63	103
65	3 ½	335	341	429	75	122





SKPk / SKPVC k						
DN	G	L	L1	L2	Ød	ØD
10	¾	165	171	199	16	35
15	1	185	191	223	20	43
25	1 ½	200	206	250	32	60





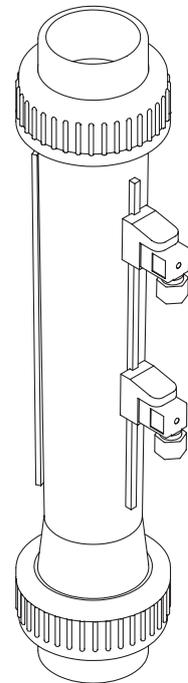
### 10.3 Limit value switches Z40 / Z42

#### Application

Limit value switches Z40 and Z42 are designed for the external monitoring of limited flow values on SKT/SKP and SKPVC flow meters. They are slipped on to the guide on the flow meter and can be set to any desired value on the appropriate scale.

#### Function

A magnet built into the float closes or opens a potted reed contact in the limit value switch. The switching function is bistable, which means that the switching status is maintained even when the magnetic float is located a distance away from the contact.



#### Switching status

Limit value switch type	Float above	Float below
Z40 min	open	closed
Z42 max	closed	open

#### Note

When retrofitting limit value contacts, be sure to replace the standard float by a magnetic float. The magnetic float is clearly marked with an "M" on the top side.



## 10.3.1 Directions for assembly Z40 / Z42

1. Slide contact on the dovetail of the flow meter.
2. Set the desired value and tighten clamping screw.
3. Remove plug connector and wire up.
4. Screw on plug connector with seal inserted.

## 10.3.2 Technical data Z40 / Z42

Z40, Z42	
Switching voltage*	max. 230 V AC/DC
Switching current*	max. 0,5 A
Switching capacity*	max. 10 W/12 VA
Volume resistance	< 200 $\Omega$
Insulation resistance	> 10 <sup>11</sup> $\Omega$
Temperature range	0 ... + 55 °C
Degree of protection	IP 65 acc. to DIN 40050
Make/break hysteresis	1 - 2 mm way of float

### \* Note

The values for electric strength, contact rating and current switched should not be exceeded on any account, not even for short times, as this could otherwise result in damage to the reed contact.

## 10.3.3 Terminal assignment Z40 / Z42

The contacts feature two terminals 1 + 2 and one earthing terminal. Voltage is supplied via 1 + 2. Assignment is freely selectable.



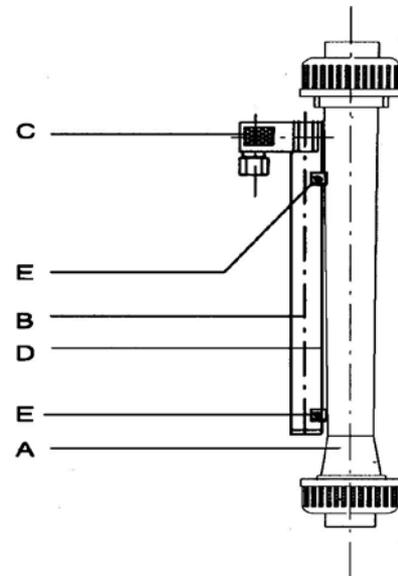
## 10.4 Measuring sensor Z60

### Function elements

- A – Flow meter SKT/SKP/SKPVC with monostable magnetic float
- B – Measuring sensor Z60
- C – Plug connector
- D – Dovetail guide
- E – Clamping screws for fastening and adjusting the sensor

### Special features

- Easy to assemble
- Analog output signal 4 ... 20 mA
- 24 V DC voltage supply
- +/- 10 %
- Degree of Protection IP 65
- Casing made of PVC-U
- DIN plug connection



### Function

The Z60 measuring sensor fitted to the SKT/SKP/SKPVC flow meter is a further development of the Z50 sensor. In contrast to the previous model, the Z60 has no reed contacts; instead, it features a special, newly developed electronic device with microprocessor and sensors.

The measuring sensor supplies an analog output signal of 4 ... 20 mA that is proportional to the position of the magnetic float. This signal can be further processed in order to control processes, e. g. by way of a PLC or to provide exact indications of the flow rate via an external display.

The sensor can also be retrofitted, providing the flowmeter is fitted with a monostable magnetic float (axially magnetized mounting position: south top, north bottom).

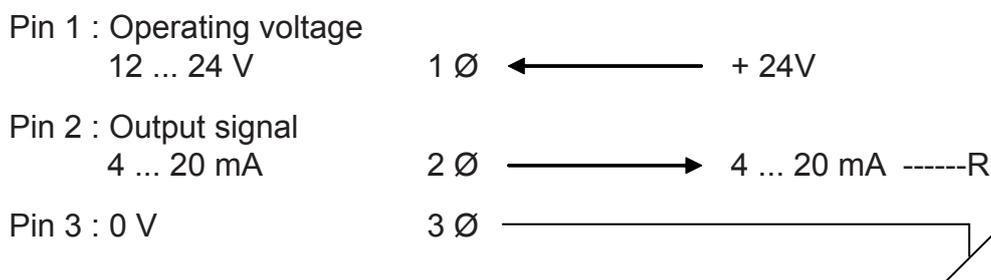
To obtain best possible reproducibility, programming is always factory-set and adapted to the respective measuring range since the various scales all have a different resolution. Therefore, when ordering, please state the required measuring range.



## 10.4.1 Directions for assembly Z60

1. Slide sensor on to the dovetail guide of the flow meter.
2. Adjust marking on sensor to the 50 % scale mark on the flow meter.
3. Tighten clamping screws.
4. Remove plug and wire as specified.

## 10.4.2 Electrical Connection Z60



## 10.4.3 Technical data Z60

Z60	
Supply voltage	12 ... 24 V DC ( $\pm 10\%$ )
Power consumption	< 50 mA
Load resistance	min. 0 max. 500 $\Omega$
Current output	4 ... 20 mA (3 conductors)
Protection type	IP 65
Ambient temperature	0 ... + 50 °C
Connector	DIN 43650 connector
Measurement inaccuracy	< 1 %

## 10.5 Low Voltage Directive

Above 50 V AC/75 V DC, contacts are subject to the EU Low Voltage Directive. The user is required to verify their use accordingly.









**Kirchner und Tochter**  
Durchflussmesstechnik seit 1951



The devices from **Kirchner und Tochter** have been tested in compliance with applicable EC/EU CE-regulations of the European Community.

The respective declaration of conformity is available on request. Subject to change without notice. The current valid version of our documents can be found at [www.kt-flow.de](http://www.kt-flow.de).

The **Kirchner und Tochter** QM-System is certified in accordance with DIN EN ISO 9001:2015. The quality is systematically adapted to the continuously increasing demands.