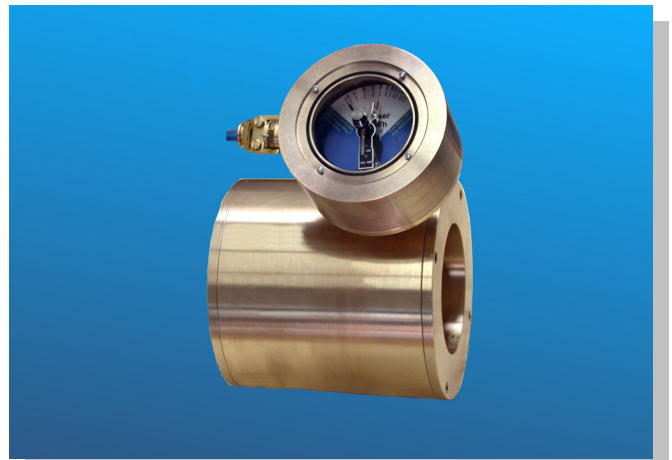
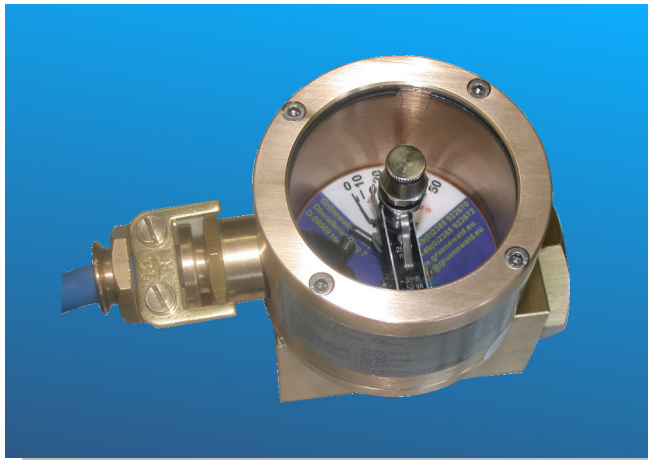


## OPERATING MANUAL



***Flow control device  
Type DAK  
Manufacturing Ranges  
from DN25 to DN200***



***I M2 Ex ia I Mb***

## General Information

*Dear Customer,*

The flow control device purchased, is a product of **Grünewald GmbH, 59069 Hamm** designed and manufactured for the operation of liquid medium in closed and filled Systems.

To ensure long term and safe operation of the control device, read the operating manual attentively.

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## 1. Introduction

This operating manual will assist to operate the flow control device in a safe, proper and economical manner.

Observing the instructions of this manual will:

- Increase reliability and lifespan of the control facility.
- Prevent possible danger.
- Avoid down times caused by failures and repairs.

This manual must:

- be present whilst any installation, maintenance and repair work is performed.
- be read, acknowledged and applied by any person performing tasks to and at the DAK flow control device.

Grünewald control and measuring devices operate mainly on electric-mechanical principles. The general installation and operating manuals as well as the product information's do therefore refer to the mechanical and electrical data of the individual device or assembly.

**The DAK flow control device is manufactured to latest technical and safety relevant standards, rules and regulations. However, abuse and operation of the device within incorrect applications may result in serious injury or death of the user and/or a third party, as well as it may endanger equipment and other property.**



## 2. General

### 2.1 General information to the operating manual

This operating manual contains all necessary information required, to ensure correct and safe installation as well as operation of the device. The manufacturer or distributor must be contacted for further information and assistance, if arising difficulties and problems cannot be solved within the operating manual provided information. Changes to specification and design as well as improvements to the device are subject to change with out notice and are fully to the discretion of the manufacturer. Users of this operating manual must fulfil required qualification standards. Operating personnel must be trained in accordance to the operating manual.

### 2.2 General safety instructions

**Read the operating manual of the DAK flow control devices prior commencement of any work and acknowledge instructions during execution and operation.**



The correct condition and operation of the device as well as the compliance with safety rules and regulations is to the full responsibility of the operator. The DAK flow control device is manufactured to latest technical and safety relevant standards, rules and regulations. However, abuse and operation of the device within incorrect applications may result in serious injury or death of the user and/or a third party, as well as it may endanger equipment and other property.

Use and operation of the flow control device is only permitted when:

- **the compliance with the intended purpose of use is granted.**
- **the condition of the device complies with safety relevant rules.**

Take note of the technical data of the DAK flow control device and the ambient temperatures. The intended purpose of use of the DAK flow control device is described with in chapter 8 of this Documentation and must be acknowledged. Awareness of the basic safety instructions and rules is the minimal requirement for the safe use and trouble free operation of DAK flow control devices. Additionally, all site specific rules and regulations, such as, but not limited to, occupational health and safety rules, rules and standards for erecting and using of electric and mechanical facilities, as well as radio noise suppression rules and standards, must be complied with.

Pay attention and care to tidiness of workspace during performance of repair and maintenance tasks. Do not eat or smoke during work. Unauthorized altering or modifying the equipment will cause loss of any warranty and liability provided by the manufacturer.

Take note of the operating manual and pay special attention to safety symbols and safety instructions on the device and the documentation. Please store the operating manual carefully.

### 3. Obligations of the Operator

It is the full responsibility of the operator that only persons complying with below out lined regulations are authorized to work on and with the devices.

Persons authorised must,

- be confident and trained with rules of occupational health and safety und the handling and operation of the equipment.
- has read, understood and acknowledged the safety instructions and warnings of this operating manual and all other, with the device associated documentations.
- is examined for compliance and consciousness of work place safety rules on regular bases.

Installation, maintenance and repair work must be performed by trained and qualified personnel only. Faults, which may influence safety, must be rectified immediately.

### 4. Obligations of User Personnel

Personnel authorized to fulfil tasks at the DAK flow control device must be familiar with the operating manual.

Persons authorized to work on the device must permanently commit them self's to:

- Acknowledge the basic occupational health and safety rules at all times.
- Read and acknowledge safety instructions and warnings of this operating manual.

#### 4.1 Qualified personnel

These are persons, familiar with the installation, assembly, commissioning and operation of the product. Furthermore these persons must be qualified and trained for tasks, these persons are authorized to perform. (E.g. training and obligation to maintain required operating conditions in accordance to regional and site-specific rules and regulations).

Education or training for care and use of safety and protective equipment, according relevant standards of safety techniques.

### 5. Warranty and Liability

Our standard terms and conditions of sale and delivery apply, unless other conditions for warranty and liability were explicitly mutually agreed upon. Claims of warranty or liability leading back to any of the below described causes is not legitimate.

- Using the DAK flow control device not in compliance with the intended purpose of use of this item.
- Incorrect installation, commissioning, operation and maintenance of the DAK flow control device.
- Operation of the DAK flow control device in conjunction with defective safety devices or in correctly installed safety and protective devices.
- Neglecting of instructions regarding transportation, storing, installation, commissioning, operation and maintenance of the DAK flow control device.
- Unauthorized modification or adjustments of the DAK flow control device.
- Inappropriate condition monitoring of parts subject to wear.
- Incorrect repairs, inspections and maintenance.
- Catastrophic failures caused by external forces and force majeure.

Any liability for damages caused by in correct operation of the DAK flow control device will be rejected.

## 6. Warnings and Safety relevant Standards

For references to special hazards and uncommon information's signal the terms **DANGER**, **WARNING**, **ATTENTION** and **REMARK** are used within this operating manual.

**DANGER** neglecting may cause danger to life and/or serious damage to property.



**WARNING** neglecting may cause, serious injury and/or damage to property.



**ATTENTION** neglecting may cause, injury and/or damage to property.



**REMARK** indicates that special attention to technical correlations is required.



To prevent injury and damage of property due to failure of the device, the acknowledgement of the not specially marked instructions for transportation, installation, product range and maintenance is an absolute necessity.

## 7. Observing of Environmental Rules and Regulations

Rules and regulations for waste prevention and disposal must be followed at all times when working with or at the DAK flow control device. Materials that may endanger and pollute water such as:

- Grease, oil and Lubricants
- Hydraulic fluids
- Coolants
- Cleaning fluids containing solvents



must not be emitted to surrounding soil, waters and drains. Such materials must be stored, transported and caught, in suitable containers. For safe and environmentally friendly disposal of hydraulic fluids and with such fluids contaminated materials, national and international laws, rules and regulations must be acknowledged.

## 8. Intended Purpose of Use

The DAK flow control device is exclusively designed to monitor liquid mediums within closed and filled systems.

Any adaptation as well as modification or extension of the device, not complying with the intended purpose of use is prohibited and requires the explicit and exclusive approval of the manufacturer.

Acknowledgement of the operating manual and instructions for inspection and maintenance as well as the observance of inspection and maintenance intervals are subject of the intended purpose of use.

Any damage that may arise out of the incorrect use will not be at the responsibility of the manufacturer. The sole risk devolves at the user.

### 8.1 Range of Application

The DAK flow control device monitors volume in [l/min] or [m<sup>3</sup>/h]. Integrated changeover contacts, in conjunction with different kinds of line monitoring modules enable the use of the flow control device in either SPS or conventional controlled systems. As described with in this manual, minimum and/or maximum flow settings can be adjusted and monitored. The most common applications of use for the DAK flow control device are, pumps where a possible “dry run” must be monitored and prevented and the flow control in cooling circuits of motors.

## 9. Installation / Commissioning / Assembly Instructions

- **DANGER**

- Take notice of operating pressure and pressure level
- Use device with fluids specified only
- Take notice of maximum flow
- Bleed system prior start up
- The Instruments of the series “TROPICAL” are not allowed to be dismantled in explosive areas.



- **WARNING**

- Take notice of flow direction.
- Do not install directly after a pump.

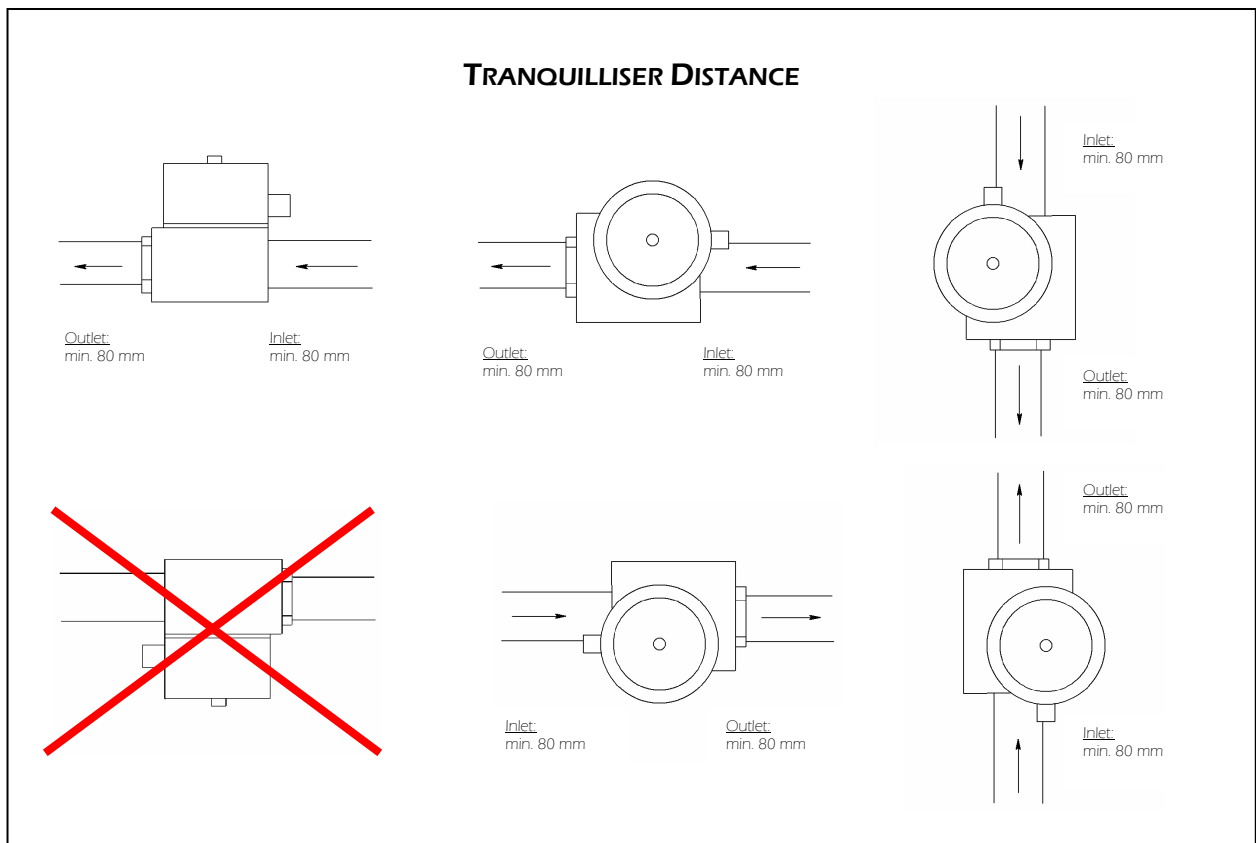


- **ATTENTION**

- Seal during installation.



- **NOTE**
  - If required take notice of mounting position
  - Notice the specifications of the switch and gauge tolerances
  - A tranquilliser length of 5 x pipe diameter is recommended
  - The System pressure must exceed the pressure drop caused by the device



## 10. Adjustment of flow control device

For adjustment, the square pin of the lock is to be pressed with the adjusting spanner until the adjustment arm attached at the square pin, engages with the adjustment pin on either of the two pointers for the nominal setting point. By turning the adjustment spanner, whilst being pressed, each of the pointers can be positioned to the desired nominal setting over the entire range of the scale. The adjusting arm must not touch the contact of the device whilst in pressed condition.



## 11. Operation, Maintenance and Repair

Rules and regulations for workplace safety and occupational health and safety apply for the operation of the device.

Modifications, add-ons and / or changes to the DAK flow control device may influence safety and must not be performed unless approved by the manufacturer.

The devices are, apart from periodical cleaning (which is dependent on the degree of pollution of the medium) maintenance free units.

- Appropriate workshop equipment is absolutely necessary for the execution of maintenance measures.
- Regulations for electrical equipment must be observed.
- Incorrect use, operation or repair may result in severe injury or death.
- Prior to any repair or maintenance tasks, local rules and regulations must be acknowledged.

## 12. Transportation / Storage

- Transport temperatures shall not exceed the range of -20°C to 60°C within a dry and clean environment.
- Protect against external forces.
- Storage temperatures shall not exceed the range of -20°C to 60°C within a dry and clean environment.
- To prevent any condensation of water when stored in rooms with a high degree of humidity, measures such as heating of the room or application of drying agents is required.

## 13. Functioning of the DAK flow control device

The angle of the flap, mounted inside of the flow control device, changes with the medium's velocity of the flow.

A shaft firmly attached to the flap leads into the display part of the device. A pointer and a spring are attached to the shaft. The pointer in the display housing moves in accordance to the flap position.

An integrated change over contact, which can be adjusted as described in paragraph 10 of this manual, is positioned above the pointer.

On customer demand the scale is equipped with a dual scale for water and an additional oil scale. Accuracy of the oil flow depends on oil type (viscosity) and oil temperature and is noticeably inferior.

## 14. Hazards

This paragraph contains a summary description of hazards that may arise during, Transport, Storage, Installation, Operation, Maintenance and Repair.

### ATTENTION!

Observe the weight of devices larger than size DN 50. Mounting devices must be used.



Do not touch inside of the housing with hands or fingers. Risk of cutting, jamming or pinching.

Observe this operating manual to prevent any of the within this document described hazards.

Hazards emerging from assembly / installation into a facility must be observed and included into a risk assessment.



## 16. Model Key

*DA-*    \*\*\* | \*\*\* | \*\*  
*DAK-*   \*\*\* | \*\*\* | \*\* | \*\*\* | \*

| Nominal Width<br>DN | Measuring<br>range                               | Mechanical<br>connection                                                                                        | Electrical<br>connection                                                                                                                                                                                          | Control form                                                                                                                                                                                                                                   |
|---------------------|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ***                 | <b>L</b><br>[L/min]<br><br><b>cbm</b><br>[cbm/h] | <b>F</b><br>[Flange]<br><br><b>G**</b><br>[Thread]<br><br><b>S</b><br>[Sandwich]<br><br><b>O</b><br>[connect-O] | <b>E**</b><br>[Insertion through fixed<br>wire<br>max. 30m]<br><br><b>P</b><br>[PROMOS-plug<br>connector BN 41**]<br><br><b>S</b><br>[Souriau-plug-<br>connector]<br><br><b>H</b><br>[Harting-plug-<br>connector] | <b>N</b><br>[without circuit]<br><br><b>E</b><br>[Resistor circuit]<br><br><b>D</b><br>[Light emitting<br>diode/LED]<br><br><b>DD</b><br>[Anti parallel diode]<br><br><b>P</b><br>[PROMOS circuit]<br><br><b>S</b><br>[Siemens end<br>element] |

Order Examples:    DAK-025/120L/G1"/E10/N                      DAK-025/50L/G1"/P/P                      DA-080/100cbm/O  
                               DAK-150/180cbm/S/E03/DD                      DAK-032/200L/G1¼"/SF/E                      DA-050/40cbm/R2"

## 17. Technical details

### Electrical parameters

Models DAK-\*\*\*/\*/\*/\*/\*/\*

|   |    |        |    |          |
|---|----|--------|----|----------|
| - | D  | ≤I max | 30 | mA       |
| - | DD | ≤I max | 1  | A        |
| - | S  | ≤I max | 50 | mA       |
|   |    | ≤V     | 13 | V        |
| - | P  | ≤I max | 25 | mA / 24V |
|   |    | ≤I max | 50 | mA / 12V |
| - | E  | ≤I max | 25 | mA / 24V |
|   |    | ≤I max | 50 | mA / 12V |
| - | N  | ≤I max | 1  | A / 24V  |
|   |    | ≤I max | 2  | A / 12V  |

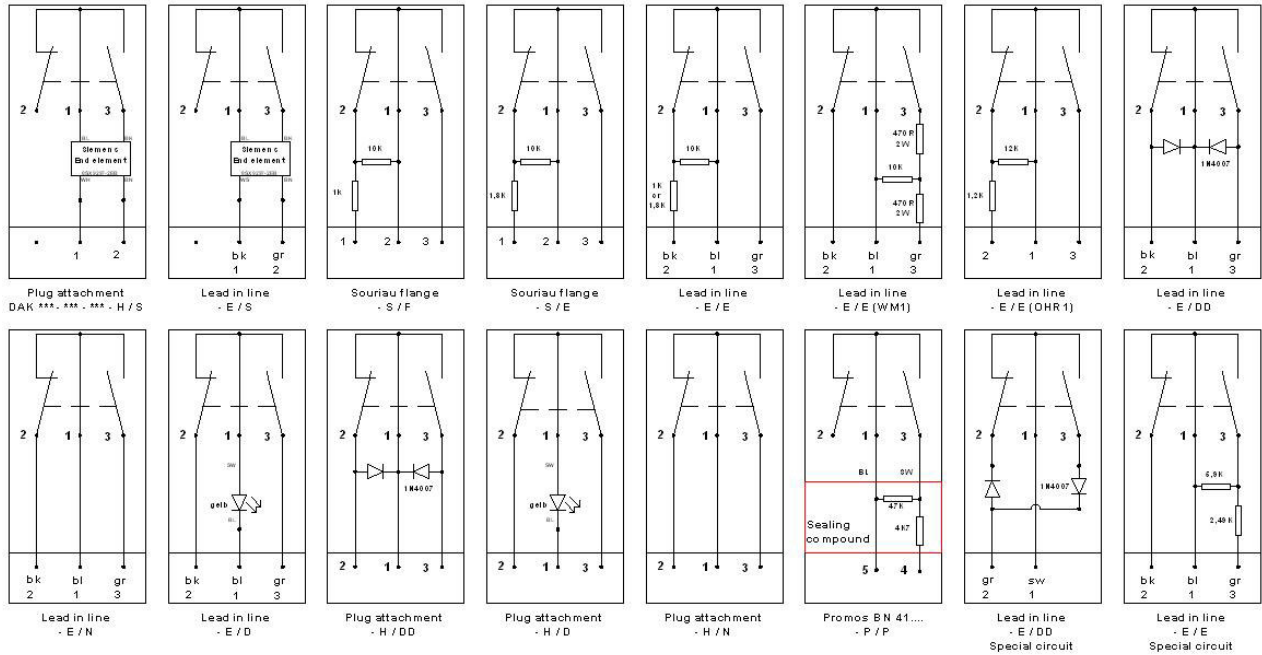
Changes to specification and design as well as technical improvements to the device are subject to change with out notice and are fully to the discretion of the manufacturer.

|                          |                                                                             |
|--------------------------|-----------------------------------------------------------------------------|
| Mechanical Connection:   | 1", 1 ¼", 2" straight pipe thread or Sandwich connection                    |
| Nominal Width:           | DN 25 to DN200 (see table)                                                  |
| Measuring range:         | see table                                                                   |
| Tranquilliser Distance:  | In: 5 x DN (e.g. 5x DN25 = 125 mm)                                          |
|                          | Out: 5 x DN (e.g. 5x DN25 = 125 mm)                                         |
|                          | Any adaptation to the length requires written approval of the manufacturer. |
| Medium:                  | Water or medium with water like viscosity                                   |
| Nominal Pressure:        | 40bar (580Psi, 4Mpa) up to 200bar (2900Psi, 20Mpa)                          |
| Material:                | Brass MS58 / Red Brass RG7                                                  |
| Environment Temperature: | -20°C to +60°C (253,15°K to 333,15°K)                                       |
| Nominal Current:         | 0V to 24V                                                                   |
| Circuit Durability:      | 0V to 12V: 2,0A                                                             |
|                          | 12V to 24V: 1,0A                                                            |
| Protection class:        | IP54 for >DN50                                                              |
|                          | IP67 for DN25 and DN32                                                      |

| Type    | Nominal Pressure | Connection Type                | Mounted length                             | Measuring Range          |
|---------|------------------|--------------------------------|--------------------------------------------|--------------------------|
| DAK 025 | PN 200 bar       | internal screw-thread G 1"     | 100 mm                                     | 0-30 l / min             |
| DAK 025 | PN 200 bar       | internal screw-thread G 1"     | 100 mm                                     | 0-50 l / min             |
| DAK 025 | PN 200 bar       | internal screw-thread G 1"     | 100 mm                                     | 15-80 l / min            |
| DAK 025 | PN 200 bar       | internal screw-thread G 1"     | 100 mm                                     | 15-120 l / min           |
| DAK 032 | PN 100 bar       | internal screw-thread G 1 1/4" | 110 mm                                     | 20-200 l / min           |
| DAK 032 | PN 100 bar       | internal screw-thread G 1 1/4" | 110 mm                                     | 20-300 l / min           |
| DAK 050 | PN 40 bar        | internal screw-thread G 2"     | 130 mm                                     | 0-40 m <sup>3</sup> / h  |
| DAK 050 | PN 40 bar        | Sandwich connection            | 115 mm                                     | 0-40 m <sup>3</sup> / h  |
| DAK 050 | PN 40 bar        | Sandwich connection            | 115 mm                                     | 0-60 m <sup>3</sup> / h  |
| DAK 050 | PN 40 bar        | Connect-O                      | 145 mm<br><small>length of housing</small> | 0-40 m <sup>3</sup> / h  |
| DAK 050 | PN 40 bar        | Connect-O                      | 145 mm<br><small>length of housing</small> | 0-60 m <sup>3</sup> / h  |
| DAK 080 | PN 40 bar        | Sandwich connection            | 150 mm                                     | 0-60 m <sup>3</sup> / h  |
| DAK 080 | PN 40 bar        | Sandwich connection            | 150 mm                                     | 0-80 m <sup>3</sup> / h  |
| DAK 080 | PN 40 bar        | Sandwich connection            | 150 mm                                     | 0-100 m <sup>3</sup> / h |
| DAK 080 | PN 40 bar        | Connect-O                      | 225 mm<br><small>length of housing</small> | 0-100 m <sup>3</sup> / h |
| DAK 100 | PN 40 bar        | Sandwich connection            | 165 mm                                     | 0-80 m <sup>3</sup> / h  |
| DAK 100 | PN 40 bar        | Sandwich connection            | 165 mm                                     | 0-100 m <sup>3</sup> / h |
| DAK 100 | PN 40 bar        | Sandwich connection            | 165 mm                                     | 0-120 m <sup>3</sup> / h |
| DAK 100 | PN 40 bar        | Sandwich connection            | 165 mm                                     | 0-150 m <sup>3</sup> / h |
| DAK 150 | PN 40 bar        | Sandwich connection            | 220 mm                                     | 0-180 m <sup>3</sup> / h |
| DAK 150 | PN 40 bar        | Sandwich connection            | 220 mm                                     | 0-200 m <sup>3</sup> / h |
| DAK 150 | PN 40 bar        | Sandwich connection            | 220 mm                                     | 0-250 m <sup>3</sup> / h |
| DAK 150 | PN 40 bar        | Sandwich connection            | 220 mm                                     | 0-300 m <sup>3</sup> / h |
| DAK 150 | PN 40 bar        | Sandwich connection            | 220 mm                                     | 0-350 m <sup>3</sup> / h |
| DAK 150 | PN 40 bar        | Sandwich connection            | 220 mm                                     | 0-400 m <sup>3</sup> / h |
| DAK 200 | PN 40 bar        | Sandwich connection            | 220 mm                                     | 0-400 m <sup>3</sup> / h |
| DAK 200 | PN 40 bar        | Sandwich connection            | 220 mm                                     | 0-450 m <sup>3</sup> / h |
| DAK 200 | PN 40 bar        | Sandwich connection            | 220 mm                                     | 0-500 m <sup>3</sup> / h |
| DAK 200 | PN 40 bar        | Sandwich connection            | 220 mm                                     | 0-550 m <sup>3</sup> / h |
| DAK 200 | PN 40 bar        | Sandwich connection            | 220 mm                                     | 0-600 m <sup>3</sup> / h |

Other measuring ranges, inside diameters, materials, types of connection and nominal pressures on request.

## 18. Electrical connection



Drawing number:  
2-05-025-001\_001

## 19. Environmental protection

### ATTENTION!

For safe and environmentally friendly disposal of operating and process materials as well as replacement parts, national and international laws, rules and regulations must be acknowledged. Observe any relevant safety rules and data sheets when handling oils, greases and other chemical substances.

