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1. General

Before installing and operating this equipment, we highly recommend that you become thoroughly familiar with these instructions. DELIMON does not accept liability, expressed or implied, for any direct or consequential injuries to personnel or damage to equipment, including process interruption, arising from the misuse or misapplication of its products. Application and / or modification of product beyond its intended purpose is strictly prohibited.

DELIMON reserves the right to make modifications, changes and/or amendments to both products and to these instructions as may become necessary to assure ongoing technical clarity.

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2. Safety

These instructions provide basic guidance which must be followed during installation, operation and maintenance. It is assumed that personnel performing required tasks are skilled in the areas of electrical and mechanical millwright trades plus all local and federal safety requirements. These instructions should be kept near the point of use and made available for reference at all times.

2.1 Identification of safety warnings in the operating instructions

To minimize risk to people working with this equipment, safety warnings included within these instructions must be observed. Potential safety issues are identified through use of the following general danger symbols:



Safety Sign, per DIN 4844, provides warning of potential general danger.



Safety Sign, per DIN 4844, provides warning of potential electrical danger.

ATTENTION

Caution designation utilized to signify that damage to machinery and function may result if guidance is not properly followed.

Instructions affixed directly to machines and equipment must always be observed and maintained to ensure that they are fully legible. Examples of such instructions would be:

- Rotational direction arrows for shafts and couplings.
- Identification of fluid connections, direction of flow and substance contained in pipes.

Important Note: There is always increased risk of slipping or falling whenever spilled or leaking lubricants are present. In all cases, they should be properly removed and disposed of.



Safety Sign, per DIN 4844, provides warning of an increased risk of slipping and falling due to the presence of water, oil, grease or other foreign substances on pavements, floors and walkways.

2. Safety (continuation)

2.2 Personnel qualification and training

Personnel performing work required to install, operate, maintain or inspect this equipment must be adequately trained and qualified. In this regard, determination of competency, understanding and supervision levels required for individual assignment is left to the purchaser of the equipment. However, should assistance with on-site training be desired, please contact your local DELIMON office for assistance.

2.3 Dangers in case of nonobservance of the safety instructions

Failure to properly follow all safety instructions may result in hazard to personnel, the environment or to machinery and equipment. Failure to follow these instructions may also additionally void warranties and nullify claims for damages. Examples of such instances follow:

- Failure of machinery or operating systems to function properly
- Failure to observe proper methods of maintenance and repair
- Unnecessary creation of hazards to personnel by means of electrical shock, mechanical injury or exposure to potentially hazardous chemicals
- Unnecessary creation of environmental hazards through chemical leaks

2.4 Safety conscious working

All Safety Instructions resulting from National, Local or User mandated regulations, as well as those contained within this instruction, must be observed at all times.

2.5 Safety instructions for the user/operator

- Users should always take care that only authorized and skilled personnel are allowed to perform installation, maintenance and inspection work.
- Installation, maintenance and inspection of lubrication systems should only be performed while machinery and equipment being serviced is in "Shut-Down Mode".
- Protective covers and guards, provided to ensure that contact with moving parts is eliminated during machine operation, (e.g. couplings, pulleys, gears, etc.), must be replaced following maintenance and repair.
- Use "Common Sense"! When hot or cold machine parts can lead to potential dangers, those parts must be handled in such manner so as to avoid human touch; i.e. shielding is required.
- Leaks from shaft seals, reservoirs, piping or fittings should be repaired so as to not cause potentially hazardous materials from escaping to the work area. In instances where such leaks have occurred, all local and National rules and regulations for their recovery and disposition must be followed.
- All potential hazards resulting from exposure to electrical sources must be eliminated. Please refer to VDE and local power company rules and regulations for guidance.
- Before restarting system and equipment, refer to instruction in Section 7; Start-Up Procedure.

2.6 Safety instructions for maintenance, inspection and installation work

Before installing or servicing lubrication equipment and machinery, management should insure that only persons who are fully trained, skilled and authorized to perform such work are assigned to such tasks. Major installation or modification work should only be performed during shut-downs. It is also imperative that shut-down procedures recommended by equipment manufacturers be followed. Pumps, lubricators and distribution systems which deliver potentially hazardous materials to the environment must be thoroughly cleaned. All safety devices and protective equipment, disabled or removed during cleaning, must be immediately reinstalled and reactivated prior to machine use.



Safety Sign, per DIN 4844, Use Safety Glasses or Goggles.
Advice: Whenever working with compressed air, wear safety glasses



Safety Sign, per DIN 4844, Use Breathing Mask.
Advice: Observe EC-Safety Data Sheet for materials of consumption and additives used and use personal protective equipment.

2. Safety (continuation)

2.7 Unauthorized conversion and manufacture of spare parts

The modification and/or manufacturing of parts for use as spare or replacement parts in DELIMON lubrication equipment, without the written consent and approval of DELIMON Engineering, is strictly prohibited. Any such modification and/or manufacture of component parts shall immediately render any and all warranties as null and void.

2.8 Unacceptable modes of operation

The operational integrity and reliability of all equipment supplied is warranted only when said equipment is utilized in strict accordance with parameters established in Section 1; Introduction. Maximum operating parameters outlined in Engineering Data Sheets must never be exceeded.

2.9 Guidelines & standards

1., 2. and 3. guideline (see data sheet: R&N_2009_1_GB)

3.0 Notes on environmental protection and waste disposal

During proper operation, various component parts of lubricating systems are subject to special requirements as set forth by Environmental Legislation.

General requirements for handling lubricants are specified in their respective safety data sheets.

Used lubricants are hazardous forms of waste and therefore require special handling and supervision with regard to § 41 paragraph 1, sentence 1 and paragraph 3 no. 1 of KrW-/AbfG (Closed-Loop Waste Management Act).

Used oils must be handled in compliance with AltölV (Waste Oil Ordinance).

Any devices or components which become contaminated with lubricant must be disposed of by a certified waste management company. Additionally, records indicating proper conformance to waste management practice and law must be filed according to NachwV (Ordinance on Waste Recovery and Disposal Records).

GENERAL PRODUCT CHARACTERISTICS

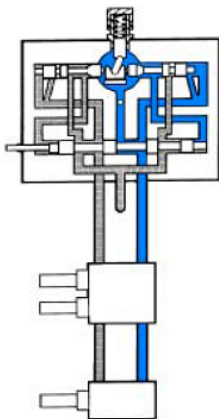
- Hydraulically controlled
- Working pressure adjustable from 40 to 350 bar
- Motion indicator with optional electrical monitoring

A. VALVE TYPE DR4

B. FUNCTION

Non-return (adjusting of 200 bar)

Non-return (adjusting of 150 bar)

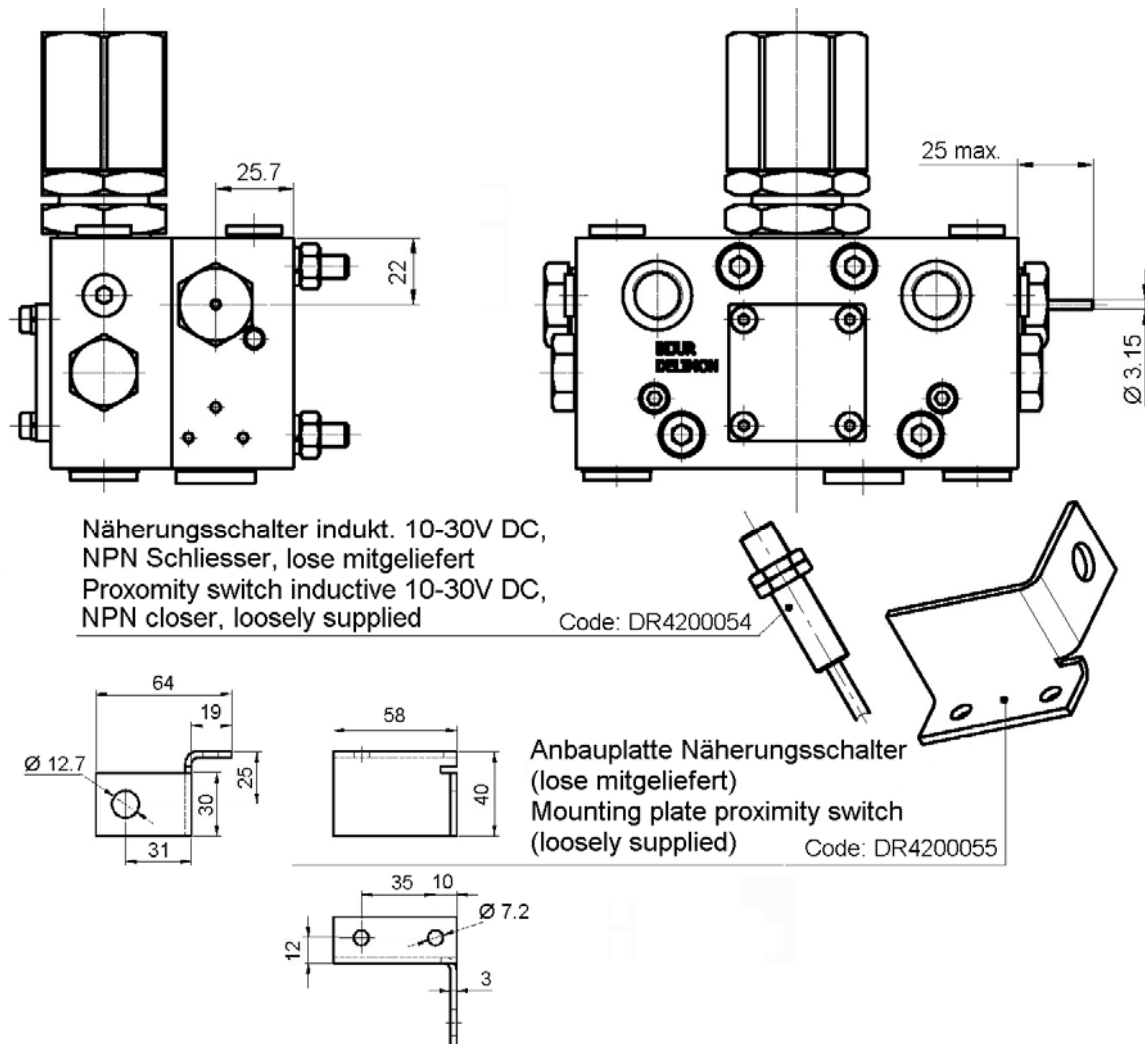


C. INSPECTION

Stage A

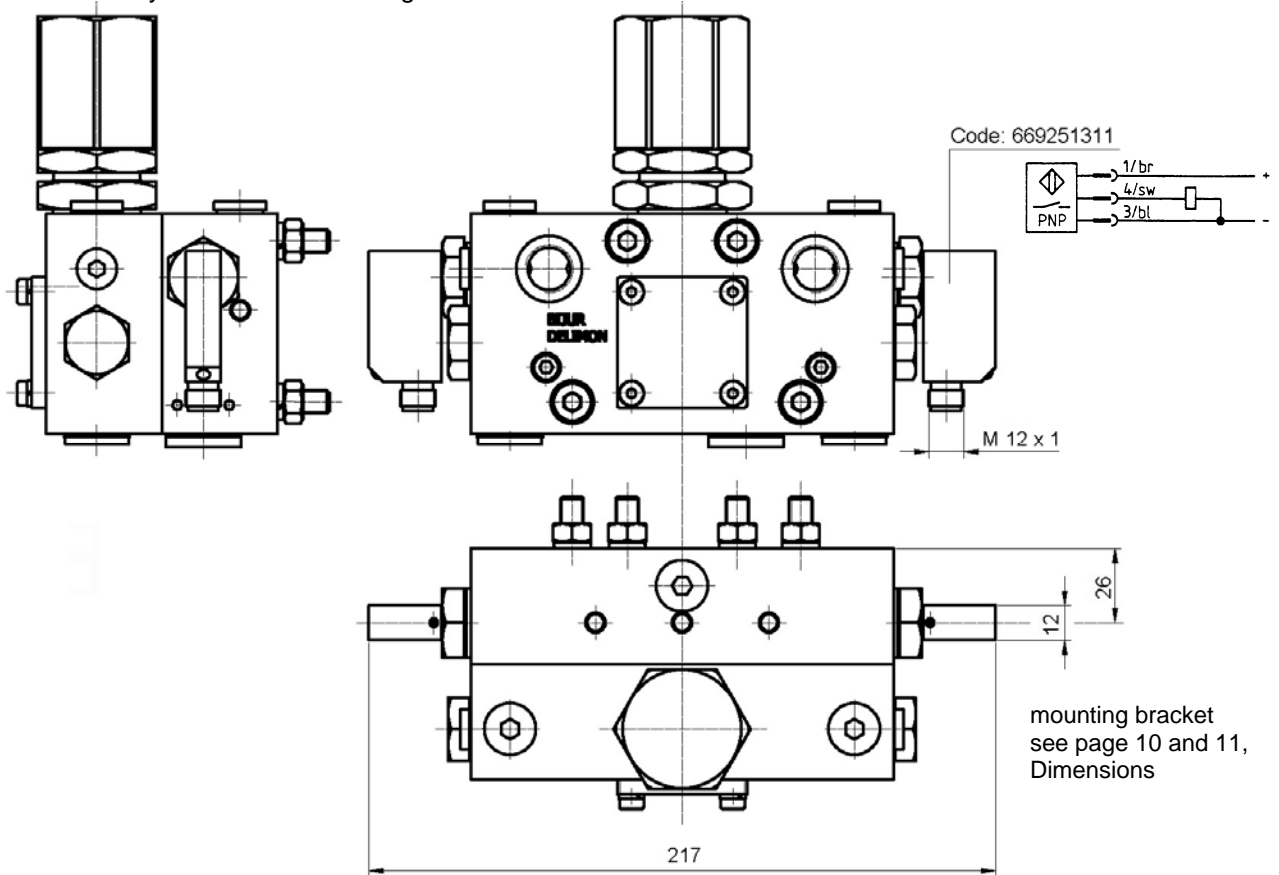
D. MONITORING

1 x Proximity switch with mounting bracket (Denco)

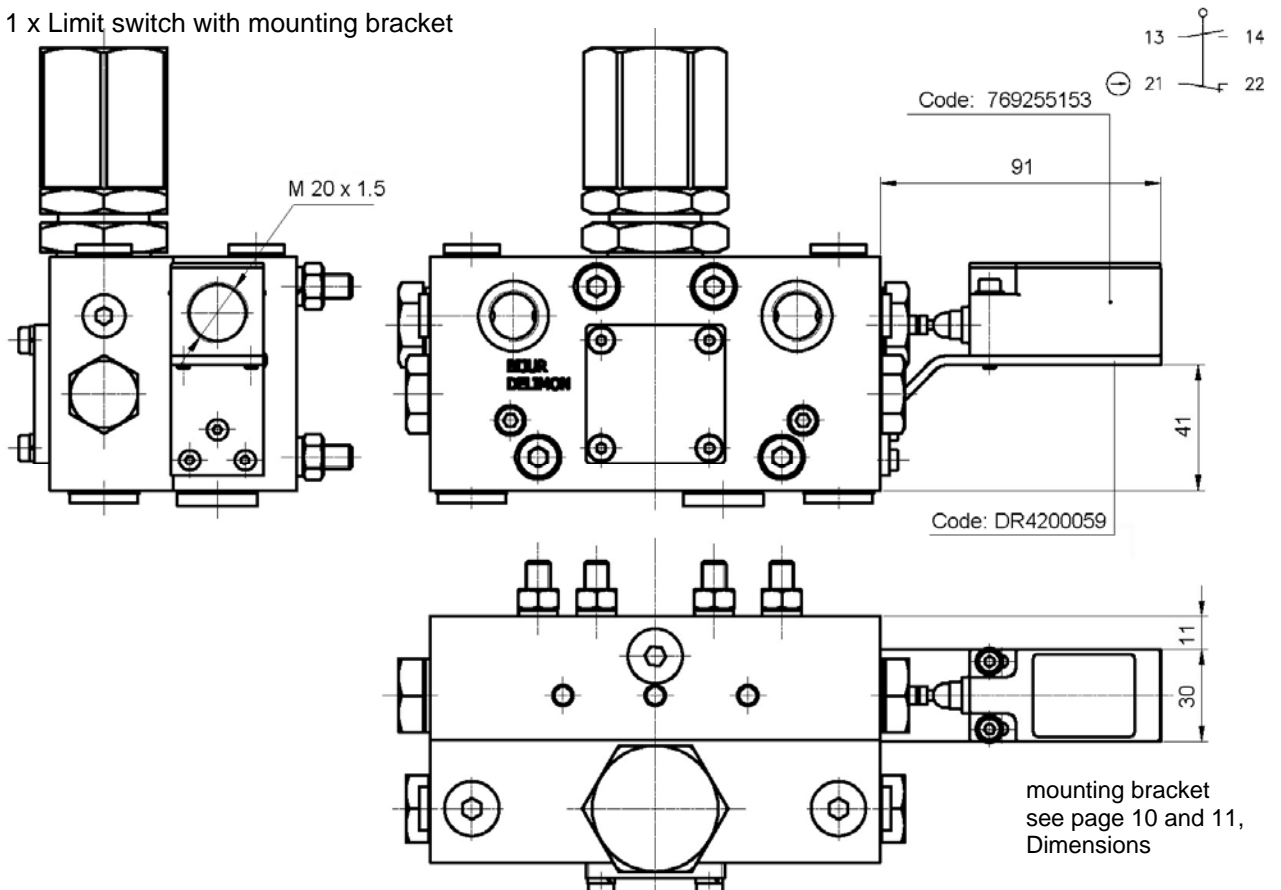


D. MONITORING (continued)

2 x Proximity switch with mounting bracket

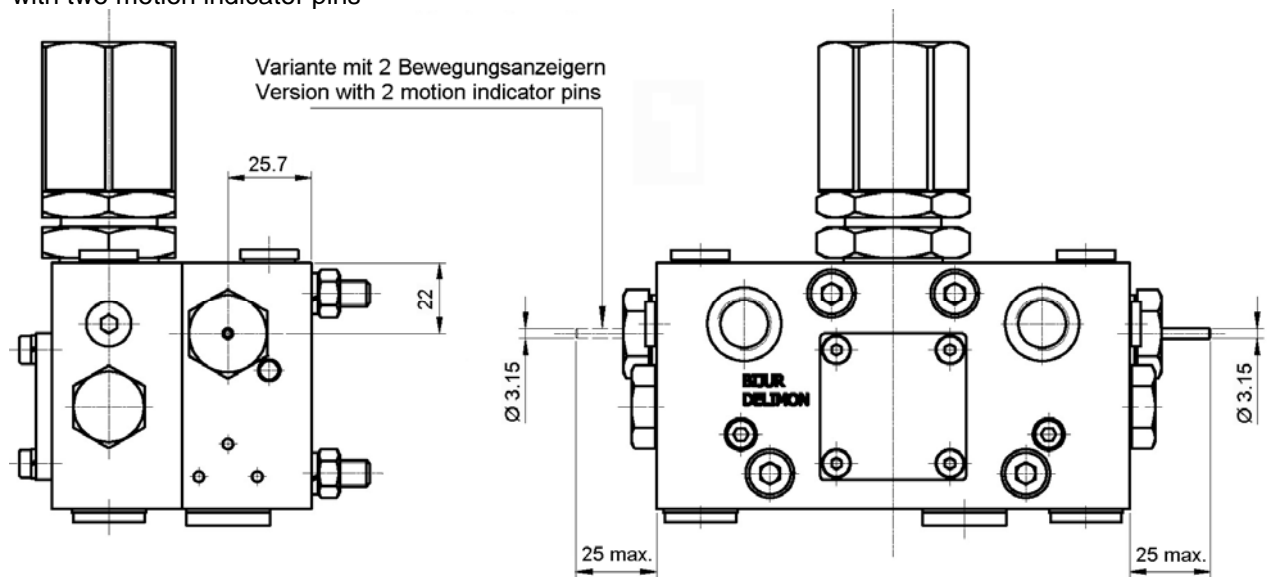


1 x Limit switch with mounting bracket



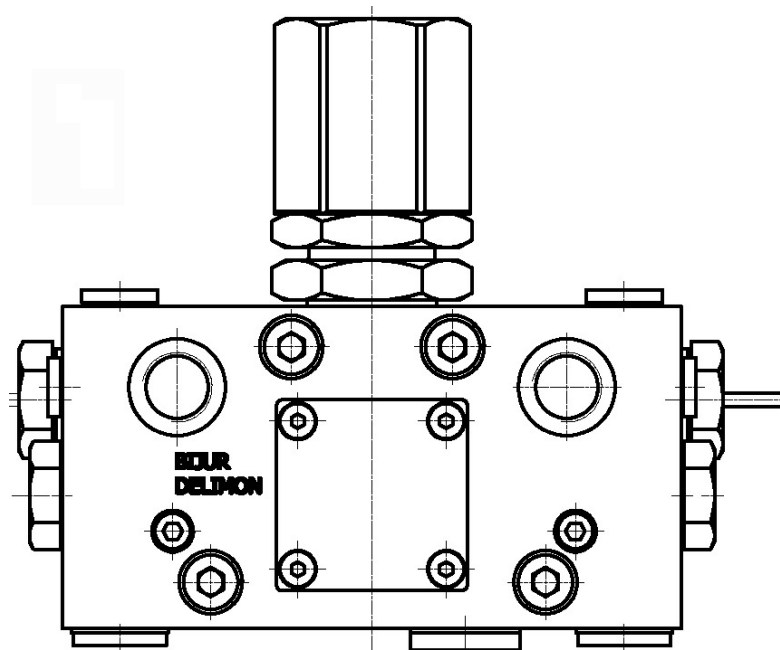
D. MONITORING (continued)

with one motion indicator pin
with two motion indicator pins



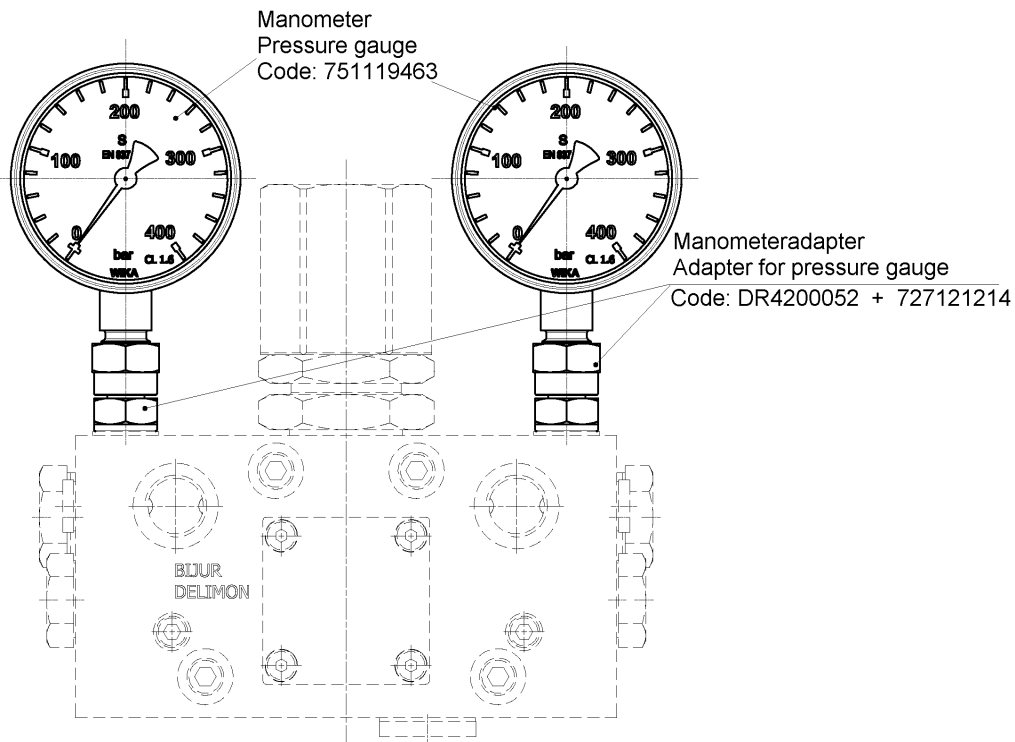
E. ACCESSORIES

without

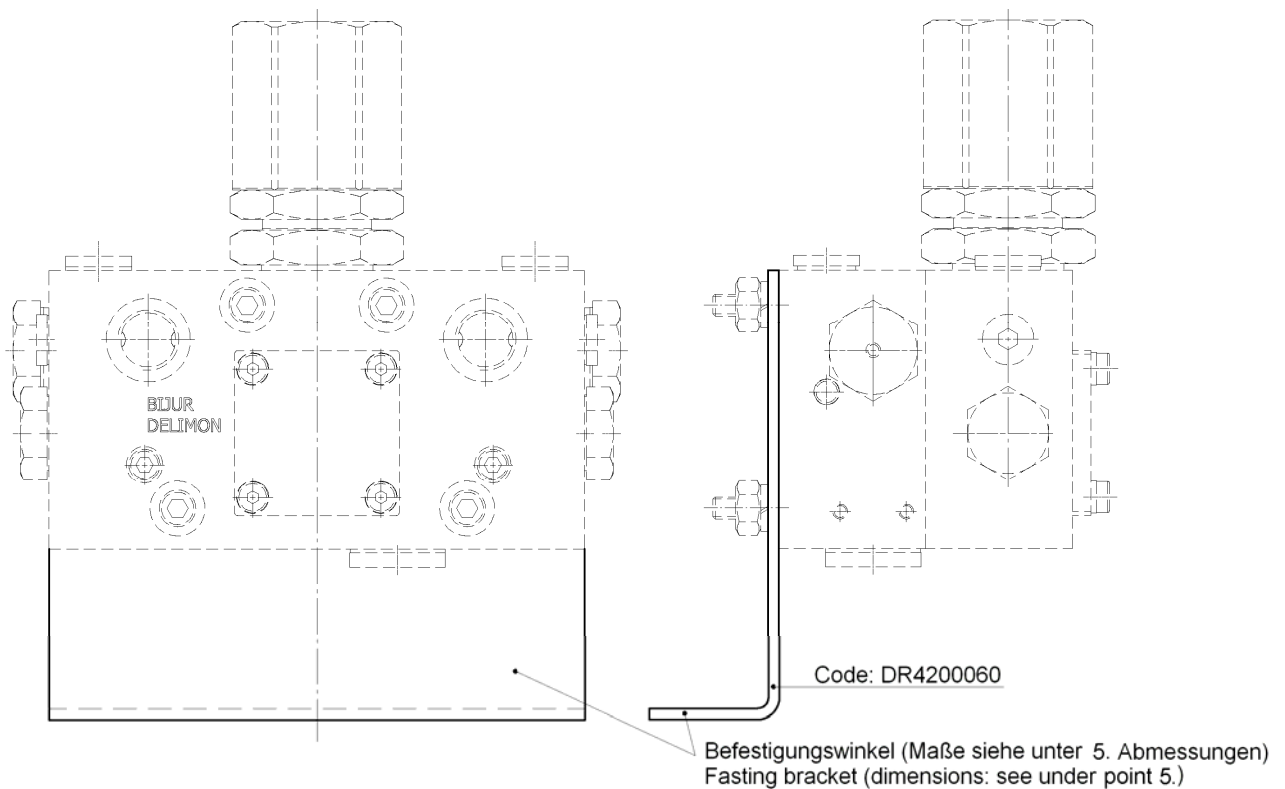


E. ACCESSORIES (continued)

2 pressure gauges with adaptors

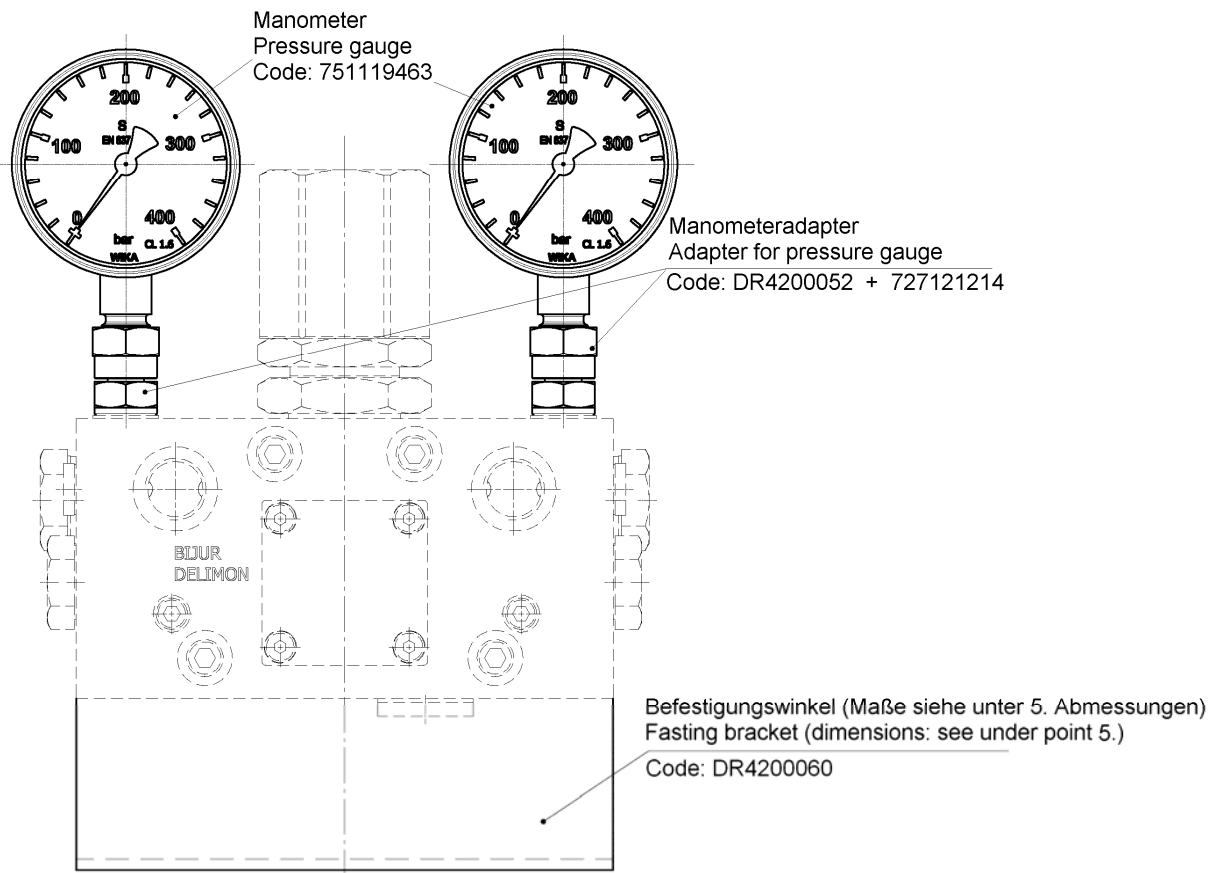


Mounting bracket (for fixing onto the basic frame)



E. ACCESSORIES (continued)

2 x pressure gauges (with adaptor) and mounting brackets (for fixing onto the basic frame)



3. Application

The DR4 is an hydraulically operated directional control valve for use with dualine or non-return systems.

4. Principle of operation

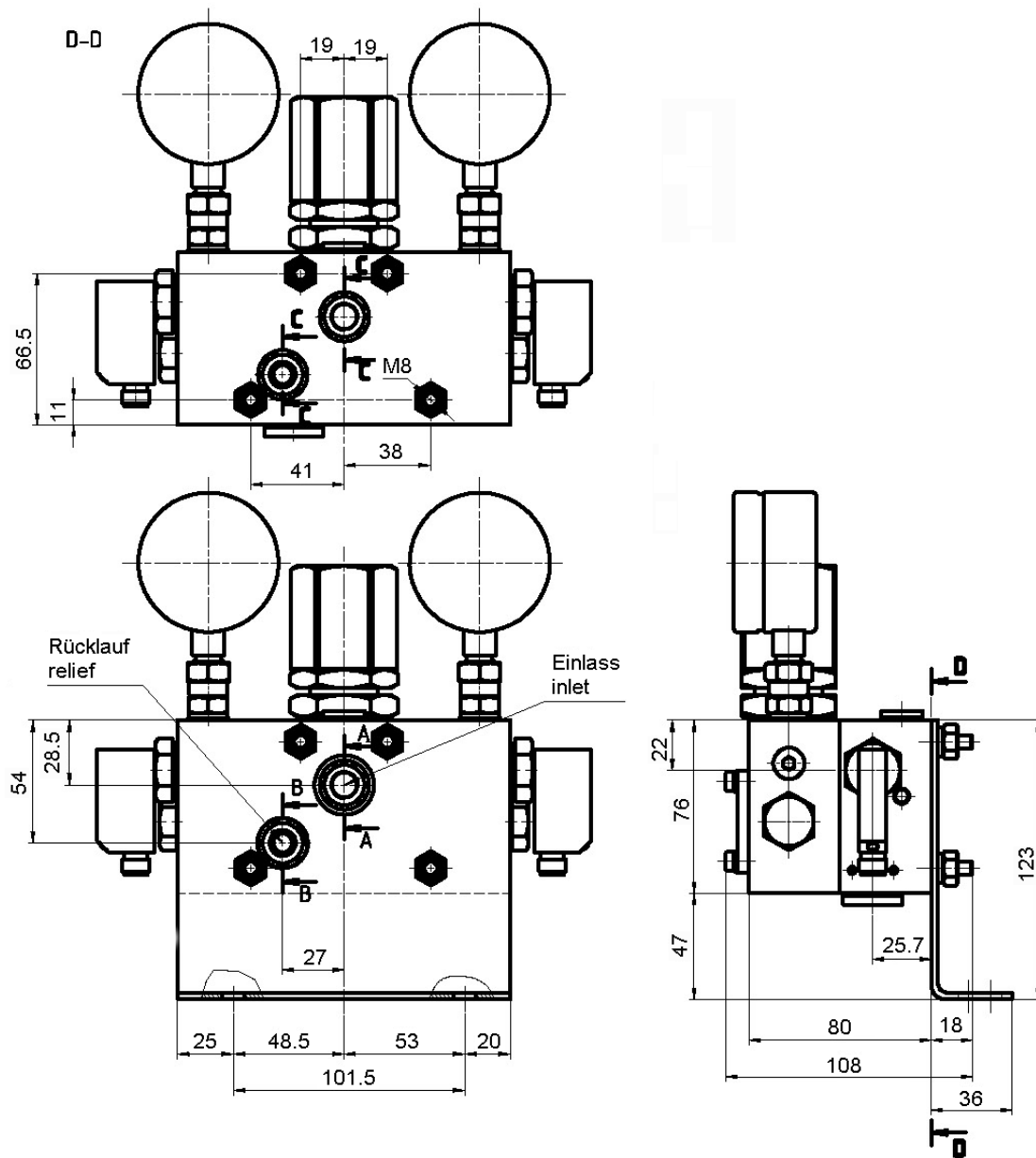
The reversing valve's switching pressure depends on the spring pressure, which can be set for installation. After the activation of all dual-line metering valves in the lubricating system, pressure is built up against a guide piston, which in turn acts on a rocker arm. If the force acting on the rocker arm is equal to the spring force, it moves into the other end position. This directs a control current towards one end of the piston, which determines the direction of flow. The piston moves, thereby freeing at the other end the passage to the tank. Accordingly the pump's delivery flow is directed into the opposite line and the pressure is taken off the originally pressurised line back to the tank.

An electric switch, which is activated by means of a pin attached to the control piston in the direction of flow, is mounted on the reversing valve. When the switch is activated by the pin, either to open or close it, a signal is sent to the control to either stop the pump or start a switching interval.

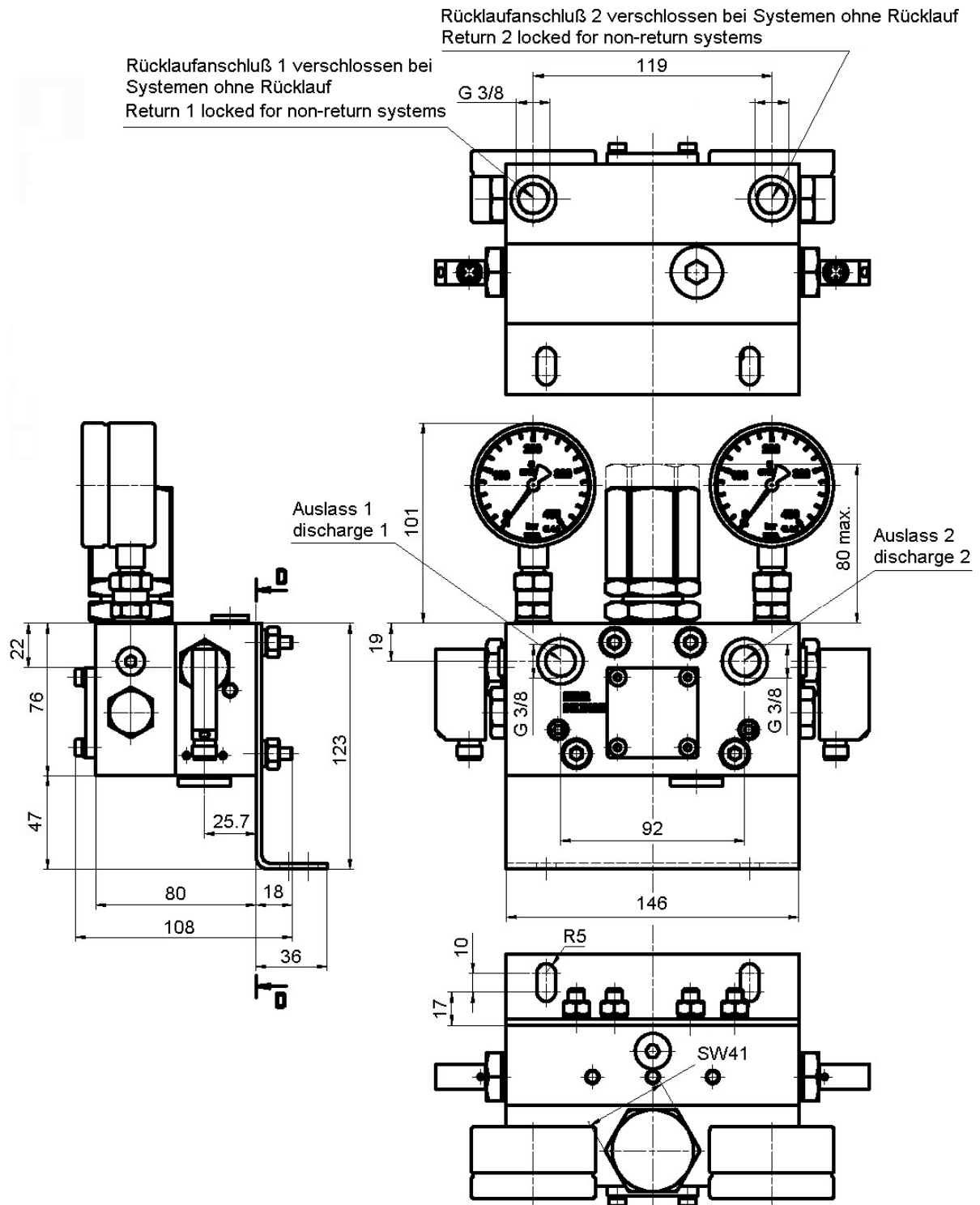
The diagram and the details on pages 4 clarify the mode of operation. The following mode of operation is available for use in dual-line lubrication systems.

On the DR4 valve (non-return system), the two pipelines do not return to the reversing valve but the reversal pressure is sufficient for the operation of all the measuring valves.

5. Dimensions



5. Dimensions (continued)



6. Specification

Pressure adjustment range: 40 ... 350 bar
Maximum Flow rate: 650 ccm/minute
Temperature range: - 20° C to + 100° C
Useable lubricants:
Oil or grease max. NLGI class 2
Weight: 7.0 kg
Material:
Metal parts (body etc.) Steel
Seals Viton

7. Service / Start-up

Adjustment

It will be noted that the control of pressure is accomplished through the use of a spring in compression between the adjusting bonnet and the piston assembly. To raise the operating pressure on the system the adjusting bonnet, should be turned clockwise after slackening off the locknut. When the pressure is correct, tighten up the locknut so there will be no further movement of the adjusting bonnet.

Maintenance

The valve will operate for many years without any maintenance provided that new clean lubricant is pumped into it. If the valve is clogged with dirt, it can be disassembled. It is important to note which pistons are assigned to which boreholes. Clean the valve in solvent. Put the pistons in the right boreholes and re-assemble the valve. As the pistons are produced and fitted into the corresponding boreholes with very tight tolerances, it is not possible to mix up the pistons on site.

Fault finding

Besides ingress of contamination, the most common reason of failure is when the valve has been applied with a greater flow rate than the maximum stated in the specification. Excessive flow will cause the flow directing piston to "bounce" when moving across and find a position which will lock-up the valve. To release it from this state, after exhausting any pressure, the piston closure plugs can be removed and the pistons pushed fully to one end of their bores.