

Installation and Operating Instructions for 2-Stage Brake Control BCS 050

E09.809e



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RINGSPANN	Installation and operating instructions for 2-Stage Brake Control BCS 050			E 09.809e	
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IMPORTANT

Please read these instructions carefully before installing and operating the product. Your particular attention is drawn to the notes on safety.

These installation and operating instructions are valid on condition that the product meets the selection criteria for its proper use. Selection and design of the product is not the subject of these installation and operating instructions.

Disregarding or misinterpreting this installation and operating instructions invalidates any product liability or warranty by RINGSPANN; the same applies if the product is taken apart or changed.

These installation and operating instructions should be kept in a safe place and should accompany the product if it is passed on to others – either on its own or as part of a machine – to make it accessible to the user.

Safety Notice

- Installation and operation of this product should only be carried out by skilled personnel.
- Repairs may only be carried out by the manufacturer or accredited RINGSPANN agents.
- If a malfunction is indicated, the product or the machine into which it is installed, should be stopped immediately and either RINGSPANN or an accredited RINGSPANN agent should be informed.
- Switch off the power supply before commencing work on electrical components.
- Rotating machine elements must be protected by the purchaser to prevent accidental contact.
- Supplies abroad are subject to the safety laws prevailing in those countries.

This is a translation of the German original version!

In case of inconsistencies between the German and English version of this installation and operating instruction, the German version shall prevail.

RINGSPANN	Installation and operating instructions for 2-Stage Brake Control BCS 050			E 09.809e	
Date: 02.01.2025	Issue: 1	drawn: MAPM	checked: EISF	Pages: 17	Page: 3

Contents

1. General notes	4
1.1 General safety instructions	4
1.2 Special safety instructions	4
2. Design and function / parts list	4
2.1 Function	4
2.2 Markings	6
2.3 Drawings and Parts Lists	6
3. Intended use	7
4. Impermissible use	7
5. Condition as delivered	8
6. Handling and storage	9
7. Technical prerequisite for reliable operation	9
8. Installation of the 2-Stage Brake Control	10
8.1 General instructions for assembly and installation	10
8.2 Assembly and installation	11
9. Start-up	15
10. Disassembly	16
11. Maintenance	16
12. Options	17

RINGSPANN	Installation and operating instructions for 2-Stage Brake Control BCS 050			E 09.809e	
Date: 02.01.2025	Issue: 1	drawn: MAPM	checked: EISF	Pages: 17	Page: 4

1. General notes

1.1 General safety instructions

Read this installation and operating manual carefully before using the hydraulic power unit and the brake control BCS 050. Follow all instructions, including drawings in the respective sections. All work involving the hydraulic power unit and BCS 050 must be carried out with care and with safety as the top priority.

Turn off the hydraulic power unit before performing any work on the brake system. Ensure that the system is fully depressurized.



Life-threatening danger!

When assembling, operating, and maintaining the brake, it must be ensured that the entire drivetrain is secured against accidental activation. Moving parts can cause serious injuries. Rotating parts (e.g. brake disc) must be secured by the operator to prevent accidental contact.

1.2 Special safety instructions



Life-threatening danger!

When installing, operating, or maintaining the hydraulic unit, ensure it is protected against accidental activation.

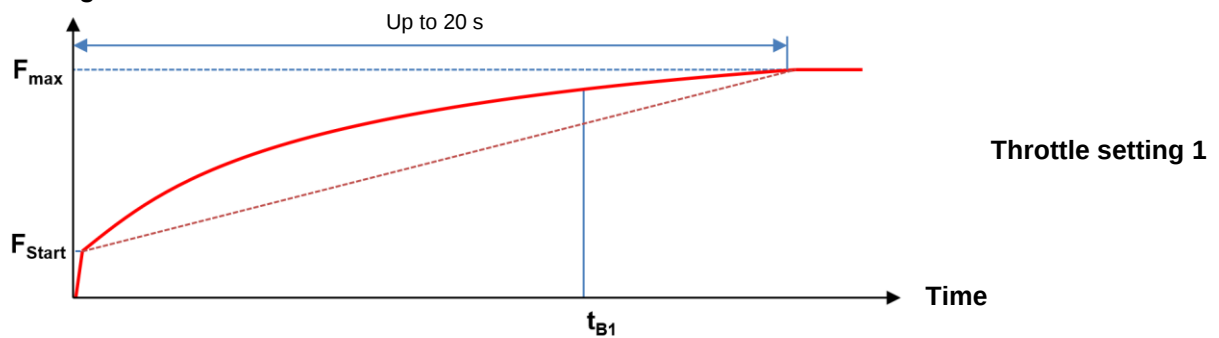
2. Design and function / parts list

2.1 Function

The 2-stage brake control is used in RINGSPANN brake calipers and brake pads that are spring actuated and hydraulically released (the braking force is generated by spring force, and the brake is opened by hydraulic pressure).

The integrated valve control of the unit is specifically designed for braking applications. At the beginning of the braking process, the switching valves of the hydraulic unit open and the brake engages immediately via the pressure relief valve (Pos. 6) of the brake control. The oil volume from the pressure accumulator (Pos. 4) is released into the hydraulic system via the accumulator valve (Pos. 5) once the preset pressure is reached. It then flows back into the tank of the hydraulic unit through the adjustable throttle (Pos. 7). On the brake side, back pressure builds up in the hydraulic system, which affects a brake force development over time. Depending on the throttle setting, the oil from the pressure accumulator flows into the tank of the hydraulic power unit either faster or slower. By adjusting the throttle setting, the braking time can be varied by changing the speed of pressure reduction in the system and the increase in clamping force of the brake (see Figure 2.1). Once the volume of the accumulator is fully discharged, the full braking force is applied.

Braking Force



Braking Force

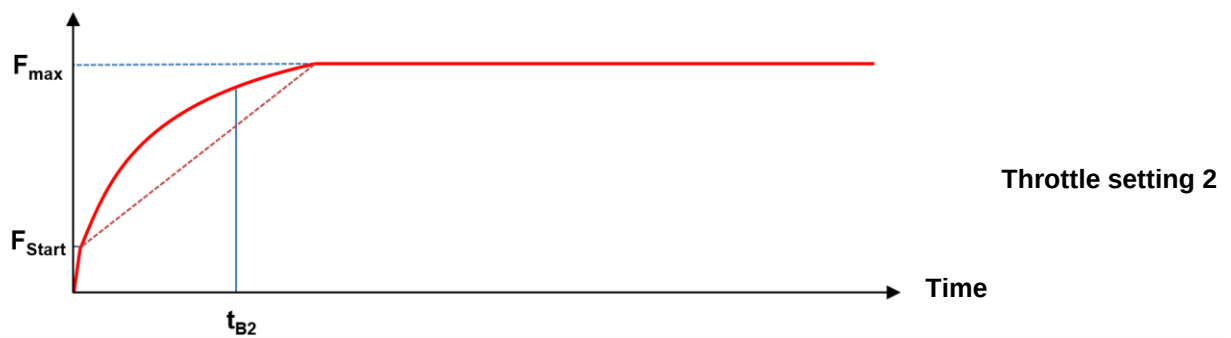


Figure 2.1



Caution!

The intended braking function is only achieved with spring-actuated, hydraulically released brakes.



Information!

Due to the use of a pressure accumulator in the BCS 050 the hydraulic power unit will need more time to open the brake, because the brake and the accumulator are filled parallel. The total opening time of the brake depends also on the hydraulic flow of the hydraulic power unit.

2.2 Markings

This operating manual is valid for the 2-stage brake control BCS 050 in combination with a RINGSPANN hydraulic power unit and a RINGSPANN brake caliper or brake saddle, with or without additional options.

The brake control features a nameplate with a 16-digit material number. The exact configuration is defined by this material number.

Refer also to the catalog data for the brake at www.ringspann.com and the drawings in the individual sections for further details.

2.3 Drawings and Parts Lists

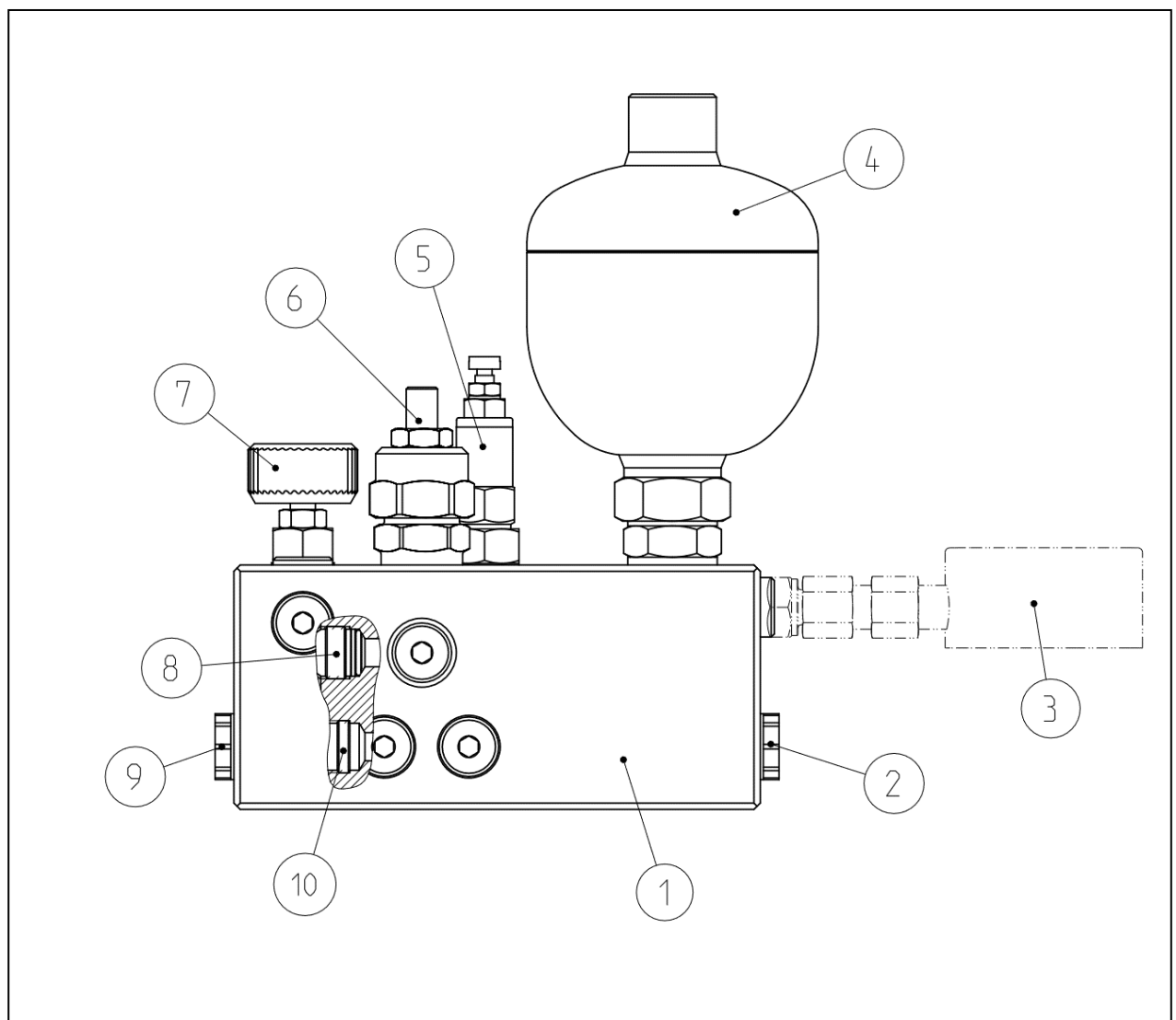


Figure 2.2

Table 1

Pos.	Name	Material code
1	Block BCS 050	2777-168001-000000
2	Plug G3/8" (Brake Connection)	5025-016205-000000
3	Option: Pressure Gauge Mount	-
4	Pressure Accumulator (0.32 l)	3515-001092-000000
5	Accumulator Valve	3515-001091-000000
6	Pressure Relief Valve	3515-001089-000000
7	Adjustable Throttle	3515-001090-000000
8	Check Valve	3515-001104-000000
9	Plug G3/8" (Unit Connection)	5025-016205-000000
10	Check Valve with Orifice	3515-001093-000000

3. Intended use

The maximum allowable pressure of the brake and the BCS 050 need to be considered for the selection and the pressure setting of the hydraulic power unit. The maximum cycle count of the hydraulic power unit must be observed.



Caution!

The maximum allowable operating pressure of the connected brake caliper or brake saddle and the brake control must be strictly adhered to.

The hydraulic power unit is designed for use as an actuating element for RINGSPANN brake calipers and brake saddles. The BCS 050 is intended as an extra between the hydraulic power unit and the brake, and it functions as intended only with spring-actuated, hydraulically released brakes.

Permissible temperature range standard: min. -10 °C; max. +50 °C. It is important to ensure that the hydraulic oil remains within a viscosity range of 10...500 mm²/s, despite potential temperature fluctuations. The brake's response behavior can be affected by changing viscosity.

Any other use is considered improper. RINGSPANN is not liable for any resulting damage; only the user bears the risk for this.

4. Impermissible use

It is prohibited to operate the BCS 050 at a pressure higher than the value specified in the technical data or with other media. Additionally, unauthorized structural modifications are not allowed.

The pressure relief valve (Pos. 6) is factory-set to the connected brake. The set pressure is marked on the valve. Any changes to the setting of the pressure relief valve may result in delayed brake engagement, posing a significant risk to personnel and equipment. Altering the setting or using the

RINGSPANN	Installation and operating instructions for 2-Stage Brake Control BCS 050			E 09.809e	
Date: 02.01.2025	Issue: 1	drawn: MAPM	checked: EISF	Pages: 17	Page: 8

brake control in combination with a different brake than intended is only permitted with the explicit consent of RINGSPANN.

The gas pressure in the accumulator is factory-set to the value intended for the braking process and the brake. The set value is printed on the accumulator and may only be changed with the explicit consent of RINGSPANN. The accumulator pressure must be checked as part of the maintenance procedures outlined in Section 11. If it deviates from the intended printed value, it must be immediately corrected to the specified value.

RINGSPANN is not liable for any damage resulting from incorrect settings of the valves or the accumulator; the user assumes full responsibility for the associated risks.



Danger to Life!

Changing the pressure setting in the pressure relief valve (Pos. 6) may result in delayed brake response.



Caution!

Incorrect gas pressure in the accumulator (Pos. 4) can cause the brake's force buildup to function improperly. If the gas pressure in the accumulator drops, the membrane in the accumulator may be damaged, and the function of the brake control will be lost. The brake force will be applied with no delay.

5. Condition as delivered

The control block is delivered tested and ready for installation. The pressure relief valve is pre-set and adjusted to the intended brake. The gas pressure in the accumulator is preset and adjusted to the brake and the intended braking process. Unless otherwise agreed, the customer must set the throttle according to the desired braking behavior (see also Figure 2.1).



Caution!

Unless otherwise agreed, the throttle must be adjusted during commissioning to achieve the desired braking behavior and then secured against unintentional adjustment.

The connection to the brake and the hydraulic power unit is made by the customer. For the option to mount the brake control on a console with the brake, the connection is made according to prior arrangement.

Table 2

Brake	Set Pressure of Pressure Relief Valve (Pos. 6)	Gas Pressure in Accumulator (Pos. 4)	Maximum Start Pressure
HW/HS 075 FHM - 030	25 bar	5 bar	35 bar (6 kN)
HW/HS 075 FHM - 040	32 bar	7 bar	50 bar (6 kN)
HW/HS 075 FHM - 055	45 bar	10 bar	70 bar (8 kN)
HW/HS 095 FHM - 083	38 bar	8 bar	55 bar (15 kN)
HW/HS 120 FHM - 050	32 bar	7 bar	50 bar (8 kN)
HW/HS 120 FHM - 070	45 bar	10 bar	70 bar (10 kN)
HW/HS 120 FHM - 100	65 bar	14 bar	100 bar (15 kN)
HW/HS 120 FHM - 120	80 bar	17 bar	120 bar (18 kN)
HW/HS 135 FHM - 180	85 bar	18 bar	125 bar (25 kN)
HW/HS 145 FHM - 270	100 bar	20 bar	140 bar (30 kN)
HW/HS 165 FHM - 420	100 bar	20 bar	140 bar (50 kN)
HW/HS 215 FHM - 560	100 bar	20 bar	140 bar (60 kN)

Data based on calculations with nominal clamping force. The start pressure and the resulting force may differ under real operating conditions.

In special cases, an application-optimized setting can be made. The values for the setting of the factory-installed valves are stored in the material number. Any change in the valve settings is only permitted in case of deviations from the specified values or with explicit consent from RINGSPANN. The user must ensure that the valve settings are restored to their original values in .

Before performing a braking operation under load, a test brake must be carried out to verify the intended functions of the respective valves. See also Section 0.

The hydraulic unit must be equipped with an oil filter for safe operation. Hydraulic connections, especially hose lines, must be protected from external influences such as strong UV radiation, contact with solvents and cleaning agents, fuels and lubricants, or high ozone exposure

8. Installation of the 2-Stage Brake Control

8.1 General instructions for assembly and installation



Caution!

For safety reasons, no pipe fittings, connections, or devices should be loosened while the system is pressurized!



Caution!

Increased risk of injury exists when hydraulic fluid leaks. Slipping or falling may occur on oily surfaces. Therefore, external leaks must be prevented. Any spilled hydraulic fluid must be fully absorbed or removed. There is an increased risk of injury when working with oily hands!



Caution!

Hydraulic fluid can cause skin diseases upon contact. Therefore, contact should be avoided by wearing appropriate protective gloves or using skin protection cream!



Caution!

Hydraulic fluid generally poses a potential fire hazard due to its flammability. Leaks must be immediately absorbed with suitable means, and any flammable materials, such as cardboard, that come into contact with the fluid must be disposed of immediately. Materials contaminated with hydraulic fluid are hazardous waste! Ignition sources in the vicinity must be prohibited!

8.2 Assembly and installation

The connection of the BCS 050 control block is made between the brake and the hydraulic power unit. The block can be mounted on the mounting component in two ways:

- 2 x M8 for through holes
- 2 x M10 for threaded inserts on the underside

The length of the fastening screws must be selected by the customer. The thread length and the length for the screw connection are shown in Figure 8.2.

The fastening screws should be tightened with the specified torque according to VDI 2230, based on the friction values for the specific application.

The brake control can be mounted both vertically and horizontally. The connection of the control block is made between the hydraulic power unit and the brake. The threads for the connection are G3/8" on both sides. The connection points are each marked with an engraving for the respective connection:

- "HPU" - Connection to the hydraulic power unit
- "Brake" - Connection to the brake

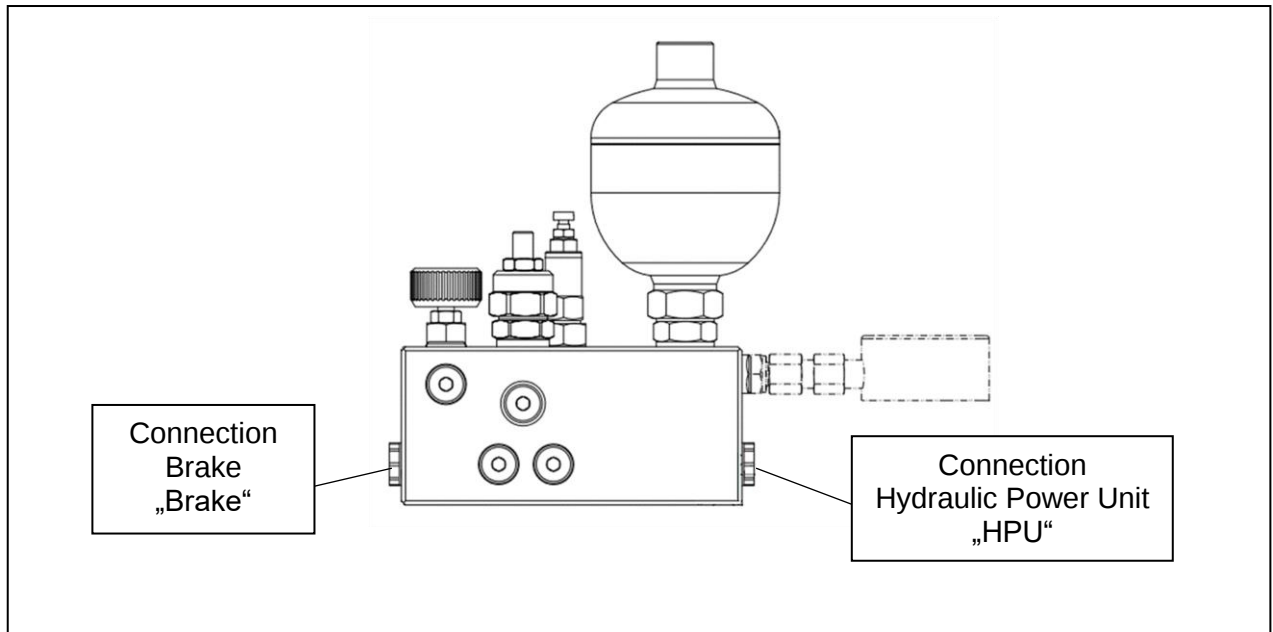


Figure 8.1

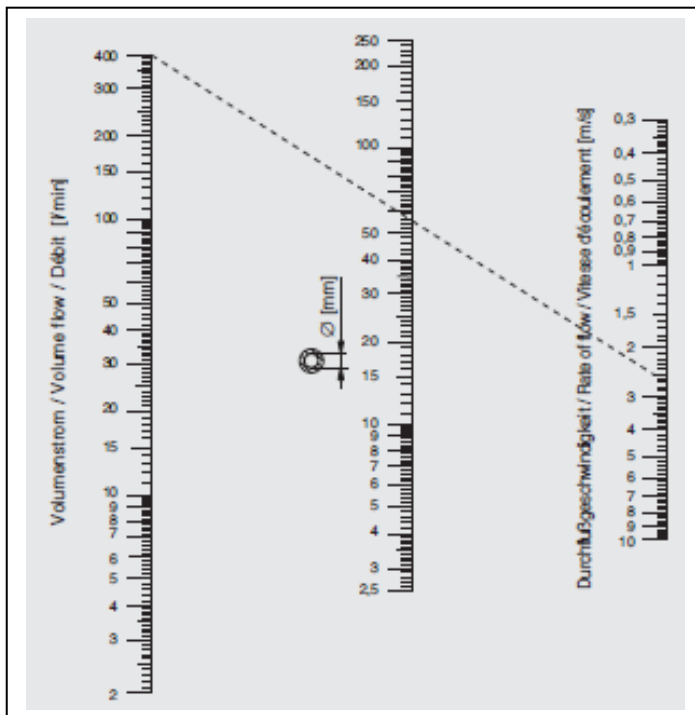
To avoid kinking when using hydraulic hoses, the brake control should be mounted as close as possible to the brake and the hydraulic power unit. The engravings on both connection sides must be observed. The connection marked "HPU" should be easily accessible for the connection to the hydraulic unit. The connection marked "Brake" should be easily accessible for the connection to the brake.



Caution!

The brake control may only be pressurized with hydraulic pressure after complete assembly.

Stepped bores must align precisely to prevent housing stresses. The selection of pipes, hoses, and fittings is based on application requirements. For the integration of RINGSPANN brakes and the BCS 050, only seamless precision steel tubing should be used. The following diagram is useful for determining the inner diameter of the tubing:



Recommended Oil Speeds

Suction lines:	0,5...0,8 m/s
Return lines:	2...4 m/s
Lines up to 100 bar:	2...4 m/s
Lines up to 300 bar:	3...12 m/s

Figure 8.2

Pipes must be cleaned of scale, sand, dirt, chips, etc., before installation; welded pipes must be pickled and flushed.

Pipes should be laid in a stress-free manner, ensuring that no vibrations are transmitted.

Hydraulic hoses must be installed without torsion, with a sufficient bending radius, and always with proper slack.

The pipe connections and thread depths are designed to allow the use of both fittings with sealing edges and elastomer seals.



Caution!

Hemp or putty are not allowed to be used for sealing.



Caution!

The thread of the connections is not allowed to touch the bottom of the hole.



Caution!

If the connection is not made correctly or if the connections for the brake and hydraulic unit are reversed, the 2-stage brake control will lose its function.

RINGSPANN	Installation and operating instructions for 2-Stage Brake Control BCS 050			E 09.809e
Date: 02.01.2025	Issue: 1	drawn: MAPM	checked: EISF	Pages: 17 Page: 14

The coupling nuts must be tightened sufficiently. The following applies:

After a noticeable increase in force, the coupling nut must be tightened by an additional 1/4 turn (metallic sealing) or 1/2 turn (elastomer sealing).

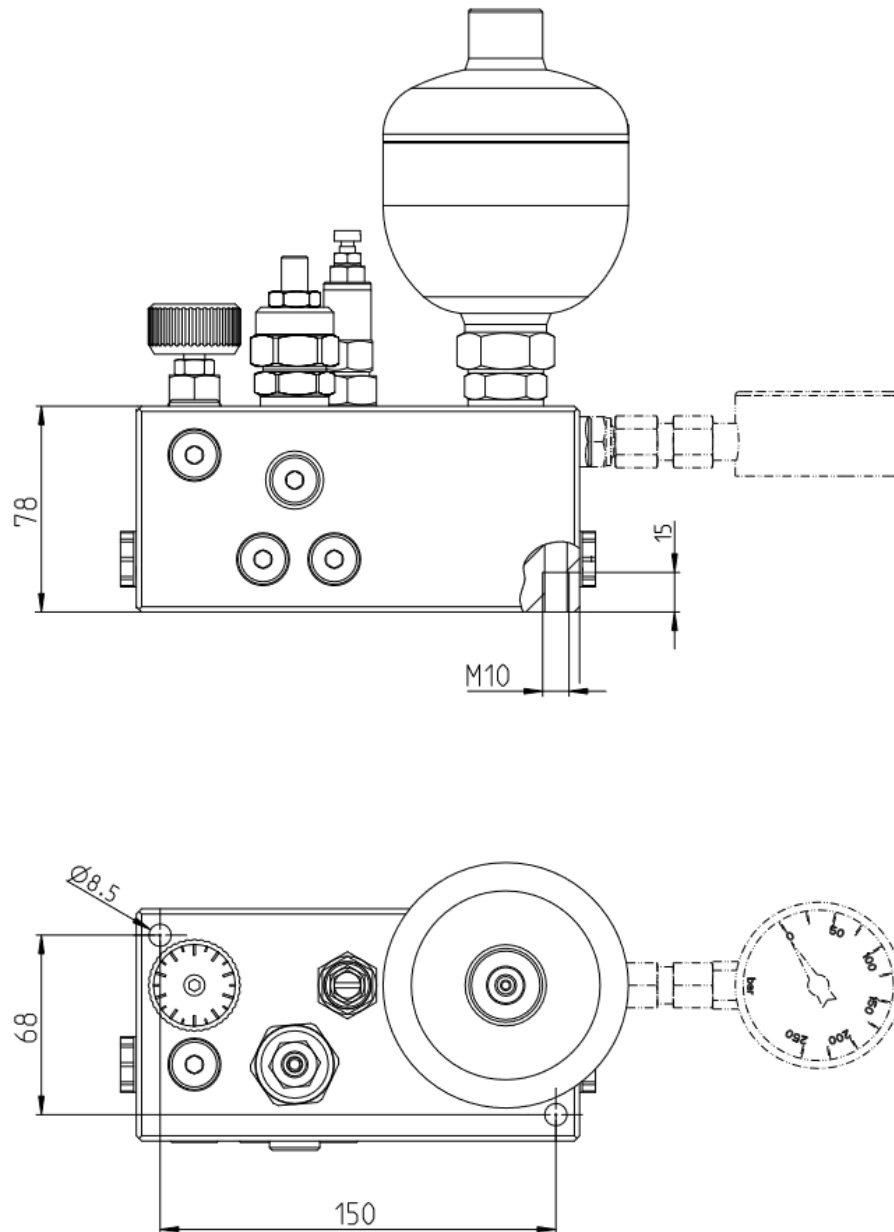


Figure 8.3

9. Start-up

After proper assembly, commissioning can take place. Before starting, the following items must be checked:

- Are the lines clean and free of debris? (Flush pipe and hose lines if necessary)
- Are the fittings and flanges tightened to the specified torque?
- Are the hydraulic unit and brake connected to the correct ports?
- Is the pressure set on the pressure relief valve (Pos. 6) according to Table 1 for the connected brake (see label on the valve)?
- Is the gas pressure in the accumulator (Pos. 4) according to Table 1 for the brake or braking application (see label on the accumulator)?

For commissioning, follow the steps in sequence:

- Bleed the system at the highest point of the consumer lines. Follow the instructions of the hydraulic power unit. Bleeding is successful when no jerky movements occur at the consumer and no abnormal sounds are heard.
- Check the function of the system without load during operation. To do this, measure the pressure via a sensor or manometer at the connection (Pos. 3) and before the brake. Then engage the brake and observe the speed of pressure drop. The function is correct if the pressure at the brake initially drops sharply to the pressure level at connection Pos. 3. After that, the pressure should drop more slowly. The speed of the pressure drop can be adjusted using the adjustable throttle (Pos. 7). The throttle must always remain at least half a turn open.

The behavior of the block is correct if the pressure drop over time follows the schematic curve below:

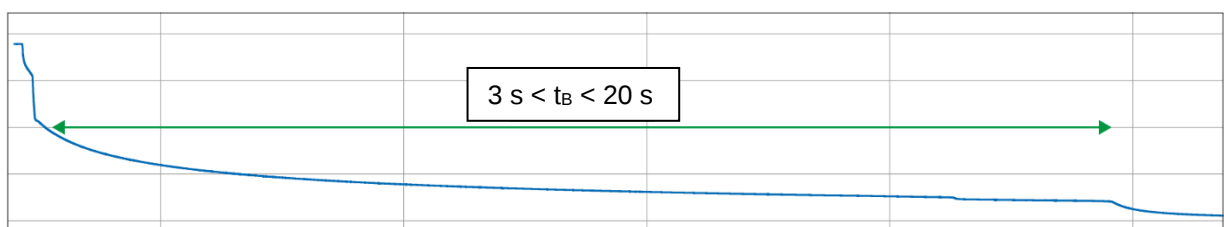


Figure 9.1

The total time to full clamping force of the brake can vary depending on the throttle setting, oil viscosity, and temperature. The curve can be stretched or compressed by adjusting the throttle setting. It should be noted that this will also affect the braking time under load. The shorter the overall pressure drop time (throttle is opened further), the faster the connected brake will develop its force, and the quicker the system to be braked will come to a stop.



Life-threatening danger!

The function of the brake control must be checked without load after installing the brake. All valve settings must be verified, and the pressure drop of the brake should be observed. The pressure drop must be compared to the expected behavior.

In addition to the pressure curve, the reaction time of the brake must be considered. If the brakes do not close without delay ($T_E > 0.6$ s), the set pressure of the pressure relief valve must be checked without fail.

10. Disassembly



Life-threatening danger!

During disassembly, ensure the entire drivetrain is secured against accidental activation. Rotating parts, such as brake discs, must be safeguarded to prevent unintentional contact.

Steps for Disassembly:

- Pressurize the brake with the specified hydraulic pressure from the technical data of the brake. Secure this state with the manual release screw if possible.
- Remove the screws securing the brake to the machine frame. The caliper can now be detached from the mounting surface.
- Depressurize the hydraulic brake circuit.
- Subsequently, disassemble the 2-stage brake block BCS 050 by releasing it from its mounting surface using the two fastening screws when the hydraulic system is in a depressurized state. The same procedure can be followed if only the 2-stage brake block needs to be removed.

11. Maintenance

The manufacturer specifies the following maintenance intervals:

At commissioning:

- Check all functions.
- Verify oil level and system tightness.
- Adjust oil level one week after commissioning.

Monthly:

- Check and adjust the hydraulic unit's oil level.
- Inspect connections and hoses; tighten as needed.
- Check the pressure at the hydraulic unit's manometer and at Position 3 on the brake block.
- Perform general functionality tests, including brake engagement times and pressure curves.

Annually:

- Replace the oil and filter in the hydraulic unit.
- Perform a complete system cleaning.
- Inspect hoses for operational safety.
- Verify the pneumatic pressure in the accumulator.

Every 5 years:

- Replace hoses.
- Replace all seals.

12. Options

Optionally, a manometer can be installed to monitor the stored oil pressure (Pos. 3). Alternatively, a pressure sensor or pressure switch can be adapted to read the pressure via a control system and issue a warning in case of a fault.

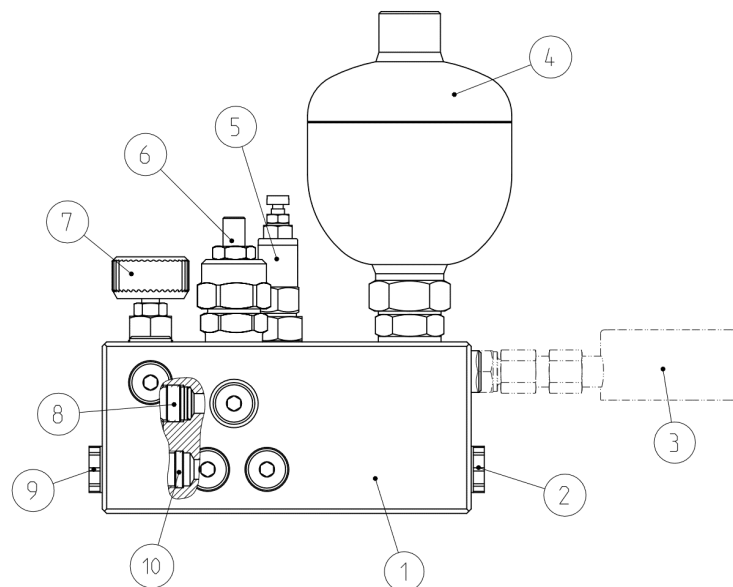


Figure 12.1