KGW-ISOTHERM	Mounting instruction & user's manual **RK-EF-25 Double-walled reaction vessel with Easy Frame**	07.05.2012

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1) Mounting Instruction for complete Reactors with EASY FRAME

1) Set the frame, straighten it and secure the wheels with the help of the breaks.

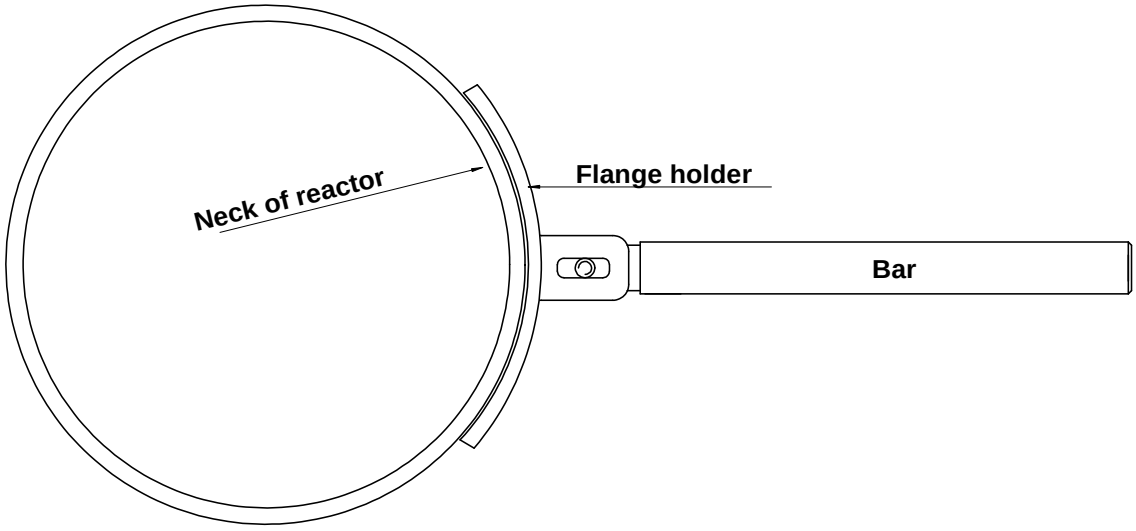
2) Release the aluminium-setting board with the help of the headless pins. Adjust the complete stage to the desired height and fasten the headless pins again. Afterwards, please secure the board with the tubular safety piecess from the bottom.

3) The bars of the flange holders might be removed for transport. The bars must be put into the fasteners from inside, again.

4) The aluminium-setting board must have cork cushioning.

5) Put the reactor on top of this cushioning insert and turn it into the desired position (e.g thermal jacket connections in the background).

6) Afterwards, the complete stage of flange holders must now be adjusted, so that the flange holders can be fixed in the height of the reactor neck. Therefore please loosen the headless pins inside of the blue-coated connectors move the complete stage and fasten the headless pins again.



7) Now, set the stirrer seal (KGW-40466) on the centre socket NS 45/40 of the lid and secure it with a suitable clamp for NS 45/40.

8) Lead the stirrer element (Anchor or Propeller Stirrer) from downwards through the stirrer seal and secure it with the help of the pressure screw (please see below under Practice Advice for Stirrer Sealant).

9) Put the o ring NW 200 (KGW-4061) into the groove of the reactor flange.

10) Now put this lid unit, consisting of lid, stirrer seal and stirrer element on top of the reactor flange.

11) The reactor and the lid will now be closed with the help of the quick release clamp (KGW-4051).

12) Please put the stirrer coupling on the shaft relief of stirrer element and fasten it.

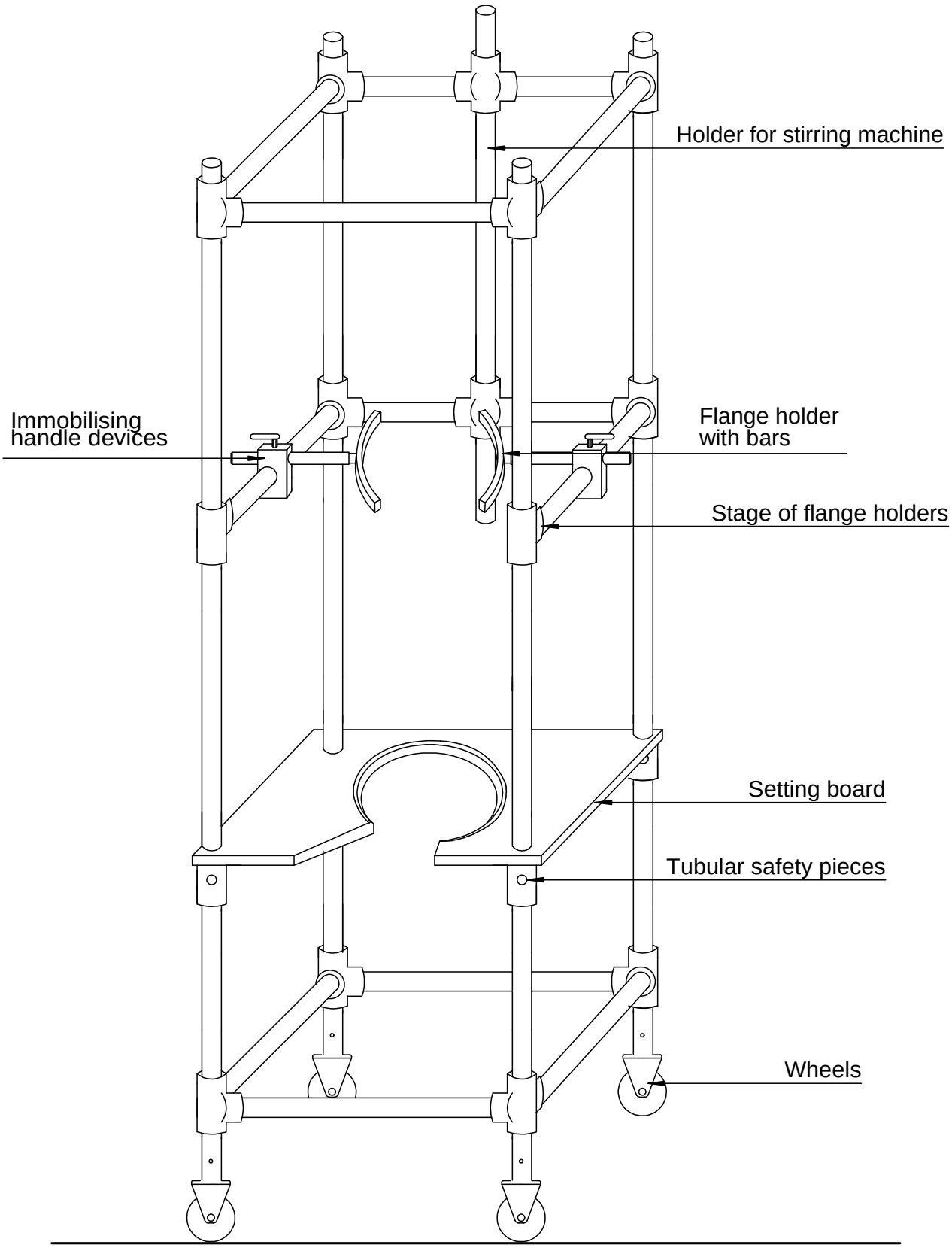
13) Now, put both PTFE seals (KGW-4202) for the thermostat hoses into the metal adapters (KGW-4200) and screw them on the DN15 flanges (please see practice advices for metal adapters). The transport securing of the thermal jacket flanges must possibly the removed at first.

14) Connect the thermostat hoses with the metal adapters and your thermostat.

15) Fasten the stirring machine with a cross clamp on its bracket to the middle tube of frame. This centred tube must possibly be height adjusted a little.

16) Connect the stirrer element with the help of this stirrer coupling with the chuck of stirring machine (please pay attention, that the stirrer is strictly aligned).

Now the reactor is ready to use and can be put into operation.


Holder for stirring machine
Immobilising handle devices
Flange holder with bars
Stage of flange holders
Setting board
Tubular safety pieces
Wheels

2) Safety Information

2.1 General Safety Information for Vessel Owners

This operating manual contains basic information on setting up, operating and servicing your vessel. The vessel owner and designated personnel should (a) read this manual before performing any such activities, (b) follow its instructions while performing the activities, and (c) make sure the manual is available wherever the double-walled vessel is being used.

They should also follow the following rules:

- All applicable national regulations on accident prevention, electrical equipment, static electricity, transportation equipment, environmental protection and explosion prevention
- The vessel owner's in-house process specifications, operating instructions and safety regulations

If you have any questions, please contact KGW-ISOTHERM in Karlsruhe, Germany.

2.2 General Safety Information for Vessel Operators

- Do not perform any activity that could make the double-walled vessel and/or the system less safe.
- As a general rule, you should only work on the double-walled vessel once it has gone out of operation and reached ambient temperature.
- Before disassembling the vessel, make sure it does not contain any substances that are hazardous to the environment and/or human health.
- Once you are finished with your work, you must immediately re-attach all the protective and safety devices.
- Before performing any maintenance or repairs, you must ensure that the apparatus cannot be turned on again.

2.3 Types of Safety Warnings

This operating manual contains safety warnings that, if not followed, could pose a serious health hazard. These warnings are labelled as follows:

General hazard symbol

Electrical voltage warning

Safety warnings that, if not followed, could pose a risk to the vessel and its functionality

2.4 Personnel Qualifications

The employees who assemble, connect, test-run, operate, service and eliminate faults on the vessel must be appropriately qualified or adequately trained.

The vessel owner must:

- Make clear arrangements regarding personnel responsibilities and supervision
- Ensure the personnel fully understand the contents of the operating manual(s)

2.5 Hazards of Ignoring the Safety Warnings

If you ignore the safety warnings, you could put yourself, other personnel, the environment and the vessel (as well as the apparatus/system) at risk, and free KGW-ISOTHERM of any and all liability for defects as to quality.

The hazards of ignoring safety warnings may include for example:

- Injuries due to electrical, mechanical or chemical influences
- Problems with important functions
- Environmental pollution from hazardous material leaks

2.6 Alterations and Spare Parts

The vessel owner may only alter or modify the double-walled vessel in consultation and agreement with the manufacturer. For your safety, you should only use original spare parts and accessories authorized by the manufacturer. Using other parts may render the manufacturer's liability for any consequences null and void.

2.7 Correct and Incorrect Ways to Operate the Vessel

The vessel must be operated as indicated in this manual (under point 5) to ensure adequate safety. If you operate the vessel in any other way or with media, which may attack the vessel materials, we may disclaim any and all liability for the consequences. Also: The vessel may only be operated if it is in flawless condition.

2.8 Safety Warnings for Operations in Hazardous Areas

If you operate glass apparatuses in hazardous areas in a way that may lead to explosive discharges of static electricity, you must take appropriate precautions. The extent of these precautions depends on the probability that an explosive atmosphere will be created. This probability (in terms of time and location) is broken down into zones that depend on the areas in which the device is to operate. The zones correspond to the Equipment Categories laid out in Directive 94/9/EC.
For more details on how electrostatic ignition hazards are caused, evaluated and avoided, please consult Guideline BGR 132 on static electricity issued by BG Chemie.

3) Liability for Defects as to Quality

Our liability for defects as to quality is as laid out in our General Terms and Conditions of Sale and Delivery as they may change from time to time. Please notify us immediately if damages occur during the contractually agreed upon period. This is the only way you can safeguard your rights to a remedy in case of defects as to quality.

We are only liable if the permitted operating conditions were complied with and the material's resistance to the media was considered. As set forth in our valid Terms and Conditions of Sale and Delivery, we disclaim all liability for damages sustained by the failure to observe these requirements.

4) Transportation

Any transportation must comply with generally accepted technical conventions, accident prevention regulations, regulations on handling and using transportation and lifting equipment (including the manufacturer's instructions), and in-house safety rules.

Achtung

Every double-walled vessel is delivered packaged in boxes / cases. The vessel must be protected against shock, impact or any other mechanical stress when you unpack the parts and transport them on your own premises.

Achtung

Keep people outside of the hazard area.

5) General Information

5.a Manufacturer's Declaration

The triple-walled vessel was manufactured by

KGW-ISOTHERM
Karlsruher Glastechnisches Werk Schieder GmbH
Gablonzer Str. 6
D 76185 Karlsruhe
Phone: +49 (0) 721 958 97-0
Fax: +49 (0) 721 958 97-77
Email: info@kgw-isotherm.de

Please contact the manufacturer if you have any questions about assembling, connecting, operating, servicing, repairing, or eliminating faults on the vessel.

5.b Design

Double-walled vessels contain two walls that have been fused together. The space between the inner and the outer wall will be filled with the tempering medium.
You will generally have to install a pressure relief device rated at 0.5 bar before you can fill the vessel with a liquid tempering medium.
As a general rule, the vessel is outfitted with a bottom outlet J-valve designed to automatically adjust to changes in the extension of the PTFE valve spindle.

5.c Specifications / Limits of Use

The standard rules for calculating pressure resistance do not apply to vessels with two fused walls: Their design and construction are too complicated. That is why these vessels are individually pressure-tested.

The vessels can be used in the following operating conditions:

	Product space	Thermal jacket
Pressure range	- 1 / + 0.5 bar	+ 0.5 bar
Temperature range	- 70 / + 200℃	- 70 / + 200℃
Temperature differential in the glass wall	max 30℃	max 30℃

The bottom outlet J-valve is spring-loaded to maintain the same level of closing force at different temperatures.

The vessel is equipped with DN15-glass flanges as thermal jacket connection. They have different temperature ranges, depending on used sealants (standard: PTFE sealants).

Thermal jacket connection DN15 with PTFE sealants, Temperature range from –120° to +200℃.

6) Mounting the Double-walled Vessel

Make sure to wear protective goggles or a facemask as well as protective gloves whenever you handle or work with reaction vessels.

Only properly trained personnel should install glass components in KGW supporting frames or in mounting equipment provided by the customer. The glass components must be installed without stress.

All external connections on the double-walled vessel must be connected without stress.

Glass vessels with several fused walls are held in place using standard stainless steel connectors with a supporting ring or on aluminium plates (Easy Frame) in a supporting frame that holds the vessel's entire weight.

To ensure adequate safety, the vessel must also be installed in an enclosure / protective wall made of transparent plastic to protect the operator if the vessel is destroyed.

The product space and the thermal jacket must be equipped with a pressure relief device to prevent the maximum permissible operating pressure from being exceeded.

You may have to remove the bottom outlet J-valve to clean the vessel. When you reinstall the valve, you should make sure it is opened. Otherwise, you could damage the valve seat or the valve spindle.

7) Putting Into Operation

Before the vessel is put into operation, the owner needs to look for cracks, scratches and other signs of damage on the surface of the glass and in the glass itself.

You should also examine the glass surface for signs of chemical wear, if applicable.

Vessels with signs of surface damage, wear and tear, et cetera, should not be used: They could implode when placed under thermal or mechanical stress.

When putting the vessel into operation, you should avoid any start-up processes that could lead to surges in pressure. The tempering medium circuit must be depressurized and fully evacuated of air before being put into operation.

When starting up or shutting down the vessel, you must make sure to increase / decrease the circulation flow slowly. Quickly increasing or decreasing the circulation flow can produce sudden surges in pressure that could destroy the vessel.

Due to the double-walled vessel's special design, you must make sure when filling the empty vessel that the difference between the medium temperature and the thermal jacket temperature is not heigher than 30 K.

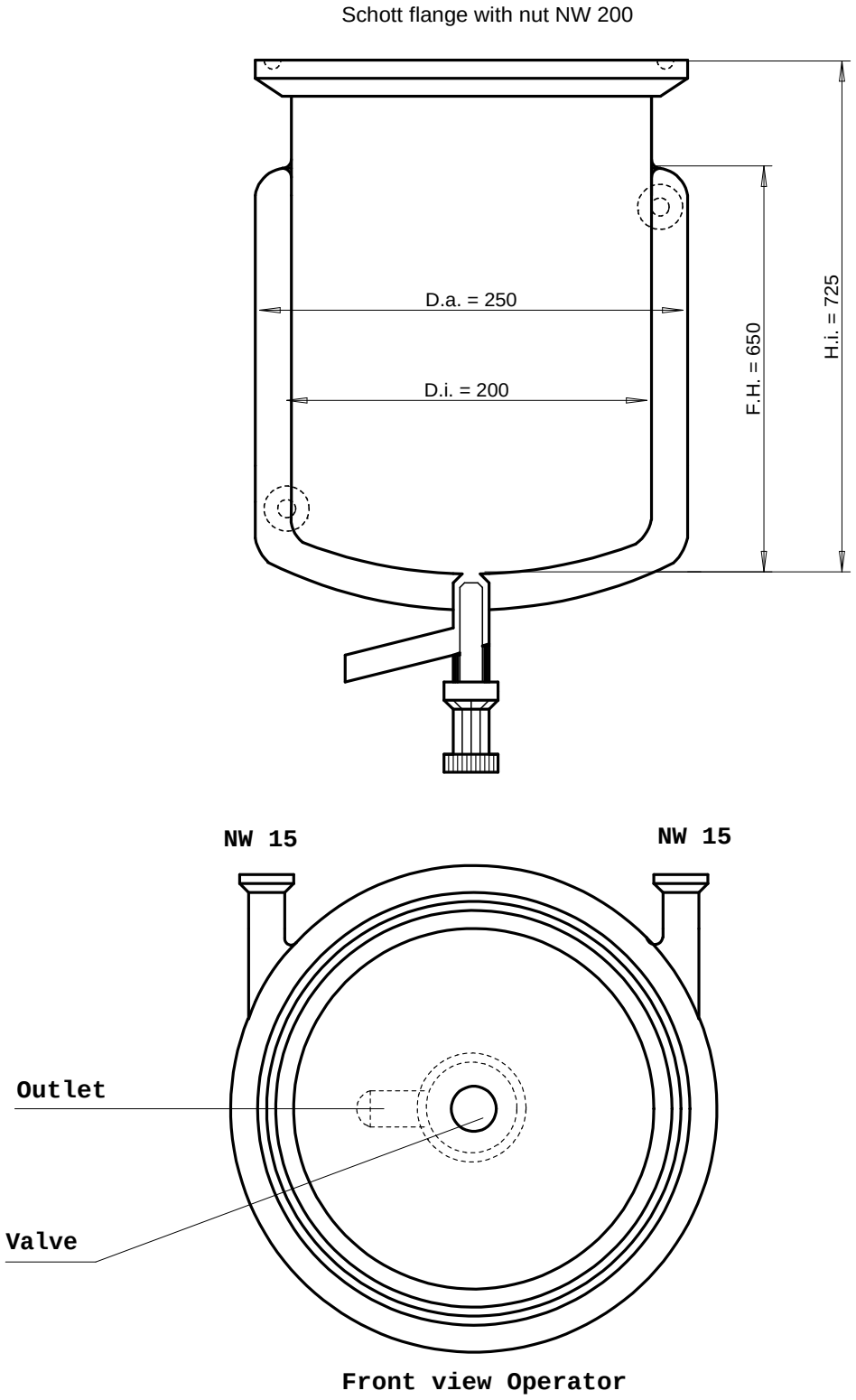
When you are adding a medium to a vessel you have previously filled, and the difference between the medium temperature and the product temperature is higher than 30 K, you must make sure not to feed the medium directly onto the wall, which would expose the glass to critical thermal stress.

8) Maintenance / Servicing / Repairs

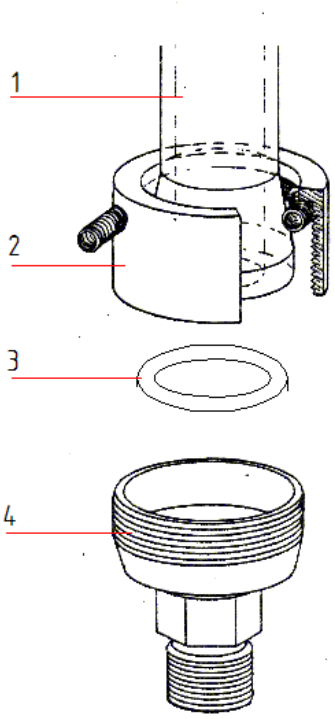
If the product tends to leave deposits, make sure that there are no solid particles near the valve spindle and/or valve seat when you close the valve. Deposits will produce leaks and could damage the valve.

Damaged vessels should not be put into operation.
Please contact the manufacturer if your vessel requires repairs.

9) Diagram of a Double-walled Reactor



10) Practice Advice for Metal Adapters



Construction

1) Glass flange DN 15
2) Cap nut with spring ring
3) Sealant
4) Metal adapter with thread M16 x 1 for metal hoses

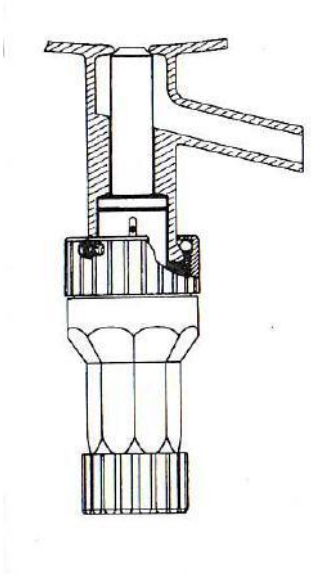
Installation

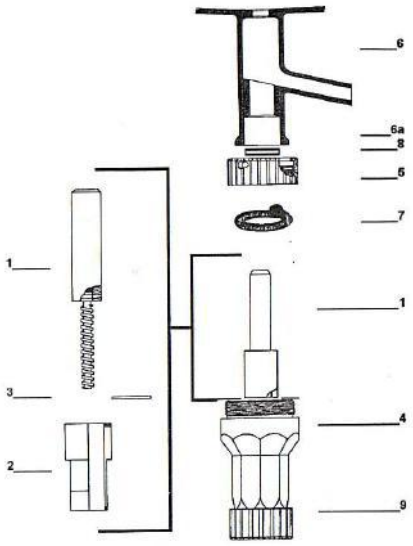
1) The spring ring is pulled out of the cap nut (No. 2).
2) Now the cap nut will be pushed over the glass flange (No. 1). Afterwards the spring ring can be replaced into the drilling of the cap nut.
3) The sealant (No. 3) can now be placed into the metal-adapter cage (No. 4).
4) The metal-adapter cage (No. 4) will be pushed against the glass flange (No. 1) and fastened by means of the cap nut (No. 2).
5) Afterwards the metal hose of the thermostat can be connected to the metal adapter (No. 4)

Spare parts

A) Metal adapter, complete for DN 15	part no. 4200
B) Sealant out of silicon	part no. 4201
C) Sealant out of PTFE (GORE)	part no. 4202
D) Metal hoses, thermal insulated up to 300°C.	
Screw connection M16 x 1	
- Length 1,0 metre	part no. 4216
- Length 1,5 metre	part no. 4217
- Length 2,0 metre	part no. 4218
E) Metal adapter, complete for DN 15 with olive 13mm	part no. 4153

11) Practice Advice for Industrial valve Type „J 10“





Mounting instruction for Bottom outlet valve Type „J“

A Set the valve plunger **(1)** into the guide sleeve **(2)** and secure it with split pin **(3)**. Then, please screw the V2A thread into valve body **(4)** against the clockwise direction as far as it will go. The square of the guide sleeve must be inserted into the appropriate drilling of the valve body.

B Screw Lock nut **(5)** one revolution onto valve body.

C Insert Seal **(8)** into glass flange **(6a)** and press it up to the restriction.

D Push the valve as far as it will go into the glass part and push in the steel spring **(7)** up to extension in the tangential drilling of lock nut **(5)**. Afterwards tighten lock nut until the guide sleeve is resting upon on the seal. By further tightening of the lock nut now the pressure on the seal can be adjusted.

Note: do not tighten the lock nut with excessive force, since thereby the abrasion of seal increases!

E By turning of the valve cap **(9)** in the clockwise direction the valve is closing. The maximum stroke length of the drain valve amounts to 50 mm, which can be used fully. In order to ensure the function of the built in safety spring of valve, the valve cap must kept turning approx. 2 revolutions after the valve is closed; this correspond to 5 mm possible safety feed motion.

General Advices for Industrial valve Type „J“

As long as the split pin is not visible in the valve body, turning the valve cap, in any case, can retighten the safety spring. Should the split pin become visible and a distance of approx. 5 mm up to the end of the guide groove is under-run, the exchange of the valve temple is recommended, since the stamp point itself has worn out and so in the same measure it reduces the safety spring motion.

The vessel was equipped with a Bottom-Outlet valve Type „J“ (Industrial Version).

The bottom-outlet valve Type „J“ has got a spring-pressured PTFE plunger for constant seal pressure at various temperatures. Temperature range from –120°to +200° C.

On request, such vessels can be equipped with other thermal jacket connections or other bottom outlets.

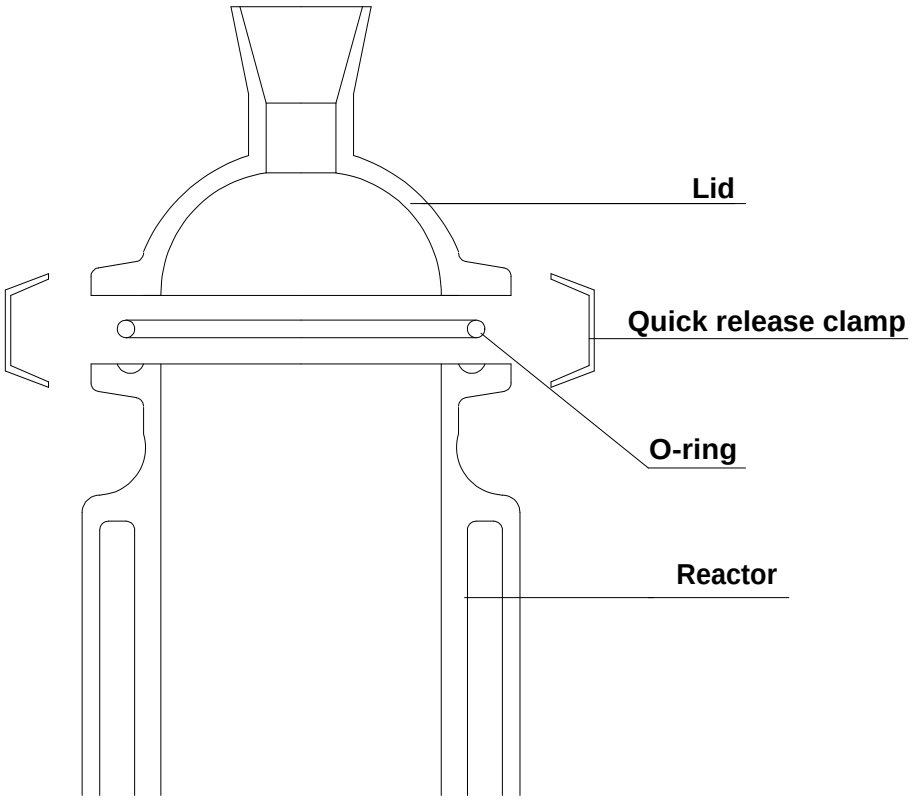
12) Mounting the Lid on a Doble-walled Vessel

Make sure to wear protective goggles or a facemask as well as protective gloves whenever you handle or work with the reaction vessels.

Only properly trained personnel should install glass components in KGW supporting frames or in mounting equipment provided by the customer. The glass components must be installed without stress.

All external connections on the double-walled vessel must be connected without stress.

On an Easy Frame, the Lid will be fixed to the Reactor with the help of a Quick-release Clamp.



13) Technical Data of Reaction Vessel

Reactions Vessel

Type: TRGN 7198-20

Capacity: 20 Litres

Flange: NW 200 / DIN 12214

Maximum Overpressure of Reactor: 0,5 bar

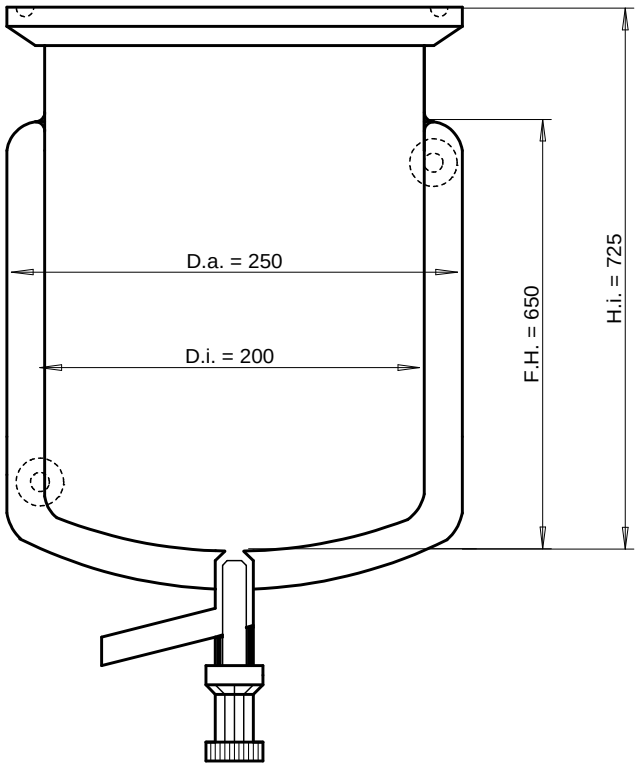
Temperature range maximum: +200°C

Temperature range minimum: -70°C

Bottom-Outlet-Valve: „J" Valve, 10mm

Capacity of Thermal Jacket of Reactor: approx 6,5 Litres

Material: Borosilicate glass 3.3 DIN/ ISO 3585

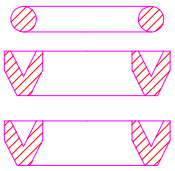


14) Stirrer seal out of glass RV 16/45

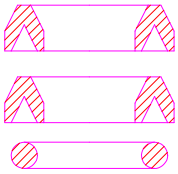
- Tighten pressure screw only after installing the stirrer shaft; stirrer seal (complete)
- Shaft and seals should be cleaned beforehand, if necessary
- Slightly worn out sealing elements can be adjusted by tightening the pressure screw step less. The inserted Viton compound - square ring serves as form and/or compensating element.
- Sealing elements should be exchanged in time
- By appropriate installation of the sealing elements the stirrer seal is suitable both for pressure and for vacuum usage. Working with pressure, a sufficient fastening must be provided for the stirrer seal.

Examples

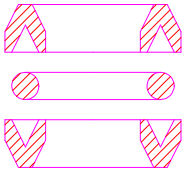
Vacuum



Pressure



all-purpose application



Stirrer seal, complete

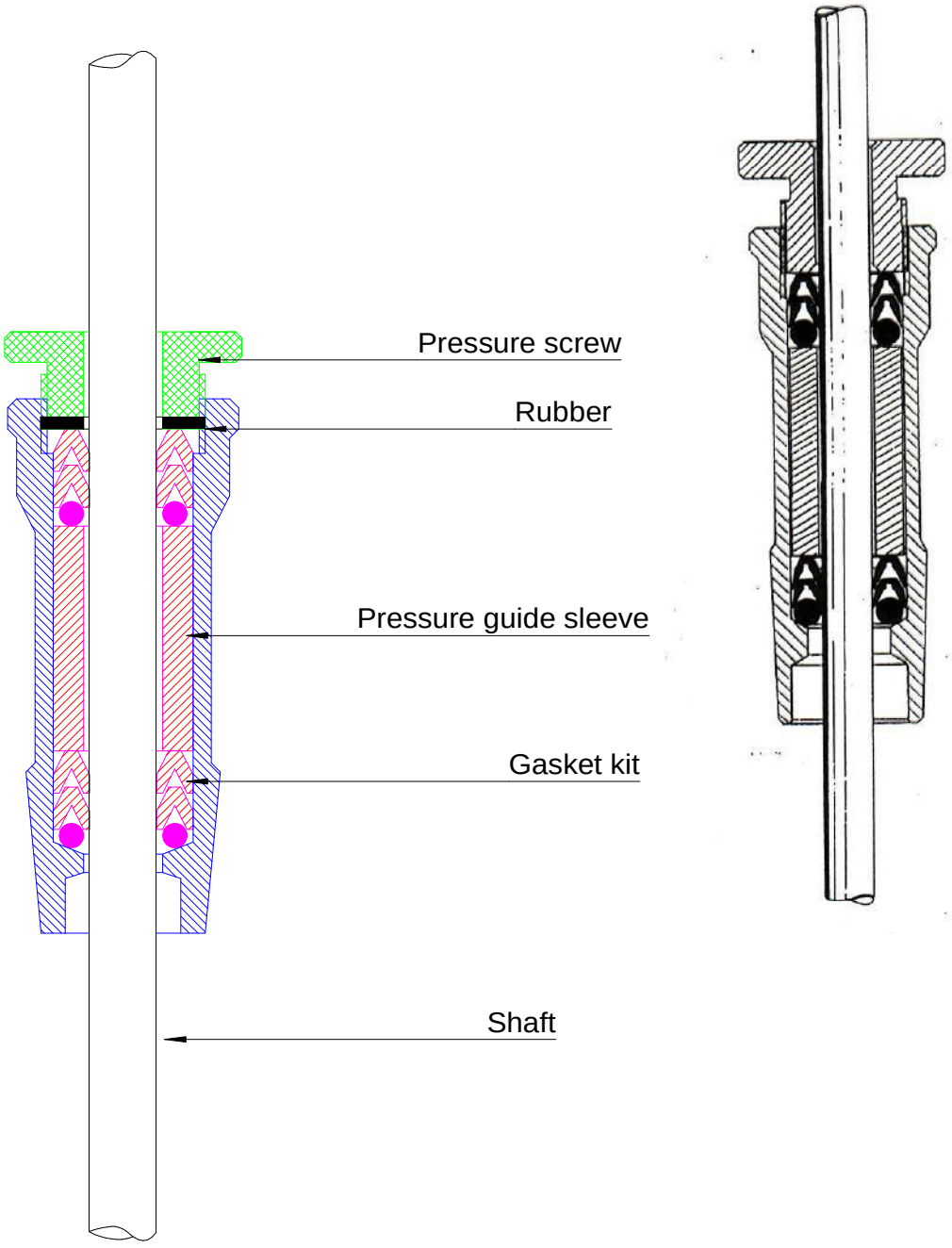
Shaft diameter mm	Size of joint NS	Fitting length mm	Part no.
16	45/40	105	40466

Spare parts

Pressure guide sleeve out of PTFE-compound, red
for 16 mm shaft diameter Part no.:40463 / 220

Gasket kit consisting of 2 lip seals and1 O-ring out of PTFE
for 16 mm shaft diameter Part no.:40463 / 270
(for a complete exchange you will need 2 gasket kits)

Pressure screw out of PTFE-compound, red
for 16 mm shaft diameter Part no.:40463 / 310

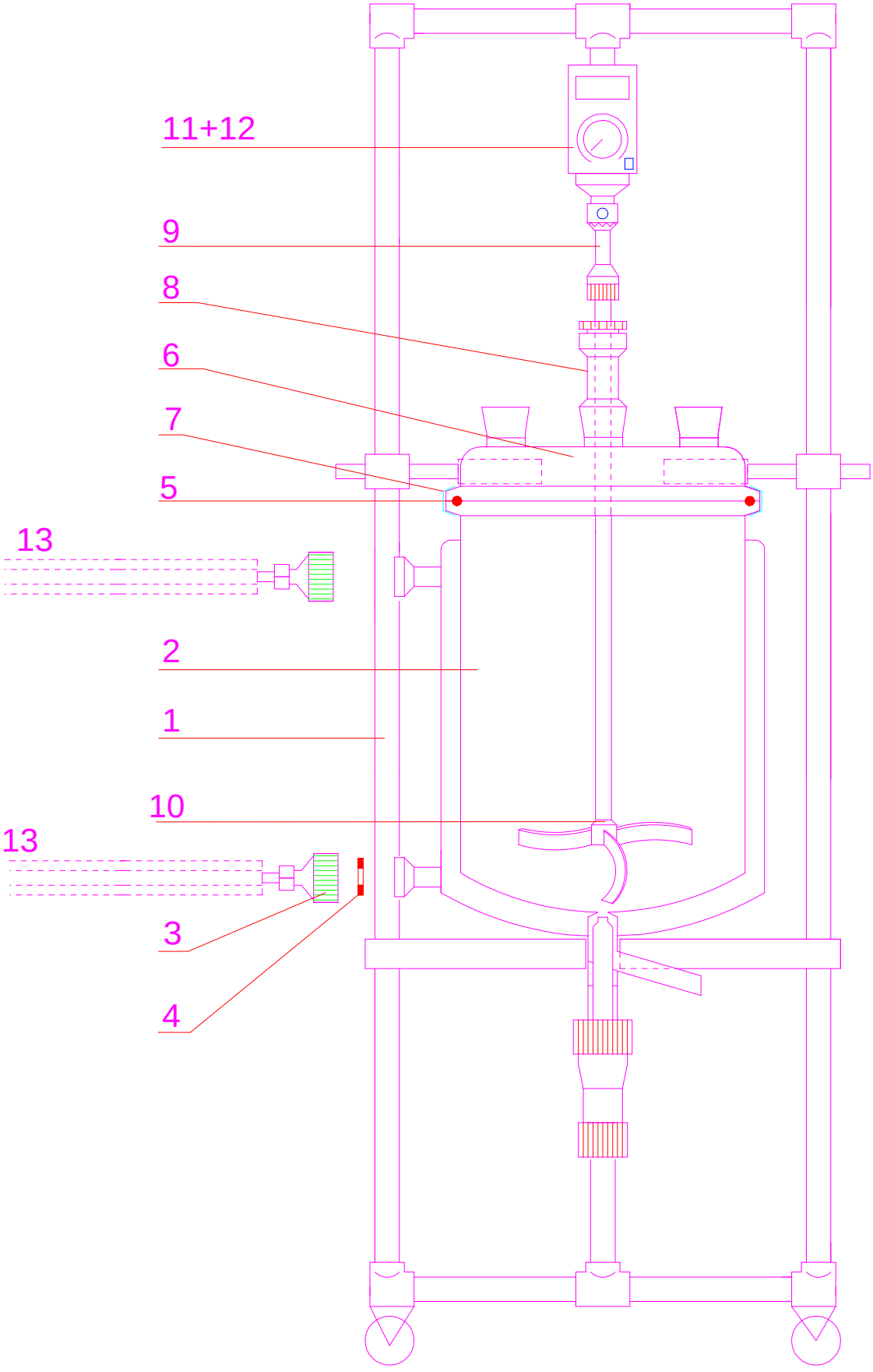

Pressure screw
Rubber
Pressure guide sleeve
Gasket kit
Shaft

15) Part List and Spare Parts for Easy-Frame Assembly

1)	**Frame Type Easy Frame**	**Part No.: 7706**	**Pieces: 1**
2)	**Reaction Vessel**	**Part No.:TRGN 7198-20**	**Pieces: 1**
3)	**Metal Adapter DN15 to M16x1**	**Part No.: 4200**	**Pieces: 2**
4)	**PTFE Sealants DN 15**	**Part No.: 4202**	**Pieces: 2**
5)	**Silicon-FEP O-Ring NW 200**	**Part No.: 4061**	**Pieces: 1**
6)	**Lid** **Centre socket NS 45/40 and 3x side socket NS 29/32 angular**	**Part No.: D 4302S**	**Pieces: 1**
7)	**Quick Release Clamp NW 200**	**Part No.: 4051**	**Pieces: 1**
8)	**Stirrer seal out of glass RV 16/45**	**Part No.: 40463**	**Pieces: 1**
9)	**Stirrer coupling RKG 16**	**Part No.: 404741**	**Pieces: 1**
10)	**Propeller stirrer made of stainless steel shaft PD-W16-V-TRGN 7198-20, length 1000mm**		**Pieces: 1**

Options

11)	**Cross clamp**	**Part No.: 112233**	**Pieces: 1**
12)	**Stirrer mashine IKA**	**Part No.: 11230CV**	**Pieces: 1**
13)	**Tempering metal hose 1,5 metre**	**Part No.: 4217**	**Pieces: 2**


11+12
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