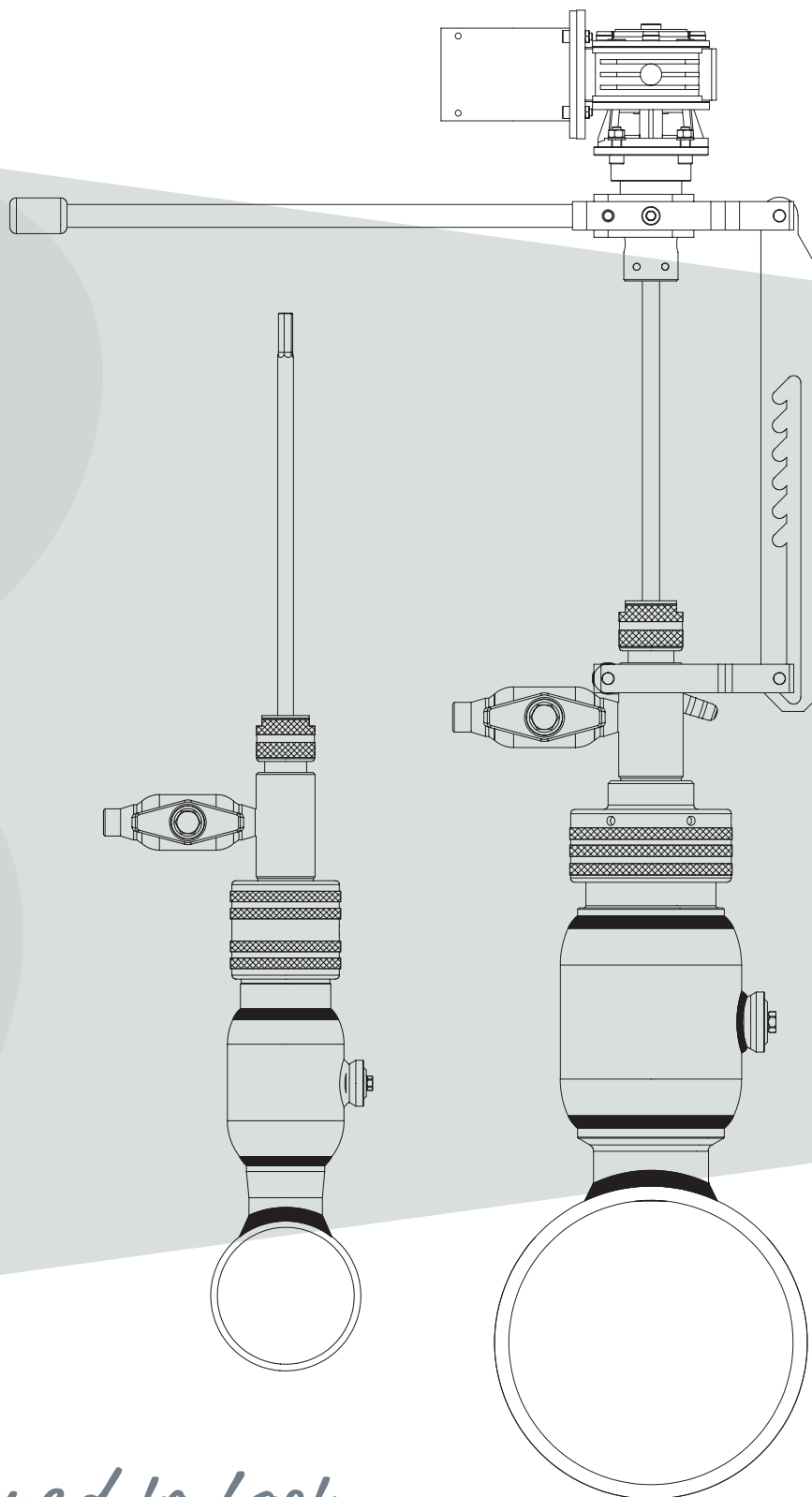


## BROEN BALLOMAX® OPERATING MANUAL

Hot tapping tool DN 15 - DN 100

July 2024



Tutorial



Please note that drilling into district heating systems in operation can be dangerous.

Only trained personnel may be used. They must be familiar with the safety precautions. Ensure that personal protective equipment is worn when carrying out welding and tapping work.

The protective equipment must protect against the dangers of hot surfaces and hot water.



Flushing is conducted during tapping to remove the chips from the system. This requires a drain hose, which must be vapour resistant.

Please always make these operating instructions available to the user!

The BROEN BALLOMAX® hot tapping tool is type-approved and is regular approved by TÜV³ .  
The approval label: TÜV . A . 334 – 21 is stamped on the hot tapping tool |hot tapping unit.

## 1. Application:

The BROEN BALLOMAX® hot tapping tool is for use of hot tapping on closed piping system in operation, which contains a media in fluid group 2 according to the directive of pressure holding equipment. Fluid group 2 comprises all non-flammable media in liquid and gaseous state. The hot tapping valves are not approved for drinking water.

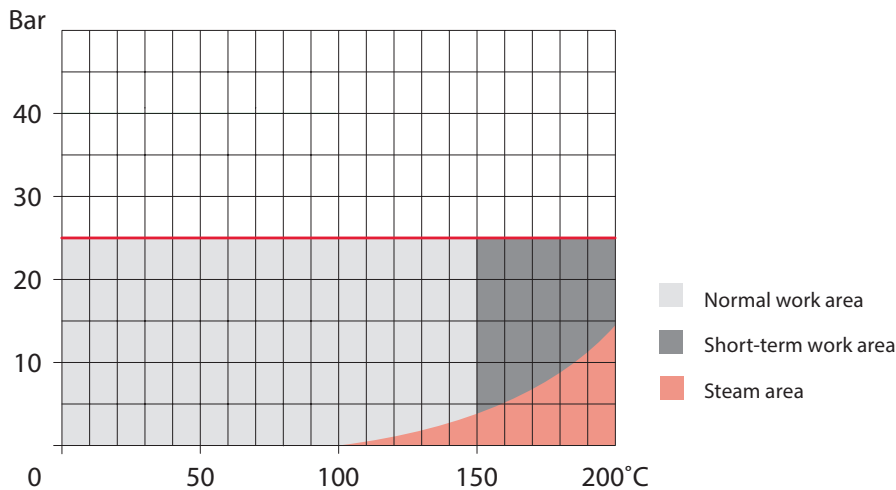
Maximum allowed operating pressure: PS 25 bar

Maximum allowed temperature: TS 200° C

Design data for BROEN BALLOMAX® hot tapping system

Please see the following diagram for the hot tapping valves.

## Pressure and temperature diagram



Pressure - | Temperature – diagrams for the BROEN BALLOMAX® Hot tapping valves should be strictly observed.

Note: The BROEN BALLOMAX® hot tapping valves are not suitable for the steam area.

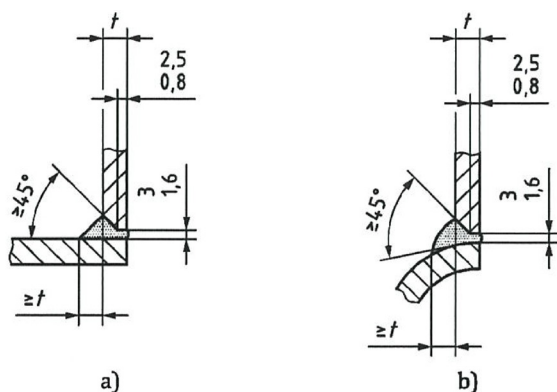
## 2. Preparations:

Prior to the work begins it should be checked that the BROEN BALLOMAX® hot tapping system is functioning correctly. Drills and hole saws are wear parts, which condition has to be evaluated. Exchange these parts early in order to secure a safe hot tapping with a good result.

Defective sealings and gaskets are to be replaced with BROEN original spare parts.

## 3. Preparation of the hot tapping valve:

The BROEN BALLOMAX® hot tapping valves are to be operated before the work begins and following left in fully open position.



1. Source AGFW FW 446.

a) Section X at crotch of right angle branch

b) Section Y at flank of unequal branch.

Ratios of diameters  $\leq 2/3$ .

With the use of a grinding machine the thread less end of the valve is adapted to the radius of the main pipe.

The preparation of the welding is to be carried out according to the specifications FW446 [AGFW]. There should be made a weld seam of at least 45°, as shown on the examples in the drawings.

During the grinding the particles and other foreign material should be avoided to get into the BROEN BALLOMAX® valve.

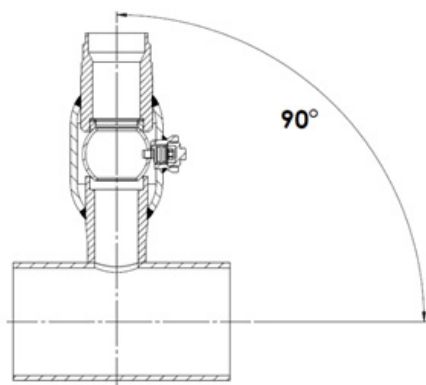


Figure 2

#### 4. Welding of the hot tapping valve:

The hot tapping valve must be in "Open" position before the welding begins. On condition that the valve is 90° in relation to the axis of the piping, the BROEN BALLOMAX® hot tapping valves can be placed in any desired position. There have to be taken into account of the necessary space for operating the valves and assemble and disassemble the BROEN BALLOMAX® hot tapping system. The welding should be executed with manual arc welding or preferable TIG welding according to the AGFW work sheet FW 446.

The welding onto the main piping should be carried out with a closed ball valve.

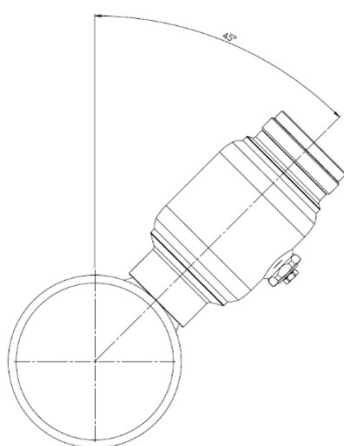


Figure 3

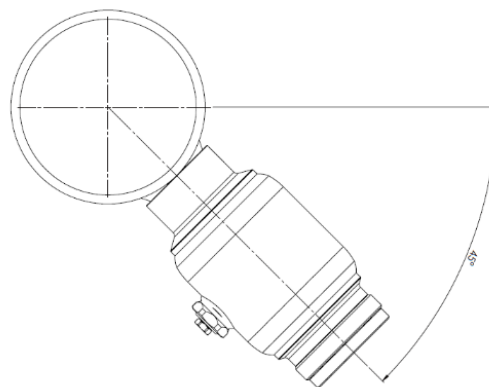






Figure 4

#### 5. Assembly of drillstem:

The complete drill stem is assembled of four parts in relation to the below table.

All parts should be firmly connected – note that the center drill has a flat side on the shaft. The pointed screw should be fasten onto this flat side of the drill shaft.

Please note the possible combination of the separate parts in the table below.

Definition for the following table: Combination of drill stems and the hot tapping unit	
	Recommended combination of the individual parts
	Possible combination of the individual parts
	On these sizes it is not possible the use the hot tapping basic unit TÜV A.334.21!
	The drill stems without thread for hole saws are requiring the hot tapping basic unit TÜV A.334.21!

Combination of drill stems and the hot tapping tools																			
Tools	Vare nr.	Note	DN – reduced bore								DN – full bore								
			20	25	32	40	50	65	80	100	15	20	25	32	40	50	65	80	100
Ø 14 Twist drill with extension	491385		■								■								
Drill stem DN 025 - 050 with thread for hole saw holder and triangle drive – old version	491394	L = 365 mm		■	■	■	■					■	■	■	■				
Drill stem DN 065 - 100 with thread for hole saw holder and triangle drive – old version	497394	L = 430 mm						■	■	■						■	■	■	
Drill stem DN 025 - 050 with thread for hole saw holder and HEX drive 11 mm	491399	L = 365 mm		■	■	■	■					■	■	■	■				
Drill stem DN 065 - 100 with thread for hole saw holder and HEX drive 11 mm	497399	L = 430 mm						■	■	■						■	■	■	
Drill stem up to DN 080 full + reduced bore with internal HEX for hole saw holder and HEX drive 11 mm – version from 12/2022	601263*	L = 440 mm				■	■	■	■	■				■	■	■	■	■	
Drill stem only for DN 100 full bore with internal HEX for hole saw holder and HEX drive 11 mm – version from 12/2022	601266*	L = 520 mm																	■
Hole saw holder DN 020 – DN 032 Med gevind til borestang 491399	491388			■	■	■						■	■	■					
Kopbor holder DN 040 – DN 100 With thread for drill stem 491399	491389						■	■	■	■					■	■	■	■	
Hole saw holder DN 040 – DN 100 With HEX for hole saw holder - version from 12/2022	601264*						■	■	■	■					■	■	■	■	■
Hot tapping tool older versions	491375	TÜV.A.334.xx	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Modified hot tapping tool	491375	TÜV.A.334-21	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
*marked drill stems and holders can only be combined with the hot tapping tool TÜV.A.334-21!																			

Material combination BROEN BALLOMAX® hot tapping system											
Material	DN	15	20	25	32	40	50	65	80	100	
Drill Hole saw Ø	RB	-	14 <sup>1)</sup>	19	24	30	37	48	60	76	
	VB	14 <sup>1)</sup>	19	24	30	37	48	60	76	95	
Thread for adaptor	RB	-	G 7/ 8"	G 1 1/8"	G 1 1/2"	G 1 3/4"	G 2 1/4"	M64 × 2	M76 × 2	M95 × 2	
	VB	G 7/8"	G 1 1/8"	G 1 1/2"	G 1 3/4"	G 2 1/4"		M80 × 2	M95 × 2	M120 × 3	
Hot tapping tool with mounted flush valve								491375 with TÜV marking			DN 65 – DN 100 FB only with Marking: TÜV A.334.21
BROEN Adaptor	RB	-	-	491380	491381	491382	491383	497380	498380	499380	
	VB	-	491380	491381	491382	491383		601066	601067	601068	
BROEN BALLOMAX® Hot tapping valves											
Material	DN	15	20	25	32	40	50	65	80	100	
Type designation	RB	-	68102020	68102025	68102032	68102040	68102050	68102065	68102080	68102100	
Drawing no.			68102020 S746900	68102025 S747000	68102032 S747100	68102040 S747200	68102050 S747300	68102065 S747400	68102080 S747500	68102100 S747600	
Type designation	VB	68602015	68602020	68602025	68602032	68602040	68602050	68602065	68602080	68602100	
Drawing no.		68602015 S748000	68602020 S748100	68602025 S748200	68602032 S748300	68602040 S748400	68602050 S748500	68602065 S748600	68602080 S748700	68602100 S748800	
Welding end main piping	RB t =mm	-	5,4	6,0	6,0	6,9	7,0	7,5	8,0	9,0	
		5,4	6,0	6,0	6,9	7,0	7,5	8,0	9,0	9,0	
Welding end connection	RB+ VB t =mm	2,0	2,3	2,6	2,6	2,6	2,9	2,9	3,2	3,6	
RB = reduced bore   FB = full bore											
Remarks:	Reduced bore hot tapping valve DN 65 up to DN 100 can possibly be combined with the named adaptors.										
Marking of adaptors – example: 491382 DN 40 RB + DN 32 FB											

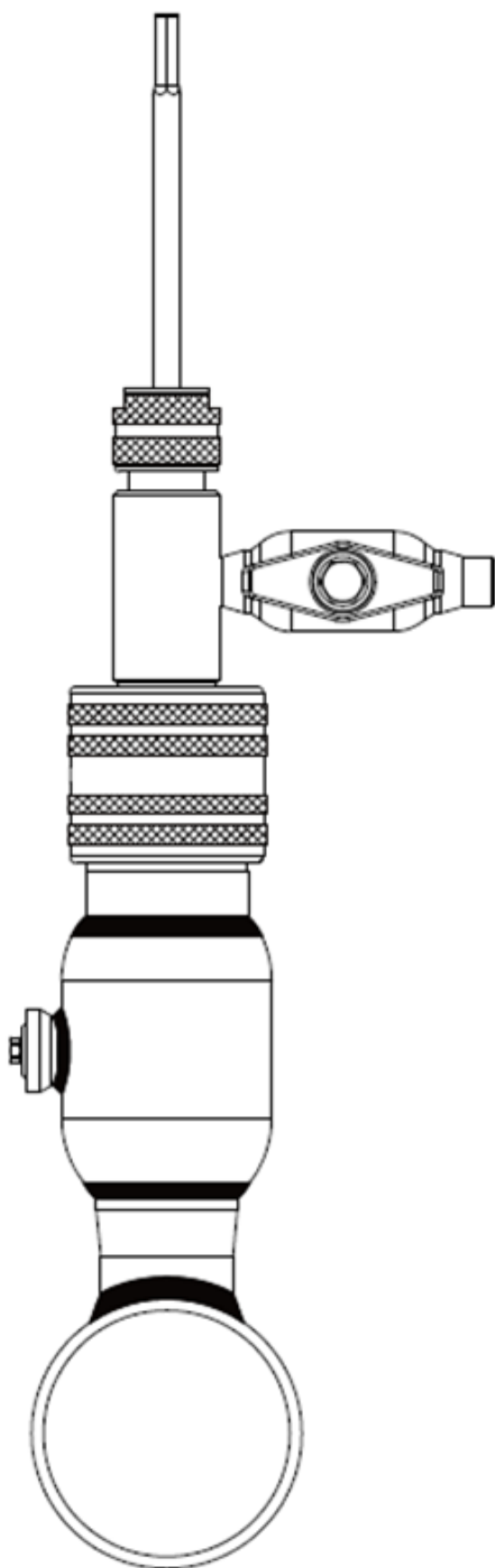


Figure 5

The center drill may only protrude the hole saw with max. 10 mm.

## 6. Assembly of the hot tapping tool:

**Ensure good visibility conditions and safe standing position. Wear proper protection gloves, safety goggles, shoes and clothes to avoid injuries (personal protection equipment). The user manual shows the extent and use of personal protective gear.**

The full assembled drill stem is led into the **fully open** BROEN BALLOMAX® hot tapping valve until it hits the main pipe.

*Tip: If the placement of the hot tapping valve allows it there can be used cutting oil or grease on the drill.*

Now assemble the adaptor that fits the size of the hot tapping valve. The adaptor is tightened by hand without the use of tools.

- **See table above**

The hot tapping basic tool with flush valve is mounted on the adaptor. Now it is time for leak test through the flush valve as described in AGFW Code of practice FW 602. The test is to be carried out before the hot tapping begins. There is performed a pressure test with air at 0,2-0,5 bar with visual inspection for at least one minute. The test is to be documented in the hot tapping protocol.

In case of visible leakage the gaskets of the hot tapping tool should be exchanged with original spare parts.

The leak test also includes the welding from the hot tapping valve to the main pipe. This has to be faultless.

After the leak test is concluded the drilling machine can be mounted onto the drill stem.

For reduced bore valves from DN 65 up to DN 100 and for full bore valves from DN 50 it is necessary to use the reduction gear in order to manage the low revolutions and create the necessary torque for the hole saws.

The reduction gear can also be used when hot tapping with smaller dimensions.

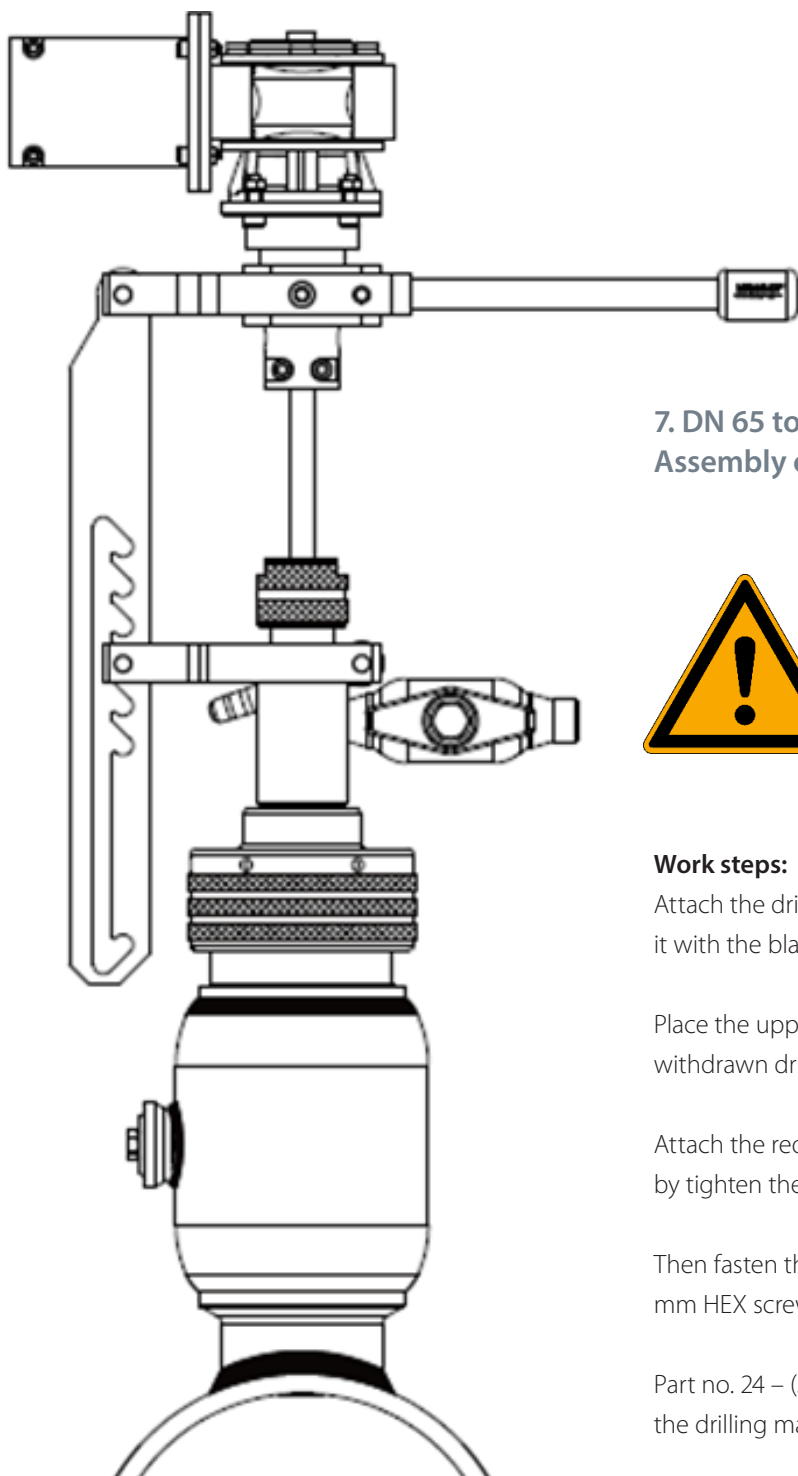


Figure 6

### 7. DN 65 to DN 100 RB + DN 50 – DN 80 FB Assembly of the reduction gear:



**DN 100 Full bore:**  
In this case the assembly is different.  
Please read chapter 8 and 9!

#### Work steps:

Attach the drill column on the hot tapping basic unit and fasten it with the black handle.

Place the upper part of the drill column over the fully withdrawn drill stem.

Attach the reduction gear (7:1) onto the drill stem and fasten it by tighten the 5 mm HEX screws.

Then fasten the reduction gear on the drill column with the 6 mm HEX screw.

Part no. 24 – (300100) conveyor | Adaptor with key is fasten in the drilling machine.

The handle on the drilling column and the drilling machine should point away from each other.

Finally the drilling machine can be fasten with the 4 mm HEX screws in the holder of the reduction gear so it prevents it from accidentally rotate.

Follow the guide for choice of suitable drilling machine



## 8. Different assembly of hot tapping valves DN100 full bore

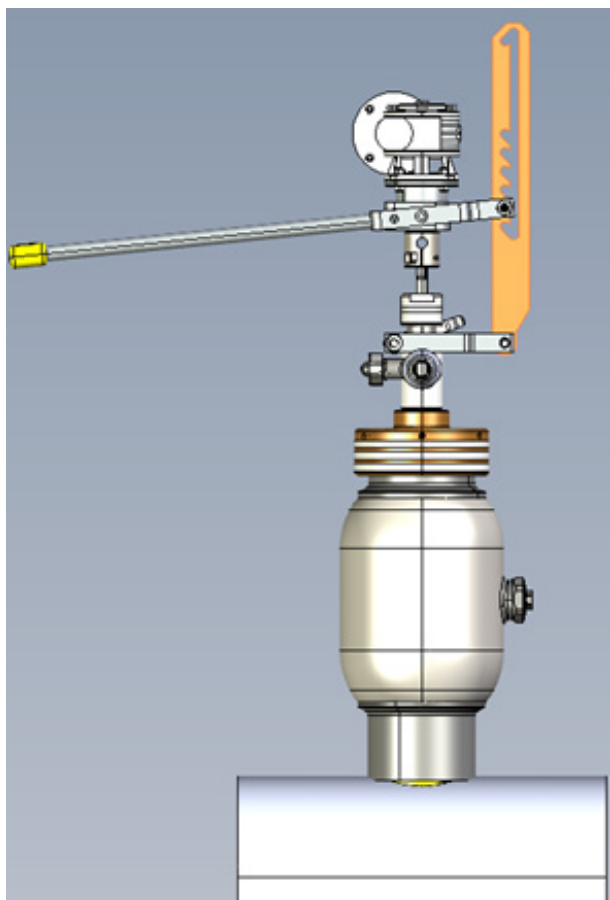


Figure 7

The hot tapping valve has a total length of 367 mm.

For hot tapping with DN100 full bore the drill stem no. 601266 and a total length of 520 mm is to be used together with a hole saw. This drill stem is only for hot tapping with DN100 full bore.

The diameter of house on the hot tapping valve is 178 mm (Drawing no. 68602100S748800).

Resulting from the diameter the drilling column has to be mounted in another position:

**The grate part of the drilling column is mounted 180° opposite, as shown on figure 7.**

Any further assembling processes are to be done like earlier described.



The hot tapping valve can't + shouldn't be closed now.  
The length of the drill stem now prevents the valve to be operated!  
Please note the following page.

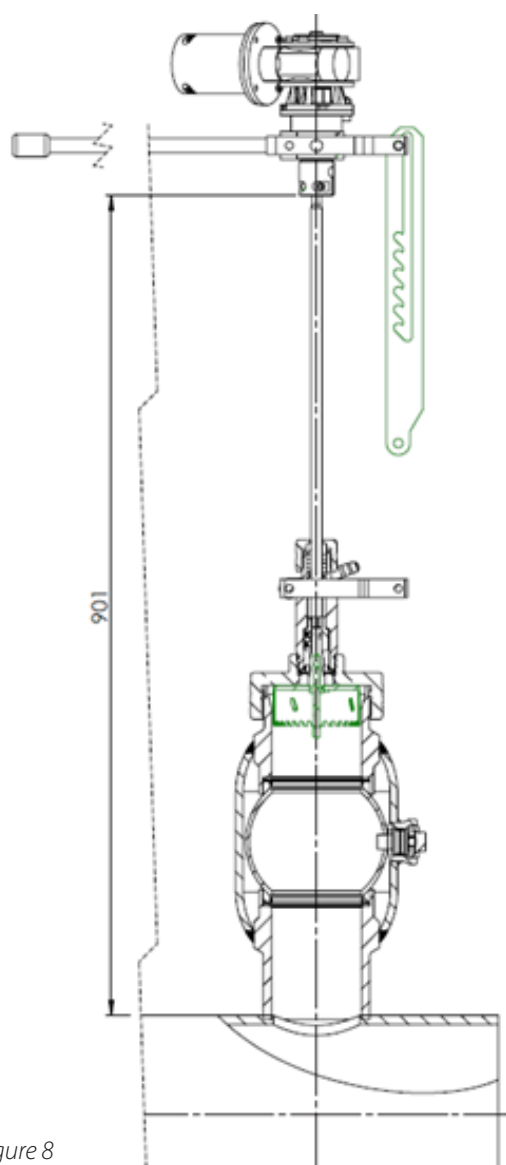


Figure 8

## 9. Different assembly of the hot tapping valves DN100 full bore



The length of 520 mm of the drill stem makes it necessary to loosen the grate part from the drilling column.

**Only then it is possible to withdraw the drill stem enough so it is possible to operate the ball in the hot tapping valve.**

## 10. Requirement for the drilling machine:

The drilling machine should have the possibility for adjusting the revolutions and have an electric power of 1300 watt. The machine has to be CE-marked.

These machines have proven their worth in practice: Bosch - GSB 21-2 RCT Professional | Metabo - SBE 1300

## 11. Revolutions / Speeds

The revolutions of the drill and hole saw should not be exceeded.



**Low revolutions and low pressure ensure small cuttings during the hot tapping.**

Small cuttings can be led away via the flushing hose.

Big cuttings and spiral chips can damage the hot tapping valve during operation.

The allowed revolutions and settings of the stated drilling machines are shown in the table on the next page:

**Table of revolutions BROEN BALLOMAX® Hot tapping system – Hot tapping valves**  
 The required revolutions depends on the diameter of the used hole saw  
 Perform the hot tapping with moderat pressure + don't exceed the required revolutiones.

Drill <sup>1)</sup> Hole saw Ø	mm	Ø 14 <sup>1)</sup>	Ø 19	Ø 24	Ø 30	Ø 37	Ø 48	Ø 60	Ø 76	Ø 95
Max Revolutions	rpm	400	450	350	250	200	180	150	120	90
Setting of drilling machines, that have proven their worth in practice:										
Bosch GSB 21-2 RCT	Direct	1. G   II   2	1. G   I   6	1. G   I   4	1. G   I   4	1. G   I   4	Perform hot tapping with reduction gear			
Bosch GSB 21-2 RCT	With gear	2. G   III   5	2. G   II   6	2. G   II   6	2. G   II   4	2. G   II   2	2. G   II   2	1. G   III   5	1. G   III   5	1. G   III   4
Metabo SBEV 1300-2	Direct	1. G   2	1. G   2	1. G   2	1. G   1	1. G   1	Perform hot tapping with reduction gear			
Metabo SBEV 1300-2	With gear	2. G   5	2. G   5	2. G   4	2. G   3	2. G   2	1. G   5	1. G   3	1. G   1	1. G   1
		Revolutions setting: Metabo SBEV 1300-2						Revolutions setting: Bosch GSB 21-2 RCT		
										
Remarks:	rpm = revolutions per minute									
	Direct means that the drilling machine is mounted directly on the drill stem.									
	The reduction gear can be used with all diameters, but have to be used from Ø 48.									
	The reduction gear has a 7:1 ratio which increases the torque of the drilling machine.									
	With the use of the reduction gear the drilling machine is protected and can be used with higher revolutions.									

## 12. Demands for the flushing hose:

The flushing hose should as minimum be designed for the actual service conditions of the pipeline.



If the media is hotter than 90°C, the flushing hose should also be suitable for steam!

If steam is formed the visibility of the traffic can be reduced!

Take care that no people or animals can be endangered.

**The discharging end of the flushing hose should be fasten securely.**

If necessary the floating district heating water can be mixed with cold water.

Remarks and demands for the flushing hoses according to AGFW Arbeitsblatt FW 427 should be kept.

## 13. The execution of hot tapping:

Use cutting oil for the hot tapping process – it makes the job much easier.

Before the hot tapping begins, it should be checked that the center drill on the drill stem doesn't prevent the closing of the ball. The complete drill stem is withdrawn to the endstop and then the ball is carefully operated. The center drill needs to be re-adjusted if it prevents the movement of the ball.

After this check the drill stem is pushed forward to the main piping. The revolutions of the drilling machine are pre-set in relation to the table above and it is electrically connected via a safety transformer.

## 14. The execution of hot tapping:

The flush valve on the hot tapping unit has to be open during all the work. The media, that comes out will be led away through the flushing hose.

Now follows two different working processes: the drill goes through the main pipe and media flushes out through the hot tapping tool. The hole saw is placed carefully on the main pipe – when drilling there should be applied a light pressure on the tool.

Make sure that the hole saw is entered a little into the main pipe and that the small hole plate is cut completely out. Then withdraw the drill stem with a light rotating movement until it reaches the endstop.

When the drill stem is withdrawn completely after the hot tapping process is finished, the hot tapping valve is moved to the position "closed" with a tool. Check at the discharge end of the flushing hose that the hot tapping valve is shut tight. When no more media is coming out, the flushing valve is closed.

The flushing hose is detached – be aware of water running back from the flushing hoser!



After dismantling the flushing hose, the flushing valve is carefully opened in order to make the hot tapping tool pressure free.

Only when no water is coming out of the flushing valve, the dismantling of the hot tapping tool can begin.

## 15. Completion of hot tapping:

The hot tapping tool is dismantled. The cut out hole plate is removed from the hole saw. Wearing parts (drill and hole saw) and gaskets are checked and if necessary replaced. After that the work can continue with the next hot tapping.

Store the tool dry – in this way you can have use of the BROEN BALLOMAX® hot tapping system in the future.

## 16. Pipe connection | Commissioning:

Connection ends and pipe connections are preferably welded with TIG welding or manual arc welding. This also applies for the welding of the plug on the hot tapping valve. Gas welding should not be used.

Overheating of the valve should be avoided.

Underground fully welded systems are the newest technical level.

We recommend that the plug is welded after commissioning of the connected pipeline.

Alternatively there can after a written agreement with the operator be used LOCTITE® 577 [medium strength for metallic thread sealing – range of application: -55°C to +150°C].

**Do not hesitate to contact us if there are any question.**

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In relation to the notification about health and safety on the work place the hot tapping system should be checked regularly. The inspection should be done at least once a year.

A detailed inspection and check list is included in the documentation.

By checking the gaskets of the hot tapping tool, the following information should be kept in order to avoid leakage at the drill stem.

**Only use BROEN spare parts for maintenance.**

Details about the gaskets in relation to the drawings below:

**Union nut 491 377**

Design of gaskets for drill stem bushing:

Bushing elements until 2016			Bushing elements since April 2016		
Item no.	Number	Description	Item no.	Number	Description
Not included			492 378	1 pce	Bearing ring brass
491 379	3 pce	Seal ring	491 379	3 pce	Seal ring
491 378	1 pce	Bearing ring brass	491 378	1 pce	Bearing ring brass
491 377	1 pce	Union nut	491 377	1 pce	Union nut

Nr.	68 501 015 000 BROEN Hot tapping system	Description	BROEN Nr.
<b>Spare part list for DN15 - DN50 FB / RB from January 2023.</b>			
1	Drill Ø14 with drill stem.		491385
2	Drill stem with thread for hole saw 491388   491389	Length ca. 365 mm	491399
3	Holder with thread for hole saw	Ø 19, Ø 24 + Ø 30 mm	491388
4	Drill stem for hole saw with drill holder 601264	Length ca. 440 mm to DN 80	601263
5	Holder with hexagon for hole saws	Ø 37 mm, Ø 48, Ø 60, Ø 76 + Ø 95 mm	601264
	<b>NOTE: 601263, 601266 + 601264 can only be used together with hot tapping unit TÜV A.334.21.</b>		
6	HSS Hole saw Ø 19 mm		100845
7	HSS Hole saw Ø 24 mm		100846
8	HSS Hole saw Ø 30 mm		100847
9	HSS Hole saw Ø 37 mm		100848
10	HSS Hole saw Ø 48 mm		100940
11	Centre drill Ø 6,4 mm		100842
12	BROEN Centre drill Ø7mm with jumpring		601246
13	Adaptor for DN25RB + DN20FB		491380
14	Adaptor for DN32RB + DN25FB		491381
15	Adaptor for DN40RB + DN32FB		491382
16	Adaptor for DN50RB + DN40FB		491383
17	Test cap		491384
18	Test cap with pressure gauge and pump		68 400 015
19	Hot tapping unit	Labelled TÜV A.334.21	491375
20	Packings 3 pcs	For hot tapping unit 491375	491379S
21	Pressure ring drill stem stuffing box	For hot tapping unit 491375	491378
22	Bushing from 04/2016 for hot tapping unit TÜV A.334.21	For hot tapping unit 491375	492378
23	Coupling for drill stem stuffing box	For hot tapping unit 491375	491377
24	Hook spanner Ø 6 mm		100841
25	Fork spanner SW 24 mm		300091
26	Fork spanner SW 11 mm	for holderr 491388	300090
27	O-ring Ø 31 x 3 mm	For hot tapping unit 491375	100824
28	O-ring Ø 37,2 x 3 mm	For hot tapping unit 491375	100825
29	O-ring Ø 39 x 3 mm	for adaptor 491380	100820
30	O-ring Ø 50,39 x 3,53 mm	for adaptor 491381	600124
31	O-ring Ø 55 x 4 mm	for adaptor 491382	100821
32	O-ring Ø 68 x 4 mm	for adaptor 491383	100822
33	Hexagon key 1/8"	for hole saw holder / centre drill	500147
34	Hexagon key 3 mm	for drill stem 601263	601336
35	BROEN BALLOMAX® Users manual		
36	Case with foam insert	DN 15 - DN 50 VD + RD	601353H

Nr.	68 501 065 000 BROEN Hot tapping system	Description	BROEN Nr.
<b>Spare part list for DN65-DN100 FB   RB from January 2023</b>			
4	Drill stem for hole saw holder 601264	Length app. 440mm up to DN80	601263
37	Drill stem for hole saw holder 601264	Length app. 520mm only for DN100FB	601266
5	Holder with hexagon for hole saws	Ø 37, Ø 48, Ø 60, Ø 76 + Ø 95 mm	601264
	<b>NOTE: 601263, 601266 + 601264 cab only be used with hot tapping unit TÜV A.334.21</b>		
38	HSS Hole saw Ø 48 mm		100940
39	HSS Hole saw Ø 60 mm		100941
40	HSS Hole saw Ø 76 mm		100942
41	HSS Hole saw Ø 95 mm		601275
42	Adaptor for DN65RB + FB		601066
43	Adaptor for DN80RB + FB		601067
44	Adaptor for DN100RB + FB		601068
45	Reductions-gear 7:1		100943
46	Adaptor for gear - drilling machine	Connection with key	300100
19	Hot tapping unit	Label TÜV A.334.21	491375
47	Attachment unit		100944
48	O-ring Ø 80 x 4 mm	for adaptor 601066	500690
49	O-ring Ø 88 x 4 mm	for adaptor 601067	601087
50	O-ring Ø 114 x 4 mm	for adaptor 601068	601088
51	O-ring Ø 62 x 4 mm until 11/2022	for adaptor 497380	100931
52	O-ring Ø 75 x 4 mm until 11/2022	for adaptor 498380	100932
53	O-ring Ø 100 x 4 mm until 11/2022	for adaptor 499380	100933
54	Hexagon key 1/8"	for hole saw holder	500147
34	Hexagon key 3 mm	for drill stem 601263 + 601266	601336
55	Hexagon key 4 mm	for gear mounting	100959
56	Hexagon key 5 mm	for gear mounting	100960
57	Hexagon key 6 mm	for gear mounting	100961
35	BROEN BALLOMAX® Users manual		
58	Case with foam insert	DN 65 - DN 100 FB + RB	601352H

# *Our brand is our promise*

# **BROEN**

VALVE TECHNOLOGIES

## **BROEN VALVE TECHNOLOGIES**

BROEN is a leading international manufacturer of valve technology and we operate on three continents across the world with key markets in Europe, China and USA.

For more than 75 years BROEN has been the global leader in the development and production of valve technology for the control of water, air and gas. BROEN delivers complete solutions for HVAC building installations and is a leading supplier of district energy valves and valve technology for natural gas.

We know application and valve technology in depth and in close dialogue with our customers and partners all over the world we create value and reliability with proven valves offering full quality assurance.

BROEN is headquartered in Assens, Denmark and is part of Aalberts N.V. listed on the EuroNext Stock Exchange (NL).

Read more at: [www.broen.com](http://www.broen.com)

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