



DRILLING MACHINE FOR UNDER PRESSURE MAINS MODEL *AcuDriII Plus*

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NOTES !

The modifications carried out against the previous revision of this publication are indicated with || on the right margin.

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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

The **AcuDrill Plus** drilling machine is especially designed to drill on mains, under pressure or pressureless, on any type of material: gray-iron casting, ductile casting, PVC, PE, PP, asbestos cement, polyester, clay, steel, etc. For drilling mains under pressure, the maximum allowable pressure is 16 bar (for water mains). It is specially designed to be used over:

- **All kind of DIN flanged branch connections:**

T-clamps with flange connection (such as the Acuster's **ARH** branch T-clamp), or any clamp or fitting with flange connection.

The available flange adapters for the drilling machine go from DN65 up to DN200 (PN10/PN16).

This option allows holes of up to 177 mm diameter to be drilled, using standard hole saws (of high-speed steel, tungsten carbide, etc), long series hole saws (according to the pipe wall thickness to be drilled) or hole saws for plastics (PE, PVC, PP) and coupon retainer-equipped pilot drill.

- **Threaded outlet saddles:**

Also it is used to drill over any saddle or ferrule with threaded outlets of 2", 2½" and 3" BSP. It allows holes from 32 up to 76 mm diameter to be drilled, using standard hole saws (of high-speed steel, tungsten carbide, etc), long series hole saws (according to the pipe wall thickness to be drilled) or hole saws for plastics (PE, PVC, PP) and coupon retainer-equipped pilot drill.

The assembly of the different drilling accessories to the drilling machine is done by means of a flange which is provided with lossless anchoring screws and a venting valve for depressurizing and pressurizing test operations. The assembly to the threaded outlet saddles is achieved by a 3" threaded dome on which the three possible thread adapters ((2", 2½" and 3" BSP) are fitted to. In case of fitting the flange adapters to the drilling machine, the smallest flange adapter of DN65 / DN80 is directly screwed in the 3" dome whereas the rest of flange adapters (DN100 / DN125, DN150 and DN200) are directly fitted on the drilling machine mounting flange.

The size range of hole saws are mounted on a modified universal arbor which is installed and removed from the chuckshaft without any threaded connection, just using an anchoring locking pin. The hole saw arbor is provided with a 6.35 mm pilot drill with coupon retainer (on the first units the pilot drill was of diameter 9 mm). Depending on the hole saw diameter, a transmission disc must be used which is supplied separately.

The chuckshaft can be fixed in four different positions according to the position of the accessories to be drilled. Its length allows it to drill through valves of sizes up to DN200 (short series), assembled on the corresponding pipeline flanged T-clamp.

The machine is equipped with an absorbing mechanism that ensures a soft and regular operation system of the drill and hole saw over the pipe during drilling, absorbing excessive feed that could lead to blocking of the hole saw, allowing continuous drilling. It can be operated manually by means of a ratchet wrench, although it is designed to be used through a swivel gear with an electric actuator.

The basic set includes the machine body with its chuckshaft, a 3" dome, a modified universal hole saw arbor with pilot drill (with coupon retainer system), a 3/4" ratchet wrench, in addition to carrying case with *User Manual*. The rest of components and accessories are supplied separately although on the carrying case foam the necessary rooms to locate the 80-120 mm hinged pin key, the three threaded adapters, the DN65/DN80 flange adapter, the plug carrier and the adapter for the electric actuator are already prepared. The remaining three flange adapters are supplied with its own package.

The technical information provided in this *Manual* is purely informative, and subject to change without prior notification. ACUSTER GLOBAL, S.L. shall not be responsible for any claims derived from misuse of this publication or any errors and/or omissions that could be detected in it following its publication.

1.2 GENERAL INFORMATION

The development, documentation, production, testing and shipping of the products described have been performed:

- in compliance with the applicable safety rules, and
- in accordance with the Acuster Global, S.L. quality assurance requirements.



WARNING !
Only qualified personnel are authorized to perform drilling work with the AcuDrill Plus drilling machine. Qualified personnel must be familiar with all safety measures, potential hazards and maintenance rules described in this <i>Manual</i> .
The safe usage of the products described herein requires appropriate transport, storage, installation and use, careful treatment and compliance with the pre-established regular maintenance.

1.3 "CE" DECLARATION OF CONFORMITY



ACUSTER GLOBAL, S.L.
Ctra. Montcada, 608
08223 Terrassa (Barcelona)
SPAIN

we declare, under our sole responsibility that the **AcuDrill Plus** drilling machine has been manufactured in compliance with the following specifications:

Directive	Related specification	Model
2006/42/CE <i>Machine safety Directive</i>	EN-ISO 12100 EN 60204-1	<i>AcuDrill</i>

Sant Just Desvern, 3rd September 2007



Jaume Puig
General Manager

1.4 GUARANTEE**Guarantee declaration:**

All **AcuDrill Plus** drilling machines are manufactured from high quality material and have been subjected to rigorous tests for resistance and working order as well as passing all the quality control tests required by the applicable normative (see "CE" Declaration of conformity).

Regardless of whether an incident might occur during the period of guarantee, we recommend a careful reading of the following general guarantee conditions.

General conditions of Guarantee:

1. ACUSTER GLOBAL, S.L. guarantees that this product has no manufacturing defect at the time of its purchase and extends this guarantee for the period of TWO years.
2. If the product proves defective during this period, due to the materials or its assembly, it will be repaired free of charge, including the cost of materials and labour at Acuster Global, S.L.'s Technical Service.
3. The Guarantee is not valid in the following cases:

When the fault in the product is a result of:
 - Usual wear and tear due to usage.
 - Abuse or incorrect use of the unit
 - Repairs carried out without authority from Acuster Global, S.L..
 - Accidents, natural disasters (including lightning, water action etc) as well as any cause beyond Acuster Global, S.L.'s control.
4. In all claims against this guarantee, information relating to the model, date of purchase, Serial number and any other additional information must at all times be stated.

CHAPTER 2: MACHINE DESCRIPTION

2.1 COMPONENTS OF THE DRILLING MACHINE

The **AcuDrill Plus** drilling machine assembly is made of the following components:

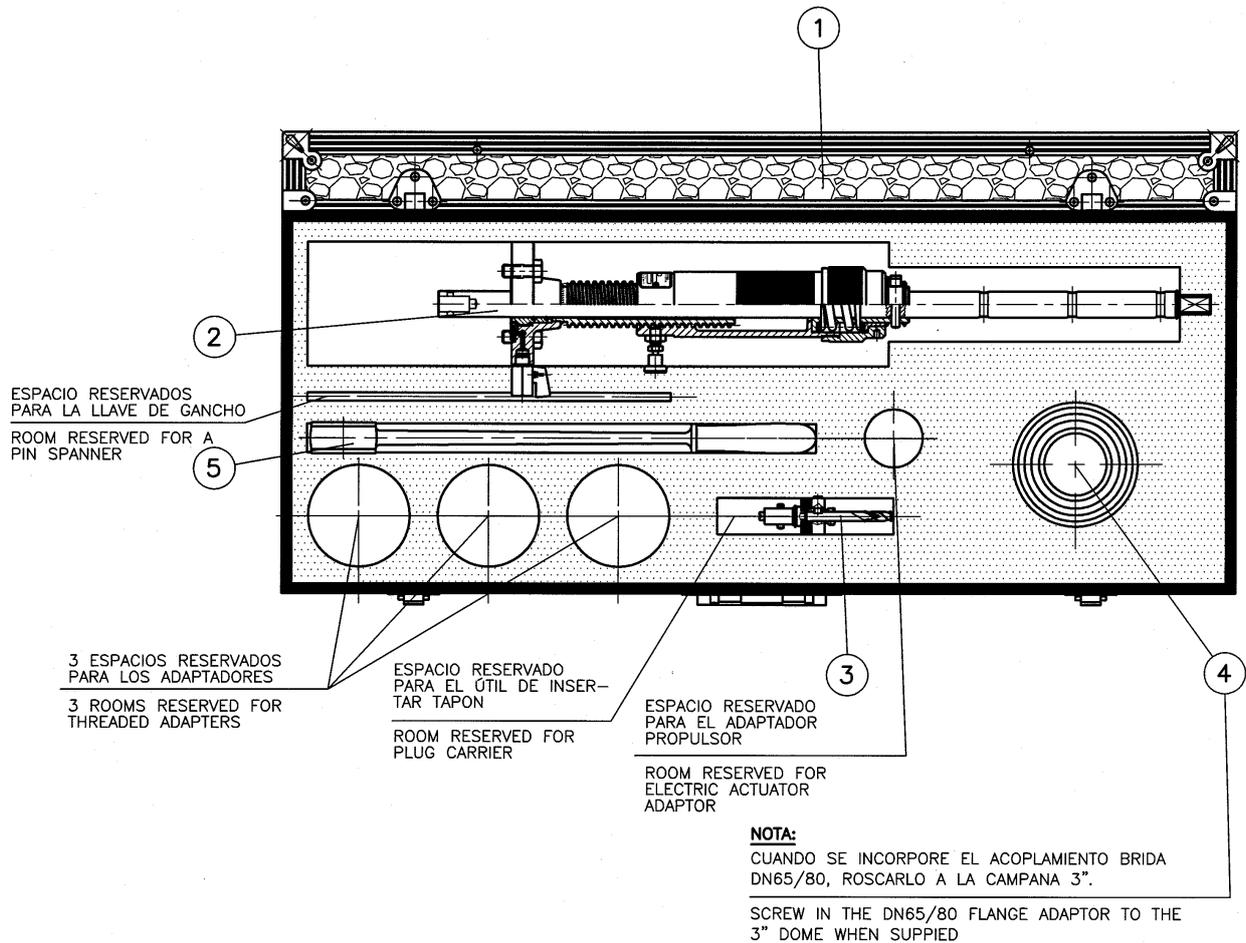


Figure 1

- | | |
|---|---|
| 1 | Carrying case with die cut foam |
| 2 | Drilling machine |
| 3 | Modified universal hole saw arbor (≥ 32 mm) with pilot drill with coupon retainer |
| 4 | 3" dome |
| 5 | 3/4" ratchet wrench |

Main parts of the **AcuDrill Plus** drilling machine:

- 1 Connecting flange with spindle
Includes four lossless screws and a front o-ring for the 3" dome and flange adapters tightness.
- 2 Venting valve
PN16 valve for depressurizing and pressurizing test operations.
- 3 Machine body
Includes end travel mechanism and absorbing mechanism to optimize drilling power.
- 4 **CE** identification plate
Marking pursuant to Machinery Safety Directive.
- 5 End travel mechanism
Blocks the machine's end travel but allows a manual release through the retractable handle.
- 6 Chuckshaft
Features four fastening openings to select the most appropriate length for drilling.
- 7 Absorbing mechanism
Assembly which includes the absorbing mechanism.
- 8 Chuckshaft fastening mechanism
This allows quick and safe fastening of the chuckshaft to the fastening bush. In case of carrying out an automatic drilling through an electric actuator, this fastening mechanism should be replaced by an adapter.

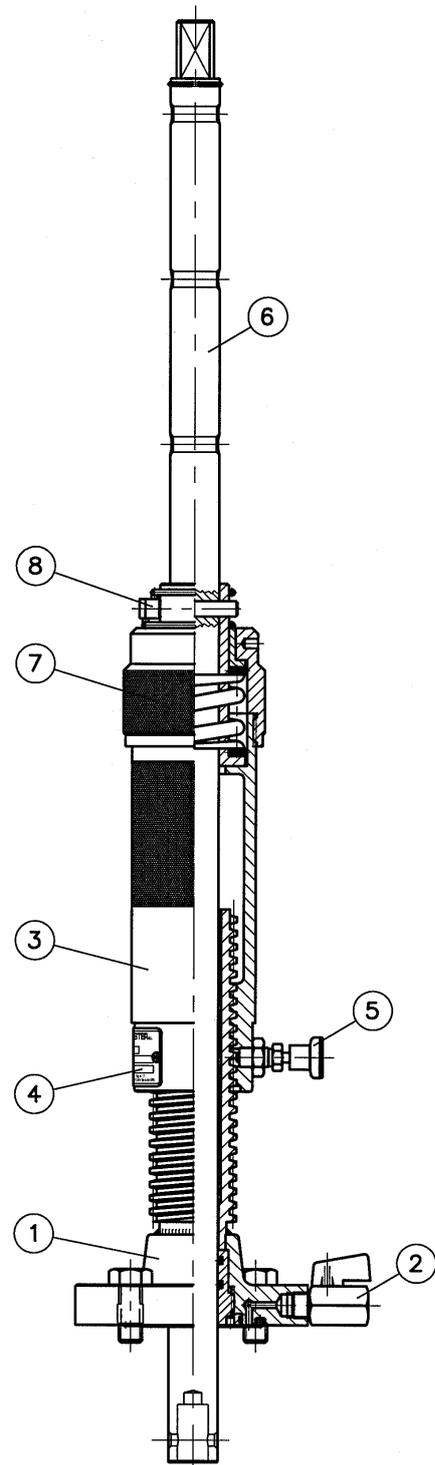


Figure 2

2.2 MACHINE ACCESSORIES

The **AcuDrill Plus** drilling machine also features the following accessories:

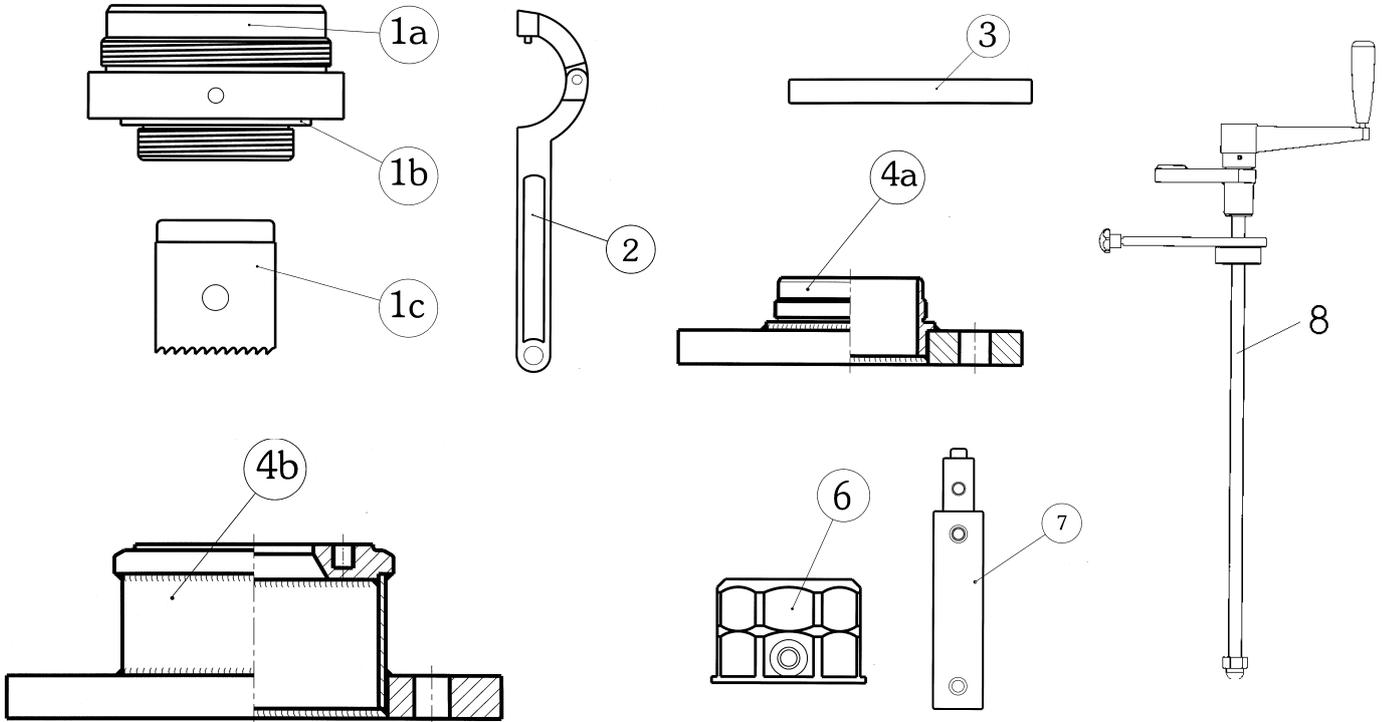


Figure 3

- 1** Saddle adapter kit on three different sizes: 2", 2½" y 3".
 - 1a** Saddle adapter.
 - 1b** Gasket (metal-rubber washer for 2" adapter and o-ring for 2½" and 3" adapters).
 - 1c** Variable pitch hole saws of 46, 60 and 76 mm, respectively.
In addition to the hole saws sizes indicated above, other optional sizes can be ordered.
There are special hole saws for drilling PE pipes.
For additional information, refer to clause 2.3 of this *Manual*.
- 2** 80-120 mm hinged pin key.
- 3** Hole saw transmission discs.
For hole saws from 76 to 105 mm.
For hole saws from 108 to 152 mm.
- 4** Flange adapters of PN10/PN16.
 - 4a** DN65/DN80 > Threaded connection to the 3" dome.
 - 4b** DN100/DN125, DN150 and DN200 > Screwed in the machine flange
- 5** Plug carrier, 19 mm squared size.
- 6** Adapter for electric actuator.
- 7** Chuckshaft extension (it provides an additional length of 100 mm).
- 8** Shaft retention tool.

2.3 HOLE SAW DIAMETERS AND CHARACTERISTICS FOR ACUDRILL & ACUDRILL PLUS

ADAPTER SIZE	ADAPTER INSIDE DIAMETER	HOLE SAW DIAMETER (MAX*)			APPLICATION
		Bi-metal HSS	Tungsten Carbide Grit	For plastic pipes	
3/4"	20	19	19	19	AcuDrill
1"	24,5	22	22	22	AcuDrill
1¼"	32,5	30	29	30	AcuDrill
1½"	37,5	33	32	35	AcuDrill
2"	49	46	44	48	AcuDrill+Acudrill Plus
2½"	65	60	60	60	AcuDrill Plus
3"	78	76	76	76	AcuDrill Plus
DN65/80	78	60 / 76	60 / 76	62/76	AcuDrill Plus
DN100/125	125,8	95 / 121	95 / 121	98/114	AcuDrill Plus
DN150	160,3	146	146	146	AcuDrill Plus
DN200	184,7	177	152	160	AcuDrill Plus
GENERAL CHARACTERISTICS					
	<p><u>Bi-metal HSS:</u> Hole saw made of speed steel type M3. Sizes: from 14 to 210 mm; cutting depth of 35 mm. Long series: request information (cutting depth of 48 mm). Application: standard pipelines made of ductile iron, steel and asbestos cement.</p>				
	<p><u>Tungsten carbide:</u> Hole saw made from tungsten carbide tooth welded on a solid body of special steel. Sizes: from 19 to 152 mm; cutting depth of 38 mm. Application: pipelines made of ductile iron and steel.</p>				
	<p><u>For plastic pipes:</u> Hole saw made of tungsten carbide tooth welded on a sheet body. Sizes: from 16 to 210 mm; cutting depth of 50-55 mm. Application: plastic pipelines, such as PE, PP, PVC, etc.</p>				
<p>(MAX*) The indicated hole saw diameter is the one recommended based on:</p> <ul style="list-style-type: none"> • Available diameters according to the hole saw supplier. • Maximum diameter depending on the drilling machine adapter used. • Maximum diameter depending on the saddle, T-clamp, valve (full bore), connecting accessories, etc., of the DN used. 					

CHAPTER 3: MODE OF OPERATION

3.1 MACHINE APPLICATION LAYOUT

The **AcuDrill Plus** drilling machine can be operated in accordance with the following combinations:

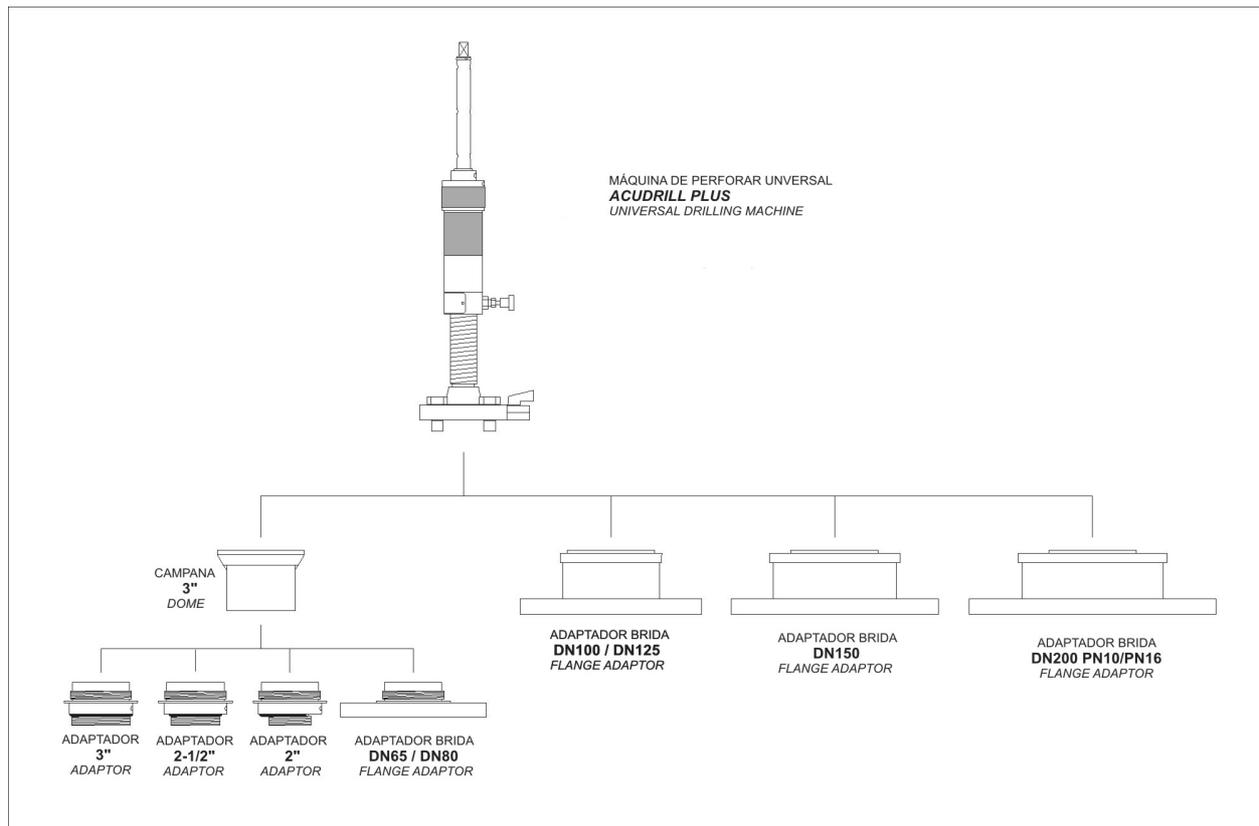


Figure 4

3.2 DRILLING UNDER PRESSURE OVER FLANGED T-CLAMP: APPLICATION EXAMPLE USING AN ACUSTER'S **ARH** FLANGE CONNECTION (DIN DN80 & DN100 FLANGE)

3.2.1 **Initial operations:**

Before performing the drilling operations, ensure that you have all the necessary material and that it is in good condition:

- Complete drilling machine.
- Modified universal hole saw arbor (with pilot drill installed).
- Chuckshaft extension (only for very long T-clamps neck: see information below).
- Hole saw of diameter to be used (plus transmission disc for diameter ≥ 76 mm).
- Flange adapter: DN80 or DN100 for **ARH** (DN according to the valve to be installed).
- Flat gaskets for DN80 or DN100 (according to the valve to be installed).
- Full bore flange-connection gate valve of DN80 or DN100 (according to branch).
- Shaft retaining tool (if required).
- Tools: flat screwdriver, open-end spanners of 19 and 24 mm, 3/4" ratchet wrench (manual drilling) and electric actuator with its chuckshaft adapter (if applicable).

3.2.2 **Branch connection installation:**

The installation of the Acuster's **ARH** clamp or equivalent is performed placing the saddle with its rubber gasket on the pipe (on **ARH**'s the gasket is factory glued to the saddle). Next, fasten the clamp between the saddle and mains (the hinge joints should remain above the saddle), equally tightening the fastening bolts to ensure tightness.



For more information, refer to Fitting Instructions included with the accessory.

3.2.3 **Assembly of the valve:**

Install the full bore flange-connection gate valve. Screw it over the flange branch connection previously installed on the line. Use the flat gasket of the proper size.

Leave the gate valve in the fully OPEN position.

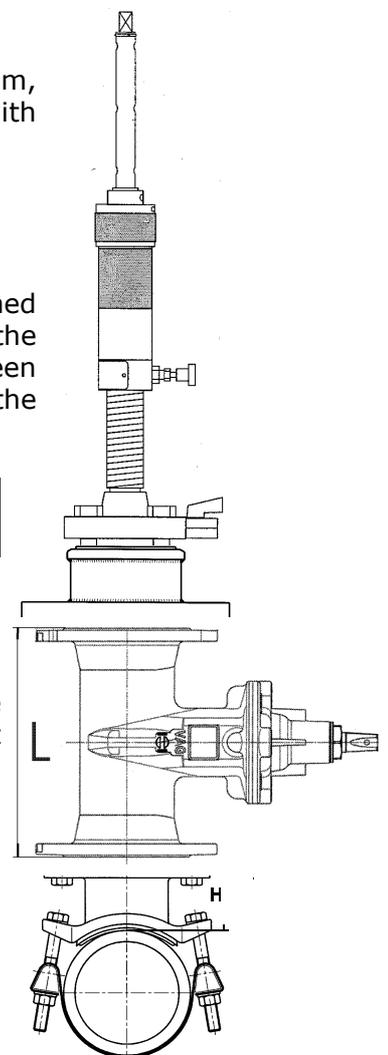


Figure 5



INFORMATION ABOUT VALVE INSTALLATION !	
Saddle of flanged T-clamp: Depending on the dimension H of the saddle, the shaft extension shall be necessary to be used: H ≤ 120 mm: <i>without shaft extension.</i> H > 120 ≤ 220 mm: <i>with shaft extension.</i>	
Gate valve: Depending on the DN used, the dimension L could be different. Side-to-side flange dimension according to EN 1092-1 for a gate valve VAG EKO PLUS or equivalent:	
DN	SHORT SERIES (F4)
65	170 mm
80	180 mm
100	190 mm
125	200 mm
150	210 mm
200	230 mm

3.2.4 Assembly of the drilling machine:

- Choose the flange adapter which matches the valve flange size installed on the branch connection. Refer to *Figure 6*.
 - > Valve with DN80 flange: install the 3" dome and the DN65/DN80 flange adapter.
 - > Valve with DN100 flange: install the DN100/DN125 flange adapter directly on the drilling machine flange.
- Set up the modified universal hole saw arbor with the pilot drill in the chuckshaft.



This step is carried out just the first time of machine operation or when using the shaft extension. Normally the hole saw arbor keeps always installed in the chuckshaft: *it is not necessary to disassembly it when the drilling is completed.* So, for normal routine applications the assembly of the hole saw corresponding to the diameter to be drilled would be the standard procedure.

Screw the hole saw matching the size outlet of the branch connection into the hole saw arbor. For hole saws from 76 mm diameter a transmission disc must be used. See *Figure 7*.

- Place the body of the machine in its upper position (unscrew it until the end travel mechanism is released).
- Now assemble the **AcuDrill Plus** drilling machine onto the valve. Install the gasket of the corresponding size. See *Figure 5*.
- Select the position of the chuckshaft depending on the distance it will have to travel during drilling (on the current example: **ARH** clamp + gate valve), placing the retention mechanism in the most appropriate opening of the four located on the shaft (locking pin or actuator's adapter, according to the operation mode used). See *Figure 8*.

Slid the chuckshaft downwards till the pilot drill touches the pipe. Then move the chuckshaft upwards to fit the retention mechanism in the closest shaft opening.

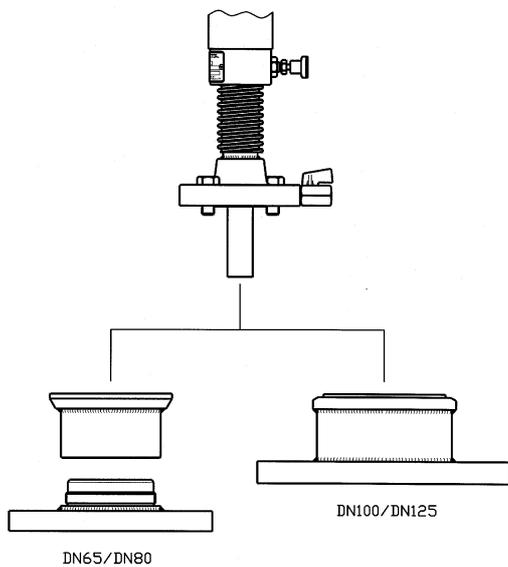


Figure 6

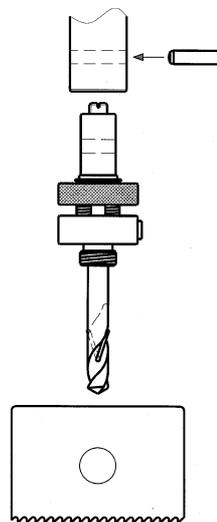


Figure 7

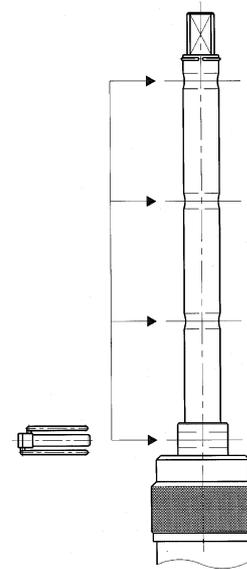


Figure 8

3.2.5 Pressure test:

Once the drilling machine set and accessories are installed on the valve, perform a pressure test.

To do so, apply compressed air through the venting valve to check tightness of the assembly (see Figure 9).

Once the interior is pressurized, and with the venting valve closed, check for leaks in the connected parts and their gaskets using a spray detector or soapy water. Correct in case of leaks. Once the check is complete, open the venting valve to depressurize, then leaving it in the "closed" position.

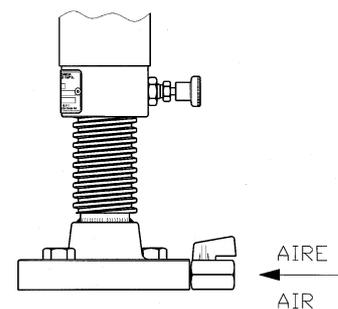


Figure 9

3.2.6 Drilling the mains:

Once the pressure test is complete, lower the chuckshaft by rotating the machine body (with your hand in the knurled area), until the pilot drill makes contact with the pipe (the chuckshaft will have risen depending on the contact force: see dimension **a** of Figure 10).

At this point, withdraw the tip of drill from the pipe by approximately one turn.

Now begin drilling the mains by activating the chuckshaft using the ratchet wrench, if drilling is manual, or through the electrical swivel gear.



SWIVEL GEAR

If an electrical actuation swivel gear (threading machine) is used, the following considerations must be taken into account:

- The adapter components may be supplied Acuster Global, S.L.
- The usage and safety recommendation given by the manufacturer must be followed.

Feed is achieved by making the machine body rotate (with the hand placed in the knurled area). Do not exceed the feed (increasing of dimension **a**: see *Figure 10*).



WARNING !

It is recommended to avoid excess of feed, especially in the pilot drill work phase, given that the drill could break specially at low revolutions.

Once perforated with the drill, remember that distance **a** will be increased by the internal mains pressure. If due to an excess of compression (feed + internal pressure) the drilling resistance increases, turn slightly in the opposite direction to release that increase of drilling resistance.

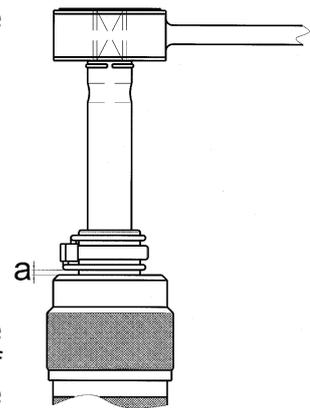


Figure 10



WARNING !

In case of using an electric threading machine as drilling actuator, take in mind that an excess of feed results in a high increase of torque which might lead to a potential risk of accident for the operator.

Depending on the working conditions the drilling operation could be carried out with the venting valve open to remove chip residues produced during the drilling. Ensure that the drilling is complete by making one or two additional turns. Close the venting valve in case it was in the open position.

If a length longer than the machine's travel is necessary, the drilling can be continued by moving the retention mechanism to the opening above the one it was fastened to on the shaft (unless the highest anchoring has been in use). See *Figure 8*.

3.2.7 **Disassembly of the machine and accessories:**

Once the mains has been perforated, move the chuckshaft up by turning the machine body counterclockwise until the end travel mechanism is activated. Because the chuckshaft has not rose enough to close the valve, proceed with the following steps:

Conventional method (Figure 11a):

Continue withdrawing the chuckshaft by pulling the retention mechanism out of the opening where it is located on the shaft. To do so, first place the ratchet wrench on the end shaft 3/4" square and push down to facilitate the retention mechanism removal. Then, take control with the ratchet wrench of the moving up of the chuckshaft due to pipeline pressure. The chuckshaft will fully rise until the hole saw is positioned on the upper part of the dome.

Using the shaft retention tool (Figure 11b):

Install the shaft retention tool. Fix the anchorage plate screwing the knob **(1)** inside the existing hole on the drilling machine. Assemble the upper plate in the shaft square end **(2)**. Slide the nut **(3)** until it fits in the plate orifice.

Turn the handle (4) slightly clockwise to be able to remove the bolt of the adapter (5). Once the adapter bolt removed, turn the handle (4) on the opposite direction to allow the shaft to go up until the hole saw is positioned on the upper part of the flange adapter dome.

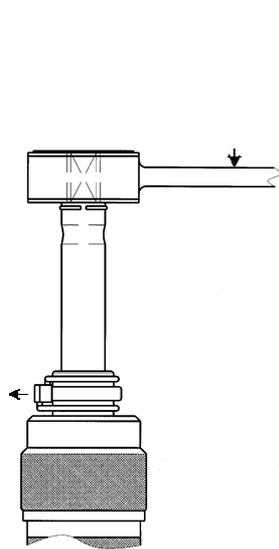


Figure 11a

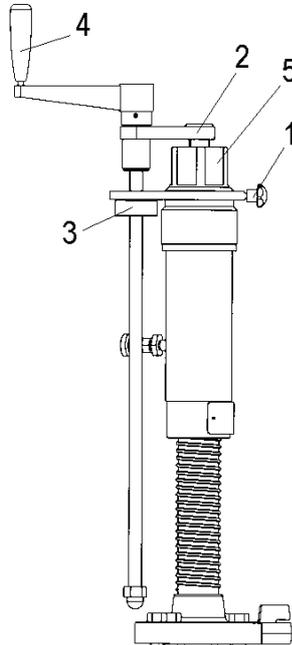


Figure 11b

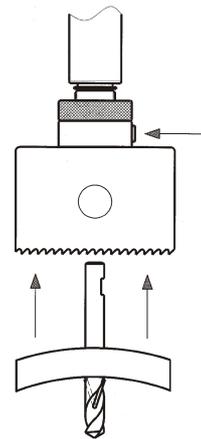


Figure 12



WARNING !

Due to internal mains pressure, the chuckshaft will pop up by itself. Take the necessary safety precautions to avoid any sort of accident during the operation.

Carefully open the venting valve to remove chip residues. Next, close the valve again. Then switch the gate valve to the CLOSED position. Open again the venting valve to depressurize the drilling machine and to be sure that the gate valve is fully closed as well. Disassemble the drilling machine and flange adapter set from the gate valve. The coupon resulting from drilling the mains will have remained trapped by the pilot drill's coupon mechanism. To extract the coupon, disassemble the drill by loosening the fastening stud. Remove the coupon through the upper part of the drill and fit it to the hole saw arbor again (place correctly the drill's slot aligned with the fastening stud position). See Figure 12.

3.2.8 Connecting the branch connection:

Make the necessary branch connection to the gate valve flange. If required, make a pressure test of the new connection before opening the valve. Retighten the saddle branch connection fasteners.

3.3 DRILLING OVER THREADED OUTLET SADDLES

3.3.1 **Initial operations:**

Before performing the drilling operations, ensure that you have all the necessary material and that it is in good condition:

- Complete drilling machine.
- Modified universal hole saw arbor (with pilot drill installed).
- Hole saw of diameter to be used.
- Threaded adapter (with gasket included) of the diameter of the thread matching the saddle to be installed.
- If the drilling operation is under pressure, intermediate full bore valve of the size corresponding to the saddle's threaded outlet. Adapter fitting (if necessary).
- Shaft retaining tool (if required).
- Tools: flat screwdriver, open-end spanner of 19 mm, 80-120 mm hinged pin key, 3/4" ratchet wrench (manual drilling) and electric actuator with its chuckshaft adapter (if applicable).

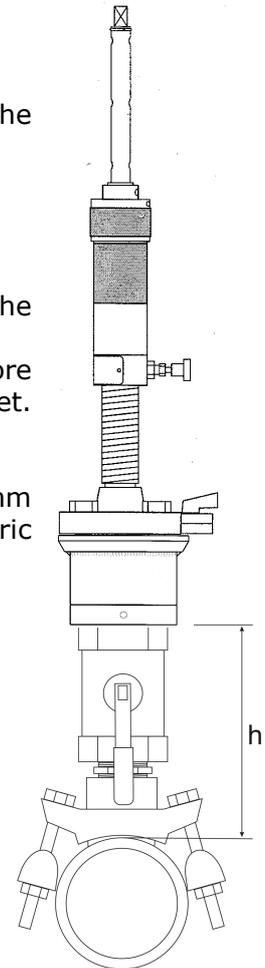


Figure 13

3.3.2 **Branch connection installation:**

The installation of the threaded outlet saddle is performed placing the saddle and gasket on the pipe. Next, fasten the clamp between the saddle and mains, equally tightening the fastening bolts to ensure tightness.



For more information, refer to Fitting Instructions included with the accessory.

3.3.3 **Assembly of the valve (for under pressure drilling only):**

Install the full bore intermediate valve (not supplied with the equipment). Screw it directly (or through an adapter fitting) over the branch connection previously installed on the line. Put the valve actuation lever in OPEN position.

3.3.4 **Assembly of the drilling machine:**

- Fit the 3" dome on the drilling machine flange.
- Choose the threaded adapter that matches the thread of the saddle and screw it into the installed dome: adapters of 2", 2½" and 3". See *Figure 14*.



This assembly can be done manually. If necessary, use the 80-120 mm hinged pin key.

- Set up the modified universal hole saw arbor with the pilot drill in the chuckshaft.



This step is carried out just the first time. Normally the hole saw arbor keeps always installed in the chuckshaft: *it is not necessary to disassembly it when the drilling is completed.* So, for normal routine applications the assembly of the hole saw corresponding to the diameter to be drilled would be the standard procedure.

Screw the hole saw matching the size outlet of the branch connection into the hole saw arbor. See *Figure 15*.

- Place the body of the machine in its upper position (unscrew it until the end travel mechanism is released).

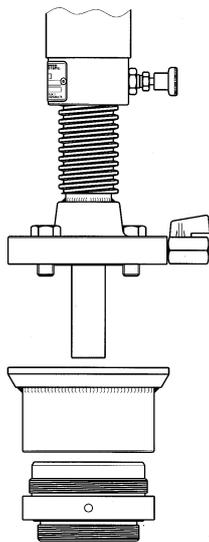


Figure 14

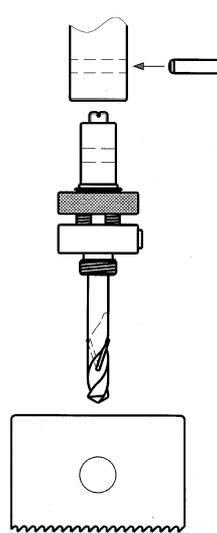


Figure 15

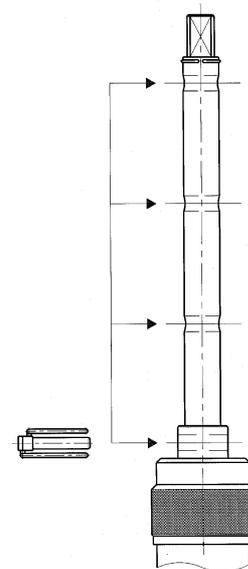


Figure 16

- With the installed valve actuation lever in the open position (for under pressure drilling operations), now assemble the **AcuDrill Plus** drilling machine, screwing it onto the valve or over the saddle installed on the pipe, depending on the situation. The adapter must have the gasket installed. See *Figure 13*.



WARNING !

If the support face of the intermediate valve is not flat enough, apply Teflon tape to the adapter thread to achieve tightness.

Manually tighten the machine body. If necessary, retighten using a 80-120 mm hinged pin key.

- Select the position of the chuckshaft depending on the distance it will have to travel during drilling (under pressure or pressureless drilling operation), placing the retention mechanism in the most appropriate opening of the four located on the shaft (locking pin or actuator's adapter, according to the operation mode used). See *Figure 16*.



WARNING !

Be sure that the retention mechanism is placed in the correct shaft opening: the hole saw arbor with its hole saw and pilot drill must be located inside the threaded adapter dome. Modify accordingly.

3.3.5 Pressure test (for under pressure drilling only):

Once the drilling machine set and accessories are installed on the valve, perform a pressure test.

To do so, apply compressed air through the venting valve to check tightness of the assembly (see *Figure 17*).

Once the interior is pressurized, and with the venting valve closed, check for leaks in the connected parts and their gaskets using a spray detector or soapy water. Correct in case of leaks. Once the check is complete, open the venting valve to depressurize, then leaving it in the "closed" position.

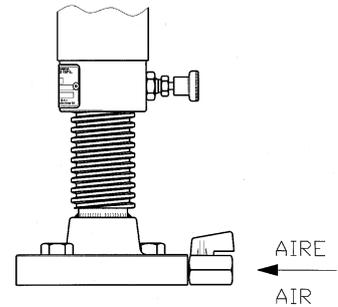


Figure 17

3.3.6 Drilling the mains:

Once the pressure test is complete (for under pressure drilling only), lower the chuckshaft by rotating the machine body (with your hand in the knurled area), until the pilot drill makes contact with the pipe (the chuckshaft will have risen depending on the contact force: see dimension **a** of *Figure 18*). At this point, withdraw the tip of drill from the pipe by approximately one turn.

Now begin drilling the mains by activating the chuckshaft using the ratchet wrench, if drilling is manual, or through the electrical swivel gear.



SWIVEL GEAR

If an electrical actuation swivel gear (threading machine) is used, the following considerations must be taken into account:

- The adapter components may be supplied Acuster Global, S.L.
- The usage and safety recommendation given by the manufacturer must be followed.

Feed is achieved by making the machine body rotate (with the hand placed in the knurled area). Do not exceed the feed (increasing of dimension **a**: see *Figure 18*).



WARNING !

It is recommended to avoid excess of feed, especially in the pilot drill work phase, given that the drill could break specially at low revolutions.

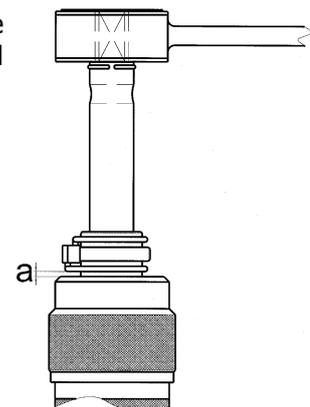


Figure 18

Once perforated with the drill, remember that distance **a** will be increased by the internal mains pressure (for under pressure drilling operation only). If due to an excess of compression (feed + internal pressure) the drilling resistance increases, turn slightly in the opposite direction to release that increase of drilling resistance.



WARNING !

In case of using an electric threading machine as drilling actuator, take in mind that an excess of feed results in a high increase of torque which might lead to a potential risk of accident for the operator.

Depending on the working conditions the under pressure drilling operation could be carried out with the venting valve open to remove chip residues produced during the drilling. Ensure that the drilling is complete by making one or two additional turns. Close the venting valve in case it was in the open position.

3.3.7 **Disassembly of the machine and accessories:**

Once the mains has been perforated, move the chuckshaft up by turning the machine body counterclockwise until the end travel mechanism is activated. In case of being installed an intermediate valve and the chuckshaft would not be up enough, continue withdrawing the chuckshaft proceeding with following steps:

Conventional method (Figure 19a):

Continue withdrawing the chuckshaft by pulling the retention mechanism out of the opening where it is located on the shaft. To do so, first place the ratchet wrench on the end shaft 3/4" square and push down to facilitate the retention mechanism removal. Then, take control with the ratchet wrench of the moving up of the chuckshaft due to pipeline pressure. The chuckshaft will fully rise until the hole saw is positioned on the upper part of the dome.

Using the shaft retention tool (Figure 19b):

Install the shaft retention tool. Fix the anchorage plate screwing the knob **(1)** inside the existing hole on the drilling machine. Assemble the upper plate in the shaft square end **(2)**. Slide the nut **(3)** until it fits in the plate orifice. Turn the handle **(4)** slightly clockwise to be able to remove the bolt of the adapter **(5)**. Once the adapter bolt removed, turn the handle **(4)** on the opposite direction to allow the shaft to go up until the hole saw is positioned on the upper part of the flange adapter dome.



WARNING !

Due to internal mains pressure, the chuckshaft will pop up by itself. Take the necessary safety precautions to avoid any sort of accident during the operation.

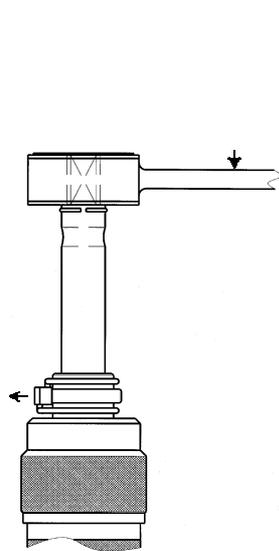


Figure 19a

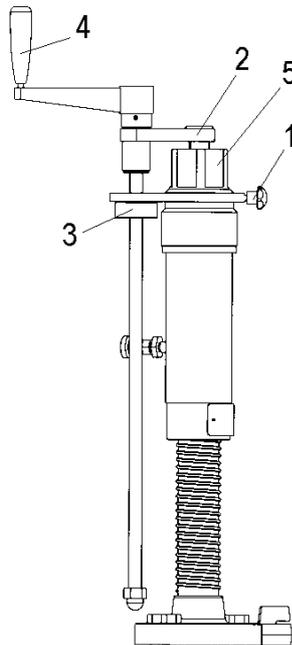


Figure 19b

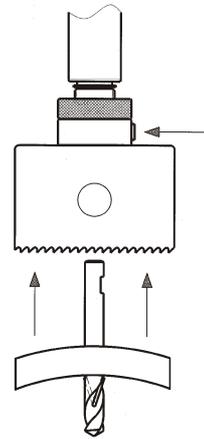


Figure 20

If the drilling operation was under pressure, carefully open the venting valve to remove chip residues. Next, close the valve again.

Then switch the intermediate valve to the CLOSED position.

Open again the venting valve to depressurise the drilling machine and to be sure that the intermediate valve is fully closed as well.

Disassemble the saddle adapter and drilling machine using the 80-120 mm hinged pin key.

The coupon resulting from drilling the mains will have remained trapped by the pilot drill's coupon mechanism. To extract the coupon, disassemble the drill by loosening the fastening stud. Remove the coupon through the upper part of the drill and fit it to the hole saw arbor again (place correctly the drill's slot aligned with the fastening stud position). See *Figure 20*.

3.2.8 Connecting the branch connection:

Connect the branch connection to the appropriate outlet for the intermediate valve or saddle, according to the layout. Retighten the saddle branch connection fasteners.

CHAPTER 4: MAINTENANCE

4.1 GENERAL INFORMATION

As a general principle, we recommend maintaining the drilling machine (and all components and accessories) in perfect conditions of cleanliness and lubrication, ready for use, and stored in their original carrying case.

The preventive maintenance for the equipment is minimal; cleaning and lubricating the chuckshaft, the optional shaft extension, the spindle threads and machine dome is sufficient. Monitor the cutting condition of the drill and hole saws before usage. It is recommended they be replaced in case of fault.

On a regular basis, and especially when the equipment is used over a prolonged period, we recommend it be sent to the ACUSTER GLOBAL, S.L. After-Sales Service Department for a complete inspection (generally, with time and use, the O-rings and gaskets need to be changed).

CHAPTER 5: TECHNICAL CHARACTERISTICS

- Usage : Drilling of mains made of steel, gray cast iron, ductile casting, asbestos cement, clay, polyester, PVC, PE, PP, etc.
- Flanged branch connections : T-clamps with flange connection (such as the Acuster's **ARH** branch T-clamp), or any clamp or fitting with DIN flange connection, sizes from DN65 up to DN200 (PN10/PN16), both included .
- Threaded outlet saddles : Any saddle or ferrule with threaded outlets of 2", 2½" and 3" BSP.
- Maximum drilling capacity : Up to ϕ . 76 mm (threaded connections)
Up to ϕ . 177 mm (flanged connections)
- Maximum range : 141 mm from the machine body.
255 mm from the chuckshaft (moving the fastening openings).
100 mm Optional shaft extension.
396 mm Total, adding range travel and fastening shaft.
496 mm Total, adding range travel, fastening shaft and shaft extension.
- Service pressure : 16 bar for water mains
- Operation : Manual by means of a 3/4" ratchet wrench.
Optionally by means of an electric swivel gear (threading machine).
- Total equipment weight : 20 kg (including carrying case)
- Outer dimensions : Carrying case:
Length: 915 mm
Width: 390 mm
Height: 165 mm

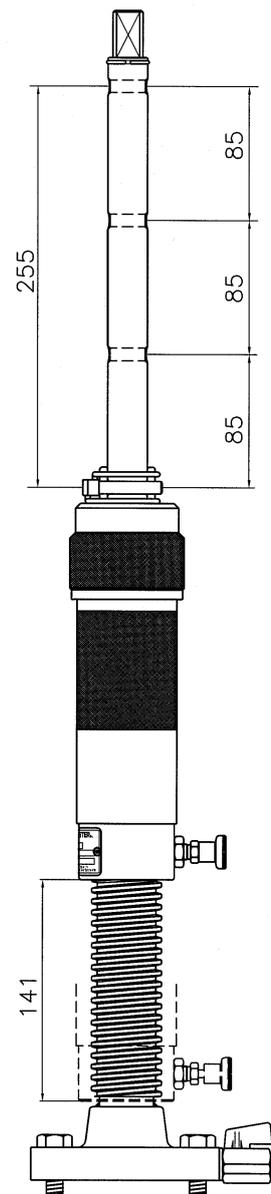


Figure 21

Weight of optional items:

80-120 mm hinged pin key	:	0.685 Kg
2" threaded saddle adapter	:	0.990 Kg
2-1/2" threaded saddle adapter	:	0.810 Kg
3" threaded saddle adapter	:	0.670 Kg
DN65/DN80 flange adapter	:	3.920 Kg
DN100/DN125 flange adapter	:	7.735 Kg
DN150 flange adapter	:	10.355 Kg
DN200 flange adapter	:	15.330 Kg
Transmission disc (76-105 mm hole saws)	:	0.230 Kg
Transmission disc (108-152 mm hole saws):	:	0.615 Kg
Plug carrier, 19 mm squared size	:	0.220 Kg
Adapter for electric actuator	:	0.425 Kg
Electric actuator (threading machine)	:	8.515 Kg (with carrying case)
Shaft retaining tool	:	1.290 Kg

