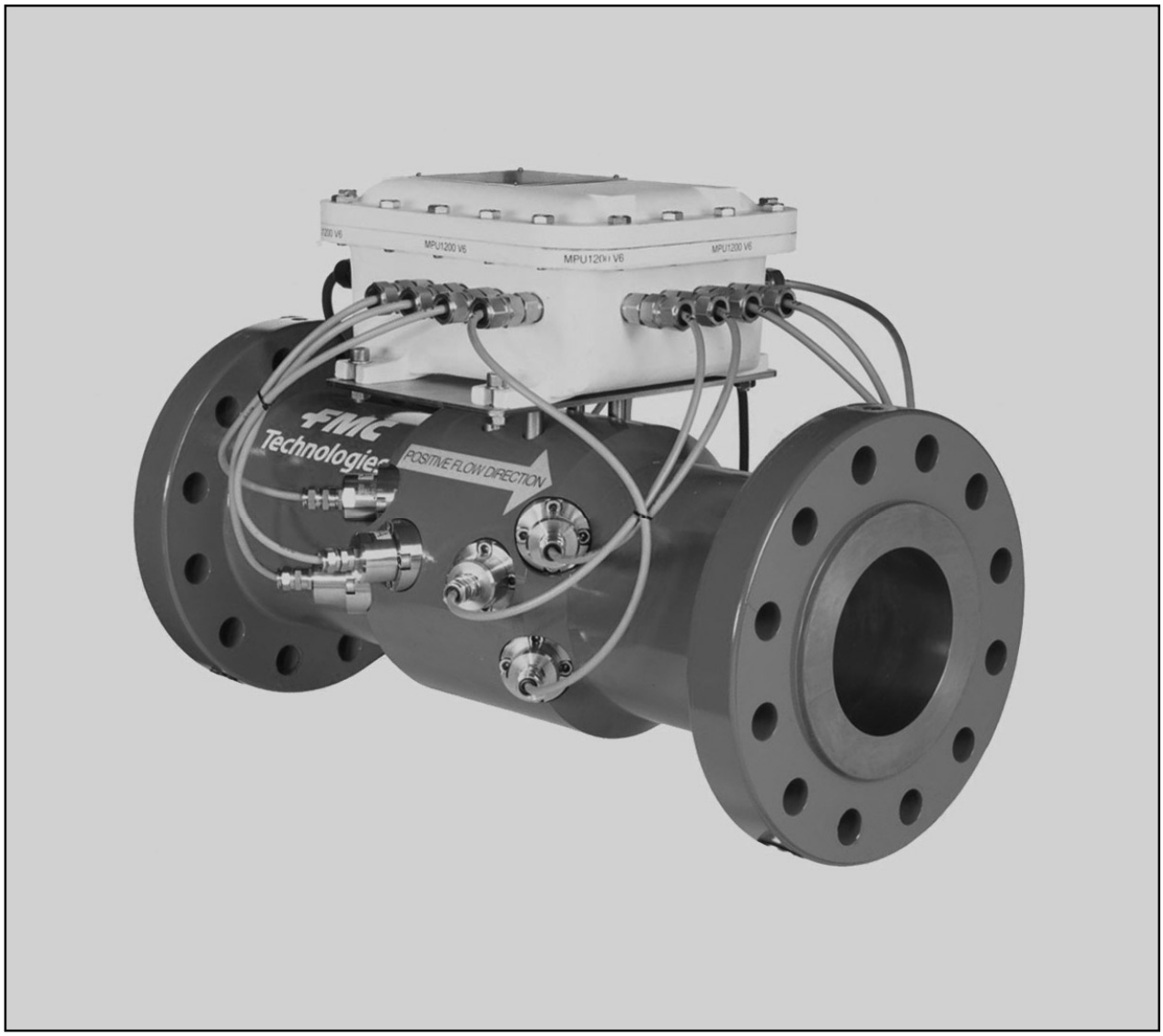
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FMC
Technologies
POSITIVE FLOW DIRECTION

MPU Transducer Replacement Procedure Using Transducer Retraction Tool

Procedure

History

Revision	Date	Editor	ECN	Status	Description
Rev. D	Juni 2003	xxx	xxx	released	Take over from KOS SAP System
Rev. 00E	**April 2008**	NB	20207	released	New Logo

Important

All information and technical specifications in this documentation have been carefully checked and compiled by the author. However, we cannot completely exclude the possibility of errors. **Smith Meter GmbH** is always grateful to be informed of any errors.

TABLE OF CONTENT

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1. INTRODUCTION

This manual describes mounting and dismounting of the Transducers for the MPU ultrasonic gas flow meter by using the Transducer Retraction Tool delivered by FMC Kongsberg Metering.

The Transducer Retraction Tool is used to remove and replace transducers in a pressurized MPU flow meter. The Transducer Retraction Tool allows inspection and replacement of Transducers without shutdown and pressure bleed-off.

We reserve the right to make changes to the construction and/or configuration at any time. This manual is based on the latest information and may be subject to changes.

1.1. Contact Address if Assistance is Required

	Publisher	**Customer Support**
Contact Address:	FMC Kongsberg Metering AS P.O. Box 1012 NO-3601 Kongsberg Norway	FMC Kongsberg Metering AS P.O. Box 1012 NO-3601 Kongsberg Norway
Telephone No.:	(47) 32 28 67 00	(47) 32 28 79 21
Telefax No.:	(47) 32 28 67 50	(47) 32 28 79 10
E-Mail:	service@metering.no	
Internet:	www.fmcmeasurementsolutions.com	

1.2. Copyright

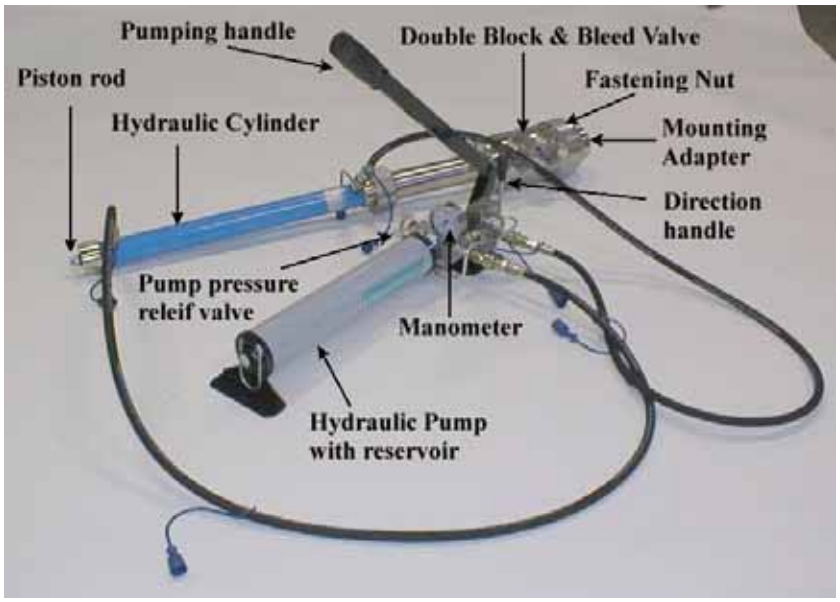
1.3. Trademarks

Products listed are trademarks of their respective manufacturers. Company names listed are trade names of their respective companies.

1.4. Equipment Required

- Adjustable wrench
- Spanner, 14 mm.
- Hexagonal keys, 4 mm and 8 mm
- Torque wrench, with hexagonal 8 mm head
- Slide calliper
- Oilstone or fine file
- Transducer Retraction Tool with the following main parts:

  - Mounting Adapter with Fastening Nut.
  - Double Block & Bleed Valve with Pressure Balancing Valve.
  - Hydraulic Cylinder with Piston Rod and Interface Nut.
  - Manually operated Hydraulic Pump with reservoir, Hydraulic Hoses, Manometer, direction handle and pumping handle.



Picture 1. Transducer Retraction Tool Overview

- The following O-rings and Back-up rings in the sizes listed below should be available as spare parts.

Size	Quality	Quantity	Item
70x4 mm (O-ring)	NBR 70	1	Mounting Adapter
70x77x1.7 mm (Backup ring)	Pu	1	Mounting Adapter
33x1.5 mm (O-ring)	NBR 70	1	Mounting Adapter
30x4.0 mm (O-ring)	NBR 70	2	Double Block & Bleed Valve (Back)
30x37x1.7 mm (Backup ring)	Pu	2	Double Block & Bleed Valve (Back)
21.89x2.62 mm (O-ring)	NBR 70	1	Interface Nut
22x26x1.4 mm (Backup ring)	Pu	1	Interface Nut
31.47x1.78 (O-ring)	NBR 70	1	End Cover
22x2 (O-ring)	NBR 70	1	End Cover
18.77x1.78 mm (O-ring)	Viton 70	1	Transducer (Front)
19.4x22x1.2 mm (Backup ring)	Z52	1	Transducer (Front)
25.12x1.78 mm (O-ring)	Viton 70	1	Transducer (Back)
26.2x29x1.4 mm (Backup ring)	Z52	1	Transducer (Back)

All O-rings and backup rings can be stored for 10 to 15 years without reduction in quality if stored under the following conditions:

- Stored in sealed plastic bags
- Not subjected to sunlight
- Low humidity
- Storage temperature from +5 °C to +25 °C

1.5. Site Preparations

A pressure outlet with operational pressure must be available to perform this work. Check that a certified Gas Hose of required length with correct fittings is available. The Gas Hose is connected to the Transducer Retraction Tool in order to equalize the pressure inside the tool.

A Gas Hose of length 8 meters with ½" NPT male and female connector is included with the tool.

1.6. Consumables

- O-rings.
- Back-up rings.
- Copper Grease (Copaslip or equivalent)
- Silicone grease (Gleitmo 750 or equivalent)

1.7. Warnings

Only personnel with thorough practical training is allowed to perform transducer retraction under operational conditions.

Courses from the manufacturer are available, held at supplier's or customer's location.

Alternatively, transducer inspection and replacement services can be ordered from supplier's service department.

When servicing, repairing or when maintenance work is carried out on the MPU ultrasonic gas flow meter or the MPU Transducer Retraction Tool, it is very important to follow this Procedure strictly.

This complete procedure must be well known to all involved personnel BEFORE any work is initiated.

Remember that working on a pressurized system requires special precautions. Be sure to follow general rules for working on high-pressure systems, and do exactly as stated in this Procedure.

Make sure that required permits are obtained (e.g. hot work permit).

If any doubts should arise, please contact manufacturer for assistance.

Do not wear wool clothes, which may generate static electricity, preferable clothing is fireproof boiler suits.

Opening and closing of valves must generally be done slowly with great care.

A pressure outlet with operational pressure MUST be available to perform this work. Check that a certified Gas Hose of required length is available. A Gas Hose of length 8 meters with ½" NPT male and female connector is included with the tool.

Never use the Transducer Retraction Tool as a support, do not lean or sit on it while operating.

Never stand behind the Transducer Retraction Tool while working. Place yourself beside it.

Be very careful with all parts removed from the MPU and the parts of the Transducer Retraction Tool itself, remember they have O-ring surfaces which must not be damaged.

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2. REPLACEMENT PROCEDURE

2.1. Pre-operation

2.1.1. Joint mating, O-rings and Threads

When replacing a Transducer, replace the O-rings and Back-up rings on re-assembly and fit it with silicone grease.

Make sure that the mating faces are clean and dry. When cleaning a joint face, use tools or cloths that will not score or damage the face and remove any burrs or nicks with an oilstone or fine file.

All threads should be applied lightly with copper-grease, e.g. Copaslip.

All O-rings and Back-up rings on the Transducer Retraction Tool should be checked, and if necessary replaced, before the work is started.

Carry out the work in the sequence explained in this procedure and check that everything is correctly assembled and tightened afterwards.

Always keep the work area tidy – it is only too easy to fall over articles left lying around.

Always wear eye protection when operating the Transducer Retraction Tool.

Don't rush to finish this job or take unverified short cuts.

2.2. Removal of the Transducer End Cover

Before starting any work, make sure that all involved personnel are familiar with this complete procedure. Also make sure that a pressure outlet with operational pressure is available. Check that certified Gas Hoses of required lengths are available. A Gas Hose of length 8 meters with ½" NPT male and female connector is included with the tool.

The first step is to secure the Transducer with the Locking Screws before remove the End Cover. (See Picture 2 and Picture 3 for details.) Depending on maximum operating pressure, the Fastening Cover will be supplied with 2 or 4 Locking Screws.

A. Tighten the Locking Screws (2 or 4 off) to the inner position to lock the Transducer in place. The inner position is reached when the distance from the top of the Locking Screw to flush of the Fastening Cover is minimum 6.0 mm.

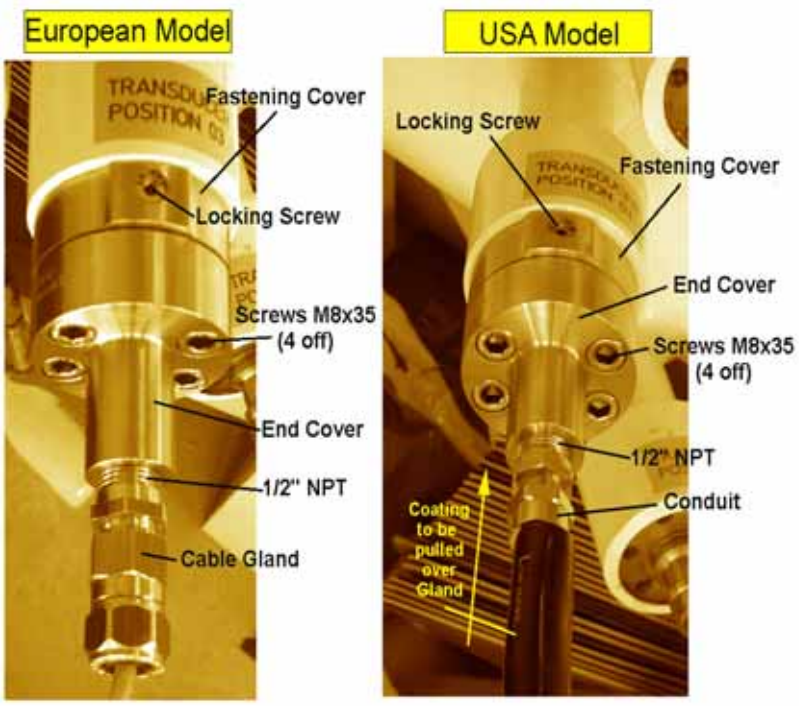
Before removing the End Cover, check that the Locking Screws located in the Fastening Cover are set in the inner position.

B. Remove the screws (4 off) located on the End Cover. Remove the screws carefully in a cross sequence. The Transducer will be pushed outwards maximum one (1) millimeter by the process pressure until it is stopped by the Locking Screws. Observe that the End Cover screws rotate easily without any restrictions, as this indicates that the Transducer is held in place by the Locking Screws.

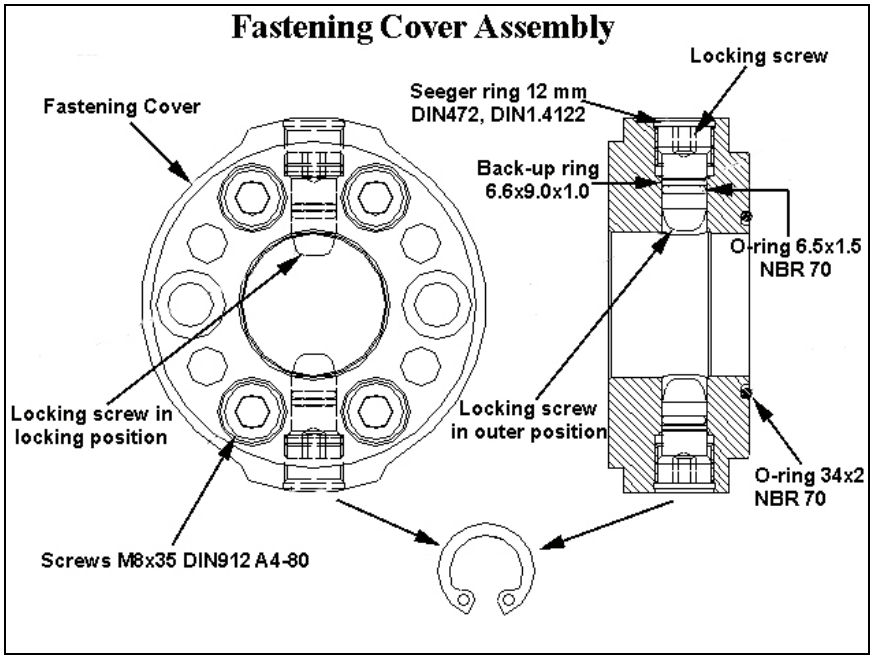
C. Remove the End Cover carefully as the transducer cable is still connected to the Transducer.

D. Disconnect the transducer cable from the Transducer by pulling firmly on the connector sleeve to release the connector locking mechanism.

E. Place the End Cover in a clean and dry area to avoid damage to sealing surface. Do not leave the End Cover hanging by the cable, stressing the cable connector.



Picture 2. Transducer Assembly before dismounting



Picture 3. Fastening Cover assembly

2.3. Mounting of the Transducer Retraction Tool

This chapter describes how to mount the Transducer Retraction Tool, step by step.

A. Check the O-rings and the Back-up rings on the sealing surfaces of the Mounting Adapter. See Picture 4.

If any cuts are observed on the O-rings, replace the O-rings, apply Silicone grease on the O-rings and clean and polish the sealing surface.

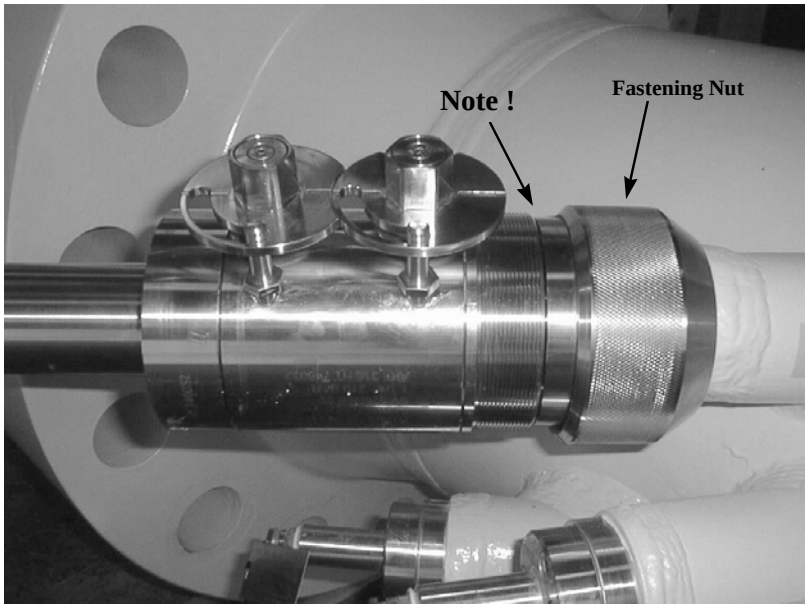
B. Put the Mounting Adapter the correct way into the Fastening Nut. Fasten it to the Spool Nozzle with the 33x1.5 mm O-ring in the front using the 4 screws (M10x50). Picture 5 shows the Mounting Adapter mounted to the Spool Nozzle.

C. Tighten the 4 screws in a cross sequence. **The torque shall be 44 Nm.**

Picture 4. Mounting Adapter

Picture 5. Mounted 'Mounting Adapter'

Picture 6. Double Block & Bleed Valve



Picture 7. Double Block & Bleed valve mounted to Mounting Adapter

D. Check the O-ring and the Back-up ring at the back side of the Double Block & Bleed Valve. (See Picture 6.)
(O-ring 30x4 mm, Backup-ring 30x37x1.7 mm).

If any cuts are observed on the O-rings, replace the O-rings, apply Silicone grease on the O-rings and clean and polish the sealing surface.

E. Check that Valve #1 and #2 on the Double Block & Bleed Valve are in the open position, as shown in Picture 10, view A.

F. Mount the Double Block & Bleed Valve to the Mounting Adapter. Ensure that the Double Block & Bleed Valve is located exactly into the slot in the Mounting Adapter. There should not be any “free space” between the Valve and the Adapter. (See “Note !” in Picture 7.)

G. Connect the Fastening Nut on the Mounting Adapter to the Double Block & Bleed Valve.

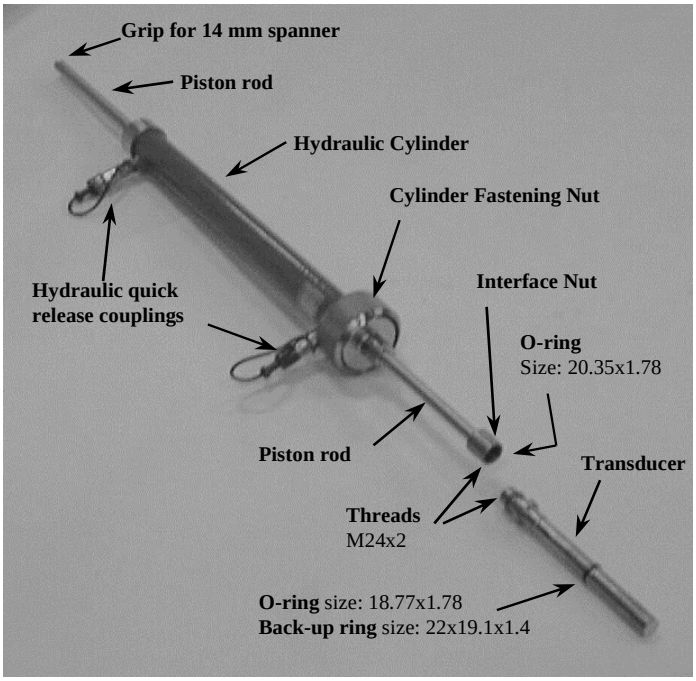
H. Tighten the Fastening Nut, it should not be possible to move or tilt the Double Block & Bleed Valve in neither vertical nor horizontal direction.

I. **If any movement of the Double Block & Bleed Valve is possible, continue to tighten the Nut until no movements can be detected.**

J. Connect the two Hydraulic Hoses from the Hydraulic Pump to the Hydraulic Cylinder. The Hoses are fitted with male and

female quick release couplings. It is not possible to connect the Hydraulic Hoses wrongly. **(**See Picture 1.)

K. Set the handle on the Hydraulic Hand Pump in the "Transducer In" position. (See Picture 9.) Operate the Hand Pump until the Piston Rod is at its maximum extended position.



Picture 8. Hydraulic Cylinder

Picture 9. Hydraulic Pump with the Direction Handle

L. Disconnect the Hydraulic Hoses from the Hydraulic Cylinder. Insert the Piston Rod through the Double Block & Bleed Valve. Rotate the Hydraulic Cylinder and Piston Rod clockwise to connect the Interface Nut to the Transducer. (See Picture 8.) Use a 14 millimeter spanner at the end of the Piston Rod to

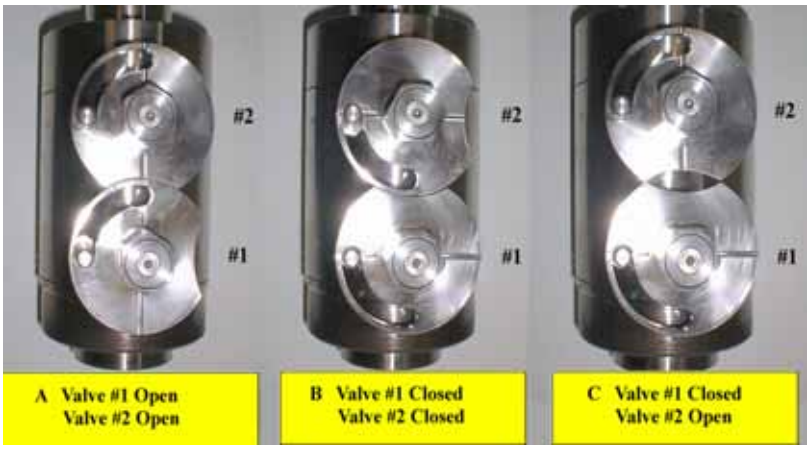
check that the Interface Nut is firmly connected to the Transducer. **Do not use excessive force on the 14 millimeter spanner.**

M. Connect the Hydraulic Hoses to the Hydraulic Cylinder. Place the Direction Handle on the Hydraulic Pump in the "Transducer Out" position. (See Picture 9.) Secure the Hydraulic Cylinder to the Double Block & Bleed Valve by turning the Cylinder Fastening Nut clockwise.

N. Operate the Hand Pump carefully to close the gap between the Double Block & Bleed Valve and the front face of the Hydraulic Cylinder.

Stop the Hand Pump operation as soon as the gap has been closed in order to avoid damaging the Locking Screws or the Transducer.

O. Tighten the Cylinder Fastening Nut on to the Doble Block & Bleed Valve.



Picture 10. Double Block & Bleed Valve, Open/Close positions

Picture 11. Complete TRT mounted on the MPU

2.4. Removing the Transducer

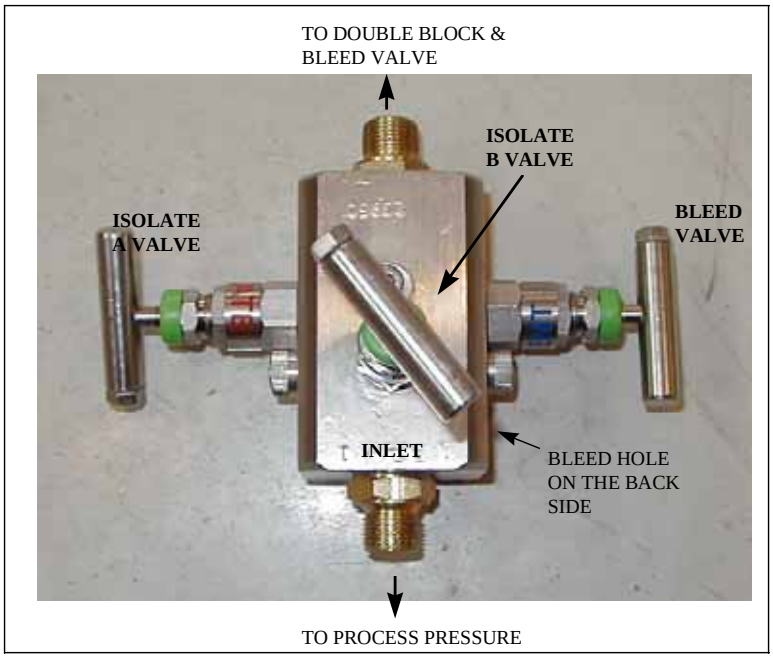
This chapter describes the process of connecting the Pressure Balancing Equipment to the process piping and removing the Transducer from the MPU.

2.4.1. Mounting the Pressure Balancing Valve

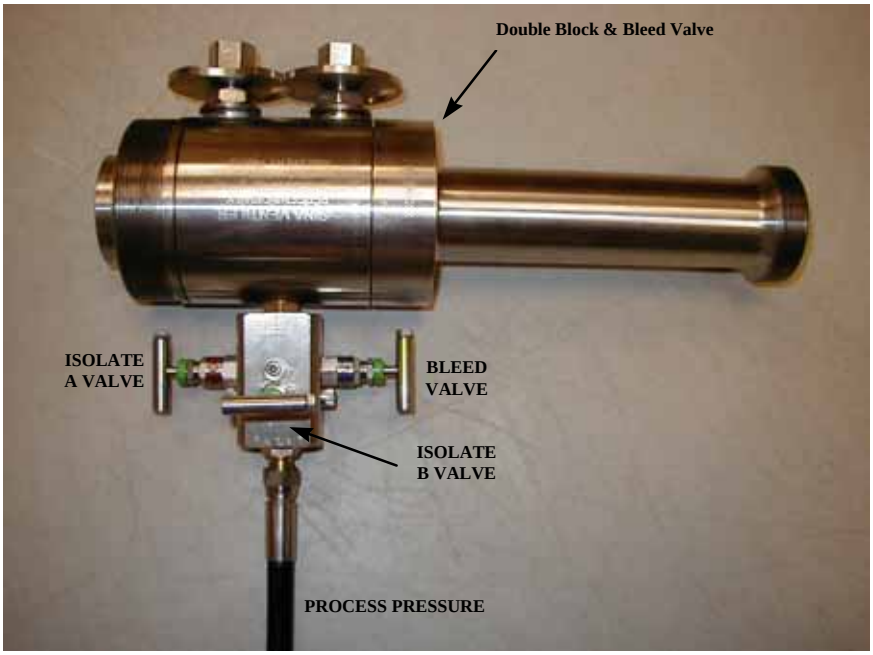
A. Mount the Pressure Balancing Valve below the Double Block & Bleed Valve as shown in Picture 12 and Picture 13.

B. Make sure that the Isolate A Valve, Isolate B Valve and the Bleed Valve are closed. Closing the Valves are done by turning all handles fully clockwise.

C. Connect the Gas Hose between the pressure outlet in the process piping and the Process Inlet connection on the Pressure Balancing Valve. Then make sure to open the required valves or taps, such that the Gas Hose is pressurized.



Picture 12. Pressure Balancing Valve



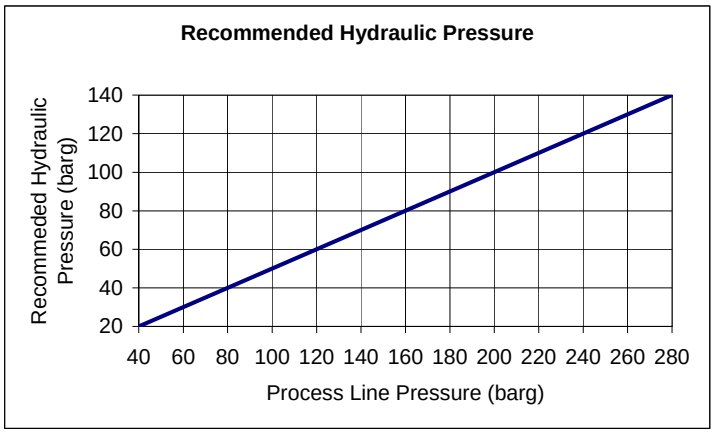
Picture 13. Pressure Balancing Valve mounted to the Double Block & Bleed Valve

2.4.2. Removing the Transducer

A. Connect the two Hydraulic Hoses to the Hydraulic Cylinder.

B. Make sure that the Direction Handle on the Hydraulic Pump is set to the “Transducer In” position. (See Picture 9.)

C. Using the Hydraulic Pump, push the Transducer from 1 to 3 millimeters in to release the tension on the Locking Screws. The Transducer is pushed against the nozzle by the Hydraulic Cylinder. Continue pumping until the hydraulic pressure reaches approximately 50% of the process line pressure. (See figure below for recommended hydraulic pump pressure.) Check the Manometer reading. (See Picture 1.)



D. Release the Locking Screws by turning them counter clockwise until they are stopped by the Seeger rings. (See Picture 3.) The Locking Screws shall rotate easily.

If the Locking Screws do not rotate easily, higher hydraulic pressure may be required in the Hydraulic Cylinder in order to exceed the operational pressure force on the Transducer and to avoid damaging the Locking Screw or the Transducer.

E. Place the Pump Handle on the Hydraulic Pump in upper position. Set the Direction Handle on the Hydraulic Pump to the “Transducer Out” position and let the Piston Rod retract between 40 and 50 mm until the length of the retracted Piston Rod is approximately 65 mm (measured from the Hydraulic Cylinder metal surface). Set the Direction Handle on the Hydraulic Pump back to the “Transducer In” position to stop the movement of the Piston Rod.

The force from the process pressure will normally push the Transducer slowly outwards. The Piston Rod will move slowly due to built-in mechanical restrictions in the Hydraulic Pump.

At low operating pressures it might be necessary to operate the Hydraulic Pump carefully for pulling the Transducer out.

F. Open the Isolate Valves A and B on the Pressure Balancing Valve and the pressure outlet valve connected to the process piping. This balances the pressure in the Double Block & Bleed Valve with the process pressure.

G. Set the Direction Handle on the Hydraulic Pump to the "Transducer Out" position and let the movement of the Piston Rod stop in the outer (fully retracted) position.

H. Close Valve #1 on the Double Block & Bleed Valve. (See Picture 10.)

I. Close the valve at the pressure outlet of the process piping.

J. Make sure that both Isolate A and Isolate B Valves are open. (See Picture 13.)

K. Open the Bleed Valve on the Pressure Balancing Valve to release the pressure inside the Double Block & Bleed Valve and the Gas Hose from the process piping. (See Picture 13.)

L. Move the Direction Handle on the Hydraulic Pump from the "Transducer Out" to the "Transducer In" position in order to release the pressure in the Hydraulic Cylinder. Alternatively the pressure may be released by turning the Pressure Relief Valve on the Hydraulic Pump. (See Picture 1.)

Do not leave the direction handle in middle position. Then the Manometer will only show the pressure inside the Hydraulic Pump, while the pressure inside the Hydraulic Cylinder may be different.

M. Close Valve #2 on the Double Block & Bleed Valve. (See Picture 10.)

If Valve #2 on the Double Block & Bleed Valve will not close properly with normal force on the valve handle, it can be caused by the Transducer not being fully retracted. Do not use excessive force to close the valve, as the Transducer may be damaged!

Check that the Piston Rod is fully retracted. The length from the back of the Hydraulic Cylinder (metal surface) to the back (end) of the Piston Rod should be 450 mm.

If the problem of closing Valve #2 still exists with a fully retraced Piston Rod, verify that Valve#1 is closed and loosen the Cylinder Fastening Nut (see Picture 8) by turning it counter clockwise before closing Valve #2.

N. Disconnect the two Hydraulic Hoses from the Hydraulic Cylinder.

O. Close the Bleed Valve and Isolate B Valve on the Pressure Balancing Valve. Isolate A Valve remains open. Wait for 2 minutes. Open the Bleed Valve and confirm no pressure leakage. Close the Bleed Valve.

P. Disconnect the Hydraulic Cylinder from the Double Block & Bleed Valve. Pull the Cylinder carefully backwards. The Transducer is attached to the Interface Nut on the Piston Rod.

Q. Remove the Transducer from the Interface Nut.

2.5. Replacing the Transducer

This chapter describes the process of replacing the Transducer in the MPU ultrasonic gas flow meter.

A. Replace the damaged Transducer. Take note of the Transducer serial number. **The new Transducer must be fitted with new, greased, O-rings and Backup-rings**.

B. Make sure that the Bleed Valve and Isolate B Valve on the Pressure Balancing Valve are closed. Isolate A Valve must be open.

C. Connect the Transducer to the Interface Nut on the Piston Rod.

D. **Check that the Piston Rod is located in its retracted position.**

E. Connect the Hydraulic Cylinder to the Double Block & Bleed Valve, and tighten the Cylinder Fastening Nut. Make sure that it is completely fastened, that no horizontal or vertical movement is possible.

F. Connect the two Hydraulic Hoses on the Hydraulic Cylinder.

G. Open first Valve #2 and then Valve #1 on the Double Block & Bleed Valve. Do this carefully, as the Double Block & Bleed Valve will become pressurized.

H. Set the direction handle on the Hydraulic Pump to the “Transducer In” position. (See Picture 9.)

I. Push the Piston Rod with the Transducer into the Spool Nozzle by operating the Hydraulic Pump. Stop the movement 40 to 50 mm from the inner position.

J. Open the Bleed Valve on the Pressure Balancing Valve to release the gas pressure inside the Double Block & Bleed Valve.

If the pressure does not subside, the front O-ring on the Transducer may be damaged. Remove the Transducer again and replace the front O-ring and Backup-ring.

K. Continue pushing the Piston Rod with the Transducer into the Spool Nozzle by operating the Hydraulic Pump. Stop pumping when the Piston Rod has reached the inner position.

L. Tighten the Locking Screws to the inner position by turning them fully clockwise. The inner position is reached when the distance from the top of the Locking Screw to flush of the Fastening Cover is at least 6.0 mm. (See Picture 3.) If it is not possible to set the Locking Screws to this position, the Transducer is not completely in its inner position. In that case, go back to the previous point for moving the Transducer further in. Check that the Transducer Retraction Tool is correctly aligned by ensuring that it is not possible to move it in either vertical or horizontal direction.

M. Set the Direction Handle on the Hydraulic Pump to the "Transducer Out" position.

N. Disconnect the Hydraulic Hoses from the Hydraulic Cylinder.

O. Release the Transducer from the Piston Rod on the Hydraulic Cylinder by turning the Piston Rod counter clockwise using the 14 mm Spanner at the end of the rod.

P. Disconnect the Hydraulic Cylinder from the Double Block & Bleed Valve by pulling the Hydraulic Cylinder carefully backwards.

Q. Operate both Valve #1 and Valve #2 on the Double Block & Bleed Valve, first to closed position, then back to open position. This is necessary for releasing possible trapped pressure in the Double Block & Bleed Valve.

R. Disconnect the Double Block & Bleed Valve from the Mounting Adapter.

S. Disconnect the Mounting Adapter.

T. Replace the O-ring on the End Cover (size 32x1.5 mm). Use silicon grease in the O-ring groove at the front of the End Cover to ensure that the O-ring stays in the groove during mounting.

U. Connect the Transducer Cable to the Transducer.

V. Mount the End Cover. Tighten the 4 screws in a cross sequence. **The torque must be 44 Nm.** The End Cover will push the Transducer into its correct position, releasing the force on the Locking Screws.

W. Unscrew the Locking Screws to their outer position, stopping at the Seeger ring.

X. Make sure that the Transducer name plate and the numbering for the cable is located at its right place. If the Transducer has been changed, the corresponding name plate with correct serial number must be mounted.

Y. Disconnect the Gas Hose from the pressure outlet.

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3. POST PROCEDURE

Dismount and clean all parts of the Transducer Retraction Tool and place them back into the aluminium case.

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4. TICK-OFF LISTS

This chapter includes tick-off check lists for the work described in the previous chapters. Only a short form of the tasks are described in the tick-off list, the procedure in the respective chapters must be read and followed. The numbering in the tick-off list corresponds to the numbering in the respective chapters. This chapter should be copied once for each repetition of the operation.

4.1. Removal of the Transducer End Cover (Section 2.2)

Task No.	Description	Done
A	Tighten the Locking Screws (2 or 4 off) to the inner position to lock the Transducer in place.	
B	Remove the screws (4 off) located on the End Cover.	
C	Remove the End Cover.	
D	Disconnect the transducer cable from the Transducer.	
E	Place the End Cover properly.	

4.2. Mounting of the Transducer Retraction Tool (Section 2.3)

Task No.	Description	Done
A	Check the O-rings and the Back-up rings on the sealing surfaces of the Mounting Adapter.	
B	Put the Mounting Adapter the correct way into the Fastening Nut and fasten it to the Spool Nozzle.	
C	Tighten the 4 screws in a cross sequence. **The torque shall be 44 Nm.**	
D	Check the O-ring and the Back-up ring at the backside of the Double Block & Bleed Valve.	
E	Check that Valve #1 and #2 at the Double Block & Bleed Valve is in the open position.	
F	Mount the Double Block & Bleed Valve to the Mounting Adapter.	
G	Connect the Fastening Nut on the Mounting Adapter to the Double Block & Bleed Valve.	
H	Tighten the Fastening Nut.	
I	If any movements on the Double Block & Bleed Valve is possible, continue to tighten the Nut until no movements can be detected.	
J	Connect the two Hydraulic Hoses from the Hydraulic Pump to the Hydraulic Cylinder.	
K	Set the Direction Handle on the Hydraulic Pump in the “Transducer In” position. Make sure that the Piston Rod is in its maximum extended position by operating the Hand Pump.	
L	Disconnected the two Hydraulic Hoses from the Hydraulic Cylinder. Insert the Piston Rod through the Double Block & Bleed Valve and rotate the Hydraulic Cylinder to connect the Piston Rod to the Transducer.	
M	Mount the Hydraulic Cylinder to the Double Block & Bleed Valve.	
N	Operate the Direction Handle to close the gap between the Double Block & Bleed Valve and the Hydraulic Cylinder.	
O	Tighten the Cylinder Fastening Nut	

4.3. Removing the Transducers (Section 2.4)

Mounting the Pressure Balancing Valve (Section 2.4.1)

Task No.	Description	Done
A	Mount the Pressure Balancing Valve below the Double Block & Bleed Valve.	
B	Make sure that Isolate A Valve, Isolate B Valve and the Bleed Valve are closed.	
C	Connect the Gas Hose between the pressure outlet in the process piping and the Process Inlet connection on the Pressure Balancing Valve. Make sure that the required valves or taps are opened, such that the Gas Hose is pressurized.	

Removing the Transducer (Section 2.4.2)

Task No.	Description	Done
A	Connect the two Hydraulic Hoses to the Hydraulic Cylinder.	
B	Make sure that the Direction Handle on the Hydraulic Pump is set to position “Transducer In”.	
C	Push in the Transducer to release the tension on the Locking Screws by operating the Hydraulic Pump.	
D	Release the Locking Screws for the Transducer by turning them counter clockwise to outer position.	
E	Retract the Piston Rod approximately 45 mm.	
F	Open the Isolate Valves A and B on the Pressure Balancing Valve connected to the process piping.	
G	Set the handle on the Hydraulic Pump to position “Transducer Out” and let the movement of the Piston Rod stop in outer (retracted) position.	
H	Close Valve #1 on the Double Block & Bleed Valve.	
I	Close the valve at the pressure outlet of the process piping.	
J	Make sure that both Isolate A and Isolate B Valves are open.	
K	Open the Bleed Valve on the Pressure Balancing Valve to release the pressure inside the Double Block & Bleed Valve and the Gas Hose from the process piping.	
L	Release the pressure in the Hydraulic Cylinder.	
M	Close valve #2 on the Double Block & Bleed Valve.	
N	Disconnect the two Hydraulic Hoses from the Hydraulic Cylinder.	

Task No.	Description	Done
O	Close the Bleed Valve and Isolate B Valve on the Pressure Balancing Valve. Isolate A Valve remains open. Confirm no pressure leakage by opening and closing the Bleed Valve.	
P	Disconnect the Hydraulic Cylinder from the Double Block & Bleed Valve. Pull the Cylinder carefully backwards. The Transducer is attached to the Interface Nut on the Piston Rod.	
Q	Remove the Transducer from the Interface Nut.	

4.4. Replacing the Transducer (Section 2.5)

Task No.	Description	Done
A	Replace the damaged Transducer. Take note of the Tansducer serial number.	
B	Make sure that the Bleed Valve and Isolate B Valve on the Pressure Balancing Valve is closed. Isolate A Valve must be open.	
C	Connect the replacement Transducer to the Interface Nut on the Hydraulic Cylinder rod.	
D	Observe that the Piston Rod is located in its retracted position.	
E	Connect the Hydraulic Cylinder to the Double Block & Bleed Valve, and tighten the Cylinder Fastening Nut.	
F	Connect the two Hydraulic Hoses on the Hydraulic Cylinder.	
G	Open first Valve #2 and then Valve #1 on the Double Block & Bleed Valve.	
H	Set the direction handle on the Hydraulic Pump to position “Transducer In”.	
I	Push the Piston Rod with the Transducer into the Spool Nozzle by operating the Hydraulic Pump. Stop approximately 45 mm from the inner position.	
J	Open the Bleed Valve on the Pressure Balancing Valve to release the gas pressure inside the Double Block & Bleed Valve.	
K	Continue pushing the Piston Rod into the Spool Nozzle until the Piston Rod has reached the inner position.	
L	Tighten the Locking Screws in the inner position.	
M	Set the Direction Handle on the Hydraulic Pump to the “Transducer Out” position.	
N	Disconnect the Hydraulic Hoses from the Hydraulic Cylinder	

Task No.	Description	Done
O	Release the Transducer from the Piston Rod.	
P	Disconnect the Hydraulic Cylinder from the Double Block & Bleed Valve.	
Q	Operate both Valve #1 and Valve #2 on the Double Block & Bleed Valve, first to closed position, then back to open position.	
R	Disconnect the Double Block & Bleed Valve from the Mounting Adapter.	
S	Disconnect the Mounting Adapter.	
T	Replace the O-ring on the End Cover.	
U	Connect the Transducer Cable to the Transducer.	
V	Mount the End Cover.	
W	Unscrew the Locking Screws to their outer position, stopping at the Seeger ring.	
X	Make sure that the correct Transducer name plate and the numbering for the cable is located at its right place.	
Y	Disconnect the Gas Hose from the pressure outlet.	

MPU Transducer Replacement Procedure using theTransducer Retraction Tool

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