Turbine Gas Meter
Automatic lubrication system

INSTRUMENT INSTRUCTION MANUAL

Revision History

Revision	Content of Change	Document Pages total :

Used Signs

Sign	Description
	**Warning** Indicates a procedure that has to be strictly followed as contravention may result in injury to personnel or loss of life
	**Caution** Highlights a procedure which, if not strictly followed , can result in injury to personnel or damage to equipment
	**Note** Is an important element of the procedure and should be observed

Contents

FIGURES

In the design and construction of this equipment and instructions contained in this manual, due consideration has been given to safety requirements in respect of statutory industrial regulations.

Users are reminded that these regulations similarly apply to installation, operation and maintenance, safety being mainly dependent upon the skill of the operator and strict supervisory control.

1 INTRODUCTION

The Instromet Turbine Gas Meter is a state of the art precision instrument, which measures the flow of gases by means of a turbine wheel. As extension to the known lubrication possibilities Instromet has developed an Automatic Lubrication System. With the line pressure and an electrical signal this system is able to lubricate the turbine gas meter independently. It will help to keep the turbine gas meter in the optimum working condition.

The purpose of this manual is to provide a general guide to the installation, operation and care of automatic lubrication system for turbine gas meter. Every effort has been made to ensure that the information contained in this manual is as accurate as possible, however, the continuous improvements which Instromet makes to its products may result in small inconsistencies. Custom manufactured equipment or “specials” may also result in differences.

It is highly recommended to use the Automatic lubrication system in combination with the Instromet Smart-Index providing the required signal.

It is therefore prudent to consult the specific technical data and other documents which accompanies the system. If in any doubt, Instromet should be contacted.

2 GENERAL DESCRIPTION

The automatic lubrication system must be considered a part of the pressure containing system.

2.1 Operating principle

The automatic Lubrication System consists of three main parts, pressure regulator (1), solenoid valve (2) and oil pump (3). The working principle of the pressure regulator and solenoid valve are described in the manuals from the suppliers, see attachments. In this part we will only describe the working principle of the oil pump.

Fig. 1 Automatic Lubrication System

All other parts are described in the attached company manuals. See attachments

2.1.1 Working principle of the oil pump

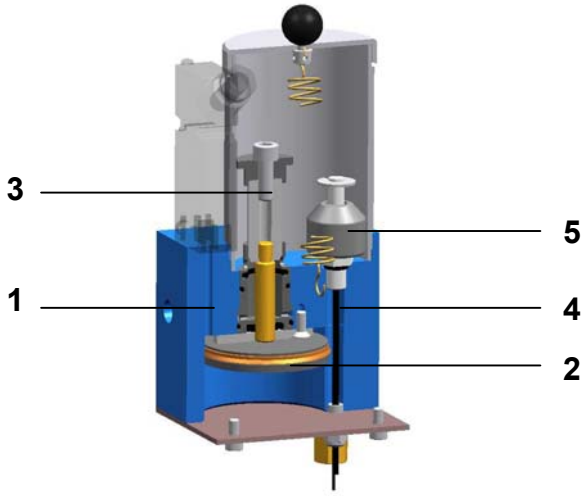
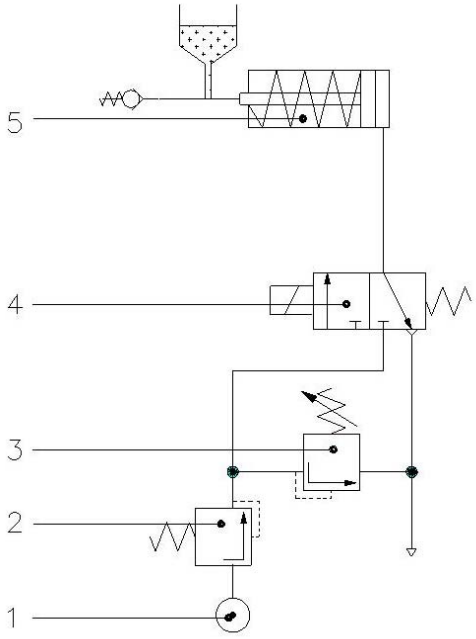


Fig. 2 Pump Automatic Lubrication system

The oil pump consists of two main parts, as they are pump body and the piston assembly. This assembly consists of a pneumatic piston (2) and a hydraulic piston (3), see figure 2. By means of the 3/2 solenoid valve channel (1) is pressurised and de-pressurised. When pressurised the pneumatic piston is activated its force exceeded the spring setting and pulls the hydraulic piston into the housing. The locked quantity of lubrication in housing is transported trough the channel (4) to the turbine gas meter. De-pressurising the pneumatic piston will allow the spring to pull up the hydraulic piston again allowing the pump body to re-fill again for the next stroke. In order to detect a low oil level in the oil reservoir a low-level switch (5) is built in. This switch can be easily changed from NO (normally open) into NC (normally closed) by means of reverse mounting of the lever. For description see attachment Reverse Contact

2.1.2 Flow chart of the oil pump



Index

1	Pressure tapping point
2	Pressure regulator
3	Safety valve
4	Solenoid valve
5	Oil pump

Fig. 3 Principle flow chart

From the pressure tapping point the gas or compressed air is lead to the pressure regulator which is reducing the (line) pressure 7 upto 130 bar to 6 bar. An additional safety relief valve (3) is build in to protect the system. This relieve valve is be connected with the open air in case the line pressure is used. The solenoid valve (4) is also equipped with a button to allow manual lubrication. With this button the pump can be tested also.

3 INSTALLATION

Installation only by authorised skilled people.

International, national, local and company safety rules are to be strictly followed as contravention may result in injury to personnel or loss of life.

Factory settings of pressure regulator and pressure relieve valve are not to be changed.

Recommended way of connecting to a turbine gas meter is described in Technical Note TN-11.368

If the meter is located in a zone classified as hazardous, all connections must be to intrinsically safe circuits.

Connect the (line) pressure or compressed air to the pressure regulator inlet marked with “in”.

Verify if the outlet pressure from the regulator is appropriate to the intended application.

Fill the oil reservoir with the oil delivered with the turbine gas meter.

The oil should be clean and free of liquids, dust or foreign material, which could damage the automatic lubrication system.

3.1 Start-Up

At the first use external oil pipes has to be filled-up with oil. This has to be done by a predicted number of manual strokes using the button on the solenoid.

Each push is one stroke.

In order to estimate the required number of strokes the equation below can be used.

Number lubrications = (L / 8) + V

Where:

L = the length of the external oil piping in cm

V = additional volume inside meter body as a factor depending on size

Size	V
50 / 2”	1
80 / 3”	1
100 / 4”	3
150 / 6”	4
200 / 8”	4
250 / 10”	7
300 / 12”	8
400 / 16”	10
500 / 20”	12
600 / 24”	14

Lubricate the turbine gas meter with the required strokes by pushing the red button on the solenoid valve and checking the hydraulic piston is moving at each strokes.

Close the oil reservoir.

Adjust the right lubrication frequency at the Smart-Index. See manual Smart Index. Lubrication frequency for normal use is given in attachment Oil Frequency

4 MAINTENANCE

It is not allowed to carry out any repair or maintenance during use.

The turbine gas meter operates under pressure and / or at dangerous mediums.

The turbine gas meter can be in operation at high or low temperature.

Due to this fact the turbine gas meter can turn very hot or cold and touching can cause serious injuries.

4.1 Periodic inspections

No inspection (of the lubrication system) can be done while the system is activated.

The gas stream should be clean and free of liquids, dust or foreign material, which could damage the meter rotor and mechanism.

A correct functioning of the piston can be checked by measuring “L”, with a clean slide gauge, the distance between hydraulic piston and the top of the oil reservoir, see figure 4

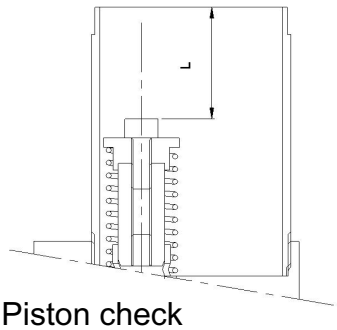


Fig. 4 Piston check

Operate button manual and measure the distance L again. The difference between the two measurements must be 26 ±1 mm. If the distance is less the system is not working correct and needs maintenance.

5 TROUBLE SHOOTING

No inspection and or maintenance (of the lubrication system) can be done while the system is activated.

Check the working pressure of the automactic lubrication system. This is the outlet pressure of the pressure regulator it must 6 bar. Measure the distance L again as described above.

If the required distance is not achieved the cilinder inside (1) has to be cleaned and greased again. Remove cable gland (2) from oil-level switch, untight 4 crews (3) and remove the bottom, see figure 5.

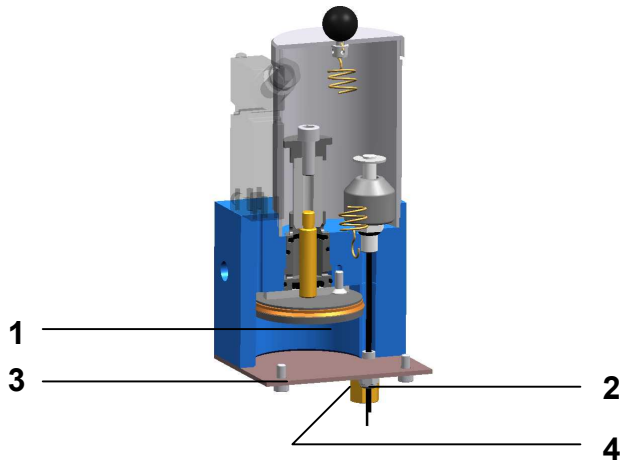


Fig. 5 How to Clean

Clean the cilinder inside and grease with Molykote 55M or equal. Mount all parts and perform 10 manual strokes. At the last stroke the distance L should measured again. If the distance L is still to smal the “back” pressure from the turbine gas meter may be to high. This is to verify by removing the oil pipe (4) at the bottom side of the lubrication system see figure 5. Please collect the released oil and discharge it in the correct way.

Perform a manual stroke again and measure the distance L again. If the distance is correct the check valve of the turbine gas meter is the problem. Otherwise the automatic lubrication system is defect.

5.1 Refilling the oil reservoir

The oil reservoir has to checked and refilled regularly. See attachment 9.2 Before refilling verify the remaining oil is clean. If not, the remaining oil should be discharged in a proper way. To discharge the remaining oil the drain at the bottom of the oil reservoir can be opened or the pump has to be dismantled.

6 DISMANTLING

Before a meter may be dismantled or removed from the installation, the line must be de-pressurised.

It is important that the line is de-pressurised slowly and with care to prevent damage to the turbine and bearings. See manual turbine gas meter

The measuring line should be at ambient temperature before the gas meter is removed.

The oil reservoir has to checked and the remaining oil should discharged on a proper way. To discharge the remaining oil the drain at the bottom of the oil reservoir can be opened or the pump has to be dismantled

Dismantling the pump by:

Remove (line) pressure or compressed air from the system

Remove the pressure connection

Remove the electrical connection

Dis-assamble the pump from the turbine gas meter by removing the 2 M8 bolts

Remove the remaining oil from the reservoir and discharge it on a proper way

7 FURTHER INFORMATION

7.1 Publications by Instromet

Turbine Gas Meter Handbook

P-Meter Handbook: Turbine Meters for Ethylene

7.2 International Reference Material

International standards:

ISO 9951: 1993,

Measurement of gas flow in closed conduits – Turbine meters.

Recommendations of the International Organisation of Legal Metrology:

7.3 OIML R6, General specifications for gas volume meters

7.4 OIML R32, Rotary piston meters and turbine gas meters

American Gas Association:

7.5 AGA report No. 7, Measurement of fuel gas by turbine meters.

8 TECHNICAL SPECIFICATION & PART IDENTIFICATION

8.1 Technical specification Oil pump

Materials

Body material	:	Aluminium anodized
Piston and Spring	:	Stainless steel
Seals	:	NBR
Temp. range	:	263.15 – 333.15 K (-10 / +60° C)
Max. oil pressure	:	10 M pa (100 bar)
Content reservoir	:	175 cc
Capacity / stroke	:	1.5 cc
Connecetion	:	6mm Swagelock

8.2 Technical specification Solenoid Valve

Power supply	:	24V ± 10%
Powerconsumption	:	0.5 W
Protection class	:	IP65
Ex approval class	:	II 2G EEx ia IICT5 or T6 (Old - EEx ia IIC6T)
Min. puls	:	3 sec
Min. delay time	:	5 sec (resting time)

For furhter informations and instructions see:

Operating Instructions Bürkert
Function descriptions Solenoid valve Type 6106

8.3 Technical specification Level-switch

Material	:	Polyamide
Switch	:	Reed switch
Execution	:	NC (standard) or NO
Max. current	:	0.5A
Max. voltage	:	200V

8.4 Technical specification Pressure Regeulator

For further information and instructions see:

Tescom technical information
Tescom Operatiing and servicemanual
Tescom safety, Installation & Operation precautions

9 ATTACHMENTS

9.1 Reverse Contact

If required the oil-level switch, which is Normaly Open, can be changed into Normaly Closed version.

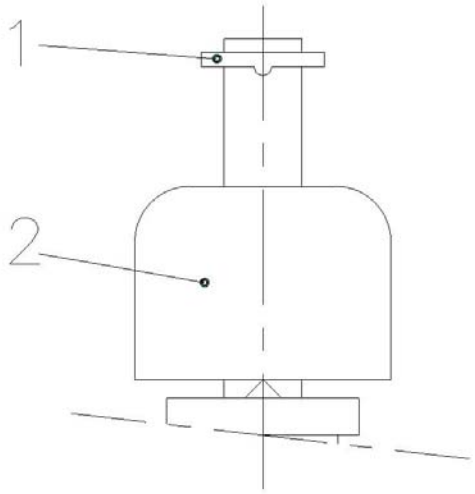


Fig. 6 Detail lever-switch

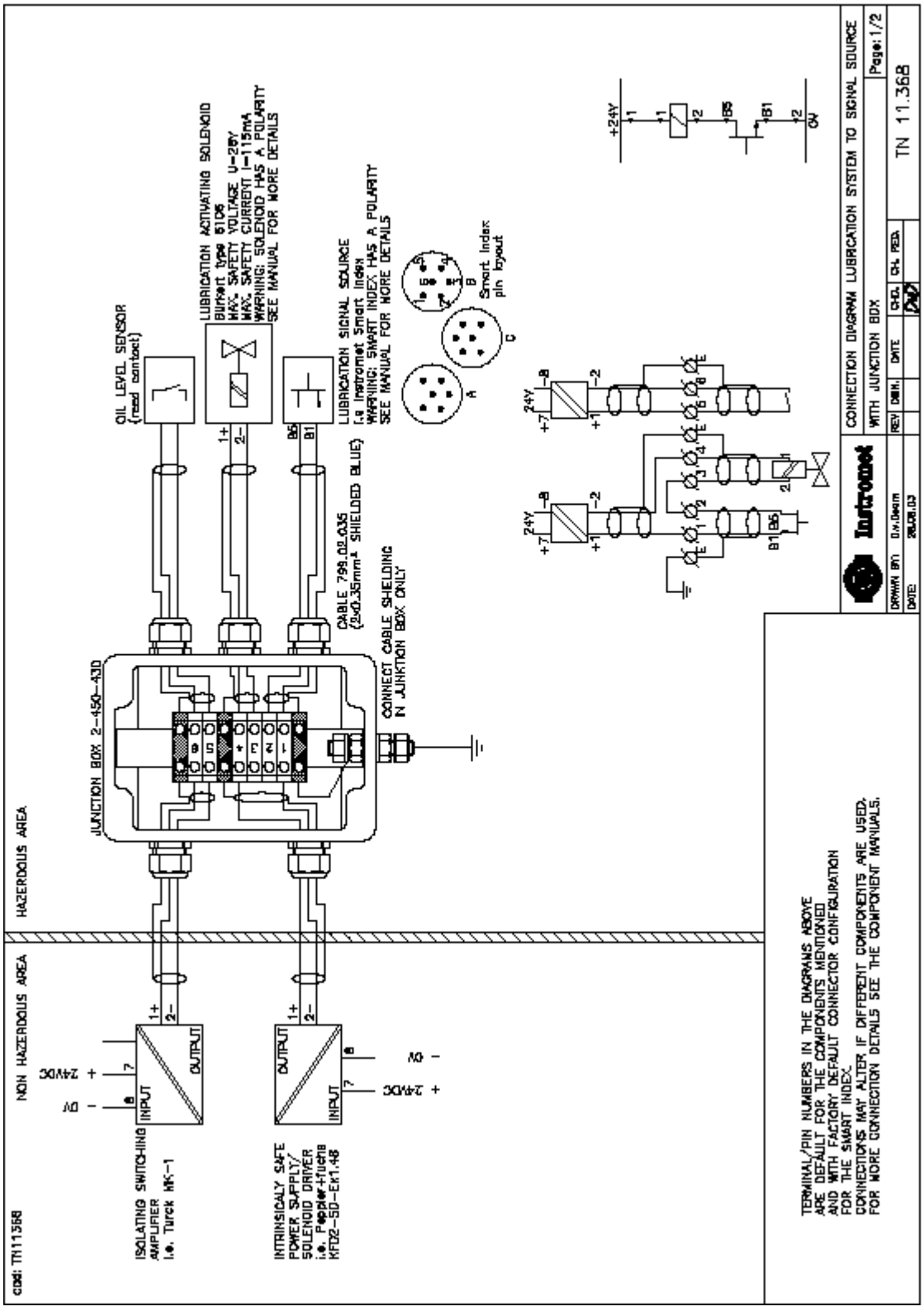
- Prepare your tools to be clean
- Open the reservoir by removing the reservoir cap.
- Remove ring (1) figure 7
- Take the level-body (2) from the pilar
- Place the level-body upside down
- Replace ring (1)
- Test the sensor
- Close the reservoir with the cap again

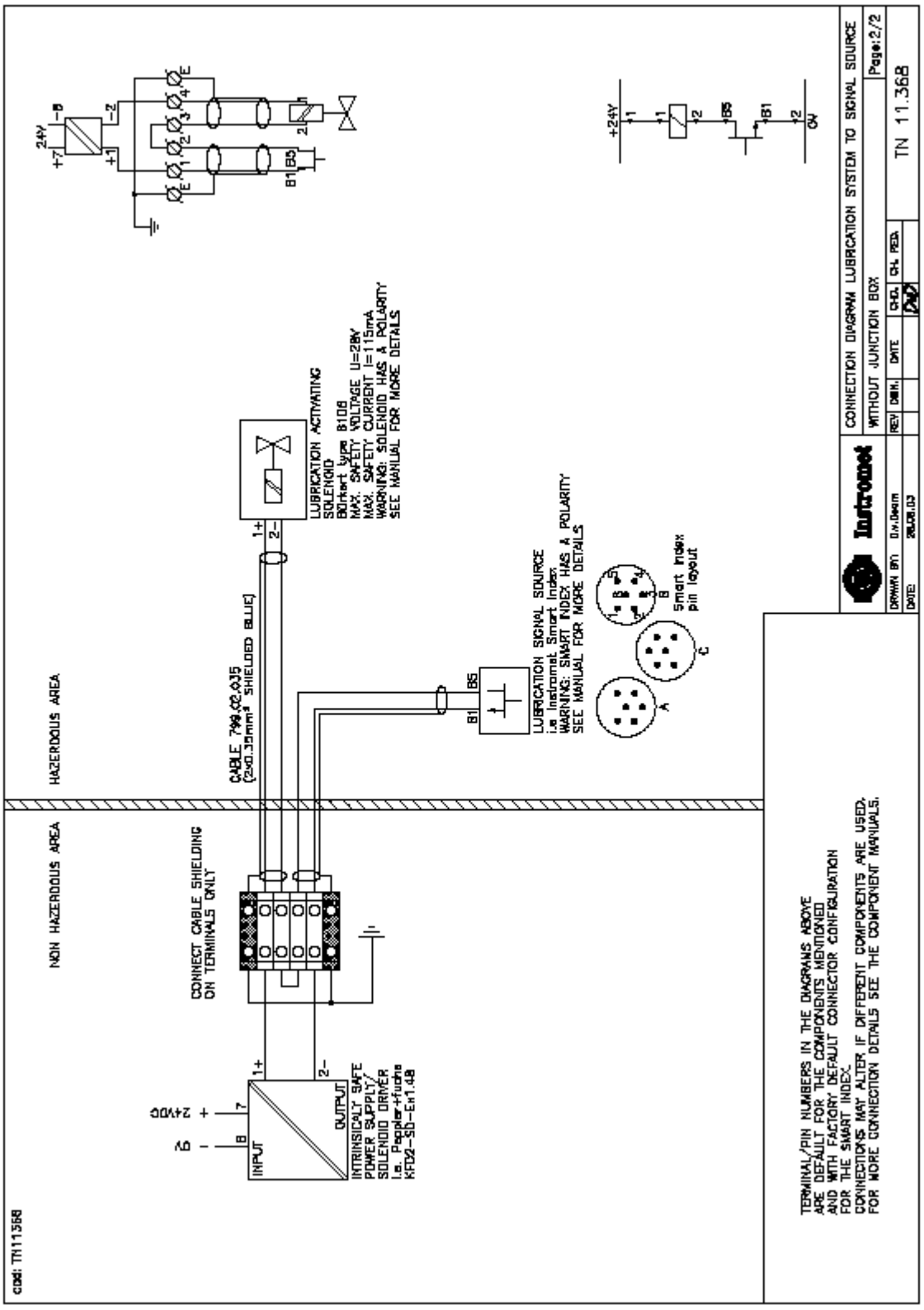
9.2 Oil Frequency

Lubricating frequency of Instromet trubine gas meters

Size	Lubricatio 1 x per …. Days	Lubrication quantity (cc)	Reservoir refill 1x per …. year
50 / 2”	60	1.5	5
80 / 3”	60	3	5
100 / 4”	60	3	5
150 / 6”	60	4.5	5
200 / 8”	60	4.5	5
250 / 10”	60	7.5	3
300 / 12”	60	7.5	3
400 / 16”	60	9	3
500 / 20”	60	12	2
600 / 24”	60	12	2

9.3 Connection diagramm




CONNECTION DIAGRAM LUBRICATION SYSTEM TO SIGNAL SOURCE
WITHOUT JUNCTION BOX
Page:2/2
TN 11.368
HAZERDOUS AREA
NON HAZERDOUS AREA
CABLE 799.02.035
(2x0.35mm² SHIELDED BLUE)
LUBRICATION ACTIVATING SOLENOID
BOrtert type B108
MAX. SAFETY VOLTAGE U=28V
MAX. SAFETY CURRENT I=115mA
WARNING: SOLENOID HAS A POLARITY
SEE MANUAL FOR MORE DETAILS
LUBRICATION SIGNAL SOURCE
i.e Instromet Smart Index
WARNING: SMART INDEX HAS A POLARITY
SEE MANUAL FOR MORE DETAILS
Smart Index
pin layout
CONNECT CABLE SHIELDING
ON TERMINALS ONLY
INTRINSICALLY SAFE
POWER SUPPLY/
SOLENOID DRIVER
i.e. Pepperl+fuchs
KFD2-SD-Ex1.48
INPUT
OUTPUT
24VDC
0V
TERMINAL/PIN NUMBERS IN THE DIAGRAMS ABOVE
ARE DEFAULT FOR THE COMPONENTS MENTIONED
AND WITH FACTORY DEFAULT CONNECTOR CONFIGURATION
FOR THE SMART INDEX.
CONNECTIONS MAY ALTER IF DIFFERENT COMPONENTS ARE USED.
FOR MORE CONNECTION DETAILS SEE THE COMPONENT MANUALS.

9.4 Description Solenoid type 6106

Type 6106
(3/2-way)

DN 0.6 mm; 0 - 8 bar; BURKERT sub-base; flow rate: 8.5 l/min

Design/Function

The valve consists of a plastic body, a frictionless rocker armature with spring and a DC coil. A stainless steel plate hermetically isolates the fluid from the actuator.

The innovative rocker alternately opens or closes two connections when switched. All 3/2 circuit functions can be achieved by pressuring or exhausting a further outlet connection via them. The de-energized position is spring set.

The simple design ensures that the valves can be switched with a minimal rocker movement combining low wear under absolute non-lube conditions.

The external surfaces of the valve are smooth preventing dirt particles from adhering.
The valves can be driven by a PLC with their low power consumption .

A manual override allows easy maintenance and commissioning of the valve.

Advantages/Benefits

- EEx-i-IIC T6 approved
- Simple design, robust and frictionless
- Long service life, under absolute non-lube conditions
- Compact size
- PLC-compatible; low power and high drop-out voltage
- Suitable for technical vacuum

Applications

Fluids

- Lubricated, non-lubricated dry air
- Neutral gases
- For technical vacuum

Applications

- Direct-acting single valve
- Pilot valve
- Actuator control
- Logic control circuits
- Manifold assembly

bürkert
Fluid Control Systems

Direct-acting rocker Solenoid Valve, sub-base mounting 16 mm wide

Type 6106
(3/2-way)

Technical Data

Circuit Functions

C 3/2-way valve, when de-energized, port A exhausted

Symbol

Specifications

Orifice DN [mm]	Flow QNn-value air[2] P→A BURKERT	Manifold B→R BURKERT	Pressure range[1] [bar]	Weight [g]	Electr. power consumption [W]
0.6	8.5	9.5	0 - 8	60	0.5

[1] All pressures quoted are gauge pressures with respect to the prevailing atmospheric pressure.
[2] Measured with 6 bar upstream pressure and 1 bar pressure drop across the valve at +20 °C.

Valve specification

Body material	PA (polyamide)
Seal material	FPM (Viton)
Isolating plate between body and coil	stainless steel
Fluids	lubricated, unlubricated, dry air, neutral gases, for technical vacuum
Max. viscosity	approx. 21 mm²/s
Ambient temperature	–10 up to +55 °C
Fluid temperature	–10 up to +55 °C
Port connection	BURKERT-interface with connection through the bottom

Response times[3]

Opening	70 ms
Closing	70 ms

[3] The response times of a 3/2-way valve are determined using an end volume of approx. 1 cm³. The times are measured at outlet A from switching on until pressure rise to 90% /pressure drops to 10%. Delay time: Time from electrical switching on until the beginning of the pressure change.

Solenoid specification

Nominal voltage	24 V DC (power supply)
Voltage tolerance	±10 %
Power consumption	0.5 W (optimum operating current > 30 mA)
Drop-out voltage (for switching rocker)	at least 0.15 x voltage nominal (under the regulations VDE 0580)
Electr. control	PLC-controllable
Cycling rate	600 c.p.m.
Duty cycle	100 % continuously rated
Rating	IP 65 with cable plug
Type of protection	EEx i IIC T6
Electr. connection Standard:	connectors according DIN 43 650 on top (do not use connectors with LED or circuitry)

Electrical specifications

Power supply only from certified intrinsically safe circuits with following max. values:

Explosion group	IIC
Max. safety voltage	U = 28 V
Max. safety current	I = 115 mA
Consumption of energy for block mounting	P = 0.7 W (ambient temp. +60 °C)
Consumption of energy for single mounting	P = 0.8 W (ambient temp. +60 °C)

Installation/Accessories

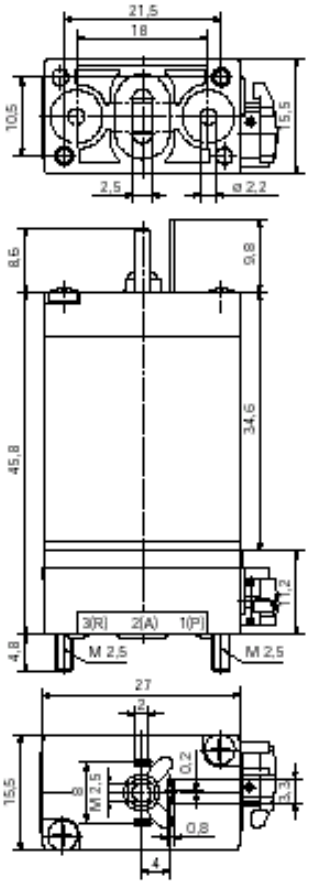
Installation	as required, but preferably with solenoid system upright
Manifolding	with common pressure supply max. 12 valves on special manifolds (as accessory)
Coil spacing	16,5 mm

Direct-acting rocker Solenoid Valve, sub-base mounting
16 mm wide

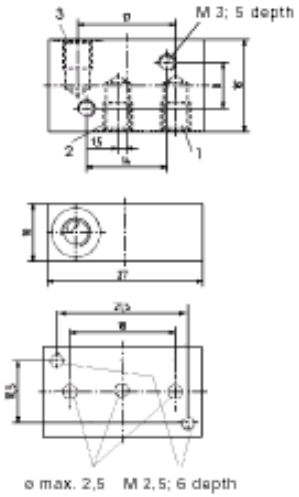
Type 6106
(3/2-way)

Dimensions [mm]

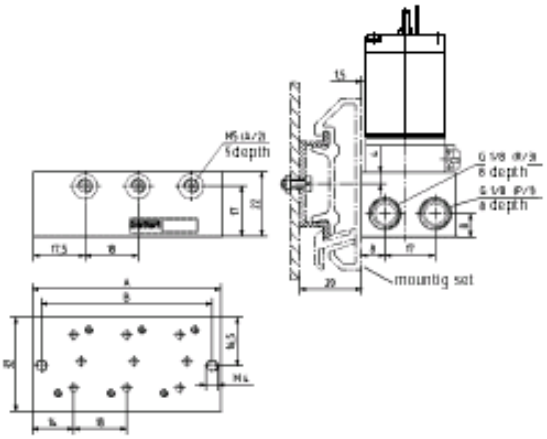
Type 6106 with Burkert-flange, tag connectors above



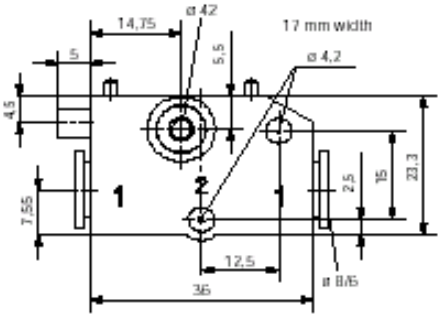
Single manifold for Burkert sub-base



Multiple manifold for Burkert sub-base



Module for plug-in coupling



Instromet®

Direct-acting rocker Solenoid Valve, sub-base mounting 16 mm wide

Type 6106
(3/2-way)

Ordering Chart (Other Versions on Request)

Version with tag connector on top, polyamide body and FPM-seal.
Supply package includes 2 mounting screws M2.5 x 16; without cable plug (see accessories)

Circuit-function	DN [mm]	Q_{nn}-value air [l/min] 1→2	[l/min] 2→3	Pressure [bar]	Port-connection interface to	Voltage [V DC]	Power consumption [W]	Item-No.
C	0.6	8.5	9.5	0 - 8	BURKERT	24	0.5	139 272 D

Accessory Ordering Chart

Unit	Characteristics	Item-No.
Cable plug Type 2506	no wiring, 0–250 V	008 353 P
Single manifold BURKERT	width 16 mm, port connection M5	623 873 V
Single manifold BURKERT	width 16 mm, port connection G1/8	634 917 L

Manifolds Ordering Chart
Multiple manifolds (material: aluminium);
for Burkert-sub-base; coil spacing 18 mm

Manifold	A [mm]	B [mm]	Item-No.
2 Station	46	40	629 500 J
3 Station	64	58	629 169 R
4 Station	82	76	629 501 F
5 Station	100	94	629 502 G
6 Station	118	112	629 503 H
7 Station	136	130	629 504 A
8 Station	154	148	629 505 B
9 Station	172	166	629 890 H
10 Station	190	184	629 919 H
11 Station	208	202	007 110 X
12 Station	226	220	629 920 E
Connection kit DIN-rail TS 35 x 7,5 mm			629 254 N
Blanking plate			629 327 F

In case of special application conditions, please consult for advice.

We reserve the right to make technical changes without notice.

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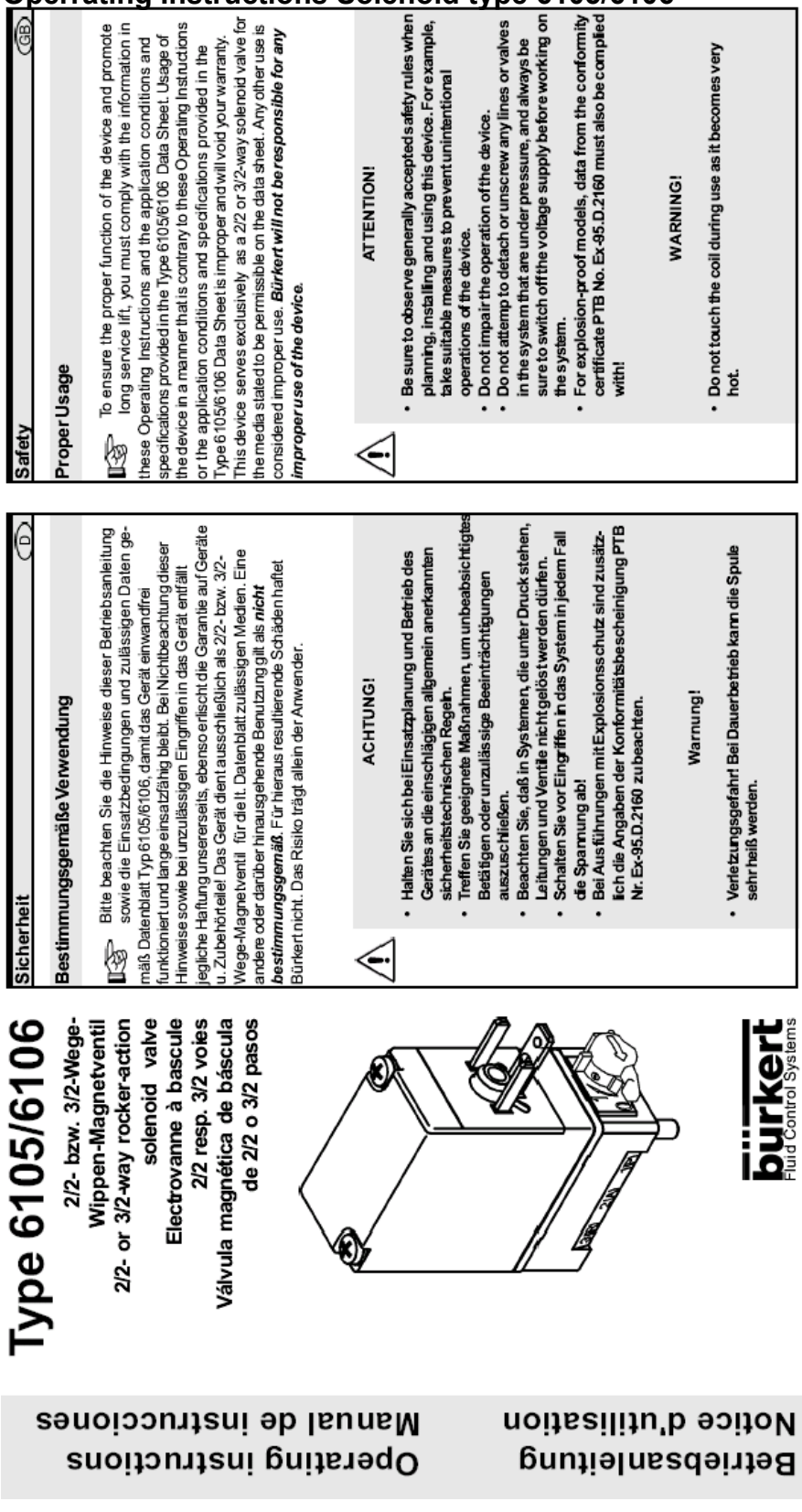
9.4.1 Operrating Instructions Solenoid type 6105/6106



Safety (GB)

Proper Usage

To ensure the proper function of the device and promote long service lift, you must comply with the information in these Operating Instructions and the application conditions and specifications provided in the Type 6105/6106 Data Sheet. Usage of the device in a manner that is contrary to these Operating Instructions or the application conditions and specifications provided in the Type 6105/6106 Data Sheet is improper and will void your warranty. This device serves exclusively as a 2/2 or 3/2-way solenoid valve for the media stated to be permissible on the data sheet. Any other use is considered improper use. ***Bürkert will not be responsible for any improper use of the device.***

ATTENTION!

- Be sure to observe generally accepted safety rules when planning, installing and using this device. For example, take suitable measures to prevent unintentional operations of the device.
- Do not impair the operation of the device.
- Do not attempt to detach or unscrew any lines or valves in the system that are under pressure, and always be sure to switch off the voltage supply before working on the system.
- For explosion-proof models, data from the conformity certificate PTB No. Ex-95.D.2160 must also be complied with!

WARNING!

- Do not touch the coil during use as it becomes very hot.

Sicherheit (D)

Bestimmungsgemäße Verwendung

Bitte beachten Sie die Hinweise dieser Betriebsanleitung sowie die Einsatzbedingungen und zulässigen Daten gemäß Datenblatt Typ 6105/6106, damit das Gerät einwandfrei funktioniert und lange einsatzfähig bleibt. Bei Nichtbeachtung dieser Hinweise sowie bei unzulässigen Eingriffen in das Gerät entfällt jegliche Haftung unsererseits, ebenso erlischt die Garantie auf Geräte u. Zubehörteile! Das Gerät dient ausschließlich als 2/2- bzw. 3/2-Wege-Magnetventil für die lt. Datenblatt zulässigen Medien. Eine andere oder darüber hinausgehende Benutzung gilt als ***nicht bestimmungsgemäß***. Für hieraus resultierende Schäden haftet Bürkert nicht. Das Risiko trägt allein der Anwender.

ACHTUNG!

- Halten Sie sich bei Einsatzplanung und Betrieb des Gerätes an die einschlägigen allgemein anerkannten sicherheitstechnischen Regeln.
- Treffen Sie geeignete Maßnahmen, um unbeabsichtigte Betätigen oder unzulässige Beeinträchtigungen auszuschließen.
- Beachten Sie, daß in Systemen, die unter Druck stehen, Leitungen und Ventile nicht gelöst werden dürfen.
- Schalten Sie vor Eingriffen in das System in jedem Fall die Spannung ab!
- Bei Ausführungen mit Explosionsschutz sind zusätzlich die Angaben der Konformitätsbescheinigung PTB Nr. Ex-95.D.2160 zu beachten.

Warnung!

- Verletzungsgefahr! Bei Dauerbetrieb kann die Spule sehr heiß werden.

Type 6105/6106

2/2- bzw. 3/2-Wege-Wippen-Magnetventil

2/2- or 3/2-way rocker-action solenoid valve

Electrovanne à bascule 2/2 resp. 3/2 voies

Válvula magnética de báscula de 2/2 o 3/2 pasos

bürkert Fluid Control Systems

Betriebsanleitung
Notice d'utilisation
Operating instructions
Manual de instrucciones

Sécurité (F)

Utilisation conforme aux prescriptions

Afin que l'appareil puisse fonctionner parfaitement et pendant longtemps, veuillez observer les instructions contenues dans cette notice d'utilisation ainsi que les conditions d'utilisation et les données admissibles mentionnées dans la fiche technique du type 6105/6106. En cas d'inobservation de ces instructions et d'interventions non autorisées dans l'appareil, nous déclinons toute responsabilité et la garantie couvrant l'appareil et les accessoires s'éteint! L'appareil sert uniquement d'électrovanne 2/2 resp. 3/2 voies pour les fluides admis selon la fiche technique. Une autre utilisation ou une utilisation excédant ce contexte sera considérée comme ***non conforme aux prescriptions***. Pour les dommages qui en résulteraient, le fabricant/fournisseur décline toute responsabilité. L'utilisateur seul en assume le risque.

ATTENTION!

- **Pour la planification de l'utilisation et l'exploitation de l'appareil, veuillez vous en tenir aux règles applicables et généralement reconnues en matière de technique de sécurité.**
- **Prenez les mesures nécessaires pour exclure tout actionnement involontaire ou des altérations inadmissibles.**
- **Notez qu'il n'est pas permis de desserrer des conduites ou des vannes se trouvant sous pression dans des systèmes!**
- **Avant d'intervenir dans le système, coupez l'alimentation électrique dans tous les cas!**
- **Dans les exécutions antidéflagrantes, les indications de l'attestation de conformité PTB N° Ex-95.D.2160 doivent observées en plus.**

AVERTISSEMENT!

- **Risque de blessure! En cas de fonctionnement permanent, la bobine peut devenir très chaude.**

Seguridad (E)

Utilización con arreglo a las disposiciones

Se ruega observar las indicaciones contenidas en este Manual de instrucciones así como las condiciones de uso y datos admisibles con arreglo a la hoja de servicio Tipo 6105/6106, de modo que el aparato funcione impecablemente y permanezca durante largo tiempo apto para el empleo. La inobservancia de estas indicaciones así como las intervenciones inadmisibles en el aparato suponen la declinación por nuestra parte de toda clase de responsabilidad, además de la extinción de la garantía de los aparatos y de las piezas de los accesorios. El aparato sirve exclusivamente como válvula magnética de 2/2 o 3/2 pasos para los medios autorizados según la hoja de datos. Cualquier otra utilización que vaya más allá ***no será conforme a las disposiciones.*** El fabricante / suministrador no es responsable de los daños que de ello pudieran resultar. El riesgo corresponde únicamente al usuario.

¡ATENCIÓN!

- **Para la planificación y operación del aparato atenerse a las correspondientes reglas generales y reconocidas de la técnica de seguridad.**
- **Tomar las medidas apropiadas para excluir accionamientos no intencionados o perjuicios inadmisibles.**
- **Prestar atención a que en el caso de sistemas que se encuentren bajo presión no deben desconectarse conducciones y válvulas.**
- **Antes de proceder a intervenciones en el sistema desconectar siempre la tensión.**
- **En las ejecuciones con protección debe tenerse adicionalmente en cuenta los datos de la declaración de conformidad PTB n° Ex-95.D.2160.**

¡AVISO!

- **¡Peligro de lesiones! En estado de operación continua la bobina puede ponerse muy caliente.**

Sicherheit (D) (GB) (F) (E)

Safety / Sécurité / Seguridad

① Spannungsfreie Montage / Voltage-free assembly
Montage sans tension / Montaje libre de tensión

② Elektrischer Anschluß / Electrical connection
Raccordement électrique / Conexión eléctrica

Sicherheit
D GB F E
Safety / Sécurité / Seguridad
3 Wechselspannung / Alternating voltage
Tension alternative / Tensión alterna
AC
Type 2506 (2510)
4 Fluidischer Anschluß / Fluid connection
Raccordement fluidique / Conexión fluídica
0 bar, psi, kPa

Technische Daten
D GB
Technical Data
Temperatur / Temperature
Umgebung/ Surroundings
max. 55°C
Gehäuse/Housing
PA (Polyamid/Polyamide)
Temp.
Medium
-10 .. +55 °C
Dichtwerkstoff
Sealing material
FPM
Nennweite/Nominal size
Wirkungsweise
Circuit function
Typ / Type
Beispiel
Example
6106 C 0,9
P 0 - 7 bar
24 V DC 1W
W14UN
450000Y
MADE IN GERMANY
Bestell-Nr. / Id. No.
Spannung (±10 %) - Leistung
Voltage (±10 %) - Power
Druckbereich/Pressure range
A
B
C
D
Technische Änderungen vorbehalten
We reserve the right to make technical changes without notice

Technische Daten
F E
Caractéristiques techniques / Datos técnicos
Température d' ambiante
Temperatura de ambiente
max. 55°C
Boîtier/Caja
PA (Polyamida)
Temp.
Fluide/Medio
-10 .. +55 °C
Matériau d'étanchéité
Material de estanqueidad
FPM
Dimension nominale
Anchura nominal
Fonctionnement
Funcionamiento
Type/Tipo
Exemple/
Ejemplo
6106 C 0,9
P 0 - 7 bar
24 V DC 1W
W14UN
450000Y
MADE IN GERMANY
N° id. / N° de pedido
Tension (±10%) - puissance
Tensión (±10 %) - potencia
Plage de pression / Gama de presión
A
B
C
D
Sous reserve de modification techniques.
Nos reservamos el derecho de llevar a cabo modificaciones técnicas
sin previo aviso.

Niederlassungen / Branch Offices

BÜRKERT GERMANY

Chr.-Bürkert-Straße 13-17
74653 Ingelfingen
Ph: (0 79 40) 10-0
Fax (0 79 40) 10-204
www.buerkert.com
info@de.buerkert.com

Berlin	Ph: (0 30) 67 97 17 - 0
Dortmund	Ph: (0 23 73) 96 81 - 0
Dresden	Ph: (03 59 52) 36 30 - 0
Frankfurt	Ph: (0 61 03) 94 14 - 0
Hannover	Ph: (05 11) 9 02 76 - 0
München	Ph: (0 89) 82 92 28 - 0
Stuttgart	Ph: (07 11) 4 51 10 - 0

BÜRKERT INTERNATIONAL

A	Ph.	(01) 894 13 33	Fax	(01) 894 13 00
AUS	Ph.	(02) 96 74 61 66	Fax	(02) 96 74 61 67
B	Ph.	(03) 325 89 00	Fax	(03) 325 61 61
BRA	Ph.	(011) 51 82 00 11	Fax	(011) 51 82 88 99
CDN	Ph.	(0905) 847 55 66	Fax	(0905) 847 90 06
CH	Ph.	(041) 785 66 66	Fax	(041) 785 66 33
CN	Ph.	(0512) 808 19 16	Fax	(0512) 824 51 06
CZ	Ph.	(0641) 22 61 80	Fax	(0641) 22 61 81
DK	Ph.	(044) 50 75 00	Fax	(044) 50 75 75
E	Ph.	(093) 371 08 58	Fax	(093) 371 77 44
F	Ph.	(01) 48 10 31 10	Fax	(01) 48 43 61 04
GB	Ph.	(01453) 73 13 53	Fax	(01453) 73 13 43
HKG	Ph.	(02) 24 80 12 02	Fax	(02) 24 18 19 45
I	Ph.	(02) 95 90 71	Fax	(02) 95 90 72 51
IRE	Ph.	(021) 486 13 36	Fax	(021) 486 13 37
J	Ph.	(03) 53 05 36 10	Fax	(03) 53 05 36 11
KOR	Ph.	(02) 34 62 55 92	Fax	(02) 34 62 55 94
MAL	Ph.	(0065) 383 26 12	Fax	(0065) 383 26 11
N	Ph.	(063) 84 44 10	Fax	(063) 84 44 55
NL	Ph.	(0346) 58 10 10	Fax	(0346) 56 37 17
NZ	Ph.	(09) 570 25 39	Fax	(09) 570 25 73
PL	Ph.	(022) 827 29 00	Fax	(022) 6 27 47 20
RC	Ph.	(02) 27 58 31 99	Fax	(02) 27 58 24 99
S	Ph.	(040) 664 51 00	Fax	(040) 664 51 01
SA	Ph.	(011) 397 29 00	Fax	(011) 397 44 28
SF	Ph.	(09) 54 97 06 00	Fax	(09) 503 12 75
SIN	Ph.	383 26 12	Fax	383 26 11
TR	Ph.	(0232) 459 53 95	Fax	(0232) 459 76 94
USA	Ph.	(0949) 223 31 00	Fax	(0949) 223 31 98

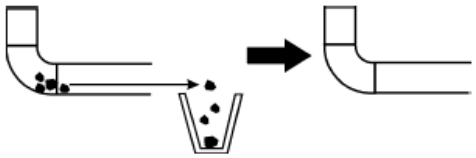
Betriebsanleitung-Nr. 893 214 - ind 08/jul01 07/01/1M

Montage

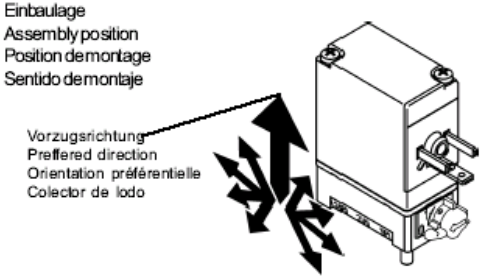
D GB F E

Montage / Assembly / Montage / Montaje

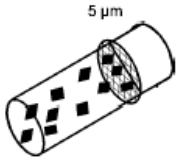
① Rohrleitungen reinigen / Cleaning the piperuns
Nettoyer les conduites / Limpieza tuberías



② Einbaulage
Assembly position
Position de montage
Sentido de montaje



③ Filterung / Filtering / Filtre / Filtro

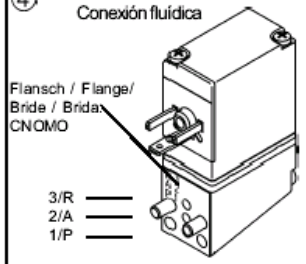


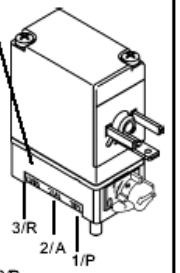
Montage

D GB F E

Montage / Assembly/ Montage / Montaje

④ Fluidischer Anschluß / Fluid connection / Raccordement fluidique
Conexión fluídica

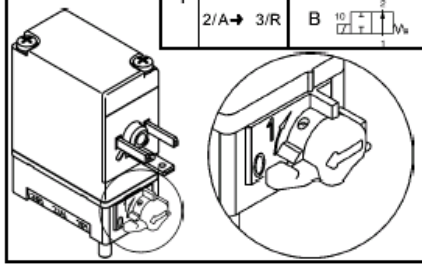




Umbau zum 2/2-Wegeventil: 3/R nicht anschließen
Conversion to 2/2-way valve: don't connect 3/R
Modification en vanne à 2/2 voies: ne pas raccorder 3/R
Transformación en válvula de 2/2: no conectar 3/R

⑤ Handbetätigung / Manual override
Actionnement manuel / Accionamiento a mano

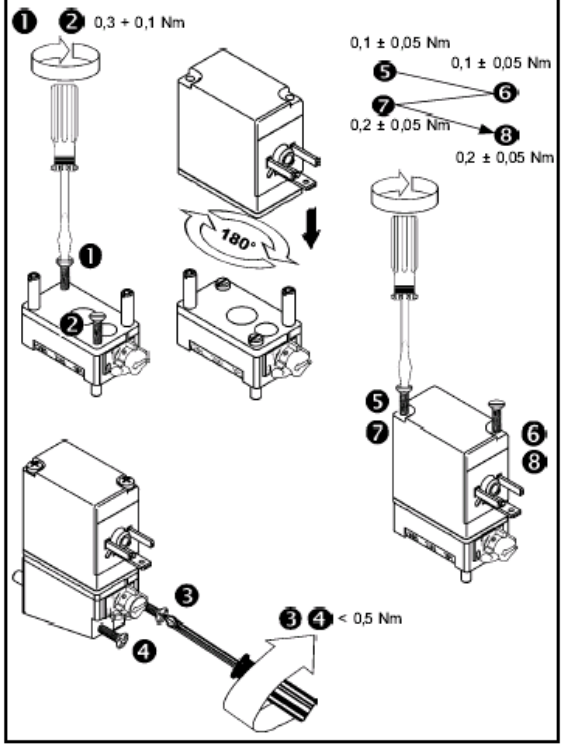
0	AUTO		
1	1/P → 2/A	A	C
	2/A → 3/R	B	D



Montage (D GB F E)

Montage / Assembly / Montage / Montaje

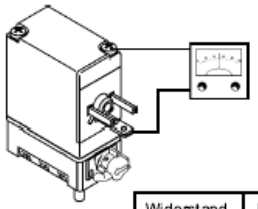
⑥ Montage / Assembly / Montage / Montaje



Montage (D GB F E)

Montage / Assembly / Montage / Montaje

⑦ Schutzleiterfunktion / Protective conductor function
Fonctionnement du conducteur de protection
Función del conductor de protector

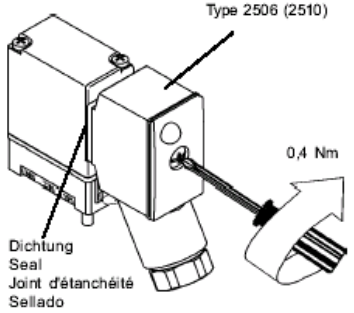


Nach Spulenmontage immer prüfen!
Always test function after assembly of coil!
Toujours vérifier après montage de la bobine!
¡Tras el montaje de bobina pruébese siempre la function¡

Widerstand resistance résistance intensidad	Prüfspannung test voltage tension d'essai tensión de prueba	Prüfstrom test current courant d'essai corriente de prueba
max. 0,1 Ω	12 V	1 A

⑧ Gerätesteckdose / Instrument socket / Connecteur / Caja de enchufe para aparatos eléctricos

Schutzleiter **immer** anschließen!
Always connect the protective conductor!
Raccordez dans **tous les cas** le conducteur de protection!
Conectar **en todo caso** el conductor de puesta a tierra!

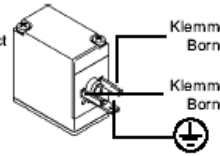


Montage (D GB F E)

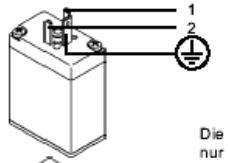
Montage / Assembly / Montage / Montaje

⑨ Elektrischer Anschluß / Electrical connection
Raccordement électrique / Conexión eléctrica

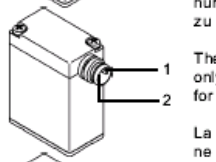
El. Anschluß seitlich
Side electrical contact
Raccordement électrique latéral
Conexión eléctrica lateral



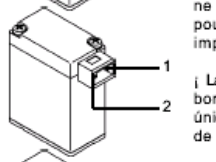
El. Anschluß oben
Upper electrical contact
Raccordement électrique en haut
Conexión eléctrica superior



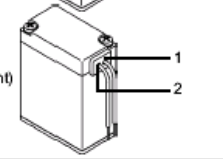
Rundstecker
Round plug
Fiche ronde
Clavija de enchufe coaxial



Rechteckstecker
Rectangular plug
Fiche rectangulaire
Clavija de enchufe cuadrada



Litzen
Wired connection
Cordon (raccordement)
Cordones (racor)



Die Klemmenbelegung ist nur bei Impulsausführung zu beachten!

The terminal allocation only has to be considered for the impulse models!

La connexion des bornes ne doit être observée que pour l'exécution à impulsions!

¡ La conexión de los bornes debe observarse únicamente con ejecución de impulso ¡

Montage

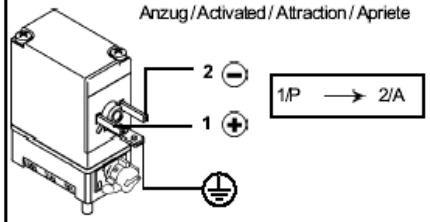
(D) (GB) (F) (E)

Montage / Assembly / Montage / Montaje

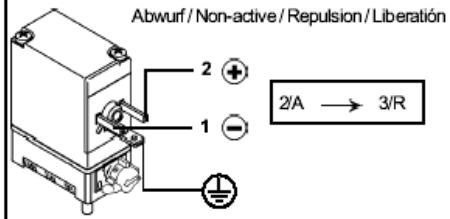
⑩ Impulsausführung / Pulsed model
Exécution à impulsions / La ejecución de impulso

Achten Sie auf die Polarität! / Note the polarity! / Attention! Veiller à la connexion des bornes. / ¡ATENCIÓN¡ Observar la conexión de bornes ¡

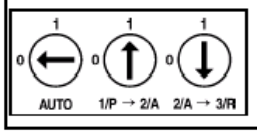
Anzug / Activated / Attraction / Apriete

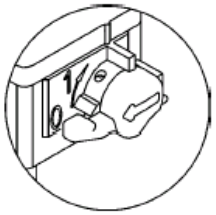


Abwurf / Non-active / Repulsion / Liberatión



Handbetätigung
Manual override
Actionnement manuel
Accionamiento a mano





Störungen

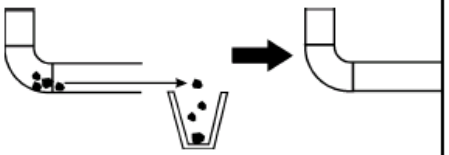
(D) (GB) (F) (E)

Troubleshooting / Dérangements / Averías

Spannung prüfen! / Check the voltage!
Vérifier la tension! / Comprobar tensión!

Druck prüfen! / Check the pressure!
Vérifier la pression! / Comprobar presión!

Rohrleitungen prüfen! / Check the piperun!
Vérifier les conduites! / Comprobar tuberías!



Ersatzteile

(D) (GB) (F) (E)

Spare parts/Pièces de rechange /Pieza de repuesto

Type 6105/6106

Spannung Voltage Tension Tensión [V / DC]	Leistung Rating Puissance Potencia [W]	Id.-Nr. Id. No. No cde. No de pedito	
24	1	131 296 N	131 300 E
24	2	131 295 M	131 299 Z
110-120	3	131 297 P	131 301 T
220-240	3	131 298 Y	131 302 U

Wirkungsweise Circuit function Fonctionnement Funcionamiento	DN [mm]	Id.-Nr. Id. No. No cde. No de pedito	
C	0,9	126 490 Q	131 308 A
C	1,2	126 488 J	131 306 Y
D	1,2	126 489 K	131 307 Z

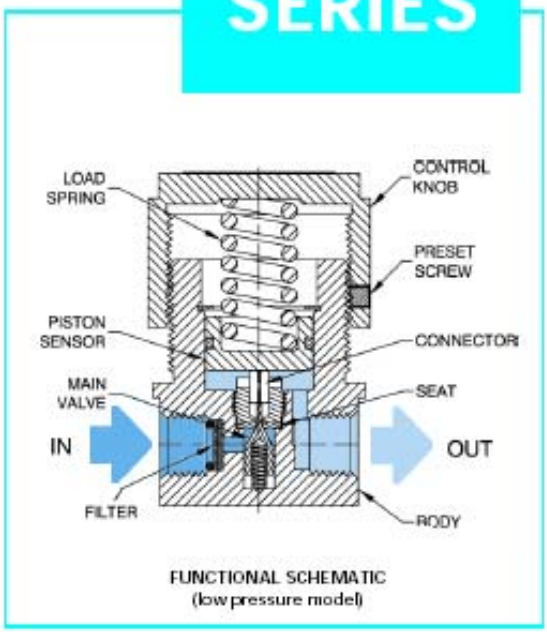
Bitte geben Sie bei der Bestellung von Ersatzteilen zusätzlich zur Bestellnummer der Ersatzteile auch die Bestellnummer Ihres Komplettgerätes an.
When ordering replacements parts, please also quote the order number of your complete appliance in addition to the order number of the replacement parts.
Lors de la commande de pièces de rechange, indiquez, en plus de leur numéro de commande, celui de commande de votre appareil complet.
Con ocasión del pedido de las pieza de repuesto, rogamos indicar además del número de pedido de la pieza de requesto también el número de pedido de su aparato completo.

9.5 Product information Pressure regulator type BB-1

HIGH PRESSURE / MINIATURE

PRESSURE REDUCING REGULATOR

BB-1 SERIES



FUNCTIONAL SCHEMATIC
(low pressure model)

HIGH PRESSURE • DURABLE • COMPACT

Tescom's BB Series miniature pressure reducing regulators are designed to control pressures up to 6000 PSIG. BB regulators are compact and economical, lightweight and able to control both hydraulic and pneumatic medias.

The BB Series miniature regulators feature an adjustable or preset pressure mechanism and a choice of outlet pressure ranges up to 1800 PSIG maximum. A spring loaded, piston sensed design offers reliability, durability and high cycle life. BB regulators are constructed of aluminum with aluminum and stainless steel trim parts. Minimal soft goods are used in BB regulators. Seat material is PCTFE, PEEK or Vespel®.

BB Series miniature regulators are available in two versions – three pressure ranges each. The pressure ranges can be varied by simply exchanging load springs from the control knob side of the regulator. This can be accomplished under full inlet pressure without removing the regulator from the system.

- 6000 PSIG maximum inlet pressure
- Outlet pressure ranges: 0-220 PSIG (low pressure model), 0-1800 PSIG (high pressure model)
- Durable piston sensed design
- Outlet pressure ranges are field adjustable
- Unbalanced main valve
- Two or four 1/4" NPT or SAE ports standard
- Minimal soft goods
- Non-venting
- Back pressure, two-stage and cartridge versions available
- 316 SST wetted construction available

TYPICAL APPLICATIONS

Portable Pneumatic Equipment
Calibration Kits
Manufacturing Processes
Low Flow Purge Systems
Industrial Controls
Gauge Protection
Research & Development Laboratories

TESCOM CORPORATION
INDUSTRIAL CONTROLS DIVISION
12616 Industrial Boulevard
Elk River, Minnesota 55330-2491
1-800-447-1250 (612) 241-3238
Fax: (612) 241-3224
e-mail: icd@tescom.com
www.tescom.com

9.5.1 Safety Instructions Pressure Reglator

Safety, Installation, & Operation Precautions

TESCOM

INDUSTRIAL CONTROLS DIVISION

DO NOT ATTEMPT TO SELECT, INSTALL, USE, OR MAINTAIN THIS REGULATOR, VALVE, OR ACCESSORY UNTIL YOU HAVE READ AND FULLY UNDERSTAND THESE INSTRUCTIONS.

BE SURE THIS INFORMATION REACHES THE OPERATOR AND STAYS WITH THE PRODUCT AFTER INSTALLATION.

DO NOT PERMIT UNTRAINED PERSONS TO INSTALL, USE, OR MAINTAIN THIS REGULATOR, VALVE, OR ACCESSORY.

WARNING

IMPROPER SELECTION, IMPROPER INSTALLATION, IMPROPER MAINTENANCE, MISUSE, OR ABUSE OF REGULATORS, VALVES, OR RELATED ACCESSORIES CAN CAUSE DEATH, SERIOUS INJURY, AND/OR PROPERTY DAMAGE.

Possible consequences include but are not limited to:

- High velocity fluid (gas or liquid) discharge
- Parts ejected at high speed
- Contact with fluids that may be hot, cold, toxic, or otherwise injurious
- Explosion or burning of the fluid
- Lines/hoses whipping dangerously
- Damage or destruction to other components or equipment in the system

WARNING SAFETY PRECAUTIONS:

1. Inspect the regulator, valve, and accessories before each use.
2. Never connect regulators, valves, or accessories to a supply source having a pressure greater than the maximum rated pressure of the regulator, valve, or accessory.
3. Refer to product label (modification specific) for maximum inlet pressures. If this rated pressure cannot be found, contact your local Tescom representative for the rated pressure prior to installation and use. Verify the designed pressure rating of all equipment (e.g., supply lines, fittings, connections, filters, valves, gauges, etc.) in your system. All must be capable of handling the supply and operating pressure.
4. Clearly establish flow direction of the fluid before installation of regulators, valves, and accessories. It is the responsibility of the user to install the equipment in the correct direction.
5. Do not tighten fittings, gages, or components in pressurized systems.
6. Never turn regulator or valve body. Instead hold regulator or valve body and turn fitting nut.
7. If a regulator or valve leaks or malfunctions, take it out of service immediately.
8. Do not modify equipment or add attachments not approved by the manufacturer.
9. Apply pressure to the system gradually, avoiding a sudden surge of fluid or pressure shock to the equipment in the system.

WARNING SAFETY PRECAUTIONS (continued):

10. Regulators are not shut-off devices. Install a pressure relief device downstream of the regulator to protect the process equipment from operating pressure increases. Shut off the supply pressure when the regulator is not in use.
11. Periodic inspection and scheduled maintenance of your equipment is required for continued safe operation.
12. The frequency of servicing is the responsibility of the user based on the application.
13. Never allow problems or lack of maintenance to go unreported.
14. Read and follow precautions on compressed gas cylinder labels.
15. It is important that you analyze all aspects of your application and review all available information concerning the product or system. Obtain, read, and understand the Material Safety Data Sheet (MSDS) for each fluid used in your system.
16. Oxygen service requires special expertise and knowledge of system design and material compatibility in order to minimize the potential for death, serious injury, and/or property damage.
17. Never use materials for regulators, valves, or accessories that are not compatible with the fluids being used.
18. Users must test under normal operating conditions to determine suitability of materials in an application.
19. Vent fluids to a safe environment, and in an area away from employees. Be sure that venting and disposal methods are in accordance with Federal, State, and Local requirements. Locate and

WARNING SAFETY PRECAUTIONS (Continued):

construct vent lines to prevent condensation or gas accumulation. Make sure the vent outlet is not obstructed by rain, snow, ice, vegetation, insects, birds, etc. Do not interconnect vent lines; use separate lines if more than one vent is needed.

20. Do not locate regulators, valves, or accessories using flammable fluids near open flames or any other source of ignition.
21. Some fluids when burning do not exhibit a visible flame. Use extreme caution when inspecting and/or servicing systems using flammable fluids to avoid death or serious injury to employees. Provide a device to warn employees of these dangerous conditions.
22. Many gases can cause suffocation. Make certain the area is well ventilated. Provide a device to warn employees of lack of oxygen.
23. Never use oil or grease on these regulators, valves, or accessories. Oil and grease are easily ignited and may combine violently with some fluids under pressure.
24. Have emergency equipment in the area if toxic or flammable fluids are used.
25. Upstream filters are recommended for use with all fluids.
26. Do not bleed system by loosening fittings.
27. Prevent icing of the equipment by removing excess moisture from the gas.
28. Always use proper thread lubricants and sealants on tapered pipe threads.

INSTALLATION

Inspect the regulator, valve, and accessories for physical damage and contamination. Do not connect the regulator, valve, or accessory if you detect oil, grease, or damaged parts. If the regulator, valve, or accessory is damaged, contact your local Tescom representative to have the regulator cleaned or repaired.

WARNING **Make sure that the components and materials used in the fluid handling system are compatible with the fluid and have the proper pressure rating.**

REPAIR SERVICE

If a regulator or valve leaks or malfunctions, take it out of service immediately. You must have instructions before doing any maintenance. Do not make any repairs you do not understand. Have qualified personnel make repairs. Return any equipment in need of service to your equipment supplier for evaluation and prompt service. Equipment is restored to the original factory performance specifications, if repairable. There are flat fee repair charges for each standard model. The original equipment warranty applies after a complete overhaul.

WARNING Safe Component Selection

1. Consider the total system design when selecting a component to ensure safe, trouble-free performance.
2. The user is responsible for assuring all safety and warning requirements of the application are met through his/her own analysis and testing.

WARNING Safe Component Selection (continued)

3. Tescom may suggest material for use with specific media upon request. Suggestions are based on technical compatibility resources through associations and manufacturers. Tescom does NOT guarantee materials to be compatible with specific media -- THIS IS THE RESPONSIBILITY OF THE USER!
4. Component function, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system user.

WARNING **Do not modify equipment or add attachments not approved by the manufacturer.**

ASSEMBLY/INSTALLATION DRAWINGS & BILLS OF MATERIAL Drawings and parts lists for your product may be obtained by calling the number below. Tescom will provide these by fax or mail. Your local Tescom representative can provide additional assistance.

Call (800) 447 - 1250
for assembly/installation drawings & bills of material. Be sure to have your complete model number ready.

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9.5.3 Operation and Service manual pressure regulator

OPERATION AND SERVICE MANUAL for TESCOM

Piston Sensed Pressure Reducing Regulators

General
Tescom's piston sensed pressure reducing regulators are specifically engineered for applications requiring dependable pressure regulation. These regulators are especially appropriate for installations where high system pressures (up to 20,000 psi) must be reduced to levels suitable for actuating low pressure (0 to 20,000 psi) instruments and related equipment.

Pressure Activation Methods
Tescom uses three basic types of activation methods. The activation method provides the means by which the operator can set the force that determines the outlet pressure of a regulator

Control Knob: Delivery pressure is increased by turning the control knob. The control knob applies a load through a spring to the piston.

Dome Load: Delivery pressure is increased by applying pressurized gas or liquid to the dome of a regulator at a pressure equal to the outlet pressure desired. This dome pressure is normally provided by a second regulator called the pilot regulator.

Combination Spring and Dome: Delivery pressure is increased by applying a spring force as well as the introduction of pressurized gas or liquid.

Materials of Construction
Standard materials of construction contacting the fluid media can be any of the following:

Regulator Body: 300 Series SST, Brass, Hastelloy®, Monel®, Aluminum
Seats: Teflon®, PCTFE, Vespel®, Peek®, Soft Goods (O-rings & back-up Rings) Teflon®, BUNA-N, Viton A®

Trim: 300 Series SST, Brass, Hastelloy, Monel, Aluminum

The official material of construction and pressure activation method for your pressure reducing regulator depends on series number and modification ordered.

Operation (Control Knob Adjustment)
Controlled outlet pressure settings are obtained using Tescom pressure reducing regulators by adjusting the control knob. Rotating the knob clockwise raises the outlet pressure while a counterclockwise rotation, coupled with venting of the downstream side of the regulator plumbing, lowers the outlet pressure. Final adjustments should be made in the direction of increasing pressure to obtain the most accurate set point.

Tescom regulators will operate with any liquid or gaseous media compatible with the wetted materials. Some series/modifications come with an internal filter that only are designed to stop random contamination resulting from the installation of the regulator. An auxiliary upstream filter is recommended for use in all but the cleanest media. Gaseous media should be free of excessive moisture to prevent icing of the regulator at high flow rates.

WARNING *A REGULATOR IS NOT INTENDED TO BE USED AS A SHUTOFF DEVICE. WHEN THE REGULATOR IS NOT IN USE, THE INLET SUPPLY SHOULD BE TURNED OFF. AS A SAFETY PRECAUTION, A PRESSURE RELIEF DEVICE SHOULD BE INSTALLED DOWNSTREAM OF THE REGULATOR.*

Maintenance
The following procedures are provided to enable the customer to perform all normal maintenance and repair operations. These operations are more easily performed with the regulator removed from the line. However, in some cases repair may be accomplished without removal of the regulator body as long as the supply has been shut off and the inlet and outlet pressures have been vented.

The following steps outline the disassembly of pressure reducing regulators for maintenance and repair. Up-to-date assembly drawings and bills of material are available from the factory.

1. Clamp the regulator in a vise by the flats on the bottom and/or side of the regulator body.
2. Turn control knob and/or spring adjustment mechanism counterclockwise to insure removal of all spring force on the piston.

NOTE (Dome loaded regulators): All pressurized gas or liquid must be vented from dome before disassembly.

3. Remove upper portion of regulator (bonnet and/or dome). Some models require the handknob and/or mounting bracket to be removed first.

NOTE: Upper portion of regulator may also include spring button, load spring, back-up plate, and piston sensor, etc. Review correct drawing to ensure that all parts have been disassembled.

NOTE: (Two-Stage Regulator) Tescom Model Series BB-5 is a two-stage regulator that has portions on both ends of the regulator body that must be removed. It is Tescom's recommendation that two-stage regulators be returned to the factory for repair.

Maintenance (continued)
4. The valve parts can now be removed from the regulator body by turning the seat retainer and/or back cap counter-clockwise until it is free of the regulator body.

WARNING *TESCOM MODELS 26-1000 AND 44-1100 VALVE PARTS ARE HELD IN PLACE BY THE USE OF LEFT-HANDED THREADS.*

NOTE: If necessary, valve seat may be removed from the seat retainer using a sharp instrument.

CAUTION: When removing valve parts from a regulator that has a back cap, care must be taken to insure the main valve stem remains vertical. If the main valve stem is not removed correctly, parts may remain in the regulator.

5. To disassemble main valve assembly and/or valve, clamp valve in smoothed jaw vice or hold with pliers. Clamping should be done on flats.

CAUTION: Care must be used to not damage valve. A special fixture may be ordered from the factory to aid in the disassembly of the main valve assembly, found in Tescom Regulator Models 26-1000 and 44-1100.

NOTE: Several of Tescom's regulators are supplied with internal filters. They will be located either in the inlet port or in the main valve area of the regulator. In each case, they should be removed and replaced before reassembly.

Reassembly
The regulator is reassembled in the reverse order of disassembly, observing the following precautions. Please reference the Bill of Material and assembly drawing for the correct location of replacement parts and correct torque specifications.

Reassembly (continued)

1. Inspect all parts and replace those worn or damaged with Tescom replacement parts.

2. All parts should be cleaned to the cleanliness level required for safe operation with the media and system they will be used in. All parts in the flow stream must be free of particles which could prevent proper seating of the main valve.

3. Apply a thin uniform coating of fluorocarbon grease to any or all of the following parts: indentation of spring button, threaded portion of adjusting screw, entire threaded area of the bonnet, all O-rings, all threaded parts internal to regulator.

   NOTE: Do NOT apply any type of grease to the inlet or outlet connections.

4. Valve seats must be installed with the chamfered side towards the main valve.

5. Standard Regulator with Control Knobs - The body and bonnet are best joined by holding the bonnet assembly open end up and dropping all required items into place one at a time. The last item to be placed in the body of most all of Tescom regulators is the piston sensor. Place all O-rings and back-up rings that are external to the piston sensor in the body before placing the sensor in place. O-rings should always be installed before back-up rings. The bonnet and body may now be attached. This is best done by holding the body in one hand and the bonnet in the other. Tilt the body at a 45° angle and then attach the bonnet by screwing it into the body firmly, hand tight. Regulator should then be placed in vise and bonnet retorqued to correct specifications. See print.

PRODUCT WARRANTY

Tescom Corporation ("Tescom") warrants to the initial purchaser ("Initial Purchaser", as defined below) of products manufactured and sold by its Industrial Controls Division ("ICD") and Electronic Controls Division ("ECD") that such products are free from defects in materials and workmanship under normal use and service for a period of 365 days from the date of delivery of the products ("Warranty Period"). This warranty applies only to the Initial Purchaser, that is someone who purchases products for initial use directly from Tescom, its affiliates or authorized distributors or representatives. This warranty is not transferable to subsequent purchasers or users of the products.

During the Warranty Period, Tescom will, in its sole discretion, repair or replace, free of charge at its factory in Minnesota, any product or part thereof that is found by Tescom, after reasonable notification by the Initial Purchaser, to have been defective in materials or workmanship. The Initial Purchaser must pay all shipping costs for warranty service and is responsible for risk of loss or damage of products during shipment. Tescom does not warrant, and will not pay for, any repairs or replacement made during the Warranty Period by anyone other than personnel authorized by Tescom, ICD or ECD to make such repairs or replacement.

THE ABOVE WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES. TESCOM, ICD AND ECD MAKE NO OTHER EXPRESS OR IMPLIED WARRANTY, AND IN PARTICULAR AND WITHOUT LIMITATION MAKE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE. The Initial Purchaser's only remedy under this warranty is repair or replacement of the products during the Warranty Period. This warranty does not apply to any product which has been damaged by accident, abuse, misuse, modification or lack of proper maintenance. NEITHER TESCOM, ICD NOR ECD WILL BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL OR INDIRECT DAMAGES, INCLUDING WITHOUT LIMITATION, LOST PROFITS.

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Reassembly (continued)

6. Dome/Spring Combination and Dome Loaded Regulators are more easily reassembled by holding regulator firmly in vise and reinstalling dome.

7. Self-Venting Regulator - If your regulator has an adjustable relief valve mechanism, it is set on final assembly at the factory and usually will not require further adjustment. If adjustment becomes necessary, use the following procedure after regulator has been installed:

   Step 1. Remove hole plug located in control knob.
   Step 2. Using control knob, apply 10 to 15 psi on downstream side.
   Step 3. Turn vent adjusting screw CW (located under hole plug) until media can be heard escaping through relief valve.
   Step 4. Turn screw CCW until media flow stops, plus 1/2 turn. Replace hole plug.

8. Reinstalling wire mesh inlet filter - Insert filter into primary inlet port. It must then be expanded to fit correctly. This can be accomplished by inserting a metal tool the same size as the port and then lightly tapping it with a hammer.

WARNING *AFTER REGULATOR HAS BEEN REASSEMBLED, IT SHOULD BE CONNECTED TO A PRESSURE SOURCE WITH MEDIA COMPATIBLE WITH THE USE OF THE REGULATOR AND PRESSURIZED TO CHECK FOR INTERNAL AND EXTERNAL LEAKAGE AND OPERATING CHARACTERISTICS.*

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