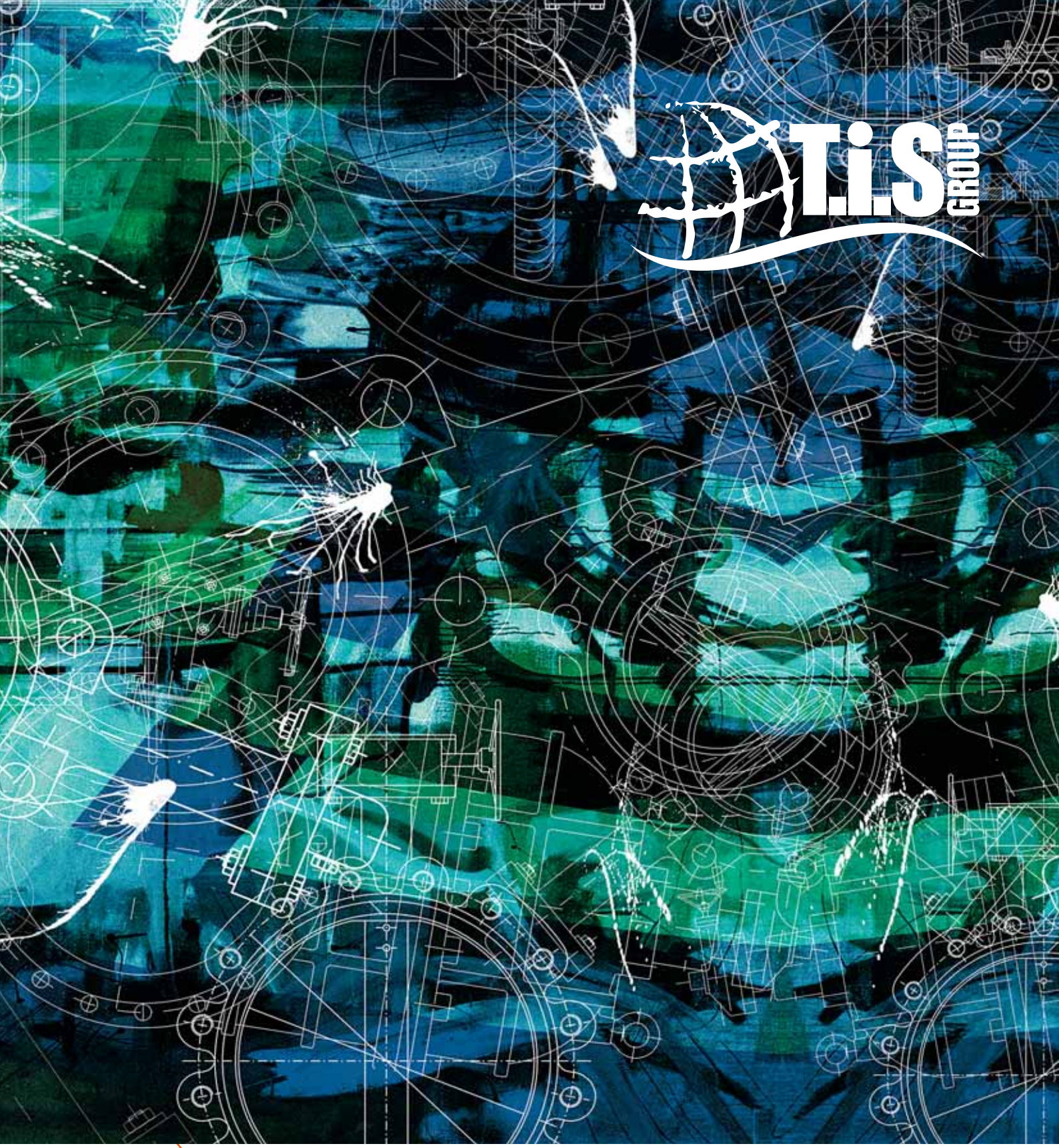

PLUNGER FLOW CONTROL VALVE
AIR APPLICATION
F500 E F560 TIS-AIR

PLUNGER FLOW CONTROL VALVE AIR APPLICATION F500 E F560 TIS-AIR

PLUNGER FLOW CONTROL VALVE AIR APPLICATION F500 E F560 TIS-AIR DN80 - DN600

MAIN CHARACTERISTICS

Plunger valves are mainly designed to control fluid flow or pressure in pipelines and can also be used to control the rate of flow or the pressure of air in waste water treatment plants.
This regulation is achieved by means of the axial movement of a cylindrical obturator operated by a shaft-connecting rod-crank mechanism.
The obturator closes in the flow direction and moves within a suitably shaped chamber within which the pressure is compensated. These characteristics ensure the valve works in a progressive, linear direction, keeping it steady and vibration-free in all operating conditions.
The fluid is flows through a circular crown-shaped passageway that progressively decreases in section from the inlet towards the seal seat, directing the flow to the centre of the pipeline downstream of the seat.
Plunger valves feature low manual effort due to their construction shape, which guarantees a perfect balance between the chambers upstream and those downstream of the obturator.
The operating mechanism comprises the link, the shaft, the connecting rod and the pins, all details made of stainless steel. The moving parts rotate/slide on bearings/sliding blocks.
The obturator, whose sliding surfaces are made entirely of stainless steel, is guided by sliding blocks fixed to the body to ensure stability in all operating conditions.
The seating ring, which is screwed onto the body and made of stainless steel, is designed to ensure an excellent seal, as well as to facilitate maintenance work on the parts inside the valve.
The two seals are made of EPDM rubber: the main seal is inserted directly into the obturator head, while the secondary seal, which is designed with an anti-extrusion section, is inserted into the valve body in a specially created seat.

TYPICAL USE

Water treatment plants, downstream of the blowers used to input air into tanks (oxidation, primary treatments, etc.).
They can be used with gases such as: air, nitrogen, carbon dioxide. They cannot be used with flammable, hazardous, or corrosive gases.

ADVANTAGES

- Fine-tuning to control air flow according to the concentration levels of dissolved oxygen in the tank
- Optimisation of blower functioning resulting in overall energy savings for the system
- Lower maintenance costs as the reduced power surges on the blowers allows – in combination with and adequate scheduled maintenance – to extends the life of the blowers.

In air applications, use of a dissipating cylinders (or slotted cylinders) optimises valve operation by modifying the adjustment curve according to actual needs. In this way, the obturator stroke can be adjusted according to the change in the flow rate.
There are dissipating cylinders available which feature gradually increasing pressure drop.

Fig.1 - Plunger valve for controlling air flow inside oxidation tanks.

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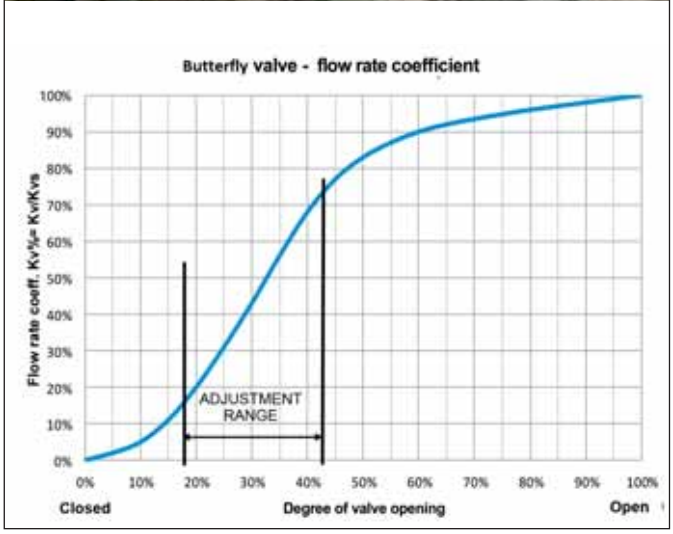
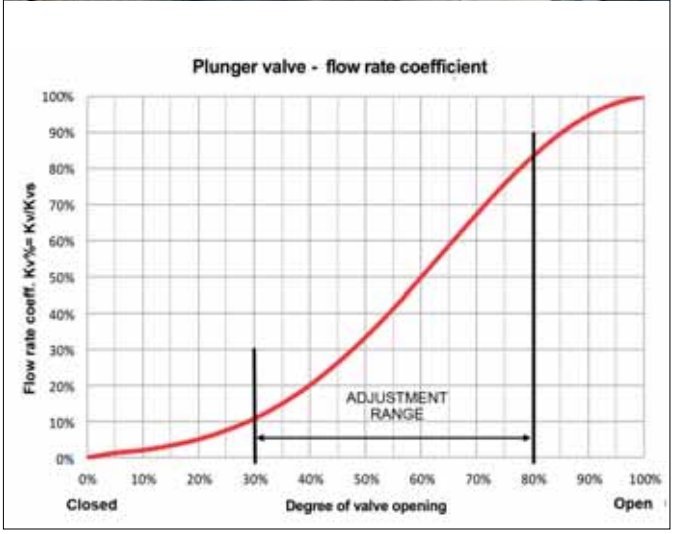
COMPARISON OF BUTTERFLY VALVE OPERATION VS. PLUNGER VALVE OPERATION F500 E F560 TIS AIR



Example of flow rate adjustment on tank aeration system with **butterfly valve:** shut-off valves, with narrow adjustment range:

NOT optimal adjustment



Example of flow rate adjustment on tank aeration system with **plunger valve**: valves designed for adjustment, with the possibility of varying the degree of opening over a very wide range. It also allows very slight opening for low flow rates:

Optimal adjustment

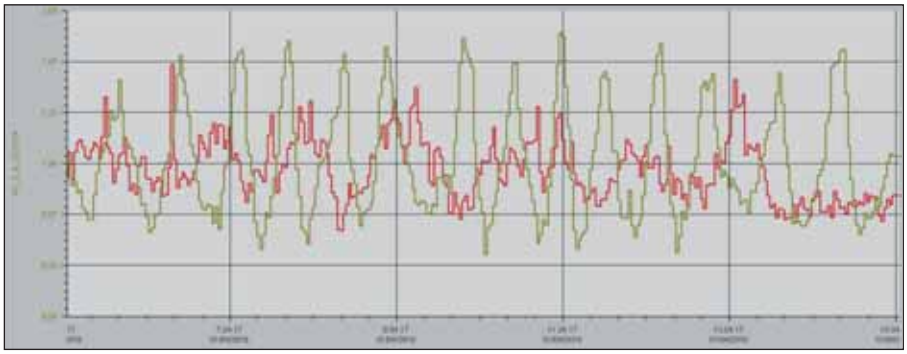


Fig.2 - Graph comparing changes in the concentration of dissolved oxygen in the tank (in mg/l) following adjustment with a plunger valve (red line) and a butterfly valve (green line).

NUOVAL LINE

F560 • PLUNGER FLOW CONTROL VALVE
DN80 - DN150

DESIGN FEATURES :

- Hydraulic testing according to EN 1074-5;
- Compliant with EN 1074-5;
- Body with annular section made of ductile iron EN GJS 400-15, EN 1563 (GS 400-15);
- Face-to-face dimension according to EN 558 Series 15 (unless specified otherwise);
- Flanges according to UNI - EN 1092-2;
- All internal screws, bolts, nuts, and washers made of A2-70 stainless steel EN ISO3506-1;
- Hydraulically balanced obturator to allow minimum opening/closing torques made of stainless steel 1.4301 EN10088-3(AISI304) or 1.4306 EN10088-3 (AISI304L);
- Seating box in 1.4408 + AT EN10283 (AISI316);
- Retaining ring made of 1.4301 EN10088-3 (AISI304);
- Rod-link mechanism :
  * link made of 1.4028 EN10088-3 (AISI420B);
  * shaft made of 1.4028 EN10088-3 (AISI420B)
  * connecting rod made of 1.4301 EN10088-3 (AISI304);
- Link, connecting rod, and fork rotate on solid bronze bearings;
- Main seal made of EPDM rubber and protected by the flow;
- Low-friction obturator lip seal made of EPDM rubber;
- FKM Viton rubber O-ring;
- Actuator coupling flange compliant with ISO 5211;
- FBE - (Fusion Bonded Epoxy) anti-corrosion coating on internal and external surfaces, colour: RAL 5015 blue, average thickness: 300 µm + RAL 5012 external epoxy polyester layer with average thickness: 50 µm. Average external thickness 350 µm.
- Manual operation device with ductile iron casing, bronze wheel with Shell Alvania 1029 lubricant, double sealing, steel input shaft and KS paint average thickness 140 µm, suitable for highly corrosive environments, classification: C5-I compliant with EN15714-2.

ACCESSORIES

- Dissipating cylinders calculated on the basis of the operating conditions, made of 1.4301 EN10088-3 (AISI304) or of 1.4306 EN10088-3 (AISI304L);

OPERATING LIMITS:

- Allowed pressure drop on the valve: max 1 bar;
- Maximum inlet pressure: 2 bar;
- Speed in the pipeline (inlet): max 30 m/s;
- Operating temperature: (fluid) min. + 0 ° C max. + 100 °C (without ice forming);
- Storage temperature: (room temp.) min. - 20 °C max. + 70 °C.

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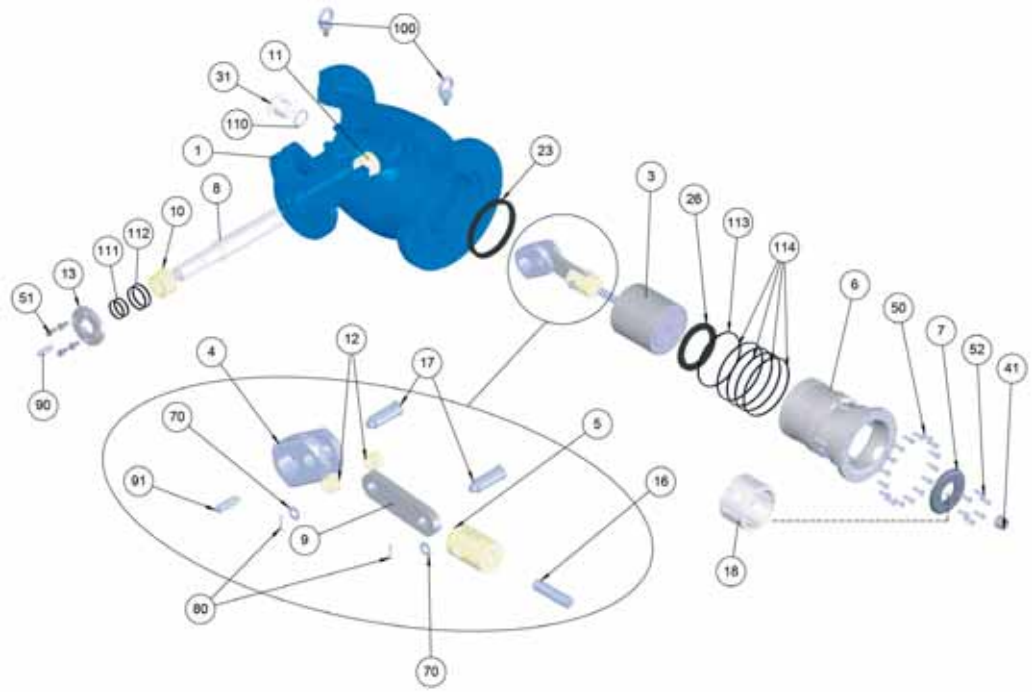
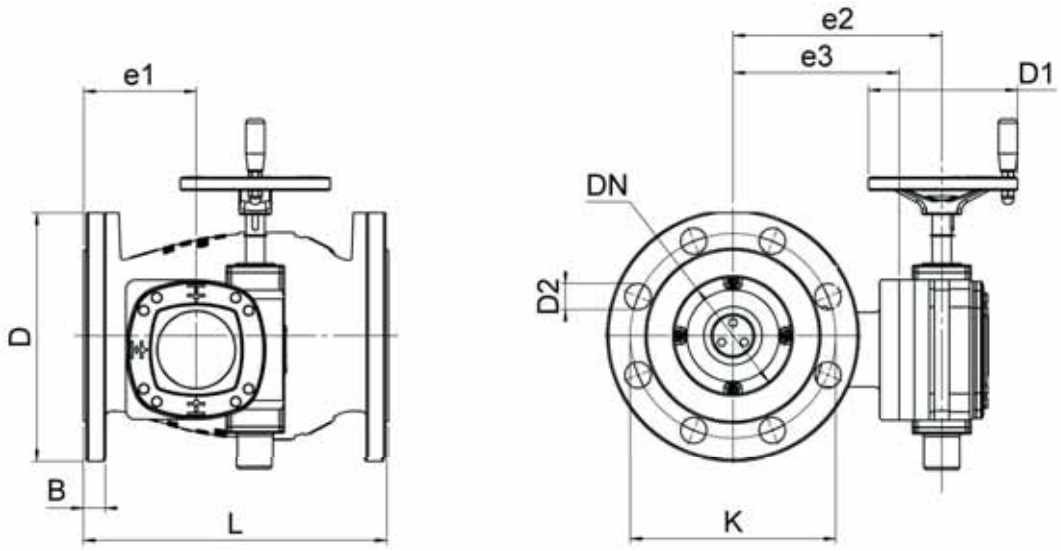
COMPONENTS AND MATERIALS



ITEM	COMPONENT	MATERIAL	NOTES
1	Body	EN-GJS 400-15 EN 1563 (GS 400 - 15)	Epoxy coating 300 µm
3	Obturator	1.4301 EN 10088-3 (AISI 304)	
4	Link	1.4028 EN 10088-3 QT850 (AISI 420 B)	
5	Fork	CC 333 G EN 1982 CuAl10Fe5Ni5-C	
6	Seating box	1.4408+AT EN 10283 (AISI 316)	
7	Seal retaining ring	1.4301 EN 10088-3 (AISI 304)	
8	Shaft	1.4028 EN 10088-3 QT850 (AISI 420 B)	
9	Piston rod	1.4301 EN 10088-3 (AISI 304)	
10	Outer bearing	CC 333 G EN 1982 CuAl10Fe5Ni5-C	
11	Inner bearing	CC 333 G EN 1982 CuAl10Fe5Ni5-C	
12	Link bearing	CC 333 G EN 1982 CuAl10Fe5Ni5-C	
13	Actuator coupling disk	1.4301 EN 10088-3 (AISI 304)	
16	Screw fork	1.4301 EN 10088-3 (AISI 304)	
17	Connecting pins	1.4028 EN 10088-3 QT850 (AISI 420 B)	
18	Dissipating cylinder	1.4301 EN 10088-3 (AISI 304) / 1.4306 EN 10088-3 (AISI 304L)	
23	Lip seal	EPDM rubber	
26	Main seal	EPDM rubber	
31	Cover	1.4301 EN 10088-3 (AISI 304)	
41	Nuts	1.4301 EN 10088-3 (AISI 304)	
50	Bolts	A2-70 EN ISO3506-1	
51	Bolts	A2-70 EN ISO3506-1	
52	Bolts	A2-70 EN ISO3506-1	
70	Washers	A2-70 EN ISO3506-1	
80	Cotter pins	A2-70 EN ISO3506-1	
90	Tongue	1.0511 EN 10083-2 + QT (C40B)	
91	Tongue (internal)	1.4028 EN 10088-3 QT850 (AISI 420 B)	
100	Eyebolt	Galvanized steel	
110 ÷ 114	O-ring	Viton	

NUOVAL LINE

DIMENSIONS AND WEIGHTS



PN10

DN	80	100	125	150
D [mm]	200	220	250	285
D1 [mm]	160	160	160	160
D2 [mm]	19	19	19	23
B [mm]	19	19	19	19
e1 [mm]	109	120	120	127
e2 [mm]	172	187	225	240
e3 [mm]	130	145	180	195
K [mm]	160	180	210	240
L[1] [mm]	280	300	325	350
Holes [nr]	8	8	8	8
Weight[2] [kg]	31	38	41	78

PN16

DN	80	100	125	150
D [mm]	200	220	250	285
D1 [mm]	160	160	160	160
D2 [mm]	19	19	19	23
B [mm]	19	19	19	19
e1 [mm]	109	120	120	127
e2 [mm]	172	187	225	240
e3 [mm]	130	145	180	195
K [mm]	160	180	210	240
L[1] [mm]	280	300	325	350
Holes [nr]	8	8	8	8
Weight[2] [kg]	31	38	41	78

[1]: Face to face dimension according to EN 558 series 15
[2]: Gearbox included
Inlet/outlet flange: type B sealing surface (step)

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F500 • PLUNGER FLOW CONTROL VALVE
DN200 - DN600

DESIGN FEATURES:

- Hydraulic testing according to EN 1074-5;
- Compliant with EN 1074-5;
- Body with annular section made of ductile iron EN GJS 500-7, EN 1563 (GS 500-7);
- Face-to-face dimension according to EN 558 Series 15 (unless specified otherwise);
- Flanges according to UNI – EN 1092-2;
- All internal screws, bolts, nuts, and washers made of A2-70 stainless steel EN ISO3506-1;
- Hydraulically balanced obturator to allow minimum opening/closing torques made of stainless steel 1.4301 EN10088-3 (AISI304) or 1.4306 EN10088-3 (AISI304L);
- Corrosion- and rub-resistant bronze-aluminium sliding blocks, screwed to the body for easy maintenance;
- Seal ring made of 1.4301 EN10088-3 (AISI304);
- Retaining ring made of 1.4301 EN10088-3 (AISI304);
- Rod-link mechanism:
    - link made of 1.4028 EN10088-3 (AISI420B);
    - shaft made of in 1.4028 EN10088-3 (AISI420B);
    - connecting rod made of 1.4028 EN10088-3 (AISI420B);
- Link, connecting rod, and fork rotate on sturdy bronze bearings;
- Main seal made of EPDM rubber and protected by the flow;
- Low-friction obturator lip seal made of EPDM rubber;
- FKM Viton rubber O-ring;
- Actuator coupling flange compliant with ISO 5211;
- FBE – (Fusion Bonded Epoxy) anti-corrosion coating on internal and external surfaces, colour: RAL 5015 blue,
- average thickness: 300 µm + RAL 5012 external epoxy polyester layer with average thickness: 50 µm. Average external thickness 350 µm.
- Manual operation device with ductile iron casing, bronze wheel with Shell Alvania 1029 lubricant, double sealing, steel input shaft and KS paint average thickness 140 µm, suitable for highly corrosive environments, classification: C5-I compliant with EN15714-2.

ACCESSORIES:

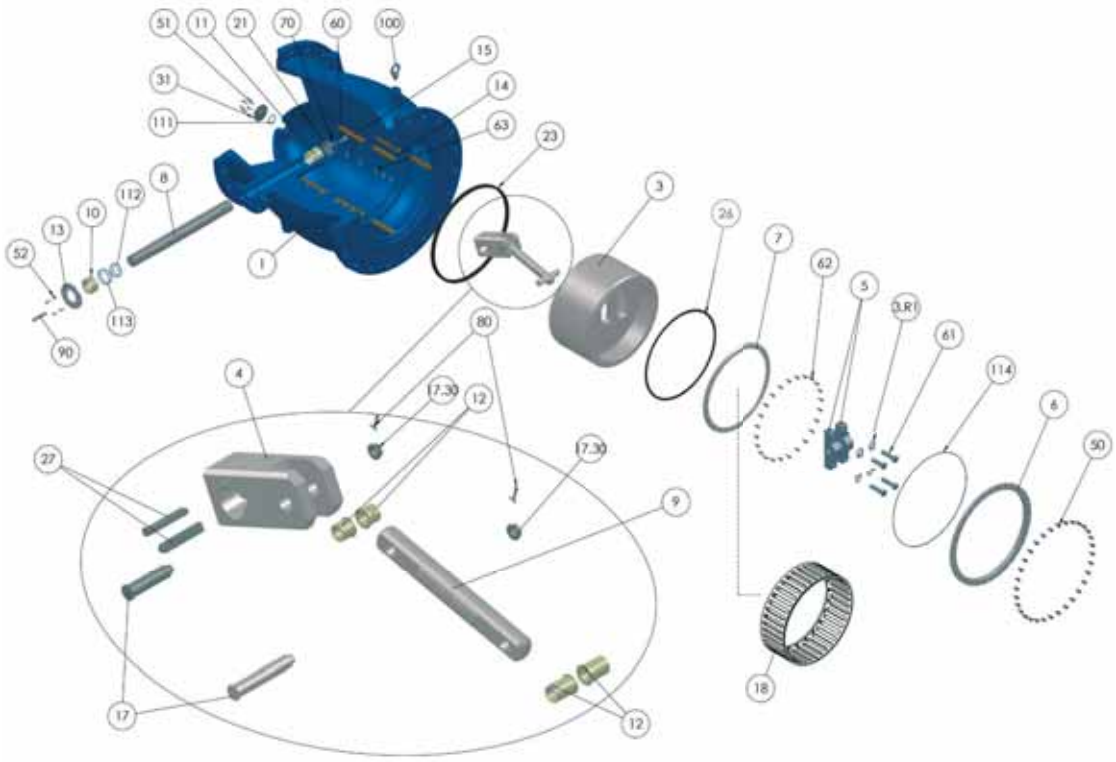
Dissipating cylinders calculated on the basis of the operating conditions, made of 1.4301 EN10088-3 (AISI304) or of 1.4306 EN10088-3 (AISI304L);

OPERATING LIMITS:

- Allowed pressure drop on the valve: max 1 bar;
- Maximum inlet pressure: 2 bar;
- Speed in the pipeline (inlet): max 30 m/s;
- Operating temperature: (fluid) min. + 0 °C max. + 100 °C (without ice forming);
- Storage temperature: (room temp.) min. – 20 °C max. + 70 °C.

NUOVAL LINE

COMPONENTS AND MATERIALS



ITEM	COMPONENT	MATERIAL	NOTE
1	Body	EN-GJS 500 - 7 EN 1563 (GS 500 - 7)	Epoxy coating 300 µm
3	Obturator	1.4301 EN 10088-3 (AISI 304) / 1.4306 EN 10088-3 (AISI 304L)	
3.R1	Locking washer	1.4401 EN 10088-3 (AISI 316)	
4	Link	1.4028 EN 10088-3 (AISI 420 B)	
5	Fork (DN200 - DN300)	1.4028 EN 10088-3 (AISI 420 B)	
	Bracket-fork (DN350 - DN600)	1.4028 EN 10088-3 (AISI 420 B) / 1.4462 EN 10088-3 (DUPLEX 2205)	
6	Seating ring	1.4301 EN 10088-3 (AISI 304)	
7	Seal retaining ring	1.4301 EN 10088-3 (AISI 304)	
8	Shaft	1.4028 EN 10088-3 (AISI 420 B)	
9	Connecting rod	1.4028 EN 10088-3 (AISI 420 B)	
10 / 11 / 12	Outer / Inner bearing / Link bearing	CC 333 G EN 1982 CuAl10Fe5Ni5-C (Bronze)	
13	Actuator coupling disk	1.4301 EN 10088-3 (AISI 304)	
14 / 15	Sliding blocks	CW 307 G M EN 12165 (Bronze)	
17	Connecting pins	1.4028 EN 10088-3 (AISI 420 B)	
17.30	Washer for connecting pins	1.4401 EN 10088-3 (AISI 316)	
18	Dissipating cylinder	1.4301 EN 10088-3 (AISI 304) / 1.4306 EN 10088-3 (AISI 304L)	
21	Stop washer	1.4301 EN 10088-3 (AISI 304)	
23	Lip Seal	EPDM rubber	
26	Main Seal	EPDM rubber	
27	Tongue (internal)	1.4028 EN 10088-3 (AISI 420 B)	
31	Cover	1.4301 EN 10088-3 (AISI 304)	
50/51/52/60 61/62/63	Screws	A2-70 EN ISO3506-1	
70	Locking washer	A2-70 EN ISO3506-1	
80	Cotter pins	A2-70 EN ISO3506-1	
90	Tongue	1.0511 EN 10083-2 + QT (C40B)	
100	Eyebolt	Galvanized steel	
110 - 114	O-Ring	Viton	

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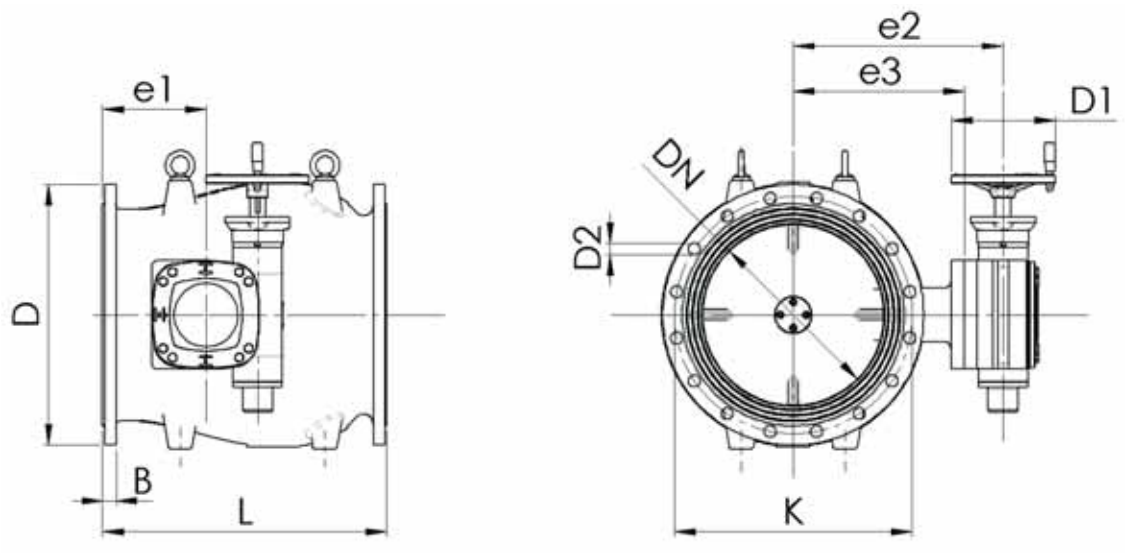
DIMENSIONS AND WEIGHTS



PN10

DN	200	250	300	350	400	450	500	600
D [mm]	340	395	445	505	565	615	670	780
D1 [mm]	160	160	160	160	160	160	160	160
D2 [mm]	23	23	23	23	28	28	28	31
B [mm]	20	22	24,5	24,5	24,5	25,5	26,5	30
e1 [mm]	160	164	185	200	230	235	245	318
e2 [mm]	273	300	352	410	440	470	500	563
e3 [mm]	228	255	295	335	365	395	425	488
K [mm]	295	350	400	460	515	565	620	725
L[1] [mm]	400	450	500	550	600	650	700	800
Foratura] [nr]	8	12	12	16	16	20	20	20
Peso[2] [kg]	106	145	195	290	335	495	470	700

PN16

DN	200	250	300	350	400	450	500	600
D [mm]	340	405	460	520	580	640	715	840
D1 [mm]	160	160	160	160	160	160	160	160
D2 [mm]	23	28	28	28	31	31	34	37
B [mm]	20	22	24,5	26,5	28	30	31,5	36
e1 [mm]	160	164	185	200	230	235	245	318
e2 [mm]	273	300	352	410	440	470	500	563
e3 [mm]	228	255	295	335	365	395	425	488
K [mm]	295	355	410	470	525	585	650	770
L[1] [mm]	400	450	500	550	600	650	700	800
Foratura] [nr]	12	12	12	16	16	20	20	20
Peso[2] [kg]	106	145	195	290	335	495	510	750

[1]: Face to face dimension according to EN 558 series 15
[2]: Gearbox included
Inlet/outlet flange: type B sealing surface (step)

PRESSURE DROP

The flow rate - pressure drop relationship for plunger valves for air is expressed by the formula (1), which is valid in subsonic flow conditions:

$$Qn = 514\ K_v * [(\Delta P * P_{out} / (\rho n\ (T_{in}+273))]^{0.5} \quad [Nm^3/h] \qquad (1)$$

Where:

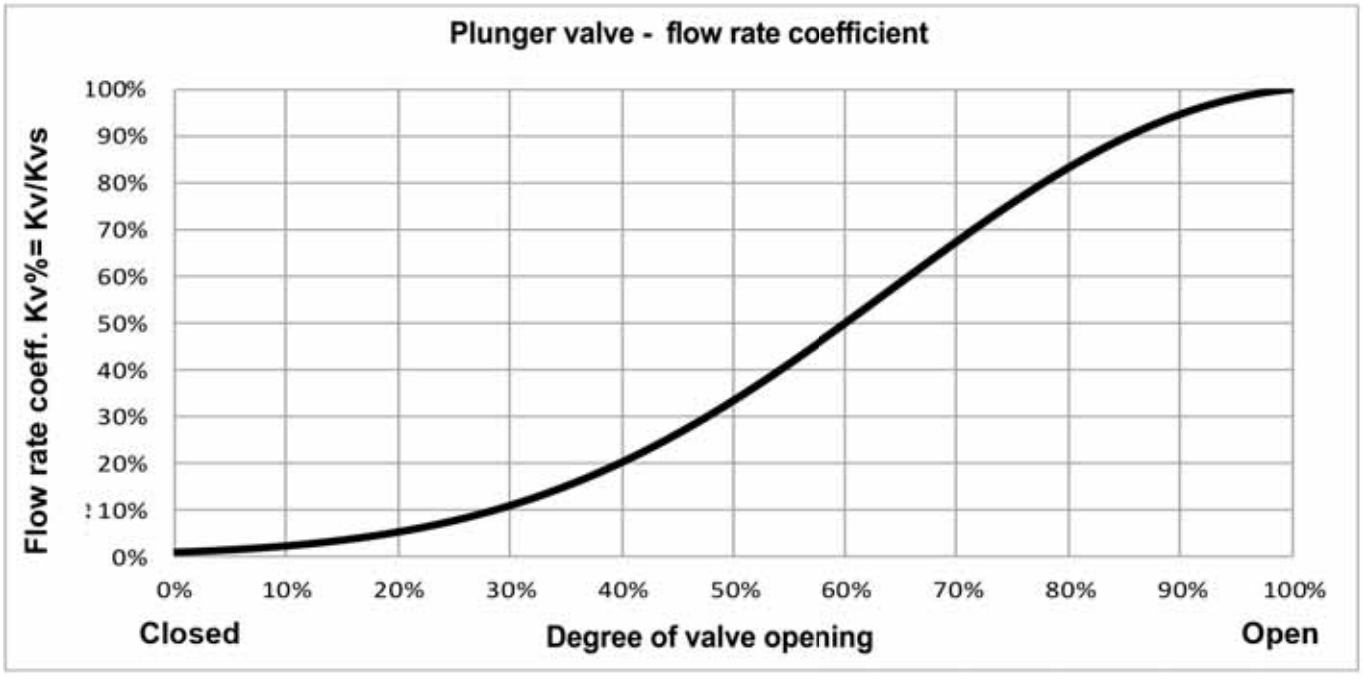
- Qn = flow rate [Nm^3/h] (normal-m^3/h in standard conditions (0°C, 1 absolute bar)
- ΔP = pressure drop [bar]
- P_{out} = downstream pressure [absolute bar] (atmospheric pressure = 1 absolute bar)
- ρn = fluid density [kg/m^3] in standard conditions (0°C, 1 bar absolute)
- K_v = flow coefficient [m^3/h]
- T_{in} = Inlet temperature [°C]

The flow coefficient with the valve completely open (Kvs) is shown in Table 1 for valves with standard obturator and K20 or K50 dissipating cylinder. Other kinds of dissipating cylinders are available on request.
For partially open obturator conditions, the flow coefficient can be obtained from formula (2)

$$K_v = K_{v\%} \times K_{vs} \qquad (2)$$

Where:

- Kv% is shown in Diagram 1 as a function of the valve opening degree



Flow coefficient Kvs (valve 100% open)

	F560					F500							
OBTURATOR TYPE	DN	80	100	125	150	200	250	300	350	400	450	500	600
Standard obturator	Kvs [m^3h]	145	203	310	430	678	1070	1550	2120	2785	3540	4395	6380
K20 dissipating cylinder	Kvs [m^3h]	57	89	138	199	354	553	797	1085	1417	1793	2214	3188
K50 dissipating cylinder	Kvs [m^3h]	36	56	88	126	224	350	504	686	896	1134	1400	2016

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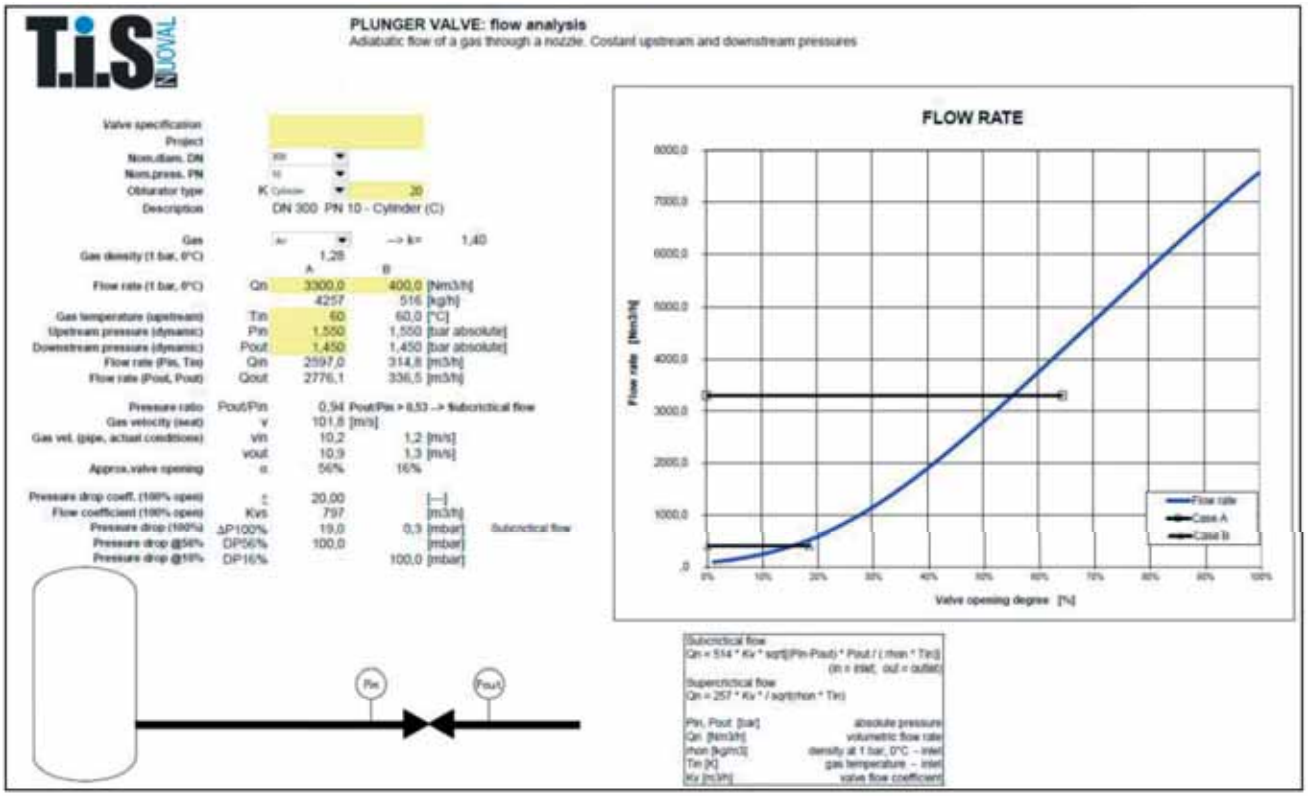
FLOW ANALYSIS SOFTWARE



ACCESSORIES

STANDARD VALVE

DISSIPATING CYLINDER

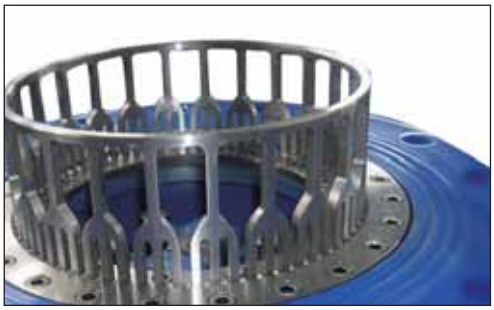
DISSIPATING CYLINDERS

Depending on the operating conditions, the valve may be equipped with a stainless steel cylinder bolted to the obturator: the outgoing flow is divided, via adequate sized slots, into several radial jets that collide with each other at the valve axle, downstream of the valve seat.
This accessory allows the energy dissipation to be modulated, modifying the valve adjustment curve according to actual needs.
Standard dissipating cylinders are available.

Special cylinders can be supplied based on the actual operating conditions. This way it is possible to obtain, for example, low pressure drops with the valve completely open

DIFFERENT TYPES OF DISSIPATING CYLINDERS

SPECIAL DISSIPATING CYLINDERS



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TYPICAL INSTALLATIONS

MAIN DATA FOR THE SIZING OF THE PLUNGER VALVE F500 E F560 TIS-AIR

To ensure correct sizing for plunger valves for air application, which are generally used in treatment plants, the following information should be given:

DATE: _____

CUSTOMER: _____

PROJECT: _____

PLANT TYPE: _____

TANK n°: _____

- Fluid: air from volumetric compressor (usual for treatment plants; specify if different) (*)

-Type of diffusers (usually micro-perforated diaphragms) or other device: : _____

- Maximum flow rate of the air generation system :	_____	Nm^3/h
- Maximum flow required for each plunger valve :	_____	Nm^3/h (*)
- Typical average flow rate for each plunger valve :	_____	Nm^3/h
- Minimum flow rate for each valve :	_____	Nm^3/h (*)
- Operating pressure at the valve inlet :	_____	relative bars (*)
- Required valve outlet pressure: :	_____	relative bars (*)
- height of sewage above the diffusers :	_____	meters
- Maximum room temperature :	_____	°C
- Maximum temperature of the fluid (air) flowing through the valve :	_____	°C (*)

(*): mandatory information

NOTE:

Nm^3/h refers to atmospheric pressure and 0°C

Atmospheric pressure = 0 relative bar

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NOTE

T.I.S GROUP

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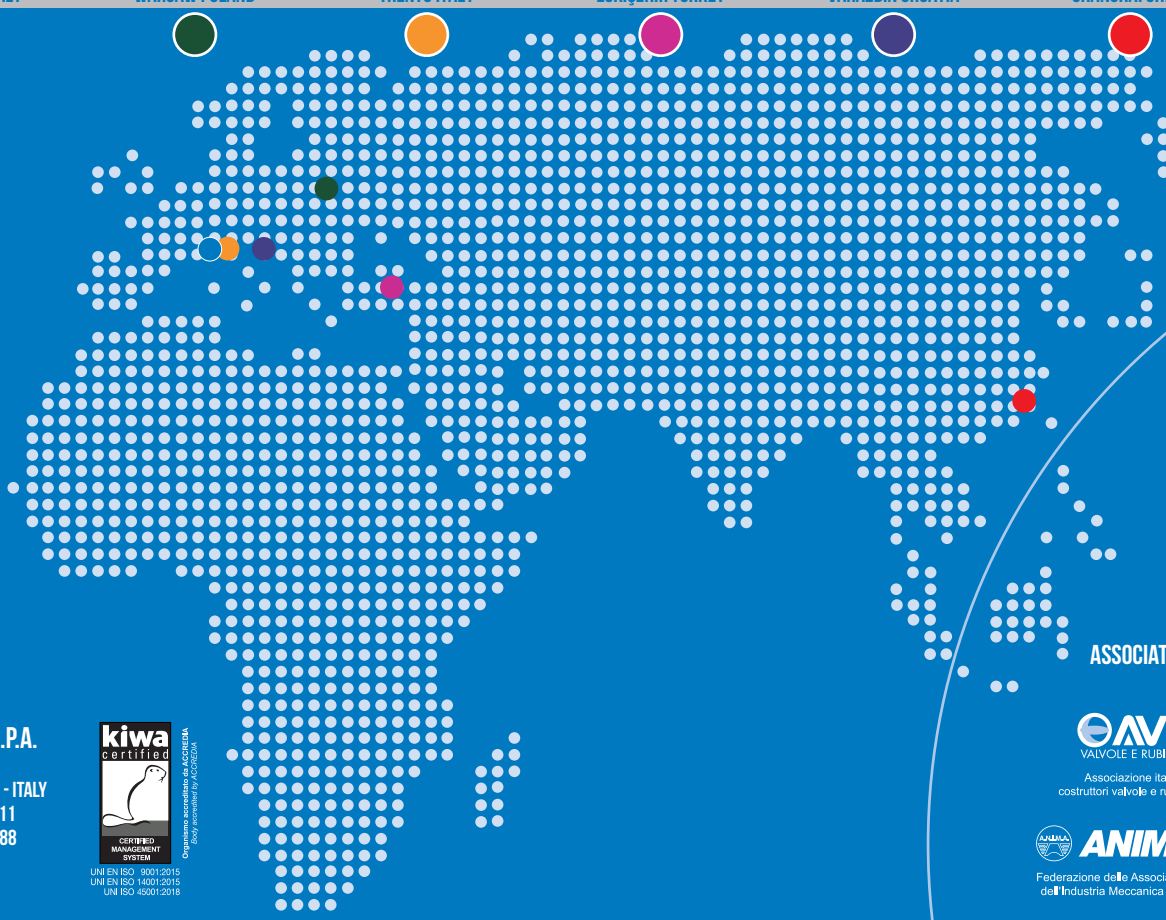

T.I.S. SERVICE S.P.A.
VIA LAGO D'ISEO 4,6
24060 BOLGARE (BG) - ITALY
TEL. +39 035 8354 811
FAX +39 035 8354 888
WWW.TISGROUP.IT
INFO@TISGROUP.IT

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