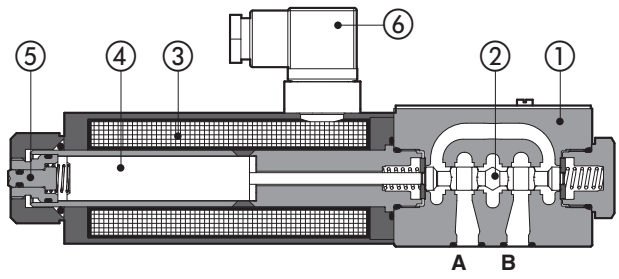
Intrinsically safe solenoid directional valves type DHWL8

on-off, spool type, direct - **low leakage** - **ATEX** and **IECEx**

SIL
IEC61508



DHWL8-0611

① valve body
② valve spool
③ intrinsically safe solenoid
④ solenoid tube
⑤ manual override
⑥ electrical connector

DHWL8

On-off, spool type directional valves, equipped with intrinsically safe solenoids certified for safe operation in hazardous environment with potentially explosive atmosphere.

Certifications:

- Multicertification **ATEX** and **IECEx**: for gas group **II 1G** surface plants zone 0, 1, 2
- Multicertification **ATEX** and **IECEx**: **I M1** tunnels or mining plants

DHWL8 are **SIL** compliance with IEC 61508

See section 11 for certification data

The valves must be electrically powered through specific "safety barriers" limiting the max current to the solenoid, see section 14

Size: **06**
Max flow: up to **30 l/min**
Max pressure: **350 bar**

1 MODEL CODE

DHWL8	/	*	-	0	61	1	-	100	/	*	*	/	*

DHWL8: Intrinsically safe valve, spool type, direct, low leakage

Certification type:
- = Omit for Group II 1G
M = Atex Group I (mining)

Valve size (ISO 4401):
0 = size 06

Configuration, see section 2 :

Spool type, see section 2 :

Coil resistance:
100 = 108 Ω
150 = 157 Ω

Options (2):
A = solenoid at side of port B
WP = ⚠ prolonged manual override protected by rubber cap

Series number

Seals material, see section 6 :
- = NBR
PE = FKM
BT = NBR low temp. **(1)**

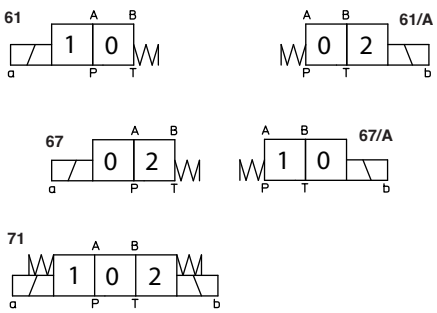
(1) Not for certification **M** Group I (mining)

(2) Possible combined options: **AWP**

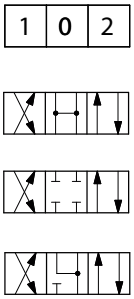
⚠ The pressure at T port makes difficult the manual override operation that can be possible only if its value is lower than 50 bar

2 CONFIGURATIONS and SPOOLS (representation according to ISO 1219-1)

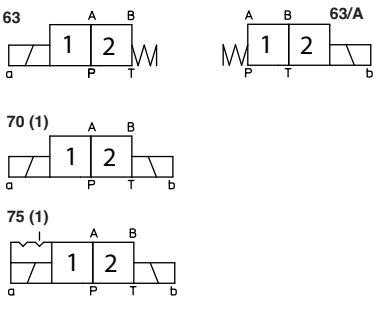
Configurations



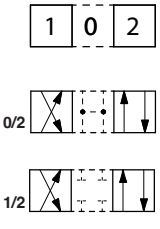
Spools



Configurations



Spools



Note (1): configuration 70 and 75 available only with spool type 1/2

3 GENERAL CHARACTERISTICS

Assembly position	Any position, horizontal recommended
Subplate surface finishing to ISO 4401	Acceptable roughness index, Ra ≤ 0,8 recommended Ra 0,4 - flatness ratio 0,01/100)
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007
Ambient temperature	**Standard** = -30°C ÷ +60°C **/PE** option = -20°C ÷ +60°C **/BT** option = -40°C ÷ +60°C
Storage temperature range	**Standard** = -30°C ÷ +80°C **/PE** option = -20°C ÷ +80°C **/BT** option = -40°C ÷ +70°C
Surface protection	Zinc coating with black passivation - salt spray test (EN ISO 9227) > 200h
Compliance	Intrinsically safe protection "Ex ia", see section 11 RoHs Directive 2011/65/EU as last update by 2015/863/EU REACH Regulation (EC) n°1907/2006

4 HYDRAULIC CHARACTERISTICS

Operating pressure	Ports P,A,B: **350** bar; Port T **160** bar
Rated flow	See Q/Δp diagrams at section 7
Maximum flow	**30 l/min**, see operating limits at section 8

5 ELECTRICAL CHARACTERISTICS - see also section 11

Nominal resistance at 20°C	108 Ω	157 Ω
Coil insulation	Class H	
Minimum suggested supply current **(1)**	90 mA	70 mA
Protection degree	IP65; IP66/IP67 with mating connector suitable for the protection class	
Duty factor	100%	
Electrical connector	DIN 43650 2 pin+GND	

(1) Valve functional limits depend on the supply current, see section 8
In case of supply currents lower than the minimum suggested, the valves may not operate or may operate with reduced limits

6 SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

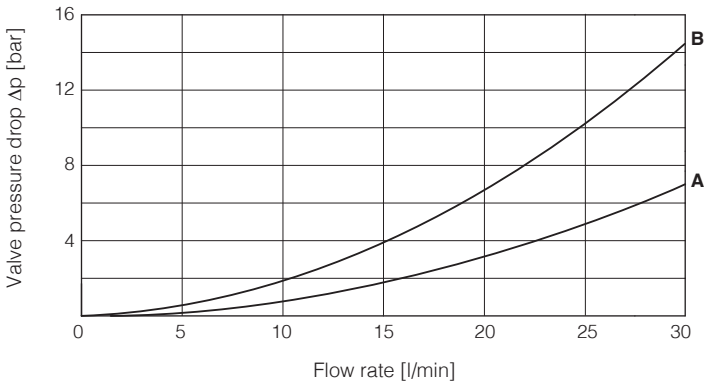
Seals, recommended fluid temperature	NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C NBR low temp. seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C		
Recommended viscosity	15÷100 mm²/s - max allowed range 2.8 ÷ 500 mm²/s		
Max fluid contamination level	ISO 4406 class 18/16/13 NAS 1638 class 7, see also filter section at www.atos.com or KTF catalog		
Hydraulic fluid	**Suitable seals type**	**Classification**	**Ref. Standard**
Mineral oils	NBR, FKM, NBR low temp.	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR, NBR low temp.	HFC	

⚠ The ignition temperature of the hydraulic fluid must be 50°C higher than the max solenoid surface temperature

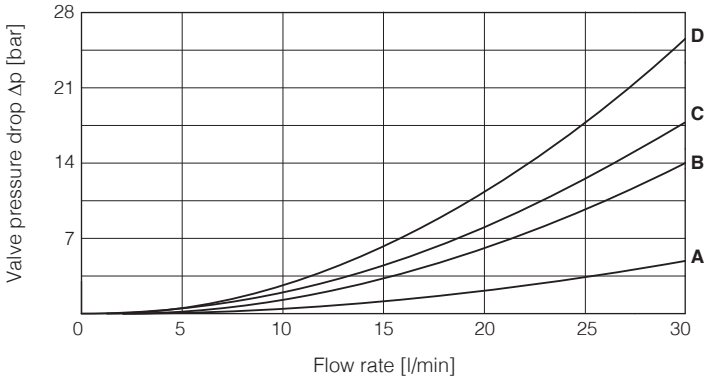
Performance limitations in case of flame resistant fluids with water:
-max operating pressure = 210 bar -max fluid temperature = 50°C

7 Q/ΔP DIAGRAMS based on mineral oil ISO VG 46 at 50°C

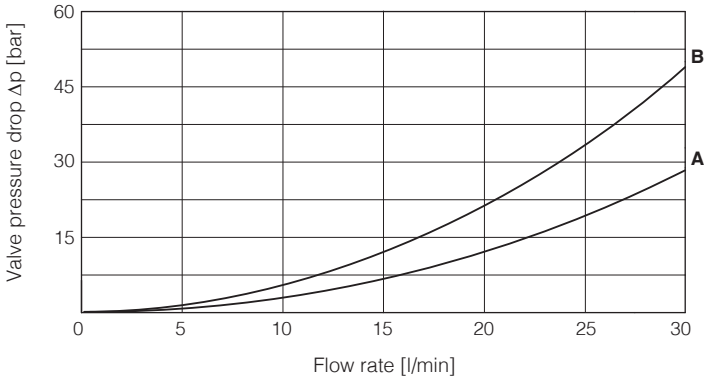
Flow direction / Spool type	P→A	P→B	A→T	B→T
0	A	A	A	A
0/2	B	B	A	A



Flow direction / Spool type	P→A	P→B	A→T	B→T	AB→T
1/2	B	B	C	C	-
3H	D	D	A	A	C



Flow direction / Spool type	P→A	P→B	A→T	B→T
1	A	A	B	B



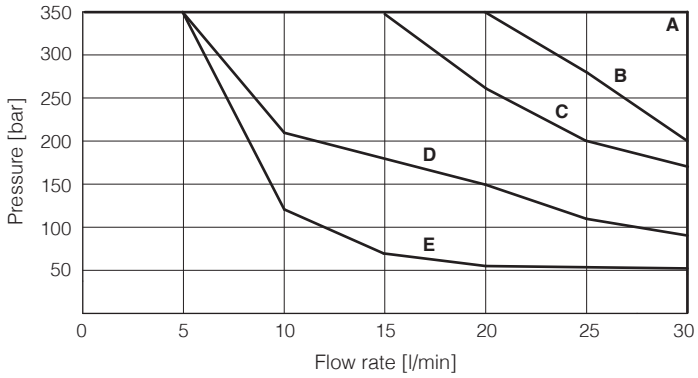
8 OPERATING LIMITS based on mineral oil ISO VG 46 at 50°C

The curves refer to application with symmetrical flow through the valve (i.e. P→A and B→T).
In case of asymmetric flow the operating limits could be reduced.

Note: valve operating limits depends to the current supplied from the intrinsically safe barrier.

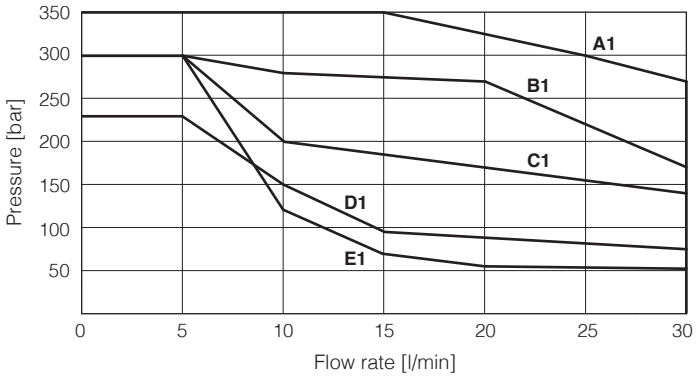
In the diagram are reported the operating limits using Y-BXNE 412 002 : supply current 80mA (for coil resistance 157Ω)
supply current 100mA (for coil resistance 108Ω)

Spool type	Curve
Spool type **1/2** (config 75)	**A**
Spool type **1**	**B**
Spool type **3H**	**C**
Spool type **0/2**	**D**
Spool type **1/2**	**D**
Spool type **0**	**E**



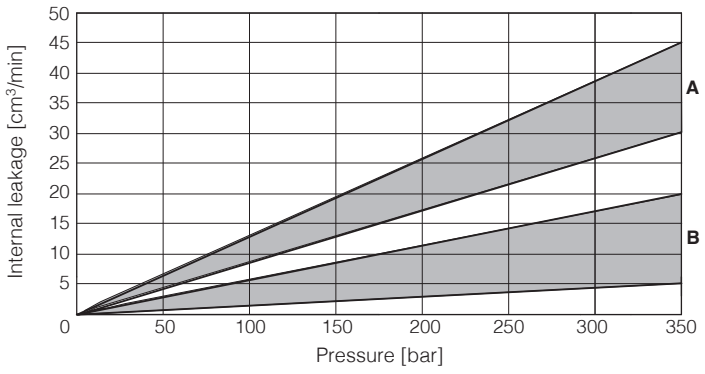
In the diagram are reported the operating limits providing the following current values: 70mA for coil resistance 157Ω
90mA for coil resistance 108Ω

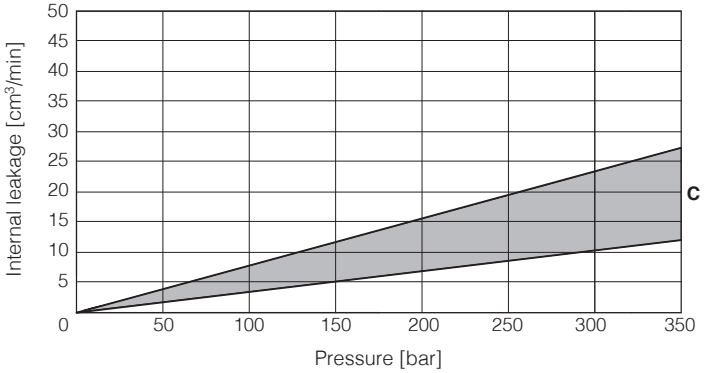
Spool type	Curve
Spool type **1/2** (config 75)	**A1**
Spool type **1**	**B1**
Spool type **3H**	**C1**
Spool type **0/2**	**D1**
Spool type **1/2**	**D1**
Spool type **0**	**E1**



9 INTERNAL LEAKAGES based on mineral oil at viscosity 15 cSt

Spool type		Position		
0				
	curve	A		A
1				
	curve	B	C	B
3H				
	curve	B	C	B
0/2				
	curve	A		A
1/2				
	curve	B		B





10 SWITCHING TIME

Switch-on (ms)	**Switch-off** (ms)
300	430

11 CERTIFICATION DATA

Valve type		DHWL8			DHWL8/**M**
Certification		**ATEX, IECEx** (Group II)			**ATEX, IECEx** (Group I)
Coil code		**COW-100** (108Ω), **COW-150** (157Ω)			**COW-100/M** (108Ω) **COW-150/M** (157Ω)
Type examination certificate **(1)**		ATEX: TUV IT 22 ATEX 051X; IECEx: IECEx TPS 22.0057X;			ATEX: TUV IT 22 ATEX 051X IECEx: IECEx TPS 22.0057x
Method of protection		• ATEX, Ex II 1G Ex ia IIC T6 Ga Ex II 1G Ex ia IIC T5 Ga • IECEx Ex ia IIC T6 Ga Ex ia IIC T5 Ga			• ATEX, Ex I M1 Ex ia I Ma • IECEx Ex ia I Ma
Temperature class		**T6**		**T5**	**-**
Electrical characteristics (max values)	Ci , Li	≅ 0	≅ 0	≅ 0	≅ 0
	Ui [V]	30V	30V	30V	30V
	Ii [mA]	800mA	2200mA	2200mA	2200mA
	Pi [W]	3W	6.82W	6.82W	6.82W
Ambient temperature **(2)**		-40 ÷ +60°C	-40 ÷ +45 °C	-40 ÷ +60°C	-40 ÷ +60°C
Applicable standards		EN 60079-0 EN 60079-11		IEC 60079-0 IEC 60079-11	

(1) The type examinator certificates can be downloaded from www.atos.com

(2) In case the complete valve must withstand with minimum ambient temperature of -40°C, select **/BT** in the model code

⚠ **WARNING: service work performed on the valve by the end users or not qualified personnel invalidates the certification**

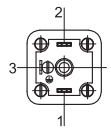
12 SIL compliance with IEC 61508: 2010

- **SC3** (systematic capability)
- max **SIL 2** (HFT = 0 if the hydraulic system does not provide the redundancy for the specific safety function where the component is applied)
- max **SIL 3** (HFT = 1 if the hydraulic system provides the redundancy for the specific safety function where the component is applied)

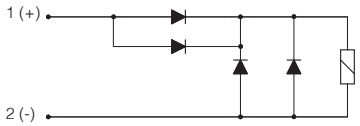
13 EX PROOF SOLENOIDS WIRING

Connector wiring	
1	Coil +
2	Coil -
3	GND

ELECTRIC CONNECTOR
DIN 43650

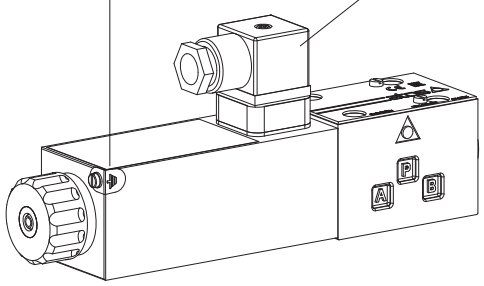


INTERNAL ELECTRICAL SCHEME



Screw terminal for additional equipotential grounding

Electric connector



14 INTRINSICALLY SAFE BARRIERS - see tech. table **GX010**

Intrinsically safe valves must be powered through safety barriers certified according to Ex-i protection mode, limiting the energy to the solenoid.

To select the proper intrinsically safe barriers following data must be considered:
1) Vmax and Imax of the solenoid as specified in section 11 must not be exceeded also in fault conditions;
2) For proper operation, the minimum supply current value must be provided.

The barriers type **Y-BXNE 412** are galvanically isolated electronic devices, complying with European Norms EN60079-0/06, EN60079-11/07 and ATEX certified according to protection mode Ex ia IIC.

The barriers Y-BXNE-412 are double channel type, suitable to operate valves with double or single solenoid. Two single solenoid valves can be connected to the barrier (one to each channel) but they cannot be contemporary operated.

MODEL CODE OF I.S. BARRIER

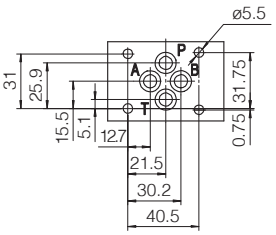
Y-BXNE 412 00	*

Supply voltage
E = 110/230 VAC
2 = 24÷48 VDC

15 INSTALLATION DIMENSIONS [mm]

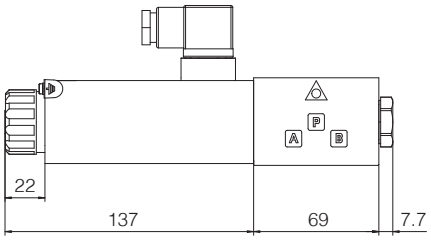
ISO 4401: 2005 (see table P005)
Mounting surface: 4401-03-02-0-05
Fastening bolts: 4 socket head screws:
M5x30 class 12.9
Tightening torque = 8 Nm
Seals: 4 OR 108
Ports P,A,B,T: Ø = 7.5 mm (max)

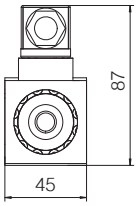
Valve's bottom view



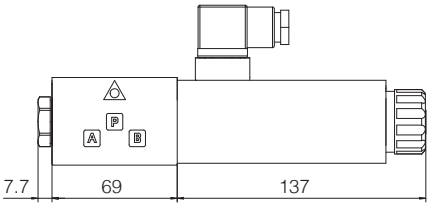
P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT

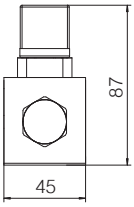
DHWL8-06*





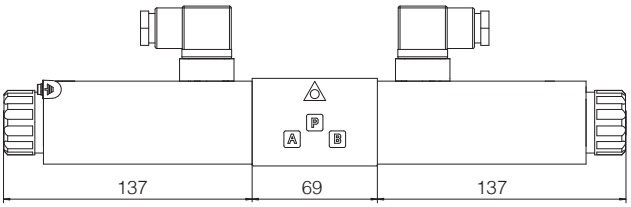
DHWL8-06*/A

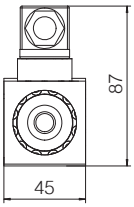




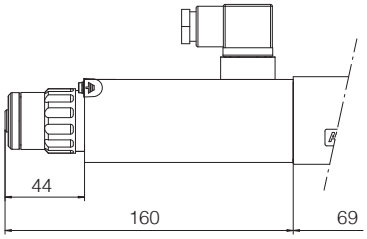
Mass [kg]	
DHWL8-06	2,6
DHWL8-06*/A	2,6
DHWL8-07*	4,2

DHWL8-07*





Option **/WP**



Note: the connector type 666 is supplied with the valve

16 RELATED DOCUMENTATION

X010	Basics for electrohydraulics in hazardous environments
X050	Summary of Atos intrinsically safe components certified to ATEX and IECEx
EX950	Operating and maintenance information for intrinsically safe valves
P005	Mounting surfaces for electrohydraulic valves