Pilot valves

FOR PNEUMATIC ACTUATORS

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ASCO®

EMERSON™
Industrial Automation

The process industry has different sub-segments with specific demands such as for:

- **oil & gas**
- **(petro)chemical**
- **pharmaceutical**
- **power generation**
- **water & beverage**
- **food**
- **pulp & paper**




Solenoid pilot valves are often installed in environments with low and/or high ambient temperatures, corrosive influences and high mechanical loads.

Consequently, they have to be designed for long-term high reliability under harsh conditions.

Quality and reliability of process valves are of great importance for the safety and output of the production.

Solenoid valves are used to activate single/double acting pneumatic actuators operating as the driving force on process valves.

Since the pilot valve can restrict the flow, the actuator and process valve response time performances are strongly influenced by the pilot valve's flow capacity.

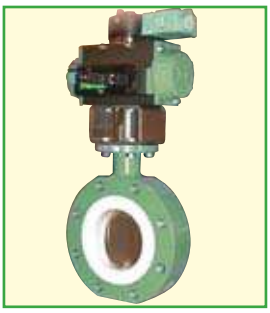
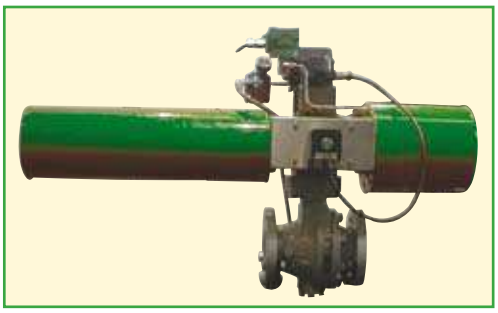
ASCO Numatics, the industry leader offering the widest variety of solenoid valves in the world

PILOT VALVES FOR THE PROCESS INDUSTRY

To fulfil the actuators' and the environment requirements, the ***selection of the pilot valve*** *has to be done carefully regarding:*

- mounting interface
- flow capacity
- function
- choice between direct-acting or pilot operated valve
- functional safety
- power consumption and electrical connection method
- communication through fieldbus and remote I/O
- environment: temperature, humidity, aggressive atmosphere; if applicable, explosion-proof zone and protection method

Different types of pneumatic actuators: rack & pinion, scotch yoke, linear ...

To give the best solution for your application, **ASCO Numatics** provides unique pilot valve solutions including:

- explosion proof and intrinsic safety
- low power
- direct Namur mount
- functional safety.

Pilot valves which operate at extremely low power levels are compatible with interfaces and their major communication protocols including ASinterface, DeviceNet, Profibus-PA and Foundation Fieldbus.

Pilot valves are available in a large selection of:

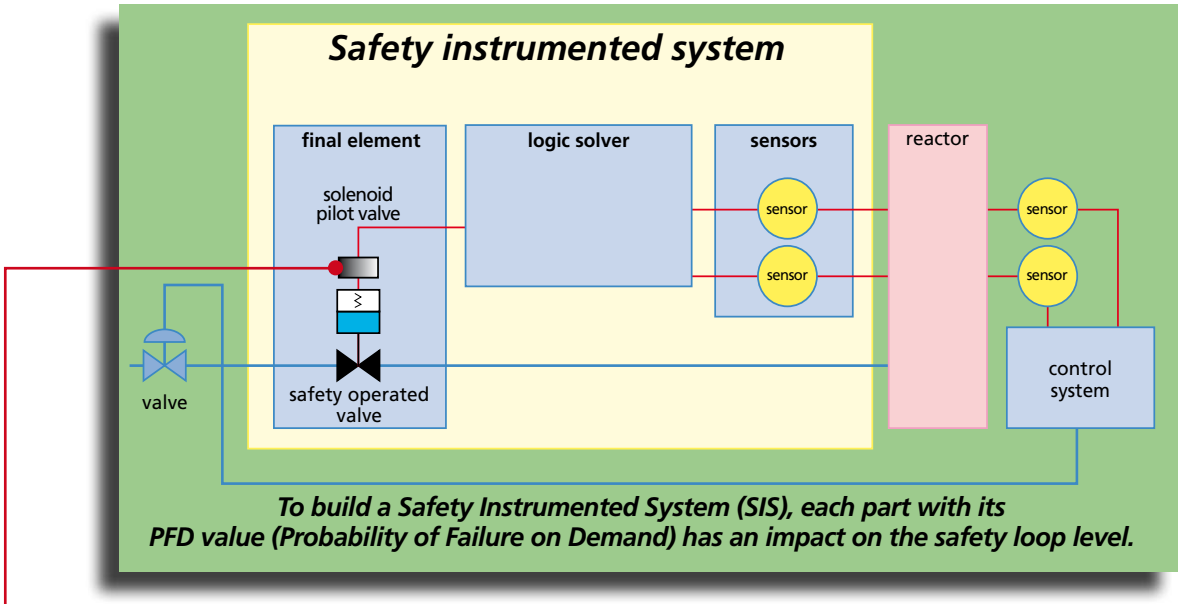
- 3-, 4- and 5-way direct-acting or pilot operated/pressure assisted versions
- brass, stainless steel, aluminium and plastic valves
- sealing materials in a wide range of resilients
- ATEX and other solenoid operator enclosures are available to operate from -50°C to +100°C in normal or explosive environments.

FUNCTIONAL SAFETY

Reliability is a critical factor in control and safety systems.

Essential is our **compliance with functional safety IEC 61508 and 61511 standards**.
ASCO Numatics pilot valves can easily perform millions of cycles, meaning in most cases they can outlive the rest of the customer's process with zero maintenance. At the other end, pilot valves fitted to safety shut-off valves may operate only a handful of times during the plant lifetime. However, they must operate perfectly when required.

ASCO Numatics pilot valves models 327, 551, 126 have successfully been tested by TÜV according to IEC 61508 and are suitable for use in safety **applications up to SIL 4** with PFD < 4.10^{-7}. This is the highest achievable rating.



To build a Safety Instrumented System (SIS), each part with its PFD value (Probability of Failure on Demand) has an impact on the safety loop level.

The final element often consists of a solenoid valve, an actuator and a process valve. Solenoid valves are an essential part in the safety loop, then directly control the on/off valve actuators.

Safety Integrity Level	Risk reduction by Safety System	Probability of Failure on Demand
SIL < 1	No requirements	No requirements
SIL 1	> 10	< 0.1
SIL 2	> 100	< 0.01
SIL 3	> 1000	< 0.001
SIL 4	> 10.000	< 0.0001

Relationship between PFD and SIL

International Standards
IEC 61508 & IEC 61511

EXPLOSIVE ATMOSPHERES

An important aspect of safety is the application of equipment in explosive atmospheres.

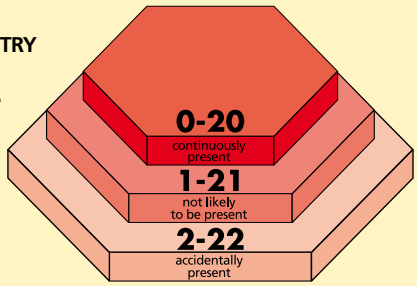
European directives 99/92/EC (ATEX 137) and 94/9/EC (ATEX 100a) aim at improving the health and safety protection of workers potentially at risk from explosive atmospheres.

With effect from 1st July 2006, all installations must comply with ATEX directives.

ATEX DIRECTIVE 94/9/EC

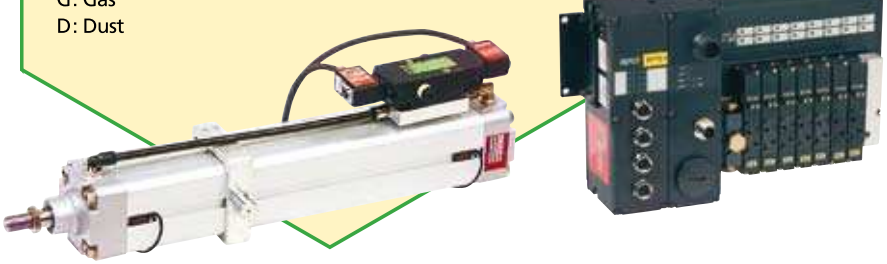
EQUIPMENT FOR SURFACE INDUTRY GROUP II

GAS / DUST ZONES



ZONES	0	20	1	21	2	22
Type of explosive atmosphere	G	D	G	D	G	D
Presence of explosive atmosphere	Continuous, frequent		Intermittent (likely)		Occasional	
Category of equipment	1		2		3	

G: Gas
D: Dust



A wide range of ASCO Numatics equipment can be used in explosives zones and includes:

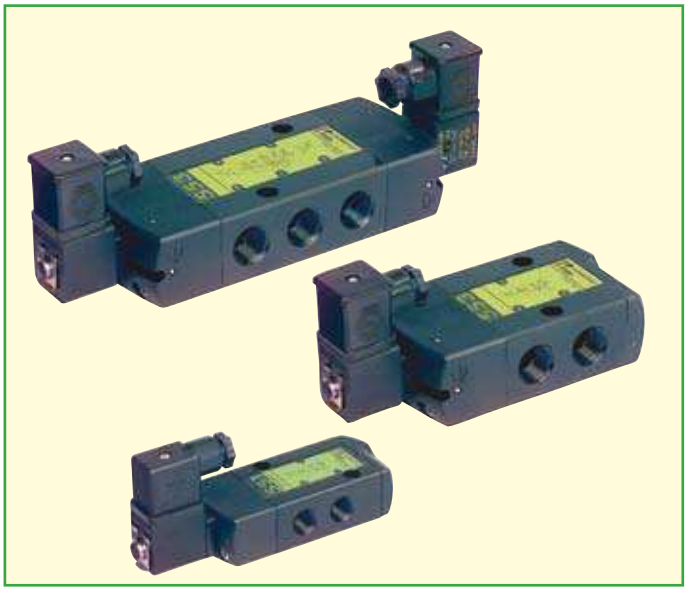
- solenoid valves
- pressure operated valves
- cylinders
- spool valves
- valve islands
- filter-regulator-lubricator
- completely integrated pneumatic system

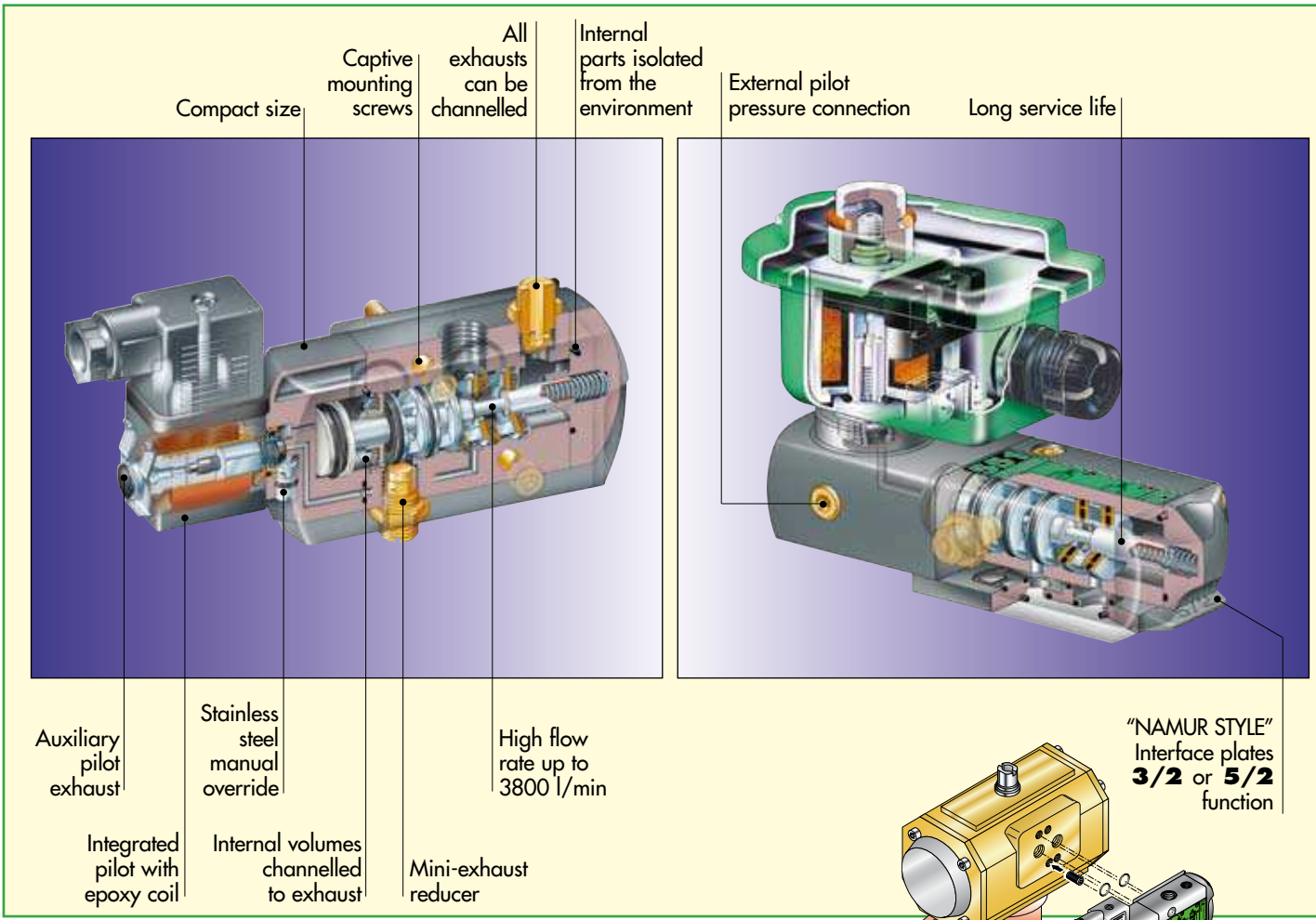
Functional safety

AK7 DIN 19251 standard

SIL4 IEC 61508 & IEC 61511 standards

TÜV





Clean/Aggressive environments

All exhaust ports can be connected to the piping system for environmental protection.
The spool valve's internal volumes are channelled to the common exhaust ports.

"NAMUR STYLE" version: the spring-return chambers "breathe" through the solenoid valve which provides proctection against particles and contaminants from the environment, entering the actuator .

PILOT OPERATED SOLENOID VALVES THREADED AND "NAMUR STYLE"

Product series 551, 552, 553

A unique range of 1/4", 3/8", 1/2" pilot operated solenoid valves for your pneumatic actuator applications.

- Small size and high flow rate up to 3800 l/min
- Threaded and "NAMUR style"
- Explosion proof and intrinsically safe version
- Fieldbus compatible
- Suitable for hazardous areas zones 0, 20, 1, 21, 2, 22.

Our large range of solenoid operators, electrical power levels, valve materials, pilot interfaces, 3/2, 5/2 mono/bistable, 5/3 functions enable these valves to meet your needs for safety and low power consumption.

Threaded versions and "NAMUR STYLE" interface are in accordance with CEN/TC69/WG1/SG10, VDI/VDE3845 (NAMUR) standards.

Large range of solenoids

EEx m

EEx d

EEx em, nA

EEx ia

EEx ia, nA
ISO/CNOMO pilot

Various valve body materials

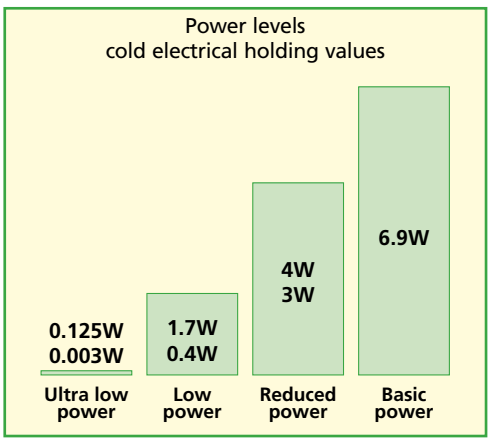
aluminium body

brass body

stainless steel body

Electrical power level

To reduce the total cost of installation and to make the solenoids more reliable and suitable for fieldbus control, there is a strong trend towards lower power consumption.



Characteristics

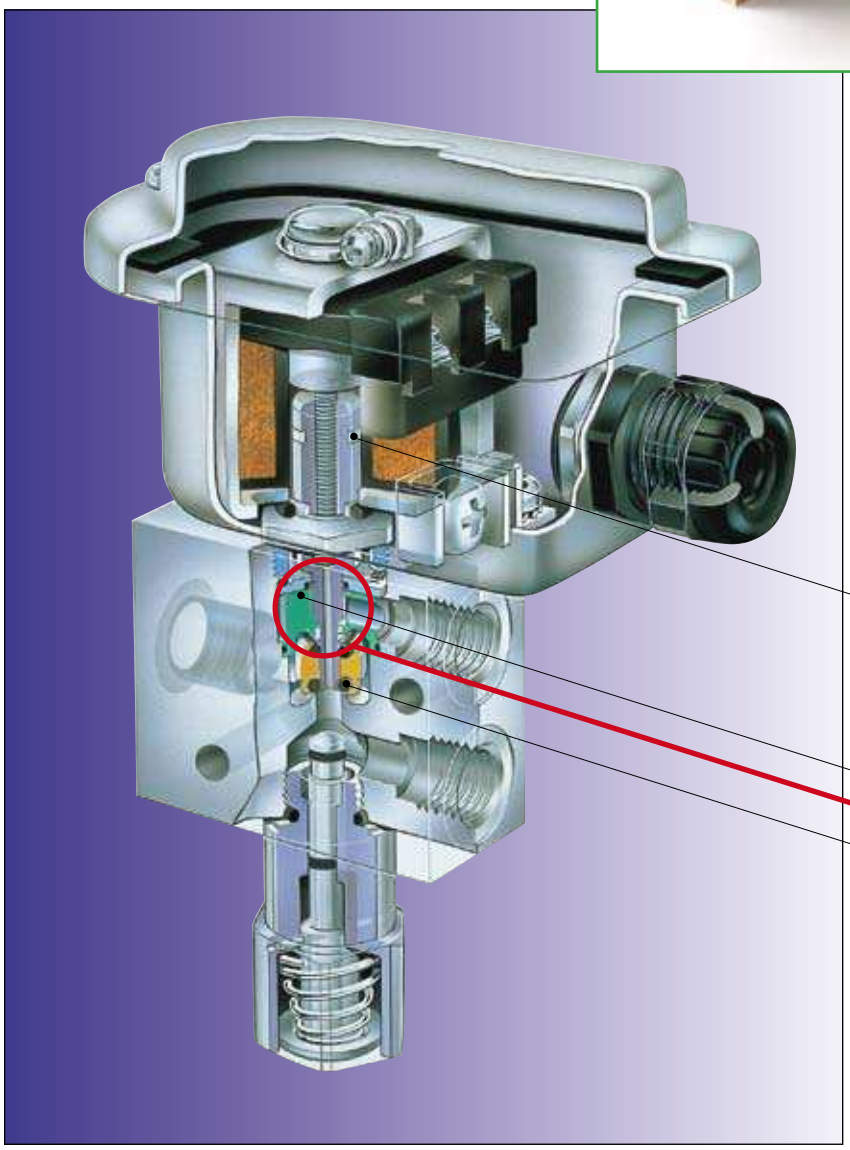
Maximum operating pressure 10 bar
Operating temperature -40°C to +80°C
Flow range Qv 700 to 3800 l/min Kv 0.75 to 3.15 m^3/h

Functional safety

AK7 DIN 19251 standard

SIL4 IEC 61508 & IEC 61511 standards

TÜV



1 Energy saving: reduced power consumption thanks to low friction "Delta" seal

2 Reliability: balanced poppet technology assures resistance against pressure surges

3 Exceptional service life: Teflon rider and desulphurised seal eliminate sticking on valve seat

The original balanced poppet construction gives an equal pressure field all around the poppet and no pressure resistance during valve opening. This way, the coil compensates only seal friction.

HIGH FLOW SOLENOID VALVES
UNIVERSAL OPERATION

Product series 327 1/4"- 1/2"

The reliable balance poppet technology and **non-sticking seal** concept provide an optimum balance between **high flow rates and low power consumption**. The 1/4" and 1/2" direct acting solenoid valves Series 327 are recommended for pilot applications with **high flow**, wide pressure range and **no minimum operating pressure**.

Due to the universal flow concept, pressure can be applied on all ports allowing normally closed, normally open and divergent flow configurations.

The 3/2 pilot valves are mainly used to control single acting, spring return actuators driving all kinds of process and shutdown valves.

- NAMUR versions
- Tamperproof manual reset
- Redundant solenoid valves
- Suitable for hazardous areas 1, 21, 2, 22.

Large range of solenoids

EEx d

EEx em

EEx m

EEx nA

Various valve body materials

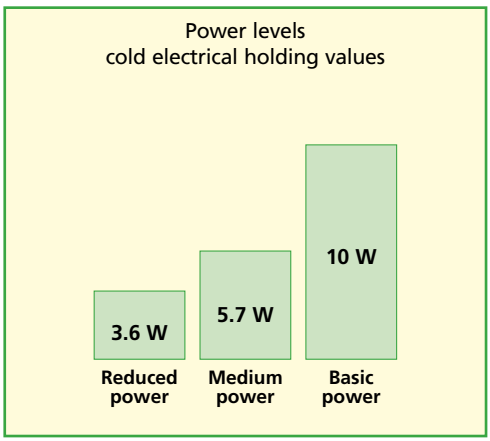
brass body

stainless steel body

aluminium body for NAMUR execution

Electrical power level

The special non sticking seals offer a very low friction. In combination with the balanced poppet construction, this reduces the power consumption. Various power ratings are available to cover the different flow, temperature and safety requirements.

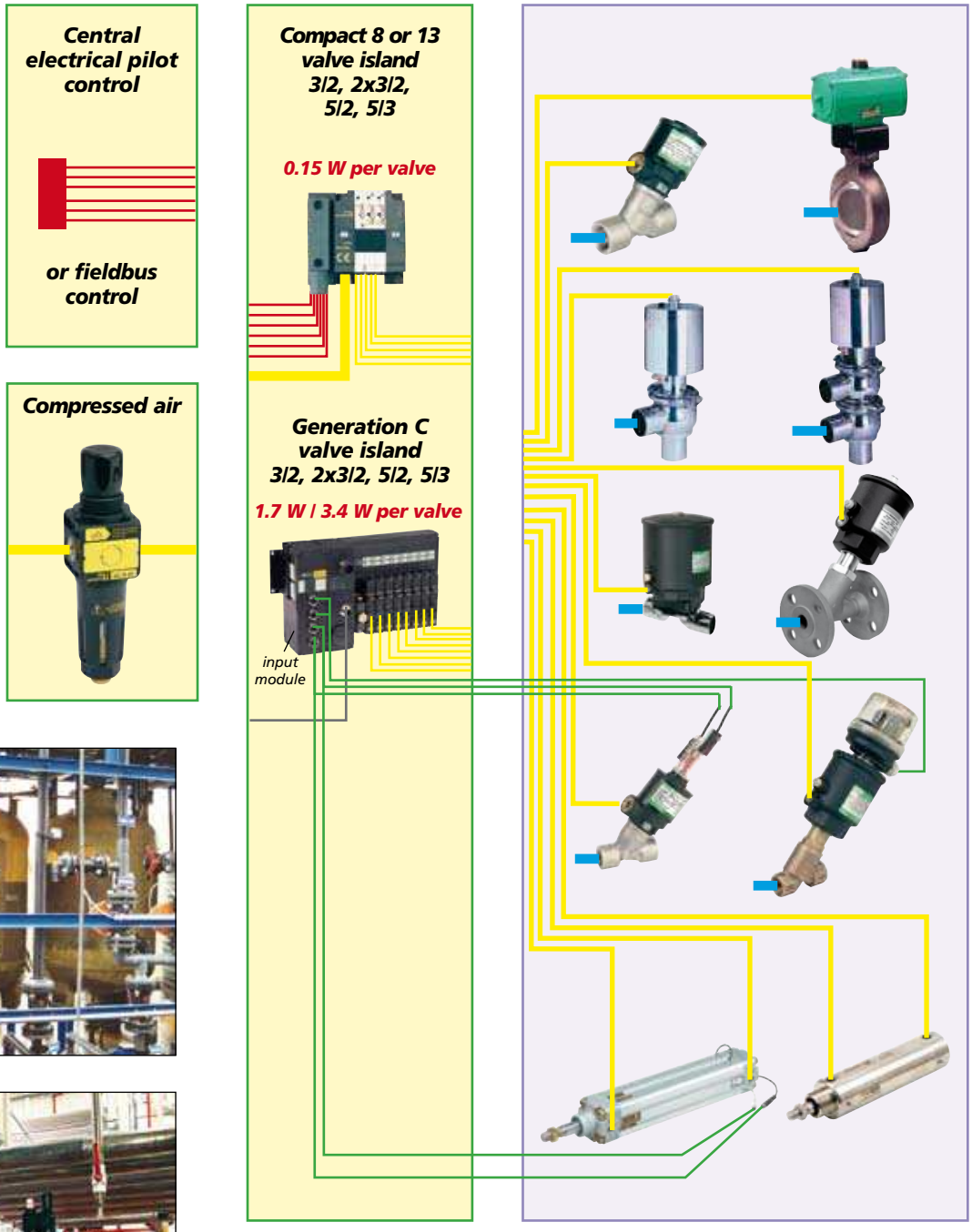


Characteristics
Operating pressure 0 to 10 bar
DN 6, 12 mm
Operating temperature -40°C to +90°C
Flow range Kv 0.5 to 1.5 m^3/h

ACTUATORS, VALVES PILOTING SOLUTIONS

Due to their increasing performances: flow versus size, easy installation, modular configuration, IP 65, I/O modules, valve islands are becoming more and more popular for process control applications.

- Reduced electrical wiring
- Low power consumption
- Cabinet installation for use in “aggressive” environments.



VALVE ISLANDS

In order to answer the different needs, **ASCO Numatics** has developed different valve island concepts.

Modular concept

Compact 8 or 13

300 l/min ANR (Compact 8)
750 l/min ANR (Compact 13)
3/2 NC or NO, 2X 3/2 NC, 5/2, 5/3 spool valves
Instant fittings
IP 65 protection rating for direct assembly onto machines

Multipol, Profibus-DP, ASinterface, CanOpen, DeviceNet

Up to 16 monostable or bistable spool valves enable the control of up to 32 actuators, pressure operated valves

Mega

900 l/min, ANR
3/2, 2x 3/2, 5/2, 5/3 spool valves
Instant fittings
Individual connector IP 20/IP 65

Multipol, Profibus-DP, ASinterface
Up to 16 monostable or bistable spool valves
Air operated version

Monobloc subbase concept

Generation C

175 l/min, 600 l/min, 1050 l/min ANR
3/2, 2x 3/2, 5/2, 5/3 spool valves
M5, G 1/8", G 1/4" or instant fittings
Versions with fieldbus control
intended for use in explosive zones 2, 22

ISO 1, 2 valve islands

1400 l/min, 2800 l/min ANR
5/2, 5/3 W1-W2-W3 spool valves
G 1/4", G 1/2"

ISO 01 (VDMA G01) ISO 02 (VDMA G02) valve islands

950 l/min, 500 l/min ANR
5/2, 5/3 spool valves
G 1/4", G 1/8"

Common characteristics

Multipol, Profibus-DP, Interbus-S, DeviceNet, ASinterface, Modbus, FIPIO
Up to 16 monostable or bistable spool valves
Up to 32 inputs and outputs per island

FIELDBUS COMMUNICATION

PROFI BUS PROCESS FIELD BUS

ASI INTERFACE

DeviceNet™

CANopen

INTERBUS Worldwide No.1

MODBUS

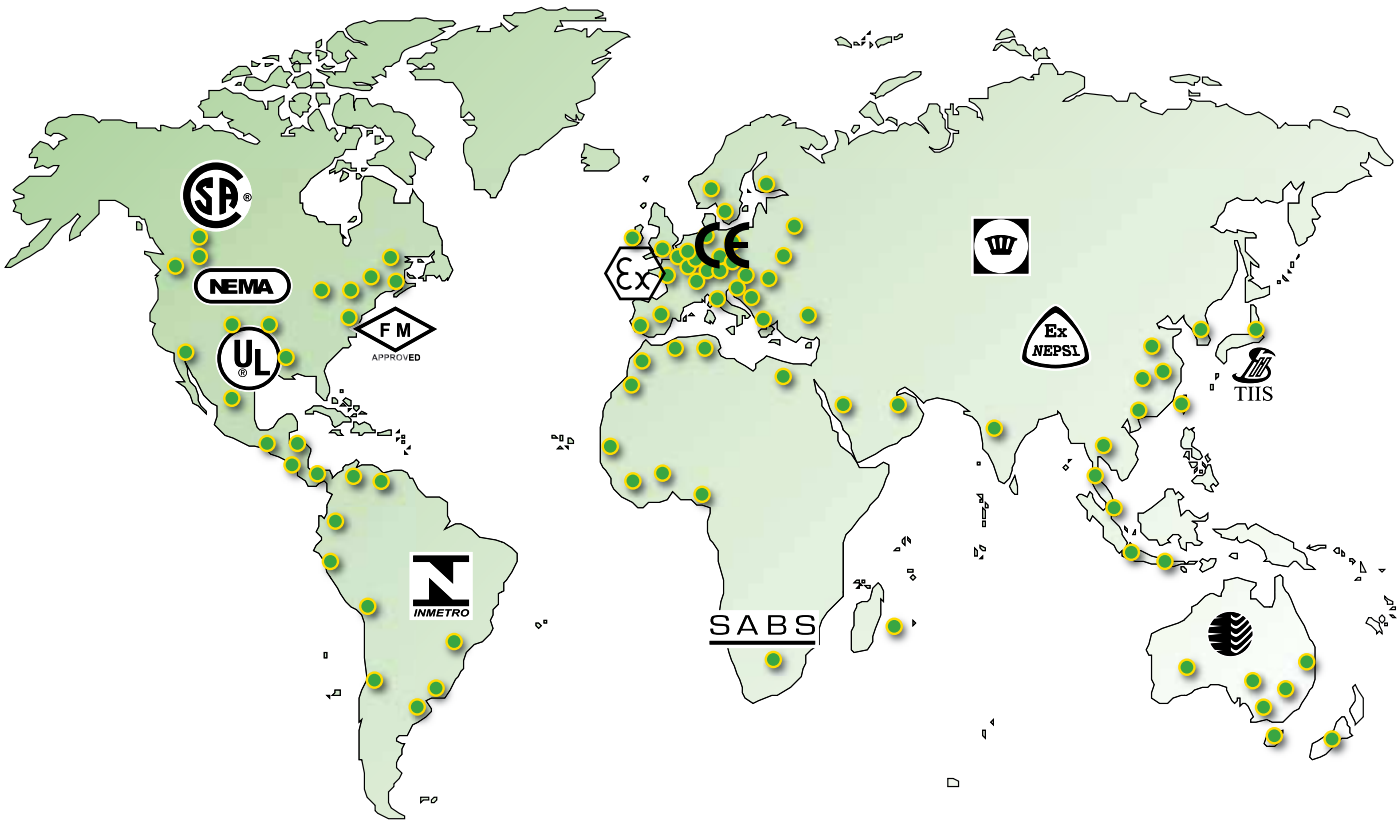
WorldFIP

Besides standard solutions, we have various customised islands for specific requirements for many years. For example, islands with intrinsically safe piezo pilot, isolation valves which act on the pneumatic circuit during operation, additional input/output modules, specific mounting plates, pressure switches ...

INTERNATIONAL APPROVALS

With over 100 years of experience, **ASCO Numatics** is the worldwide leader in the design and manufacture of quality solenoid valves for the process industry.
The ability to serve various markets is further reflected in the agency approvals that **ASCO Numatics** has obtained.

- **International organisation**
  With 20 manufacturing plants and a global support network of over 1000 sales offices and distributors, **ASCO Numatics** has a thorough understanding of valves and their applications. International contacts help keep **ASCO Numatics** in touch with technology developments and legislative changes in markets worldwide.



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