

atos®

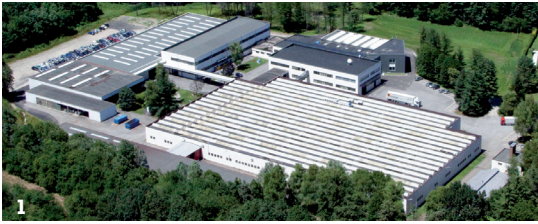
electrohydraulics



an advanced & consistent line

www.atos.com

this is atos



first class facilities
modern factories
and advanced machinery

know-how
the acknowledged
specialists in
electrohydraulics

updated technology
original solutions and
design make Atos an
acknowledged leader

full product range
custom products
are often standard
for Atos

reliable products
a consistent range of
fully tested products,
mass machined

professional team
for best R&D
and quality policy
assurance

sales & service
experienced engineers
assist customers
worldwide



1 Atos headquarters in Sesto Calende, Italy, a town close to Alps at shore at Lago Maggiore • 2-4 machining by CNC transfers with robot loading • 5 washing & thermal deburring • 6 zincing plant • 7 precise honing of valve's bodies • 8 laser welding for solenoids & spools • 9 3D micrometric control • 10-11 valves and cylinders assembly & testing lines • 12-13 shipping & storage depts • 14-15 electronic dept • 16 CNC testing of servoproportionals



foreword

Atos is one of the top international manufacturers in electrohydraulics, the advanced technology that integrates hydraulics with electronics to improve machine performances.

Atos components are evolved & reliable products of original design with a modular “meccano” concept.

They conform to international standards for dimensions, quality assurance and safety requirements.

Atos electrohydraulics is at your disposal through our sales & service network, see back page cover

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master catalog on-line

Atos Master Catalog is available on-line at www.atos.com

Over 400 pages of technical information, in various languages

Technical tables are steadily updated with sections, data and performances diagrams



DVT catalog has the same contents of the

“Catalog on-line” with possible installing into PC

SWK software electrohydraulics designer for assisted selection of Atos components codes



with up-to-date 2D & 3D drawings and full technical data

available for free download on catalog on-line page



hydraulic pumps

fixed displacement:
vane, radial piston, gear
variable displacement:
axial piston, proportional controls
multiple pumps



cylinders & servocylinders

ISO standard:
square & round heads
servocylinders with position transducer
special execution with proximity sensors
stainless steel - attachments



conventional & modulars

pressure controls: screw-in, in line, subplate or flange mounting - flow & check controls
modular valves: pressure, flow, check valves - pressure switch



directional on-off controls

solenoid valves:
spool type direct or piloted
leak free 2 or 3 way
hand lever - cam - hydraulic - pneumatic operated



safety valves

solenoid valves:
spool type, direct or piloted
screw-in cartridges 2 way
ISO cartridges 2 way
ISO active cartridges 2 way



proportional valves

pressure - directional - flow controls
proportional cartridges:
pressure relief, reducing, compensator
servoproportional cartridges: throttle



digital electronics

drivers for proportionals
with/without transducer:
integral to valve, plug-in, DIN rail
Eurocard format
programming tools & fieldbus



axis motion control

servoproportional valves with integral axis controller
Eurocard format axis controller
digital servomotors
programming tools & fieldbus



ISO cartridge valves

pressure controls:
relief, reducing, compensator
flow control
directional controls 2 way - check function
active cartridges 2 way



ex-proof & stainless steel

ATEX pumps and servocylinders
Multicertified valves ATEX/IECEX/EAC or UL
intrinsically safe valves and barriers
stainless steel valves



power units and systems

standard & customized power packs
automotive power packs
electrohydraulic systems
stainless steel power packs
accessories for hydraulic systems

technical trainings

Atos has an active approach to education and training of engineers by specific programs and tools



seminars on digital electrohydraulics, 1- or 2- days, are regularly held at headquarters or on strategic locations, in various languages



TE



TC



TZ

technical handbooks

TE, TZ, TC handbooks, 15 x 21 cm, are conceived to provide engineers & students with a technical survey of advanced digital electrohydraulics

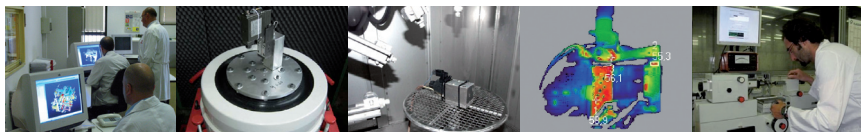
research & development

Atos, a leader in pioneering electrohydraulics, has first class R&D depts, fully equipped with technology tools and testing devices, active on basic research, improvement/development of components and innovative solutions for any application

quality policy

Atos' excellence is featured through high specialization and constant improvement philosophy

Quality activities are managed to ensure the best reliability of electrohydraulic components, targeted to obtain full customers satisfaction



proportional controls

Electrohydraulic proportional controls with integral electronics are the ideal interface between hydraulic and electronic systems to achieve faster, smoother and more accurate motions required by today's modern machines and plants

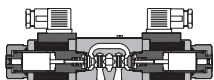
Digital proportionals introduce a powerful mix of advanced characteristics: rugged design, white zinc protection, IP66/67 water-proof, temp. range $-40^{\circ}\text{C} \div +60^{\circ}\text{C}$

The wide range of Atos proportionals includes:

Basic (B) are cost effective solution with analog command signal and USB port

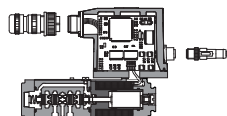
Full (S) are execution with fieldbus interfaces and optional alternated P/Q control

ZE-A ZO-A



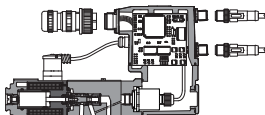
open loop without transducer, ZE-A screw-in or ZO-A high performance solenoids, with remoted electronic driver

ZO-AEB ZO-AES



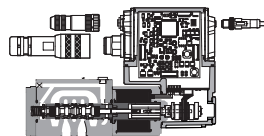
as ZO-A plus integral basic **(B)** or full **(S)** digital electronic driver

ZO-REB ZO-RES



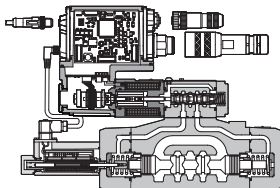
closed loop pressure proportionals with integral basic **(B)** or full **(S)** digital electronic driver and integral pressure transducer

ZO-TEB ZO-TES



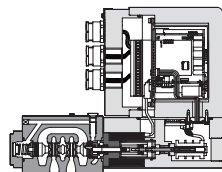
closed loop directional proportionals with integral basic **(B)** or full **(S)** digital electronic driver and integral spool transducer

ZO-LEB ZO-LES



closed loop two stage for high-performance with integral basic **(B)** or full **(S)** digital electronic driver and integral spool transducer

ZA-TES



ex-proof proportional, Multicertified ATEX-IECEx-EAC or UL standards, closed or open loop (ZA -T, -A), with or without digital electronic driver **(ES)**

Typical characteristics of Atos proportional 4-way valves

ISO size	valve version	06	10	16	25/27	32
hysteresis %	-A, -T, -L	≤ 5 $\leq 0.1\%$				
response time msec	-A, -T, -L	20-30 8-15	25-40 10-20	80-100 20-35	100-120 25-45	160-180 60-80
pressure gain	-T, -L	2 .. 5%	2 .. 5%	3 .. 6%	3 .. 6%	3 .. 6%
frequency resp. $\pm 100\%$ at -3dB, 90° phase lag $\pm 5\%$	-T, -L	≥ 50 Hz ≥ 130 Hz	≥ 40 Hz ≥ 100 Hz	≥ 30 Hz ≥ 60 Hz	≥ 15 Hz ≥ 40 Hz	≥ 9 Hz ≥ 15 Hz

servoproportionals

Spool-sleeve proportional valves,
precise zero overlapping, closed loop feedback
fail-safe, high response with excellent reliability
digital or analog electronics/factory preset
excellent for flow/pressure/position axis controls
software setting of functional parameters,
rugged option versus vibrations & shocks,
ex-proof & stainless steel executions



17 DLHZO-TEB & DLKZOR-TEB

Servoproportionals 4-way, direct - ISO 4401

DLHZO size 06 DLKZOR size 10

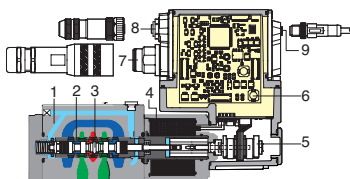
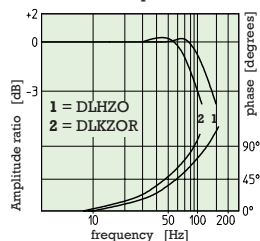
details on table FS180

max pressure 350/315 bar	size	spool (1)	max l/min
	06	L D DT	8, 14, 30, 40, 50, 70
	10	T V	90, 160

- (1) **L** linear; **T** knick for fine flow control;
D differential for cylinders with area ratio 1:2; **V** progressive for P/Q control

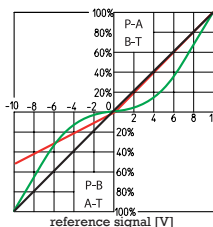
Bode diagrams

at $\pm 5\%$ of spool stroke

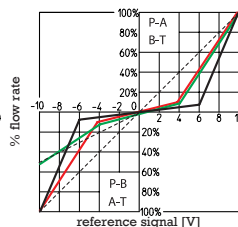


- 1 shell moulding body
2, 3 hardened sleeve & spool
4 proportional solenoid
5 LVDT transducer
6 integral electronic driver
7 main connection 7 or 12 pin
8 M12 IN/OUT fieldbus connection
9 M12 USB connection

regulation diagrams



- L** = linear spool
D = L spool - differential
V = progressive spool



- T5** = knick spool 60%
T7 = knick spool 40%
DT7 = knick spool 40% differential

Hydraulic data

	fail safe type 3 (*40-L*3)	fail safe type 1 (*40-L*1)	no fail safe (*60-L*1)
	max l/min for spools	L0 L1 V1 L3 V3 L5 T5	L7 T7 V7 D7 DT7
DLHZO	at $\Delta p = 30$ bar	2,5 4,5 5 9 13 18	26 26÷13
	at $\Delta p = 70$ bar	4 7 8 14 20 28	40 40÷20
	max permissible	8 14 16 30 40 50	70 70÷40
DLKZOR	at $\Delta p = 30$ bar		60 60÷33
	at $\Delta p = 70$ bar		100 100÷50
	max permissible		160 160÷80

proportional 4-way valves

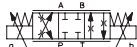
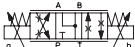
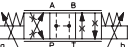
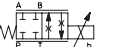
Atos proportionals are a full & modular line of valves to control flow, pressure, direction in association with proper electronic drivers and axis controllers.

Full set of interchangeable spools with progressive, linear, differential characteristics.

Excellent performances for response time, hysteresis, repeatability

details on tables F150, FS160, FS165, FS168

Proportional 4-way valves, direct ISO 4401 DHZ size 06 DKZ size 10

												
overlap +10% size 06 - +20% size 10												
max l/min for spools (1)		DHZE (2) - DHZO				DKZE (2) - DKZOR						
		S3	S5	L1	L3	L5	D5	S3	S5	L3	L5	D5
at Δp = 30 bar		30	50	8	30	50	50	80	130	80	130	130
at Δp = 70 bar		45	75	12	45	75	75	120	170	120	170	170
max permissible		50	85	18	50	85	85	150	180	150	180	180

(1) spools: S = progressive L = linear D = differential 1:2

max pressure 350/315 bar

(2) for DHZE and DKZE the flow performances are 5% to 10% lower than the values in the table

Note additional spools Q5 and V9 are available for specific application, i.e. injection or mould controls in plastic machinery



18



19



20



21



22

18 DHZE-A-05 and DKZE-A-15 with screw-in solenoid

19 DHZO & DKZOR-A proportionals

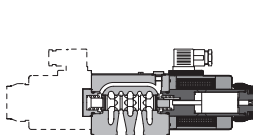
20 DHZO & DKZOR-AEB proportionals

21 DLHZO-TES with SF option and pressure transducers for closed loop force control

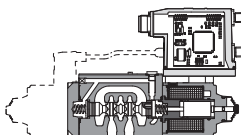
22 DKZOR-TEB-17 with integral digital driver and LVDT transducer

typical sections

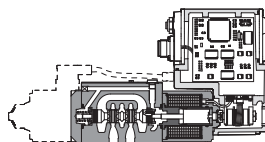
direct 4-way proportionals with multiple modular executions



Direct screw-in solenoid
-A without spool position transducer, 1 or 2 solenoids, with remoted open loop driver, page 14



Direct
-A* without spool position transducer, 1 or 2 solenoids, with integral digital driver basic -AEB or full -AES



Direct
-T* with integral spool position transducer, 1 or 2 solenoids, with integral digital driver basic -TEB or full -TES

Proportional 4-way valves, two stage ISO 4401 *details on tables FS170, FS172, FS175, FS178*

overlap +15%	overlap +15%	overlap 0%	overlap +15%		
code	DPZO-1	DPZO-2	DPZO-4	DPZO-6	DPZO-8
size	10P	16	25 (2)	32	35 (3)
max l/min for spools (1)	L5 S5 D5	L3 S3 D3	L5 S5 D5	L5 S5 D5	L5 S5 D5
at $\Delta p = 10$ bar	100	160	250	480	1200
at $\Delta p = 30$ bar	160	270	430	830	2000
max permissible	180	400	550	1000	3000

(1) spools: S = progressive L = linear D = differential 1:2

max pressure 350 bar

(2) optional size 27 high flow 4M execution with oversized oil ports ø32

(3) standard high flow execution with oversized oil ports ø50



23



24



25

23 DPZO-LEB basic servoproportional, pilot operated, size 16

24 Pilot operated -LES servoproportionals, size 16 & 25, with integral driver and 2 LVDT transducers

25 DPZA-2 & 4, ex-proof execution with multicertified solenoids, page 22

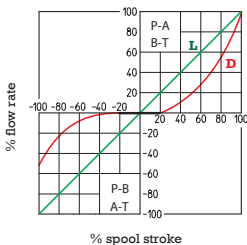
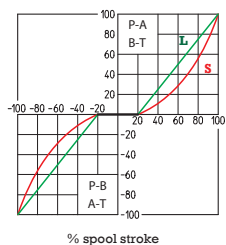
regulation diagrams

L = linear spool

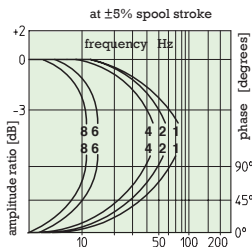
S = progressive spool

L = linear spool - 0% overlap

D = S spool - differential

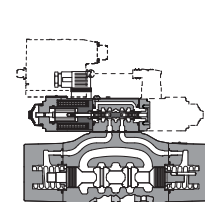


Code diagrams for LEB, LES valves



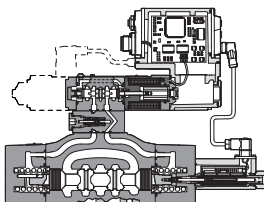
1 = DPZO-1 2 = DPZO-2

4 = DPZO-4 6 = DPZO-6; 8 = DPZO-8



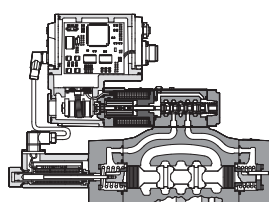
Two stage

-A* without spool position transducer, 1 or 2 solenoids, with remoted open loop driver, page 14, or with integral digital driver basic -AEB or full -AES



Two stage

-T* with integral spool position transducer on main stage, 1 or 2 solenoids, with integral digital driver basic -TEB or full -TES



Two stage

-L* with 2 spool position transducers on main stage and servoproportional pilot with integral digital driver basic -LEB or full -LES

proportional cartridges

LIQZ*-LEB, -LES are 2-way or 3-way proportional cartridges with integral digital electronics providing flow control with high dynamics, according to reference signals. Factory preset electronics ensure fine functionality plus valve-to-valve interchangeability

details on tables FS330, FS340

Proportional throttle cartridges ISO 7368 LIQZ*-LEB, -LES sizes 16 to 100

		LIQZO - max P 350 bar				LIQZP - max P 420 bar			
max l/min	for size	16	25	32	40	50	63	80	100
2 way at $\Delta p = 10$ bar max permissible		350 600	700 1200	1100 1800	1700 2500	2800 4000	4250 6000	6350 10000	10200 16000
3 way at $\Delta p = 10$ bar max permissible			260 500	470 850	590 1050	1100 2000	1750 3100	3000 5000	

hysteresis $\leq 0,1\%$ repeatability $\pm 0,1\%$ (% of the max flow)



26

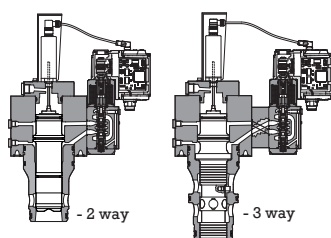


27



28

typical sections

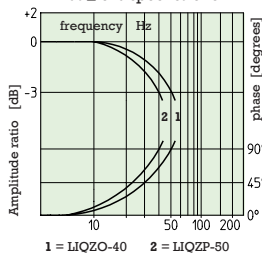


- 2 way

- 3 way

Bode diagrams

at $\pm 5\%$ spool stroke



2- & 3-way servoproportional cartridges with integral digital electronics:

26 Basic LIQZP-LEB rugged execution, size 50

27 Full LIQZO-LES and LIQZP-LES, size 16 to 63

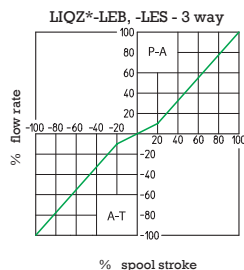
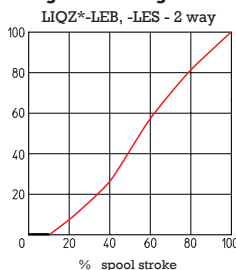
28 ATEX or IECEx ex-proof execution

-LEB, -LES cartridges

Double closed loop control by two position transducers on main spool and pilot valve to grant fast response times, high dynamics and regulation accuracy

Proportional cartridges are in "rugged" execution to withstand high vibrations and mechanical stresses

regulation diagrams



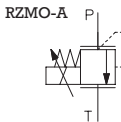
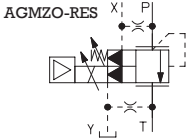
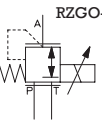
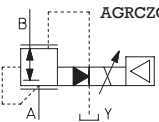
pressure & flow valves

Main models of proportional valves for pressure and flow control are resumed in this page
Pressure & flow may be also regulated in high dynamics by the 4-way or cartridge proportionals, described in pages 8, 9, 10

details on tables from F007 to FS075

Proportional pressure valves direct & two-stage

max pressure 350 bar

				
model	RZME, RZMO relief direct/two-stage	AGMZO relief two-stage	RZGE, RZGO reducing direct/two-stage	AGRCZO reducing two-stage
ISO subplate	4401	6264	4401	5781
sizes	06	10 20 32	06	10 20
max l/min	4 40	200 400 600	12 40	160 300



29 Pilot operated pressure reducing and relief valves

30 REB pressure relief valves with integral pressure transducer

31 Pressure reducing and relief valves



32 RZMO-RES pressure relief valve

33 AGMZA with ex-proof solenoid, driver & transducer, page 22

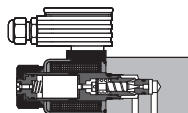
34 PC assisted test benches for proportionals

details on tables FS410, FS412

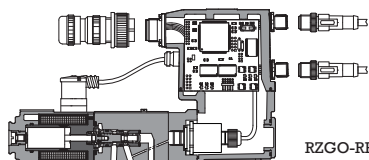
Proportional flow valves pressure compensated

		
model	QVHZO	QVKZOR
ISO 4401 sizes	06	10
max l/min	45	90

max pressure 210 bar



RZME-A + E-MI-AS



RZGO-RES

-A without pressure transducer

-AEB, -AES with integral digital electronic

-R with integral pressure transducer

-REB, -RES with integral digital electronic and transducer for closed loop pressure control

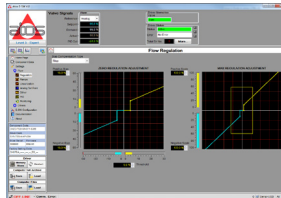
digital electronics

Modern world is driven by digital electronics ... thanks to its typical benefits in comparison with analog electronics: fast and powerful data processing, easy programmability, high immunity to electromagnetic noise, process parameters and data storage

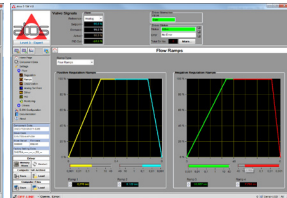
Atos new digital electronics are equipped with a standard USB port to be interfaced with the user-friendly PC software E-SW allowing the programming of all functional parameters



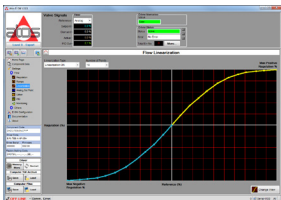
software setting of proportional



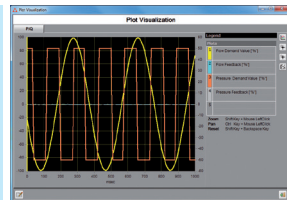
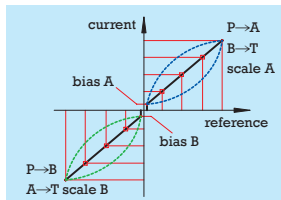
scale, bias & threshold



ramps



linearization - 10 points



diagnostic

E-SW programming software allows to set the driver's functional parameters. **Basic** version is available for free web download; fieldbus or P/Q versions are supplied in dvd format.

Atos unique PC software for digital drivers, easy installable on a personal computer, provides better performances, easy software setting with unsurpassable consistency & inherent diagnostics. Interface options USB, CANopen, PROFIBUS, EtherCAT, POWERLINK, etc.

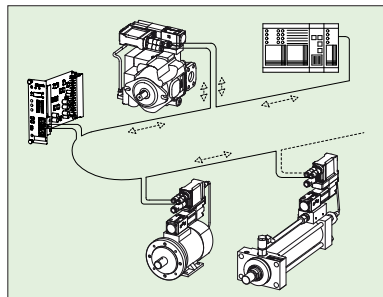
The software graphic interface is organized in pages and levels related to different specific functional groups and allows to:

- simply access all the functional parameters of Atos proportionals
- numerically adapt the factory preset parameters to the application requirements
- real time monitoring of the actual working conditions
- identify and quickly solve fault conditions
- store the customized setting into the driver or into the PC database

Fieldbus network

Atos digital proportionals in full execution integrates fieldbus communication: CANopen, PROFIBUS DP, EtherCAT, POWERLINK, etc.

The fieldbus offers remarkable advantages: immunity from electromagnetic disturbances, standardization of communication protocols, reduced wiring costs, diagnostics and remote assistance.

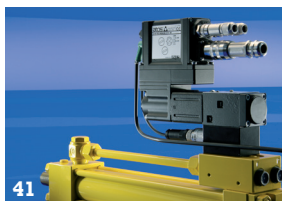


digital electrohydraulics

New digital electrohydraulics with on board electronics enables new functionalities within the conventional control architectures, integrates several logic and control functions - distributed intelligence - and it makes feasible and inexpensive its introduction in the hydraulic system of modern fieldbus communication networks

features

- **better performances:** hysteresis, response time, linearity and stability
- **easy & repetitive numerical software setting** of hydraulic parameters: scale, bias, ramps
- **new functions and settings**, like compensation of valve's non-linearities, of dynamic performances and of fail safe configuration
- **diagnostics** (alarms, fault, monitor) and PC assisted maintenance of machines and systems
- **direct interfacing to fieldbus networks**
- optional **combined pressure/flow or force/flow control** for valves and pumps



36 Complete range of digital proportional valves with integral driver & transducer

37 Basic TEB version, servoproportional 4-way valves, size 06

38 Full TES version with optional fieldbus, servoproportional 4-way valves, sizes 06, 10

39 DPZO-LES high performance servoproportional, sizes 25 & 35

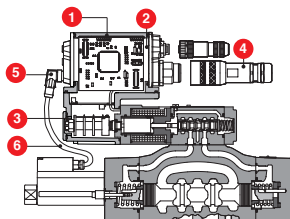
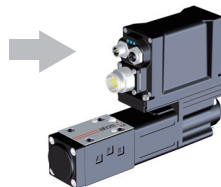
40 PVPC axial piston pump with PERS digital P/Q control

41 Electrohydraulic AZC servoactuators including: servocylinder with integral rod position transducer, pressure transducer and servoproportional valves with integral controller

rugged proportionals

Atos proportional valves have rugged execution to withstand high vibration levels and mechanical shocks typical of high demanding systems like die-casting, wood machinery, heavy mobile, military, aerospace

- **shock test** according to IEC 68-2-27 → 50g on 3 axis
- **vibration test** according to IEC 68-2-6 → 22Hz and 55Hz

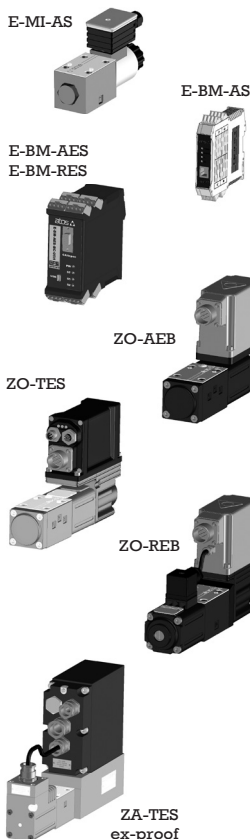


specifications

- 1 metal electronic housing
- 2 SMD electronics
- 3 strengthened LVDT housing
- 4 military style, 7 pin metal connector
- 5 M12 LVDT connector
- 6 shielded cable

electronic drivers

Atos digital electronic drivers supply proportional valves with a proper PWM current to align the valve regulation to the reference signal



Remote drivers *details on tables G020, G030, GS050, GS203*

driver	valve model	format	loop (1)
E-MI-AS	without integral transducer	DIN 43650 plug-in	O
E-BM-AS		DIN-rail panel	
E-BM-AES			
E-BM-RES	pressure control		C

Integral drivers *details on tables GS115, GS205, GS208, GS210, GS212, GS215, F650*

driver	valve model	format	loop (1)
ZO-AEB	basic directional & flow control 4-way & cartridges	integral-to-valve	O
ZO-TEB			C
ZO-LEB			D
ZO-AES (2)	full directional & flow control 4-way & cartridges		O
ZO-TES (2)			C
ZO-LES (2)			D
ZO-REB	basic pressure control		C
ZO-RES (2)	full pressure control		
ZO-PES	P/Q variable pumps		D
ZA-*	ex-proof execution		O/C/D

(1) control loop: **O** open; **C** closed; **D** double closed

(2) integral drivers available also in ex-proof execution multicertified ATEX, IECEx and EAC



Atos electronics are CE marked to qualify the conformity to the EMC European Directive
Electromagnetic Compatibility



42



43



44

42 Plug-in E-MI-AS driver mounted on proportional ZE open loop solenoid

43 Digital Driver Range for open loop valves

44 TES closed loop integral drivers

Atos is active since many years in R&D activities on digital electrohydraulics, including: research and testing of new DSP microcontrollers, simulation models of valves and systems, development of advanced softwares, extensive testing of components and new solutions



45



46

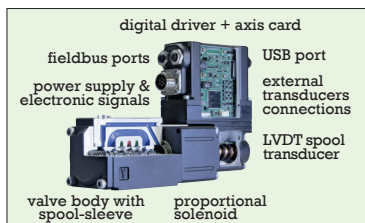


47

45 Complete range of digital electrohydraulics 46-47 R&D activity

Integral electronics, factory preset, ensures fine functionality plus valve-to-valve interchangeability and simplifies installation wiring and system set-up.

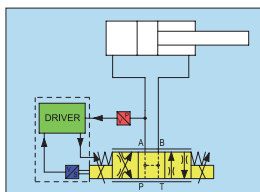
Drivers integral to valves with & without transducer, direct and pilot operated, as well as variable displacement pumps, also in ex-proof execution



Pressure-force/flow combined controls

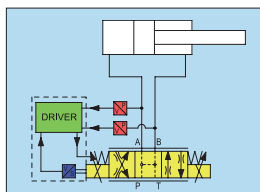
SP, SF, SL options in digital drivers add a pressure-force closed loop to the spool position control of 4-way proportionals.

A single proportional valve with S* option manages complex machine operations requiring high combined regulations: i.e. typical applications are injection or mould controls in plastic machinery



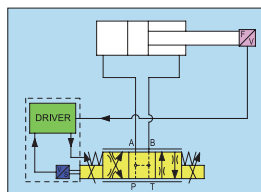
4-way proportional valve
SP - flow/pressure

■ electronic driver



4-way proportional valve
SF - flow/force by PA-PB

■ valve position transducer

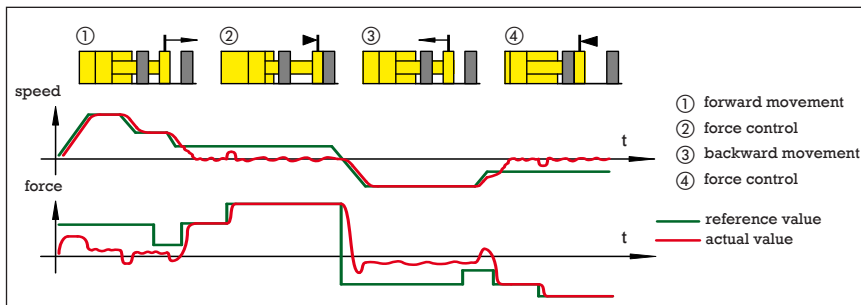


4-way proportional valve
SL - flow/force by load cell

■ pressure transducer

■ load cell

Pressure-force/flow functional schemes



motion controllers

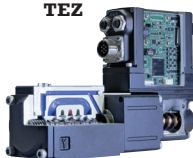
Atos digital axis motion controllers are the **up-to-date solution for the motion control** in modern machines and systems: they can be easily configured and PC programmed to **best manage position, speed or force of any electrohydraulic axis**, in closed loop by a digital servopropportional valves

They improve motion performance, simplify the automation architecture and may be interfaced by fieldbus to the machine control unit

details on tables FS230, G340, G345

Digital motion controllers

TEZ



integral axis controller
plus driver integral to
servopropportional valve

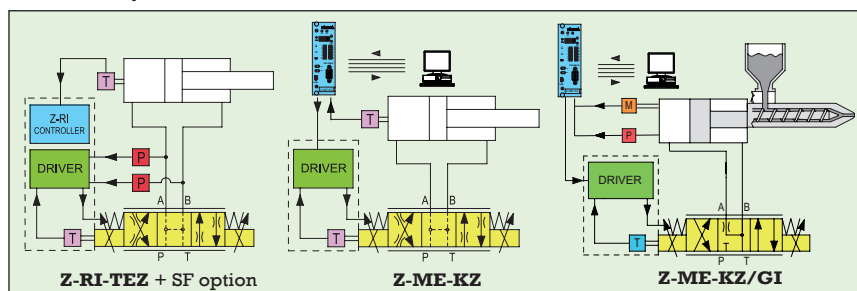
Z-ME-KZ



Eurocard axis controller
for flexible-general
purpose motion control

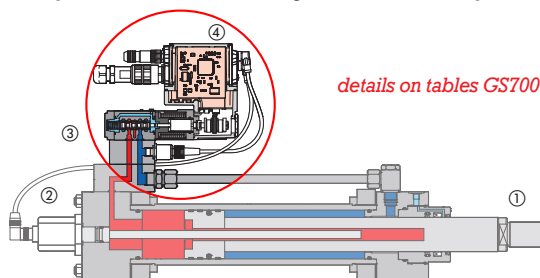
valve driver function	●	
number of controlled axis	1	1
internal programmable cycles	simple	complete
graphic programming software	●	●
position transducer interface analog - SSI - encoder	1	1
pressure-force/position control	● option SP, SL, SF, page 15	
pressure transducer interface	2	2
valve parameters setting	● factory preset	●
communication interface Serial / USB, CANopen, PROFIBUS DP, EtherCAT, POWERLINK	●	●
digital input/output	up to 2	9 (input) / 8 (output)
auxiliary analog input/output	up to 2	6 (input) / 3 (output)

Basic block systems



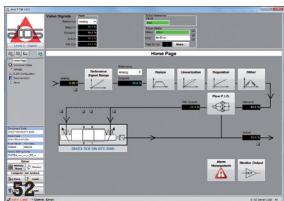
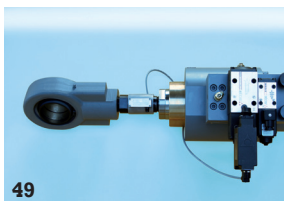
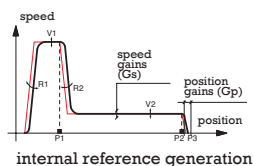
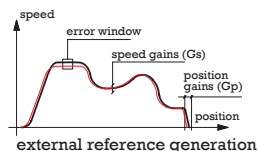
AZC servoactuators

Atos digital servoactuators perform the axis motion cycle with position closed loop plus optional speed/pressure/force control. They are smart machines' elements ready to use after piping to the hydraulic source and wiring to the electronic system.



details on tables GS700

- ① AZC servoactuator
- ② SSI position transducer
- ③ digital servoproportional
- ④ on board driver + controller



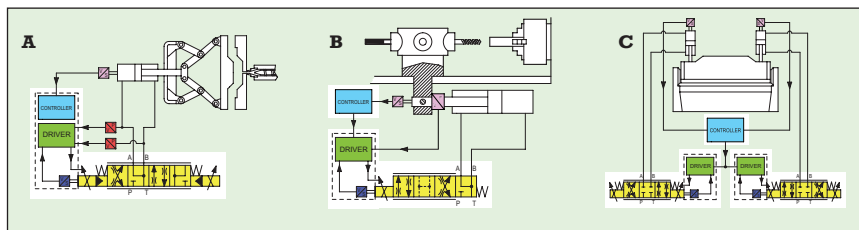
48 AZC servoactuator with potentiometric transducer

49-50 Electrohydraulic servoactuators with SL option for flow/force control by load cell

51 AZC servoactuator with built-in position transducer plus digital axis controller

52 Atos software for full parameters setting of the axis motion & relevant diagnostics

53 Punching servoactuator for high working frequency with SF option for flow/force control by 2 pressure transducers



application examples: **A** - clamp position control with force limitation in plastic machinery - **B** position-speed control with force limitation for machine tools - **C** synchronized control system for bending presses

solenoid valves



54

Atos is leading manufacturer of solenoid valves:

many millions of valves operate today worldwide

Atos valves features: shell-moulding castings machined by transfer lines and then cleaned by thermal deburring - large internal cores for low pressure drops - interchangeable precision spools - wet solenoids with manual override

Direct operated solenoid valves

details on tables E010, E015, E025, TE015

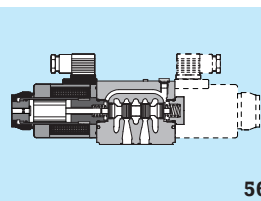
model	DHI	DHE	DKE	DHEP	DKEP
size	06	06	10	06	10
nominal flow [l/min]	60	80	150	80	150
Pmax [bar]	P, A, B port	350	350	350	420
	T port	120	160 [AC], 210 [DC]		
electrical power DC [W]	33	30	36	30	36
DC voltages	12, 14, 24, 28, 110, 220	•	•	•	•
	special 6, 9, 18, 48, 125	•			
	with electronic rectifier 110RC, 230RC	•	•	•	•
electrical power AC [VA]	60	58	85	58	85
AC voltages	110/50/60, 230/50/60	•	•	•	•
	24/50/60, 48/50/60, 120/60, 230/60	•			
certification cULus	•	•	•	•	•

- **DHI:** light duty applications, DC or AC supply just changing coils
- **DHE, DKE:** valves with screw-in solenoids different for DC or AC supply
- **DHEP, DKEP:** max pressure **up to 420 bar** for heavy duty applications
- **low power** consumption valves, size 06 with 8 W or 15 W solenoids, page 28

- **operating limits** of solenoid valves see tech. tables
- **interchangeable spools** available in a wide range of configurations, also for damped switching and low leakage executions
- **L devices** for controlling switching times
- **/WP devices** for manual operation by prolonged push-pin
- **/MV or /MO** hand lever execution, page 29



55



56



57

55 DHE valves, single solenoid AC, double solenoid DC

56 Section of DKE valve with UL certified solenoid(s)

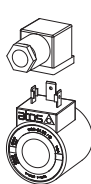
57 Range of connectors for DHE valve: standard, AMP JT, Deutsch, lead-wire

Coil options

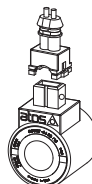
electric connectors to be ordered separately:

- X** 666 = standard
- 669 = built-in rectifier for AC supply on RC coils
- J** = AMP JT connector
- K** = Deutsch DT connector
- S** = lead-wire connection

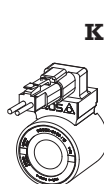
for other electric or electronic connectors: *details on table K500*



DIN 43650 connector
IP 65



AMP Junior Timer connector
IP 67



Deutsch DT connector
IP 67



lead-wire connection

Pilot operated solenoid valves *details on table E085*

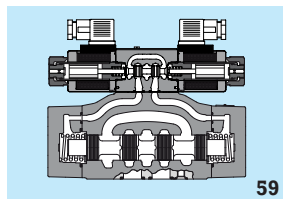
model	DPH*-1	DPH*-2	DPH*-4	DPH*-6
size	10	16	25	32
nominal flow - l/min	160	300	700	1000
Pmax - bar	P, A, B X port	350	350	350
	T port	250	250	250

pilot valve DHI for DPHI & DHE for DPHE

options: /H adjustable switching times /S spool stroke limiter
/R check valve in P port for low pressure systems



58



59

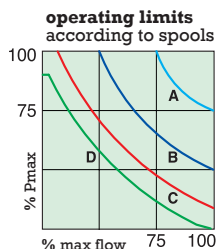


60

58 DHE, DKE, DPHE-2 valves
59 Sectional drawing of DPHI-2 valve
60 DPHE-2, DPHE-4 pilot operated solenoid valves

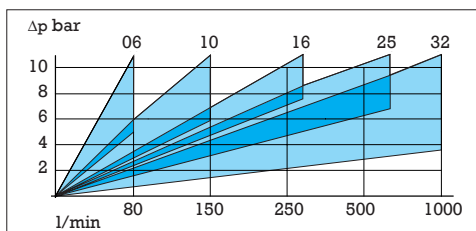
Basic spools - models

symbol	code	DHI	DHE	DKE	code	symbol
	- 631/2	B	A	A	-751/2	
	- 610	B	A	A	-710	
	- 611	B	A	A	-711	
	- 613	C	B	B	-713	
	-632/2	D	D	C	-714	



flow/ Δp for solenoid valves various sizes

check right curves on specific technical tables
pressure drops Δp depend on spool type



Subplate mounting surface ISO 4401

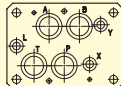
size 06



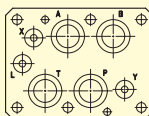
size 10



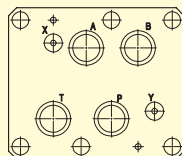
size 16



size 25



size 32



safety valves

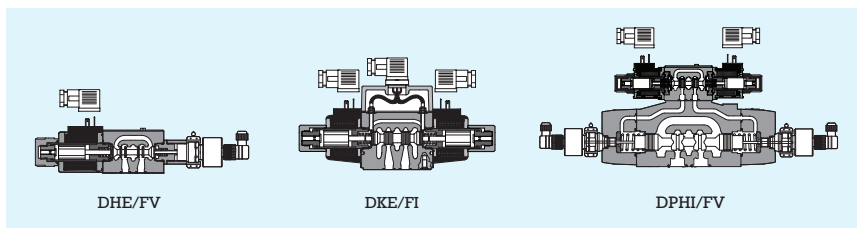


To ensure safety and avoid uncontrolled movement of actuators Atos range is TÜV certified to Machine Directive 2006/42/CE and includes specific optional devices for monitoring spool position and the relevant hydraulic status, the output signal means "intercepted line" or "not intercepted line".

They are available in **two basic executions**:

/FI inductive proximity - /FV inductive position switch

61



safety solenoid valves

details on table E110

model	ISO 4401	sensor	DH*-0	DK*-1	DPH*-1	DPH*-2	DPH*-4
size			6	10	10	16	25
solenoid type			I - E	E	I - E	I - E	I - E
max pressure at T port		FI	100	100	-	-	-
		FV	120	210	250	250	250

Other performances pages 18-19

DHE-0611/FV



DKE-1751/2/FI










leak free solenoid valves & cartridges

in 2- or 3- way execution used to cut off the line of hydraulic power to an actuator or to grant the fixed position of vertical actuator's in case of maintenance, emergency, safety situations

Leak free valves ISO 4401 NG06 size




details on table E041

	DLEH-2A	DLEH-2C	DLEH-3A	DLEH-3C	DLEHM-3A	DLEHM-3C
						
nominal flow	12				30	
Pmax - bar	350				315	
	210				210	
internal leakages	less than 5 drops/min (<0,36 cm³/min) at max pressure					
electrical power DC - w	30				30	
DC voltages	12, (14), 24, (28), 110, 220 - 110 RC, 230 RC					

leak free cartridges

threaded connection

details on table E115

JO-DL	-4-2/NC	-4-2/NO	-6-2/NC	-6-2/NO	-10-2/NC	-10-2/NO
symbols	 /NO		 /NC		 /NC/FV	
thread size UNF	3/4"		1/8"		1" 5/16	
max flow - l/min	40		75		150	
Pmax - bar	350					
internal leakage	less than 5 drops/min (≤ 0,36 cm³/min) at max pressure					

electrical power DC19 W - voltage 12, 24 DC option /FV with inductive position switch

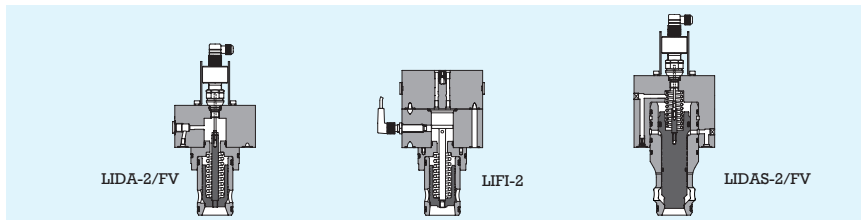


62

leak free cartridges ISO 7368

size	16	25	32	40	50
LIDA-LIFI					
flow - l/min at ΔP 6 bar	130	300	480	940	1500
max permissible flow - l/min	290	700	1070	2100	3300
LIDAS - active cartridges					
flow - l/min at ΔP 6 bar	220	400	600	1300	2000
max permissible flow - l/min	550	1000	1400	2700	4000
Pmax - bar	420				

details on tables E110



modular safety valves ISO 4401

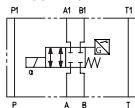
model	HF	HF*/FV
nominal flow - l/min	06	
max flow - l/min	60	
Pmax - bar	P, A, B port	350
	T port	210 (DC), 160 (AC)
electrical power DC or AC	see pilot valve DHE	

HF-0611/FV-*

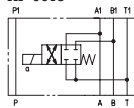


to be modular stacked below size 06 solenoid valves

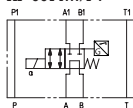
HF-0611.../FV*



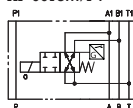
HF-0613



HF-0614.../FV*



HF-0673.../FV*



details on table TD032

screw-in valves

/R reduced leakages

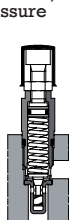
/RS as above + conforming to 2006/42/CE

Directive, factory preset at cracking pressure

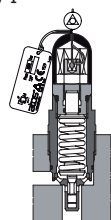
pressure relief valves direct operated for screw-in mounting

/PED certified by ConCert according to 97/23/CE

PED Directive factory preset at required pressure



CART-M5



CART-M6 /PED /RS

details on table C010

relief		size	Qmax l/min	Pmax bar (1)
CART M-3		G 1/2"	2,5	420
CART M-4		M 14 x 1	15	
CART M-5		M 20 x 1,5	35	350
CART M-6		M 33 x 1,5	40	500
CART ARE-15		M 32 x 1,5	75	420
CART ARE-20		M 35 x 1,5	120	400

(1) different setting pressure are available for each model

PED safety execution for pressure relief valves and relevant cartridges, to avoid unauthorized adjustment, have a special execution of internal parts and a protective cap, locked on adjustment screw by means of a metallic wire and a leaded seal:

M-3, M-4, M-5, M-6 ARE-15, ARE-20 as above table
ARAM-* = G3/4, G1 1/4 **AGAM**-* = 10, 20, 32 (ISO 6264)

/PED certified by ConCert to 97/23/CE PED Directive



explosion proof

A full range of ISO electrohydraulics for potential explosive environments

with presence of flammable gas or dust.

Atos ex-proof valves conform to international safety directives and are largely applied in thousands of systems worldwide, offering high reliability and withstanding extreme temperatures, corrosive fluids and aggressive conditions.



65



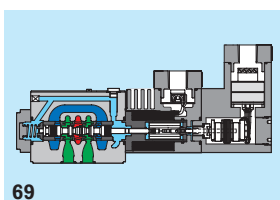
66



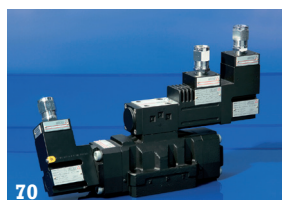
67



68



69



70

65 DLHZA-T and DPZA-A ex-proof proportional valves

66 Ex-proof solenoid valves, single & double solenoid

67 3-way LIQZA-LES proportional cartridge in full explosion proof execution

68-69 Servoproportional digital valves with ex-proof integral driver & transducer, ATEX or IECEx certified

70 DPZA-L ex-proof proportional 4-way valve with 2 integral LVDT transducers

Ex-proof solenoids valves have original ex-proof solenoids, integral and consistent to valves, designed to contain the explosion inside the enclosure, and to limit their external temperature, according to the certified class, in order to avoid self ignition of the explosive mixture in the environment.

Ex-proof on-off valves

details on tables E120, E121, E125, F600, F650

control function	ISO sizes	(l)	type code	P max bar	Q max l/min
directional, 4 way spool type	6	D	DHA	350	70
	10, 16, 25, 32	P	DPHA-1, 2, 4, 6		160, 300, 700, 1000
directional, 2- & 3-way poppet type, leak free	6	D	DLAH	250	12
	6	D	DLAHM		30
2-way cartridges with ex-proof, pilot valve	16÷63	P	LIDEW-AO	350	160÷3600
	10÷32	P	AGAM-AO		200÷600
pressure valves with ex-proof venting valve	20, 32	P	ARAM-AO		350, 500

Ex-proof proportional valves

The whole range of Atos proportional valves - see pages 6 to 11 is available in open (ZA-A) or closed loop (ZA-T) execution and also with integral digital external drivers (ZA-TES) or controllers (ZA-TEZ)

Multicertification: ATEX, IECEx, EAC

- ATEX 94/9/EC standard protection mode:
 - for Gas & Dust environments
 - for Mining plants - Atos code /M
- IECEx international certification system
- EAC Eurasian Certification



- UL 1002 american standards - Atos code A/UL
- MA Chinese Mining Certification
- PESO (Petroleum and Explosives Safety Organization) certification by Government of India

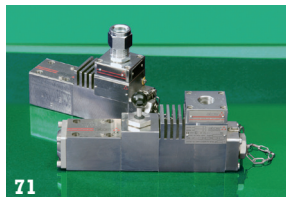
Extended ambient temperature range
-60°C to +70°C for multicertified
stainless steel valves

stainless steel valves

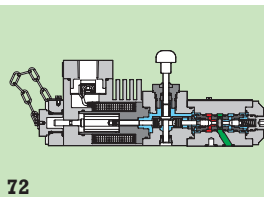
Full line of electrohydraulic controls in stainless steel for corrosive environments: rugged design, suitable for use with mineral oils, water glycol and special hydraulic fluids. Also available in special execution for water hydraulics applications.

Original stainless steel solenoids are explosion-proof type, with ATEX, IECEx or EAC multicertification or cULus certification.

Extended ambient temperature range -60°C to +70°C for multicertified valves



71



72



73

71-72 DLOHX leak free valve with & without manual reset option

73 Full range of Atos stainless steel electrohydraulics in ex-proof 25W & 8W execution

Stainless steel on-off valves

details on table E135

control function	ISO sizes	(1)	type code	P max bar	Q max l/min
4 way, spool type solenoid valves	06 (ISO 4401)	D	DHAX4	350	60
3 way, poppet type, leak free, solenoid valves	06 (ISO 4401)	D	DLAHX6	315	10
			DLAHX4	350	12
			DLAHMXS6	250	25
			DLAHMX4	315	30
			DLAHPX6	315	40
3 way, poppet type, leak free, solenoid valves	no	P	DLAPX6	315	220
			DLHPX	315	40
			DLPX	315	220
relief valve, direct screw-in	no	D	CART-MX-3	420	2,5
	no		CART-MX-6	500	40 (60 PED)
	no		CART-AREX-20	400	120 (150 PED)
relief valve, DIN cartridge	25 (ISO 7368)	P	SC LIX-2531* LIMMX-2/*	350	400

Stainless steel proportional valves see on same above tables

(1) D = direct operated; P = pilot operated

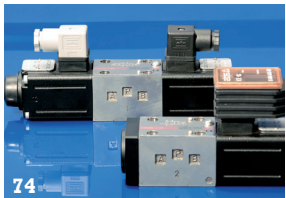
Stainless steel specification

valve type	solenoid housing	valve body	internal parts	springs	std	seals /PE /BBT
DHAX DLAHX	AISI 630	AISI 316L	AISI 316L, 420B, 440C, 430F	AISI 302	HNBR (buna)	FPM (viton)
CART-*X HMPX	-	AISI 316L	AISI 316L, 420B, 630	AISI 302	HNBR (buna)	FPM (viton)

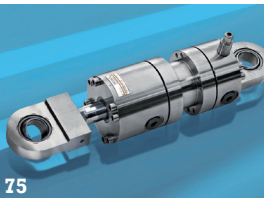
water electrohydraulics

is designed for applications requiring **uninflammability or intrinsic fluid eco-compatibility/non toxicity** and normally use stainless steel valves.

The term "water" refers to specific HFA Water based fluids or just pure water instead of common mineral or synthetic oils. The HFA emulsion is generally composed by a minimum of 95% of water and only 5% (or less) of oil



74



75

Water hydraulics is widely used in die-castings, steel plants, food, chemical and pharmaceutical industry

74 Water solenoid valves on-off & proportional

75 Stainless steel cylinder

conventional values



Full line of conventional hydraulic valves for **pressure, flow, directional control**
 Conceived in up-to-date modular cartridge design, for threaded or subplate mounting
Pressure controls: relief, sequence, unloading, reducing
Flow controls: pressure compensated, check valves
Directional controls: hand, cam, hydraulic, pneumatic

pressure valves

details on tables

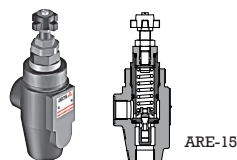
C020, C045, C066, C070

threaded connections

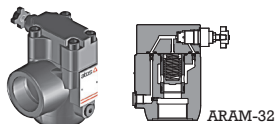
relief	option with venting	size	Q _{max} l/min	P _{max} bar
ARE-06		G 1/4"	40	500
ARE-15		G 1/2"	75	250
ARAM-20		G 3/4"	350	350
ARAM-32		G 1 1/4"	500	

subplate models

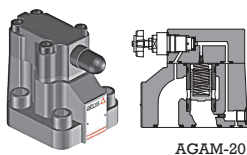
relief ISO 6264	option with venting			
AGAM-10		10	200	350
AGAM-20		20	400	
AGAM-32		32	600	
unloading ISO 5781	option with venting			
AGIU-10		10	100	
AGIU-20		20	200	
AGIU-32		32	300	
sequence ISO 5781	option with check valve			
AGIS-10		10	200	
AGIS-20		20	400	
AGIS-32		32	600	
reducing ISO 5781	option with check valve			
AGIR-10		10	160	
AGIR-20		20	300	
AGIR-32		32	400	



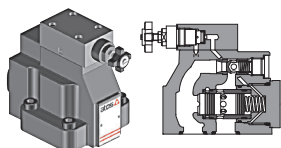
ARE-15



ARAM-32



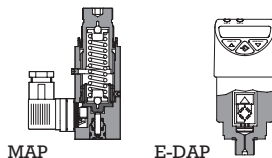
AGAM-20



AGIR-20 AGIR-20

pressure switches

model	MAP	E-DAP
type	mechanical	electrical
size		G 1/4"
pressure range - bar	/40 /80 /160 /320 /630	/100 /250 /400
differential	fixed	adjustable
output characteristics	microswitch NO/NC	PNP transistor NO/NC
connector	4 pin DIN 43650	4 pin M12

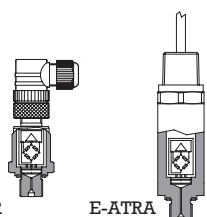


MAP

E-DAP

pressure transducers

model	E-ATR	E-ATRA
type	standard	ex-proof
size	G 1/4"	
pressure range - bar	/60 /100 (only E-ATR) /160 /250 /400	
output characteristics	0÷10VDC or 4÷20 mA	4÷20 mA
max protection degree	IP67	
connector	4 pin M12	5 mt cable



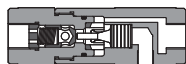
E-ATR

E-ATRA

flow valves



QV-06



ADRL-20





AGRL-20

details on table C210

pressure compensated		ISO 4401	Pmax 250 bar	
2-way models	ISO (1)	size	Qmax l/min	Pmax bar
QV-06		06	24	250

check valves pilot operated details on table C450

in line model		Pmax 350 bar	
check valve	ISO 5781	size	Qmax l/min
ADRL-10		G 3/8"	30
ADRL-20		G 1/2"	60
ADRL-30		G 3/4"	100
ADRL-32		G 1 1/4"	300

subplate model		Pmax 315 bar		
check valve	ISO 5781	external drain (E)	size	Qmax l/min
AGRL(E)-10			10	160
AGRL(E)-20			20	300
AGRL(E)-30			32	500



77 AGAM-20 & -32 relief valves



78 QV-06, AGRLE-10, MAP, E-DAP

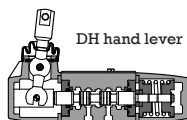


79 Hand lever DH valve

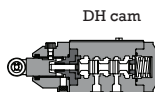
directional valves

hand lever, cam, pneumatic/hydraulic operated

details on table E150, E225, E255



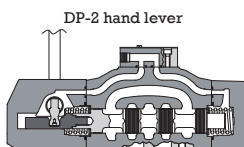
DH hand lever



DH cam



DH pneumatic/hydraulic



DP-2 hand lever

model description	size 06	size 10	size 16	size 25	symbols	
2 positions	DH-013	DK-113	DP-213	DP-413		
2 position + detent	DH-015	DK-115	DP-215	DP-415		
hand lever						
3 positions	DH-011	DK-111	DP-211	DP-411		
3 position + detent	DH-014	DK-114	DP-214	DP-415		
cam	2 positions	DH-02	DK-12	-	-	
hydraulic	2 positions	DH-04	DK-14	DP-24	DP-44	
3 positions	DK-051	DK-151	DP-251	DP-451		
2 position + detent	DK-055	DK-155	-	-		
pneumatic	2 positions	DH-08	DK-18	DP-28	DP-48	
3 positions	DH-091	DK-191	DP-291	DP-491		
2 position + detent	DH-095	DK-195	DP-295	DP-495		

note: for hydraulic characteristics, see pages 18 and 19

80 Hydraulic operated DH, pneumatic operated DK valves



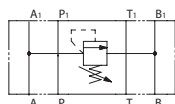
80

modular valves

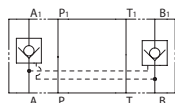
Full line of ISO 4401 modular valves, engineered design to be stacked below ISO solenoid valves

solenoid valve sizes 06, 10, 16, 25

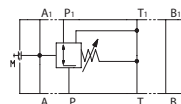
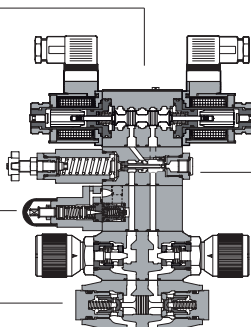
details on tables D120, D140, D160, D180



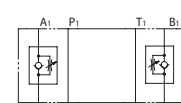
relief valve
direct or pilot operated







check valve



pressure reducing
direct or pilot operated



flow control

operation and symbols		size 06		size 10		size 16		size 25	
		3-way		3-way		2-way			
		direct piloted		direct piloted		piloted			
		Qmax-l/min		50		100		250 300	
		P reg.-bar		210		210		210 210	
		on port P	HG -031			KG -031	JPG -211	JPG -311	
	A	-033			-033				
	B	-034			-034				
		direct piloted		direct piloted					
		Qmax-l/min		35 60		120			
		Pmax-bar		350		350			
		on port P	HMP -011	HM -011		KM -011			
		A, B	-012	-012		-012			
		A	-013	-013		-013			
		B	-014	-014		-014			
A, B cross	-015	-015		-015					
		meter-out meter-in		meter-out meter-in		meter-out			
		Qmax-l/min		80		160		200 300	
		Pmax-bar		350		315		350 350	
		port A, B	HQ -012	HQ -022	KQ -012	KQ -022	JPQ -212	JPQ -312	
		A	-013	-023	-013	-023	-213	-313	
B	-014	-024	-014	-024	-214	-314			
		direct piloted		direct piloted		piloted			
		Qmax-l/min		60		120		200 300	
		Pmax-bar		350		315		350 350	
		on port P	HR -011		KR -011				
		T	-016		-016				
A, B		HR -012		KR -012	JPR -212	JPR -312			
A		-013		-013	-213	-313			
B		-014		-014	-214	-314			

81-82 JP, K, H modular valves



cartridge valves

They consists of an ISO slip-in cartridge and a **control cover** which provides the hydraulic connection to perform the specific function

They are designed to fit ISO standard cavities in hydraulic blocks or casting bodies - pmax 420 bar

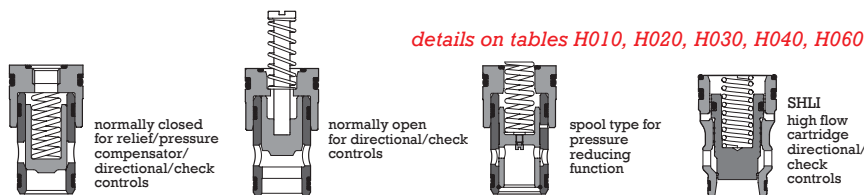


cartridges ISO 7368 SC LI flow characteristics

details on table H003

Qmax l/min	size	16	25	32	40	50	63	80	100
pressure control		200	400	670	1200	2200	3500	5400	
flow control		180	430	670	1400	2200	3500		
directional control		180	430	670	1400	2200	3500	5600	8500
check control		180	430	670	1400	2200	3500	5600	8500

SHLI and SHLIR standard 2-way, high flow cartridges with optional leak free poppet, data sheet H060

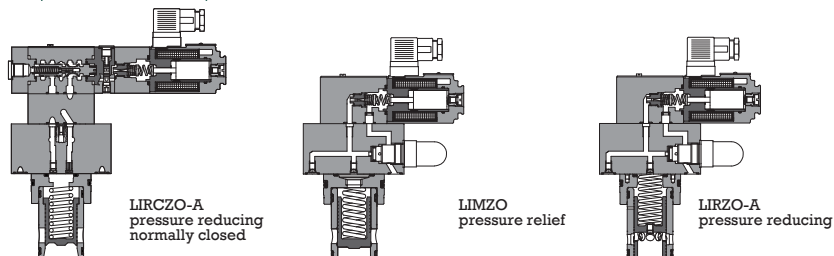


details on tables H010, H020, H030, H040, H060

control covers ISO 7368 function / hydraulic symbols

LIMM	pressure relief		
LIRA	pressure reducing		
LIC	pressure compensator		
LIMH	as LIMM plus venting		
LIDD	flow control with stroke limiter		
LIDA	check valve normally closed		
LIDO	check valve normally open		
LIDR	check valve pilot operated		
LIDB	check valve with pilot selection		
LIDBH	directional control with solenoid and shuttle valve for pilot selection		
LIDEW	directional control with solenoid valve for pilot selection with 6 configuration		

proportional pressure valves



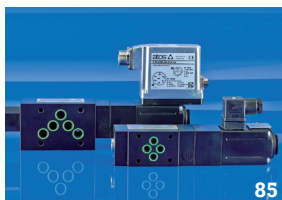
special valves & options

Atos components are customer-tailored to fulfil requirements of any application by a variety of executions and special purpose options

low temperature

Components /BT are supplied to withstand ambient temperatures down to -40°C. They are derived from standard version by using stainless steel springs plus specific HNBR seals.

Components /BBT are supplied to withstand extreme ambient temperatures down to -60°C. They are derived from stainless steel version by using special Fluorosilicon seals as per MIL-R-25988B



84 DPZO-LES rugged 85 HZGO & KZGO modular proportionals 86 Ex-proof proportionals with auxiliary hand levers

low power consumption

details on table TE015

On-off directional valves can be also provided with low power consumption solenoids: DHE 15W or DHO 8W. They can be directly operated by I/O modules of machine PLC, typically for machine tools and marine systems. They permits a considerable energy saving and reduced coil's heating

high pressure - 420 bar

details on tables E030, FS330, FS340, TF035

Atos standard range of high pressure valves for heavy duty applications withstands pressure **up to 420 bar** and includes: solenoid directional DHEP & DKEP, LIQZP proportional cartridges, pressure relief valves CART* & ARE-*, SC LI cartridges with relevant control covers

Special open loop proportional pressure relief valve RZMO-A (AEB, AES) realized with spheroidal cast iron for max pressure **up to 500 bar**

special seals for hydraulic fluids

Atos hydraulic components are designed for oil-hydraulic systems, i.e. for suitable hydraulic fluids, as:

hydraulic fluids	special seals
mineral oil HLP, HL-DIN 51524, vegetal oil HETG - VMDA 24568	STD NBR-buna
water glycol HFA, HFC - DIN 51502	
phosphate ester HFD - DIN 51502, synthetic ester HESS and polyglycol HEPG - VDMA 24568	/PE
special aeronautic SKYDROL - HyJet IV/V	/EP

STD standard and special NBR-buna for mineral & vegetal hydraulic fluids plus water glycol

/PE FKM-Viton for phosphate ester HFD fluids & high temperature

/EP EPDM-ethylene propylene for special aeronautic fluids

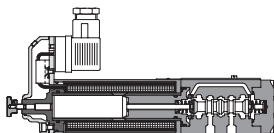
intrinsically safe valves



"Intrinsically safe" specification is based on the principle of limiting the energy of electric circuits in environments with hazardous atmospheres.

To limit the max input current, the solenoid must be powered through specific safety barriers Y-BX-NE. In fact the intrinsically safe circuit must be unable to produce electrical surges or thermic effects which could cause explosion also in a break-down situation.

details on table E130



DHW intrinsically safe pilot valve

intrinsically safe solenoid valves

model	DHW	DLOH-OW
size	06	06
nominal flow - l/min	25	12
Pmax - bar	350	350

Certification: intrinsically safe valves and barriers are certified according to ATEX 94/9/CE and IECEx, protection mode:

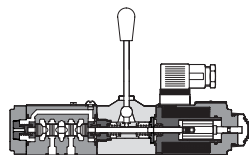
- Ex II 1 G, Ex ia IIC T6, IIB T6 or IIA T5, surface plants with gas or vapours environment, category 1, zone 0, 1 and 2
- Ex IM2 d I for mining

auxiliary hand lever

may be applied to size 06 direct operated on-off and proportional valves

details on table E138

models	DHI	DHE	DHA	DHZO	DHZE	DHZA	QVHZO
valve configuration	61-63-71			05-07		06	
spool type	0,0/2,1,1P,1/2,1/2P,3,3P,4,7			S3,S5,D3,D5,L3,L5		3÷45	
total working - angle stroke				$\pm 28^\circ / \pm 15^\circ$			
actuating force				1÷8 Nm			

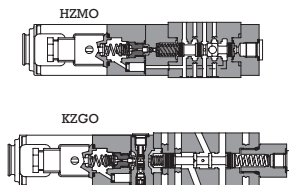


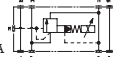
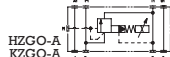
DHZO-A-051/MV

modular proportional valves

to be packed below ISO 4401 solenoid valves

details on tables F065, F070

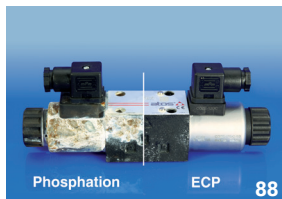


symbols			
model	HZMO	HZGO	KZGO
function	relief	reducing	
size	06	06	10
nominal flow - l/min	40	40	100

enhanced corrosion protection

ECP - Enhanced Corrosion Protection - is currently applied to all Atos valves to grant high rust resistance in open air / aggressive environments and in long-term storage

A valuable plus, it consists of zinc plating black passivation of bodies, anodizing, Geomet, plastic encapsulation and conforms to RoHS Directive 2011/65/CE, Cr+6 free.



88-89 show a valve after 200 hours testing in salt spray chamber without-with ECP treatment

vane pumps



PFE vane pumps fixed displacement

Cartridge design with integral hydraulic balancing, 12 vanes, high performance, low noise level, high versatility and long service life.

Three basic models in standard execution or heavy duty line for high pressure and further reduction of noise level.

Full interchangeability of cartridges for each size.

Mounting according to SAE standards, easy installation due to the possibility of the inlet/outlet orientation.



PFE standard

models	Pmax bar	flow - l/min at 1450 rpm and		power at 1450 rpm and Pmax kW	max speed rpm
		7 bar	140 bar		
PFE-31010	160	15	12	5	2400
-31016	210	23	19	8,3	2800
-31022	210	30	26	10,8	2800
-31028	210	40	36	14	2800
-31036	210	51	46	18	2800
-31044	210	63	58	22	2500
PFE-41045	210	64	60	23	2500
-41056	210	80	75	30	2500
-41070	210	101	95	35	2500
-41085	210	124	118	43	2000
PFE-51090	210	128	119	45	2200
-51110	210	157	147	55	2200
-51129	210	186	174	65	2200
-51150	210	215	204	80	1800

CW or CCW rotation at choice

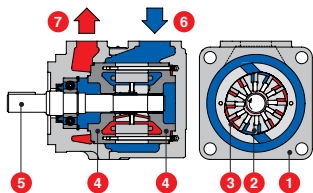
Data refer to use with hydraulic mineral oil, see hydraulic fluids on page 28



PFE high pressure, low noise

models	Pmax bar	flow - l/min at 1450 rpm and		power at 1450 rpm and Pmax kW	max speed rpm
		7 bar	140 bar		
PFE-32016	210	23	20	10	2500
-32022	300	30	26	16	2500
-32028	300	40	36	20	2500
-32036	300	51	46	26	2500
PFE-42045	280	64	60	31	2200
-42056	280	80	75	40	2200
-42070	250	101	95	42	2200
-42085	210	124	118	43	2000
PFE-52090	250	128	119	54	2000
-52110	250	157	147	66	2000
-52129	250	186	174	78	2000
-52150	210	215	204	80	1800

details on tables
A005, A007



- 1 cast iron body
- 2 rotor with vanes
- 3 vanes and pins
- 4 cartridge with cheek-plates
- 5 SAE cylindrical shaft, splined optional
- 6 inlet port
- 7 outlet port

PFE single vane pumps

PFE

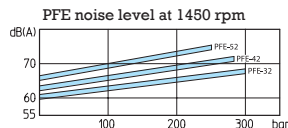
31

036

Vane pump,
fixed displacement

Size &
execution

Displacement
(cm³/rev)



91



92



93

91 PFE-42 vane pump 92 Easy access to cartridge of PFE vane pumps
93 PVPC-PERS axial piston pump, PFED double vane pump, PFR radial piston pump

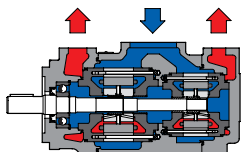
fixed displacement

PFED double vane pumps 2 cartridges into one body with common inlet port *details on table A180*

models	composition		Pmax bar	flow l/min	power kW	max speed rpm
PFED-43 ***	whatever	PFE-41, -31	210	see PFE table		
PFED-54 ***	combination	PFE-51, -41	210			



94 PFED double vane pump



PFED

- 43

070/022

One body double pump

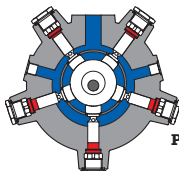
Size:
43 or 54

Displacement of first and second PFE cartridge (cm³/rev) - see pag. 30

PFR radial piston pumps fixed displacement
high pressure for long service life in heavy duty applications.



PFR-202



PFR-525

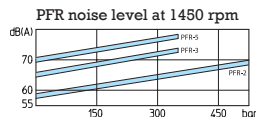


95 PFR-203 & -206 radial piston pumps

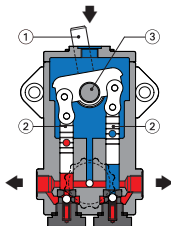
details on table A045

models	Pmax	flow at 1450 rpm	power at 1450 rpm	max speed
	bar	250 bar l/min	and Pmax kW	rpm
PFR-202	500	2,5	2,1	1800
-203	500	5,0	4,2	1800
-206	350	8,3	4,9	1800
PFR-308	350	12,5	7,5	1800
-311	350	16,5	10	1800
-315	350	21,5	12,5	1800

models	Pmax	flow at 1450 rpm	power at 1450 rpm	max speed
	bar	250 bar l/min	and Pmax kW	rpm
PFR-518	350	26,0	15,2	1800
-522	350	31,5	18,4	1800
-525	350	37,0	21,6	1800



hand pumps



PM are hand pumps, double alternate-acting, with simple and rugged construction for minimum service and long operating life.

Pumping operation is made by alternate movement of lever 1 and consequent alternate action of hollow plungers 2.

Pump body has two outlet ports (one supplied plugged).

The splined shaft attachment 3 permits to turn the lever shaft in comfortable position.

details on table A200

models	Pmax bar	displacement for double stroke cm ³	shaft rotation angle degree	max required torque Nm
PM-106	500	6	±35°	139
PM-112	250	12	±35°	133
PM-120	120	20	±35°	116

axial piston pumps



PVPC axial piston pumps variable displacement
Axial piston pumps for variable flow & high pressure on industrial applications with low noise level and long service life.

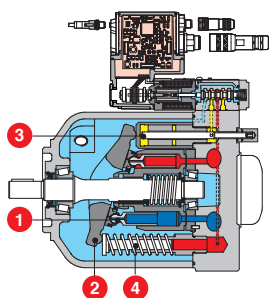
A line of hydraulic and electrohydraulic controls leads to energy-saving installation... up to the digital PERS version which performs combined proportional control of flow and pressure in high dynamics.

PVPC axial piston pumps

details on tables A160, A170

models	max displacement cm ³ /rev	max pressure bar		max flow at 1450 rpm l/min	power at 1450 rpm, max P and Q kW	speed range rpm
		P _{max}	P _{peak}			
PVPC -*.3029	29	280	350	42	20	600 ÷ 3000
-*.4046	46	280	350	67	32	600 ÷ 2600
-*.5073	73	280	350	106	50	600 ÷ 2200
-*.5090	88	250	315	127	54	600 ÷ 1850

SAE configuration is standard ISO mounting flange on request



the stroke of pumping pistons **1**
and thus the displacement of
the pump is determined by the
position of the swashing plate **2**
that is achieved by two servo
pistons **3** with differential areas,
against a spring **4**

axial piston pumps - variable displacement

PVPC - **PERS-SP** - **4** **046**

Axial piston variable
displacement

Displacement
(cm³/rev)

Size: 3, 4, 5

Type of control

C, R = manual, remote pressure control (venting CH)

L = load sensing

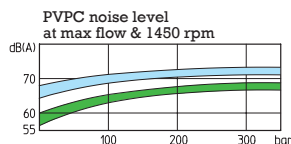
LW = constant power (mechanical)

CZ = proportional P control, open loop

LQZ = proportional flow control, open loop

PES-SP = digital closed loop P/Q control with integral driver

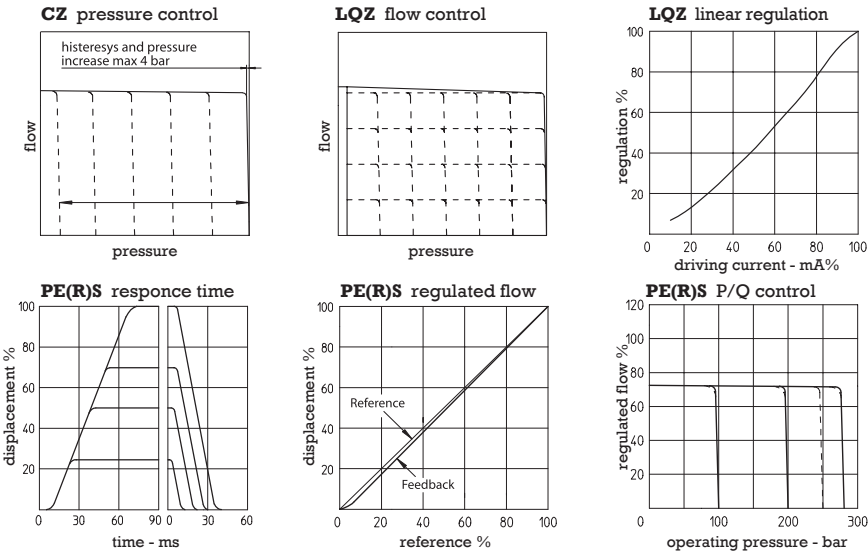
PERS-SP = as PES plus S sequence module to allow
P/Q regulation down to 0 bar



97 PVPC-CZ, 98 PVPC-LQZ, 99 PVPC-PERS axial piston pumps coupled with PFE vane pump

variable displacement

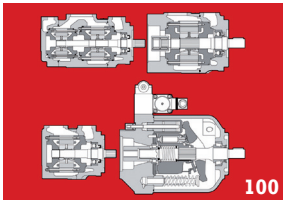
Typical functional diagrams, full information on [table A170](#)



multiple pumps by composition of PFE, PFR and PVPC pumps [details on table A190](#)

models	description
PFE_X2***, PFE_X3***	double and triple units: whatever combination of PFE pumps
PFE_XD***	triple unit: whatever combination of PFE-S, -4 with PFED
PVPC_X2E***	double unit: whatever combination of PVPC with PFE pumps
PFR_X2E***, PFR_X3E***	double and triple units: whatever combination of PFR-3, PFR-5 with PFE
PFR_XD***	triple unit: whatever combination of PFR-3, -5 with PFED

Composition subject to verification of max torque limit allowed by shaft size



PFE X	3	51090	/	31044/31044
Multiple pump		Second/third element		
Number of elements		First element PFE, PVPC, PFR		



Atex certification [details on table A300](#)

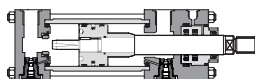
PFEA vane & PVPCA piston pumps are ATEX certified for applications in potentially explosive atmospheres, according to 94/9/CE Atex Directive.

The external surface temperature of the pump is in accordance with the certified class, to avoid the self ignition of the explosive mixture in the environment.

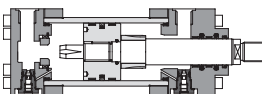
hydraulic cylinders



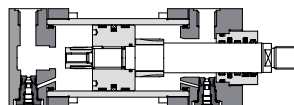
ISO standard hydraulic cylinders, double acting
engineered design and high quality machining, to suit
the requirements of modern machines and systems: top
reliability, easy installation & service, long service life



CK ISO 6020-2
square heads
nominal pressure up to 160 bar
max 250 bar



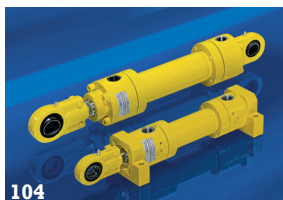
CN ISO 6020-1
round heads
nominal pressure up to 160 bar
max 250 bar



CC ISO 6022
round heads heavy duty
nominal pressure up to 250 bar
max 320 bar



103
103 CK cylinders



104
104 CN cylinders



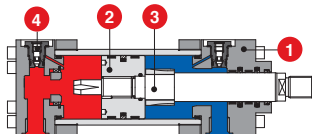
105
105 CC cylinders

Standard hydraulic cylinders

details on tables B137, B180, B241

bore ø	25	32	40	50	63	80	100	125	140	160	180	200	250	320
rod ø	12 18	14 22	18 22 28	22 28 36	28 36 45	36 45 56	45 56 70	56 70 90	90	70 90 110	110	90 110 140	180	220
CK	• •	• •	• • •	• • •	• • •	• • •	• • •	• • •		• • •		• • •		
CN			• •	• •	• •	• •	• •	• •		• •		• •		
CC				•	•	•	•	•	•	•	•	•	•	•

CC heavy duty cylinder



- ① round heads & oversized guide rings
- ② piston, largely sized with ISO seals
- ③ rod in high strength alloy-steel with rolled threads
- ④ high energy adjustable cushioning

Cylinder's code

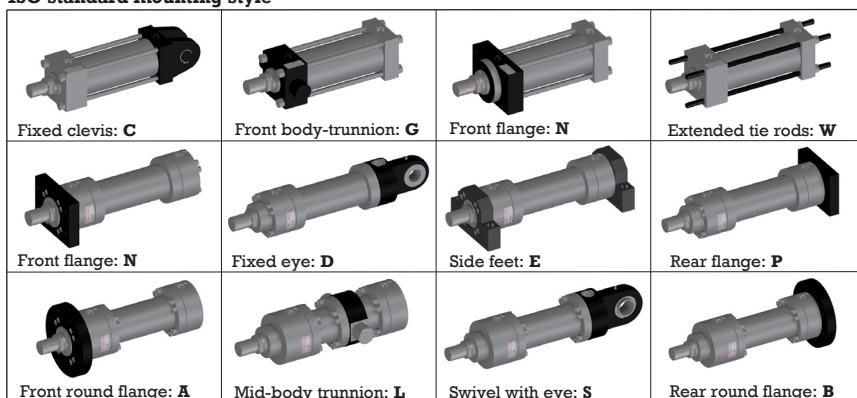
CK - 63/45 * 0500 - S 0 0 1 *

CK														
CN (1)														options (5)
CC														seals, page 35
Bore/rod diameter (2)														spacer (4)
Stroke - mm														
Mounting style														cushioning (3)

notes

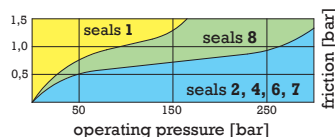
- (1) CH big bores cylinders also available, see On-line Master Catalog
- (2) Double rod cylinders available: add the second rod diameter
- (3) Fast or slow, fixed or adjustable
- (4) Spacer: increase the rod guide for strokes over 1000 mm
- (5) Proximity sensors (page 37) and rod treatments (page 35)

ISO standard mounting style

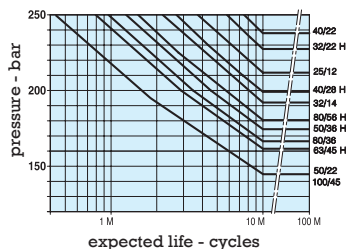


Seals options

type	material	features	speed [m/s]
1	NBR + POLYURETHANE	high dynamic sealing	0,5
2	FKM + PTFE	high temperatures	4
4	NBR + PTFE	high speeds	4
6-7	NBR + PTFE	single acting pushing/pulling	1
8	PTFE + NBR + POLYURETHANE	low friction	0,5



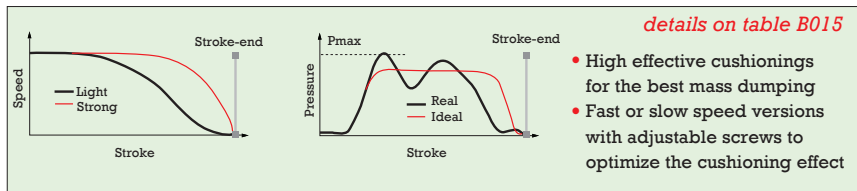
details on table B015



Rod features and options

- Hardened and tempered alloy steel rod and rolled rod threads for high strength and improved fatigue working life
- Optional NIKROM treatment and induction hardening to improve corrosion resistance and rod hardness

Engineered cushionings

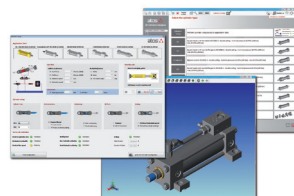


SWC cylinders designer

Is a smart software for assisted selection of Atos cylinder's code with:

- full technical information on variants & options
- up-to-date 2D & 3D drawings in several CAD format
- calculation software for application check & cylinder's sizing
- trolley function for offers requests, orders, bill of materials, etc.

SWC is available for download at www.atos.com



hydraulic servocylinders



Atos servocylinders derive from hydraulic cylinders by incorporation of an integral rod position transducer and mounting of special self lubricated seals for very low friction

The integration of the electronic transducer inside the cylinder ensures protection also in hard conditions - shocks, vibrations, high working frequency, dirt, etc. - and consequently a long working life

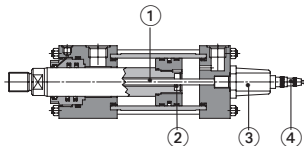
Rod position transducers

details on table B310

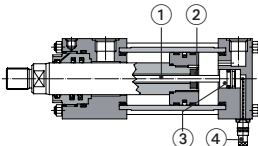
code	CKF	CKM	CKN	CKP	CKV
transducer type	Magnetosonic	Magnetosonic	Magnetostrictive	Potentiometric	Inductive
electronic conditioning	integral	integral	integral, separate (opt)	none	separate
linearity error (1)	$< \pm 0,02\%$	$< \pm 0,01\%$	$< \pm 0,02\%$	$\pm 0,1\%$	$\pm 0,2\%$
repeatability (1)	$< \pm 0,005\%$	$< \pm 0,001\%$	$< \pm 0,005\%$	$\pm 0,05\%$	$\pm 0,05\%$
max speed	1 m/s	2 m/s	1 m/s	0,5 m/s	1 m/s
strokes	50 to 2500 mm	25 to 3000 mm	100 to 4000 mm	100 to 900 mm	30 to 1000 mm
output	0 ÷ 10 V 4 ÷ 20 mA	0 ÷ 10 V, 4 ÷ 20 mA digital SSI, CANopen PROFIBUS DP	0,1 ÷ 10,1 V 4 ÷ 20 mA	0 ÷ 10 V	0 ÷ 10 V 4 ÷ 20 mA
typical applications	sawing & bending machines	steel plants, plastic & rubber machines	foundry & energy	various	simulators & energy
temperature limits	-20°C to + 75°C	-20°C to + 75°C	-20°C to + 90°C	-20°C to + 100°C	-20°C to + 120°C

Note: (1) percentage of the total stroke

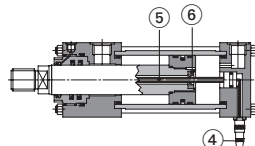
CKF/CKM



CKN



CKP/CKV

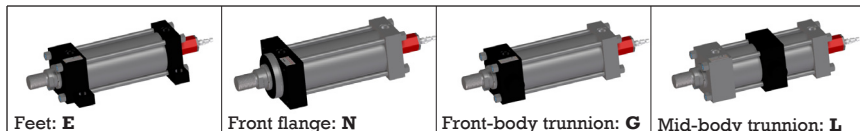


- ① Waveguide ② Permanent magnet ③ Integral conditioning electronics ④ Straight connector
⑤ Resistive track (CKP), Coil-winding (CKV) ⑥ Wiper (CKP), Ferromagnetic core (CKV)

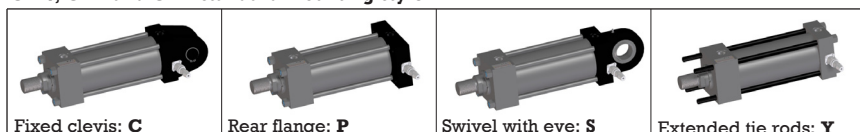
Sizes of hydraulic servocylinders - mm

bore ø	40	50	63	80	100	125	160	200
rod ø	28	36	45	56	70	90	110	140

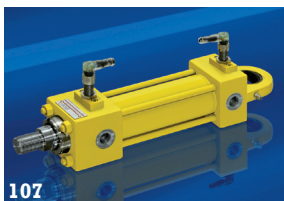
CKM and CKF standard mounting style



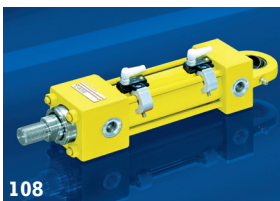
CKN, CKP and CKV standard mounting style



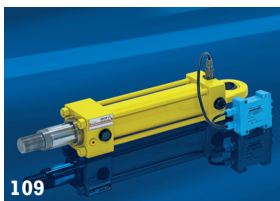
Proximity sensors, fixed & adjustable



107



108



109

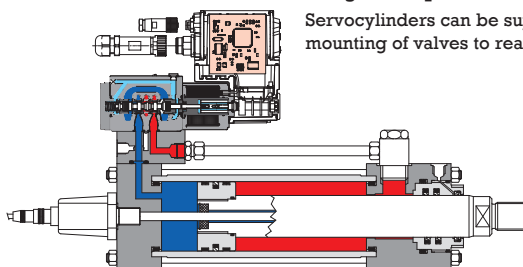
107 CK with proximity end stroke sensors, fixed, on front and rear heads: motion cycles, operating sequences, fast-slow cycles and safety functions can be easily performed, [table B137](#)

108 CKS with proximity sensors, "Reed" or "Hall effect" adjustable along the rod stroke, [table B450](#)

109 CKV servocylinders with external electronic card for signal conditioning, [table B310](#)

Integral subplates

Servocylinders can be supplied with integral subplates for mounting of valves to realize any kind of servoactuators, page 17



110

Atex certification

[details on table B400](#)

CKA cylinders are designed to limit the external surface temperature, according to ATEX 94/9/CE Directive, thus to avoid self-ignition of gas, vapours and dust mixtures

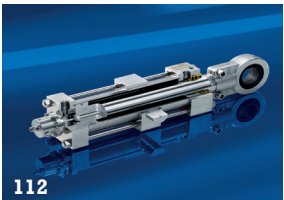
CKA are also available with ex-proof built-in digital magnetostrictive transducer, ATEX certified see picture 111



111

stainless steel cylinders

Atos cylinders are available in stainless steel **CNX** executions for sea water and aggressive environment conditions & water hydraulics applications, page 23



112



113



114

112 CKX ex-proof servocylinder in stainless steel execution, [table B137](#)

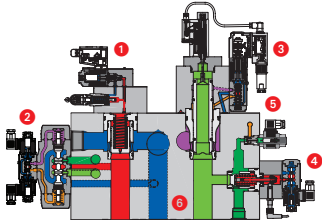
113 Special stainless steel cylinder with reinforced rod guide for marine applications

114 Special stainless steel cylinder for railway switches

hydraulic blocks

Atos standard & customized blocks integrate the electrohydraulic valves into properly machined manifolds designed to minimize power losses.

The blocks are fully assembled, tested and preset for integration into the machine

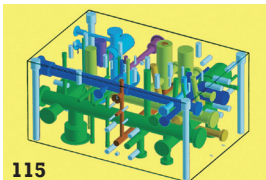
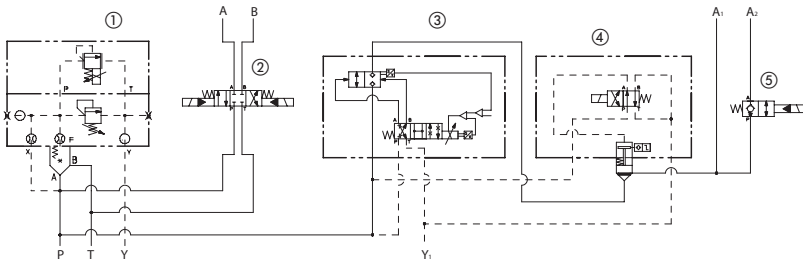


The modular “meccano” concept of Atos valves - cartridge, subplate or screw-in - allows the design of reliable systems with easy installation, commissioning and trouble shooting during field services

Atos blocks are:

- customized to the specific requirements
- conceived for the best systems' performances
- designed and machined using CAD/CAM technology
- in cast iron, steel or aluminium alloy

- ① proportional relief ② piloted directional valve ③ proportional cartridge ④ cartridge safety valve
⑤ leak free valve ⑥ manifold



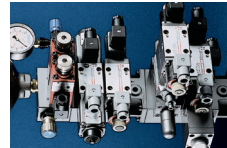
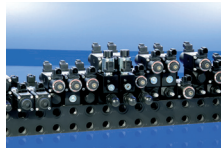
115 CAD/CAM 3D design with automatic sizing and verification of oil paths and connections

116 high quality CNC manufacturing with special tools and Renishaw probe. The plates are 100% deburred and controlled to grant perfect cleaning and tolerances conformity

machine tools

Modular blocks integrate proportional speed-position control of tools and auxiliary functions, on-off or proportional

$Q_{max} = 60 \text{ l/min}$ $P_{max} = 100 \text{ bar}$



press-brakes/shears

TÜV certified blocks perform synchronization of bending presses by proportional valves. Shears blocks control the blade actuation and provide CE certification

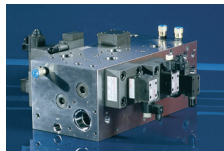
$Q_{max} = 100 \text{ l/min}$ $P_{max} = 315 \text{ bar}$



steel plants

Electrohydraulic benches fitted with manifold blocks and servoproportional valves & cartridges ensure high reliability and performances

$Q_{max} = 3000 \text{ l/min}$ $P_{max} = 350 \text{ bar}$



agriculture

Standard multi-stations subplates, equipped with solenoid valves and modulators, provide easy maintenance, also in proportional execution

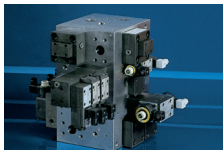
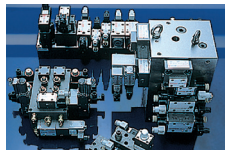
$Q_{max} = 60 \text{ l/min}$ $P_{max} = 200 \text{ bar}$



aerial platforms

The proportional valve controls the automatic levelling of the platform with manual hand lever for emergency operations

$Q_{max} = 30 \text{ l/min}$ $P_{max} = 210 \text{ bar}$



plastics

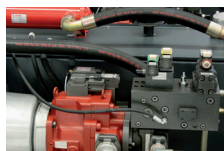
Customized blocks control clamping and injection actuation by servoproportional valves with fieldbus interface

$Q_{max} = 1000 \text{ l/min}$ $P_{max} = 280 \text{ bar}$

ceramics

Steel blocks in ruggedized execution, fitted with ISO cartridges in on/off and proportional execution

$Q_{max} = 900 \text{ l/min}$ $P_{max} = 350 \text{ bar}$



loaders

Multiple load-sensing blocks with proportional valves control the crane booms. Screw-in cartridges are used to arrange auxiliary functions

$Q_{max} = 120 \text{ l/min}$ $P_{max} = 315 \text{ bar}$



road equipment machines

Customized blocks are designed for the best operation of mobiles machines. New ECP protection treatment is a valuable plus

$Q_{max} = 120 \text{ l/min}$ $P_{max} = 270 \text{ bar}$



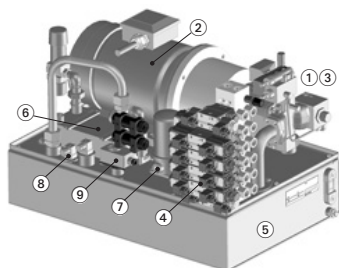
PED blocks

They integrate PED valves for overpressure safety & other auxiliary functions for easy & safe accumulators use.

Certified by ConCert to 97/23/CE Directives

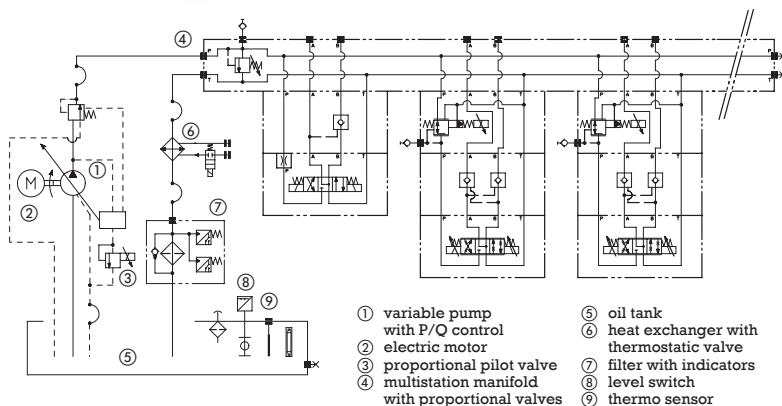
$Q_{max} = 600 \text{ l/min}$ $P_{max} = 350 \text{ bar}$

hydraulic power units



Atos supply both standard power packs and special customized units, integrating all the required elements to supply a flow of hydraulic fluid under pressure to the system or directly to the actuators

Power units conform to Machine Directive and always include "Technical dossier" and "Use & Maintenance manual"



standard power packs

Compact & modular design, horizontal or vertical motor pump group, CNOMO norms for automotive industry, CE certified to norms 97/23/CE/PED

$Q_{max} = 100 \text{ l/min}$ $P_{max} 350 \text{ bar}$
Oil tanks up to 300 l Power up to 15 kW



customized power units

Tailored to the specific application with 3D design and engineering. Single or multiple pumps, fixed or variable, customized blocks, water-oil or air-oil heat exchanger

$Q_{max} = 1000 \text{ l/min}$ $P_{max} 350 \text{ bar}$
Oil tanks up to 5000 l Power up to 400 kW



special systems

Simple and complex hydraulic systems can be conceived with electric junction boxes and electronic control units. Ex-proof ATEX certification and stainless steel execution are available for special environments or application with aggressive fluids



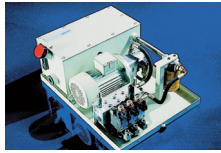
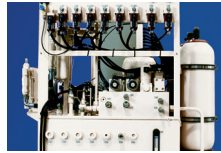
steel/foundry/die-casting

Largely sized power units for high flows through axial piston multiple pumps. 350 bar pressure allows oil volume reduction. Water glycol fluids are commonly used in hot lines



power plants/eco-generators

Continuous cycle operation (24/7) requires best reliability and remoted diagnostics. Power units are designed with redundant safety hydraulic valves & devices, with monitored alarms and emergency operation



machine tools/presses

Modular construction allows to customize the hydraulic systems to specific machine tool configurations. Variable displacement pumps coupled with inverters drivers provide high energy efficiency



injection/blow moulding

HPU for plastic materials machines are designed for energy saving and performances increase with inverters, variable displacement pumps or accumulators, in compact fitting execution

wood/paper/leather

Complete processing lines are equipped with multiple power units and controlled through fieldbus. Rugged proportional valves and auxiliary equipment may withstand high vibrations



oil & gas/off-shore

Stainless steel cabinets protect power units from aggressive environments. Ex-proof executions and flame proof fluids require specific systems engineering and construction



simulator/entertainment

Low noise power units with submerged pumps and 6 poles electric motors. High dynamic motion is achieved by large accumulators and high flow proportional valves or cartridges



marine/military

Specific know-how is required to fulfil the typical demanding requirements and relevant international norms: long life, best reliability & easy servicing, resistance to corrosion and extended temperature range

typical applications

...among thousands successful applications in many different fields

steel/foundry/die-casting



power plants/eco-generators



oil & gas: drilling/handling



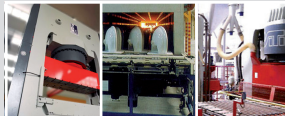
plastics/blow moulding



rubber/polyurethane



ceramic presses



press brakes/shears



machine tools/presses



bending/sawing/punching



handling/waste compactors



wood/paper/leather



agriculture machines



roads/drilling/mining



cranes/sky lifts



earth moving/concrete



simulators/entertainment



railways/avionics



marine/military





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