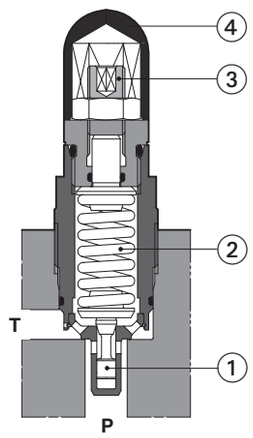
Stainless steel pressure relief valves

direct, screw-in cartridges



① Poppet
② Spring
③ Pressure adjustment screw
④ Plastic cap

CART MX-6

CART-MX(S), CART-AREX(S)

Screw-in, direct operated pressure relief valves used to limit the max pressure in the hydraulic systems or to protect part of the circuit from overpressure.
The cartridge design reduces the dimension of blocks and manifolds, without penalizing the functional characteristics.
They are available in three sizes and in two different stainless steel executions for corrosive environments and fluids.

- **•X** full stainless steel for external and internal parts, to withstand extreme and corrosive environmental conditions, and to ensure full compatibility also with water base and special fluids.
- **•XS** stainless steel only for external parts to withstand extreme and corrosive environmental conditions.

Size: **G1/2" ÷ M35**
Max flow: **2,5 ÷ 120 l/min**
Max pressure: up to **420 bar**

1 MODEL CODE OF SCREW-IN VALVES

CART	AREX-20	/	350	/	R	*	/	*	/	*

CART: Screw-in pressure relief cartridge

AREX-20: Size and stainless steel execution **(1)**:
MX-3, MXS-3 = G1/2"
MX-6, MXS-6 = M33x1,5
AREX-20, AREXS-20 = M35x1,5

350: **Max pressure settings**:
see hydraulic characteristics in section 4

R = reduced leakage for special applications only for CART AREX-20 and CART AREXS-20 **(2)**

*****: Series number

*****: **Seals material,** see section 5:
- = NBR low temp. -40°C
PE = FKM
BBT = FVMQ fluorosilicon -60°C **(4)**

*****: **Test fluid**, only for X execution: **(3)**
H = mineral oil
W = pure water

For **PED** safety version see technical table CWY010

(1) **X** = Full stainless steel
XS = Stainless steel only for external parts

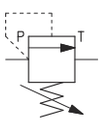
See section 5 for material specification

(2) Code **R** must be always reported in the model code of CART AREX-20 and CART AREXS-20

(3) CART MX and CART AREX in full stainless steel execution are factory tested with mineral oil or pure water in order to avoid the contamination of the end user system. At the end of each valve model code must be specified the type of fluid to be used in the valve's testing: "**H**" for hydraulic oil or "**W**" for pure water.

(4) Only for full stainless steel "**X**" execution

2 HYDRAULIC SYMBOLS



CART-*X

CART-*XS

3 GENERAL CHARACTERISTICS

Assembly position / location	Any position
Cavity	See section 8
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007
Ambient temperature	**Standard** = -40°C ÷ +70°C **/PE** option = -20°C ÷ +70°C **/BBT** option = -60°C ÷ +70°C
Storage temperature range	**Standard** = -20°C ÷ +80°C **/PE** option = -20°C ÷ +80°C **/BBT** option = -60°C ÷ +80°C
Compliance	RoHS Directive 2011/65/EU as last update by 2015/65/EU REACH Regulation (EC) n°1907/2006

4 HYDRAULICS CHARACTERISTICS

Valve model		**CART MX-3 CART MXS-3**	**CART MX-6 CART MXS-6**	**CART AREX-20 CART AREXS-20**
Max pressure setting	[bar]	50, 100, 210, 350, 420	50, 100, 210, 350, 420	50, 100, 210, 315, 400
Pressure range **(1)**	[bar]	4÷50, 6÷100, 7÷210, 8÷350, 15÷420	2÷50, 3÷100, 8÷210, 15÷350, 15÷420	3÷50, 5÷100, 6÷210, 8÷315, 10÷400
Max flow	[l/min]	2,5	40	120

(1) The values correspond to the min and max regulation of the valve's craking pressure

5 MATERIALS SPECIFICATION

Valve code	**Valve type**	**Valve body**	**Internal parts**	**Spring**	**Seals**		
					std	**/PE**	**/BBT**
CART-*X	Screw-in	AISI 316L	AISI 316L, 420B, 440C	AISI 302	NBR 70 Sh low temp	FKM (viton)	FMVQ (fluorosilicon)
CART-*XS	Screw-in	AISI 316L	Carbon steel	AISI 302	NBR 70 Sh low temp	FKM (viton)	-

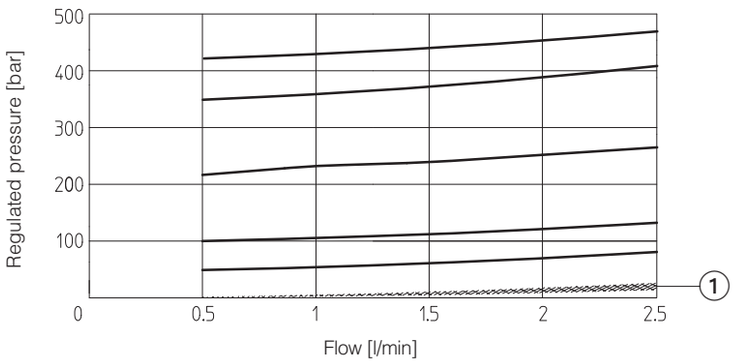
6 SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

Seals, recommended fluid temperature **(1)**	NBR seals (standard) = -40°C ÷ +60°C FKM seals (/PE option) = -20°C ÷ +80°C FVMQ seals (/BBT option) = -60°C ÷ +60°C		
Recommended viscosity	15÷100 mm²/s - max allowed range 2.8 ÷ 500 mm²/s min = 0,9 mm²/s for X full stainless steel execution with pure water		
Max fluid contamination level	ISO4406 class 20/18/15 NAS1638 class 9, see also filter section at www.atos.com or KTF catalog		
Hydraulic fluid	**Suitable seals type**	**Classification**	**Ref. Standard**
Mineral oils	NBR low temp., FKM, FVMQ	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM, FVMQ	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR low temp.	HFA-E, HFA-S, HFB, HFC	

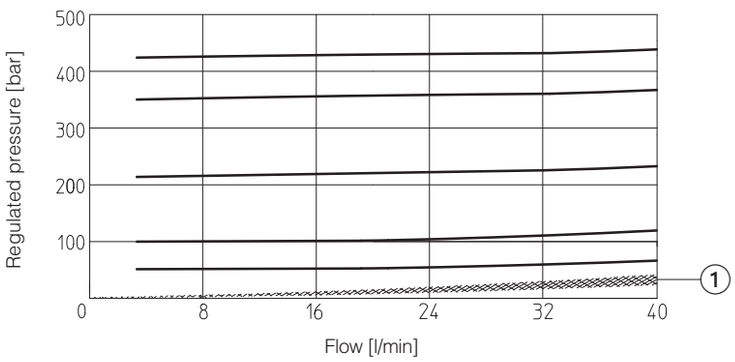
(1) The operating temperature of the fluid must be compatible with the maximum viscosity range allowed for the valve

7 REGULATED PRESSURE VS FLOW DIAGRAMS (based on mineral oil ISO VG 46 at 50°C)

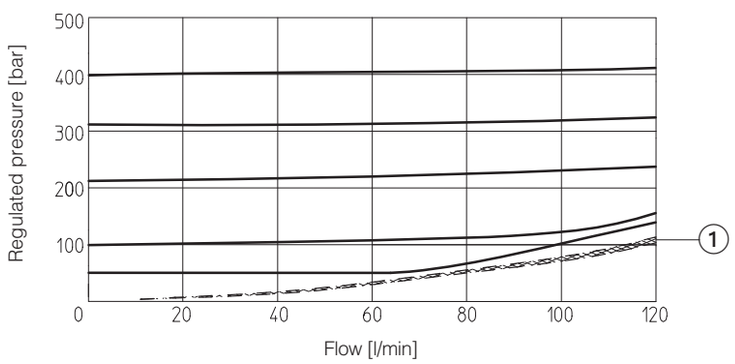
CART MX(S)-3



CART MX(S)-6



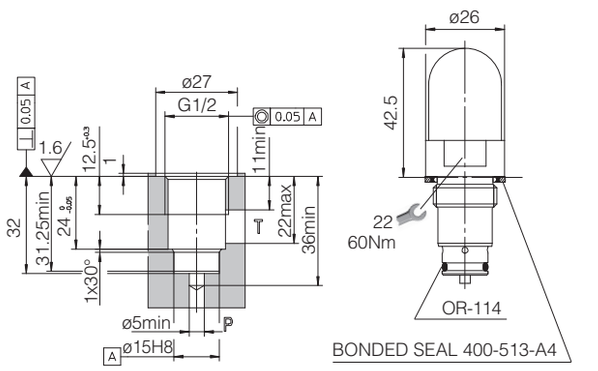
CART AREX(S)-20 **/R



(1) Minimum pressure with the adjustment screw fully unscrewed

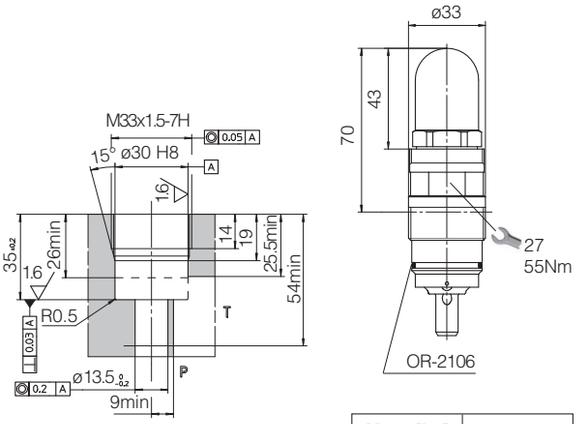
8 CAVITY AND INSTALLATION DIMENSIONS [mm]

CART MX(S)-3



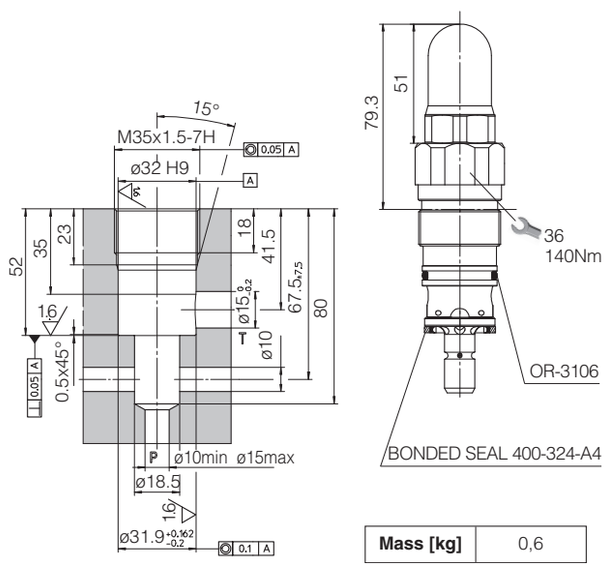
Mass [kg]	0,12

CART MX(S)-6



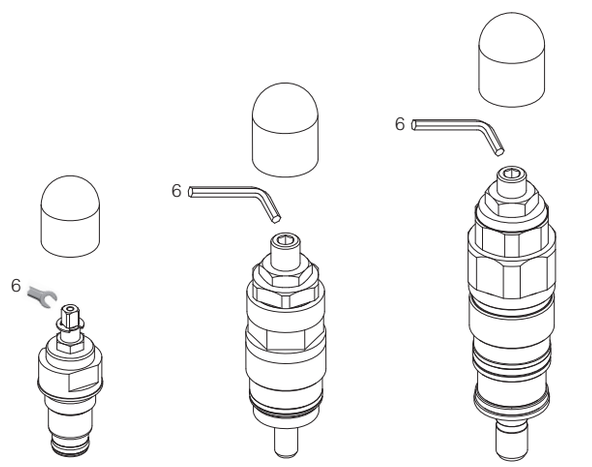
Mass [kg]	0,37

CART AREX(S)-20



Mass [kg]	0,6

Pressure adjustment screw



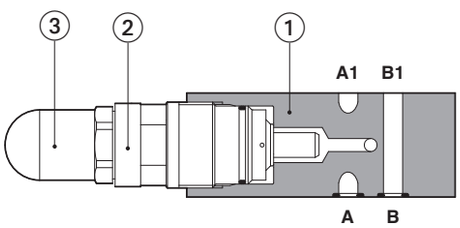
CART MX(S)-3 CART MX(S)-6 CART AREX(S)-20

9 RELATED DOCUMENTATION

W010	Basics for electrohydraulics in corrosive environments
W020	Summary of Atos stainless steel components
EW900	Operating and maintenance information for stainless steel on-off valves

Stainless steel pressure relief valves

direct, modular



HMPX(S)-011

① modular body
② relief cartridge
③ pressure adjustment screw protected by plastic cap

HMPX, HMPXS

Pressure relief valves made in modular execution for stack mounting with stainless steel directional valves ISO size 06. They are made in two different stainless steel executions for corrosive environments and fluids:

- **•X** stainless steel for external and internal parts, to withstand extreme and corrosive environmental conditions, and to ensure full compatibility also with water base and special fluids.
- **•XS** stainless steel for external parts to withstand extreme and corrosive environmental conditions.

Size: **06** - ISO 4401
Max flow: up to **35 l/min**
Max pressure: up to **350 bar**

1 MODEL CODE OF MODULR VALVES

HMP	X	-	011	/	350	**	/	*	/	*

HMP: Modular pressure relief valve ISO 4401 size 06

X = Stainless steel execution for all parts
XS = Stainless steel execution for external parts

Configuration, see section 2
011 **013** **014**

Pressure range:
50 = 50 bar
100 = 100 bar
210 = 210 bar
350 = 350 bar

Series number

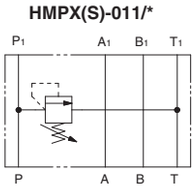
Seals material, see section 4:
- = NBR low temp. -40°C
PE = FKM
BBT = FVMQ fluorosilicon -60°C **(1)**

Test fluid, only for X execution:
H = mineral oil
W = pure water

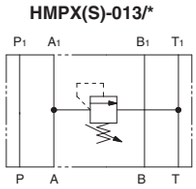
(1) Only for full stainless steel "**X**" execution

2 HYDRAULIC SYMBOLS

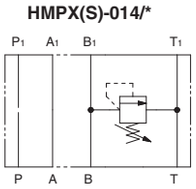
HMPX(S)-011/*



HMPX(S)-013/*



HMPX(S)-014/*



3 GENERAL CHARACTERISTICS

Assembly position / location	Any position
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007
Ambient temperature	**Standard** = -40°C ÷ +70°C **/PE** option = -20°C ÷ +70°C **/BBT** option = -60°C ÷ +70°C
Storage temperature range	**Standard** = -40°C ÷ +80°C **/PE** option = -20°C ÷ +80°C **/BBT** option = -60°C ÷ +80°C
Compliance	RoHs Directive 2011/65/EU as last update by 2015/65/EU REACH Regulation (EC) n°1907/2006

4 MATERIALS SPECIFICATION

Valve code	Valve type	Valve body	Internal parts	Spring	Seals		
					std	/PE	/BBT
HMPX	Modular	AISI 316L	AISI 316L, 420B, 630	AISI 302	NBR 70 Sh low temp	FKM (viton)	FMVQ (fluorosilicon)
HMPXS	Modular	AISI 316L	Carbon steel	AISI 302	NBR 70 Sh low temp	FKM (viton)	-

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

Seals, recommended fluid temperature **(1)**	NBR seals (standard) = -40°C ÷ +60°C FKM seals (/PE option) = -20°C ÷ +80°C FVMQ seals (/BBT option) = -60°C ÷ +60°C		
Recommended viscosity	115÷100 mm²/s - max allowed range 2.8 ÷ 500 mm²/s min = 0,9 mm²/s for X full stainless steel execution with pure water		
Max fluid contamination level	ISO4406 class 20/18/15 NAS1638 class 9, see also filter section at www.atos.com or KTF catalog		
Hydraulic fluid	**Suitable seals type**	**Classification**	**Ref. Standard**
Mineral oils	NBR low temp., FKM, FVMQ	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM, FVMQ	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR low temp.	HFA-E, HFA-S, HFB, HFC	

(1) The operating temperature of the fluid must be compatible with the maximum viscosity range allowed for the valve

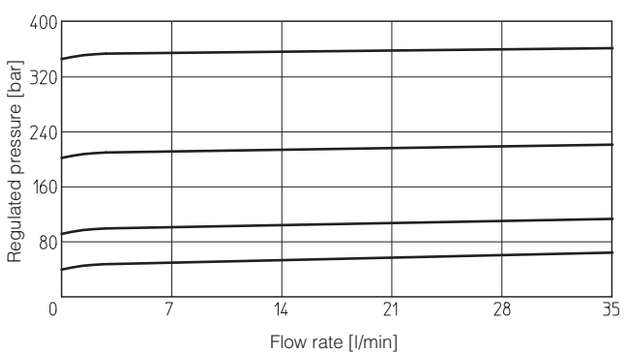
6 HYDRAULICS CHARACTERISTICS

Valve model		**HMPX** **HMPXS**
Max pressure	[bar]	Ports P, A, B = 350; Port T = 50
Max pressure setting	[bar]	50, 100, 210, 350
Pressure range **(1)**	[bar]	2÷50, 3÷100, 10÷210, 15÷350
Max flow	[l/min]	35

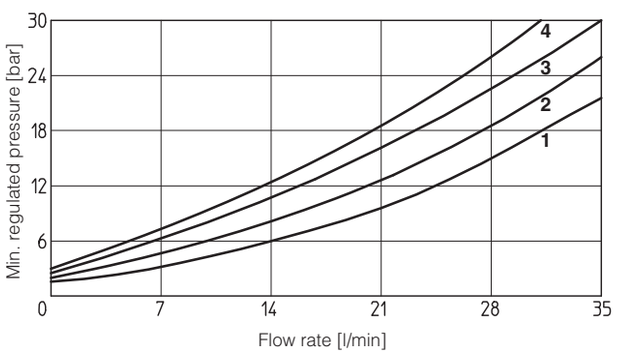
(1) The values correspond to the min and max regulation of the valve's craking pressure

7 DIAGRAMS (based on mineral oil ISO VG 46 at 50°C)

7.1 Regulated pressure versus flow diagram



7.2 Minimum pressure versus flow diagram



1 = HMPX(S)-*/50
2 = HMPX(S)-*/100
3 = HMPX(S)-*/210
4 = HMPX(S)-*/350

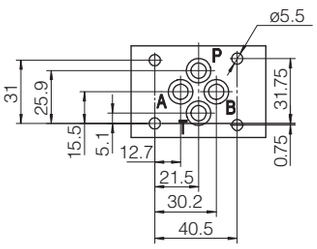
8 FASTENING BOLTS AND SEALS

Type	Size	Fastening bolts	Seals
HMPX	06 (ISO 4401)	n°4 M5xL-A4-70 Tightening torque = 5,5Nm	n°4 OR-108
HMPXS	06 (ISO 4401)	n°4 M5xL-A4-70 Tightening torque = 5,5Nm	n°4 OR-108

9 INSTALLATION DIMENSIONS OF MODULAR VALVES

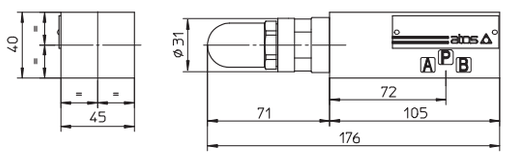
ISO 4401: 2005
Mounting surface: 4401-03-02-0-05
Fastening bolts: M5x**-A4-70
Tightening torque = 5,5 Nm
Seals: 4 OR 108
Ports P,A,B,T: Ø = 7.5 mm (max)

valve's bottom view



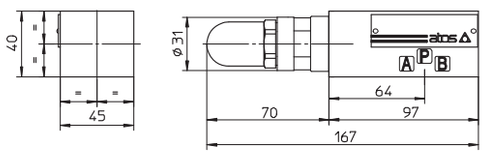
P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT

HMPX(S)-011/*



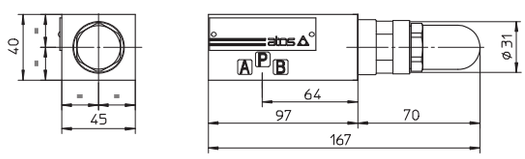
Mass [kg]	1,4

HMPX(S)-013/*



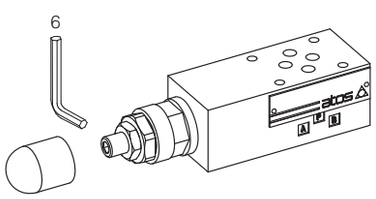
Mass [kg]	1,2

HMPX(S)-014/*



Mass [kg]	1,2

Pressure adjustment screw

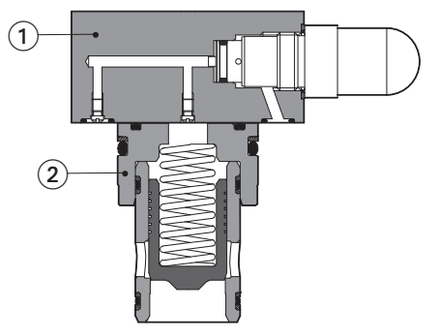


10 RELATED DOCUMENTATION

W010	Basics for electrohydraulics in corrosive environments
W020	Summary of Atos stainless steel components
EW900	Operating and maintenance information for stainless steel on-off valves

Stainless steel pressure relief valves

ISO functional cover and 2-way slip-in cartridge



LIMMX-2 + SC LIX-25

① Functional cover with integrated pressure relief pilot valve
② Slip-in cartridge

LIMMX, LIMMXS, SC LIX

Pressure relief valves, in cartridge design conforming to ISO7368 standard for installation in compact manifolds.
They are made by a functional cover **LIMMX(S)** and a 2-way slip-in cartridge **SC LIX**:

Functional covers are available in two different stainless steel executions for corrosive environments and fluids:

- **X** full stainless steel for external and internal parts, to withstand extreme and corrosive environmental conditions, and to ensure full compatibility also with water base and special fluids.
- **XS** stainless steel only for external parts to withstand extreme and corrosive environmental conditions.
  LIMMXS cover can be used also with standard SC LI-25*, see tech. table H030

LIMMX + SC LIX
LIMMXS + SC LI:

Size: **25** - ISO 7368
Max flow: **370 l/min** at Δp 5 bar
Max pressure: **350 bar**

1 MODEL CODE OF FUNCTIONAL COVER and SLIP-IN CARTRIDGE VALVES

1.1 Model code of fuctional cover

LIMM	X	-	2	/	350	**	/	*	/	*

- **LIMM**: Cover according to ISO 7368
- **X**: Stainless steel execution: **(1)**
  X = Full stainless steel
  XS = Stainless steel only external parts **(2)**
- **2**: Size: **2** = 25
- **350**: Pressure range
  50 = 6 ÷ 50 bar
  100 = 8 ÷ 100 bar
  210 = 10 ÷ 210 bar
  350 = 15 ÷ 350 bar
- ******: Series number
- *****: **Seals material,** see section 5:
  - = NBR low temp. -40°C
  PE = FKM
  BBT = FVMQ fluorosilicon -60°C **(4)**
- *****: **Test fluid**, only for X execution: **(3)**
  H = mineral oil
  W = pure water

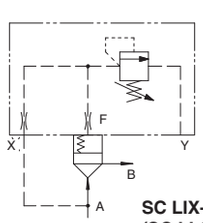
1.2 Model code of slip-in cartridge

SC LI	X	-	25	31	/	2	**	/	*	/	*

- **SC LI**: Cartridge according to ISO 7368
- **X**: Stainless steel execution:
  X= Full stainless steel
- **25**: Size 25
- **31**: Poppet type:
  31 = Area ratio 1÷1
- **2**: Spring cracking pressure
  1 = 0,3 bar
  2 = 1,2 bar
  3 = 3 bar
  6 = 6 bar
- ******: Series number
- *****: **Seals material,** see section 5:
  - = NBR low temp. -40°C
  PE = FKM
  BBT = FVMQ fluorosilicon -60°C
- *****: **Test fluid**: **(3)**
  H = mineral oil
  W = pure water

(1) See section 5 for material specifications
(2) LIMMXS cover can be used with standard SCLI-25* cartridge
(3) LIMMX and SC LIX in full stainless steel execution are factory tested with mineral oil or pure water in order to avoid the contamination of the end user system. At the end of each valve model code must be specified the type of fluid to be used in the valve's testing: "**H**" for hydraulic oil or "**W**" for pure water.
(4) Only for full stainless steel "**X**" execution

2 HYDRAULIC SYMBOL



3 GENERAL CHARACTERISTICS

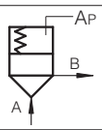
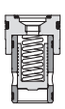
Assembly position / location	Any position
Mounting surface and cavity dimensions	ISO 7368, see section 9
MTTFd values according to EN ISO 13849	75 years, for further details see technical table P007
Ambient temperature	**Standard** = -40°C ÷ +70°C **/PE** option = -20°C ÷ +70°C **/BBT** option = -60°C ÷ +70°C
Storage temperature range	**Standard** = -40°C ÷ +80°C **/PE** option = -20°C ÷ +80°C **/BBT** option = -60°C ÷ +80°C
Compliance	RoHs Directive 2011/65/EU as last update by 2015/65/EU REACH Regulation (EC) n°1907/2006

4 HYDRAULICS CHARACTERISTICS

4.1 Hydraulic characteristics of LIMMX(S) functional cover

Functionl cover		**LIMMX, LIMMXS**
Operting pressure	[bar]	Port X = 350; Port Y = 50

5.2 Hydraulic characteristics of SC LIX slip-in cartrige

Slip-in cartridge		**SC LIX**
Operting pressure	[bar]	350
Nominal Flow at Δp 5 bar	[l/min]	370
Type of poppet		**31**
Functional sketch (Hydraulic symbol)		
Typical section		
Area ratio A: AP		1:1

5 MATERIALS SPECIFICATION

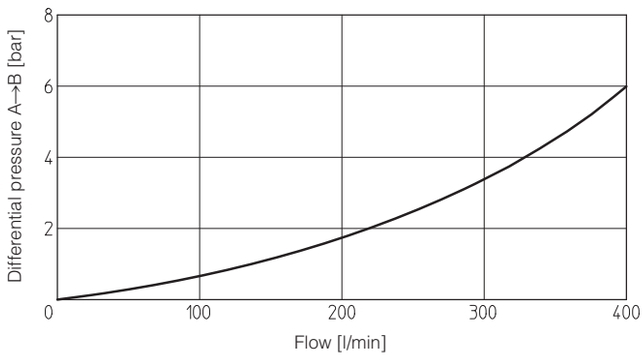
Valve code	Valve type	Valve body	Internal parts	Spring	Seals		
					std	/PE	/BBT
LIMMX	Functional cover	AISI 316L	AISI 316L, 420B, 630	AISI 302	NBR 70 Sh low temp	FKM (viton)	FMVQ (fluorosilicon)
LIMMXS	Functional cover	AISI 316L	Carbon steel	AISI 302	NBR 70 Sh low temp	FKM (viton)	-
SC LIX	Cartridge	AISI 316L	AISI 316L, 420B, 630	AISI 302	NBR 70 Sh low temp	FKM (viton)	FMVQ (fluorosilicon)

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

Seals, recommended fluid temperature **(1)**	NBR low temp. seals (standard) = -40°C ÷ +60°C FKM seals (/PE option) = -20°C ÷ +80°C FVMQ seals (/BBT option) = -60°C ÷ +60°C		
Recommended viscosity	15÷100 mm²/s - max allowed range 2.8 ÷ 500 mm²/s min = 0,9 mm²/s for X full stainless steel execution with pure water		
Max fluid contamination level	ISO4406 class 20/18/15 NAS1638 class 9, see also filter section at www.atos.com or KTF catalog		
Hydraulic fluid	**Suitable seals type**	**Classification**	**Ref. Standard**
Mineral oils	NBR low temp., FKM, FVMQ	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM, FVMQ	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR low temp.	HFA-E, HFA-S, HFB, HFC	

(1) The operating temperature of the fluid must be compatible with the maximum viscosity range allowed for the valve

7 FLOW/Δp DIAGRAM (based on mineral oil ISO VG 46 at 50°C)

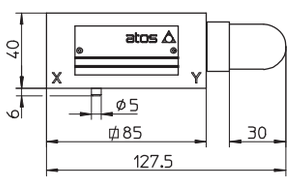


8 FASTENING BOLTS AND SEALS

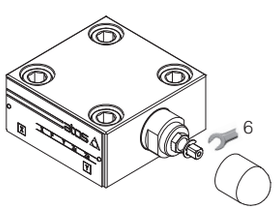
Type	Size	Fastening bolts	Seals
LIMMX LIMMXS	25 (ISO 7368)	n°4 M12x45-A4-70 Tightening torque = 125Nm	n°2 OR-108
SC LIX	25 (ISO 7368)	-	n°1 OR-3100 n°1 OR-4150, n°2 4150.BURC-39.20 n°1 OR-2118, n°2 2118.BURC-31.20

9 INSTALLATION DIMENSIONS

LIMMX(S)-2/*

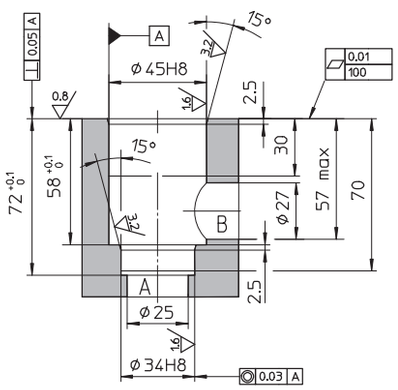


Pressure adjustment screw

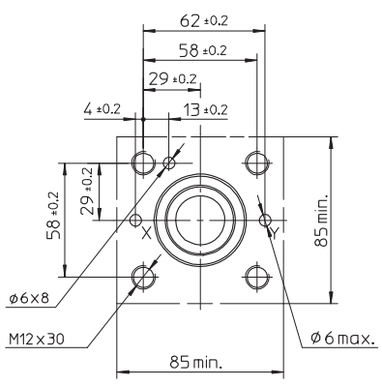


Mass [kg]	
LIMMX(S)	2,2
SC LIX	0,5

Cavity dimensions for SC LIX-25



Cover interface dimensions for LIMMX(S)-2



10 RELATED DOCUMENTATION

W010	Basics for electrohydraulics in corrosive environments
W020	Summary of Atos stainless steel components
EW900	Operating and maintenance information for stainless steel on-off valves