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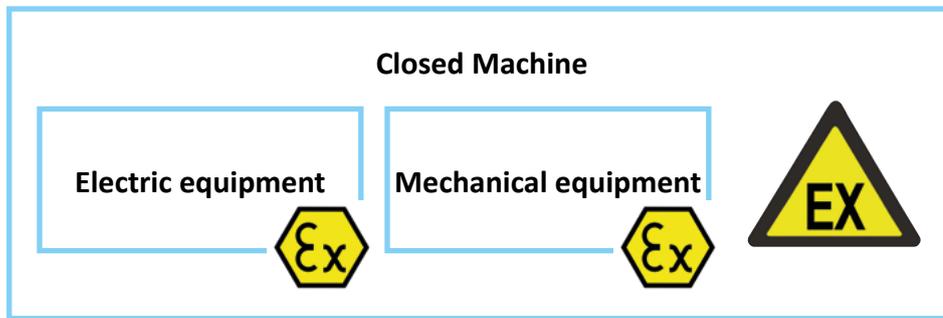
General information

The directive 2014/34/EU

ATEX derives its name from ATMosphere EXposable and stands for the Directive 2014/34/EU of the European Parliament. The Directive concerns electrical and non-electrical equipment and protection systems for use in potential explosive atmospheres. Since 1st of July 2003, devices and protection systems for use in potentially explosive areas must satisfy the new Directive 94/9/EC. This directive has been replaced by 2014/34/EU since 20th of April 2016.

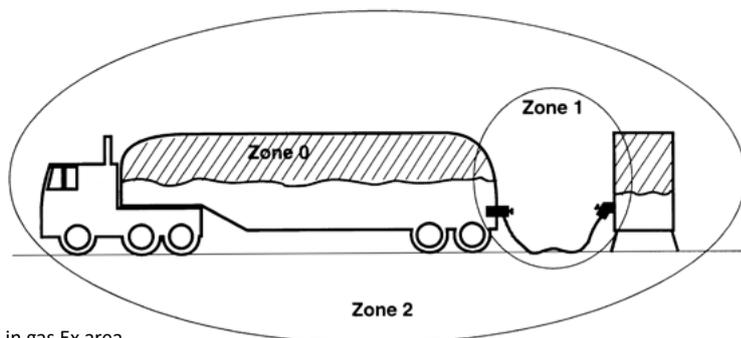
ATEX classifies explosive atmospheres and associates equipment

Problem:	Plant evaluation acc. to ATEX directive 99/92/EC		Equipment evaluation according to ATEX directive 2014/34/EU	
Guarantor:	Equipment manufacturer		AIRTEC Pneumatic GmbH	
Outcome:	Zone classification		Equipment group	
	- Temperature class - Explosion group - Ambient temperature		- Temperature class - Explosion group - Ambient temperature	



Zone and category

Zone classification reflects the likelihood of the occurrence of an explosive atmosphere. Furthermore, differentiation is made as to whether the hazard is due to gases, vapour and mists or due to dust. The category indicates in which zone the equipment is suitable.



Example of zone classification in gas Ex area

Equipments are divided in 2 groups. Group I is subdivided in category M1 and M2 and specifies the use of which equipment can be used in underground mining works.

All further equipment is classified into Group II.

Group II is divided in Category 1, 2 and 3.

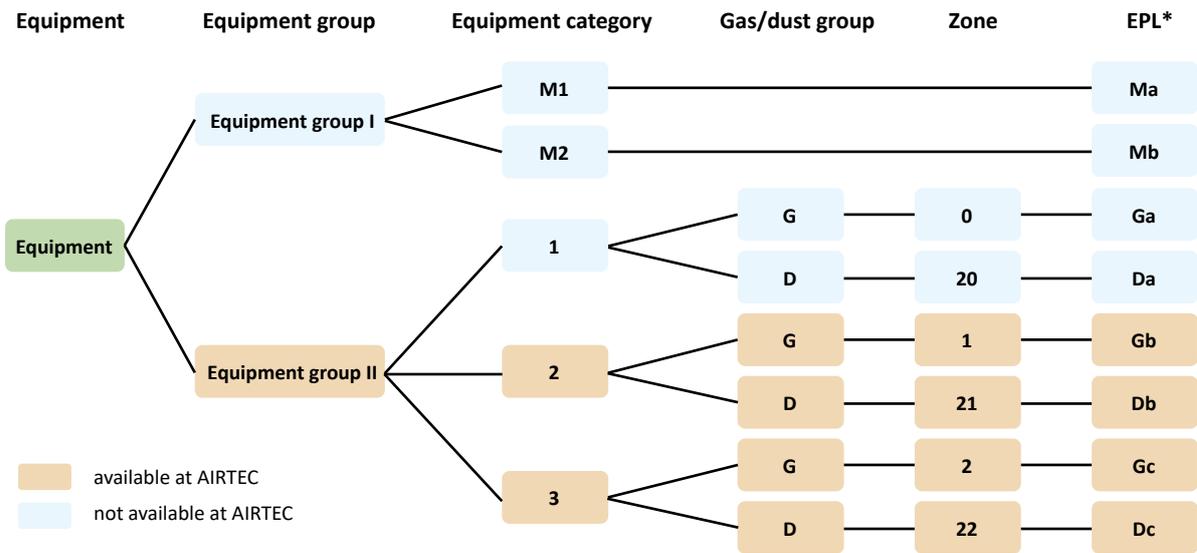
Category 1: Equipment in this category is characterised by a very high degree of safety and is specified in Zone 0 and 20.

Category 2: Equipment in this category is characterised by a high degree of safety and is specified in Zone 1 and 21

Category 3: Equipment in this category affords the necessary degree of safety in normal operation and is specified in Zone 2 and 22



Overview Zones und Categories



* EPL = Equipment protection level

Equipment category 1

Devices in Equipment category 1 guarantee a very high level of safety. They are designed for areas, in which an explosive gas atmosphere is present continuously, frequently or for long periods. Devices in this category can also be used in Equipment category 2 and 3.

Category 1G

Devices for use in **Zone 0**

Inflammable gases, vapors or mists

An area in which an explosive gas atmosphere is present continuously, frequently or for long periods.
Equipment protection level Ga, very high level of safety.

Category 1D

Devices for use in **Zone 20**

Inflammable dusts

An area in which an explosive dust atmosphere, in the form of a cloud of dust in air, is present continuously, frequently or for long periods.
Equipment protection level Da, very high level of safety.

Equipment category 2

Devices in Equipment category 2 guarantee a high level of safety. They are designed for areas, in which an explosive gas atmosphere is likely to occur periodically or occasionally in normal operation. Devices in this category can also be used Equipment category 3.

Category 2G

Devices for use in **Zone 1**

Inflammable gases, vapors or mists

An area in which an explosive gas atmosphere is likely to occur periodically or occasionally in normal operation
Equipment protection level Gb, high level of safety.

Category 2D

Devices for use in **Zone 21**

Inflammable dusts

An area in which an explosive dust atmosphere, in the form of a cloud of dust in air, is likely to occur in normal operation occasionally.
Equipment protection level Db, high level of safety.

Equipment category 3

Devices in Equipment category 3 guarantee a normal level of safety. They are designed for areas, in which an explosive gas atmosphere is not likely to occur in normal operation but, if it does occur, it will exist for a short period only.

Category 3G

Devices for use in **Zone 2**

Inflammable gases, vapors or mists

An area in which an explosive gas atmosphere is not likely to occur in normal operation but, if it does occur, it will exist for a short period only.
Equipment protection level Gc, normal level of safety.

Category 3D

Devices for use in **Zone 22**

Inflammable dusts

An area in which an explosive dust atmosphere, in the form of a cloud of combustible dust in air, is not likely to occur in normal operation but, if it does occur, will persist for a short period only.
Equipment protection level Dc, normal level of safety.



General information

Equipment protection level

EPL Ga or Da

Equipment with a very high protection level for use in hazardous areas. In normal operation this equipment represents no risk of ignition in the event of predictable or rare faults/malfunctions.

EPL Gb or Db

Equipment with a high protection level for use in hazardous areas which represents no risk of ignition in normal operation or in the event of predictable faults/malfunctions.

EPL Gc or Dc

Equipment with an advanced protection level for use in hazardous areas. There is no risk of ignition during normal operation. The equipment has additional protective measures that ensure no risk of ignition in the event of typically predictable equipment faults.

Temperature class

It must be ensured that the ignition temperature of an inflammable material is not reached during operation. For this purpose, the maximum surface temperature of a device must be less than the minimum ignition temperature. For this reason, the maximum surface temperature of equipment for use with inflammable gases, vapors or mists is specified in temperature classes. For dusty environments, the maximum surface temperature is specified in °C.

Temperature class	Maximum permissible surface temperature of the device
T1	450°C
T2	300°C
T3	200°C
T4	135°C
T5	100°C
T6	85°C



Device marking


II 2G Ex h IIC T5 Gb
II 2D Ex h IIIC T100°C Db

1. row

marking according to RL 2014/34/EU

- II** Equipment group: II Equipment for hazardous areas - apart from mining
2G Equipment category: 2 for Zone 1 and G for gases

marking according to DIN EN ISO 80079-36

- Ex** abbreviation for explosion protection
h Symbol for ignition protection class: h is representative for 6 different ignition protection classes h can be e.g. constructional safety c, flameproof enclosure d, pressurised enclosure p etc.
IIC Explosion group II = gases
 The device group II is sub-divided into explosion group A, B and C. The subdivision is indicating the gap width of a technical device. C indicates the highest and A the lowest requirement class.
 The selection of the explosion is depending of the media and the correspondent explosion group requirement.
T5 Temperature class: T5 assignment of gases and vapors accordance to the ignition temperature > 100°C
Gb Equipment protection level (EPL) G = gases b = Equipment with a high protection level for use in hazardous areas which represents no risk of ignition in normal operation or in the event of predictable faults/malfunctions.
 suitable for zone 1

2. row

marking according to RL 2014/34/EU

- II** Equipment group: II Equipment for hazardous areas - apart from mining
2D Equipment category: 2 for Zone 1 and D for dust Zone 21

marking according to DIN EN ISO 80079-36

- Ex** abbreviation for explosion protection
h Symbol for ignition protection class: h is representative for 6 different ignition protection classes h can be e.g. constructional safety c, flameproof enclosure d, pressurised enclosure p etc.
IIIC Explosion group III = Inflammable dusts, fluff
 C is indicating the type of dust for which the equipment is suitable. Additionally it's divided in A: flammable suspended materials, B: flammable suspended materials and non-conductive dusts and C: flammable suspended materials and conductive dusts.
T100°C maximum permissible surface temperature
Db Equipment protection level (EPL) D = dust b = Equipment with a high protection level for use in hazardous areas which represents no risk of ignition in normal operation or in the event of predictable faults/malfunctions.
 suitable for zone 21



Valves Mechanically or pneumatically operated

Mechanically operated valves

Device marking

Mechanically operated valves are marked as follows:

II 2G Ex h IIB T6 Gb
II 2D Ex h IIIC T85°C Db
-10°C T_{amb} +60°C

Marking according to DIN EN ISO 80079-36/ -37.

Mechanically operated valves conform to Equipment category 2 and can be used in Zone 1 respectively Zone 21.

Available valves

Series	Versions	Series	Versions
HF-12	310, 510	HR-14	320, 520
HF-14	310, 510	HR-18	320, 520
HF-18	310, 510	T-30	510
HR-12	320, 520		

Explosion-proof equipment without inherent potential ignition sources

The articles listed in the appendix do not fall into the scope of the EU Directive 2014/34/EC. They are not subjected by Article 1 (2) and (3) of Directive 2014/34/EC. It has been proven by an ignition risk analysis that the valves have no potential ignition source of their own. They can be used in compliance with the requirements of e.g. DIN EN 1127-1:2019, DIN EN IEC 60079-0:2019, DIN EN ISO 80079-36:2016 and DIN EN ISO 80079-37:2016 in

Zone 1 explosion groups IIA, IIB and IIC, Zone 21 explosion groups IIIA, IIIB and IIIC

Zone 2 explosion groups IIA, IIB and IIC, Zone 22 explosion groups IIIA, IIIB and IIIC

The valves are not marked within the meaning of the ATEX Directive. They have to meet the requirements of the existing zones.

Available valves

Series	Versions	Series	Versions
HF-12	530, 533	HR-18	530, 533
HF-14	530, 533	DHR-18	DHR-18-420-H1
HF-18	530, 533	E-28	E-28-310, ER-28-310
HR-12	530, 533	T-28	311
HR-14	530, 533	T-30	310



The operating instructions for the valve must be taken into account before putting into operation. These are included with each valve and are available at www.airtec.de.



Pneumatically operated valves

Device marking

Pneumatically operated valves are marked as follows:

II 2G Ex h IIC T5 Gb
II 2D Ex h IIIC T100°C Db
-10°C T_{amb} +50°C

Marking according to DIN EN ISO 80079-36/ -37.

Pneumatically operated valves conform to Equipment category 2 and can be used in Zone 1 respectively Zone 21.

Available valves

Series	Versions	Series	Versions
L-28	311, 511	PKX-09	511, 520
P-05	511	PKX-10	511, 520, 530
P-07	311, 511	PI-01	511, 520
P-12	311, 511	PI-02	511, 520, 530, 533
		PI-03	511, 520, 530
		PN-05	311, 511, 520, 530

Explosion-proof equipment without inherent potential ignition sources

The articles listed in the appendix do not fall into the scope of the EU Directive 2014/34/EC. They are not subjected by Article 1 (2) and (3) of Directive 2014/34/EC. It has been proven by an ignition risk analysis that the valves have no potential ignition source of their own. They can be used in compliance with the requirements of e.g. DIN EN 1127-1:2019, DIN EN IEC 60079-0:2019, DIN EN ISO 80079-36:2016 and DIN EN ISO 80079-37:2016 in

Zone 1 explosion groups IIA, IIB and IIC, Zone 21 explosion groups IIIA, IIIB and IIIC

Zone 2 explosion groups IIA, IIB and IIC, Zone 22 explosion groups IIIA, IIIB and IIIC

The valves are not marked within the meaning of the ATEX Directive. They have to meet the requirements of the existing zones.

Available valves

Series	Versions
L-25	310, 311, 320, 511, 520
L-28	310, 320, 510, 520
P-05	310, 311, 320, 510, 520, 530, 533, 534
P-07	310, 320, 510, 520, 530, 533, 534
P-12	310, 320, 510, 520, 530, 533, 534



The operating instructions for the valve and the electrical equipment must be taken into account before putting into operation. These are included with each valve and are available at www.airtec.de.



Valves Electrically operated

Device marking

Electrically operated valves are marked as follows:

II 2G Ex h IIC T5 Gb
II 2D Ex h IIIC T100°C Db
-10°C T_{amb} +50°C

Marking according to DIN EN ISO 80079-36/ -37.



Electrically operated valves conform to equipment category 2 can be used in Zone 1 respectively in Zone 21. For the use in hazardous areas the category group of the used coil has to be taken into account. The specification of the whole equipment corresponds always to the lowest category of the single components.

Available valves

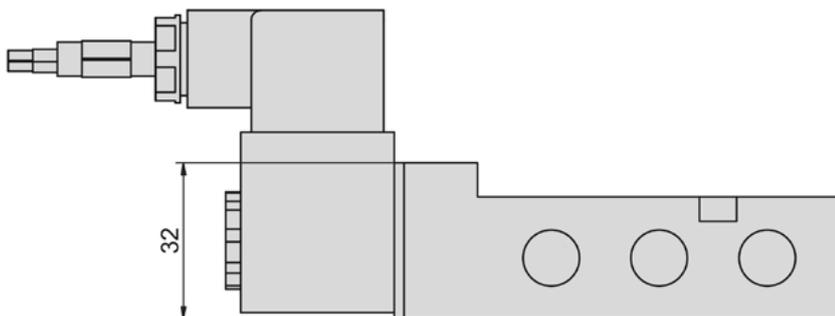
Series	Versions	Series	Versions
KM-09	510, 511, 520, 530, 533, 534	M-97	311, 510, 511, 520, 530, 533
KM-10	510, 511, 520, 530, 533, 534	ME-05	311, 320, 511, 520
KMX-09	511, 520	ME-07	311, 320, 511, 520
KMX-10	511, 520, 530	MO-05	311
KN-05	310, 311, 510, 511, 520, 530, 533, 534	MO-07	311
KN-55	311, 511	MO-22	310, 311
KNX-55	311, 511, 520	MI-01	511, 520, 530, 533
M-04	310, 510, 511, 520, 530, 533	MI-02	511, 520, 530, 533
M-05	310, 311, 510, 511, 520, 530, 533, 534	MI-03	511, 520, 530, 533
M-07	310, 311, 510, 511, 520, 530, 533, 534	MN-06	310, 311, 510, 511, 520, 530
M-22	310, 311, 510, 511, 520, 530, 533	MS-18	310
M-94	510, 511	MS-98	310
M-95	310, 311, 510, 511, 520, 530, 533		



The use of special electrical equipment and operators requires in certain cases a design change of the valve. All changes are shown on the following pages.

For the NAMUR valve as well the body dimension is different to standard. Please see below.

KN-05, MN-06 Divergent dimensions



The operating instructions for the valve and the electrical equipment must be taken into account before putting into operation. These are included with each valve and are available at www.airtec.de.

Solenoid coils
23-SP-037

Ignition protection class	Encapsulated with casting compound mb (gases) mb tb (dust)
Classification	II 2G Ex mb IIC T5 II 2D Ex mb tb IIIC T95°C IP65
Overall width	30 mm
Temperature range*	-20°C...+50°C (battery fitted -20°C...+40°C)
Temperature range medium	-10°C...+50°C (battery fitted -10°C...+40°C)



* The max. applicable operating temperature depends on the temperature specification of the used valve.

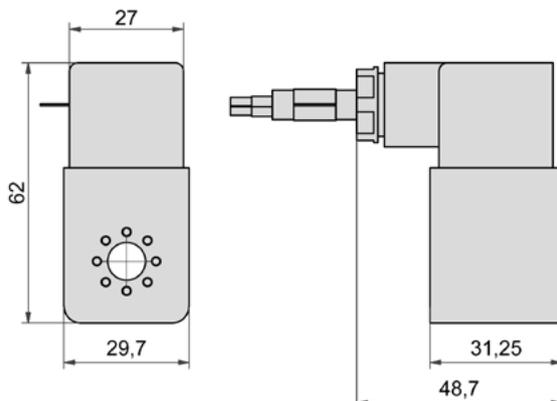
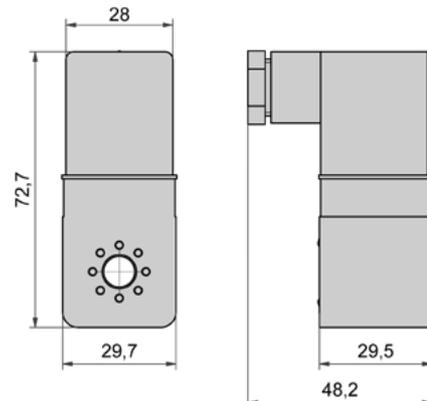
Model-no.:	23-SP-037-012-xx	23-SP-037-025-xx	23-SP-037-027-xx
Voltage	24 V DC	110...120 V AC	230 V AC
Power consumption	3.3 W	3 VA	3.1 VA
Rated current	136 mA	27 mA	14 mA
Connecting cable (xx)	03 = 3 m, 05 = 5 m, 10 = 10 m	03 = 3 m	03 = 3 m, 05 = 5 m

Solenoid coils
23-SP-038

Ignition protection class	Intrinsically safe ia (gases) t (dust)
Classification	II 2G Ex ia IIC T6 Ga (≤ 28 V DC) II 2G Ex ia IIB T6 Ga (≤ 32 V DC) II 2D Ex t IIIC T80°C Db IP65
Overall width	30 mm
Temperature range*	-40°C...+50°C
Temperature range medium	-10°C...+50°C (battery fitted -10°C...+40°C)

* The max. applicable operating temperature depends on the temperature specification of the used valve.

Model-no.:	23-SP-038-01-912
Voltage	$U \leq 28$ V DC / $U \leq 32$ V DC
Rated current	$I \leq 115$ mA / $I \leq 195$ mA
Connection	plug (part of delivery)

Dimensions
23-SP-037

23-SP-038




Valves Electrically operated

Solenoid coils

23-SP-043

Ignition protection class	enhanced safety na (gases) tc (dust)
Classification	II 3 G Ex ec IIC T5 Gc II 3 D Ex tc IIIC T95°C Dc IP65
Overall width	30 mm
Temperature range*	-20°C...+50°C
Temperature range medium	-10°C...+50°C



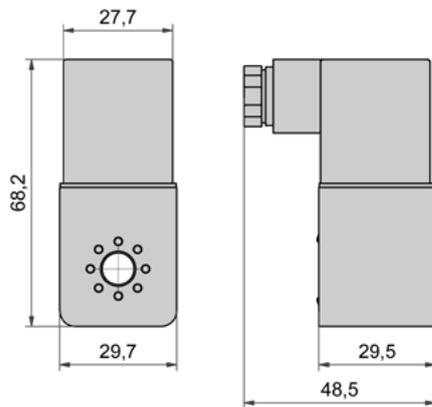
* The max. applicable operating temperature depends on the temperature specification of the used valve.

Model-no.:	23-SP-043-A12	23-SP-043-A27
Voltage	24 V DC	230 V AC
Power consumption	2.7 W	4 VA
Rated current	112 mA	17,5 mA
Connection	plug (part of delivery)*	plug (part of delivery)*

* The socket is supplied unassembled.

Dimensions

23-SP-043



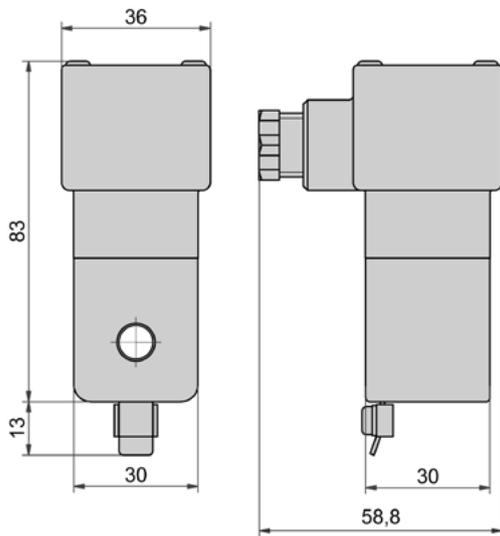
Solenoid coils
23-SP-045

Ignition protection class	encapsulated with casting compound and flameproof enclosure d mb (gases) tb (dust)
Classification	II 2G Ex d mb IIC T5 Gb II 2D tb IIIC T95°C Db IP66
Overall width	30 mm
Temperature range*	-20°C...+50°C
Temperature range medium	-10°C...+50°C



* The max. applicable operating temperature depends on the temperature specification of the used valve.

Model-no.:	23-SP-045-V12	23-SP-045-V27
Voltage	24 V DC	230 V AC
Power consumption	3 W	3,8 VA
Rated current	125 mA	14 mA
Connection	terminal box	terminal box

Dimensions
23-SP-045


Delivery is only made in a fully assembled state with valve, as the approval relates to both the electrical and mechanical components. The delivery of individual parts is only permitted for replacement purposes.



The operating instructions for the valve and the electrical equipment must be taken into account before putting into operation. These are included with each valve and are available at www.airtec.de.



Valves Function valvесе

Function valves

Flow control valves according to NAMUR

Device marking

Flow control valves are marked as follows::


II 2G Ex h IIC T5 Gb
II 2D Ex h IIIC T100°C Db
-10°C T_{amb} +50°C

Marking according to DIN EN ISO 80079-36/ -37.

Piston rod cylinders conform to Equipment category 2 and can be used in Zone 1 respectively Zone 21.

Available valves

Series	Versions
KN-063	KN-063-DRH, KN-063-DRS
KN-065	KN-065-DRH, KN-065-DRS

Explosion-proof equipment without inherent potential ignition sources

The valves **VZ-**, **SU-**, **AN-**, **OR-**, **SE-** do not fall into the scope of the EU Directive 2014/34/EC They are not subjected by Article 1 (2) and (3) of Directive 2014/34/EC. It has been proven by an ignition risk analysis that the valves have no potential ignition source of their own. They can be used in compliance with the requirements of e.g. DIN EN 1127-1:2019, DIN EN IEC 60079-0:2019, DIN EN ISO 80079-36:2016 and DIN EN ISO 80079-37:2016 in

Zone 1 explosion groups IIA, IIB and IIC, Zone 21 explosion groups IIIA, IIIB and IIIC
 Zone 2 explosion groups IIA, IIB and IIC, Zone 22 explosion groups IIIA, IIIB and IIIC

The valves are not marked within the meaning of the ATEX Directive. They have to meet the requirements of the existing zones.

Available valves

Series	Versions	Series	Versions
SE	SE-12, SE-14, SE-18	OR	OR-14-01, OR-18, OR-25
SU	SU-18-310, SU-25-310	VZ	VZ-18-310, VZ-18-310-20, VZ-25-310
AN	AN-18, AN-25		



Piston rod cylinders

Device marking

Piston rod cylinders are marked as follows:

II 2G Ex h IIC T5 Gb
 II 2D Ex h IIIC T100°C Db
 -20°C T_{amb} +80°C

Marking according to DIN EN ISO 80079-36/ -37.

Piston rod cylinders conform to Equipment category 2 and can be used in Zone 1 respectively Zone 21.

Available cylinders

Series	Versions
XL	XL, XLH
	XLC (-40°C Tamb +80°C)
XG	XG, XGH (only up to Ø 200 mm)
HM	HM, HMP, HMDE, HMPDE
CM	CM, CMP, CMDE, CMPDE

Device marking

Piston rod cylinders are marked as follows:

II 2G Ex h IIB T4 Gb
 II 2D Ex h IIIC T120°C Db
 -20°C T_{amb} +80°C

Marking according to DIN EN ISO 80079-36/ -37.

Piston rod cylinders conform to Equipment category 2 and can be used in Zone 1 respectively Zone 21.

Available cylinders

Series	Versions
XM	XM, XM4, XMH, XM4H
NYD	Ø 20 and 25 with 5 ... 250 mm stroke, Ø 32 up to 125 with 5 ... 400 mm stroke
NYE	5...60 mm stroke
NYDK	NYDK2, NYDK3, NYDK4
NYM	MYM2AG, NYM2IG, NYM3AG, NYM3IG
NYR2	NYR2

Device marking

Piston rod cylinders are marked as follows:

II 2G Ex h IIC T5...T4 Gb X
 II 2D Ex h IIIC T100°C...T135°C Db X
 -20°C T_{amb} +40°C...+60°C

Marking according to DIN EN ISO 80079-36/ -37.

Piston rod cylinders conform to Equipment category 2 and can be used in Zone 1 respectively Zone 21.

Available cylinders

Series	Versions
SLX	SLX, SLXH
HMU	HMU, HMUP, HMUDE, HMUPDE



The operating instructions for the valve and the electrical equipment must be taken into account before putting into operation. These are included with each valve and are available at www.airtec.de.



Cylinders

Device marking

Piston rod cylinders are marked as follows:


II 2G Ex h IIC T5 Gb
II 2D Ex h IIIC T100°C Db
-20°C T_{amb} +40°C

Marking according to DIN EN ISO 80079-36/ -37.

Piston rod cylinders conform to Equipment category 2 and can be used in Zone 1 respectively Zone 21.

Available cylinders

Series	Versions
88-XSI	

Piston rod cylinders

Piston rod cylinders according ATEX are marked with following suffix:

-ATEX
-EX
-X

Rodless cylinders series ZX

Device marking

ZX-cylinder are marked as follows:


II 2G Ex h IIC T6 Gb
-10°C ≤ T_{amb} ≤ 60°C

Marking according to DIN EN ISO 80079-36/ -37.

Rodless cylinders conform to Equipment category 2G and can be used in Zone 1.

Available rodless cylinders

Series	Versions
ZX	ZX-Ø-S, ZX-Ø-K, ZX-Ø-SG, ZX-Ø-KG, ZX-Ø-SR, ZX-Ø-KR,

Rodless cylinders

Rodless cylinders according ATEX are marked with following suffix:

-EX
-X



The operating instructions for the valve and the electrical equipment must be taken into account before putting into operation. These are included with each valve and are available at www.airtec.de.



Explosion-proof equipment without inherent potential ignition sources

The non-electrical components of the **series X, Y and K** do not fall into the scope of the EU Directive 2014/34/EC They are not subjected by Article 1 (2) and (3) of Directive 2014/34/EC. It has been proven by an ignition risk analysis that the valves have no potential ignition source of their own. They can be used in compliance with the requirements of e.g. DIN EN 1127-1:2019, DIN EN IEC 60079-0:2019, DIN EN ISO 80079-36:2016 and DIN EN ISO 80079-37:2016 in

Zone 1 explosion groups IIA, IIB and IIC, Zone 21 explosion groups IIIA, IIIB and IIIC
Zone 2 explosion groups IIA, IIB and IIC, Zone 22 explosion groups IIIA, IIIB and IIIC

The valves are not marked within the meaning of the ATEX Directive. They have to meet the requirements of the existing zones.

The products of the series **40-IQS...**, **44-A...**, **44-X...** do not fall into the scope of the EU Directive 2014/34/EC They are not subjected by Article 1 (2) and (3) of Directive 2014/34/EC. It has been proven by an ignition risk analysis that the valves have no potential ignition source of their own. They can be used in compliance with the requirements of e.g. DIN EN 1127-1:2019, DIN EN IEC 60079-0:2019, DIN EN ISO 80079-36:2016 and DIN EN ISO 80079-37:2016 in

Zone 1 explosion groups IIA, IIB and IIC, Zone 21 explosion groups IIIA, IIIB and IIIC
Zone 2 explosion groups IIA, IIB and IIC, Zone 22 explosion groups IIIA, IIIB and IIIC

The valves are not marked within the meaning of the ATEX Directive. They have to meet the requirements of the existing zones.



Accessories for valves

The valves are intended to be used with the following accessories:

Accessories	series
Manifolds	R-181/n, R-281/n, R-141/n
Manifolds	RF-09/n, RF-10/n
Blind plates	RF-181-V, RF-281-V, R-141-V, RF-09-V, RF-10-V
Mounting brackets	R-181-W, R-281-W, R-141-W

Accessories for piston rod cylinders

The cylinders are intended to be used with the following accessories:

Accessories	series
Flexible coupling	FK-∅
Rod eye	FO-∅, RO-∅, PO-∅ (v_{max} 1 m/s)
Rod clevis	FD-∅, RD-∅, PD-∅
Piston rod nut	FE-∅, RL-∅, PL-∅
Mounting accessories XL	XLB-∅-01, XLB-∅-02, XLB-∅-03, XLB-∅-04, XLB-∅-05, XLB-∅-06, XLB-∅-07, XLB-∅-08, XLB-∅-09, XLB-∅-10, XLB-∅-11, XLB-∅-12, XLB-∅-13, XLB-∅-14,
Mounting accessories XG	VLB-∅-01, VLB-∅-02, VLB-∅-03, VLB-∅-04, VLB-∅-05, VLB-∅-06, VLB-∅-08, VLB-∅-09, VLB-∅-12
Mounting accessories HM	RA-∅, RC-∅, RG-∅, RH-∅, RB-∅, RM-∅
Mounting accessories CM	PA-∅, PC-∅, PB-∅, PM-∅

Accessories for rodless cylinders

The cylinders are intended to be used with the following accessories:

Accessories	series
Mounting accessories ZX	ZXB-∅-01, ZXB-∅-02, ZXB-∅-10, ZXB-∅-20

Proximity switches

Model-No.	Classification / Identification marking
ZS-7300	II 3G Ex nA T4 II 3D Ex tD A22 IP67 T 125°C
ZS-7302	II 3D Ex tc IIIC T125°C Dc X



The operating instructions for the valve and the electrical equipment must be taken into account before putting into operation. These are included with each valve and are available at www.airtec.de.

Air consumption cylinder (NI for a single stroke of 100 mm, based upon extension)

Piston-Ø	Pressure in bar						
	2	3	4	5	6	7	8
8	0.02	0.02	0.03	0.03	0.04	0.04	0.05
10	0.02	0.03	0.04	0.05	0.05	0.06	0.07
12	0.03	0.05	0.06	0.07	0.08	0.09	0.10
16	0.06	0.08	0.10	0.12	0.14	0.16	0.18
20	0.09	0.13	0.16	0.19	0.22	0.25	0.28
25	0.15	0.20	0.25	0.29	0.34	0.39	0.44
32	0.24	0.32	0.40	0.48	0.56	0.64	0.72
40	0.38	0.50	0.63	0.75	0.88	1.01	1.13
50	0.59	0.79	0.98	1.18	1.37	1.57	1.77
63	0.94	1.25	1.56	1.87	2.18	2.49	2.81
80	1.51	2.01	2.51	3.02	3.52	4.02	4.52
100	2.36	3.14	3.93	4.71	5.50	6.28	7.07
125	3.72	4.96	6.21	7.42	8.64	9.91	11.14
160	6.09	8.12	10.16	12.16	14.16	16.23	18.25
200	9.52	12.68	15.88	19.00	22.12	25.36	28.52
250	14.88	19.81	24.81	29.69	34.56	39.63	44.56

Required flow rate (NI/min at p = 6 bar)

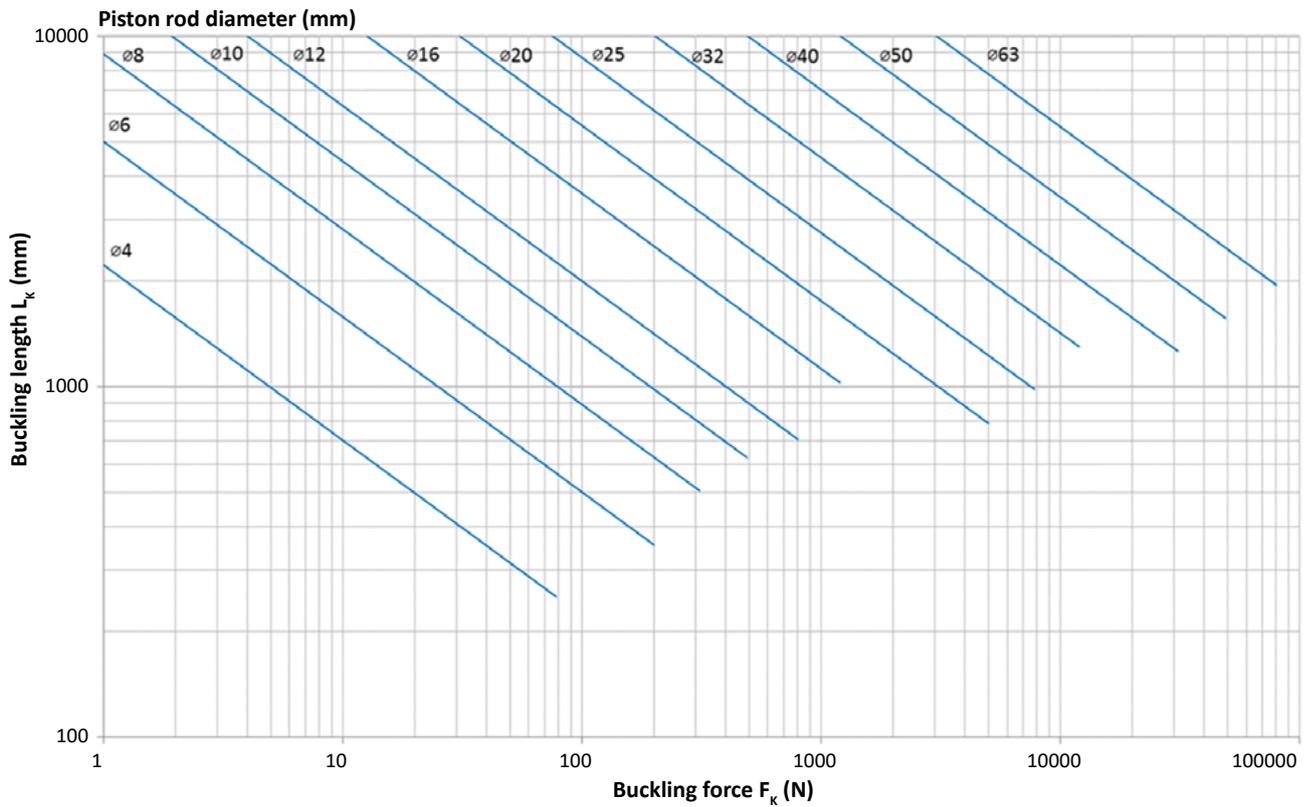
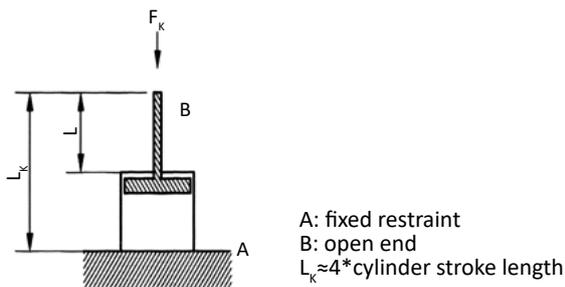
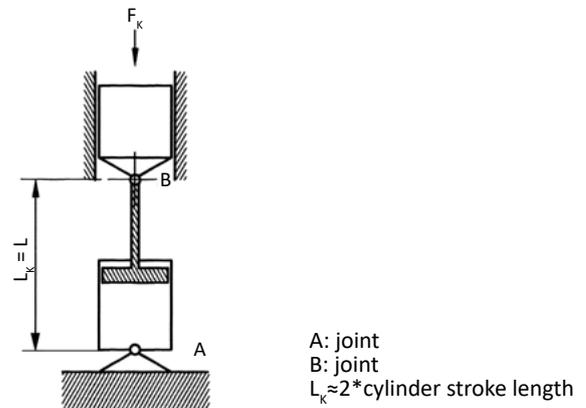
Piston-Ø	speed (m/s)				
	0.25	0.5	1	1.5	2
8	5	11	21	32	42
10	8	16	33	49	66
12	12	24	47	71	95
16	21	42	84	127	169
20	33	66	132	198	264
25	52	103	206	309	412
32	84	169	338	506	675
40	132	264	528	791	1055
50	206	412	824	1236	1649
63	327	654	1309	1963	2617
80	528	1055	2110	3165	4220
100	824	1649	3297	4946	6594
125	1288	2576	5152	7727	10303
160	2110	4220	8440	12660	16881
200	3297	6594	13188	19782	26376

Force chart cylinders (N)

Piston-Ø	Series	Piston rod Ø (mm)	Pressure in bar						
			2	3	4	5	6	7	8
8			9	14	18	23	27	32	36
	HM	4	7	10	14	17	20	24	27
10			14	21	28	35	42	49	57
	HM	4	12	18	24	30	36	42	47
12			20	31	41	51	61	71	81
	HM	6	15	23	31	38	46	53	61
16			36	54	72	90	109	127	145
	HM, CM	6	31	47	62	78	93	109	124
	NXD	8	27	41	54	68	81	95	109
20			57	85	113	141	170	198	226
	HM, CM	8	47	71	95	119	142	166	190
	NYD, NXD, LX	10	42	64	85	106	127	148	170
25			88	132	177	221	265	309	353
	HM, CM, NYD, NXD	10	74	111	148	185	223	260	297
	LX	12	68	102	136	170	204	238	272
32			145	217	289	362	434	506	579
	XL, SLX, 88-XSI, XM, NYD, NXD, HMU	12	124	187	249	311	373	435	497
	LX	16	109	163	217	271	326	380	434
40			226	339	452	565	678	791	904
	NYD, NXD	12	206	309	411	514	617	720	823
	XL, SLX, 88-XSI, XM, LX, HMU	16	190	285	380	475	570	665	760
50			353	530	707	883	1060	1236	1413
	NYD, NXD	16	317	476	634	793	951	1110	1268
	XL, SLX, 88-XSI, XM, LX	20	297	445	593	742	890	1039	1187
63			561	841	1122	1402	1682	1963	2243
	NYD, NXD	16	525	787	1049	1312	1574	1836	2099
	XL, SLX, 88-XSI, XM, LX	20	504	756	1009	1261	1513	1765	2017
80			904	1356	1809	2261	2713	3165	3617
	NYD, NXD	20	848	1272	1696	2120	2543	2967	3391
	XL, SLX, 88-XSI, XM	25	816	1224	1632	2040	2448	2856	3264
100			1413	2120	2826	3533	4239	4946	5652
	XL, SLX, 88-XSI, XM, NYD, NXD	25	1325	1987	2649	3312	3974	4636	5299
125			2208	3312	4416	5520	6623	7727	8831
	XL, SLX, 88-XSI, XM, NYD	32	2063	3095	4126	5158	6189	7221	8252
160			3617	5426	7235	9043	10852	12660	14469
	XG	40	3391	5087	6782	8478	10174	11869	13565
200			5652	8478	11304	14130	16956	19782	22608
	XG	40	5426	8139	10852	13565	16278	18991	21704
250			8831	13247	17663	22078	26494	30909	35325
	XG	50	8478	12717	16956	21195	25434	29673	33912
320			14469	21704	28938	36173	43407	50642	57876
	XG	63	13908	20862	27817	34771	41725	48679	55633

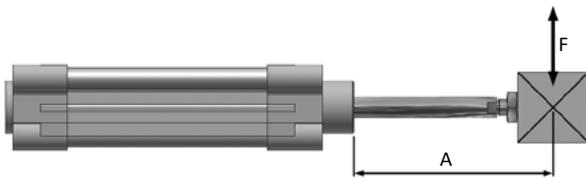
	extension force*
	retraction force*

* A correction factor of 0.9 for the internal friction is already calculated.

Critical load diagram for the piston rod

First elastic case of buckling

Second elastic case of buckling


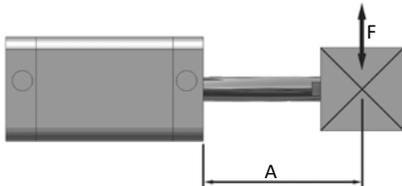
Knowing the actual buckling case, either 1 or 2, and knowing the requested stroke length you can calculate the buckling length L_k . If you know the buckling force F_k (compressive force) you determine in the diagram above the intersection of both data. Choose the next graph line above to get the necessary rod diameter.

Permissible side load F (N), series XL and XM



Piston- \varnothing	Distance A (mm)											
	25	40	50	80	100	125	160	200	250	320	400	500
32	75	55	50	40	34	28	23	20	16	12	9	7
40	175	150	130	105	91	78	62	55	45	35	28	21
50 + 63	220	180	170	130	120	105	90	80	65	52	43	33
80 + 100	500	450	400	350	310	270	230	205	180	150	125	100
125	810	710	680	590	520	470	420	390	330	270	230	200

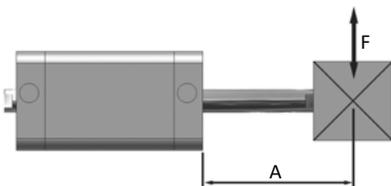
Permissible side load F (N), series NYD* and NXD, version 200 and 210



Piston- \varnothing	Distance A (mm)									
	25	30	40	50	60	70	80	90	100	125
12 + 16	8	7	6	6	5	5	4	3	2	-
20 + 25	12	11	9	7	6	5	4	3	3	-
32 + 40	23	20	16	12	10	8	7	7	6	4
50 + 63	38	34	28	22	18	15	13	12	11	3
80	49	43	35	28	24	20	18	17	16	12
100	93	82	67	55	46	40	37	34	31	23

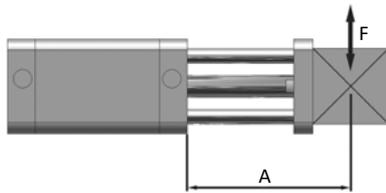
* series NYD from \varnothing 20 mm

Permissible side load F (N), series NYD* and NXD, version 600 and 610



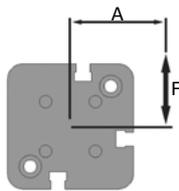
Piston- \varnothing	Distance A (mm)									
	25	30	40	50	60	70	80	90	100	125
12 + 16	22	20	18	15	13	11	10	10	9	6
20 + 25	32	30	26	21	19	16	14	13	12	9
32 + 40	47	43	38	32	28	26	22	20	18	13
50 + 63	83	78	68	59	51	46	41	38	36	27
80	112	108	93	83	74	67	60	57	54	40
100	194	181	160	144	130	118	108	101	96	72

* series NYD from \varnothing 20 mm

Permissible side load F (N), series NYD* and NXD, version 220


Piston-Ø	Distance A (mm)									
	25	30	40	50	60	70	80	90	100	125
16 + 20	38	33	27	23	20	18	16	14	12	9
25	59	53	43	37	31	27	24	23	22	15
32	76	68	58	49	43	38	35	34	32	24
40	112	101	84	72	62	56	50	47	46	34
50 + 63	145	130	108	92	83	74	66	61	56	42
80 + 100	200	180	155	135	120	110	100	90	80	60

* series NYD from Ø 20 mm

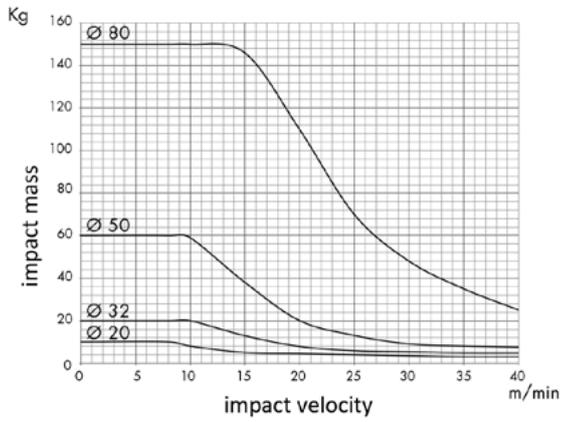
Permissible torque F x A (Nm), series NYD* and NXD, version 220


Piston-Ø	Distance A (mm)											
	10	15	20	25	30	40	50	60	70	80	90	100
16	0.75	0.7	0.6	0.5	0.45	0.4	0.35	0.3	0.25	0.2	0.15	0.1
20	1.0	0.85	0.8	0.7	0.6	0.4	0.35	0.35	0.3	0.25	0.2	0.2
25	2.0	1.75	1.6	1.3	1.2	0.9	0.75	0.6	0.5	0.45	0.45	0.4
32	2.7	2.5	2.2	2.0	1.8	1.6	1.3	1.1	1.0	0.9	0.9	0.8
40	5.0	4.0	3.5	3.3	3.0	2.5	2.2	2.0	1.8	1.5	1.4	1.3
50	8.8	7.6	6.7	6.0	5.4	4.6	4.0	3.5	3.0	2.8	2.6	2.4
63	10.7	9.4	8.3	7.4	6.7	5.5	4.8	4.2	3.8	3.5	3.2	2.9
80	17.5	15.3	13.7	12.4	11.3	9.6	8.5	7.6	7.0	6.3	5.8	5.3
100	20.0	19.0	17.0	15.5	14.0	12.0	10.5	9.5	8.5	7.7	7.0	6.5

* series NYD from Ø 20 mm

Applicable load, series NYSE

smooth rod



rod with roller

