piSAFE program

VA – division 29/3-2021

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piab Evolving automation

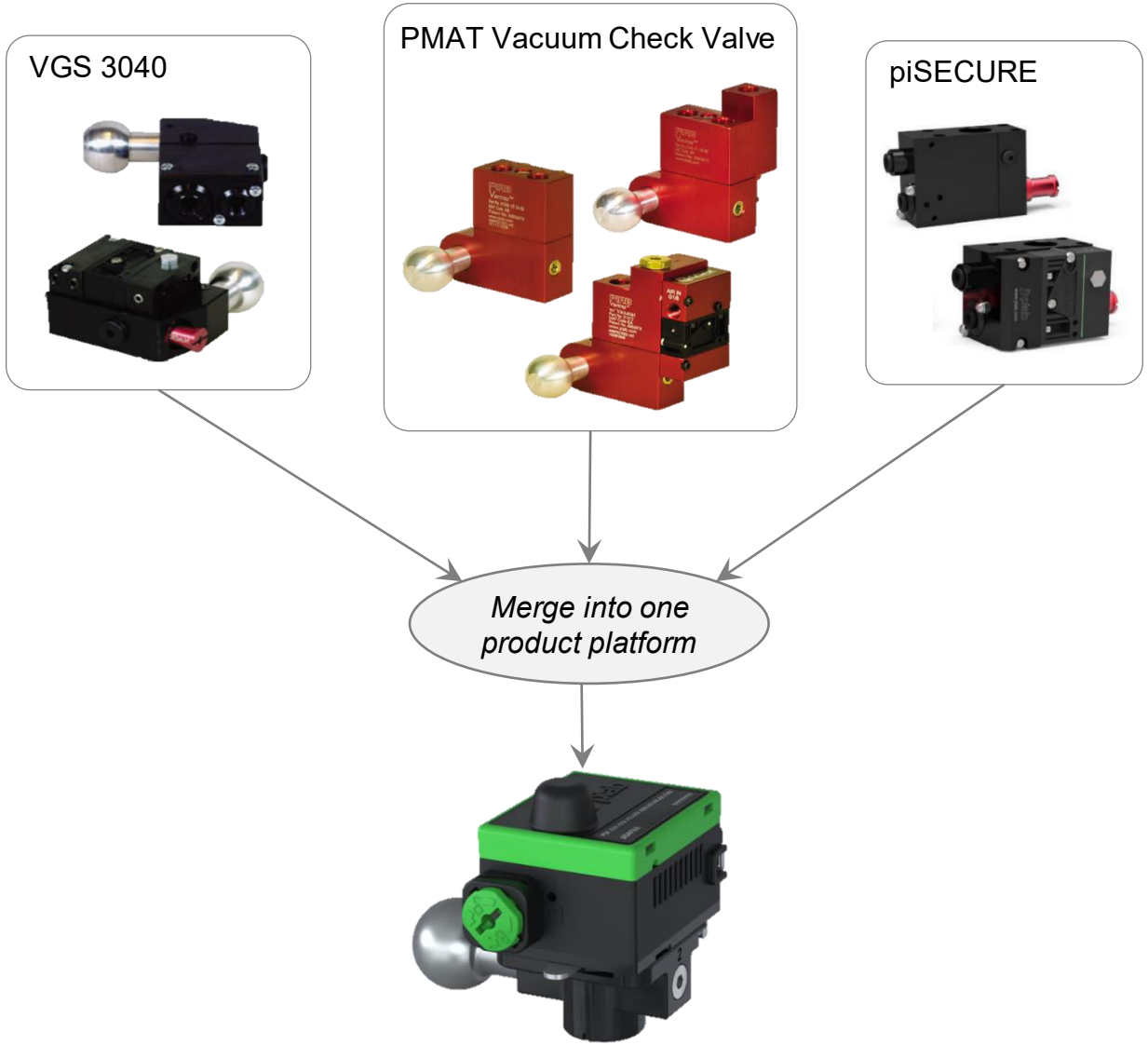
Industrial manufacturers with a high value add in their operations indicates that there is a potential for improvement of vacuum components

Customer pains

- Industrial manufacturing need components with high performing saftey features.
- Configurable to be fit for purpose.
- Component modularity, ease of use and quick maintenance is key.
- Light weight components ro reduce wear of EOAT and Robotics.
- Cost reduction of both downtime and machinery.

The piSAFE program provides the global market with light, safe and high performing components

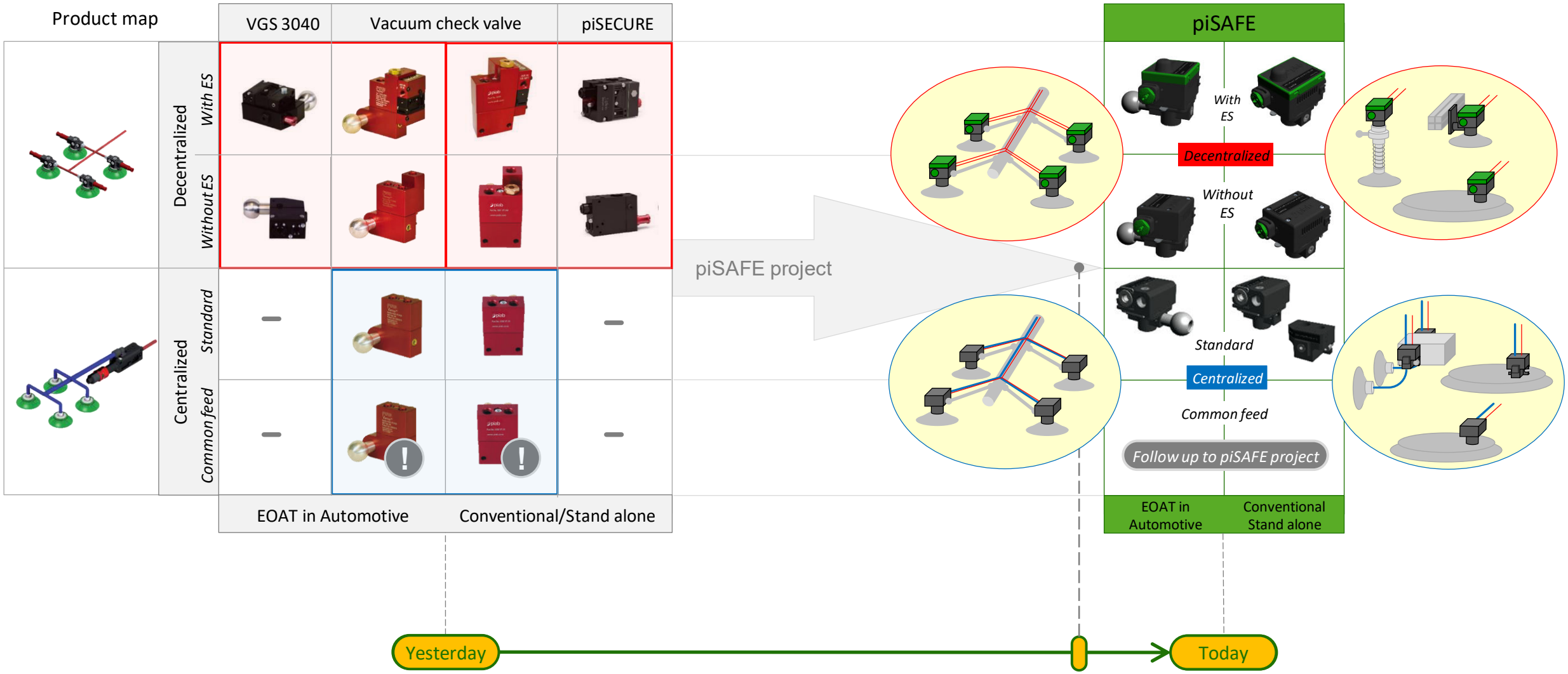
- Renew and Strength our offering towards Automotive and other similar or related industries.
- New and long wanted customer benefits are possible to be featured in this new product line.
- Based on insights from VGS3040, PMAT-Vacuum check valve and the piSECURE merged into one new platform.
- Make Piab's superior technology in area and applications more accessible globally.



piab

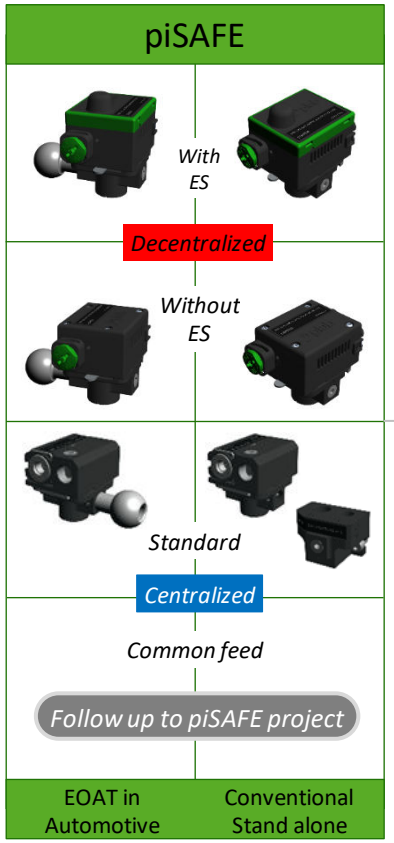
piSAFE program matrix

Replacing 3 programs & adding more customer benefits



piSAFE program

Overview

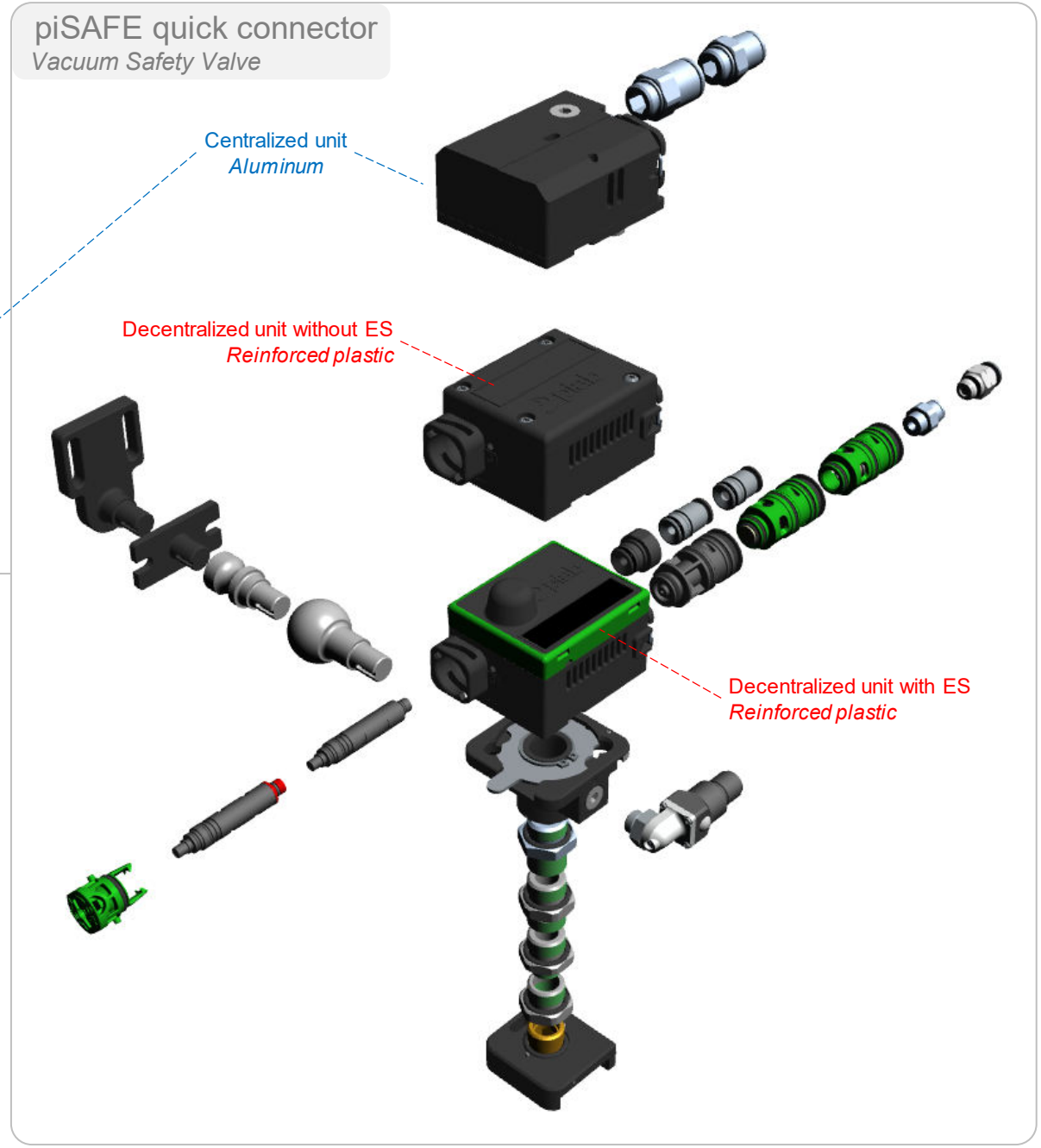


piSAFE Stand alone

Mini Vacuum Safety Valve

piSAFE quick connector

Vacuum Safety Valve



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piSAFE program

Configurator

3 sections

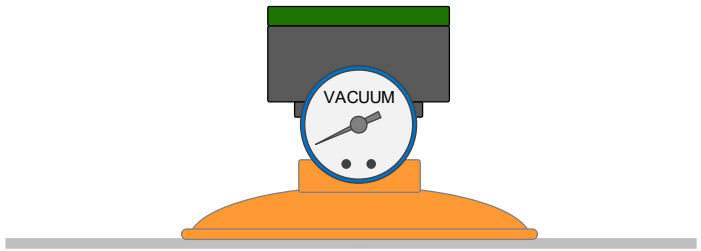
1. Vacuum Safety Valve
2. Vacuum connection (cup side)
3. Mounting

piSAFE program

Name & Model

PSF.PS.PI2.SF.X.BO.0F.X.4F.QXU

PSF - Product code name for ”piSAFE”

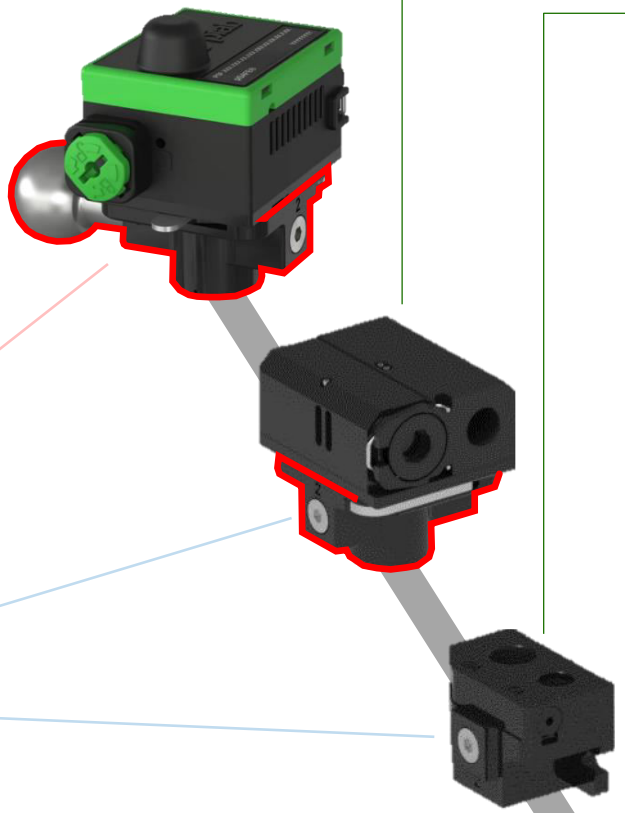


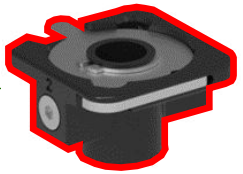
piSAFE Vacuum Safety Valve (VSV)

Very sealed vacuum unit. Next to the well-known Vacuum Check Valve, piSAFE is by far Piab’s most air-tight ”non-return” valve ever manufactured.

Model

- PS – Pump with VSV
- SS – VSV with seperate vacuum and release ports
- MSS – Mini VSV with seperate vacuum and release ports
- X – No VSV / Mounting option only

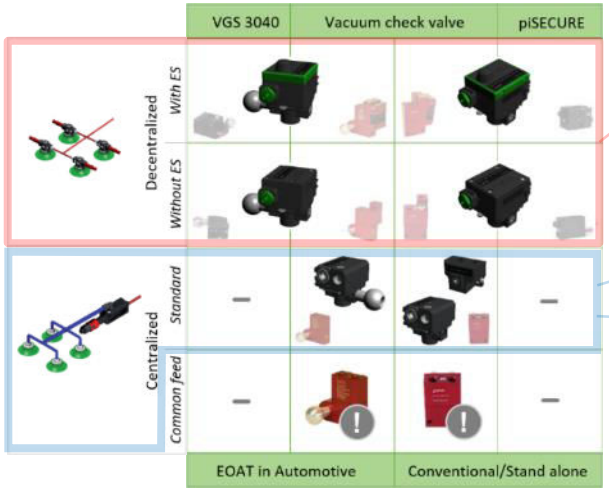




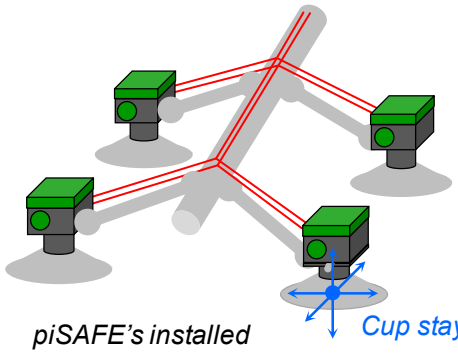
New Quick Connector function

*Enabling a Tool-less & fast exchange of VSV unit **if** maintenance is required*

Tooling & position remains



3 models completing whole program



piSAFE’s installed on gripper

Cup stays in position

Spare unit

To maintenance

piSAFE program

Nozzle

PSF.PS.PI2.SF.X.BO.0F.X.4F.QXU

Nozzle

Vacuum to 90 -kPa even on lower levels of feed pressure giving system reliability in case of compressed air fluctuations.

High efficiency with fast evacuations and even deeper vacuum down to 94 -kPa.

PI – Pi12-2 – Low pressure and deep vacuum

XI – Xi10-2 – Extra deep vacuum

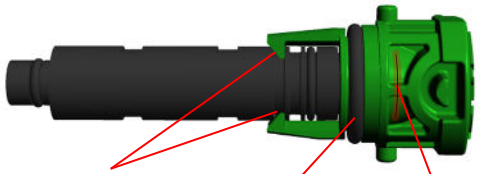
X – No Nozzle

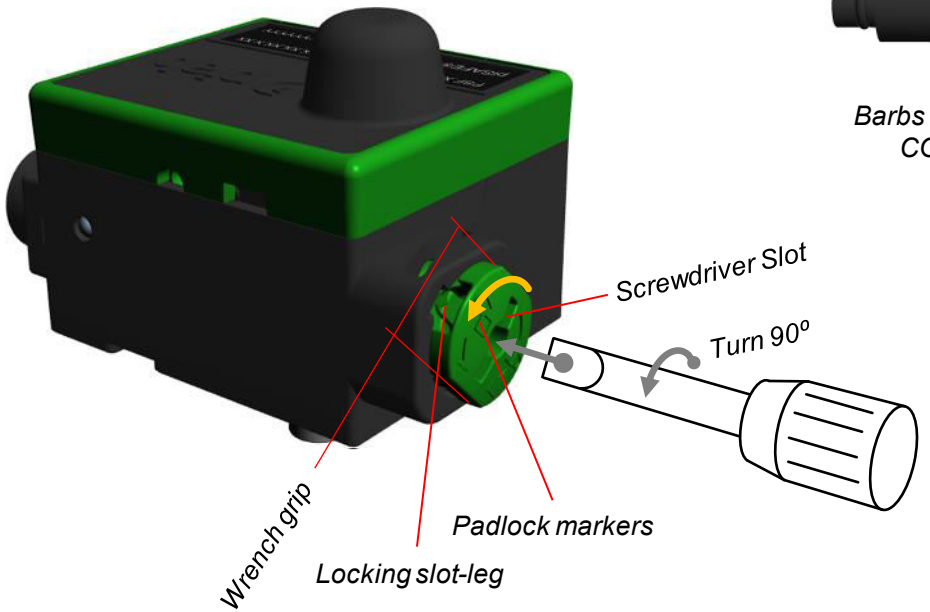
New COAX holder twist lock mechanism

New design with many built in features making it very easy to release and take out as one complete package.

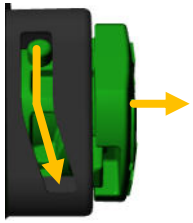
One complete unit

Without non-return valve
Only flap valve for 2:a stage

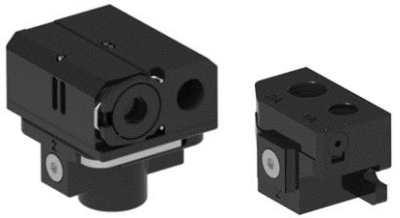




COAX twisted and pulled out



Quick-connector



VSV – Centralized units

piSAFE program

Energy Saving

PSF.PS.PI2.SF.X.BO.0F.X.4F.QXU

Energy saving

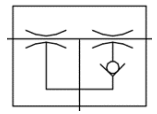
- X – No energy saving
- SF – Pneumatic ES, 60 -kPa [17.7 inHg]
- LP – Pneumatic ES, 45 -kPa [13.3 inHg]
- A – Pneumatic ES, Adjust. 30-70 –kPa [8.9-20.7 inHg]

<u>New ES-Energy Saving system</u>

- Based on the well-known Vacustat unit but smaller and with fewer parts.
- Easier, faster and much more accurate setting of ES level in production.
- 3 version share the same parts.
- ES Reduces noise and air consumption to a minimum.

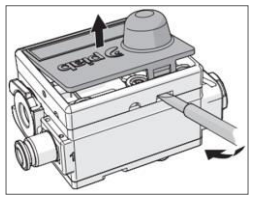
No noise

0 Nl/s [scfm]



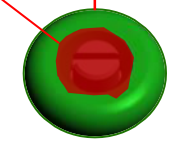
<u>ES adjustment screw</u>

- SF and LP versions have a locked, glued adjustment screw.
- Adjustable version is very easy to adjust with a simnple screwdriver.

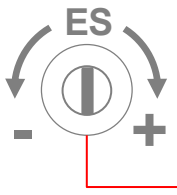


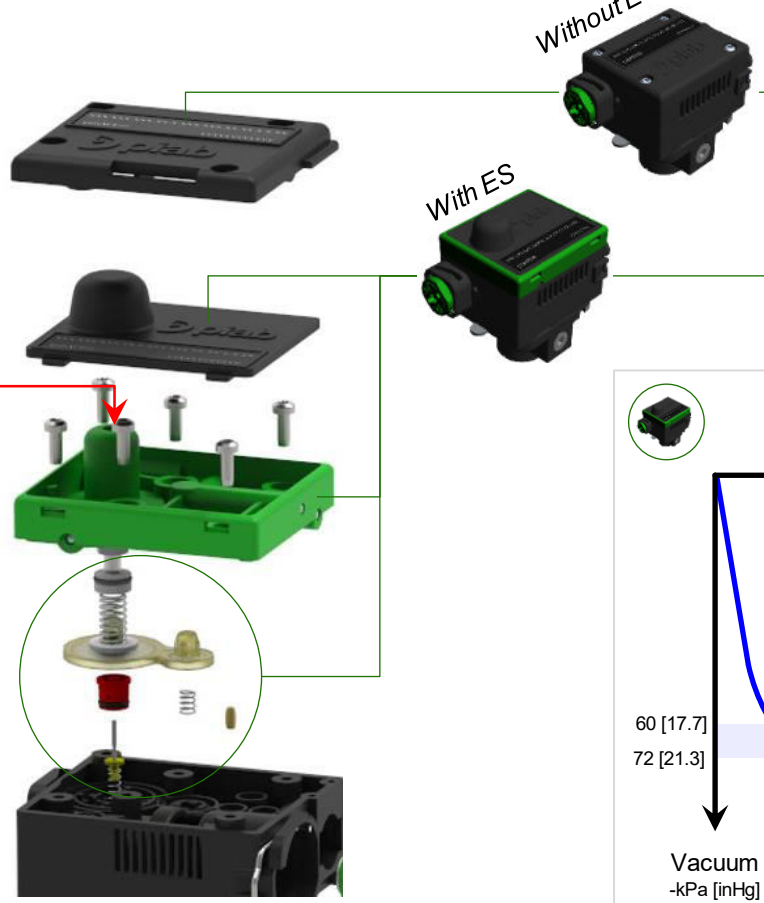
Slot for screwdriwer

Glued on SF & LP versions



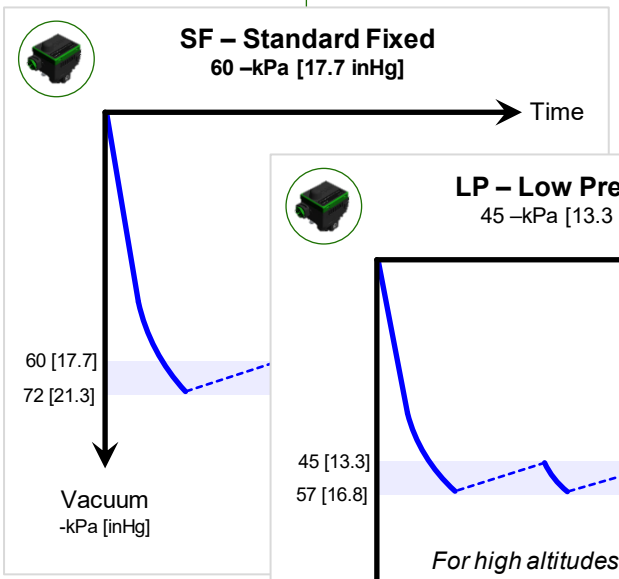
Adjustment screw

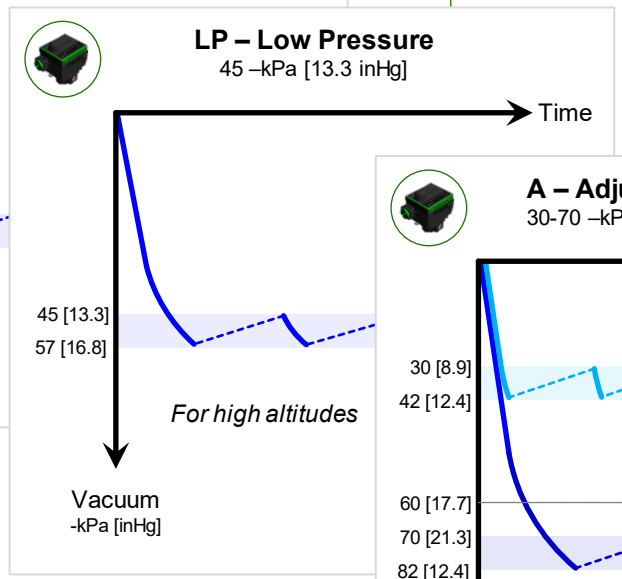


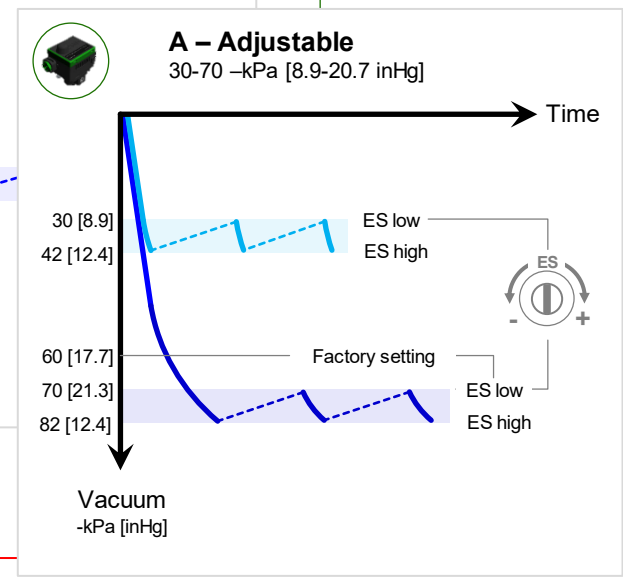


Continues air consumption when generating vacuum

Turns Off air distribution when the vacuum level for energy saving is achieved







piSAFE

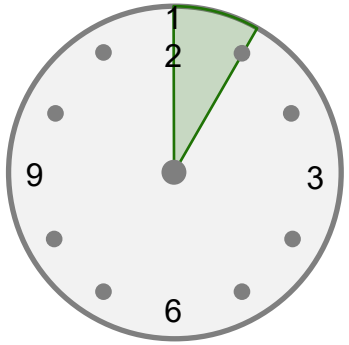
Buy in test & max leakage requirement

Manages safety regulations with great margin

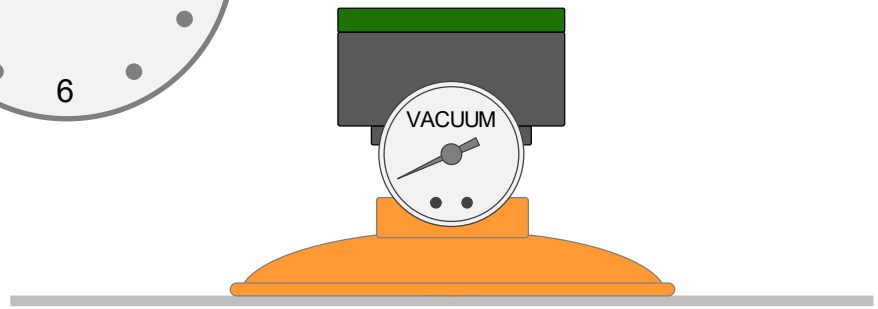
(DIN/SS) – EN 13155, ASME Standard B30.20, etc.

Standards applying to ergonomic lifting devices

Buy in test



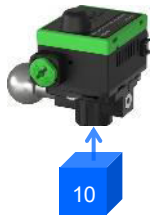
Hold vacuum for 1h
without dropping part



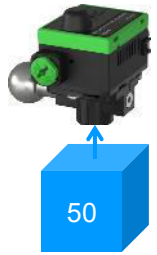
Production test & Data sheet value

Leaking rate, max.

< **0,75** kPa/min [< 0.22 inHg/min] towards a 10 ml [0.61 in^3] volume.



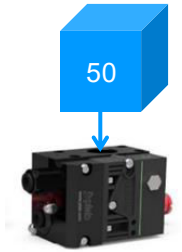
Comparisons



< 0,15 kPa/min
[< 0.0443 inHg/min]

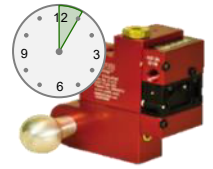
Comparison with piSECURE which was designed for cups with a volume of 50ml [3.05 in^3] used in e.g. glass handling applications, the new piSAFE towards this volume is tested **2.666** times tougher.

$P_L t^* V$ *P_L=Pressure leak, t=time, V=volume*



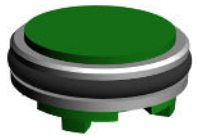
< 0,4 kPa/min
[< 0.118 inHg/min]

Comparison with Vacuum Check Valve we know that these units do pass the 1h buy in test with good margin.

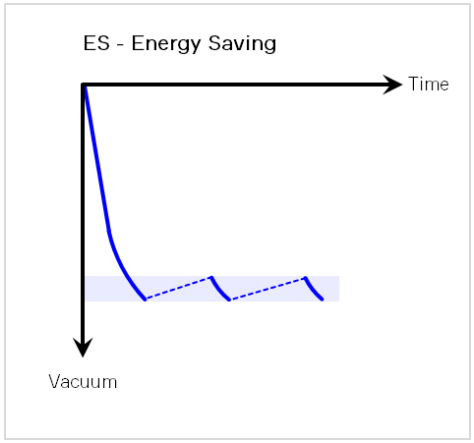


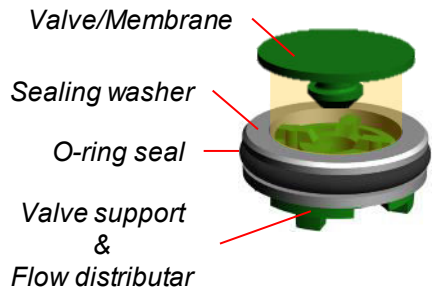
piSAFE

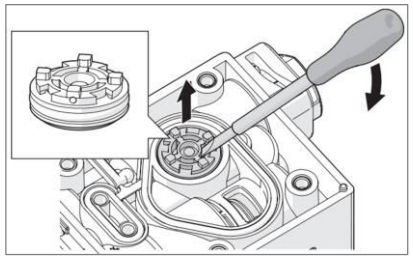
Non-return / vacuum safety valve

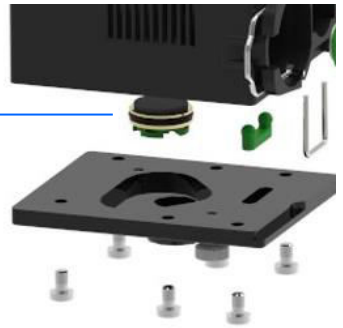


- *The valve function acts as the non-return valve for the ES - Energy Saving function as well as the safety valve.*
- *New design has a great sealing capability using the same principle as in piSECURE but now shaped round to distribute the pressure more evenly.*
- ***If** maintenance is needed the valve- package is very easily accessible.*





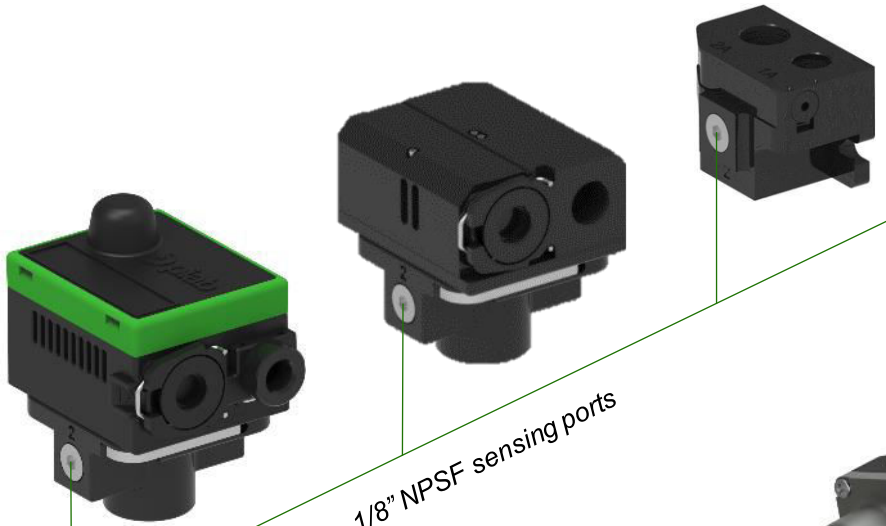




piSAFE program

Part present signal

PSF.PS.PI2.SF.X.BO.0F.X.4F.QXU



1/8" NPSF sensing ports

Part present signal

- X – No part present signal
- V3E – Vacuum switch, 30 –kPa, electrical
- V4E – Vacuum switch, 40 –kPa, electrical
- V5E – Vacuum switch, 50 –kPa, electrical
- VAP – Vacuum switch, adjustable, pneumatic

Electro-mechanical
VS4128 M12, PNP

"The Metal-louse"

Pneumatic,
Adjustable, NC

More switches to be added

- *M12 NPN*
- *Fixed pneumatic*

Note !

Info text in configurator

The chosen switch is included in the complete product but not mounted on the unit, see data sheet for more info.

piSAFE program

Release functions

PSF.PS.PI2.SF.X.BO.0F.X.4F.QXU

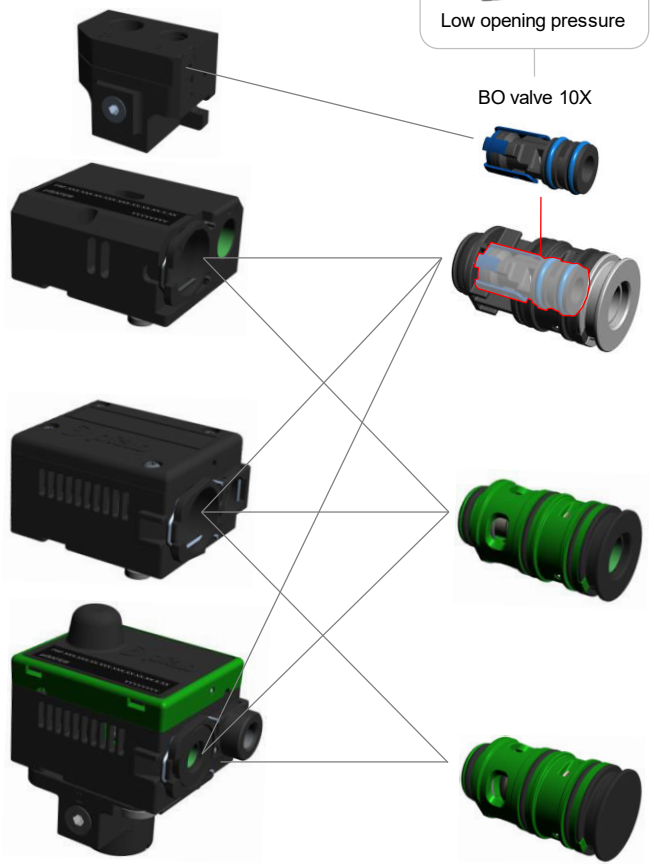
BO valve G1/8”

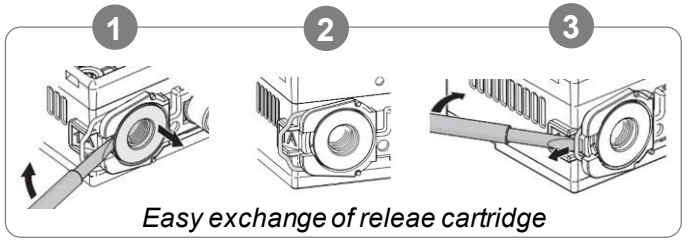
Low opening pressure

BO valve 10X

Centralized

Decentralized

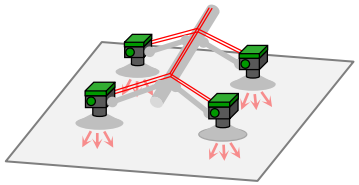




Easy exchange of releae cartridge

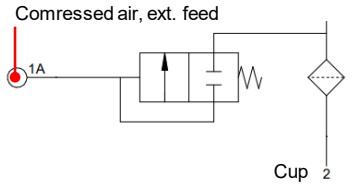
Release function

- BO – Blow-Off check valve
- ANC – AQR, normally closed
- ANO – AQR, Normally open



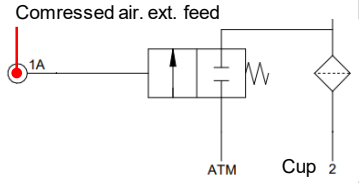
BO

- Quick and fast release using compressed air as a source. Consumption: 1.3-2.7 Nl/s [2.8-5.7 scfm]
- Very low feed pressure is required for a release, < 1 bar [<14.5 psi] ensuring a simultaneously release using several units with one control valve.
- Safe function if compressed air is lost. Externally controlled with extra tubing needed.



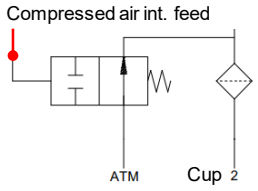
ANC

- Quick and fast release using the atmosphere as a source. Consumption: **~0** , only external pilot air.
- Very low feed pressure is required for a release, ~1 bar [14.5 psi] ensuring a simultaneously release using several units with one control valve.
- Safe function if compressed air is lost. Externally controlled with extra tubing needed.



ANO

- Quick and fast release using the atmosphere as a source. Consumption: ~0, only internal pilot air.
- Very low feed pressure is required for a release, ~1 bar [14.5 psi] ensuring a simultaneously release using several units to one control valve.
- Not a Safe function if compressed air is lost but no self vacuum in cups when not activated. Internally controlled. No extra tubing needed.



piSAFE BO (10X) vs PMAT BO G1/8”

piSAFE BO using blow-off check from the piCOMPACT 10X with the same deign principle as the G1/8”-Johnny check. Both outlet holes are 1,8mm.

piSAFE program

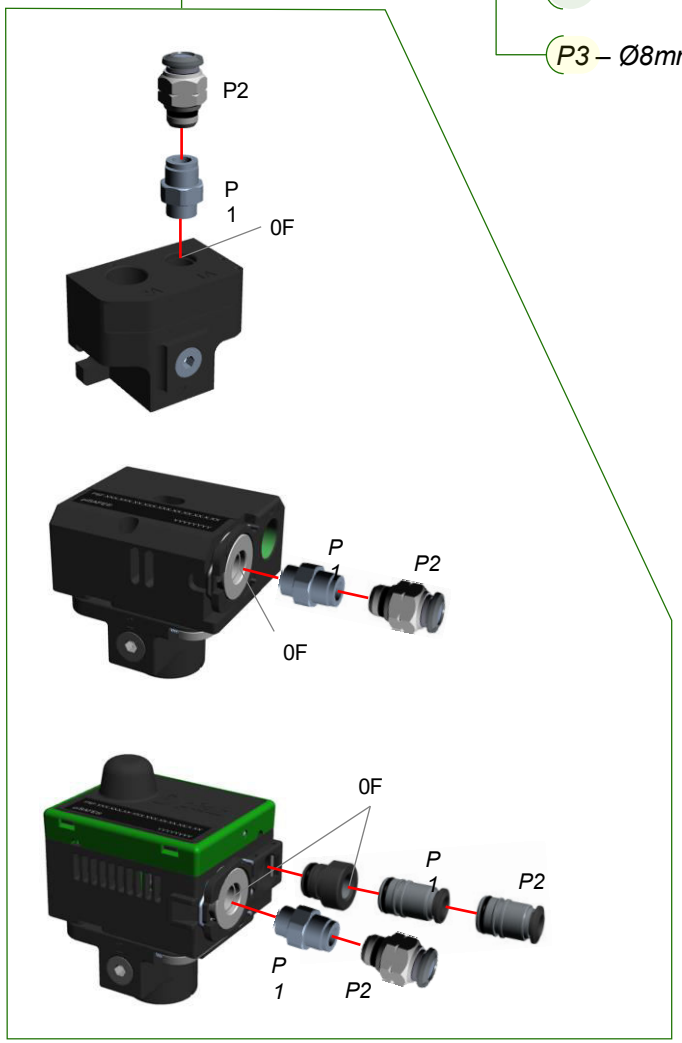
Connections

PSF.PS.PI2.SF.X.BO.0F.X.4F.QXU

Compresed air connection

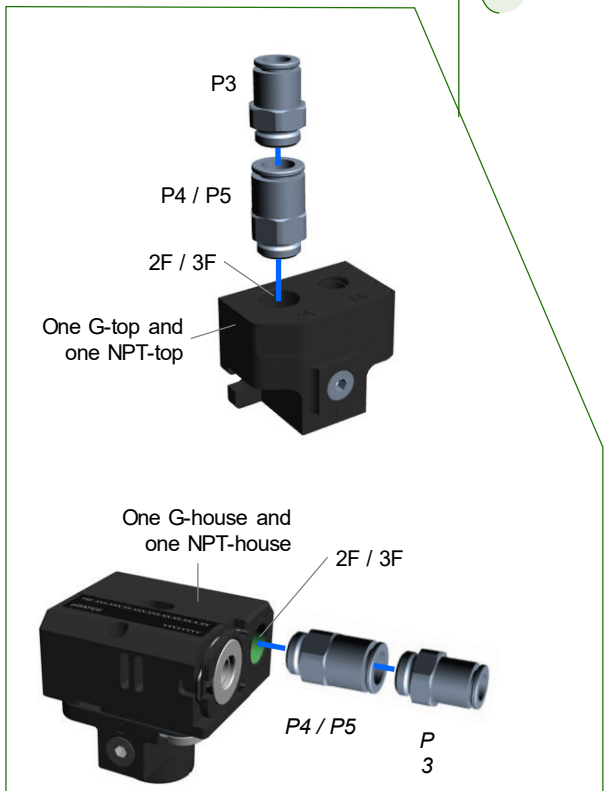
- 0F – 1/8” NPSF female thread
- P1 – Ø6mm push-in
- P2 – Ø1/4” push-in
- *P3 – Ø8mm/5/16” push-in*

Added in next face



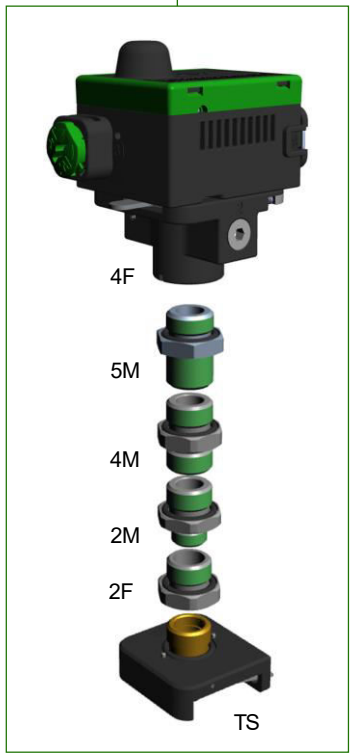
Vacuum source connection

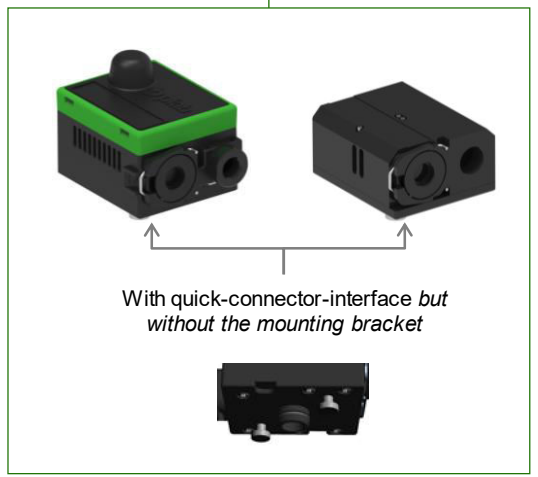
- X – No vacuum connection on pump side
- 2F – G1/4” female thread
- 3F – 1/4” NPT female thread
- P3 – Ø8mm/5/16” push-in
- P4 – Ø10mm push-in
- P5 – Ø3/8” push-in



Vacuum connection

- 2F – G1/4” female thread
- 2M – G1/4” male thread
- 4F – G3/8” female thread
- 4M – G3/8” male thread
- 5M – 3/8” NPT male thread
- TS – T-slot
- X – No vacuum connection / VSV unit only





piSAFE program

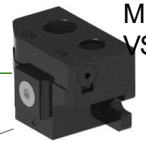
Quick-connector & mounting options

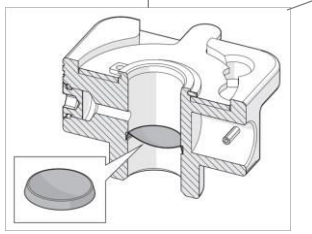
PSF.PS.PI2.SF.X.BO.0F.X.4F.QXU

Mounting type

- Q – Quick connect
- S – Stand alone

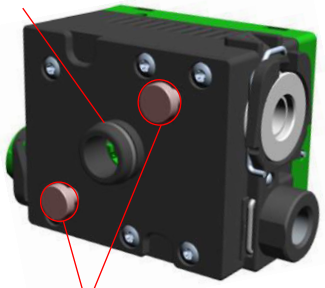
Mini VSV…



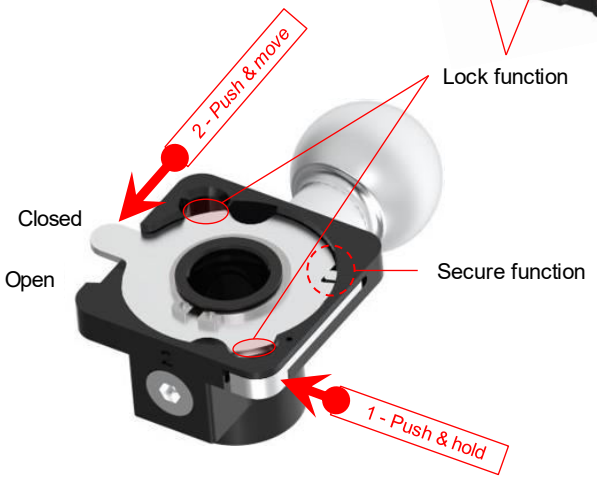


Steel mesh filter

O-ring seal

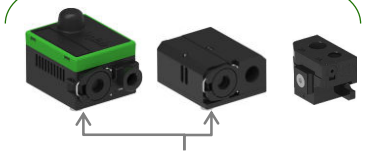


Lock function

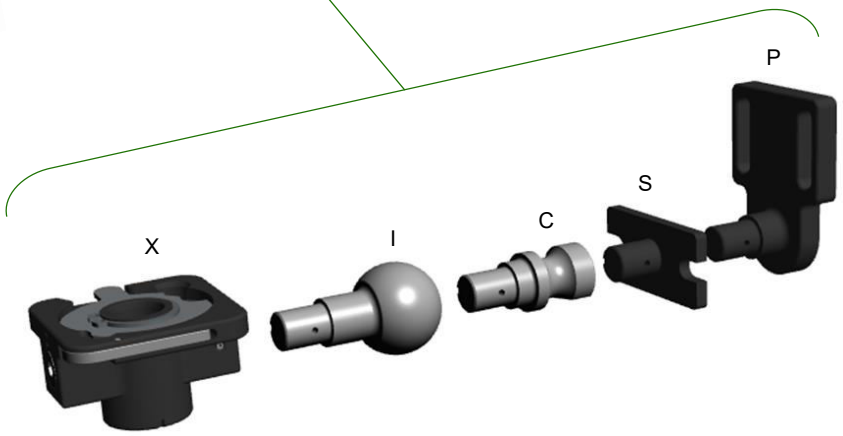


Mounting style

- X – No mounting style
- S – Screw mount
- I – Ball-joint 28,6mm
- C – Lock-pin 19mm
- P – Profile mount



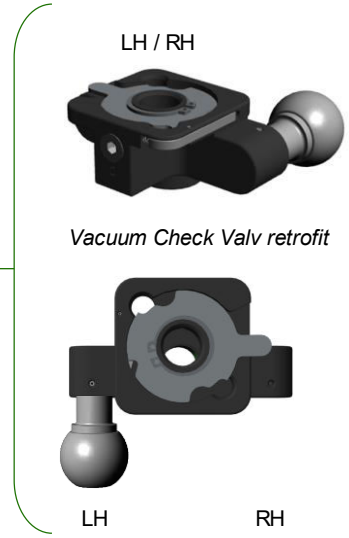
With Quick-connector-interface



Mounting direction

- X – No mounting direction
- U – Universal LH or RH
  - LH – Left hand
  - RH – Right hand

Tool-arm direction



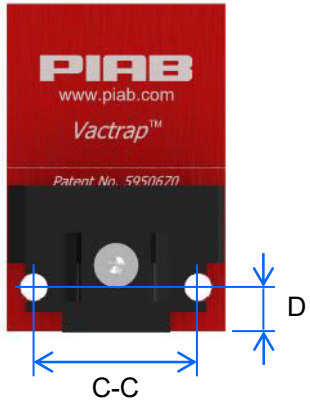
piSAFE program

Retrofit matching in size and positioning

piSAFE – VSV mini

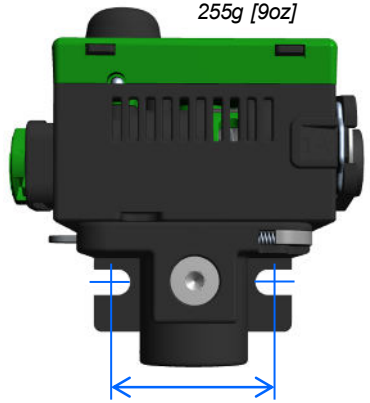
Vacuum Check Valve X1000

piSAFE VSV mini



536g [18.9oz]

255g [9oz]

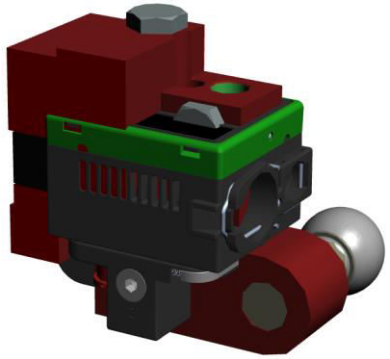


piSAFE – *screw mount*

piSAFE - *LH-retrofit mounting*

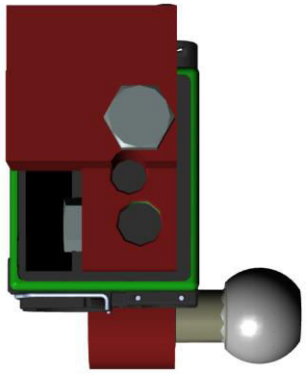
Vacuum Check Valve - *LH-X1092*

608g [21.5oz]

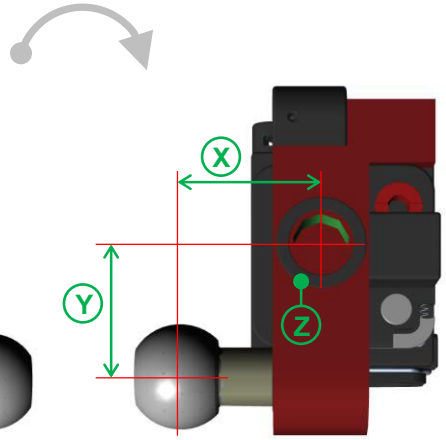


piSAFE - *LH-retrofit mounting*

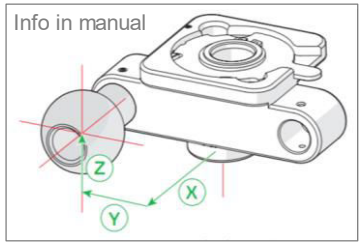
292g [10.3oz]



Topp-view



Bottom-view



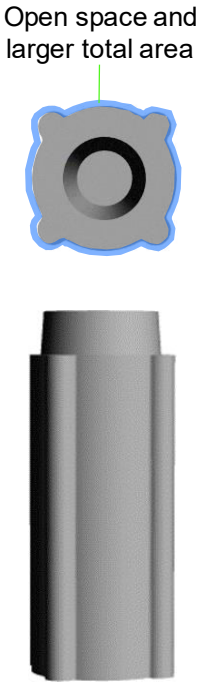
piSAFE program

New filter in extension rod 50mm

Background

Piab USA have successfully with very positive feedback over several years been selling a similar filter. Most of the use is together with the Vacuum Check Valve into automotive applications where particles can be of issues to keep good air tightness, such as welding cells etc..

- *The new filter has all the good benefits from its forerunner but equipped with some more.*
  - *Easy cleaning or exchange of filter element*
  - *Improved vacuum flow around filter*
  - *Matching size to a 50mm extension rod*
  - *Easy spotting from a distance with bright orange label*
- *The label is a very durable sticker that withstand oils and other fluids without falling off. Marked with flow direction, Art.nr. / Part No. for complete filter and filter insert.*
- *Filter element is in pour size 50µm with equal filtration grade as the existing version.*



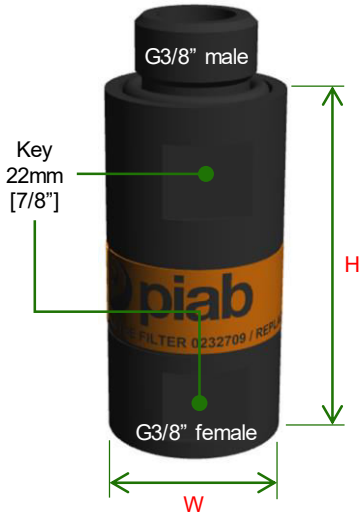
Existing Filter

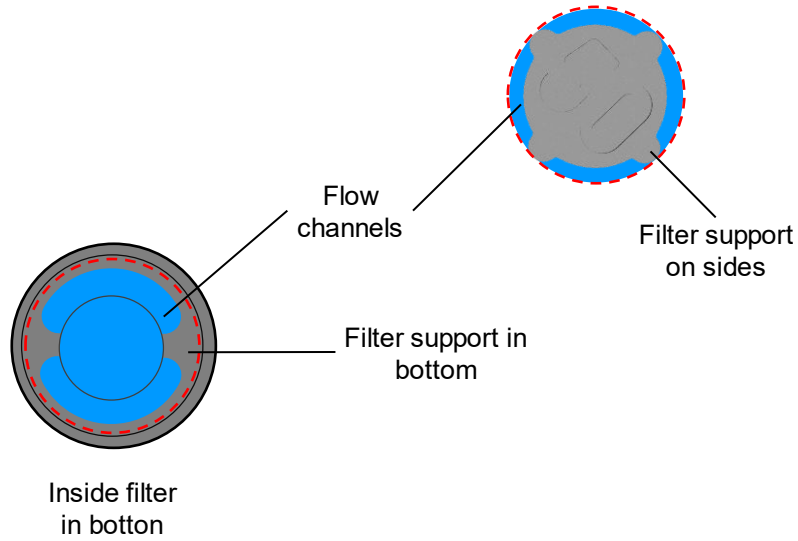
mm [inch]

H: 52,83 [2.07] -> 50 [1.97]

W: 34,95 [1.38] -> 25 [1]

New Filter





piSAFE program

Manual and spare parts

- *Use manual for more in-depth knowledge of the piSAFE*
- *There are two separate manuals, one for decentralized and one for centralized units piSAFE units.*
- *In the manual you will also find detailed info about maintenance and spare parts.*

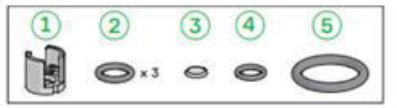
10. Spare parts and accessories

To ensure the longevity of piSAFE® and its functions, it is recommended to use Piab's original spare parts and accessories.

10.1 Spare parts

Fig	Spare part description	Art no
35 A	COAX® MINI Pi12-2 on holder	0232702
35 B	COAX® MINI Xi10-2 on holder	0232704
36	Service kit COAX® Mini	0232770
37	Service kit Flap valve	0232765
38	Replacement kit Flap valve	0232766
39 C	AQR NC Assembly	0230615
39 D	AQR NO Assembly	0230617
39 E	BO Assembly Ø1.8 mm	0232706
40 F	Spare part kit - EC20 1/8" NPSF female thread incl clips	0232767
40 G	Spare part kit - EC20 6 mm push in fitting incl clips	0232768
40 H	Spare part kit - EC20 1/4" push in fitting incl clips	0232769
41	O-ring kit	0233145

Figure 35 *COAX® Mini on holder (Pi12-2 and Xi10-2).*



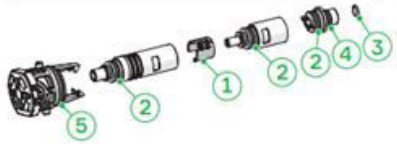


Figure 36 *Service kit COAX® Mini.*

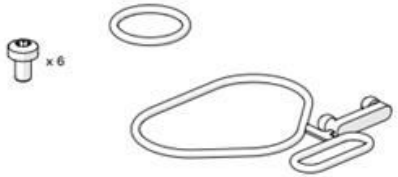


Figure 37 *Service kit Flap valve.*

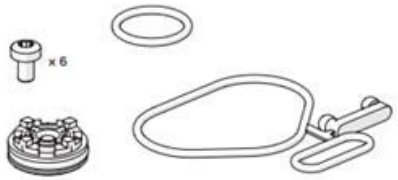


Figure 38 *Replacement kit Flap valve.*

Figure 39 *Release function cartridges assemblies.*

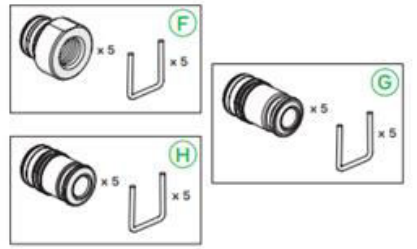


Figure 40 *Spare part kits - EC20 compressed air connections.*

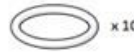


Figure 41 *O-ring kit.*

10.2 Accessories

The accessories for piSAFE® are:

- Vacuum switches: Electrical and pneumatic models are available.
- Inline vacuum filter: Can be installed between the mounting bracket and the suction cup.

Datasheets and information are available at piab.com

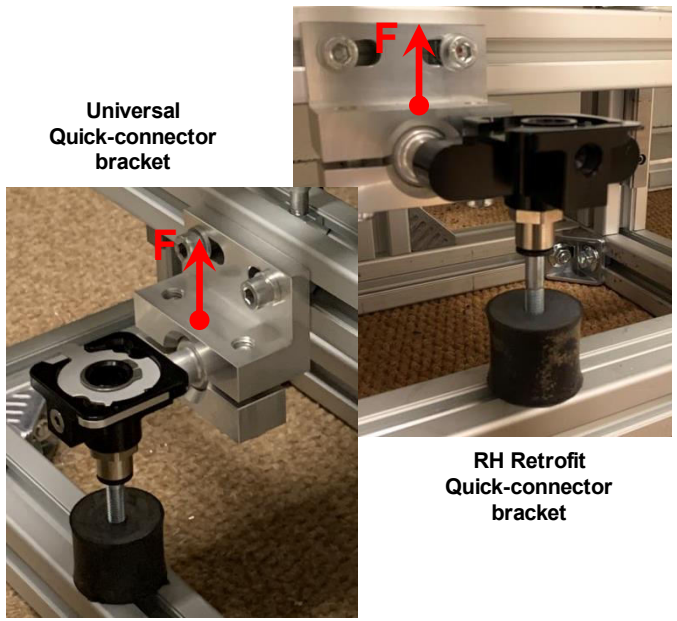
Accessory description	Art no
Vacuum Switch VS4128 30 -kPa / 9 -inHg, M12 PNP NO (electrical)	0110630
Vacuum Switch VS4128 40 -kPa / 12 -inHg, M12 PNP NO (electrical)	0213570
Vacuum Switch VS4128 50 -kPa / 15 -inHg, M12 PNP NO (electrical)	0110631
Vacuum Switch, pneumatic, adjustable with screw (NC)	3116014
Inline vacuum filter 50 µm	0232709

Product robustness tests

Extreme testing and final inspection

As of today, with 80 cycles/min

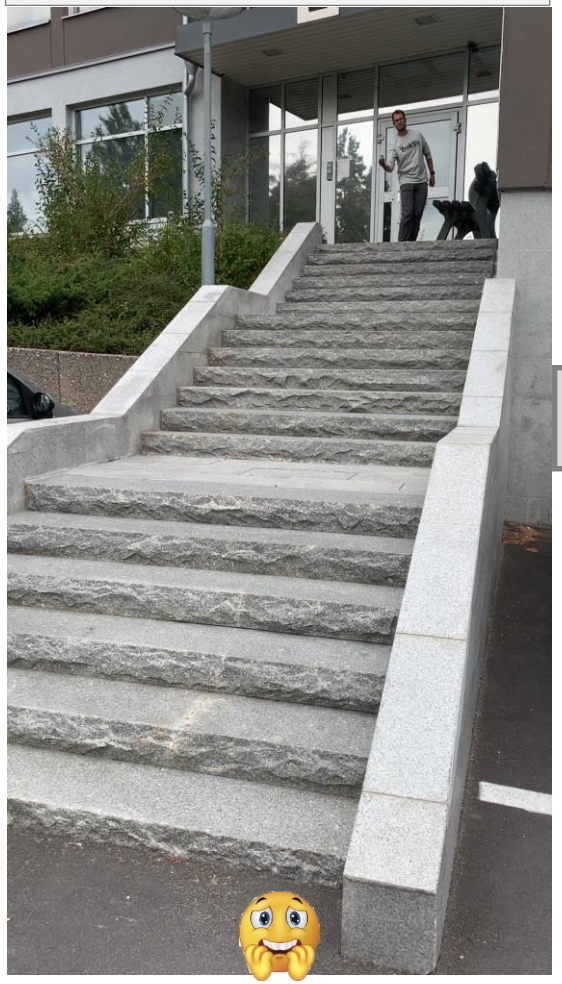
- New Energy saving system >15.000.000 cycles
- New AQR functions >10.000.000 cycles
- New non-return/safety valve >10.000.000 cycles
- Tested in climate chamber in different temps and moister.
- Mounting bracket testing of internal connection between i.e., ball-joint in quick-connector bracket. Max load test to 5000N and fatigue test 300N passing 3.000.000 cycles with 20 cycles/min
- Durability testing of plastic design and material.



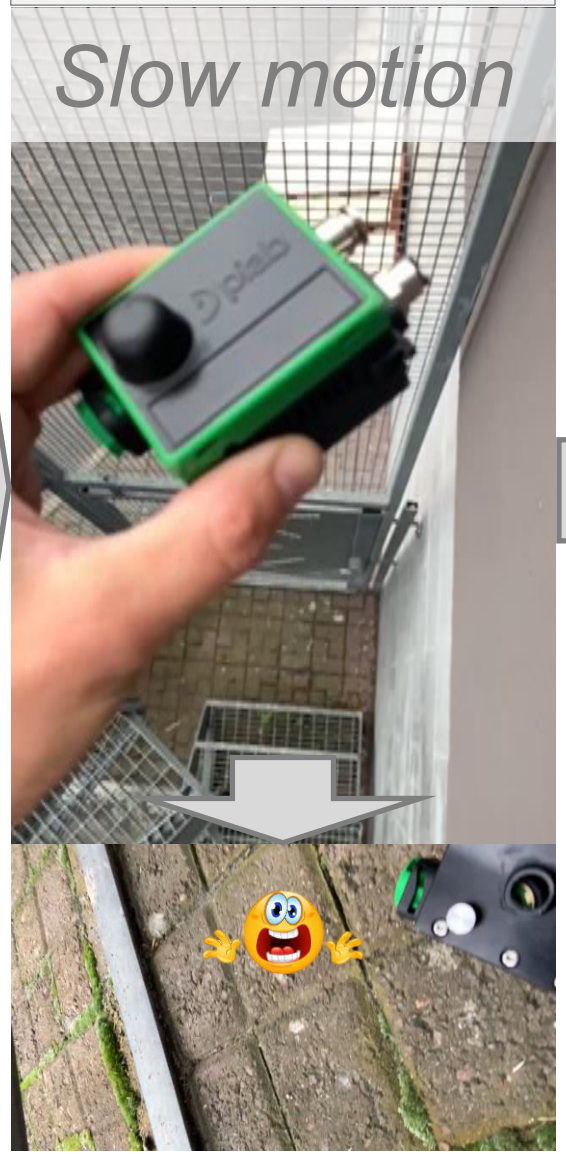
Universal Quick-connector bracket

RH Retrofit Quick-connector bracket

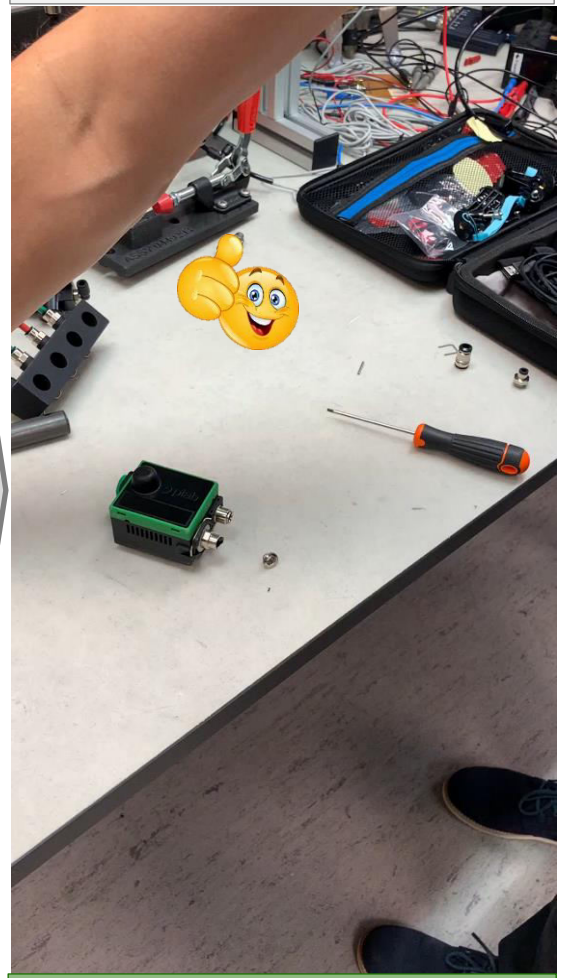
Free throw down the Piab entrance stairs



5m [16.4'] free fall in fire escape



Final inspection



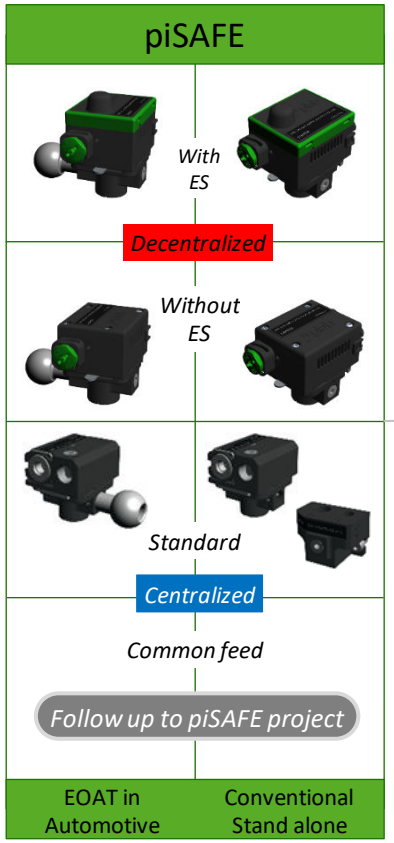
Only the fittings broke

piSAFE program

Comparison sheet ***piSAFE decentralized*** ● ***New products & features***	 piSAFE *EOAT*	 piSAFE *Conventional Stand-alone*	 PMAT X1072 *EOAT*	 PMAT X2098 *Conventional Stand-alone*	 VGS3040 *EOAT*	 piSECURE *Conventional Stand-Alone*
Overall size towards piSAFE			Bigger/taller	Bigger/taller	Shorter	Smaller/Shorter
Size in height & width towards piSAFE vacuum port facing down, *mm [inch]*			14.1 [0.55] taller ~Same in width		38.5 [1.52] mm shorter ~Same in width	35.5 [1.35] shorter 9.5 [0.37] in width
Design material	● Reinforced PA and Aluminum		Aluminum		Aluminum	Aluminum
Weight, *g [oz]*	292 [10.3]	255 [9]	608 [21.5]	536 [18.9]	448 [15.8]	355 [12.5]
Air tightness for vacuum safety	Yes		Yes		No	Yes
Toolless exchange of unit	● Quick-connect		No		No	No
Nozzle options	Pi, Xi		Pi		Pi, Xi, Si	Xi
Nozzle holder	● New twist lock all in one package		Traditional COAX holder		Traditional COAX holder	Traditional COAX holder
Energy saving system	Yes		Yes		Yes	Yes
Release function options • *BO – Blow-Off check valve* • *AQR – Atmospheric Quick Release* - *NC – Normally Closed* - *NO – Normally Open*	BO ● AQR-NC AQR-NO		BO		BO & AQR-NO	BO
Air connections options	Thread & Push-in		Thread only		Thread only	Push-in
Vacuum connection options	Large selection of several types and sizes		1 size thread		1 size thread	1 size thread
EOAT interfaces	Ball-Joint Lock-pin 19	-	Ball-Joint Lock-pin 19 Lock-pin 16	-	Ball-Joint Lock-pin 19 Lock-pin 16	-
Profile mount with height adjustment	-	Option in code	No	No	Option in code	-
Screw mount	-	Option in code	No	Yes	NO	-
Programs retrofit-ability towards piSAFE in, (*Function, Attachment, Size)*			(Great, Great, Great)	(Great, Good, Great)	(Great, Good, OK)	(Great, - , OK)

piSAFE program

Overview summery

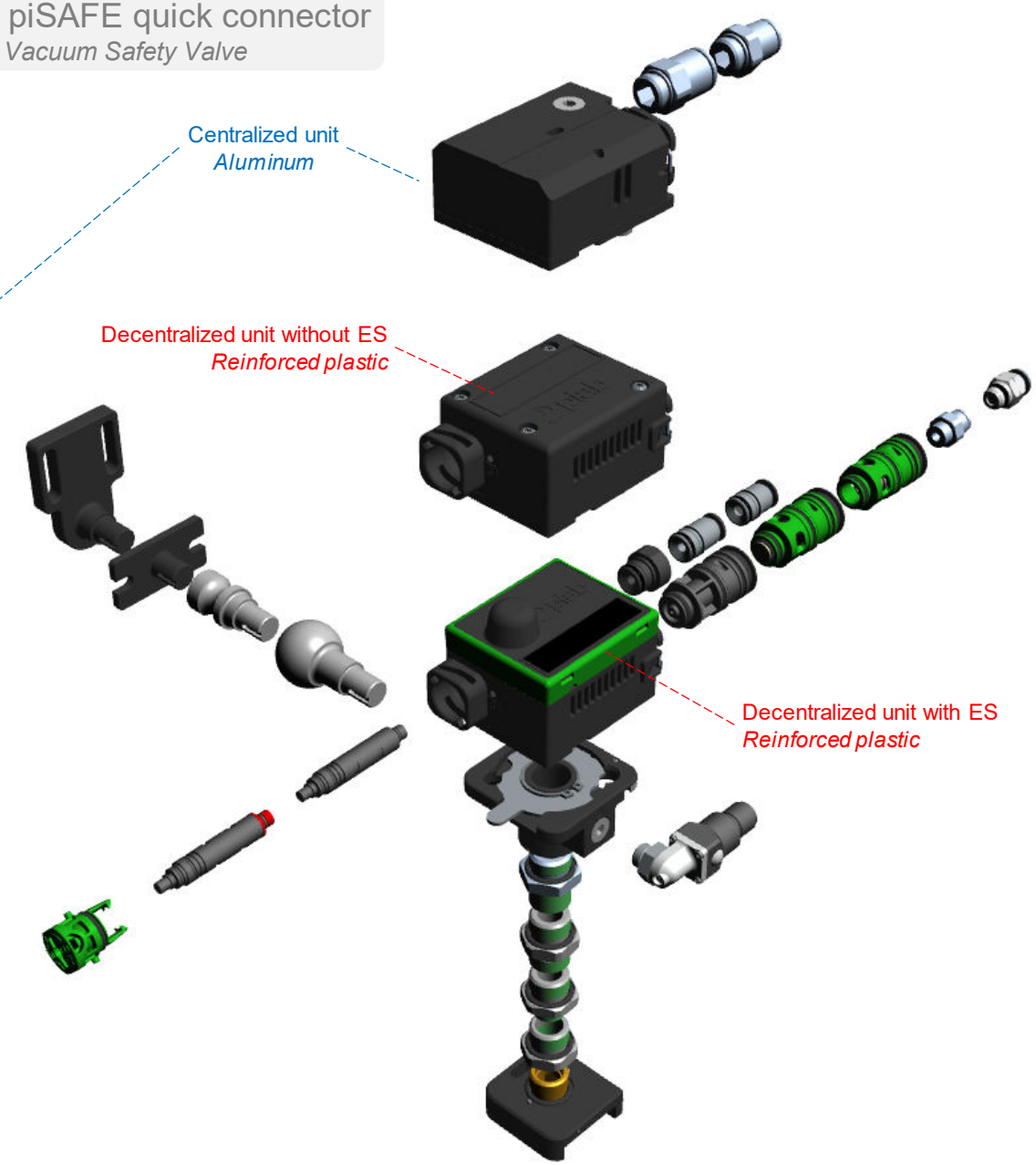


piSAFE Stand alone

Mini Vacuum Safety Valve

piSAFE quick connector

Vacuum Safety Valve



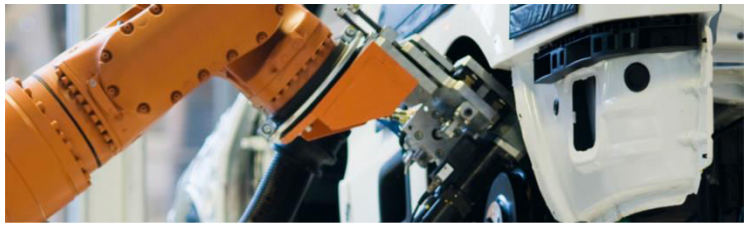
piab

piSAFE is targeted towards industries and applications that demands high reliability, safety features and speed

Automotive including sub applications such as:

- *Stamping Assembly*
- *Body Assembly*
- *General Assembly*
- *Plastics*
- *Glass*
- *Battery*
- *Powertrain Assembly*
- *Palletizing/Depalletizing*

Automotive body assembly



Automotive final assembly

Other applicable industries includes;

- *White Goods*
- *Aerospace*
- *Laser Welding*
- *Ergonomic Part Handling*

Aeropace industry

piab

Key features that adds value to the customers

Multiple release function options, where AQR NC ensures safety even with the loss of air pressure

Configurable to ensure fit for purpose inc COAX variations and a number of mounting options

Unique Quick Connect function reduces complexity and downtime

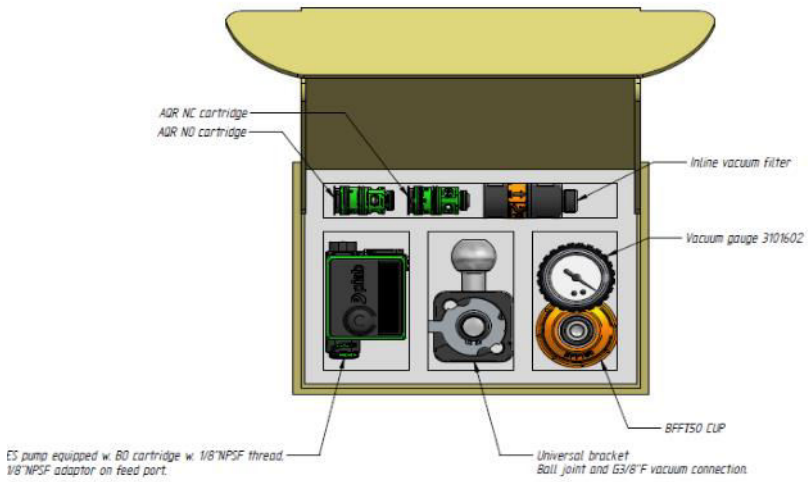
Light-weight materials lower the weight for EOAT and ensure less wear on robotics

Competitively priced compared to PMAT, piSECURE and VGS3040 with more features

piab

Marketing materials is available from today and Demo kits can be ordered from 1st of April

Demo kit



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piab

Q&A