

Pressure Control General presentation



03 / 05 / 2022
Yuriy Solyak

Agenda

- Product design, applications, functionality
- Sanhua portfolio
- Key features and benefits
- Installation recommendation
- New developments
- General quality status
- Supporting materials

Definition, applications, functions

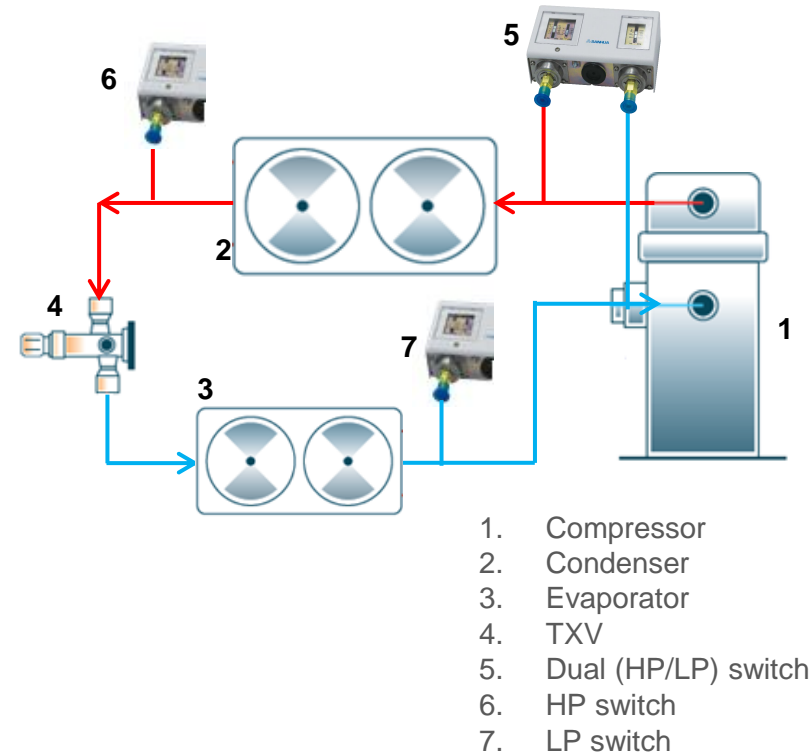
Pressure Control: a device which opens/closes an electrical contacts when **pressure** in the system has reached the value pre-set on this device

Control function:

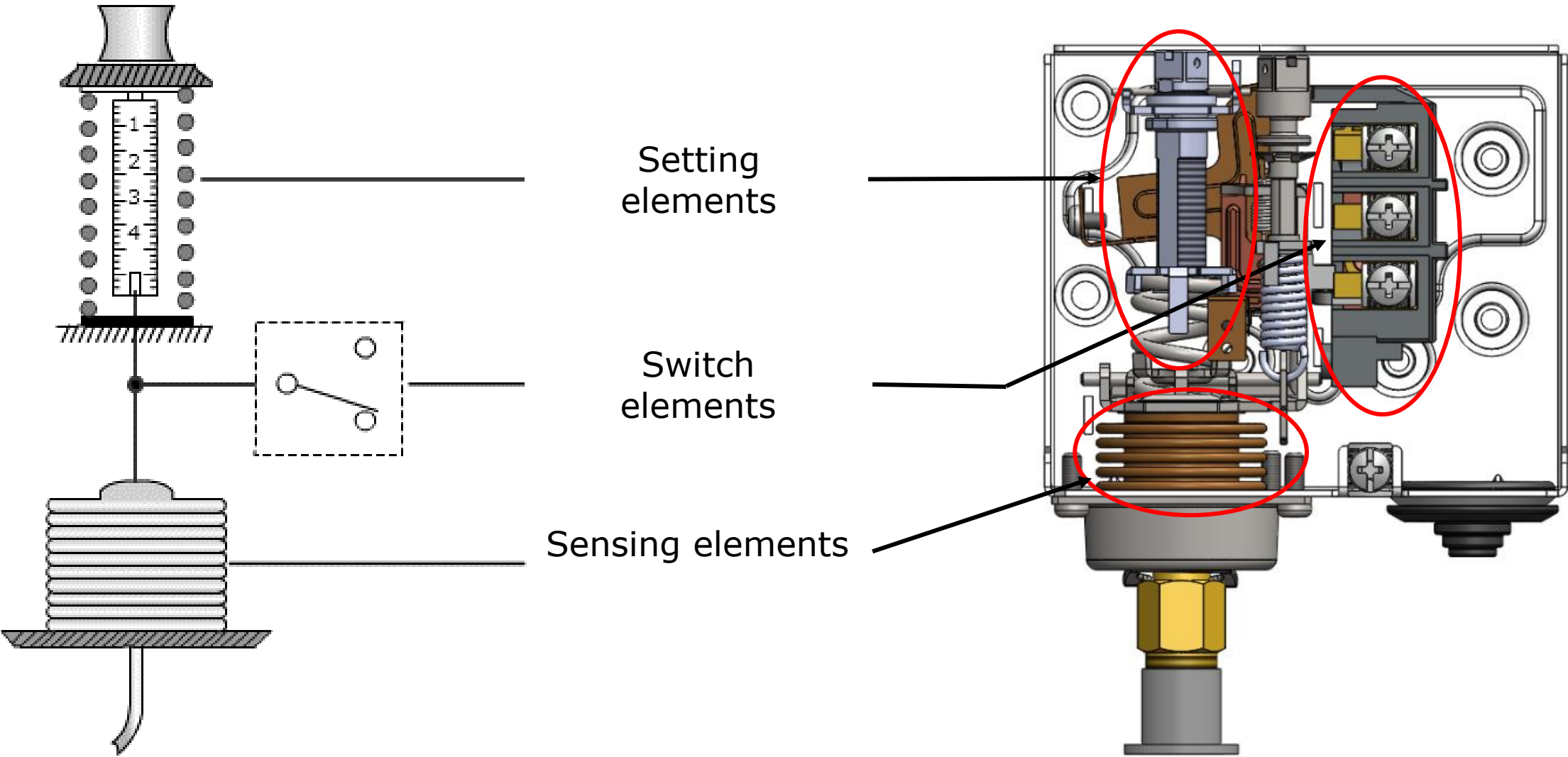
- compressor cycling (7; 5 LP)
- fan-cycling (6; 5 HP)
- pump-down (7;5 LP)

Protective function:

- pressure limiting and cut out
- 1) against excessive pressures (5;6;7),
- 2) against loss of charge (7; 5 LP)



Pressure control – main components



Operational principle

HP: When the pressure exceeds the upper set point, contacts 1 and 3 becomes open (off) and contacts 1 and 5 make close (on)

When pressure becomes more (or equal) than Differential lower than USP, contacts 1 and 3 becomes close (on) and contacts 1 and 5 open (off)

LP: When the pressure exceeds the lower set point, contacts 1 and 5 becomes open (off) and contacts 1 and 3 make close (on)

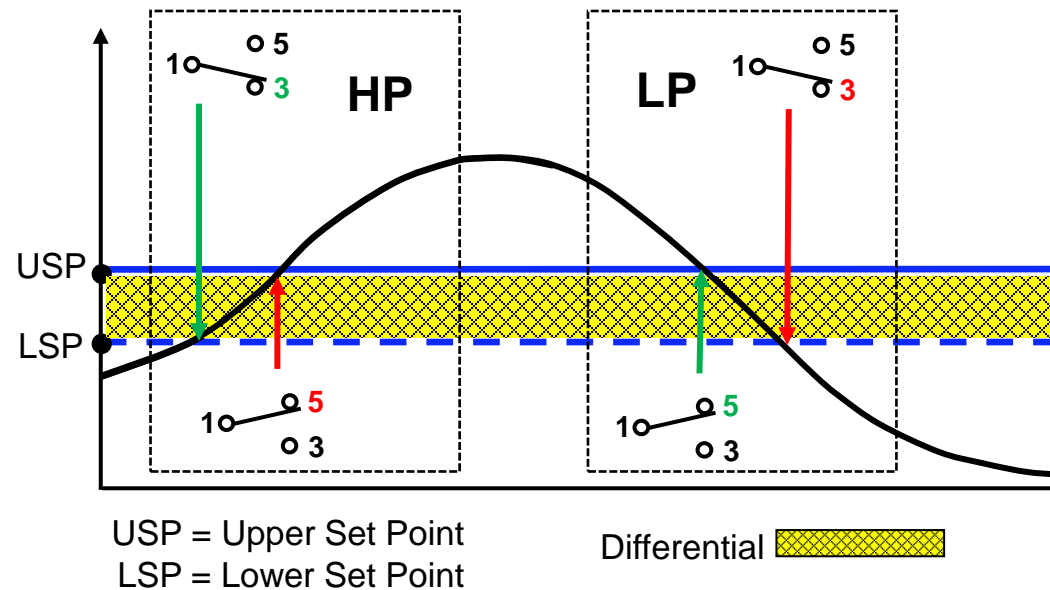
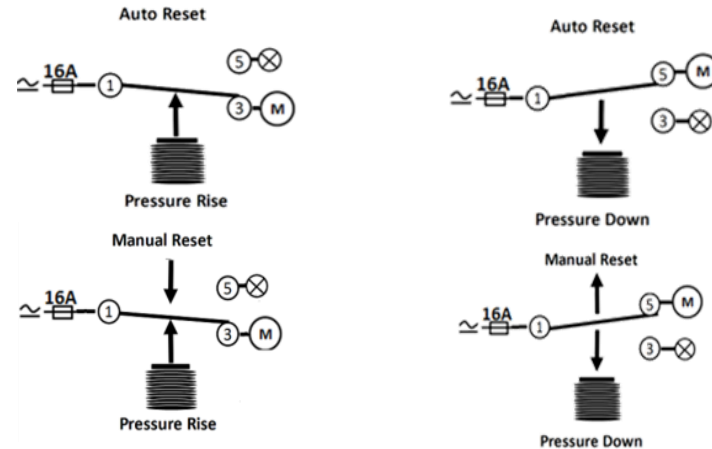
When pressure becomes more (or equal) than Differential higher than LSP, contacts 1 and 5 becomes close (on) and contacts 1 and 3 open (off)

automatic reset:

after cut-out operation the unit will automatically cut-in when pressure returns to required level

manual reset:

after cut-out operation the unit will not cut-in until the reset button is activated



Sanhua portfolio

Type	Model	Low pressure (LP)		High pressure (HP)		Reset		PED IV
		Range, bar	Differential, bar	Range, bar	Differential, bar	LP	HP	
LP	PS01	-0.5~7	0.5~5	—	—	—	Auto	YES
			1				Manual	YES
HP	PS50	—	—	6~32	—	—	Auto	NO
							YES	
							Manual	NO
							YES	
Dual (HP/LP)	PS15	-0.5~7	0.5~5	6~32	—	—	Auto	NO
							YES	
							Manual	NO
							YES	

Function: Pressure Control, pressure limiter (PSH/L), pressure cut-off (PZH/L)

!!! Safety pressure cut-out (reset with aid of the tool) – PZHH/ZLL: so far not available

Basic parameters

Parameter	Value
LP range	-0.5bar ~ 7bar
HP range	6bar ~ 32bar
Reset type	Auto/Manual
Nozzle type	1/4 in , 6mm Thread 1/4 in , 6mm ODF 1/4 in , 800mm Capillary
Contact type	SPDT
IP level	IP 44

Parameter	Value
Refrigerant	HCFC, HFC, Nonflammable
Ambient temperature	-30°C ~ +65°C
Fluid temperature	-40°C ~ 120°C
Certification	UL listed PED IV certificated
Set point accuracy	HP: ±0.5bar LP: ±0.2bar

Nominal voltage	AC1 400V	AC3 400V	AC15 400V	DC 24V
Rated current	16A	16A	10A	16A

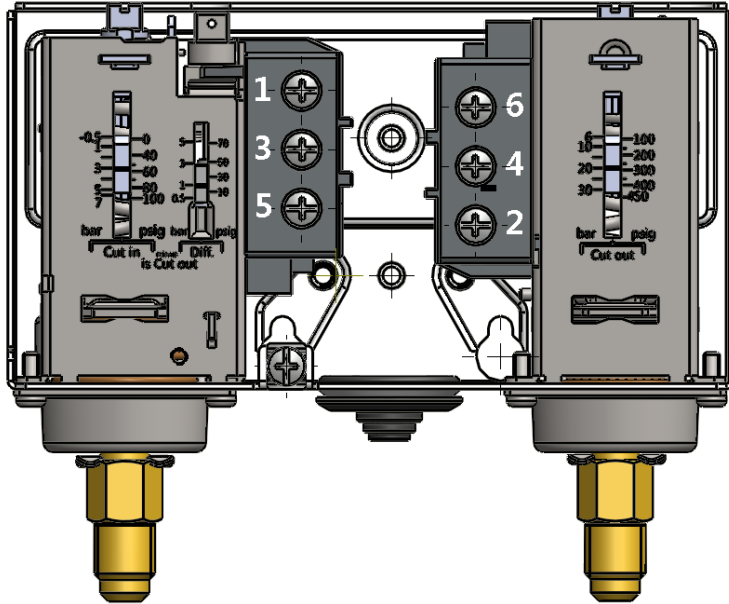
Nomenclature: PS-15-AA-L-S-01

Position Number	Model designation legend	
1	Type of pressure switch	Description
	PS	Pressure switch
2	Pressure regulating range	Description
	01	LP:-0.5~7 bar(g)
	50	HP:6~32 bar(g)
	15	Dual (LP/HP): LP:-0.5~7 bar(g)/ HP:6~32 bar(g)
3	Type of reset	Description
	A	Automatic reset
	M	Manual reset
	AA	Auto LP/ Auto HP
	AM	Auto LP/ Manual HP
4	Pressure connection type	Description
	L	Flare
	H	Solder
	M	Capillary tube
5	Product design (type)	Description
	S	Standard
	C	Customized
6	inch or mm pressure connection	Description
	01 (03/05/07/09/11/13.....)	Inch or unified Inch & Metric (PED IV)
	02 (04/06/08/10/12/14.....)	Metric only (PED IV)
	51 (53/55/57/59/61/63....)	Inch or unified Inch & Metric (without PED IV)
	52 (54/56/58/60/62/64....)	Metric only (without PED IV)

Features and benefits

- Two independent SPDT contacts in dual models: independent LP/HP alarm
- Reliable design of pressure inlet joint – bellows
- Fast response and reliable contacts
- Extensive factory tests/TÜV approval according to EN 12263
- Manual toggle for system checkout and override

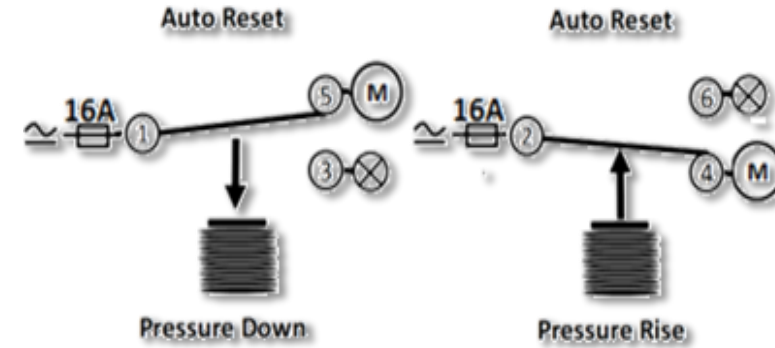
Multiple connection mode



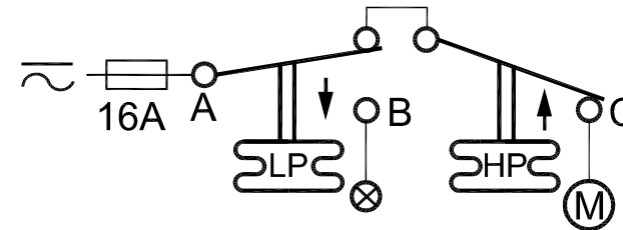
Multiple connection mode:

- Convenient for customers to connect according to different needs
- easy identification of LP or HP alarm

SANHUA



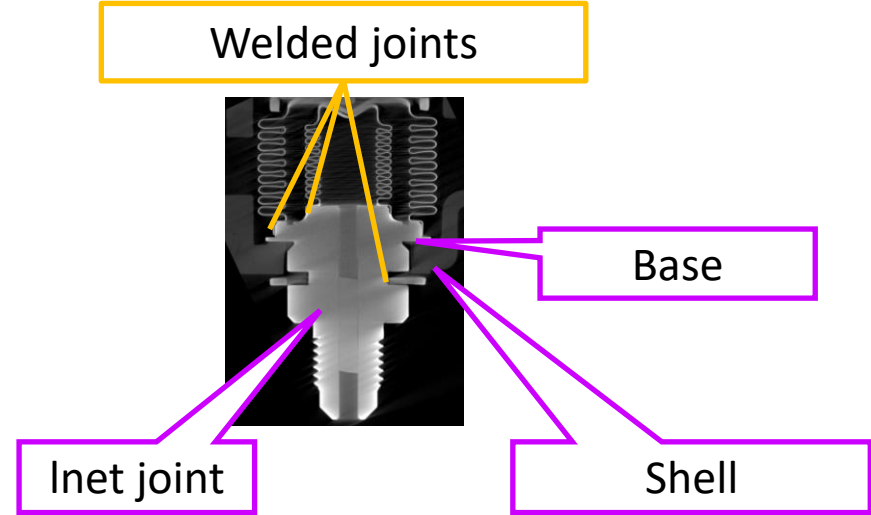
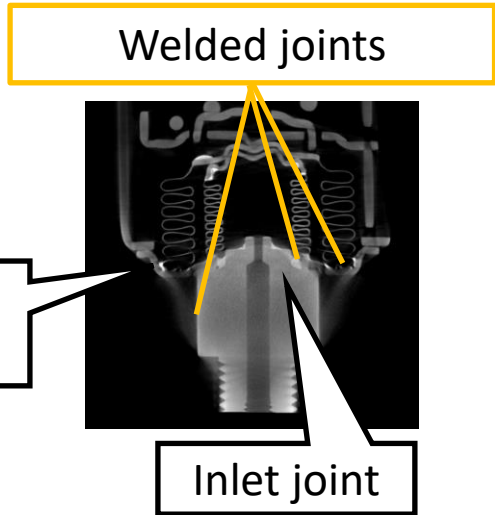
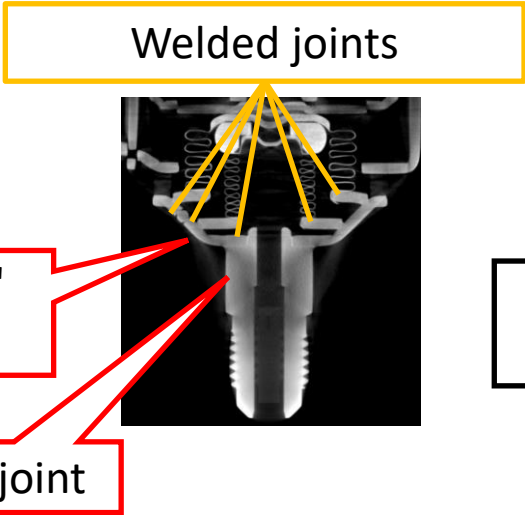
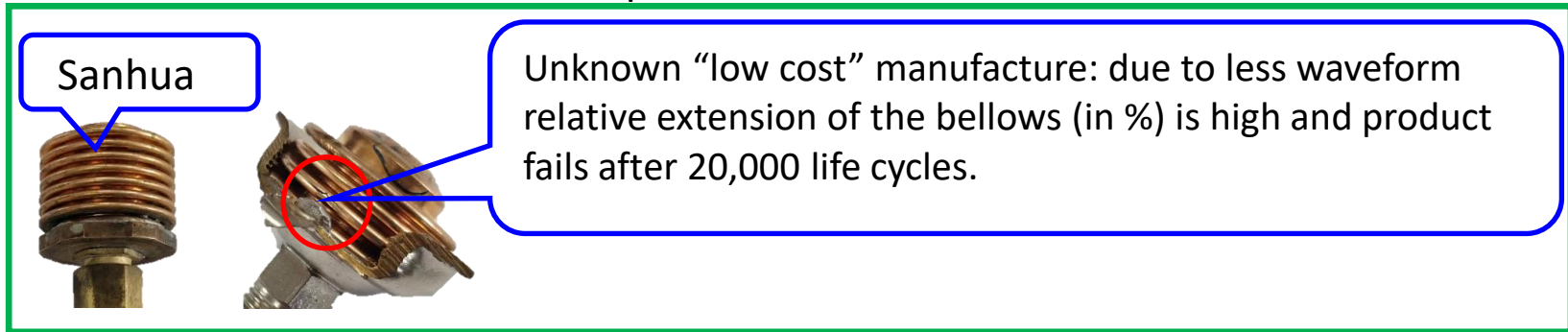
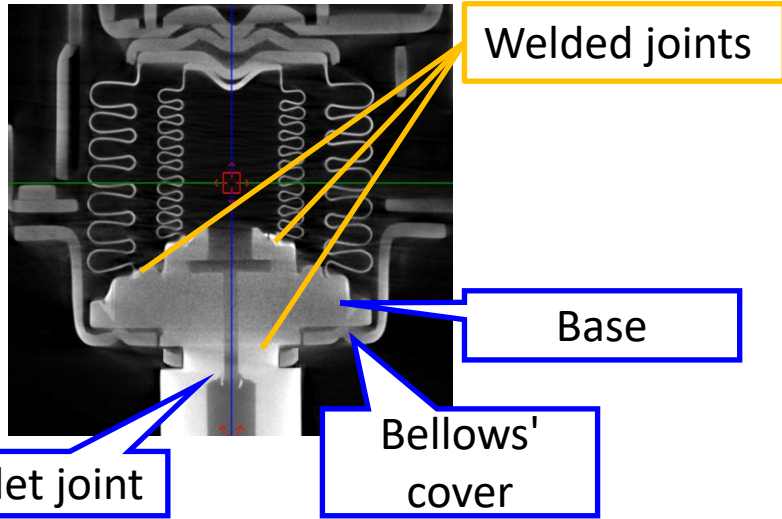
Competitor



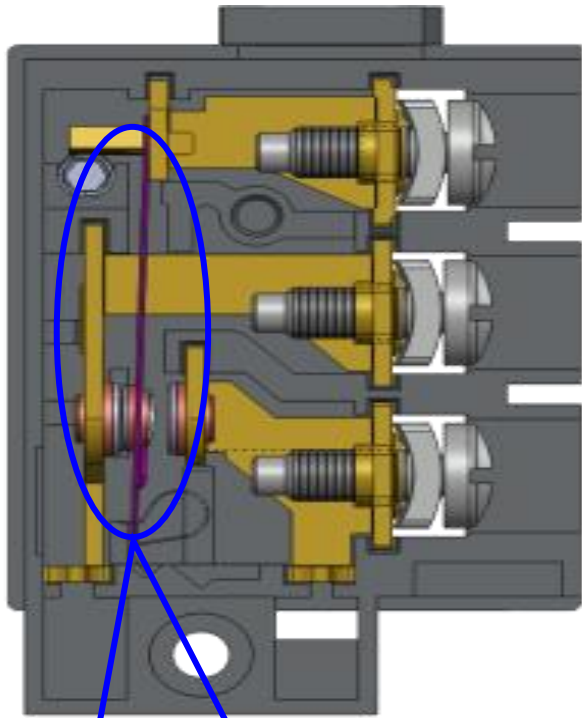
Bellows' design

1. Reliable design:

- Base - connecting all elements
- Limited welding – less risk of defects
- Bellows cover for additional protection



Switch elements



SANHUA:

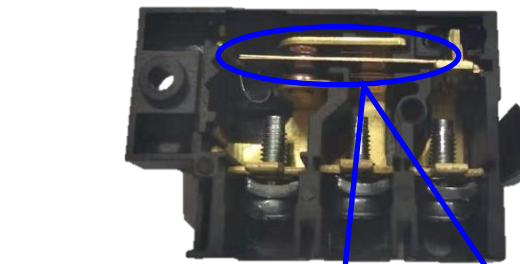
Double reed design, shorter travel, close to the control point of the jump, react sensitively

1. Switch elements:

- Double reed design – high reliability and tolerance
- Shorter travel – fast contact, low risk of spark
- Close to the control point of the jump – high tolerance

2. Key materials:

The reed is made of alloy material: high strength, high elasticity, fatigue resistance, high conductivity, non-magnetic, corrosion resistance, low spark when hit



SANHUA:
Double reed design



Others:
Single reed design

Extensive factory tests

Mechanical lifetime test

Load: no load

Pressure up to :31 bar (reference value 32 bar-1 bar); (EN12263 19 bar: 20 bar – 1 bar) ;

Pressure release to: 27 bar (intake - 4 bar); (EN12263 15 bar: 19 bar – 4 bar);

Frequency: 1000 times / hour

Number of times: 100,000 times; (EN12263 50 000 pressure cycles)

Electrical lifetime test:

Load: AC1 rated voltage 400V, rated current 16A; (EN12263 230 V);

Pressure up to : 3.5MPa (reference value +10%); (EN12263 22 bar: 20 bar + 10%);

Pressure release to : 1.5MPa (reference value -10%); (EN12263 14 bar: 16 bar - 10%)

Frequency: 8 times / minute

Number of times: 10,000 times (EN12263 5000 cut-off cycles)

Helium leakage test (100%):

at MWP (35/16,5 bar) $< 1 \times 10^{-6}$ mbar*L/s (1×10^{-7} Pa·m³/s)

TÜV approval according to EN 12263 (selected models)

Manual toggles for system checkout and override

A front access manual toggles are provided for checking out control operation. On low pressure controls this toggle may be used to override the low-pressure signal during system evacuation



Fail-safe bellows function (double bellows)

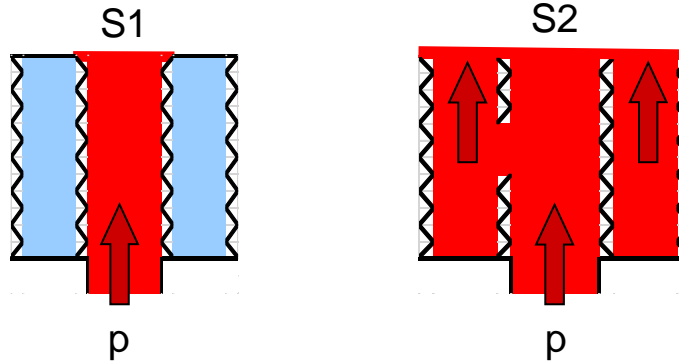
Inner bellows damaged:

$$F1 = S1 \times p$$

$$F2 = S2 \times p$$

$$S2 > S1$$

$$F2 > F1$$



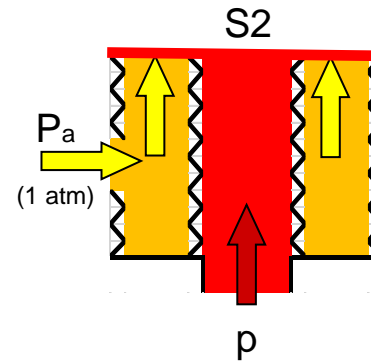
Outer bellows damaged:

$$F1 = S1 \times p$$

$$F2 = S1 \times p + (S2 - S1) \times p_a$$

$$P_a \approx 1 \text{ bar}$$

$$F2 > F1$$



A **rupture in the inner bellows** will cause the control cut-out pressure to fall about **3 times less** the set value and the compressor will stop. A **rupture in the outer bellows** will cause the control cut-out pressure to fall to about **3 bar under** the set value and providing the so-called 'fail-safe' function.

Production and performance



Use fully automatic equipment to calibrate the set pressure value

A High-precision proportional control valve:

Ensure that the preset pressure value of each product is the same;

B PLC program control:

Ensure that the inlet speed of each product is the same at the preset point, eliminating the impact caused by sudden shocks;

C Fully automatic calibration:

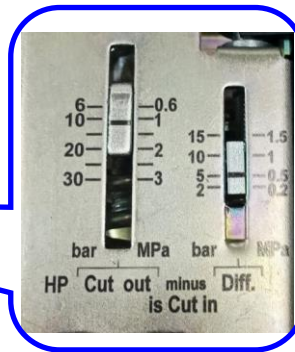
Eliminate differences caused by operators;

D Automatic alarm record:

Each product has a corresponding test record;

E EX-FACTORY INSPECTIONS:

Product re-inspection to ensure that the delivered products meet the drawing requirements



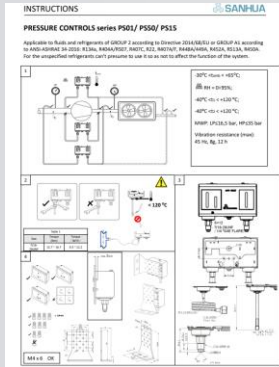
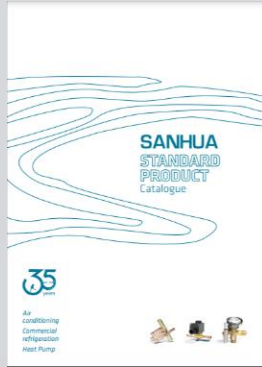
Laser scale marking:

- excellent visibility during long period of time
- accurate reading
- good product consistency

Practical recommendations

- Values on the scales are indicative only. For accurate settings a pressure gauge must be used
- Do not adjust pointers outside the highest or lowest indicator marks on the scale plate as it may cause malfunction or even damages
- After adjusting pressure settings run the controlled equipment at least few cycles at normal operating conditions
- Setting of too small differential causes hunting
- Setting of very wide differential -> longer life of the contacts due to less switches over cycles

SANHUA supporting tools



Competitor
Danfoss
Danfoss
Danfoss
Danfoss
Danfoss
Danfoss
Danfoss
Danfoss
Danfoss
Danfoss
Danfoss
Danfoss
Danfoss
Danfoss
Danfoss
Danfoss

Sort by Color >

Sheet View >

Clear Filter From "(Column A)"

Filter by Color >

Text Filters >

Search

- (Select All)
- Alco
- Danfoss
- Eliwell
- JC
- Ranco
- Saginomiya

Contact	PED (Y/N)	Model	U11
SPDT	Y	PS01AL-S01	10660003102
SPDT	Y	PS01AH-S01	10660003702
SPDT	Y	PS01AH-S02	10660005302
SPDT	Y	PS01AL-S01	10660003102
SPDT	Y	PS01ML-S01	10660003202
SPDT	Y	PS01MH-S01	10660003802
SPDT	Y	PS01MH-S02	10660005202
SPDT	Y	PS01AL-S01	10660003102
SPDT	Y	PS01AH-S02	10660005302
SPDT	N	PS50AL-S51	10660002702
SPDT	N	PS50AH-S51	10660003902
SPDT	N	PS50AH-S52	10660005102

Results EU

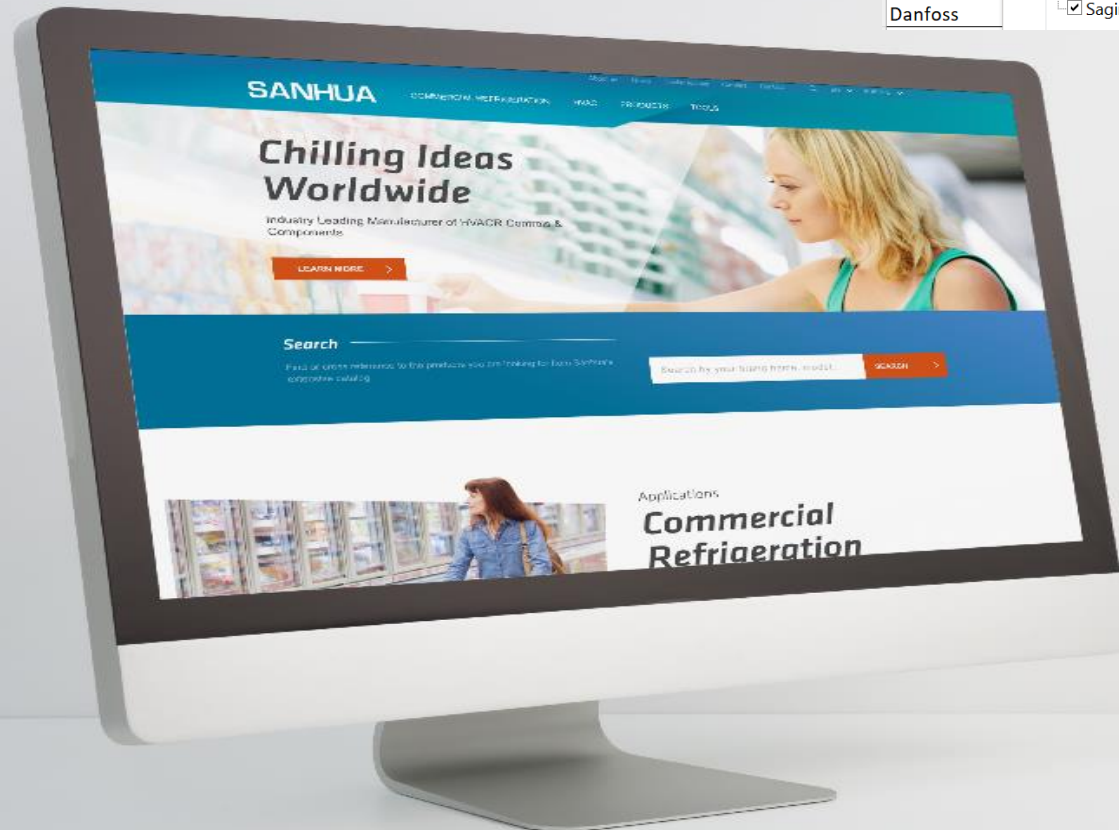
Kp15

Competitor Model / Code	Competitor
KP 15 / 060-124166	Danfoss
Sanhua Model	Sanhua Part No.
PS15AAL-S51	10660002802

Competitor Model / Code	Competitor
KP 15 / 060-125466	Danfoss
Sanhua Model	Sanhua Part No.
PS15AAH-S51	10660004502

Competitor Model / Code	Competitor
KP 15 / 060-124366	Danfoss
Sanhua Model	Sanhua Part No.

Search Find Dealer Contact



- Product Catalogue/Datasheet
- Installation Instruction
- Product presentation
- Competitor cross – reference selection
- Mobile (IOS/Android) cross-reference tool