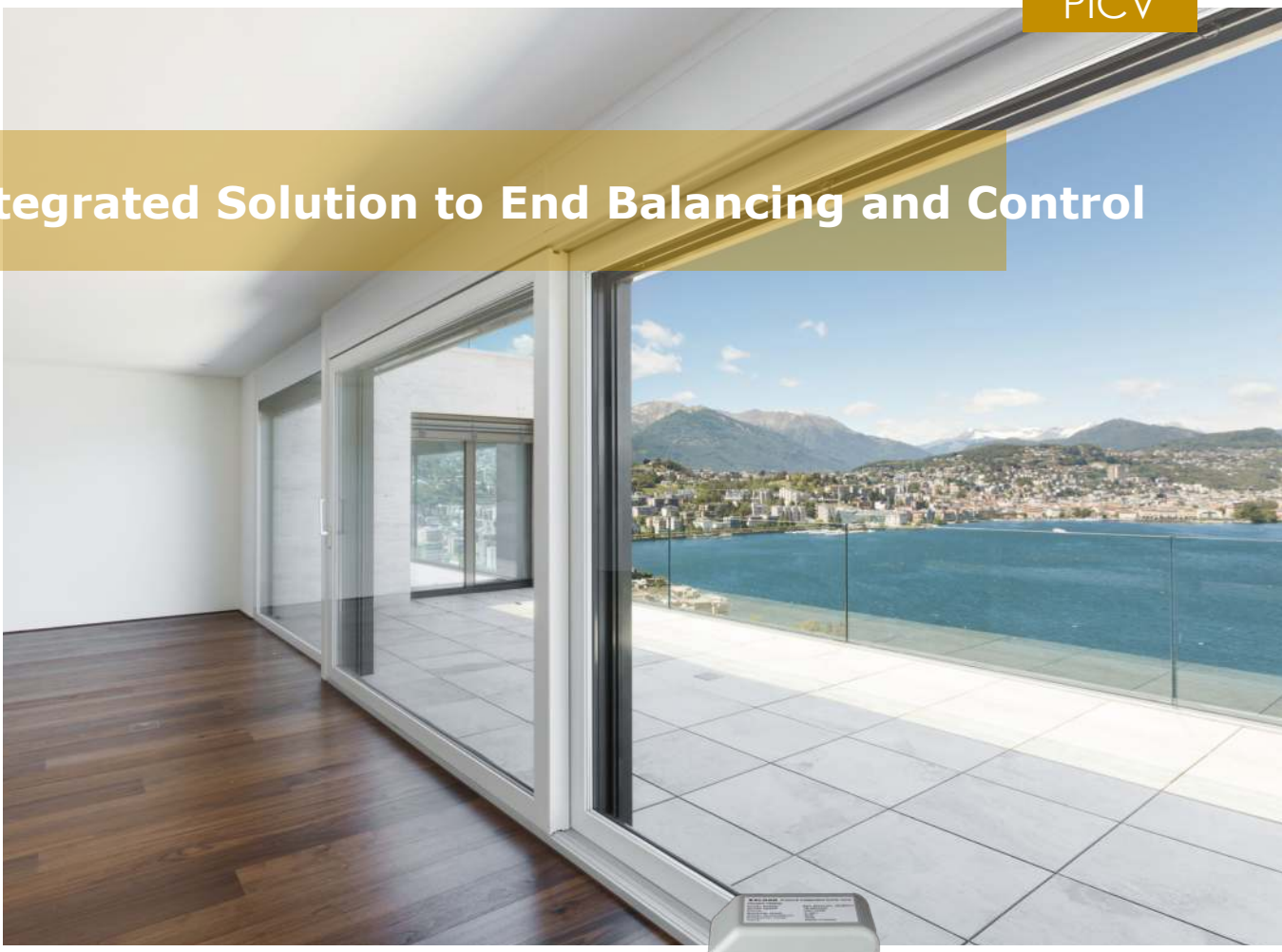
Pressure Independent Control Valves

PICV

An Integrated Solution to End Balancing and Control



Global Flow Control Combination

TALOAR®

TALOAR INC
FLUID SYSTEMS, 2023

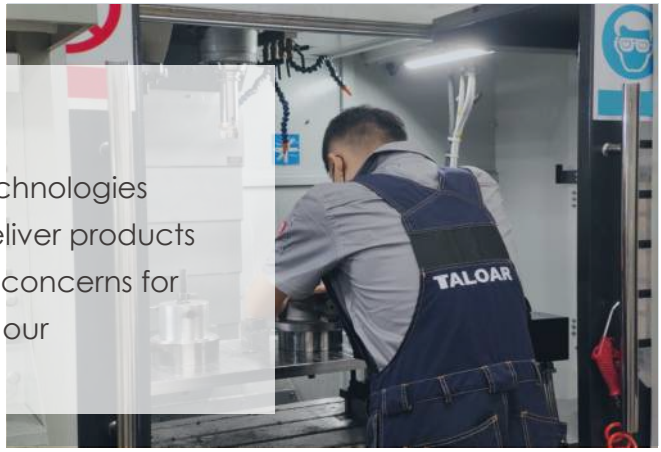
Ideal Automatic Hydraulic Balance Solution

TALOAR Global Flow Control Combination

TALOAR INC serves as a world-leading supplier of flow control products and services, providing a series of diversified fluid control products that are dedicated to commercial, water-related and industrial applications. Our product lines cover universal manual valves, fire protection valves, water control valves, balance valves and electric control valves including industrial ball valves, butterfly valves and gauge valves. Part of the products already obtained the world's most authoritative UL, FM and API certificates. TALOAR currently offers more than 12,000 items manual operated, automatic operated, under high temperature, low temperature or severe conditions, TALOAR performs its superb product quality to ensure your running system is safe and sound.

IN PRODUCTION

As usual TALOAR incorporates the latest mechanical technologies and advanced automation systems to produce and deliver products that can maintain excellent quality. TALOAR cares and concerns for our users which is not a slogan, but has permeated into our management decisions and actions.



PICVS

Concept of Pressure Independent Control Valves

In HVAC systems

The hydraulic balance of the water circulation system for energy distribution is of great importance. In general the full hydraulic balance of an ever changing pipe end instrument system can be achieved via pressure independent balancing and control function to regulate temperature in the targeted area. This system enables pressure balancing automatically, thus two or more devices work independently with the same system, would not cause any interference to each other. Therefore, it is more efficient and energy-saving. TALOAR's pressure-independent hydraulic balance technology can solve all hydraulic balance problems, cutting energy consumption, and enhancing warming comfort of the air-conditioning systems. TALOAR has provided a number of solutions to numerous projects, gaining a lot of project experience.

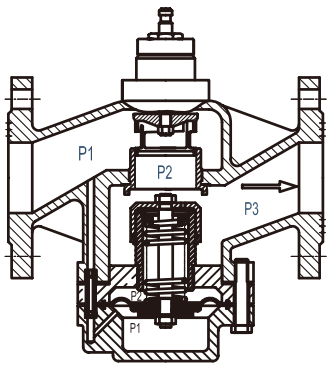
Valve authority is an important parameter influencing the actual flow of the regulating valve as it is closely related to deviation between the actual and ideal flow characteristic curves of the regulating valve. After initial setting, the pressure independent balancing and control valve will adapt itself to the changes in the hydraulic system, to achieve pressure-independent hydraulic balance. The valve either works locally, or is connected to DDC in the building. It works to regulate flow proportionally in real time. PICBV automatically keeps flow constant regardless system pressure fluctuation within the working pressure differential range. Thereby actualizing both electric control and pressure-independent balancing simultaneously. TALOAR's pressure independent balancing and control valves are applicable to variable flow systems with huge loading and changes. They are not easy to be interfered, stable working condition, and high regulating precision.

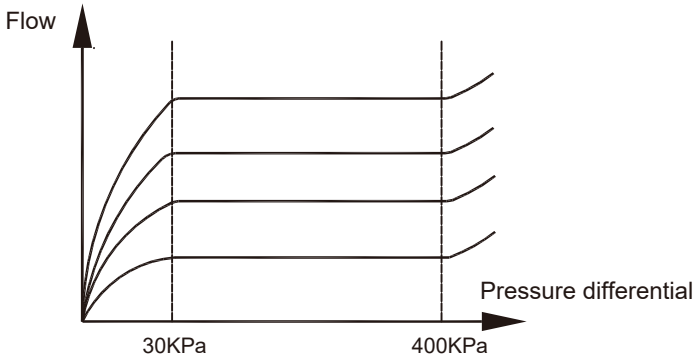
Operating Principle of Pressure Independent Control Valves

F535E series pressure independent balancing control valves are hydraulic balancing and control products integrating pressure-independent balancing and electric control. Its inner structure is totally different from the regular electric regulating valve. As shown below, in the flow system with excessively fluctuating load, pressure differential (P1-P3) between both ends of the pressure independent balancing and control valve changes along with pressure change of the system.

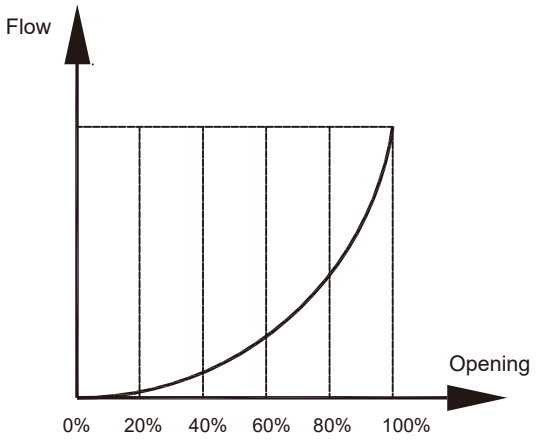
1) When the inlet pressure P1 increases, both P1 and P2 build up. In this case, the diaphragm drives the valve disc to push upward, narrowing the opening between P2 and P3. When P2 increases, both P1 and P2 remain unchanged. When inlet pressure P1 decreases, both P1 and P2 drop accordingly. In this case, the diaphragm drives the valve disc to push downward, expanding the opening between P2 and P3. When P2 decreases, both P1 and P1 remain unchanged. Similarly, when P3 changes, both P1 and P2 remain unchanged. Whatever the pressure changes within the system, P1 and P2 keeps constant due to regulation by the valve disc. Such unchanged pressure differential contributes to constant medium flow.

2) When the electric actuator receives control signal, the valve shaft acts up and down, leaving the opening between P1 and P2 to change accordingly. Pressure differential between P1 and P2 remains unchanged regardless of change in system differential pressure P1 - P3. According to the flow formula, flow increases along with increase in valve opening if differential pressure remains unchanged. Therefore, the same water flow is delivered under any valve opening. As the valve authority of the electric regulating valve is 1, the actual and ideal flow characteristic curves are consistent. F535E series pressure independent balancing and control valves perform better regulation than regular electric regulating valves.





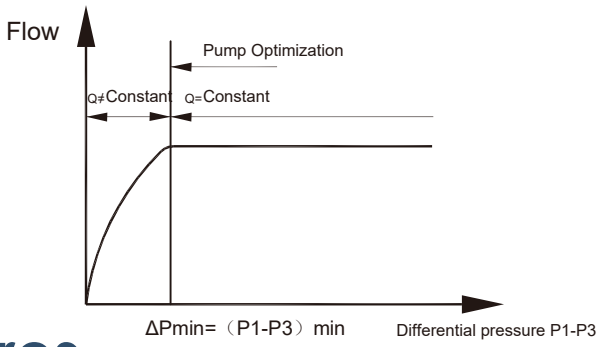
Pressure independent balancing and control valve
Flow (opening) – pressure differential curve



Pressure independent balancing and control valve
Flow characteristic curve

Optimal Selection of Pumps

As shown in the diagram: if differential pressure between P1 and P3 exceeds the given value, the pressure differential controller of the valve disc starts working to limit the flow. Pressure differential between P1 and P3 is measured to verify whether differential pressure is within the normal control range and checking the flow at the same time. Moreover, such measurement aims to optimize pump setting by gradually reducing the pump head set to ensure pressure differential (P1-P3) of the most unfavorable branch (such as the farthest branch) is not higher than ΔPmin. When proportional relation between pump head and pressure differential measured does not exist any longer, it indicates the best head is achieved.



Product Features

- Precision, pressure-independent flow limit, preventing overflow under partial load, ensuring end temperature control accuracy.
- Stable temperature control within full load range, same applies under small load condition.
- Whenever there is change in pressure within the system, the built-in pressure differential controller will automatically rectify the problem, stabilizing the indoor temperature, thus reduce operating time of the valve actuator, longer service life.
- The diaphragm prevents valve from easy blockage.
- Precise limit flow under any load condition, avoiding frequent over energy consumption when using static balance valves in the variable flow systems.
- Have pressure-independent balancing and electric control functions, save purchasing and installation costs.
- Valve authority: 1. Comparatively the valve has lower requirement for pump head, with minimum energy consumption.
- Automatic flow limit, professional commissioning is not required, cutting cost accordingly.
- No additional cost for flow change design.
- Divide the whole system into multiple independent control loops.

Technical Parameters

In		¾″	1″	1 ¼″	1 ½″	2″	2 ½″	3″	4″	5″	6″	8″
Flow Range m^3/h	Q_{min}(20%)	0.25	0.3	0.6	1.5	2.0	4.0	6.4	8.4	19	30	45
	Q_{min}(30%)	-	-	-	-	-	-	-	-	22.5	31.5	45
	Q_{max}(100%)	1.1	1.5	3.1	7.5	10	24	34	48	75	120	175
Flow Coefficient **Kvs**			10	13	21	35	63	100	140	200	280	480
Pressure Differential Range **Kpa**		30-400										
Working Pressure		PN16 / PN25										
Valve Characteristic Curve		Equal Percent										
Leak Level		＜0.05%										
Medium		Water or Ethylene Glycol Mixture										
Medium Temperature °C		-10℃ ～ 110℃										
Stroke **mm**		2.5	5	6	10	15	18	20	25			
Guide Piping type		Built-in pressure tapping pipe										
Regulating Valve Element Opening Direction		Valve closed when the valve shaft faces downward										

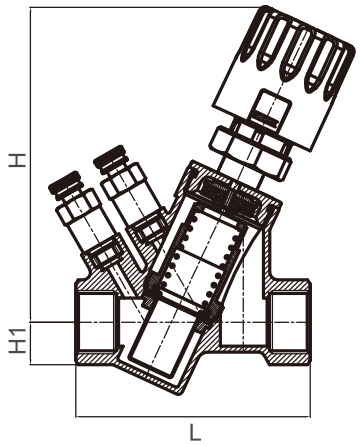
Two-Way Pressure-Independent Balance Valves

ER170 two-way pressure-independent balance valve integrates electric on/off control and pressure-independent balancing. The valve is mainly used for on/off control of cold and hot water in fan coils at the end of the HVAC system and for pressure-independent balancing. In case of pressure fluctuation within the system, it works to keep flow unchanged while the valve is power on, especially in the variable flow system with excessively fluctuating load. It features strong immunity against interference, brings optimal temperature with the best indoor comfort effect.

ER170

Product Features

- **Forged brass shell.**
- **Auto constant flow, field commissioning not required.**
- **Accurately designed orifice, flow error within ±5%.**
- **Stainless steel spring, longer service life.**
- **Replaceable cartridge, easy to disassemble.**
- **Compression fitting between the actuator and valve body for easy connection.**
- **Thread standard: BSPT and NPT.**
- **Plug-in flow measuring point, allowing quick connection.**



Technical Parameters

Supply Voltage: 230 VAC, 24 VAC ±10% 50 Hz
Power: < 3VA
Stroke: 3 mm
Working Pressure: 2.5 Mpa
Medium: Water
Medium Temperature: 5°C~90°C (40°F~194°F)
Ambient Temperature: 0°C~60°C (32°F~140°F)
Action Time: 3 min
On/off Display: Displayed
Ingress Protection: IP40

Material Specifications

Body: Brass
Cartridge: Stainless steel
Spring: Stainless steel
Seal: EPDM
Shell: ABS plastic
Measuring Port: Brass

Flow Parameters

Model	In	Structure	Flow Range m³/h	Pressure Differential Range Kpa
ER170	1/2″	Two-way	0.45-1.76	25-250
ER170	3/4″	Two-way	0.45-1.76	25-250
ER170	1″	Two-way	0.45-1.76	25-250

Dimensions

Model	L	H	H1	Weight Kg
ER170	96	132	16	0.67
ER170	98	132	18	0.71
ER170	108	132	22	0.77

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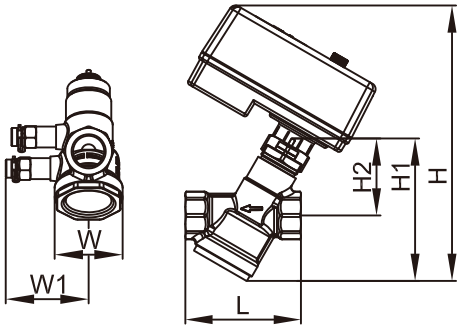
Pressure Independent Control Valves

TB300 allows presetting at the maximum flow, pressure-independent balancing and electric control. Flow control is only related to the opening of the electric actuator, regardless of system pressure differential fluctuation. TB300 valve authority reaches 100%. The actual and ideal flow characteristic curves keep consistent provides precise and fast control, reduces actuator operating frequency, bringing stable energy saving effect.

TB300

Product Features

- **Pressure-independent product.**
- **100% valve authority, minimizing energy consumption.**
- **Realizing equal percentage and linear characteristic curve.**
- **Flow presetting, pressure-independent balancing and electric control: three in one function.**
- **Free maximum flow setting, for more accurate control.**
- **No need to change the fixed stroke of the valve disc while setting flow manually.**
- **Flow control is related to the opening of the actuator, regardless of pressure differential fluctuation.**
- **Allowing multiple power supply input signal options.**
- **Plug-in flow measuring point, allowing quick connection.**



Technical Parameters

Supply Voltage: 24 VAC, 230 VAC, 0~10 V, 4~20 mA
Stroke: 2.5 mm~6 mm
Power: < 4 VA
Pressure Differential Range: 25 Kpa~400 Kpa
Working Pressure: 2.5 Mpa
Medium: Water
Medium Temperature: -10°C~110°C (-38°F~230°F)
Dimensions: ½″ ~ 1¼″
Ingress Protection: IP43
Thread Standard: BSPT or NPT

Material Specifications

Body: Forged brass
Stem: Stainless steel
Diaphragm: EPDM
Seat: Brass or stainless steel
Spring: Stainless steel
Seal: EPDM
Shell: ABS plastic
Measuring Port: Brass

Flow Parameters

Model	In	Stroke mm	Flow Range m^3/h	Pressure Differential Range Kpa
TB300	1/2″	2.5	0.15-0.6	25-400
TB300	3/4″	2.5	0.25-1.1	30-400
TB300	1″	5	0.3-1.5	30-400
TB300	1 1/4″	6	0.6-3.1	30-400

Dimensions

Model	L mm	H mm	H1 mm	H2 mm	W mm	W1 mm	Weight Kg
TB300	75	199	101	52	45	57	0.65
TB300	85	203	105	57	48	59	0.75
TB300	90	212	114	62	48	59	0.90
TB300	115	236	138	75	59	65	1.20

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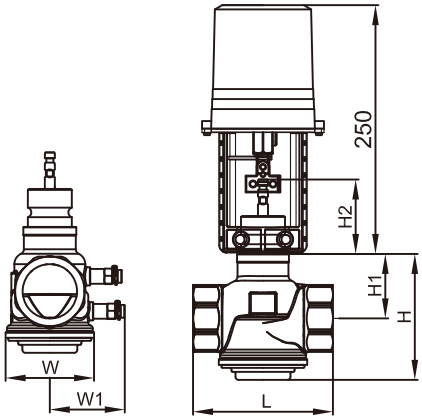
Pressure Independent Control Valves

TS500 allows presetting at the maximum flow, pressure-independent balancing and electric control. Flow control is only related to the opening of the electric actuator, regardless of system pressure differential fluctuation. TS500 valve authority reaches 100%. The actual and ideal flow characteristic curves keep consistent provides precise and fast control, reduces actuator operating frequency, bringing stable energy saving effect.

TS500

Product Features

- **Pressure-independent product.**
- **100% valve authority, minimizing energy consumption.**
- **Realizing equal percentage and linear characteristic curve.**
- **Flow presetting, pressure-independent balancing and electric control: three in one function.**
- **Pressure-independent balancing and electric control: two in one function.**
- **Maximum flow setting as desired, more accurate control.**
- **No need to change the fixed stroke of the valve disc while setting the flow manually.**
- **Lockable flow setting.**
- **Flow control is related to the opening of the actuator, regardless of pressure differential fluctuation.**
- **Allowing multiple power supply input signal options.**
- **Plug-in flow measuring point, allowing quick connection.**



Technical Parameters

Supply Voltage: 24 VAC, 230 VAC, 0~10 V, 4~20 mA
Stroke: 10 mm~15 mm
Power: < 5.5 VA
Pressure Differential Range: 30Kpa~400 Kpa
Working Pressure: 2.5 Mpa
Medium: Water
Medium Temperature: -10°C~110°C (-38°F~230°F)
Dimensions: 1½″ ~ 2″
Ingress Protection: IP54
Thread Standard: BSPT or NPT

Material Specifications

Body: Stainless steel
Stem: Stainless steel
Diaphragm: EPDM
Seat: Stainless steel
Spring: Stainless steel
Seal: EPDM
Shell: ABS plastic
Measuring Port: Brass

Flow Parameters

Model	In	Stroke mm	Flow Range m^3/h	Pressure Differential Range Kpa
TS500	1 1/2″	10	1.5-7.5	30-400
TS500	2″	15	2.0-10	30-400

Dimensions

Model	L mm	H mm	H1 mm	H2 mm	W mm	W1 mm	Weight Kg
TS500	140	121	60	75	89	121	2.7
TS500	140	126	65	75	89	121	3.0

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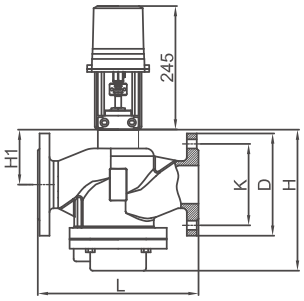
Pressure Independent Control Valves

F535E allows maximum flow presetting, pressure-independent balancing and electric control. The valve is pressure-independent with the built-in piping for easier installation and maintenance. Flow control is only related to the opening of the electric actuator, regardless of system pressure differential fluctuation. F535E valve authority is 100%. The actual and ideal flow characteristic curves is consistent. This helps precise and fast control, reduces operating frequency of the actuator. It gives the pump its optimal flow option, the system is now able to run under minimum flow with the lowest pressure differential, achieving stable, efficient and energy saving effect.

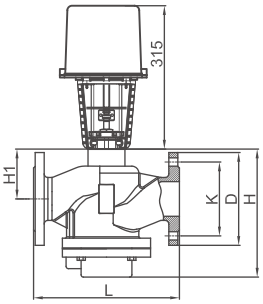
F535E

Product Features

- **Pressure-independent product.**
- **100% valve authority, minimizing energy consumption.**
- **Achieving equal percentage and linear characteristic curve.**
- **Flow presetting, pressure-independent balancing and electric control: three in one function.**
- **Pressure-independent balancing and electric control: two in one function.**
- **Maximum flow setting as wished, more accurate control.**
- **No need to change the fixed stroke of the valve disc while setting the flow manually.**
- **Lockable flow setting.**
- **Flow control is related to the opening of the actuator, regardless of pressure differential fluctuation.**
- **Allowing multiple power supply input signal options.**
- **Plug-in flow measuring point, allowing quick connection.**



2½″ ~ 3″



4″ ~ 8″

Technical Parameters

Supply Voltage: 24 VAC, 230 VAC, 0~10 V, 4~20 mA

Stroke: 18 mm~25 mm

Power: 6VA-18VA

Pressure Differential Range: 30Kpa~400 Kpa

Working Pressure: 1.6 Mpa/2.5 Mpa

Medium: Water or ethylene glycol mixture

Medium Temperature: -10°C~110°C (-38°F~230°F)

Dimensions: 2½″ ~ 8″

Ingress Protection: IP54

Thread Standard: ANSI or BSEN flange

Material Specifications

Body: Ductile iron

Stem: Stainless steel

Diaphragm: EPDM

Seat: Brass or stainless steel

Spring: Stainless steel

Seal: EPDM

Shell: ABS plastic

Measuring Port: Brass

Flow Parameters

Model	In	Stroke mm	Flow Range m^3/h	Pressure Differential Range Kpa
F535E	2½″	18	4.0-24	30-400
F535E	3″	18	6.4-34	30-400
F535E	4″	20	8.4-48	30-400
F535E	5″	25	19-75	30-400
F535E	6″	25	30-120	30-400
F535E	8″	25	45-175	30-400

Dimensions

Model	L mm	H mm	H1 mm	D mm	K mm	Weight Kg
F535E	290	248	90	185	145	25
F535E	310	252	101	200	160	32
F535E	350	296	111	235	190	43
F535E	400	339	127	270	220	65
F535E	480	370	141	300	250	83
F535E	495	448	145	360	310	115

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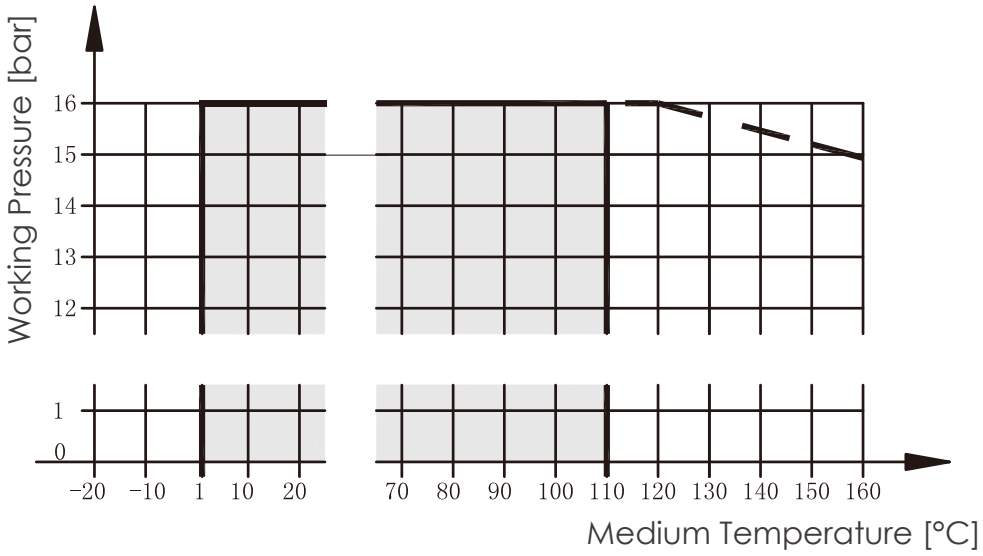
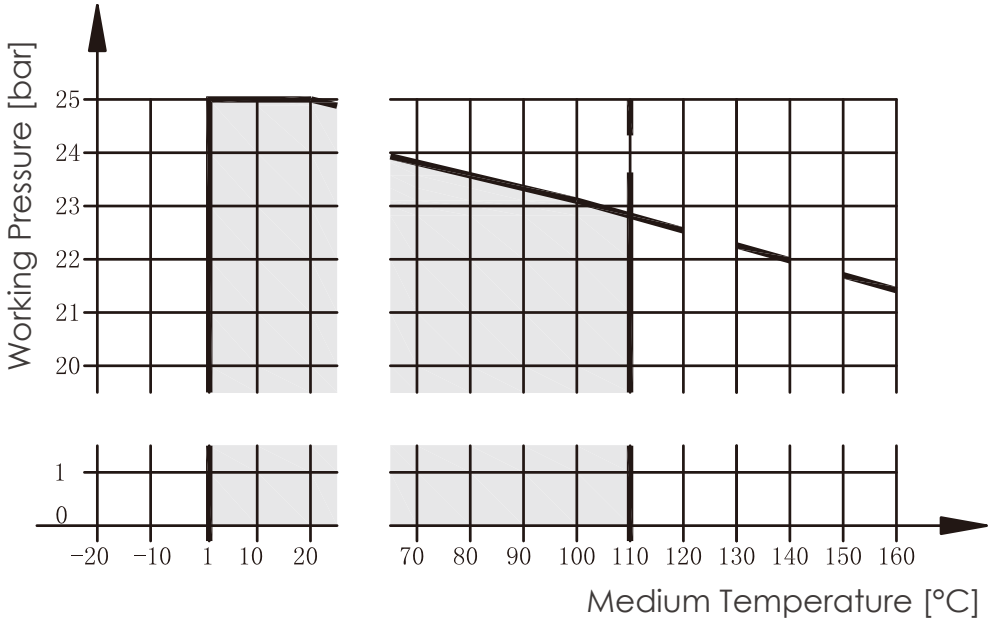
Pressure & Temperature Performance Curve



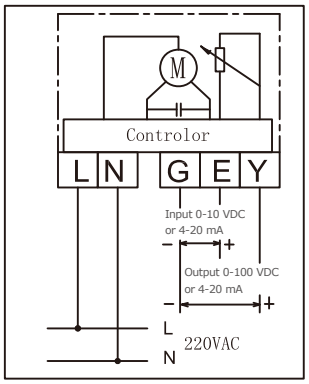
* The curve above is applicable to FIG. F535E under PN16 working pressure.



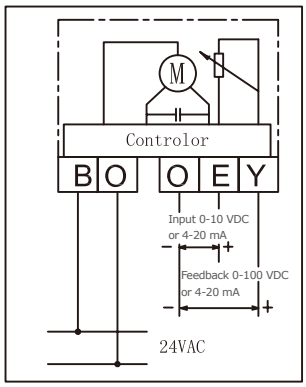
* The curve above is applicable to FIG. TS500 under PN25 working pressure.

Actuator Parameters

Item	Performance Parameter	
Figure Number	TB300/TS500/F535E	
Power Supply	AC24VAC / 220VAC ±10%, 50Hz/60Hz	
Motor	AC synchronous motor	
Acting Force	1/2"~1 1/4": 120N 1 1/2"~2": 1000N 2 1/2": 1500N 3": 1500 N under 3.1 bar shut-off differential pressure 3000 N under 4.0 bar shut-off differential pressure 4"~6": 3000 N 8": 3000 N under 2.4 bar shut-off differential pressure 6500 N under 4.0 bar shut-off differential pressure	
Power Consumption	Power: 6-18 VA	
Running Speed	1″ ~2": 0.20mm/s（1000N） 2 1/2″ ~3": 0.25mm/s（1500N） 4″ ~8": 0.32mm/s（3000N）	
Control Signal	Increment/floating point signal	0~10 VDC or 4~20 mA
Working Temperature	-10℃~50℃（50°F~120°F）	
Humidity	10%~90%RH no dew	
Maximum Stroke	120N：8mm 1000N：22mm 1500N：22mm 3000N：52mm 6500N：60mm 10000N：100mm	
Actuator Weight	1000N：1.2kg 1500N：1.5kg 3000N：3.5kg	
Materials of Main Components	ABS flame retardant plastic shell, die-cast aluminum support	
Waterproof Grade	IP54	
Valve Opening Set Before Delivery	Middle position	
Manual Function	Available	
Valve Opening Indicator	Available	
Insulation Impedance	Between power supply terminal and shell: ≥ 50 MΩ; Between input terminal and shell: ≥ 20 MΩ	
Dielectric Strength	Between power supply terminal and shell: AC 24 V mechanism: 500 V 50 Hz AC 220 V mechanism: 1,500 V 50 Hz Between input terminal and shell: 500 V 50 Hz	



AC 220 V analog control wiring diagram



AC 24 V analog control wiring diagram

TALOAR®

Our Business

Fire Protection

Resilient Wedge Gate Valve
Indicator Post
Butterfly Valve
Fire Hydrant
UL/FM

Oil Refining

Gate Valve
Globe Valve
Trunnion Ball Valve
High Performance Butterfly Valve
Plug Valve
API 609 API 6D

Shipping

Bronze Valve
Butterfly Valve
Gate Valve
Ball Valve
Check Valve

Power Plant

Metal Seal Ball Valve
Gate Valve
Globe Valve
Needle Valve
CS, FS, SS

HVAC Systems

Hydraulic Balancing Valve
Differential Pressure Valve
Motorized Valve
Temperature Control
Bronze Valve & Iron Valve

Water Treatment

Flanged Butterfly Valve
Knife Gate Valve
Check Valve

Chemical

Bellows Globe Valve
Angle Valve
Metal Seal Ball Valve
High Performance Butterfly Valve

Irrigation

Solenoid Control Valve
Pressure Reducing Valve
Pressure Relief Valve
Diaphragm Valve
Butterfly Valve
Gate Valve

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